INFORMATION SHEET

PRESIDING: Commissioner ToNola D. Brown-Bland; Chair Charlotte A. Mitchell, Commissioner Daniel G. Clodfelter, Commissioner Kimberly W. Duffley, Commissioner Jeffrey A. Hughes, Commissioner Floyd B. McKissick, Jr., Commissioner Karen M. Kemerait
PLACE: Dobbs Building, Raleigh, NC
DATE: Tuesday, June 7, 2022
TIME: 12:11 – 2:05 p.m.
DOCKET NO. E-7, Sub 1265
COMPANY: Duke Energy Carolinas
DESCRIPTION: In the Matter of Application of Duke Energy Carolinas, LLC, for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. 62-133.9 and Commission Rule R8-69

VOLUME NUMBER:

APPEARANCES
See Attached

WITNESSES
See Attached

EXHIBITS
See Attached

CONFIDENTIAL COPIES OF TRANSCRIPTS AND EXHIBITS ORDERED BY:

REPORTED BY: Tonja Vines — TRANSCRIPT PAGES: 181
TRANSCRIBED BY: Tonja Vines — PREFILED PAGES: 100
DATE FILED: June 20, 2022 — TOTAL PAGES: 281

PLACE: Dobbs Building, Raleigh, North Carolina

DATE: Tuesday, June 7, 2022

TIME: 12:11 p.m. - 2:05 p.m.

DOCKET NO: E-7, Sub 1265

BEFORE: Commissioner ToNola D. Brown-Bland, Presiding
Chair Charlotte A. Mitchell
Commissioner Daniel G. Clodfelter
Commissioner Kimberly W. Duffley
Commissioner Jeffrey A. Hughes
Commissioner Floyd B. McKissick, Jr.
Commissioner Karen M. Kemerait

IN THE MATTER OF:

Application of Duke Energy Carolinas, LLC, for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. § 62-133.9 and Commission Rule R8-69

A P P E A R A N C E S:

FOR DUKE ENERGY CAROLINAS, LLC:
Kendrick Fentress, Esq.
Associate General Counsel
Duke Energy Corporation
P.O. Box 1551
Raleigh, North Carolina 27602

Robert W. Kaylor, Esq.
Law Office of Robert W. Kaylor
353 E. Six Forks Road, Suite 260
Raleigh, North Carolina 27609

FOR CAROLINA UTILITY CUSTOMERS ASSOCIATION, INC.:
Craig Schauer, Esq.
Brooks Pierce
150 Fayetteville Street, Suite 1700
Raleigh, North Carolina 27601

A P P E A R A N C E S Cont'd.:

FOR CAROLINA INDUSTRIAL GROUP FOR FAIR UTILITY RATES, III:
Christina Cress, Esq.
Bailey & Dixon, L.L.P.
Post Office Box 1351
Raleigh, North Carolina 27602-1351

FOR NORTH CAROLINA SUSTAINABLE ENERGY ASSOCIATION:
Peter H. Ledford, Esq.
Taylor Jones, Esq.
4600 Six Forks Road, Suite 300
Raleigh, North Carolina 27609

FOR THE NORTH CAROLINA JUSTICE CENTER,
NORTH CAROLINA HOUSING COALITION,
SOUTHERN ALLIANCE FOR CLEAN ENERGY:
David L. Neal, Esq.
601 W. Rosemary Street, Suite 220
Chapel Hill, North Carolina 27516

A P P E A R A N C E S Cont'd.:

FOR THE PUBLIC STAFF:

Lucy E. Edmondson, Esq.
Public Staff - North Carolina Utilities Commission
4326 Mail Service Center
Raleigh, North Carolina 27699-4300

T A B L E   O F   C O N T E N T S

E X A M I N A T I O N S

T A B L E   O F   C O N T E N T S

E X H I B I T S

NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP

DATE: 6/9/22 DOCKET NO.: E-7, Sub 1265

ATTORNEY NAME and TITLE: Kendrick Fentress

FIRM NAME: Duke Energy

ADDRESS:

CITY: Raleigh STATE: NC ZIP CODE: 27607

APPEARANCE ON BEHALF OF: Duke Energy Carolinas

APPLICANT: ✓ COMPLAINANT: ___ INTERVENOR: ___

PROTESTANT: ___ RESPONDENT: ___ DEFENDANT: ___

Non-confidential transcripts are located on the Commission's website. To view and/or print transcripts, go to https://www.ncuc.net/, hover over the Dockets tab and select Docket Search, enter the docket number and click search, select the highlighted docket number and select Documents for a list of all documents filed.

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☑ **Yes, I have signed the Confidentiality Agreement.**

Email: Kendrick.Fentress@duke-energy.com

SIGNATURE: Kendrick C. Fentress

(Required for distribution of CONFIDENTIAL transcript)

NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP

DATE: June 7, 2022 DOCKET NO.: E-7 Subs 1262, 1263, 1264, 1265

ATTORNEY NAME and TITLE: Robert W. Kaylor

FIRM NAME: Law Office of Robert W. Kaylor, P.A.

ADDRESS: 353 E. Six Forks Rd. Ste 260

CITY: Raleigh STATE: NC ZIP CODE: 27609

APPEARANCE ON BEHALF OF: Duke Energy Energy, LLC

APPLICANT: ✓ COMPLAINANT: ___ INTERVENOR: ___

PROTESTANT: ___ RESPONDENT: ___ DEFENDANT: ___

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OFFICIAL COPY

Jun 20 2022

NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP

DATE: 6/7/2022 DOCKET NO.: DEC Rider hearing

ATTORNEY NAME and TITLE: Christina Cress, Partner

FIRM NAME: Bailey & Dixon, LLP

ADDRESS: 434 Fayetteville St, Ste. 2500

CITY: Raleigh STATE: NC ZIP CODE: 27601

APPEARANCE ON BEHALF OF: CIGFUR III

APPLICANT: ___ COMPLAINANT: ___ INTERVENOR: X

PROTESTANT: ___ RESPONDENT: ___ DEFENDANT: ___

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Email: ccress@bdixon.com

SIGNATURE: [signature]

(Required for distribution of CONFIDENTIAL transcript)

NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP

DATE: 6/7/2022 DOCKET NO.: E-7, Sub 1262-1265

ATTORNEY NAME and TITLE: Craig Schauer

FIRM NAME: Brooks Pierce

ADDRESS: 150 Fayetteville, Suite 1700

CITY: Raleigh STATE: NC ZIP CODE: 27601

APPEARANCE ON BEHALF OF: Carolina Utility Customers Assoc.

APPLICANT: ___ COMPLAINANT: ___ INTERVENOR: X

PROTESTANT: ___ RESPONDENT: ___ DEFENDANT: ___

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To receive an electronic **CONFIDENTIAL** transcript, please complete the following:

☑ **Yes, I have signed the Confidentiality Agreement.**

Email: cschauer@brookspierce.com

SIGNATURE: [signature]

(Required for distribution of CONFIDENTIAL transcript)

NORTH CAROLINA UTILITIES COMMISSION

APPEARANCE SLIP

DATE: ~~May~~ June 7, 2022 **DOCKET NO.:** DEC Rider Hearings

ATTORNEY NAME and TITLE: Peter Ledford
General Counsel

FIRM NAME: NC Sustainable Energy Association

ADDRESS: 4800 Six Forks Road, Suite 300

CITY: Raleigh **STATE:** NC **ZIP CODE:** 27609

APPEARANCE ON BEHALF OF: NC Sustainable Energy Association

APPLICANT: ___ **COMPLAINANT:** ___ **INTERVENOR:** X

PROTESTANT: ___ **RESPONDENT:** ___ **DEFENDANT:** ___

Non-confidential transcripts are located on the Commission's website. To view and/or print transcripts, go to https://www.ncuc.net/, hover over the Dockets tab and select Docket Search, enter the docket number and click search, select the highlighted docket number and select Documents for a list of all documents filed.

To receive an electronic **CONFIDENTIAL** transcript, please complete the following:

☒ **Yes, I have signed the Confidentiality Agreement.**

Email: peter@energync.org

SIGNATURE: [signature]

(Required for distribution of CONFIDENTIAL transcript)

NORTH CAROLINA UTILITIES COMMISSION

APPEARANCE SLIP

DATE: ~~6/8~~ 6/7/22 DOCKET NO.: DEC Rider Hearings

ATTORNEY NAME and TITLE: Taylor Jones, Regulatory Counsel

FIRM NAME: NCSEA / North Carolina Sustainable Energy Association

ADDRESS: 4800 Six Forks Road Ste 300

CITY: Raleigh STATE: NC ZIP CODE: 27609

APPEARANCE ON BEHALF OF: NCSEA

APPLICANT: ___ COMPLAINANT: ___ INTERVENOR: ___

PROTESTANT: ___ RESPONDENT: ___ DEFENDANT: ___

Non-confidential transcripts are located on the Commission's website. To view and/or print transcripts, go to https://www.ncuc.net/, hover over the Dockets tab and select Docket Search, enter the docket number and click search, select the highlighted docket number and select Documents for a list of all documents filed.

To receive an electronic **CONFIDENTIAL** transcript, please complete the following:

☒ **Yes, I have signed the Confidentiality Agreement.**

Email: taylor@energync.org

SIGNATURE: ______________

(Required for distribution of CONFIDENTIAL transcript)

NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP

DATE: 6/7/2022 **DOCKET NO.:** E-7 Sub 1265

ATTORNEY NAME and TITLE: David L. Neal, Senior Attorney

FIRM NAME: Southern Environmental Law Center

ADDRESS: 601 W Rosemary St, Ste 220

CITY: Chapel Hill **STATE:** NC **ZIP CODE:** 27516

APPEARANCE ON BEHALF OF: North Carolina Justice Center, North Carolina Housing Coalition, Southern Alliance for Clean Energy

APPLICANT: ___ **COMPLAINANT:** ___ **INTERVENOR:** ✓

PROTESTANT: ___ **RESPONDENT:** ___ **DEFENDANT:** ___

Non-confidential transcripts are located on the Commission's website. To view and/or print transcripts, go to https://www.ncuc.net/, hover over the Dockets tab and select Docket Search, enter the docket number and click search, select the highlighted docket number and select Documents for a list of all documents filed.

To receive an electronic **CONFIDENTIAL** transcript, please complete the following:

☑ **Yes, I have signed the Confidentiality Agreement.**

Email: dneal@selcnc.org

SIGNATURE: [signature]

(Required for distribution of CONFIDENTIAL transcript)

NORTH CAROLINA UTILITIES COMMISSION
PUBLIC STAFF - APPEARANCE SLIP

DATE: June 7, 2022 DOCKET #: E-7, Sub 1265

PUBLIC STAFF ATTORNEY Lucy E. Edmondson

TO REQUEST A **CONFIDENTIAL** TRANSCRIPT, PLEASE PROVIDE YOUR EMAIL ADDRESS BELOW:

ACCOUNTING
CONSUMER SERVICES
COMMUNICATIONS
ENERGY
ECONOMICS
LEGAL lucy.edmondson@psncuc.nc.gov
TRANSPORTATION
WATER

Non-confidential transcripts are located on the Commission's website. To view and/or print, please access https://ncuc.net.

COUNSEL/MEMBER(s) REQUESTING A **CONFIDENTIAL** TRANSCRIPT WHO HAS SIGNED A CONFIDENTIALITY AGREEMENT WILL NEED TO SIGN BELOW.

/s/ Lucy E. Edmondson

/A

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-7, SUB 1265

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of Application of Duke Energy Carolinas, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C. Gen. Stat. § 62-133.9 and Commission Rule R8-69	))))))	**APPLICATION OF DUKE ENERGY CAROLINAS, LLC FOR APPROVAL OF RIDER 14**

Duke Energy Carolinas, LLC ("DEC," "Company," or "Applicant"), pursuant to North Carolina General Statutes ("N.C. Gen. Stat.") § 62-133.9 and North Carolina Utilities Commission (the "Commission") Rule R8-69, hereby applies to the Commission for approval of its demand-side management ("DSM") and energy efficiency ("EE") cost recovery rider, Rider EE, for 2023 ("Rider 14"). Rider 14 has been calculated in accordance with the Company's currently effective DSM/EE cost recovery mechanism approved by the Commission in Docket No. E-7, Sub 1032 and the prospective Mechanism approved in the Commission's *Order Approving Revisions to Demand-Side Management and Energy Efficiency Cost Recovery Mechanisms,* issued on October 20, 2020, in Docket Nos. E-2, Sub 931 and E-7, Sub 1032 ("*2020 Sub 1032 Order*"). The prospective components of Rider 14 include estimates of the revenue requirements for Vintage 2023[1] DSM and EE programs, as well as an estimate of the second year of net lost revenues for

[1] A vintage year is the twelve-month period in which a specific DSM or EE measure is installed for an individual participant or a group of participants. Each vintage is referred to by the calendar year of its respective rate period (*e.g.*, Vintage 2023).

Vintage 2022 EE programs, the third year of net lost revenues for Vintage 2021 EE programs, and the fourth year of net lost revenues for Vintage 2020 EE programs. The Rider 14 Experience Modification Factor ("EMF") includes the following true-ups: (i) a true-up of Vintage 2018 DSM/EE programs, (ii) a true-up of Vintage 2019 DSM/EE programs, (iii) a true-up of Vintage 2020 DSM/EE programs, and (iv) a true-up of Vintage 2021 DSM/EE programs.

In support of this Application, DEC respectfully shows the Commission the following:

1. The Applicant's general offices are located at 526 South Church Street, Charlotte, North Carolina, and its mailing address is:

Duke Energy Carolinas, LLC
P. O. Box 1321
Charlotte, North Carolina 28201

2. The name and address of Applicant's attorney is:

Kendrick C. Fentress, Associate General Counsel
Duke Energy Corporation
P.O. Box 1551/NCRH 20
Raleigh, North Carolina 27602
(919) 546-6733
Kendrick.Fentress@duke-energy.com

3. N.C. Gen. Stat. § 62-133.9(d) authorizes the Commission to approve an annual rider to the rates of electric public utilities to recover all reasonable and prudent costs incurred for the adoption and implementation of DSM/EE programs. Recoverable costs include, but are not limited to, all capital costs, including cost of capital and depreciation expense, administrative costs, implementation costs, incentive payments to program participants, and operating costs. Such rider shall consist of the utility's

forecasted cost during the rate period and an EMF rider to collect the difference between the utility's actual reasonable and prudent costs incurred during the test period and actual revenues realized during the test period. The Commission is also authorized to approve incentives for adopting and implementing DSM/EE programs, including appropriate rewards based on a percentage of avoided costs achieved by DSM/EE measures.

4. The Company's cost recovery mechanism is described in the Agreement and Stipulation of Settlement DEC reached with the Public Staff, the North Carolina Sustainable Energy Association, Environmental Defense Fund, Southern Alliance for Clean Energy, the South Carolina Coastal Conservation League, Natural Resources Defense Council, and the Sierra Club filed with the Commission on August 19, 2013 (the "Stipulation"). The Commission approved the cost recovery mechanism as described in the Stipulation, as well as DEC's portfolio of DSM/EE programs, in its *Order Approving DSM/EE Programs and Stipulation of Settlement* issued October 29, 2013 ("*Sub 1032 Order*") and the prospective Mechanism approved in the *2020 Sub 1032 Order*. The approved cost recovery mechanism is designed to allow DEC to collect revenue equal to its incurred program costs for a rate period plus a Portfolio Performance Incentive based on shared savings achieved by DEC's DSM/EE programs, and to recover net lost revenues for EE programs. In addition, per the *2020 Sub 1032 Order*, beginning in 2022, the Income-Qualified EE and Weatherization programs are eligible to receive a Program Return Incentive ("PRI") based on shared savings achieved by these programs.

5. Rule R8-69(b) provides that the Commission will each year conduct a proceeding for each electric public utility to establish an annual DSM/EE rider to recover DSM/EE related costs.

6. Pursuant to the provisions of N.C. Gen. Stat. § 62-133.9 and Rule R8-69, DEC requests the establishment of Rider 14 to recover: (1) a prospective component consisting of the estimated revenue requirements associated with Vintage 2023 of DEC's current portfolio of DSM/EE programs, the second year of net lost revenues for Vintage 2022 of DEC's EE programs, the third year of net lost revenues for Vintage 2021 of DEC's EE programs, and the fourth year of net lost revenues for Vintage 2020 of DEC's EE programs; and (2) an EMF component truing up Vintage 2018, Vintage 2019, Vintage 2020 and Vintage 2021 of DEC's DSM/EE programs.

7. Pursuant to the provisions of N.C. Gen. Stat. § 62-133.9 and Rule R8-69, the Company requests Commission approval of the following annual billing factors (all shown on a cents per kilowatt hour ("¢/kWh") basis, including gross receipts tax and regulatory fee):

Residential Billing Factors	**¢/kWh**
Residential Billing Factor for Rider 14 Prospective Components	0.4291
Residential Billing Factor for Rider 14 EMF Components	(0.0903)

Non-Residential Billing Factors for Rider 14 Prospective Components	**¢/kWh**
Vintage 2020 EE participant	0.0259
Vintage 2021 EE participant	0.0671
Vintage 2022 EE participant	0.0995
Vintage 2023 EE participant	0.4323
Vintage 2023 DSM participant	0.0970

Non-Residential Billing Factors for Rider 14 EMF Components	¢/kWh
Vintage 2018 EE participant	(0.0021)
Vintage 2018 DSM participant	(0.0002)
Vintage 2019 EE participant	0.0064
Vintage 2019 DSM participant	0.0003
Vintage 2020 EE participant	(0.0012)
Vintage 2020 DSM participant	(0.0002)
Vintage 2021 EE participant	(0.0833)
Vintage 2021 DSM participant	(0.0173)

Consistent with the Commission's *Order on Motions for Reconsideration* issued on June 3, 2010 in Docket No. E-7, Sub 938 and the *Sub 1032 Order*, Rider 14 will be in effect for the twelve-month period January 1, 2023 through December 31, 2023. Also in accordance with these Orders, the test period for the Vintage 2021 EMF Component is the period January 1, 2021 through December 31, 2021; the test period for the Vintage 2020 EMF component is the period January 1, 2020 through December 31, 2020; the test period for the Vintage 2019 EMF component is the period January 1, 2019 through December 31, 2019; and the test period for the Vintage 2018 EMF component is the period January 1, 2018 through December 31, 2018.

8. The Company has attached hereto, as required by Rule R8-69, the direct testimony and exhibits of witnesses Shannon R. Listebarger and Robert P. Evans in support of the requested change in rates.

WHEREFORE, the Company respectfully prays:

That consistent with this Application, the Commission approve the rates as set forth in paragraph 7 above.

Respectfully submitted, this the 1st day of March, 2022.

Kendrick C. Fentress

By: ______________________________

Kendrick Fentress
Associate General Counsel
Duke Energy Corporation
P.O. Box 1551/NCRH 20
Raleigh, North Carolina 27602
Telephone: (919) 546-6733
Kendrick.Fentress@duke-energy.com

ATTORNEY FOR DUKE ENERGY CAROLINAS, LLC

VERIFICATION

STATE OF OHIO	)	
	)	DOCKET NO. E-7, SUB 1265
COUNTY OF LICKING	)	

Shannon R. Listebarger, being first duly sworn, deposes and says:

That she is Rates and Regulatory Strategy Manager for Duke Energy Carolinas, LLC, applicant in the above-titled action; that she has read the foregoing Application and knows the contents thereof; that the same is true except as to the matters stated therein on information and belief; and as to those matters, she believes them to be true.

Shannon R. Listebarger

Shannon R. Listebarger

Sworn to and subscribed before me
this the 25 day of February, 2022.

Lori A. Cohagen

Notary Public

My Commission Expires: 9-17-2024

LORI A COHAGEN, NOTARY PUBLIC
COMM. EXP. SEPT. 17, 2024
STATE OF OHIO

Docket No. E-7, Sub 1265

Duke Energy Carolinas
Evans Exhibit 1
Vintage 2018 True Up - January 1, 2018 to December 31, 2018
Docket Number E-7, Sub 1265
Load Impacts and Estimated Revenue Requirements by Program

				A	B	C	D =(A-B)*C	E = (B+D)	F	G		H
	Residential Programs	**System kW Reduction - Summer**	**System Energy Reduction (kWh)**	**System NPV of Avoided Costs**	**Total Cost**	**Shared Savings %**	**Incentive**	**System Revenue Requirement**	**NC Retail kWh Sales Allocation Factor**	**NC Allocation Factor (2)**		**NC Residential Revenue Requirement**
	EE Programs											
1	**Energy Efficiency Education**	967	5,530,707	$ 2,863,856	$ 1,992,260	11.5%	$ 100,234	$ 2,092,493	72.7130507%		E1 * F1	$ 1,521,516
2	**Energy Efficient Appliances and Devices**	35,125	194,356,910	$ 137,713,128	$ 42,687,244	11.5%	$ 10,927,977	$ 53,615,221	72.7130507%		E2 * F2	$ 38,985,262
3	**HVAC Energy Efficiency**	1,640	6,367,174	$ 7,089,332	$ 6,955,146	11.5%	$ 15,431	$ 6,970,577	72.7130507%		E3 * F3	$ 5,068,520
4	**Low Income Energy Efficiency and Weatherization Assistance**	888	6,845,653	$ 4,253,631	$ 6,490,735	0.0%	$ -	$ 6,490,735	72.7130507%		E4 * F4	$ 4,719,611
5	**Multi-Family Energy Efficiency**	2,336	20,923,363	$ 13,616,696	$ 3,604,921	11.5%	$ 1,151,354	$ 4,756,276	72.7130507%		E5 * F5	$ 3,458,433
6	**Residential Energy Assessments**	929	7,716,668	$ 5,757,648	$ 2,836,229	11.5%	$ 335,963	$ 3,172,192	72.7130507%		E6 * F6	$ 2,306,597
7	**Total for Residential Conservation Programs**	41,885	241,740,474	$ 171,294,293	$ 64,566,534		$ 12,530,959	$ 77,097,493				$ 56,059,939
8	**My Home Energy Report**	95,887	344,759,844	$ 22,687,264	$ 12,765,286	11.5%	$ 1,141,027	$ 13,906,313	72.7130507%		E8 * F8	$ 10,111,705
9	**Total Residential Conservation and Behavioral Programs**	137,772	586,500,319	$ 193,981,557	$ 77,331,820		$ 13,671,987	$ 91,003,807				$ 66,171,644
									NC Residential Peak Demand Allocation Factor			
10	**Power Manager®**	533,506	-	$ 61,927,510	$ 14,423,610	11.5%	$ 5,462,949	$ 19,886,558	73.6287551%	43.675154%	(E10+E26) *F10 *G10	$ 12,360,739
11	**Total Residential**	671,278	586,500,319	$ 255,909,067	$ 91,755,430		$ 19,134,935	$ 110,890,365				$ 78,532,383
	Non-Residential Programs	**System kW Reduction - Summer Peak**	**System Energy Reduction (kWh)**	**System NPV of Avoided Costs**	**Total Cost**	**Shared Savings %**	**Incentive**	**System Revenue Requirement**	**NC Retail kWh Sales Allocation Factor**			**NC Non-Residential Revenue Requirement**
	EE Programs											
12	**Non Residential Smart Saver Custom Technical Assessments**	13	83,588	$ 67,315	$ 407,293	11.5%	$ (39,098)	$ 368,196	72.7130507%		E12 * F12	$ 267,726
13	**Non Residential Smart Saver Custom**	4,054	30,333,040	$ 23,324,992	$ 6,068,902	11.5%	$ 1,984,450	$ 8,053,352	72.7130507%		E13 * F13	$ 5,855,838
14	**Non Residential Smart Saver Energy Efficienct Food Service Products**	59	744,066	$ 433,251	$ 235,605	11.5%	$ 22,729	$ 258,334	72.7130507%		E14 * F14	$ 187,843
15	**Non Residential Smart Saver Energy Efficienct HVAC Products**	893	2,908,386	$ 2,810,482	$ 1,620,748	11.5%	$ 136,819	$ 1,757,567	72.7130507%		E16 * F16	$ 1,277,981
16	**Non Residential Smart Saver Energy Efficienct Lighting Products**	31,548	177,845,339	$ 146,397,190	$ 25,872,380	11.5%	$ 13,860,353	$ 39,732,733	72.7130507%		E17 * F17	$ 28,890,882
17	**Non Residential Smart Saver Energy Efficienct Pumps and Drives Products**	421	2,669,016	$ 1,617,951	$ 277,785	11.5%	$ 154,119	$ 431,904	72.7130507%		E18 * F18	$ 314,051
18	**Non Residential Energy Efficienct ITEE**	-	17,639	$ 3,025	$ 36,875	11.5%	$ (3,893)	$ 32,982	72.7130507%		E19 * F19	$ 23,982
19	**Non Residential Smart Saver Energy Efficienct Process Equipment Products**	75	331,222	$ 226,753	$ 67,509	11.5%	$ 18,313	$ 85,822	72.7130507%		E20 * F20	$ 62,404
20	**Smart $aver(R) Non Residential Performance Incentive Program**	168	3,271,186	$ 1,672,015	$ 479,610	11.5%	$ 137,127	$ 616,737	72.7130507%		E21 * F21	$ 448,448
21	**Small Business Energy Saver**	13,374	76,696,523	$ 46,838,770	$ 15,977,993	11.5%	$ 3,548,989	$ 19,526,983	72.7130507%		E22 * F22	$ 14,198,665
22	**Smart Energy in Offices**	310	1,488,592	$ 143,303	$ 219,748	11.5%	$ (8,791)	$ 210,957	72.7130507%		E23 * F23	$ 153,393
23	**Total for Non-Residential Conservation Programs**	50,914	296,388,596	$ 223,535,047	$ 51,264,448		$ 19,811,119	$ 71,075,567				$ 51,681,213
									NC Non-Residential Peak Demand Allocation Factor			
24	**EnergyWise for Business**	7,999	2,599,904	$ 2,280,310	$ 3,062,816	11.5%	$ (89,988)	$ 2,972,828	73.6287551%			
25	**PowerShare®**	332,631	-	$ 36,016,805	$ 12,922,977	11.5%	$ 2,655,790	$ 15,578,768	73.6287551%			
26	**Total for Non-Residential DSM Programs**	340,629	2,599,904	$ 38,297,115	$ 15,985,794		$ 2,565,802	$ 18,551,596	73.6287551%	56.324846%	(E10+E26) *F26 *G26	$ 15,940,796
27	**Total Non Residential**	391,543.87415	298,988,500	$ 261,832,162	$ 67,250,242		$ 22,376,921	$ 89,627,162				$ 67,622,009
28	**Total All Programs**	1,062,822	885,488,819	$ 517,741,229	$ 159,005,671		$ 41,511,856	$ 200,517,527				$ 146,154,391

(1) My Home Energy Report impacts reflect cumulative capability as of end of vintage year, including impacts for participants from prior vintages
(2) Total System DSM programs allocated to Residential and Non-Residential based on contribution to retail system peak

I/A

Duke Energy Carolinas
Evans Exhibit 1
Vintage 2019 True Up - January 1, 2019 to December 31, 2019
Docket Number E-7, Sub 1265
Load Impacts and Estimated Revenue Requirements by Program

				A	B	C	D	E	F	G		H
							=(A-B)*C	= (B+D)				
	Residential Programs	System kW Reduction - Summer Peak	System Energy Reduction (kWh)	System NPV of Avoided Costs	Total Cost	Shared Savings %	Incentive	System Revenue Requirement	NC Retail kWh Sales Allocation Factor	NC Allocation Factor (2)		NC Residential Revenue Requirement
	EE Programs											
1	Energy Efficiency Education	841	6,713,787	$ 2,519,645	$ 1,644,077	11.5%	$ 100,690	$ 1,744,767	73.0903918%		E1 * F1	$ 1,275,257
2	Energy Efficient Appliances and Devices	31,844	187,571,870	$ 102,716,013	$ 40,433,533	11.5%	$ 7,162,485	$ 47,596,018	73.0903918%		E2 * F2	$ 34,788,116
3	HVAC Energy Efficiency	2,029	7,329,114	$ 7,079,940	$ 7,402,907	11.5%	$ (37,141)	$ 7,365,766	73.0903918%		E3 * F3	$ 5,383,667
4	Low Income Energy Efficiency and Weatherization Assistance	1,189	8,501,375	$ 3,421,362	$ 7,344,325	0.0%	$ -	$ 7,344,325	73.0903918%		E4 * F4	$ 5,367,996
5	Multi-Family Energy Efficiency	2,610	21,339,210	$ 10,815,659	$ 3,681,262	11.5%	$ 820,456	$ 4,501,718	73.0903918%		E5 * F5	$ 3,290,323
6	Residential Energy Assessments	946	7,886,916	$ 4,413,585	$ 3,153,757	11.5%	$ 144,880	$ 3,298,637	73.0903918%		E6 * F6	$ 2,410,987
7	Total for Residential Conservation Programs	39,460	239,342,273	$ 130,966,204	$ 63,659,861		$ 8,191,370	$ 71,851,232				$ 52,516,346
8	My Home Energy Report	91,387	328,439,103	$ 23,361,954	$ 10,558,344	11.5%	$ 1,472,415	$ 12,030,759	73.0903918%		E8 * F8	$ 8,793,329
9	Total Residential Conservation and Behavioral Programs	130,847	567,781,375	$ 154,328,158	$ 74,218,205		$ 9,663,785	$ 83,881,991				$ 61,309,675
									NC Residential Peak Demand Allocation Factor			
10	Power Manager®	568,235	-	$ 69,783,157	$ 13,386,942	11.5%	$ 6,485,565	$ 19,872,507	74.2414264%	45.955615%	(E10+E26) *F10 *G10	$ 13,609,891
11	Total Residential	699,082	567,781,375	$ 224,111,315	$ 87,605,147		$ 16,149,350	$ 103,754,497				$ 74,919,566
	Non-Residential Programs	System kW Reduction - Summer Peak	System Energy Reduction (kWh)	System NPV of Avoided Costs	Total Cost	Shared Savings %	Incentive	System Revenue Requirement	NC Retail kWh Sales Allocation Factor			NC Non-Residential Revenue Requirement
	EE Programs											
12	Non Residential Energy Efficienct ITEE	-	11,262	$ 1,385	$ 44,335	11.5%	$ (4,939)	$ 39,395	73.0903918%		E12 * F12	$ 28,794
13	Non Residential Smart Saver Custom	10,109	52,522,612	$ 35,884,367	$ 8,873,872	11.5%	$ 3,106,207	$ 11,980,079	73.0903918%		E13 * F13	$ 8,756,287
14	Non Residential Smart Saver Custom Technical Assessments	148	1,930,762	$ 691,285	$ 296,006	11.5%	$ 45,457	$ 341,463	73.0903918%		E14 * F14	$ 249,577
15	Non Residential Smart Saver Energy Efficienct Food Service Products	78	997,611	$ 412,886	$ 339,996	11.5%	$ 8,382	$ 348,378	73.0903918%		E16 * F16	$ 254,631
16	Non Residential Smart Saver Energy Efficienct HVAC Products	1,696	7,533,194	$ 5,516,665	$ 2,208,364	11.5%	$ 380,455	$ 2,588,818	73.0903918%		E17 * F17	$ 1,892,178
17	Non Residential Smart Saver Energy Efficienct Lighting Products	29,566	163,560,290	$ 105,608,459	$ 20,834,766	11.5%	$ 9,748,975	$ 30,583,741	73.0903918%		E18 * F18	$ 22,353,776
18	Non Residential Smart Saver Energy Efficienct Process Equipment Products	111	732,043	$ 416,343	$ 119,843	11.5%	$ 34,097	$ 153,941	73.0903918%		E19 * F19	$ 112,516
19	Non Residential Smart Saver Energy Efficienct Pumps and Drives Products	232	1,460,589	$ 720,816	$ 189,172	11.5%	$ 61,139	$ 250,311	73.0903918%		E20 * F20	$ 182,953
20	Smart $aver(R) Non Residential Performance Incentive Program	391	4,545,995	$ 2,238,186	$ 785,165	11.5%	$ 167,097	$ 952,262	73.0903918%		E21 * F21	$ 696,012
21	Small Business Energy Saver	9,196	53,674,194	$ 25,661,729	$ 11,421,399	11.5%	$ 1,637,638	$ 13,059,037	73.0903918%		E22 * F22	$ 9,544,901
22	Smart Energy in Offices	-	-	$ -	$ -	11.5%	$ -	$ -	73.0903918%		E23 * F23	$ -
23	Total for Non-Residential Conservation Programs	51,527	286,968,552	$ 177,152,121	$ 45,112,917		$ 15,184,508	$ 60,297,426				$ 44,071,625
									NC Non-Residential Peak Demand Allocation Factor			
24	EnergyWise for Business	11,716	5,148,231	$ 3,400,854	$ 3,687,462	11.5%	$ (32,960)	$ 3,654,502	74.2414264%			
25	PowerShare®	342,590	-	$ 42,072,382	$ 13,022,816	11.5%	$ 3,340,700	$ 16,363,516	74.2414264%			
26	Total for Non-Residential DSM Programs	354,306	5,148,231	$ 45,473,236	$ 16,710,278		$ 3,307,740	$ 20,018,018	74.2414264%	54.044385%	(E10+E26) *F26 *G26	$ 16,005,404
27	Total Non Residential	405,834	292,116,783	$ 222,625,357	$ 61,823,195		$ 18,492,249	$ 80,315,444				$ 60,077,029
28	Total All Programs	1,104,916	859,898,158	$ 446,736,672	$ 149,428,343		$ 34,641,599	$ 184,069,941				$ 134,996,595
		-	-	$ -	$ -		$ -	$ -				$ (0)

(1) My Home Energy Report impacts reflect cumulative capability as of end of vintage year, including impacts for participants from prior vintages
(2) Total System DSM programs allocated to Residential and Non-Residential based on contribution to retail system peak

I/A

Duke Energy Carolinas
Evans Exhibit 1
Vintage 2020 True Up - January 1, 2020 to December 31, 2020
Docket Number E-7, Sub 1265
Load Impacts and Estimated Revenue Requirements by Program

				A	B	C	D	E	F	G		H
							=(A-B)*C	= (B+D)				
	Residential Programs	System kW Reduction - Summer Peak	System Energy Reduction (kWh)	System NPV of Avoided Costs	Total Cost	Shared Savings %	Incentive	System Revenue Requirement	NC Retail kWh Sales Allocation Factor	NC Allocation Factor (2)		NC Residential Revenue Requirement
	EE Programs											
1	Energy Efficiency Education	(276)	4,746,423	$ 1,234,203	$ 1,113,485	11.5%	$ 13,883	$ 1,127,367	73.2212736%		E1 * F1	$ 825,473
2	Energy Efficient Appliances and Devices	16,975	110,986,906	$ 62,028,986	$ 22,124,101	11.5%	$ 4,589,062	$ 26,713,163	73.2212736%		E2 * F2	$ 19,559,718
3	HVAC Energy Efficiency	2,190	7,689,428	$ 7,811,427	$ 7,538,303	11.5%	$ 31,409	$ 7,569,712	73.2212736%		E3 * F3	$ 5,542,640
4	Low Income Energy Efficiency and Weatherization Assistance	301	2,039,928	$ 1,024,203	$ 2,787,490	0.0%	$ -	$ 2,787,490	73.2212736%		E4 * F4	$ 2,041,036
5	Multi-Family Energy Efficiency	522	4,042,084	$ 2,156,883	$ 1,613,839	11.5%	$ 62,450	$ 1,676,289	73.2212736%		E5 * F5	$ 1,227,400
6	Residential Energy Assessments	944	7,891,628	$ 4,582,748	$ 3,358,880	11.5%	$ 140,745	$ 3,499,625	73.2212736%		E6 * F6	$ 2,562,470
7	Total for Residential Conservation Programs	20,656	137,396,395	$ 78,838,449	$ 38,536,099		$ 4,837,548	$ 43,373,647				$ 31,758,737
8	My Home Energy Report	92,401	332,105,411	$ 23,927,899	$ 12,749,651	11.5%	$ 1,285,498	$ 14,035,150	73.2212736%		E8 * F8	$ 10,276,715
9	Total Residential Conservation and Behavioral Programs	113,058	469,501,806	$ 102,766,348	$ 51,285,750		$ 6,123,047	$ 57,408,797				$ 42,035,452
									NC Residential Peak Demand Allocation Factor			
10	Power Manager®	593,227	-	$ 74,785,083	$ 14,303,277	11.5%	$ 6,955,408	$ 21,258,684	74.1953449%	45.442653%	(E10+E26) *F10 *G10	$ 13,099,723
11	Total Residential	706,284	469,501,806	$ 177,551,431	$ 65,589,027		$ 13,078,455	$ 78,667,481				$ 55,135,175
	Non-Residential Programs	System kW Reduction - Summer Peak	System Energy Reduction (kWh)	System NPV of Avoided Costs	Total Cost	Shared Savings %	Incentive	System Revenue Requirement	NC Retail kWh Sales Allocation Factor			NC Non-Residential Revenue Requirement
	EE Programs											
12	Non Residential Energy Efficienct ITEE	-	9,917	$ 1,734	$ 15,179	11.5%	$ (1,546)	$ 13,632	73.2212736%		E12 * F12	$ 9,982
13	Non Residential Smart Saver Custom	4,785	21,156,703	$ 15,898,503	$ 5,771,790	11.5%	$ 1,164,572	$ 6,936,362	73.2212736%		E13 * F13	$ 5,078,893
14	Non Residential Smart Saver Custom Technical Assessments	76	1,413,836	$ 518,862	$ 330,629	11.5%	$ 21,647	$ 352,275	73.2212736%		E14 * F14	$ 257,941
15	Non Residential Smart Saver Energy Efficienct Food Service Products	35	502,870	$ 230,241	$ 533,411	11.5%	$ (34,865)	$ 498,546	73.2212736%		E16 * F16	$ 365,042
16	Non Residential Smart Saver Energy Efficienct HVAC Products	1,682	9,270,812	$ 7,423,034	$ 2,450,713	11.5%	$ 571,817	$ 3,022,530	73.2212736%		E17 * F17	$ 2,213,135
17	Non Residential Smart Saver Energy Efficienct Lighting Products	18,365	109,556,031	$ 71,995,510	$ 13,098,851	11.5%	$ 6,773,116	$ 19,871,967	73.2212736%		E18 * F18	$ 14,550,507
18	Non Residential Smart Saver Energy Efficienct Process Equipment Products	206	567,122	$ 236,299	$ 29,681	11.5%	$ 23,761	$ 53,442	73.2212736%		E19 * F19	$ 39,131
19	Non Residential Smart Saver Energy Efficienct Pumps and Drives Products	225	1,402,429	$ 757,993	$ 167,464	11.5%	$ 67,911	$ 235,375	73.2212736%		E20 * F20	$ 172,345
20	Smart $aver(R) Non Residential Performance Incentive Program	223	5,961,326	$ 2,035,780	$ 751,724	11.5%	$ 147,666	$ 899,391	73.2212736%		E21 * F21	$ 658,545
21	Small Business Energy Saver	6,079	32,007,385	$ 16,483,207	$ 6,933,130	11.5%	$ 1,098,259	$ 8,031,389	73.2212736%		E22 * F22	$ 5,880,685
22	Smart Energy in Offices	-	-	$ -	$ -	11.5%	$ -	$ -	73.2212736%		E23 * F23	$ -
23	Total for Non-Residential Conservation Programs	31,676	181,848,432	$ 115,581,162	$ 30,082,573		$ 9,832,338	$ 39,914,910				$ 29,226,206
									NC Non-Residential Peak Demand Allocation Factor			
24	EnergyWise for Business	11,854	2,604,631	$ 2,505,142	$ 2,941,282	11.5%	$ (50,156)	$ 2,891,126	74.1953449%			
25	PowerShare®	276,583	-	$ 34,867,428	$ 12,082,697	11.5%	$ 2,620,244	$ 14,702,941	74.1953449%			
26	Total for Non-Residential DSM Programs	288,437	2,604,631	$ 37,372,570	$ 15,023,979		$ 2,570,088	$ 17,594,067	74.1953449%	54.557347%	(E10+E26) *F26 *G26	$ 15,727,210
27	Total Non Residential	320,113	184,453,063	$ 152,953,732	$ 45,106,551		$ 12,402,426	$ 57,508,977				$ 44,953,416
28	Total All Programs	1,026,398	653,954,870	$ 330,505,163	$ 110,695,578		$ 25,480,880	$ 136,176,458				$ 100,088,591
		-	-	$ -	$ -		$ -	$ -				$ (0)

(1) My Home Energy Report impacts reflect cumulative capability as of end of vintage year, including impacts for participants from prior vintages
(2) Total System DSM programs allocated to Residential and Non-Residential based on contribution to retail system peak

Duke Energy Carolinas
Evans Exhibit 1
Vintage 2021 True Up - January 1, 2021 to December 31, 2021
Docket Number E-7, Sub 1265
Load Impacts and Estimated Revenue Requirements by Program

Residential Programs

		System kW Reduction - Summer Peak	System kW Reduction - Winter Peak	System Energy Reduction (kWh)	A System NPV of Avoided Costs	B Total Cost	C Shared Savings %	D =(A-B)*C Incentive	E = (B+D) System Revenue Requirement	F NC Retail kWh Sales Allocation Factor	G NC Allocation Factor (2)		H NC Residential Revenue Requirement
	EE Programs												
1	**Energy Efficiency Education**	(1,192)	40	7,013,162	$ 1,513,478	$ 1,147,501	11.5%	$ 42,087	$ 1,189,588	73.5233682%		E1 * F1	$ 874,625
2	**Energy Efficient Appliances and Devices**	8,813	6,584	51,700,635	$ 25,474,094	$ 10,824,171	11.5%	$ 1,684,741	$ 12,508,912	73.5233682%		E2 * F2	$ 9,196,973
3	**Residential – Smart $aver Energy Efficiency Program**	2,556	2,713	9,425,675	$ 8,402,753	$ 8,156,036	11.5%	$ 28,372	$ 8,184,408	73.5233682%		E3 * F3	$ 6,017,453
4	**Low Income Energy Efficiency and Weatherization Assistance**	493	492	2,545,882	$ 1,452,358	$ 4,634,161	0.0%	$ -	$ 4,634,161	73.5233682%		E4 * F4	$ 3,407,192
5	**Multi-Family Energy Efficiency**	279	362	2,019,667	$ 993,893	$ 517,454	11.5%	$ 54,791	$ 572,244	73.5233682%		E5 * F5	$ 420,733
6	**Residential Energy Assessments**	748	573	6,590,951	$ 3,278,832	$ 3,326,179	11.5%	$ (5,445)	$ 3,320,734	73.5233682%		E6 * F6	$ 2,441,516
7	**Total for Residential Conservation Programs**	11,697	10,763	79,295,972	$ 41,115,407	$ 28,605,502		$ 1,804,547	$ 30,410,048				$ 22,358,492
8	**My Home Energy Report**	93,380	81,339	336,292,411	$ 21,313,709	$ 7,072,233	11.5%	$ 1,637,770	$ 8,710,003	73.5233682%		E8 * F8	$ 6,403,887
9	**Total Residential Conservation and Behavioral Programs**	105,077	92,102	415,588,383	$ 62,429,117	$ 35,677,734		$ 3,442,316	$ 39,120,051				$ 28,762,379
										NC Residential Peak Demand Allocation Factor			
10	**Power Manager®**	456,664	-	-	$ 57,584,854	$ 16,829,058	11.5%	$ 4,686,917	$ 21,515,975	74.3563771%	47.000070%	(E10+E26) *F10 *G10	$ 14,259,587
11	**Total Residential**	561,741	92,102	415,588,383	$ 120,013,971	$ 52,506,792		$ 8,129,233	$ 60,636,025				$ 43,021,966

Non-Residential Programs

		System kW Reduction - Summer Peak	System kW Reduction - Winter Peak	System Energy Reduction (kWh)	System NPV of Avoided Costs	Total Cost	Shared Savings %	Incentive	System Revenue Requirement	NC Retail kWh Sales Allocation Factor			NC Non-Residential Revenue Requirement
	EE Programs												
12	**Non Residential Energy Efficienct ITEE**	-	-	2,353	$ 416	$ 74,699	11.5%	$ (8,543)	$ 66,156	73.5233682%		E12 * F12	$ 48,640
13	**Non Residential Smart Saver Custom**	6,572	4,125	30,798,533	$ 19,324,372	$ 7,505,201	11.5%	$ 1,359,205	$ 8,864,406	73.5233682%		E13 * F13	$ 6,517,410
14	**Non Residential Smart Saver Custom Technical Assessments**	110	6	921,248	$ 432,158	$ 293,539	11.5%	$ 15,941	$ 309,480	73.5233682%		E14 * F14	$ 227,540
15	**Non Residential Smart Saver Energy Efficienct Food Service Products**	80	75	1,201,408	$ 479,963	$ 203,130	11.5%	$ 31,836	$ 234,966	73.5233682%		E16 * F16	$ 172,755
16	**Non Residential Smart Saver Energy Efficienct HVAC Products**	3,325	5,262	21,054,972	$ 14,900,228	$ 4,899,800	11.5%	$ 1,150,049	$ 6,049,849	73.5233682%		E17 * F17	$ 4,448,053
17	**Non Residential Smart Saver Energy Efficienct Lighting Products**	20,325	19,283	116,783,529	$ 68,949,662	$ 17,924,291	11.5%	$ 5,867,918	$ 23,792,209	73.5233682%		E18 * F18	$ 17,492,833
18	**Non Residential Smart Saver Energy Efficienct Process Equipment Products**	117	117	824,803	$ 257,010	$ 87,540	11.5%	$ 19,489	$ 107,029	73.5233682%		E19 * F19	$ 78,691
19	**Non Residential Smart Saver Energy Efficienct Pumps and Drives Products**	239	244	1,521,286	$ 666,628	$ 202,615	11.5%	$ 53,362	$ 255,977	73.5233682%		E20 * F20	$ 188,203
20	**Smart $aver(R) Non Residential Performance Incentive Program**	1,079	1,040	8,247,437	$ 4,234,077	$ 342,826	11.5%	$ 447,494	$ 790,320	73.5233682%		E21 * F21	$ 581,070
21	**Small Business Energy Saver**	7,011	8,209	38,560,812	$ 18,680,538	$ 8,935,952	11.5%	$ 1,120,627	$ 10,056,579	73.5233682%		E22 * F22	$ 7,393,936
22	**Smart Energy in Offices**	-	-	-	$ -	$ -	11.5%	$ -	$ -	73.5233682%		E23 * F23	$ -
23	**Total for Non-Residential Conservation Programs**	38,859	38,362	219,916,383	$ 127,925,053	$ 40,469,592		$ 10,057,378	$ 50,526,970				$ 37,149,131
										NC Non-Residential Peak Demand Allocation Factor			
24	**EnergyWise for Business**	11,564	232	1,436,361	$ 1,964,689	$ 2,463,194	11.5%	$ (57,328)	$ 2,405,866	74.3563771%			
25	**PowerShare®**	335,086	311,630	-	$ 42,254,098	$ 13,583,912	11.5%	$ 3,297,071	$ 16,880,983	74.3563771%			
26	**Total for Non-Residential DSM Programs**	346,651	311,862	1,436,361	$ 44,218,787	$ 16,047,106		$ 3,239,743	$ 19,286,849	74.3563771%	52.999930%	(E10+E26) *F26 *G26	$ 16,079,915
27	**Total Non Residential**	385,509	350,224	221,352,744	$ 172,143,840	$ 56,516,699		$ 13,297,121	$ 69,813,820				$ 53,229,046
28	**Total All Programs**	947,250	442,326	636,941,127	$ 292,157,811	$ 109,023,491		$ 21,426,354	$ 130,449,845				$ 96,251,012
		-	-	-	$ -	$ -		$ -	$ -				$ -

(1) My Home Energy Report impacts reflect cumulative capability as of end of vintage year, including impacts for participants from prior vintages
(2) Total System DSM programs allocated to Residential and Non-Residential based on contribution to retail system peak

I/A

Duke Energy Carolinas
Evans Exhibit 1
Vintage 2023 Estimate - January 1, 2023 to December 31, 2023
Docket Number E-7, Sub 1265
Load Impacts and Estimated Revenue Requirements by Program

Residential Programs

					A	B	C	D	E	F	G =A*C*D	H =A*C*D	I	J
	Residential Programs	**System kW Reduction - Summer Peak**	**System kW Reduction - Winter Peak**	**System Energy Reduction (kWh)**	**System NPV of Avoided Costs**	**Total Cost**	**Shared Savings %**	**NC Retail kWh Sales Allocation Factor**	**NC Allocation Factor (2)**	**NC Allocated Total Cost**	**NC PRI**	**NC PPI**	**NC PPI Cap Reduction**	**NC Revenue Requirement**
	EE Programs													
1	**Energy Efficiency Education**	(2,299)	76	13,527,549	$ 2,757,352	$ 2,234,205	10.6%	73.5233682%		$ 1,642,662		$ 40,771		$ 1,683,434
2	**Energy Efficient Appliances and Devices**	8,508	8,106	54,068,275	$ 32,335,837	$ 12,770,451	10.6%	73.5233682%		$ 9,389,265		$ 1,524,824		$ 10,914,089
3	**Residential – Smart $aver Energy Efficiency Program**	2,035	2,197	7,523,873	$ 8,786,958	$ 7,424,637	10.6%	73.5233682%		$ 5,458,843		$ 106,172		$ 5,565,016
4	**Low Income Energy Efficiency and Weatherization Assistance**	2,044	1,725	9,120,903	$ 6,733,294	$ 8,826,241	10.6%	73.5233682%		$ 6,489,349	$ 524,758			$ 7,014,107
5	**Multi-Family Energy Efficiency**	2,404	3,258	18,590,827	$ 11,077,783	$ 3,267,171	10.6%	73.5233682%		$ 2,402,134		$ 608,718		$ 3,010,852
6	**Residential Energy Assessments**	1,769	1,257	14,843,876	$ 8,325,803	$ 5,627,652	10.6%	73.5233682%		$ 4,137,639		$ 210,280		$ 4,347,919
7	**Residential New Construction**	4,351	4,398	14,899,275	$ 22,757,696	$ 11,506,518	10.6%	73.5233682%		$ 8,459,979		$ 876,858		$ 9,336,837
8	**Total for Residential Conservation Programs**	18,811	21,017	132,574,578	92,774,722	51,656,874				37,979,874	524,758	3,367,623	-	41,872,255
9	**My Home Energy Report**	93,036	81,112	335,107,189	$ 25,502,532	$ 7,527,382	10.6%	73.5233682%		$ 5,534,384		$ 1,400,889		$ 6,935,274
10	**Total Residential Conservation and Behavioral Programs**	111,847	102,129	467,681,767	$ 118,277,254	$ 59,184,255				$ 43,514,258	$ 524,758	$ 4,768,513	$ 2,451,345	$ 51,258,873
								NC Residential Peak Demand Allocation Factor						
11	**Power Manager®**	481,410	37,481	-	$ 83,384,154	$ 19,895,473	10.6%	74.3563771%	47.0%	$ 14,793,553		$ 5,004,036	$ (2,119,293)	$ 14,530,620
12	**Total Residential**	593,257	139,610	467,681,767	$ 201,661,408	$ 79,079,729				$ 58,307,811	$ 524,758	$ 9,772,548	332,052	$ 65,789,493

Non-Residential Programs

	Non-Residential Programs	**System kW Reduction - Summer Peak**	**System kW Reduction - Winter Peak**	**System Energy Reduction (kWh)**	**System NPV of Avoided Costs**	**Total Cost**	**Shared Savings %**	**NC Retail kWh Sales Allocation Factor**		**NC Allocated Total Cost**	**NC PRI**	**NC PPI**	**NC PPI Cap Reduction**	**NC Revenue Requirement**
	EE Programs													
13	**Non Residential Energy Efficienct ITEE**	-	-	15,307	$ 2,525	$ 6,941	10.6%	73.5233682%		$ 5,104		$ (344)		$ 4,759
14	**Non Residential Smart Saver Custom**	4,590	4,590	32,169,842	$ 20,103,301	$ 10,349,514	10.6%	73.5233682%		$ 7,609,311		$ 760,159		$ 8,369,470
15	**Non Residential Smart Saver Custom Technical Assessments**	316	316	2,763,999	$ 1,566,844	$ 740,439	10.6%	73.5233682%		$ 544,395		$ 64,406		$ 608,801
16	**Non Residential Smart Saver Energy Efficienct Food Service Products**	155	146	1,865,413	$ 832,691	$ 303,893	10.6%	73.5233682%		$ 223,432		$ 41,212		$ 264,644
17	**Non Residential Smart Saver Energy Efficienct HVAC Products**	5,000	4,992	27,110,980	$ 20,024,436	$ 5,805,515	10.6%	73.5233682%		$ 4,268,410		$ 1,108,148		$ 5,376,558
18	**Non Residential Smart Saver Energy Efficienct Lighting Products**	31,925	31,332	175,815,265	$ 127,358,689	$ 29,716,420	10.6%	73.5233682%		$ 21,848,513		$ 7,609,728		$ 29,458,241
19	**Non Residential Smart Saver Energy Efficienct Process Equipment Proc**	259	262	1,737,823	$ 1,007,474	$ 373,943	10.6%	73.5233682%		$ 274,936		$ 49,374		$ 324,310
20	**Non Residential Smart Saver Energy Efficienct Pumps and Drives Produ**	301	307	2,154,687	$ 1,081,241	$ 434,644	10.6%	73.5233682%		$ 319,565		$ 50,392		$ 369,957
21	**Smart $aver(R) Non Residential Performance Incentive Program**	1,457	1,457	12,764,777	$ 6,788,212	$ 1,586,660	10.6%	73.5233682%		$ 1,166,566		$ 405,382		$ 1,571,948
22	**Small Business Energy Saver**	11,706	11,226	61,580,154	$ 39,702,935	$ 13,027,318	10.6%	73.5233682%		$ 9,578,123		$ 2,078,958		$ 11,657,081
23	**Smart Energy in Offices**	-	-	-	$ -	$ -	10.6%	73.5233682%		$ -		$ -		$ -
24	**Total for Non-Residential Conservation Programs**	55,710	54,629	317,978,247	$ 218,468,348	$ 62,345,286				$ 45,838,354	$ -	$ 12,167,415	$ (3,228,936)	$ 54,776,833
								NC Non-Residential Peak Demand Allocation Factor						
24	**EnergyWise for Business**	12,222	2,677	756,809	$ 2,420,180	$ 1,804,572	10.6%	74.3563771%		$ 1,341,814		$ 48,521		$ 1,563,025
25	**PowerShare®**	330,914	307,750	-	$ 56,852,292	$ 13,093,567	10.6%	74.3563771%		$ 9,735,902		$ 3,448,965		$ 14,822,522
26	**Total for Non-Residential DSM Programs**	343,136	310,427	756,809	$ 59,272,473	$ 14,898,138		74.3563771%	53.0%	$ 11,077,716	$ -	$ 3,497,486	$ (1,337,331)	$ 16,385,547
27	**Total Non Residential**	398,846	365,056	318,735,056	$ 277,740,820	$ 77,243,425				$ 56,916,070	$ -	$ 15,664,901	$ (4,566,267)	$ 71,162,380
28	**Total All Programs**	992,103	504,666	786,416,822	$ 479,402,228	$ 156,323,153				$ 115,223,881	$ 524,758	$ 25,437,449	$ (4,234,215)	$ 136,951,873
		-	-	-	$ -	$ -								

(1) My Home Energy Report impacts reflect cumulative capability as of end of vintage year, including impacts for participants from prior vintages
(2) Total System DSM programs allocated to Residential and Non-Residential based on contribution to retail system peak

total Costs	$ 156,323,153	total PPI	$ 35,181,963
Low Income	(8,826,241)	Low Income	(713,729)
	$ 147,496,913		$ 34,468,234
		PPI to Cost Ratio	23.37%

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Evans Exhibit 2, page 1

Duke Energy Carolinas, LLC
For the Period January 1, 2018 - December 31, 2023
Docket Number E-7 Sub 1265
North Carolina Net Lost Revenue Estimates for Vintages 2018 - 2023

Line	Vintage 2018 Residential	2018	2019	2020	2021	2022	2023	0 Total
1	Energy Efficiency Education	$ 128,311	$ 265,267	$ 172,311	$ -			$ 565,889
2	Energy Efficient Appliances and Devices	4,282,358	9,200,784	5,975,763	-			19,458,905
3	HVAC Energy Efficiency	161,443	324,295	210,669	-			696,407
4	Low Income Energy Efficiency and Weatherization Assistance	154,376	340,042	220,844	-			715,262
5	Multi-Family Energy Efficiency	493,320	1,087,466	707,931	-			2,288,716
6	My Home Energy Report	15,751,701	-	-	-			15,751,701
7	Residential Energy Assessments	204,097	359,848	233,732	-			797,677
8	Total Lost Revenues	21,175,605	11,577,702	7,521,250	-	-	-	40,274,557
9	Found Residential Revenues *	-	-	-	-	-		-
10	Net Lost Residential Revenues	**$ 21,175,605**	**$ 11,577,702**	**$ 7,521,250**	**$ -**	**$ -**	**$ -**	**$ 40,274,557**

Line	Non-Residential	2018	2019	2020	2021	2022	2023	Total
11	EnergyWise for Business	$ 66,282	$ 120,440	$ 78,851	$ -			$ 265,573
12	Non Residential Energy Efficienct ITEE	185	876	573	-			1,634
13	Non Residential Smart Saver Custom	462,774	773,838	502,673	-			1,739,285
14	Non Residential Smart Saver Custom Technical Assessments	212	866	564	-			1,642
15	Non Residential Smart Saver Energy Efficienct Food Service Products	14,176	22,681	14,685	-			51,543
16	Non Residential Smart Saver Energy Efficienct HVAC Products	50,245	116,425	75,664	-			242,334
17	Non Residential Smart Saver Energy Efficienct Lighting Products	4,088,002	6,697,444	4,357,995	-			15,143,441
18	Non Residential Smart Saver Energy Efficienct Process Equipment Products	6,501	10,497	6,820	-			23,818
19	Non Residential Smart Saver Energy Efficienct Pumps and Drives Products	66,649	87,658	56,898	-			211,206
20	Small Business Energy Saver	1,776,069	3,461,673	2,256,564	-			7,494,306
21	Smart $aver(R) Non Residential Performance Incentive Program	20,243	84,754	54,723	-			159,720
22	Smart Energy in Offices	39,733	3,847	-	-			43,580
23	Total Lost Revenues	6,591,073	11,381,000	7,406,010	-	-	-	25,378,082
24	Found Non-Residential Revenues *	-	-	-	-	-		-
25	Net Lost Non-Residential Revenues	**$ 6,591,073**	**$ 11,381,000**	**$ 7,406,010**	**$ -**	**$ -**	**$ -**	**$ 25,378,082**

* Found Revenues - See Evans Exhibit 4
(a) Lost revenues were estimated by applying forecasted lost revenue rates for residential and non-residential customers to state specific forecasted program participation.

Evans Exhibit 2, page 2
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Line	Vintage 2019 Residential	2018	2019	2020	2021	2022	2023	Total
26	Energy Efficiency Education		$ 148,216	$ 254,224	$ 105,637	$ 86,483		$ 594,560
27	Energy Efficient Appliances and Devices		4,883,104	6,752,166	2,641,017	1,743,019		16,019,306
28	HVAC Energy Efficiency		192,394	296,145	135,559	89,189		713,288
29	Low Income Energy Efficiency and Weatherization Assistance		211,667	296,296	120,408	82,532		710,903
30	Multi-Family Energy Efficiency		600,390	796,103	301,062	207,294		1,904,850
31	My Home Energy Report		16,556,381	-	-	-		16,556,381
32	Residential Energy Assessments		195,756	270,434	106,756	72,468		645,414
33	Total Lost Revenues		22,787,908	8,665,368	3,410,439	2,280,986	-	37,144,701
34	Found Residential Revenues *		-	-	-	-		-
35	Net Lost Residential Revenues		**$ 22,787,908**	**$ 8,665,368**	**$ 3,410,439**	**$ 2,280,986**	**$ -**	**$ 37,144,701**

Line	Non-Residential	2018	2019	2020	2021	2022	2023	Total
36	EnergyWise for Business		$ 113,643	$ 187,710	$ 84,670	$ 56,057		$ 442,081
37	Non Residential Energy Efficienct ITEE		334	441	140	109		1,023
38	Non Residential Smart Saver Custom		872,885	1,464,105	681,384	462,023		3,480,396
39	Non Residential Smart Saver Custom Technical Assessments		83,809	57,550	1,829	1,690		144,878
40	Non Residential Smart Saver Energy Efficienct Food Service Products		13,606	19,258	7,918	5,324		46,107
41	Non Residential Smart Saver Energy Efficienct HVAC Products		177,008	322,139	156,528	110,774		766,450
42	Non Residential Smart Saver Energy Efficienct Lighting Products		3,673,309	4,791,594	1,762,560	1,151,903		11,379,366
43	Non Residential Smart Saver Energy Efficienct Process Equipment Products		20,702	19,379	3,275	1,996		45,352
44	Non Residential Smart Saver Energy Efficienct Pumps and Drives Products		28,698	43,328	19,663	13,062		104,751
45	Small Business Energy Saver		1,333,593	1,740,842	620,136	421,980		4,116,552
46	Smart $aver(R) Non Residential Performance Incentive Program		24,374	106,552	86,737	77,081		294,744
47	Total Lost Revenues		6,341,962	8,752,898	3,424,841	2,301,999	-	20,821,700
48	Found Non-Residential Revenues *		-	-	-	-		-
49	Net Lost Non-Residential Revenues		**$ 6,341,962**	**$ 8,752,898**	**$ 3,424,841**	**$ 2,301,999**	**$ -**	**$ 20,821,700**

* Found Revenues - See Evans Exhibit 4
(a) Lost revenues were estimated by applying forecasted lost revenue rates for residential and non-residential customers to state specific forecasted program participation.

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Line	Vintage 2020 Residential	2018	2019	2020	2021	2022	2023	Total
50	Energy Efficiency Education			$ 87,646	$ 209,855	$ 211,157	$ 136,097	$ 644,755
51	Energy Efficient Appliances and Devices			2,918,372	4,427,019	4,459,740	2,004,594	$ 13,809,724
52	HVAC Energy Efficiency			192,701	372,814	375,311	203,207	$ 1,144,033
53	Low Income Energy Efficiency and Weatherization Assistance			62,151	68,772	69,291	22,399	$ 222,613
54	Multi-Family Energy Efficiency			159,305	118,078	118,046	7,513	$ 402,941
55	My Home Energy Report			17,075,171	-	-	-	$ 17,075,171
56	Residential Energy Assessments			158,872	330,249	332,622	194,466	$ 1,016,208
57	Total Lost Revenues		-	20,654,218	5,526,785	5,566,166	2,568,275	34,315,444
58	Found Residential Revenues *			-	-	-		$ -
59	Net Lost Residential Revenues		**$ -**	**$ 20,654,218**	**$ 5,526,785**	**$ 5,566,166**	**$ 2,568,275**	**$ 34,315,444**

Line	Non-Residential	2018	2019	2020	2021	2022	2023	Total
60	EnergyWise for Business			$ 76,498	$ 111,934	$ 113,213	$ 54,549	$ 356,195
61	Non Residential Energy Efficienct ITEE			172	398	402	272	$ 1,244
62	Non Residential Smart Saver Custom			328,409	735,651	743,178	454,548	$ 2,261,786
63	Non Residential Smart Saver Custom Technical Assessments			18,501	21,576	22,086	7,362	$ 69,526
64	Non Residential Smart Saver Energy Efficienct Food Service Products			8,849	16,420	16,683	8,292	$ 50,243
65	Non Residential Smart Saver Energy Efficienct HVAC Products			139,598	418,157	422,374	293,356	$ 1,273,485
66	Non Residential Smart Saver Energy Efficienct Lighting Products			2,420,220	4,196,465	4,238,057	2,208,469	$ 13,063,211
67	Non Residential Smart Saver Energy Efficienct Process Equipment Products			30,248	30,693	30,909	1,599	$ 93,449
68	Non Residential Smart Saver Energy Efficienct Pumps and Drives Products			37,562	45,568	46,026	10,977	$ 140,132
69	Small Business Energy Saver			796,192	1,418,351	1,433,061	763,151	$ 4,410,755
70	Smart $aver(R) Non Residential Performance Incentive Program			90,607	131,908	135,520	43,385	$ 401,420
71	Total Lost Revenues		-	3,946,856	7,127,120	7,201,507	3,845,961	22,121,445
72	Found Non-Residential Revenues *			-	-	-		-
73	Net Lost Non-Residential Revenues		**$ -**	**$ 3,946,856**	**$ 7,127,120**	**$ 7,201,507**	**$ 3,845,961**	**$ 22,121,445**

* Found Revenues - See Evans Exhibit 4

(a) Lost revenues were estimated by applying forecasted lost revenue rates for residential and non-residential customers to state specific forecasted program participation.

Evans Exhibit 2, page 4

Line	Vintage 2021 Residential	2018	2019	2020	2021	2022	2023	Total
74	Energy Efficiency Education				200,130	370,966	370,966	$ 942,061
75	Energy Efficient Appliances and Devices				1,442,046	2,511,364	2,511,364	$ 6,464,774
76	Residential – Smart $aver Energy Efficiency Program				252,810	462,820	462,820	$ 1,178,449
77	Low Income Energy Efficiency and Weatherization Assistance				61,632	142,429	142,429	$ 346,491
78	Multi-Family Energy Efficiency				28,957	127,637	127,637	$ 284,232
79	My Home Energy Report				17,258,649	-	-	$ 17,258,649
80	Residential Energy Assessments				160,310	343,787	343,787	$ 847,885
81	Total Lost Revenues		-	-	19,404,534	3,959,003	3,959,003	27,322,540
82	Found Residential Revenues *			-	-	-		-
83	Net Lost Residential Revenues		**$ -**	**$ -**	**$ 19,404,534**	**$ 3,959,003**	**$ 3,959,003**	**$ 27,322,540**

Line	Non-Residential	2018	2019	2020	2021	2022	2023	Total
84	EnergyWise for Business				$ 54,555	$ 100,662	$ 100,662	$ 255,878
85	Non Residential Energy Efficienct ITEE				108	149	149	$ 406
86	Non Residential Smart Saver Custom				554,154	1,297,497	1,297,497	$ 3,149,148
87	Non Residential Smart Saver Energy Efficienct Food Service Products				17,774	45,342	45,342	$ 108,457
88	Non Residential Smart Saver Energy Efficienct HVAC Products				614,754	1,040,195	1,040,195	$ 2,695,143
89	Non Residential Smart Saver Energy Efficienct Lighting Products				2,825,245	5,413,818	5,413,818	$ 13,652,882
90	Non Residential Smart Saver Energy Efficienct Process Equipment Products				9,090	35,234	35,234	$ 79,558
91	Non Residential Smart Saver Energy Efficienct Pumps and Drives Products				22,371	57,088	57,088	$ 136,546
92	Small Business Energy Saver				898,833	1,927,206	1,927,206	$ 4,753,244
93	Smart $aver(R) Non Residential Performance Incentive Program				35,712	85,850	85,850	$ 207,412
94	Total Lost Revenues		-	-	5,032,594	10,003,040	10,003,040	25,038,674
95	Found Non-Residential Revenues *			-	-	-		-
96	Net Lost Non-Residential Revenues		**$ -**	**$ -**	**$ 5,032,594**	**$ 10,003,040**	**$ 10,003,040**	**$ 25,038,674**

* Found Revenues - See Evans Exhibit 4

(a) Lost revenues were estimated by applying forecasted lost revenue rates for residential and non-residential customers to state specific forecasted program participation.

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Evans Exhibit 2, page 5

Line	Vintage 2022 Residential	2017	2018	2019	2020	2021	2022	2023	Total
97	Energy Efficiency Education						212,630	394,983	$ 607,613
98	Energy Efficient Appliances and Devices						2,106,950	3,988,025	$ 6,094,974
99	Residential – Smart $aver Energy Efficiency Program						145,714	269,047	$ 414,761
100	Low Income Energy Efficiency and Weatherization Assistance						240,306	449,666	$ 689,973
101	Multi-Family Energy Efficiency						507,144	936,267	$ 1,443,411
102	My Home Energy Report						17,381,990	-	$ 17,381,990
103	Residential Energy Assessments						431,676	753,469	$ 1,185,144
104	Total Lost Revenues	-		-	-	-	21,026,409	6,791,458	27,817,867
105	Found Residential Revenues *				-	-	-		$ -
106	Net Lost Residential Revenues	**$ -**		**$ -**	**$ -**	**$ -**	**$ 21,026,409**	**$ 6,791,458**	**$ 27,817,867**

Line	Non-Residential	2017	2018	2019	2020	2021	2022	2023	Total
107	Non Residential Energy Efficient ITEE						$ 2,132	$ 3,935	$ 6,067
108	Non Residential Smart Saver Custom						939,502	1,734,465	$ 2,673,966
109	Non Residential Smart Saver Custom Technical Assessments						101,037	186,529	$ 287,566
110	Non Residential Smart Saver Energy Efficienct Food Service Products						36,317	67,047	$ 103,364
111	Non Residential Smart Saver Energy Efficienct HVAC Products						506,985	935,973	$ 1,442,958
112	Non Residential Smart Saver Energy Efficienct Lighting Products						4,189,330	7,734,148	$ 11,923,479
113	Non Residential Smart Saver Energy Efficienct Process Equipment Products						24,914	45,996	$ 70,910
114	Non Residential Smart Saver Energy Efficienct Pumps and Drives Products						58,634	108,248	$ 166,882
115	Small Business Energy Saver						2,183,673	4,060,068	$ 6,243,741
116	Smart $aver(R) Non Residential Performance Incentive Program						138,704	256,069	$ 394,773
117	Total Lost Revenues	-	-	-	-	-	8,181,228	15,132,477	23,313,705
118	Found Non-Residential Revenues *	-	-	-	-	-	-		-
119	Net Lost Non-Residential Revenues	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 8,181,228**	**$ 15,132,477**	**$ 23,313,705**

* Found Revenues - See Evans Exhibit 4

(a) Lost revenues were estimated by applying forecasted lost revenue rates for residential and non-residential customers to state specific forecasted program participation.

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Evans Exhibit 2, page 6

Line	Vintage 2023 Residential	2017	2018	2019	2020	2021	2022	2023	Total
120	Energy Efficiency Education							367,192	$ 367,192
121	Energy Efficient Appliances and Devices							1,468,035	$ 1,468,035
122	Residential – Smart $aver Energy Efficiency Program							202,306	$ 202,306
123	Low Income Energy Efficiency and Weatherization Assistance							228,933	$ 228,933
124	Multi-Family Energy Efficiency							513,283	$ 513,283
125	My Home Energy Report							17,467,498	$ 17,467,498
126	Residential Energy Assessments							436,907	$ 436,907
127	Residential New Construction							462,348	$ 462,348
128	Total Lost Revenues	-		-	-	-	-	21,146,502	21,146,502
129	Found Residential Revenues *				-	-	-		$ -
130	Net Lost Residential Revenues	$ -		$ -	$ -	$ -	$ -	$ 21,146,502	$ 21,146,502

Line	Non-Residential	2017	2018	2019	2020	2021	2022	2023	Total
131	EnergyWise for Business							$ 17,255	$ 17,255
132	Non Residential Energy Efficient ITEE							329	$ 329
133	Non Residential Smart Saver Custom							616,396	$ 616,396
134	Non Residential Smart Saver Custom Technical Assessments							52,857	$ 52,857
135	Non Residential Smart Saver Energy Efficienct Food Service Products							41,666	$ 41,666
136	Non Residential Smart Saver Energy Efficienct HVAC Products							950,071	$ 950,071
137	Non Residential Smart Saver Energy Efficienct Lighting Products							4,341,628	$ 4,341,628
138	Non Residential Smart Saver Energy Efficienct Process Equipment Products							39,529	$ 39,529
139	Non Residential Smart Saver Energy Efficienct Pumps and Drives Products							50,829	$ 50,829
140	Small Business Energy Saver							1,312,351	$ 1,312,351
141	Smart $aver(R) Non Residential Performance Incentive Program							244,585	$ 244,585
142	Total Lost Revenues	-	-	-	-	-	-	7,667,494	7,667,494
143	Found Non-Residential Revenues *	-	-	-	-	-	-		-
144	Net Lost Non-Residential Revenues	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,667,494	$ 7,667,494

* Found Revenues - See Evans Exhibit 4

(a) Lost revenues were estimated by applying forecasted lost revenue rates for residential and non-residential customers to state specific forecasted program participation.

Evans Exhibit 3

Duke Energy Carolinas, LLC
For the Period January 1, 2021 - December 31, 2021
Docket Number E-7 Sub 1265
Actual Program Costs for Vintage Years 2018 , 2019, 2020, 2021

		Carolinas System - 12 months Ended 12/31/2018	Carolinas System - 12 months Ended 12/31/2019	Carolinas System - 12 months Ended 12/31/2020	Carolinas System - 12 months Ended 12/31/2021
1	Residential Energy Assessments	2,836,229	3,153,757	3,358,880	3,326,179
2	My Home Energy Report	12,765,286	10,558,344	12,749,651	7,072,233
3	Energy Efficient Appliances and Devices	42,687,244	40,433,533	22,124,101	10,824,171
4	Residential – Smart $aver Energy Efficiency Program	6,955,146	7,402,907	7,538,303	8,156,036
5	Appliance Recycle Program	-	-	-	-
6	Income Qualified Energy Efficiency and Weatherization Assistance	6,490,735	7,344,325	2,787,490	4,634,161
7	Multi family Energy Efficiency	3,604,921	3,681,262	1,613,839	517,454
8	Energy Efficiency Education	1,992,260	1,644,077	1,113,485	1,147,501
9	Nonresidential Smart Saver Custom Energy Assessments	407,293	296,006	330,629	293,539
10	Energy Management Information Systems	-	-	-	-
11	Non-Residential Smart Saver Custom	6,068,902	8,873,872	5,771,790	7,505,201
12	Non-Residential Smart Saver Performance Incentive	479,610	785,165	751,724	342,826
13	Non-Residential Energy Efficient Food Service Products	235,605	339,996	533,411	203,130
14	Non-Residential Smart Saver Energy Efficient HVAC Products	1,620,748	2,208,364	2,450,713	4,899,800
15	Non-Residential Smart Saver Energy Efficient Lighting Products	25,872,380	20,834,766	13,098,851	17,924,291
16	Nonresidential Energy Efficient Pumps and Drives Products	277,785	189,172	167,464	202,615
17	Nonresidential Energy Efficient ITEE	36,875	44,335	15,179	74,699
18	Nonresidential Energy Efficient Process Equipment Products	67,509	119,843	29,681	87,540
19	Smart Energy In Offices	219,748	-	-	-
20	Small Business Energy Saver	15,977,993	11,421,399	6,933,130	8,935,952
21	Business Energy Report	-	-	-	-
22	Power Manager	14,423,610	13,386,942	14,303,277	16,829,058
23	EnergyWise for Business	3,062,816	3,687,462	2,941,282	2,463,194
24	Power Share	12,922,977	13,022,816	12,082,697	13,583,912
25					
26	**Total Energy Efficiency & Demand Side Progı**	**$ 159,005,671**	**$ 149,428,343**	**$ 110,695,578**	**$ 109,023,491**
27	NC Allocation Factor for EE programs	72.7130507%	73.0903918%	73.2212736%	73.5233682%
28	NC Allocation Factor for DSM programs-Resid	32.1574721%	34.1181040%	33.7163333%	34.9475492%
29	NC Allocation Factor for DSM programs-Non-I	41.4712829%	40.1233224%	40.4790117%	39.4088278%

		NC Allocated - 12 Months Ended 12/31/2018	NC Allocated - 12 Months Ended 12/31/2019	NC Allocated - 12 Months Ended 12/31/2020	NC Allocated - 12 Months Ended 12/31/2021
30	Residential Energy Assessments	$ 2,062,308	$ 2,305,093	$ 2,459,415	$ 2,445,519
31	My Home Energy Report	$ 9,282,029	$ 7,717,135	9,335,457	5,199,744
32	Energy Efficient Appliances and Devices	$ 31,039,197	$ 29,553,027	16,199,549	7,958,295
33	Residential – Smart $aver Energy Efficiency Pı	$ 5,057,299	$ 5,410,814	5,519,641	5,996,592
34	Appliance Recycle Program	$ -	$ -	-	-
35	Income Qualified Energy Efficiency and Weatl	$ 4,719,611	$ 5,367,996	2,041,036	3,407,192
36	Multi family Energy Efficiency	$ 2,621,248	$ 2,690,649	1,181,674	380,449
37	Energy Efficiency Education	$ 1,448,633	$ 1,201,662	815,308	843,681
38	Nonresidential Smart Saver Custom Energy A:	$ 296,155	$ 216,352	242,090	215,820
39	Energy Management Information Systems	$ -	$ -	-	-
40	Non-Residential Smart Saver Custom	$ 4,412,884	$ 6,485,948	4,226,178	5,518,076
41	Non-Residential Smart Saver Performance Inc	$ 348,739	$ 573,880	550,422	252,057
42	Non-Residential Energy Efficient Food Service	$ 171,315	$ 248,504	390,570	149,348
43	Non-Residential Smart Saver Energy Efficient	$ 1,178,495	$ 1,614,102	1,794,444	3,602,498
44	Non-Residential Smart Saver Energy Efficient	$ 18,812,597	$ 15,228,212	9,591,146	13,178,542
45	Nonresidential Energy Efficient Pumps and Dr	$ 201,986	$ 138,267	122,620	148,969
46	Nonresidential Energy Efficient ITEE	$ 26,813	$ 32,404	11,114	54,921
47	Nonresidential Energy Efficient Process Equip	$ 49,088	$ 87,594	21,733	64,362
48	Smart Energy In Offices	$ 159,785	$ -	-	-
49	Small Business Energy Saver	$ 11,618,086	$ 8,347,945	5,076,526	6,570,013
50	Business Energy Report	$ -	$ -	-	-
51	Power Manager	9,778,895	10,268,601	9,888,075	11,489,414
52	EnergyWise for Business	2,416,251	2,664,815	2,324,090	1,988,733
53	Power Share	10,194,918	9,411,189	9,547,293	10,967,378
54					
55	**Total Energy Efficiency & Demand Side Progı**	**$ 115,896,335**	**$ 109,564,190**	**$ 81,338,380**	**$ 80,431,604**

I/A

Evans Exhibit 4

Duke Energy Carolinas, LLC
January 2018 - December 2021 Actuals
January 2022 - December 2023 Estimates
Docket Number E-7, Sub 1265
North Carolina Found Revenues

					Estimated KWH			Decision Tree
	2018	2019	2020	2021	2022	2023	Total	Node
Economic Development	507,965,880	285,918,000	330,562,641	159,451,000	-	-	1,283,897,521	Box 5 - exclude
Plug-in Electric Charging Station Pilot	-	-	-	-	-	-	-	Box 3 - exclude
Lighting							-	
Residential	62,832	48,249	33,562	37,786	37,786	37,786	258,001	Box 6 - include
Non Residential (Regulated)	67,443	105,681	130,447	170,265	170,265	170,265	814,366	Box 6 - include
MV to LED Credit - Residential (Regulated)	(150,968)	(113,648)	(50,351)	-	(83,771)	(93,425)	(492,163)	Box 6 - include
MV to LED Credit - Non-Residential (Regulated)	(248,852)	(232,984)	(367,126)	(335,262)	(586,397)	(653,974)	(2,424,596)	Box 6 - include
Total KWH	507,696,335	285,725,298	330,309,173	159,323,789	(462,117)	(539,348)	1,282,053,130	
Total KWH Included	(269,545)	(192,702)	(253,468)	(127,211)	(462,117)	(539,348)	(1,844,391)	
Total KWH Included (net of Free Riders 15%)	(229,113)	(163,797)	(215,448)	(108,129)	(392,800)	(458,446)	(1,567,733)	
Annualized Found Revenue - Non Residential	$ (96,542)	$ (69,401)	$ (135,345)	$ (102,594)	$ (284,340)	$ (334,372)	$ (1,022,593)	
Annualized Found Revenue - Residential	$ (59,309)	$ (44,621)	$ (12,066)	$ 27,460	$ (21,417)	$ (27,568)	$ (137,521)	

	2018	2019	2020	2021	2022	2023	Total
Vintage 2014 - Non Res							-
Vintage 2015 - Non Res	(13,108)						(13,108)
Vintage 2016 - Non Res	(30,720)	(10,169)					(40,889)
Vintage 2017 - Non Res	(47,791)	(47,791)	(21,240)	-			(116,823)
Vintage 2018 - Non Res	(51,711)	(96,542)	(56,316)	-	-		(204,569)
Vintage 2019 - Non Res		(24,424)	(54,495)	(27,392)	(19,040)	-	(125,351)
Vintage 2020 - Non Res			(54,740)	(470,426)	(112,798)	(67,891)	(705,855)
Vintage 2021 - Non Res				(37,627)	(102,594)	(102,594)	(242,814)
Vintage 2022 - Non Res					(154,017)	(284,340)	(438,357)
Vintage 2023 - Non Res						(181,118)	(181,118)
Net Negative Found Revenues to Zero*	143,330	178,925	186,791	535,445	388,450	635,942	2,068,884
Subtotal - Non Res	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vintage 2014 - Res							-
Vintage 2015 - Res	(17,981)						(17,981)
Vintage 2016 - Res	(39,657)	-					(39,657)
Vintage 2017 - Res	(50,953)	(32,706)	(14,824)	-			(98,484)
Vintage 2018 - Res	(28,325)	(59,309)	(34,597)	-	-		(122,230)
Vintage 2019 - Res		(18,413)	(34,847)	(17,075)	(11,862)	-	(82,197)
Vintage 2020 - Res			(3,392)	(10,517)	(10,517)	(7,690)	(32,115)
Vintage 2021 - Res				18,279	27,460	27,460	73,198
Vintage 2022- Res					(11,601)	(21,417)	(33,018)
Vintage 2023- Res						(14,933)	(14,933)
Net Negative Found Revenues to Zero*	136,917	110,428	87,659	9,313	6,520	16,580	367,417
Subtotal - Residential	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Found Revenues	$ -	$ -	$ -	$ -	$ -	$ -	$ -

* Eliminates the inclusion of total negative found revenues at the Residential and Non-Residential level

Evans Exhibit 5

Duke Energy Carolinas
System Event Based Demand Response January 1, 2021 - December 31, 2021
Docket Number E-7, Sub 1265

Date	State	Program Name	Event Trigger	High / Low System Temp	Customers Notified	Load Control Devices or Participating Thermostats	MW Reduction (at Generator)
1/11/2021	NC and SC	EnergyWise Business	M&V Event	46/29	461	792	2
1/29/2021	NC and SC	EnergyWise Business	M&V Event	46/22	461	792	2
2/2/2021	NC and SC	EnergyWise Business	M&V Event	45/32	463	797	3
2/4/2021	NC and SC	EnergyWise Business	M&V Event	49/20	463	797	3
3/8/2021	NC and SC	EnergyWise Business	M&V Event	64/28	472	809	3
5/26/2021	NC and SC	EnergyWise Business	M&V Event	91/68	6,573	11,358	2
6/30/2021	NC and SC	Power Manager - LCD	Full-shed System Test	90 / 71	239,383	289,278	297
7/1/2021	NC and SC	Power Manager - Thermostat	System Test	89 / 72	33,217	31,729	86
7/16/2021	NC and SC	Power Manager - LCD	M&V Event	91 / 73	239,599	289,478	209
7/28/2021	NC and SC	Power Manager - LCD	M&V Event	92 / 71	239,404	289,219	235
7/28/2021	NC and SC	EnergyWise Business	M&V Event	92 / 71	6,575	11,364	10
7/30/2021	NC and SC	Power Manager - Thermostat	M&V Event	91 / 75	30,500	34,442	32
7/30/2021	NC and SC	EnergyWise Business	M&V Event	91 / 75	6,561	11,364	10
8/11/2021	NC and SC	Power Manager - Thermostat	M&V Event	93 / 72	5,000	5,335	5
8/11/2021	NC and SC	Power Manager - LCD	M&V Event	93 / 72	10,000	11,922	11
8/12/2021	NC and SC	Power Manager - Thermostat	M&V Event	92 / 72	28,667	27,986	32
8/12/2021	NC and SC	Power Manager - LCD	M&V Event	92 / 72	5,000	5,959	5
8/12/2021	NC and SC	EnergyWise Business	M&V Event	92 / 72	6,565	11,333	10
8/13/2021	NC and SC	Power Manager - Thermostat	M&V Event	95 / 71	5,000	5,483	5
8/13/2021	NC and SC	Power Manager - LCD	M&V Event	95 / 71	5,000	5,963	4
8/23/2021	NC and SC	Power Manager - Thermostat	M&V Event	91 / 71	28,858	24,372	32
8/23/2021	NC and SC	Power Manager - LCD	M&V Event	91 / 71	5,000	5,963	6
8/24/2021	NC and SC	Power Manager - Thermostat	M&V Event	93 / 72	5,000	5,276	6
8/24/2021	NC and SC	EnergyWise Business	M&V Event	93 / 72	6,555	11,333	10
8/27/2021	NC and SC	Power Manager - LCD	M&V Event	90 / 72	5,000	5,959	3
8/30/2021	NC and SC	Power Manager - Thermostat	M&V Event	92 / 70	5,000	5,487	5
8/30/2021	NC and SC	Power Manager - LCD	M&V Event	92 / 70	10,000	11,922	8
9/13/2021	NC and SC	Power Manager - LCD	M&V Event	88 / 65	5,000	5,963	3

Notes:
- The 'High / Low System Temperature' is the average of the daily high & low temperatures from across the DEC region.
- 'Customers Notified' is the number of participants included in the event; only Power Manager - Thermostat customers are notified of the event.
- 'Load Control Devices' values represent the number of active switches; 'Participating Thermostats' values represent thermostats that participated during the entire event.
- 'MW Reduction' is an estimated number based on observed reduction in system load, or estimates based on the size of the controlled group.

Duke Energy Carolinas, LLC – Executive Summary

A. Description

During the first quarter 2019, Duke Energy Carolinas product managers prepared reports on each program describing the offerings and detailing each program's performance. This Executive Summary describes how the Company performed at an aggregate level during the full year of Vintage 2019 in comparison to as-filed information. Program-specific details are provided in the individual reports.

Program reports include:

Program	Category	Customer
Energy Assessments	EE	Residential
Energy Efficient Appliances and Devices	EE	Residential
Energy Efficiency Education Programs	EE	Residential
Residential – Smart $aver Energy Efficiency Program (HVAC EE)	EE	Residential
Income Qualified Energy Efficiency and Weatherization Assistance	EE	Residential
My Home Energy Report	EE	Residential
Multi-Family Energy Efficiency	EE	Residential
Non-Residential Smart $aver Prescriptive	EE	Non-residential
Non-Residential Smart $aver Custom	EE	Non-residential
Non-Residential Smart $aver Custom Assessment	EE	Non-residential
Non-Residential Smart $aver Performance Incentive	EE	Non-residential
Small Business Energy Saver	EE	Non-residential
EnergyWise for Business	EE/DSM	Non-residential
Power Manager	DSM	Residential
PowerShare	DSM	Non-residential

Audience

All retail Duke Energy Carolinas customers who have not opted out.

B &C. Impacts, Participants and Expenses

The tables below include actual results for the full year of Vintage 2020 in comparison to as-filed data for Vintage 2020.

The Company includes the number of units achieved and a percentage comparison to the as filed values. The unit of measure varies by measure as a participant, for example, may be a single LED bulb, a kW, a kWh, a household or a square foot. Due to the multiple measures in a given program or programs, units may appear skewed and are not easily comparable.

Carolinas System Summary[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	**$376.4**	**$291.3**	**77%**
Program Cost	**$143.3**	**$109.0**	**76%**
MW[2]	**1,186.8**	**961.9**	**81%**
MWH	**760,218.9**	**636,221.3**	**84%**
Units	**74,821,797**	**50,112,694**	**67%**

1) Values are reflected at the system level.

2) As filed MW are annual maximum peak. Coincident peak is tracked for impacts.

Duke Energy Carolinas, LLC – Executive Summary

Carolinas Demand Response Summary[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$129.9	$101.8	78%
Program Cost	$40.2	$32.9	82%
MW[2]	1,024.2	818.3	80%
MWH	2,557.6	1,436.4	56%
Units[3]	967,959	773,172	80%

1) Values are reflected at the system level.
2) MW capability derived by taking the average over the PowerShare and PowerManager contract periods.
3) Units included in filing represented kW at meter, rather than number of participants. YTD value reflects average participation for 2021.

Carolinas Energy Efficiency Summary[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$246.5	$189.5	77%
Program Cost	$103.2	$76.1	74%
MW[2]	162.6	143.6	88%
MWH	757,661.3	634,784.9	84%
Units	73,853,838	49,339,521	67%

1) Values are reflected at the system level.
2) As filed MW are annual maximum peak. Coincident peak is tracked for impacts.

D. Qualitative Analysis

Energy efficiency impacts have primarily been driven by lighting measures for both residential and non-residential customers. This is a result of a higher take-rate for lighting offerings than originally projected.

Highlights

Energy Efficiency
Customer participation continues to be largely driven by lighting and assessments programs. These measures provide customers with a relatively low-cost efficiency upgrade, with minimal effort, creating a positive initial energy efficiency experience.

Demand Side Management (DSM)
The DSM portfolio is comprised of PowerShare (non-residential), Power Manager (residential), and EnergyWise for Business (non-residential) programs. The impacts and participation were very close to the 2019 as-filed targets.

Issues

A few of the Company's programs filed for program modifications at the close of the year. The Company faces a significant challenge with reductions in avoided costs, making programs and their measures potentially less impactful. As a result of this and other factors, the Company's continued assessment of its portfolio may result in the removal of or change in measures.

Potential Changes

Duke Energy Carolinas, LLC – Executive Summary

Several programs are reviewing their current processes and are considering potential changes to increase customer adoption. Potential changes are discussed in individual program reports.

E. Marketing Strategy

Located in individual reports.

F. Evaluation, Measurement and Verification

Located in individual program reports.

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My Home Energy Report

A. Description

The My Home Energy Report ("MyHER" or the "Program") is a periodic usage report that compares a customer's energy use to similar residences in the same geographical area based upon the age, size and heating source of the home. The report includes recommendations to encourage energy saving behaviors. Customers with email addresses on file receive an electronic version of their reports monthly.

Customers receive reports up to 12 times per year via paper and electronic delivery. (Delivery may be interrupted during the off-peak energy usage months in the fall and spring.) The report delivers energy savings by encouraging customers to alter their energy use. Customer's usage is compared to the average homes (top 50 percent) in their area as well as the efficient homes (top 25 percent). It also suggests energy efficiency improvements, given the usage profile for that home. In addition, the report recommends measure-specific offers, rebates or audit follow-ups from the Company's other programs, based on the customer's energy profile. As of January 1, 2022, over 1.2 million single-family DEC customers and over 164 thousand multi-family DEC customers receive the MyHER report.

The MyHER interactive online portal allows customers to learn more about their energy use and about opportunities to reduce their usage. Customers can set goals, track their progress, and receive more targeted tips. As of January 1, 2022, over 39 thousand single-family customers and over 5 thousand multi-family customers were enrolled on the portal.

Audience

Target customers reside in individually metered, single-family and multi-family residences with active accounts and 13 months of concurrent service from Duke Energy Carolinas, LLC (the "Company"). Single-family residences receive up to 8 printed reports and, if they have an email address on file, 12 electronic reports. Multi-family residences with registered email addresses with the Company receive up to 4 printed reports and 8 electronic reports. Multi-family residences without registered email addresses with the Company receive up to 6 printed reports a year with a strong call to action to provide their email addresses.

B & C. Impacts, Participants and Expenses

My Home Energy Report[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$22.8	$21.3	93%
Program Cost	$12.9	$7.1	55%
MW[2]	95.0	93.4	98%
MWH[2]	342,161	336,292	98%
Units[3]	1,408,963	1,376,708	98%

1) Values are reflected at the system level.
2) Values represent the annual MW and MWH savings associated with the December 2021 month end participation.
3) At month-end December 2021, single-family participation was 1,212,050, while multifamily participation was 164,658

D. Qualitative Analysis

As customers receive subsequent reports and learn more about their specific energy use and how they compare to their peer group, their engagement increases. The report then provides tools in the form of targeted energy efficiency tips with actionable ideas to become more efficient. Program participants are encouraged to contact the Company with their questions, comments and report corrections. Report corrections continue to generate the largest number of inquiries. Customers wishing to be removed from the Program in 2021 represent 0.03% Program participants.

My Home Energy Report

Highlights

In 2021, the program launched a new MyHER design for the paper and email reports as well as an updated interactive website with new insights for customers. New website capabilities for customers include single sign on (a more seamless way to sign in to the site using Duke Energy credentials), updated profile experience that updates usage disaggregation real time, current week and month daily comparisons of energy usage compared to similar homes, and the ability for customers to see how their monthly energy usage by category compares to other similar homes.

In Q4 2021, the program also launched the first Seasonal HER experience. This winter seasonal HER sent to customers via paper, email, also had a new web page that highlights for customers their heating usage, how it compares to similar homes, and provides a checklist of tips to complete that would reduce heating usage and heat loss in the home.

E. Marketing Strategy

The Program is marketed on the reports themselves by referring customers to the program website for additional information, Frequently Asked Questions (“FAQs”) and contact resources. The MyHER Interactive portal is marketed by email campaigns as well as in the printed report.

In 2021, the program continued on-report marketing campaigns and introduced a new Welcome Letter mailed to all customers with their report to further awareness of the interactive portal.

F. Evaluation, Measurement and Verification

A combined DEC/DEP evaluation, covering the period Jan 2020 – Dec 2020, is currently underway with a planned completion date in the fourth quarter of 2021.

Energy Efficient Appliances and Devices

A. Description

The Energy Efficient Appliances and Devices program ("Program") offers a variety of measures to eligible Duke Energy Carolinas, LLC (the "Company") customers to facilitate a reduction in their energy consumption. The Program includes offers for lighting, water measures, smart strips and smart thermostats through the online store, website and points of purchase.

Specialty Lighting

The Duke Energy Savings Store ("Store") is an on-demand ordering platform enabling eligible customers to purchase a variety of energy efficient products for their home. The Store launched on April 26, 2013, and offers a variety of Light Emitting Diodes lamps ("LEDs"), smart thermostats, smart strips, water fixtures, and small appliances. The incentive levels vary by product, and the customer pays the difference. Various promotions are run throughout the year, offering customers reduced prices as well as shipping promotions, ranging from free to a reduced flat rate price.

The maximum number of incented products are listed below with the associated limits (per account)

- LED lighting, 36 per account.
    - LED lighting product offering is comprised of - reflectors, globes, candelabra, 3-way, dimmable bulbs. The incentive levels vary by bulb type
- Smart thermostats, 2 total
- Water measures, 3 total
- Smart Strips, 4 total
- LED fixtures (direct wires, portable, & outdoor photocell), limit 8 total
- Small appliance, dehumidifiers & air purifiers, limit 2 each total

Customers may choose to order additional products without the Company's incentive.

The Store is managed by a third-party vendor, Uplight, Inc. (Uplight). Uplight is responsible for maintaining the Store website, fulfilling all customer purchases, supporting the program call center, and recommending products. The store's landing page provides information about the store, product offerings, highlights promotions, account information and order history. Support features include a toll-free number, email, chat, package tracking and frequently asked questions.

Educational information is available to help customers with their purchase decisions. This information includes videos and documents that speaks to how the customer can reduce their energy usage while maintaining comfortable atmosphere within their home.

Product pages include application photos, product images, product specifications, purchase limits, and program pricing. Customers may place items in their shopping carts to purchase later. Customers can pay for their purchases with a credit card in the check-out process.

Retail Lighting

The Retail Lighting Program's primary objective is the reduction of electric energy consumption and peak demand through increased awareness and adoption of energy-efficient lighting technologies. The program partners with retailers and manufacturers across North and South Carolina to provide price markdowns on customer purchases of efficient lighting. The product mix includes Energy Star-rated standard, reflector, and specialty LEDs and fixtures. Participating retailers include a variety of store types, including Big Box, DIY, and discount stores.

The program promotes customer awareness and the purchase of program-discounted products through a range of marketing and outreach strategies, that may include in-store collateral, bill inserts, direct mail

Energy Efficient Appliances and Devices

and email marketing, mass media advertising, and online advertising. The program also provides training to store staff to enable better customer education at the point of purchase. Ensuring customers are purchasing the right bulb for the application through proper customer education is imperative to obtain high satisfaction with lighting products and subsequent purchases.

Water Measures

The Save Energy and Water Kit Program ("SEWK") launched in 2014. The Program is designed to increase the energy efficiency of residential customers by offering customers energy efficient water fixtures and insulating pipe tape for use within their homes.

The SEWK program is offered through a selective eligibility process, enabling eligible customers to request a kit and have it shipped directly to their homes. Customers owning and living in a single-family home with an electric water heater and who have not received similar measures through another Company-offered energy efficiency program are eligible for the program. Kits are available in two sizes for homes with one or more full bathrooms and contain varying quantities of shower heads, bathroom aerators, a kitchen aerator and insulating pipe tape. Program participants are eligible for one kit shipped free of charge to their homes. Also, customers are able to upgrade the showerhead(s) in the kit from a standard showerhead to either a wide pattern or wand showerhead at low cost.

Customers are pre-screened based on the eligibility requirements. Marketing channels include both a direct mail business reply card ("BRC") and direct email. Customers receiving the BRC may choose to return the BRC, navigate to a redemption website listed on the card, or call a toll-free number to take advantage of the offer. Customers receiving a direct email simply click on a redemption link to redeem the offer online. Upon receiving the order from the customer through one of the methods above, the vendor ships the kit to the customer. Due to the unique eligibility requirements of this program, BRCs and direct email are the only two methods being used to solicit customers for participation.

Audience

Customers who meet the Program eligibility requirements.

B &C. Impacts, Participants and Expenses

Energy Efficient Appliances and Devices[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$26.1	$25.5	98%
Program Cost	$10.6	$10.8	102%
MW	9.8	8.8	90%
MWH	56,621.9	51,701.2	91%
Units	1,563,048	2,404,965	154%

1) Values are reflected at the system level.

D. Qualitative Analysis

Specialty Lighting

Highlights

The Online Savings Store provides an ecommerce platform that allows customers to purchase a variety of energy efficient products, including LEDs, smart thermostats, smart strips and more, at any time. In the last half of 2021, the program completed a vendor transition for the ecommerce platform to enhance the customer shopping and check-out experience. The new Online Savings Store launched at the beginning

Energy Efficient Appliances and Devices

of December. During 2021, the program delivered 77,951 bulbs, 11,301 smart thermostats, 682 smart strips, 180 water products, 327 LED fixtures, 212 air purifiers and 161 dehumidifiers to customers.

Issues
Educating and bringing awareness to the variety of products in the Store to eligible customers is the program's primary issue.

Potential Changes
The program continues to explore opportunity to facilitate ease of use shopping online as well as additional product offerings for consideration to enhance energy savings.

Retail Lighting

Highlights
In 2021, the program moved a total of 2,050,774 measures, including 1,669,540 LEDs and 381,234 fixtures into customers' homes.

The DEC Energy Efficiency Program had 9 lighting retail channels actively participating in 2021. While the top three retail channels account for 80% of the program sales, all retail channels are important in that they allow access to the program for a widely diverse and geographically spread population of DEC customers. Locations are selected to ensure that the Program reaches 90% of customers within 30 miles of a participating retail location.

In addition, a key strategy for the program was continuing to increase its presence in Hard-to-Reach stores that have a high propensity of shoppers that would not adopt EE lighting had incentives not been made available to patrons at these locations. These stores include Dollar Tree, Habitat ReStore, Goodwill and Family Dollar. Overall, approximately 64% of program sales came from these types of stores.

The Program operated efficiently with 79% of overall Program costs going directly to customers in the form of incentives. Most of the remaining Program costs (20%) were spent on implementation and administration of the Program. The remaining 1% of costs were spent on marketing and labor.

Issues

Despite continued success in 2021, effects of the COVID-19 pandemic remain on the program's radar. These included:

- Suspension of in-field store visits (training of store staff, proper placement of POP) during the first few weeks of 2021 as cases of COVID-19 remained high. This action limited exposure of field team in stores for not only their safety, but that of store patrons and staff. This suspension was lifted in late Q1.
- Continued suspension of in-store and community events promoting the program and its product offering.

The Program continues to monitor this closely while adhering to Duke Energy Customer Engagement Safety Protocols.

Potential Changes
The Program will continue to evaluate the market and adjust products and incentive levels as necessary, focusing on specialty applications and strategically targeting underserved customers through select channels and events.

Energy Efficient Appliances and Devices

In addition, the program received internal approval to move forward expanding its offering to include incentives on non-lighting measures. These measures include Smart Thermostats, Air Purifiers, Dehumidifiers, and Ceiling Fans. To take advantage of the program offers, store patrons will need to validate that they are a Duke Energy customer by accessing the instant rebate portal on their smart phone or personal computer. If eligible, the customer will receive a barcode to be scanned at checkout to receive the instant rebate.

Duke Energy has selected a vendor to administer the program and is in the process of developing a statement of work. Currently, the program projects to launch in Q2 2022.

Save Energy and Water Kit Program

Highlights
During 2021, the program distributed approximately 263,367water measures in over 27,000 kits to Duke Energy customers in the Carolinas. The kits delivered 55,626 bathroom aerators, 27,813 kitchen aerators, 40,863 showerheads and 139,065 feet of pipe insulation. The program upgraded the standard showerhead in the kit to the wide showerhead effort to increase installation rates. Of customers that redeemed the offer, 10% chose to upgrade their kit to either a wand showerhead.

Issues

The program continues to review customer satisfaction surveys to identify opportunities for improvement with installation rates and overall customer satisfaction.

Potential Changes
The program transitioned to a new vendor in Q4 of 2021, AM Conservation. The program will utilize BRC's and offering an online platform for customers to request and upgrade the kit showerheads. AM Conservation will provide a new fresh look and improved customer journey which will increase customer participation, installation and satisfaction.

E. Marketing Strategy

Specialty Lighting
Since the launch of the Store, the marketing efforts include the following:
- bill messages
- bill inserts
- email campaigns
- direct mail
- and other digital media channels

Awareness and education will continue to be a focus in collateral messages to eligible customers, as well as highlighting great pricing and other promotional offerings such as free shipping.

Retail Lighting

The program's marketing efforts for 2021 included the following:

- Point of purchase materials at participating retailer locations
- Duke Energy Program website
- General awareness email and direct mail campaigns

Energy Efficient Appliances and Devices

- Cross-promotional opportunities in via internal marketing channels (Other programs, Residential newsletters)

In general, these marketing efforts are designed to create customer awareness of the Program, to educate customers on energy saving opportunities, and to emphasize the convenience of Program participation.

As a result of the COVID-19 pandemic, the program has suspended its normal advertised events at key retailers as well as community outreach events (national night out, cultural events, etc.) until further notice. This decision will be evaluated on a regular basis with activities only resuming when appropriate conditions permit.

Save Energy and Water Kit Program

The overall strategy of the program is to reach residential customers who have not adopted low flow water devices.

Both direct mail marketing in the form of BRCs and direct email are the current marketing channels being used by this program in the Carolinas.

F. Evaluation, Measurement and Verification

Residential Lighting

The evaluation for the DEC/DEP Online Saving/Marketplace Program is currently underway with a completion date planned for the fourth quarter of 2021.

The DEC/DEP Retail Lighting evaluation is tentatively scheduled to commence in first quarter 2022 with planned completion in the third quarter of 2022. This revised timeframe reflects an extension to allow for increased participation in the hard-to-reach retailer channels.

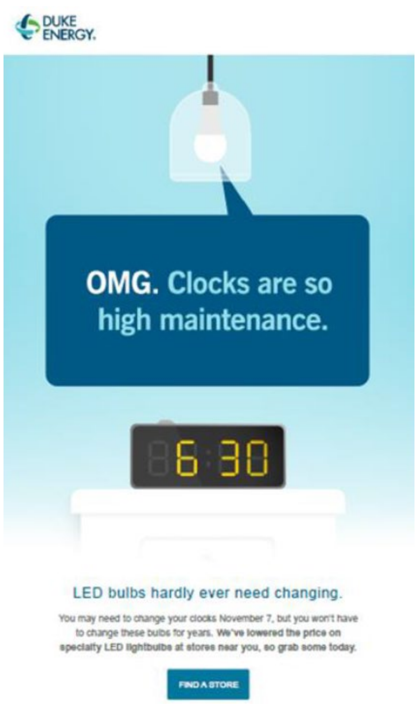
Save Energy & Water

The next evaluation for a combined DEC/DEP evaluation is scheduled to begin activities in mid-2021, with a final report scheduled for mid-2022. As part of this evaluation, the evaluator will also survey non-participants to better understand their decisions to not participate in the program.

G. Appendix

Energy Efficient Appliances and Devices

Retail Lighting General Awareness Emails:



Energy Efficiency Education Program

A. Description

The Energy Efficiency Education Program ("Program") is available to students in grades K-12 enrolled in public and private schools in the Duke Energy Carolinas (the "Company" or "DEC") service territory. The current curriculum administered by The National Theatre for Children ("NTC") provides performances in elementary, middle and high schools.

The Program provides principals and teachers with an innovative curriculum to educate students about energy, resources, how energy and resources are related, ways energy is wasted, and how to be more energy efficient. The centerpiece of the curriculum is a live theatrical production focused on concepts such as energy, renewable fuels and energy efficiency and performed by two professional actors. Teachers receive supportive educational material for classroom and student take-home assignments. The workbooks, assignments and activities meet state curriculum requirements.

School principals are the main point of contact for scheduling their school's performance at their convenience. Two weeks prior to the performance, all materials are delivered to the principal's attention for classroom and student distribution. Materials include school posters, teacher guides, and classroom and family activity books.

Students are encouraged to compete a request form with their families (found in their classroom and family activity book, as well as online) to receive an Energy Efficiency Starter Kit. The kit contains specific energy efficiency measures to reduce home energy consumption. It is available at no cost to eligible Duke Energy customer households at participating schools.

Similar to 2020, many of the aspects of the Energy Efficiency Education program continued to be impacted by the COVID-19 pandemic in 2021. No in-person school performances were permitted for the entire year. As a result, the program continued to offer livestream performances so school and students could still participate. More details are provided below in section D.

Audience

Eligible participants include the Company's residential customers who reside in households served by Duke Energy Carolinas with school-age children enrolled in public and private schools.

B &C. Impacts, Participants and Expenses

Energy Efficiency Education[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$3.0	$1.5	50%
Program Cost	$2.3	$1.1	50%
MW	1.0	(1.2)	-120%
MWH	7,951.6	7,013.2	88%
Units	29,354	13,894	47%

1) Values are reflected at the system level.

D. Qualitative Analysis

Highlights

The Company is supporting arts and theatre in schools while providing an important message about energy efficiency for students through an innovative delivery channel. Enhancing the message with a live theatrical production captivates the students' attention and reinforces the classroom curriculum materials provided.

Energy Efficiency Education Program

Starting in the spring semester of the 2019-2020 school year, the COVID-19 pandemic brought on unprecedented challenges to the program with schools temporarily closing and reverting to virtual learning. As a result, live performances ceased on March 13, 2020. This continued to be the case in 2021.

The program continued to offer these educational performances via online livestream for all three levels of schooling beginning in the Fall semester. Given the uncertainty around whether or not a school is remote learning or using a hybrid plan, the program offered time slots to schools to view a live host providing educational information and narrating between four different segments of the theatrical performance that would normally be given in schools by professional acting troupes. In addition, for added flexibility, the program offered a video recording of a livestream performance for schools/classrooms that preferred to share the content when it best fit into their lesson plan, at a later date. This livestream/video recording delivery model continues to be used here in early 2022.

Consistent with past years, each performance had content that was appropriate with its educational level. In the Spring, Elementary schools were able to view livestream performances of “Space Station Conservation”; “The Conservation Crew” was made available to Middle schools and High Schools were able to watch “Your Plant, Your Future”. For the Fall 2021 Semester, the aforementioned titles were replaced with “Nikki Neutron’s Energy Adventure”, “Energy Agents” and “Global Gamble” respectively. Though these titles changed for 2021-2022 school year, the core of the educational content remained the same; as has been the case in previous years. Students and teachers also had access to a Q&A with the host and an e-learning package that includes games, quizzes and lesson plans for the class that reinforce concepts from the show.

Overall, in 2021, a total of 550 schools participated in the program in the Company’s DEC service territory, reaching approximately 152,000 students and spurring the distribution of 13,984 kits.

Once an eligible customer submits a completed energy efficiency, the Energy Efficiency Starter Kit is shipped for delivery within two to four weeks.

In order to help encourage student participation, the program vendor, The National Theatre for Children, rewarded teachers $50 for every 20 Energy Efficient kit requests. Additionally, various rewards for schools and participating families were offered to encourage additional kit requests.

Updates

The Company continues to enhance the Program by the following:

- Introducing new productions each school year to refresh and refocus the materials and scripts to keep participating schools engaged.
- Promoting the program through social media to encourage awareness, recognition and participation.
- Partnering with Duke Energy Account and District Managers to leverage existing relationships in the community to develop positive media stories while encouraging kit sign ups.
- Enhancing the offering by providing educational materials for all student households, but particularly those that have already received the current Energy Efficiency Starter Kit as well as non-Duke Energy customer student households; both of which are ineligible for an EE Starter Kit.
- Inclusion of the Kilowatt Krush mobile gaming application that will allow users to learn about smart energy use and conservation through an engaging arcade of action-packed, energy themed games. Students build and customize virtual houses in the neighborhood of their choice while learning about energy efficiency and safety education.

E. Marketing Strategy

Energy Efficiency Education Program

The National Theatre for Children is responsible for all marketing campaigns and outreach. The marketing channels may include but are not limited to the following:

Direct mail (letters to school administrators)
Email
In-Person
Program Website
Events or assemblies
Printed materials for classrooms
Social media promotions

These marketing efforts engage students and their families in energy conservation behavior and provide energy saving opportunities through the Energy Efficiency Starter kits.

F. Evaluation, Measurement and Verification

Evaluation work is currently underway for the period covering August 2019 – July 2020. The final DEC/DEP evaluation report is scheduled to be completed in the third quarter of 2021. At this point in the evaluation, the evaluator expects to estimate savings reductions via consumption analyses.

Energy Assessments

A. Description

The Home Energy House Call Program ("Program") is offered under the Energy Assessment Program. Duke Energy Carolinas, LLC (the "Company") partners with several key vendors to administer the Program.

The Program provides a free in-home assessment performed by a Building Performance Institute ("BPI") certified energy specialist and designed to help customers reduce energy usage and save money. The BPI-certified energy specialist completes a 60- to 90-minute walk through assessment of a customer's home and analyzes energy usage to identify energy savings opportunities. The energy specialist discusses behavioral and equipment modifications that can save energy and money with the customer. The customer also receives a customized report that identifies actions the customer can take to increase the home's efficiency. Examples of recommendations might include the following:

- Turning off vampire load equipment when not in use.
- Turning off lights when not in the room.
- Using energy efficient lighting.
- Using a programmable thermostat to better manage heating and cooling usage.
- Replacing older equipment.
- Adding insulation and sealing the home.

In addition to a customized report, customers receive an energy efficiency starter kit with a variety of measures that can be directly installed by the energy specialist. The kit includes measures such as energy efficiency lighting, a low-flow shower head, low flow faucet aerators, outlet/switch gaskets, weather stripping, and an energy saving tips booklet.

Additionally, bath aerators and pipe wrap are also available for free at the time of the assessment. New discounted measures may be purchased and installed during the assessment including LED specialty lighting (i.e. Globes, Candelabra and Recessed), Hand-held Showerhead, Smart Thermostats and a Blower Door test.

Audience

Eligible Program participants are the Company's residential customers that own a single-family residence with at least four months of billing history and central air, electric heat or an electric water heater.

B &C. Impacts, Participants and Expenses

Energy Assessments[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	**$7.5**	**$3.3**	**43%**
Program Cost	**$6.1**	**$3.3**	**54%**
MW	**1.8**	**0.7**	**42%**
MWH	**14,921.4**	**6,591.0**	**44%**
Units	**126,576**	**33,369**	**26%**

1) Values are reflected at the system level.

2) Units represent number of kits, and do not include additional LEDs.

D. Qualitative Analysis

Highlights

The Company continues with a multi-channel approach which includes Duke Energy website pages, website banners, online services banner, paid search campaigns, Facebook, email, bill inserts, bill messages, direct mail, and customer segmentation to reach customers with a high propensity to participate. Examples of online, bill inserts and direct mail promotions are available in the appendix. Program staff explores other channels for marketing campaigns to reach the target audience and maximize both program performance as well as customer experience.

Vendors, partners and the team at Duke Energy collaborate regarding marketing initiatives, future scheduling, availability, routing, targeting, backlog, etc. to drive efficient operations as well as customer satisfaction.

Through December 31, 2021, the program conducted 8496 assessments. The program additionally installed 7565 feet of pipe insulation and 1523 additional bathroom aerators. The program also installed the following discounted measures: 4963 specialty LED globes, 3873 recessed bulbs, 5802 candelabra LEDs, 285 Hand-held Showerheads, 5 Blower Door audits and 857 Smart Thermostats were installed to eligible customers. The program continues to focus on maximizing the number of measures installed as well as cross-promoting other Duke Energy programs and offerings.
The program continues to focus on cross promotion of other programs and integration of in-field referrals for FindItDuke.

Potential Changes

Some program enhancements to increase the effectiveness of the Program being considered include the following:

- Continuing to optimize the online scheduling tool to enhance the customer experience
- Evaluating Virtual Audit capabilities to included townhomes/condos/Manufactured homes.
- Implementing post audit follow up with reminders of recommendations/referrals.

Issues

The program was shut down again in January due to the continuing Covid pandemic issues in 2021. Duke has continued working collaboratively with the vendor to build safety protocols, procedures and use of Personal Protective Equipment (PPE) into the assessment process for the relaunch that occurred on March 23.

Also, the program delayed the training and launch of the Blower Door measure until December 1st of 2021, due to the Covid pandemic and additional time required for training while in the home.

The program continues to coordinate closely with the vendor to monitor incoming demand, to balance marketing and to ensure adequate appointment slots are available

E. Marketing Strategy

Program participation continues to be driven through a multichannel approach including targeted mailings to pre-qualified residential customers, bill inserts, online promotions and online video. For those who elect to receive offers electronically, email marketing continues to be used to supplement direct mail. The Program management team continues to explore additional channels to drive awareness such as social, event marketing and other cross-promotional opportunities. The creative team continues to drive engagement and interest in the program based on online survey results and enrollment. In between larger initiatives, such as bill inserts, the program utilizes direct mail which can easily be modified based on demand. Core messaging remains simple and focused on key benefits—a free energy assessment from

Energy Assessments

Duke Energy can help save energy and money while also increasing comfort and it only takes three easy steps (You Call, We Come Over, You Save).

Home Energy House Call program information and an online assessment request form are available at www.duke-energy.com.

F. Evaluation, Measurement and Verification

To accommodate the additional measures now included in the energy assessment program and to work around the program suspension due to COVID, the evaluation timeframe has been pushed back to cover the period Sept 2020 – Aug 2021. The activities will begin in earnest in Fall 2021 with a final report scheduled for First Quarter 2023.

It is anticipated that the evaluation will consist of a billing analysis that will compare the consumption of program participants to future program participants. Engineering estimates for the kit measures will also be conducted to provide insight into the behavioral impacts achieved through the program and to provide impacts for the Additional Bulbs and other optional measures provided to program participants. Participants surveys will be used to determine in-service rates and determine free ridership at the measure level.

The process evaluation will consist of participant surveys which will identify barriers to participation, improve program processes and assess overall participant satisfaction.

Income-Qualified Energy Efficiency and Weatherization Assistance Program

A. Description

The purpose of the Low Income Energy Efficiency and Weatherization Assistance Program ("Program") is to assist low income customers with installing energy efficiency measures in their homes. There are three offerings currently in the Program:

- Neighborhood Energy Saver ("NES")
- Weatherization and Equipment Replacement Program ("WERP")
- Refrigerator Replacement Program ("RRP").

WERP and RRP are available for income-qualified customers in Duke Energy Carolinas, LLC's (the "Company's") service territory for existing, individually metered single-family homes, condominiums, and mobile homes. Funds are available for (i.) weatherization measures and/or (ii.) heating system replacement with a 15 or greater SEER heat pump, and/or (iii.) refrigerator replacement with an Energy Star appliance. The measures eligible for funding will be determined by a full energy audit of the residence. Based on the results of the audit, customers are placed into a tier based on energy usage so that high energy users to receive more extensive weatherization measures. (Tier 1 provides up to $600 for energy efficiency services; and Tier 2 provides up to $4,000 for energy efficiency services, including insulation and up to $6,000 for HVAC replacement.) WERP and RRP are delivered in coordination with State agencies that administer the state's weatherization programs.

Customers participating in NES receive a walk-through energy assessment to identify energy efficiency opportunities in the customer's home and a one-on-one education on energy efficiency techniques and measures. Additionally, the customer receives a comprehensive package of energy efficient measures. NES participants may have the measures listed below installed in their homes based on the opportunities identified during the energy assessment.

1. Energy Efficient Bulbs - Up to 15 energy efficient bulbs (LEDs) to replace incandescent bulbs
2. Electric Water Heater Wrap and Insulation for Water Pipes
3. Electric Water Heater Temperature Check and Adjustment
4. Water Saving Faucet Aerators - Up to three faucet aerators
5. Water Saving Showerheads - Up to two showerheads
6. Wall Plate Thermometer
7. HVAC Winterization Kits – Up to three kits for wall/window air conditioning units will be provided along with education on the proper use, installation and value of the winterization kit as a method of stopping air infiltration.
8. HVAC Filters - A one-year supply of HVAC filters will be provided along with instructions on the proper method for installing a replacement filter.
9. Air Infiltration Reduction Measures - Weather stripping, door sweeps, caulk, foam sealant and clear patch tape will be installed to reduce or stop air infiltration around doors, windows, attic hatches and plumbing penetrations.

Audience

WERP is available to qualified customers in existing individually metered, owner-occupied single-family residences, condominiums or manufactured homes.

RRP is available to qualified customers in individually metered residences irrespective of whether the property owner or the tenant owns the refrigerator.

NES is available to individually metered residential customers in selected neighborhoods where ~50% of the homeowners have income equal to or less than 200% of the Federal Poverty Guidelines, based on third party and census data.

Income-Qualified Energy Efficiency and Weatherization Assistance Program

B &C. Impacts, Participants and Expenses

Income Qualified Energy Efficiency and Weatherization Assistance[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$5.3	$0.7	12%
Program Cost	$8.1	$4.6	57%
MW	1.7	0.2	9%
MWH	9,167.5	2,018.2	22%
Units	12,214	1,322	11%

1) Values are reflected at the system level.

D. Qualitative Analysis

Highlights

Neighborhood Energy Saver: After receiving regulatory approval from both the North Carolina Utilities Commission and the South Carolina Public Service Commission in the fall of 2012, the Program was officially launched by the Company in March 2013. The yearly goal is to serve a minimum of 7500 households. Honeywell Building Solutions was awarded the contract through a competitive bid process to administer the Program through 2021. Franklin Energy was awarded the contract for DEC through a competitive bid process beginning in January 2021

Following the Covid work stoppage, the Program started operating in March 2021 offering free walk-through energy assessments and installing measures in the homes of customers in Kannapolis, Charlotte, and Greensboro NC. NES 2.0 measures are evaluated for each customer, and installation began in July 2021. The NES 2.0 measures include:

1. Attic insulation
2. Duct sealing
3. Air sealing w/ blower door
4. Floor/Belly insulation for mobile homes
5. Smart Thermostat

Weatherization: The Company launched WERP and RRP in February 2015 in North and South Carolina. The Company selected the program administrator, North Carolina Community Action Agency (NCCAA), in December 2014 via competitive bidding. The company is working with the NC and SC Weatherization Agencies to deliver this program.

In 2021, 976 homes received weatherization in conjunction with the DOE weatherization program, with 183 refrigerators replaced, 98 Tier 1 services provided, 443 Tier 2 services provided, and 252 HVACs replaced

E. Marketing Strategy

Neighborhood Energy Saver: NES continues to target neighborhoods with a significant low-income customer base using a grassroots marketing approach to interact on an individual customer basis and gain trust. Participation is driven through a neighborhood kick-off event that includes trusted community leaders and local and state officials explaining the benefits of the Program. The purpose of the kick-off event is to rally the neighborhood around energy efficiency and to educate customers on methods to lower their energy bills. Customers have the option to make an appointment for an energy assessment at the time of the event. The community kick-off events were held virtually in the first half of 2021 in accordance with Covid operating procedures and transitioned to outdoor pop-up events in the later half of 2021 to maintain social distancing and other Covid safety protocols while engaging customers in person.

In addition to the kick-off event, the Company uses the following avenues to inform eligible customers about the Program:

- Direct mail (letters and reminder post cards)
- Door hangers
- Press releases and/or neighborhood flyers
- Community presentations and partnerships
- Inclusion in community publications such as newsletters, etc.

Weatherization: WERP and RRP plan to piggy-back the marketing efforts of the current state Weatherization Assistance Programs administered by the state weatherization service providers. Additionally, agencies may utilize referrals generated from other Company energy efficiency programs as well as from their existing pool of weatherization applicants.

Potential Changes
No potential changes,

F. Evaluation, Measurement and Verification

The DEC Weatherization report was completed in the 2nd Quarter of 2021 and presented at the July 2021 DEC/DEP Collaborative.

The next evaluation for DEC Weatherization is in the planning stage now, with a tentative completion date of Fourth Quarter 2022.

The combined DEC/DEP NES evaluation is also currently underway with a planned completion date in the fourth quarter of 2021.

Residential Smart $aver® Energy Efficiency Program

A. Description

The Residential – Smart $aver® Energy Efficiency Program ("Program") offers measures that allow eligible Duke Energy Carolinas, LLC (the "Company") customers to reduce energy consumption in the home. The Program provides incentives for the purchase and installation of eligible central air conditioner or heat pump replacements in addition to Wi-Fi enabled Smart Thermostats when installed and programmed at the time the heating ventilation and air conditioning (HVAC) system is installed. Program participants may also receive an incentive for attic insulation, air sealing, duct sealing, variable speed pool pumps, and heat pump water heaters.

Program staff is responsible for establishing relationships with HVAC and home performance contractors ("Trade Allies") who interface directly with residential customers. These Trade Allies market and leverage the Program to assist with selling these products and services to customers. Once the Trade Ally has sold the service/product, they complete and submit incentive applications on behalf of the customer. An incentive is disbursed to the customer after the application has been approved and processed.

Duke Energy contracts with a third-party vendor for application processing, incentive payment disbursement, and Trade Ally and customer call processing.

Audience

The Company's residential customers that meet the eligibility requirements of the Program may participate.

B &C. Impacts, Participants and Expenses

Residential - Smart $aver Energy Efficiency Program[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$4.5	$8.4	186%
Program Cost	$5.9	$8.1	137%
MW	1.3	2.6	190%
MWH	5,570.4	9,425.7	169%
Units	14,545	28,242	194%

1) Values are reflected at the system level.

D. Qualitative Analysis

Highlights

The Smart $aver ® incentive program finished the year with strong results. As of 12.31.21, Duke Energy Carolinas participation was 28,242, remaining consistent and slightly higher than 2020 results of 28,155.

The program team continues to emphasize best practices and to build support by offering additional training to the Trade Allies (i.e. streamlined rebate processing, rebate submission training, selling higher efficiency products) and modifications to program requirements when needed.

Customer engagement continues to be a focus of the Program especially through the "Find It Duke referral platform that positions Duke Energy as a trusted advisor by providing free home improvement referrals through a premier network of qualified contractors who deliver exceptional customer service.

The Find it Duke referral channel has seen a decrease in volume due to COVID-19 concerns during 2020 that carried into the first half of the year but rebounded during the second half of 2021. The program generated 9,661 DEC referrals for 2021, compared to 8,314 in 2020 and 8779 in 2019.

Residential Smart $aver® Energy Efficiency Program

Issues

The buy-in and participation of the Trade Ally network is vital to the success of the Program. Trade Allies are important to the Program's success because they interface with the customer during the decision-making event. Customers who responded to a survey to rate their experience provided an average contractor rating of 4.84 out of 5.0 stars during 2021.

E. Marketing Strategy

Promotion of the rebate Program is targeted to HVAC and home performance contractors as well as pool and plumbing contractors that install variable speed pumps and heat pump water heater technology.

Program information to educate customers about the Program and encourage participation and Trade Ally enrollment links are available on the Program's website. Increasing the overall awareness of the Program and the participation of Trade Allies ensures more customers are considering the benefits of the Program at the time of purchase. Rebate marketing materials remain in place throughout the Carolinas in Lowe's and Home Depot stores that inform customers about the rebates available and how to apply for them post-purchase. The Midstream channel has also been used to promote Pool Pump rebates through one national distributor along with local Pool Retailers throughout NC/SC.

Various customer marketing campaigns during the first half of 2021 leveraged channels such as TV, radio, social media and email messaging in order to build awareness of the referral service. Other marketing efforts, such as paid search and co-branded special offer campaigns throughout the year created awareness and drove referral volumes up for the channel.

F. Evaluation, Measurement and Verification

No evaluation activities occurred in 2021. The evaluation for the HVAC measures is scheduled for evaluation work to begin in mid-year 2022, with a completion date in mid-2023. The timeframe for a final report has been pushed out one year to allow additional participation in the referral component of the program.

Multi-Family Energy Efficiency Program

A. Description

The Multi-Family Energy Efficiency program ("Program") provides energy efficient lighting and water measures to reduce energy usage in eligible multi-family properties. The Program allows Duke Energy Carolinas, LLC (the "Company") to utilize an alternative delivery channel which targets multi-family apartment complexes. The measures are installed in permanent fixtures by Franklin Energy, the program administrator. Franklin Energy oversees all aspects of the Program including outreach, direct installations, and customer care.

The Program helps property managers save energy by offering energy efficient lighting and water products. The Program offers LED lighting measures including A-lines, globes, candelabras, recessed, and track bulbs, and energy efficient water measures such as bath and kitchen faucet aerators, water saving showerheads, pipe wrap and smart thermostats are available at a discounted price to Property Managers. Water measures are available to eligible customers with electric water heating. Customers are also able to purchase smart thermostats, and have them installed, at a discounted price. These measures assist with reducing maintenance costs while improving tenant satisfaction through lower energy bill
The Program offers a service where Franklin Energy installs the lighting, water measures and smart thermostats during scheduled visits. If the customer opts into purchasing the discounted smart thermostats, Franklin will also install those. Crews carry tablets to keep track of which measures are installed in each apartment.

After installations are completed, Quality Assurance ("QA") inspections are conducted on 20 percent of properties that completed installations in each month. The QA inspections are conducted by an independent third party. Any QA adjustments are provided to the Company to update participation records.

Audience

The target audience is property managers who have properties served on individually metered residential rate schedules. To receive water measures, apartments must have electric water heating. Properties with CFL installations over 5 years old are eligible for all the new LEDs and water measures. Lighting measures are only installed in permanent lighting fixtures such as ceiling lights, recessed lighting, track lighting, ceiling fan lights, and bathroom vanity lighting.

B &C. Impacts, Participants and Expenses

Multi-Family Energy Efficiency[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$14.2	$1.0	7%
Program Cost	$4.9	$0.5	11%
MW	3.0	0.3	9%
MWH	28,264.6	2,019.7	7%
Units	523,776	44,542	9%

1) Values are reflected at the system level.

D. Qualitative Analysis

Highlights

The Program had been suspended in 2021 due to the pandemic with no program installation completed through August 2021. The Program was relaunched in July 2021 with installs starting in September 2021.

In early 2021, the Program filed a request to add 1.25 GPM showerheads and discounted smart thermostats to the program. The new measures were approved and were included upon the relaunch of the program in late July 2021.

Multi-Family Energy Efficiency Program

North Carolina had 29 properties completed, which included 4071 units (apartments) and 44,542 measures. These measures consisted of 31,511 LED lightbulbs, 4,541 aerators, 2,398 showerheads and 6,092 pipe wraps. Due to continued staffing and hiring issues, there were no installs in South Carolina in 2021.

Issues

Due to the Covid pandemic and safety concerns for customers and employees, the program was suspended in March 2020 impacting the ability to achieve the program goals. While the program relaunched in July 2021, Covid still caused challenges in scheduling installs and maintaining those installs, due to an increased risk of cancellations.

Resource constraints, led by a shortage of labor, has caused for a slower restart than desired. There was improvement in North Carolina, but South Carolina still had no install teams as of December 2021.

Even though discounted smart thermostats were added to the program upon its restart in July 2021, there were no properties that opted to have the discounted smart thermostats installed.

Potential Changes

New technology enhancements are being implemented to increase the accuracy of recording the measures installed and the bulb wattages removed, to increase efficiencies with scheduling units, and to improve the tracking of new opportunities from both the direct installers and energy advisors.

E. Marketing Strategy

As program implementer, Franklin Energy is responsible for marketing and outreach to property managers in the Company’s service territory. Marketing is primarily done through outbound appointment setting calls, industry trade events, and on-site visits to gauge initial interest in the program. The Program staff also utilizes local apartment association memberships to obtain access to contact information for local properties and attends association trade shows or events to promote the program.

A Multi-Family Energy Efficiency public website landing page is available for property managers to learn more about the Program. A program brochure and a frequently asked question sheet are available for download. All marketing materials were updated to include the new measures, the 1.25 GPM showerheads and discounted smart thermostats.

Other ways a property manager may learn more about this Program are through the MyDuke Portal, an online tool used to pay the utility bills of vacant units at their property. The MyDuke Portal presents a promo link that directs the user to the Program website for more information.

Once enrolled, Franklin Energy provides property managers with a variety of marketing tools to create awareness of the Program among their tenants. The tools include letters to each tenant informing them of energy efficient measures being installed and of when the installations are taking place. Tenants receive educational leave-behind brochures when the installation is complete. Feedback from both property managers and tenants is important for the Program’s continued success. Property managers are provided with leave-behind materials about the program which also includes a survey for them to complete and return. For tenants, the educational leave-behind brochure includes a satisfaction survey to return to Duke Energy. Online versions of both the Program Manager and Tenant surveys are also available.

After the installation, window clings are placed in strategic areas throughout the property, specifically in the common areas, entry and on each residential building on site (to the extent applicable). Using the window cling ensures that the program and Duke Energy are recognized long after the installation has taken place.

Multi-Family Energy Efficiency Program

F. Evaluation, Measurement and Verification

The combined DEC/DEP EM&V evaluation for the Multifamily program is currently underway and will include an impact and process evaluation. As part of the impact evaluation, virtual site verifications will be conducted to measure installations and collect data for use in an engineering analysis. The evaluation is projected to be completed in mid-2022.

G. Appendix

Program Brochure-

Updated to add Commercial Offerings partnership and new water measures

FAQ for Property Managers

What does the install process look like?
On your scheduled installation days, our team will arrive at 8:45 a.m. to begin working by 9 a.m. A member of your staff will need to accompany our installers and handle keys throughout the installation process. The time spent in each unit varies depending on the layout and products being replaced. We will leave a flyer for each resident explaining what was installed and a survey providing an opportunity to give us feedback. It's that simple and that fast!

How do we qualify?
The Multifamily Energy Efficiency Program is available to eligible customers of Duke Energy Carolinas, Duke Energy Progress, Duke Energy Kentucky and Duke Energy Indiana. Additional qualifications depend on several factors such as metering, existing products, and method for water heating. To see which offerings your property qualifies for, you will need to schedule a complimentary energy assessment with one of our Energy Advisors by calling **888.297.1671** or emailing **dukeenergymultifamilyeep@franklinenergy.com**.

How much does it cost?
Products are offered at no cost with the exception of smart thermostats, which are available for installation at a discounted price. This program is part of many programs Duke Energy offers its customers from funds set aside to help reduce energy use. There are two parts to our program: residential (inside tenant units) and commercial (common areas). There are no limits on how many products we can install. Your Energy Advisor will go over your qualifications during the energy assessment.

What safety precautions should we know before installation?
As we are going through the units, if there are any unsecured pets or unattended minors, we will not be able to enter to perform the installation. During product installation, we ask that all small children be kept at a safe distance from the installers. The installers will provide further direction once on-site.

What precautions are you taking for COVID-19?
We will take precautions for the safety of our customers and workers including: asking about the health of the home's occupants prior to appointments, wearing protective equipment, practicing social distancing on-site and limiting in-home contact as much as possible. We will ask property staff to do the same during the install process.

What is the next step?
Call **888.297.1671** or email **dukeenergymultifamilyeep@franklinenergy.com** to schedule an appointment for an energy assessment.

This program is administered by Franklin Energy, a contractor of Duke Energy with experience in the installation of home energy-saving products.

Contact us today!

Phone
888.297.1671

Website
duke-energy.com/multifamily

Email
dukeenergymultifamilyeep@franklinenergy.com

This program is administered by Franklin Energy, a contractor of Duke Energy with experience in the installation of home energy-saving products.

DUKE ENERGY.

Multifamily Energy Efficiency Program

It's what's on the inside that counts.
Our **FREE** energy-saving lightbulbs and water-saving devices can help your residents save money.

DUKE ENERGY.
BUILDING A SMARTER ENERGY FUTURE®

Start saving now with the latest **FREE** energy-saving products.

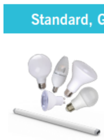
Multifamily Energy Efficiency Program
If you are a Duke Energy customer, your residents may receive energy-saving products – installed in each multifamily residence and qualifying common areas at no cost. Optional smart thermostats are available for installation at a discounted price. The Multifamily Energy Efficiency Program is available to customers of all Duke Energy utilities.

See what other property managers had to say.

You guys got top marks
"I received the satisfaction survey and filled it out. You guys got top marks. I received a lot of compliments about how friendly and professional you all were. Thank you again for all that you did!"
– Asheville Property Manager

They were so polite and professional
"I just wanted to let you know that your team did a wonderful job installing the energy-saving products. They were so polite and professional, which made the residents feel more at ease with the installation. I really appreciate all the hard work that went into making this project run so smoothly. We are now officially energy efficient!"
– Raleigh Property Manager

Standard, Globe, Candelabra, Recessed and Track LEDs



ENERGY STAR® light-emitting diodes, or LEDs, use **up to 90% less energy** and **can save at least $80** over their lifetime in energy costs compared to traditional incandescent bulbs. A popular residential option, LEDs can be installed in bathrooms, track lights, ceiling fans, recessed lights and other high-usage permanent fixtures. A19 models are not available for common areas, and T8 LEDs are available for common areas only.

Exit Sign LEDs

Exit signs are necessary to keep your residents safe. Save on operating and labor costs by replacing incandescent exit sign bulbs with LEDs.

Google Nest

The optional **Google Nest Thermostat** can help you save an average of 10% to 12% on heating costs and 15% on cooling costs.[2]

Bathroom and Kitchen Faucet Aerators

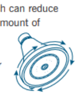
These faucet aerators use **up to 55% less water** than traditional 2.2-gallons-per-minute (gpm) faucets, which can reduce water and sewer costs, as well as the amount of energy used to heat the water.[1]

Outer ring allows for adjustable flow

Water-saving Showerheads

These showerheads use **up to 40% less water** than traditional 2.5-gpm showerheads, which can reduce water and sewer costs, as well as the amount of energy used to heat the water.[1]

Outer ring allows for adjustable flow



Hot Water Pipe Wrap

Pipe wrap insulation reduces water and energy use by preventing heat loss while hot water travels through your building's pipes.[1]

1 If water is heated by electricity, savings are not guaranteed.
2 Independent studies conducted in the U.S. showed that Nest thermostats saved people an average of 10% to 12% on heating and 15% on cooling. Individual savings are not guaranteed. Learn more at nest.com/real-savings.

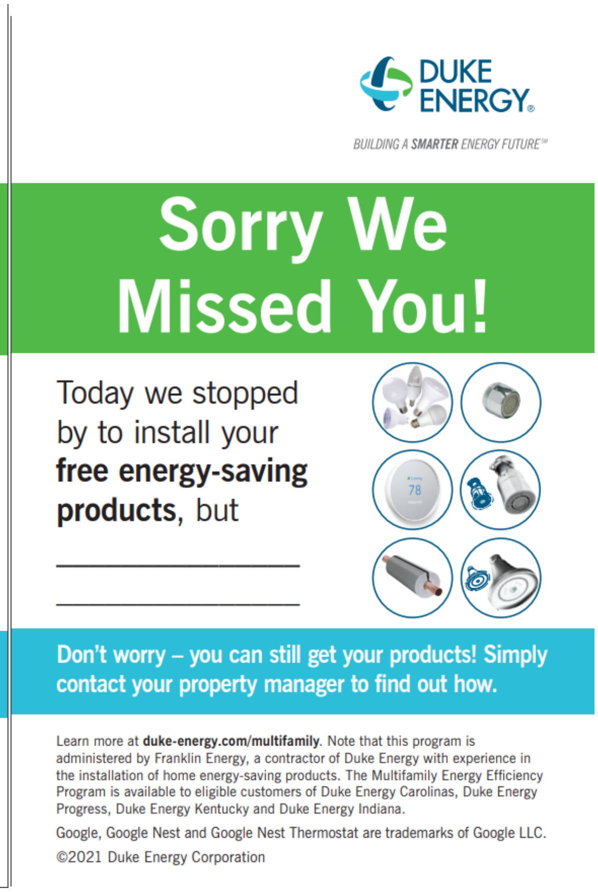
This program is administered by Franklin Energy, a contractor of Duke Energy with experience in the installation of home energy-saving products.

DUKE ENERGY.

Multi-Family Energy Efficiency Program

Sorry We Missed You

Door post-it



Window Cling

Multi-Family Energy Efficiency Program

Tenant Notice

You're Invited!

Save money on your energy bill with free products from Duke Energy.

Dear Resident:

Congratulations! Your property manager has enrolled your building in the **Multifamily Energy Efficiency Program**. Based on an assessment of your home, a selection of these complimentary products may be installed to help reduce your monthly energy usage:

Standard, globe, candelabra, recessed and track LED lightbulbs to replace your outdated incandescent lightbulbs. *(Track lighting can get very hot; please make sure your track lights are turned off before our installers arrive.)*

Water-saving showerheads to replace your existing fixtures.

High-efficiency faucet aerators for your kitchen and bathroom sinks.

Hot water pipe wrap to reduce heat loss.

Google Nest Thermostat to help you save an average of 10% to 12% on heating costs and 15% on cooling costs[1]

Help Us Help You!

In preparation for your installations, please make sure to:

- Safely contain your pet(s) during our visit
- Provide access to your water heater, shower(s), sinks and light fixtures
- Put away your valuables
- Have an adult present during installation
- Keep a safe distance while installers are working in your home

Trained technicians will perform the **free** installations in each residence on the date and time indicated below. The technicians will be accompanied by a member of the maintenance or management staff, who will provide access to your residence if you are not home at the time of installation. Additionally, the technicians will be in uniform with proper photo identification. We will take precautions for the safety of our customers and workers including: asking about the health of the home's occupants prior to appointments, wearing protective equipment, practicing social distancing on-site and limiting in-home contact as much as possible.

Technicians will be in your building:

XXXXXXX, XXXXXXX, XXXXXX

After the installations are completed, you will receive documentation and other educational materials about the energy-saving products that were installed free of charge in your home. Included in these materials is a customer satisfaction survey that we would appreciate your completing.

The Multifamily Energy Efficiency Program is available to eligible customers of Duke Energy Carolinas, Duke Energy Progress, Duke Energy Kentucky and Duke Energy Indiana. For additional information about this offering, or other offerings from Duke Energy, contact the Multifamily Energy Efficiency Program at **888.297.1671**, email **dukeenergymultifamilyeep@franklinenergy.com** or visit **duke-energy.com/multifamily**.

Thank you!
Multifamily Energy Efficiency Team

[1]Independent studies conducted in the U.S. showed that Nest thermostats saved people an average of 10% to 12% on heating and 15% on cooling. Individual savings are not guaranteed. Learn more at nest.com/real-savings.

DUKE ENERGY.

BUILDING A SMARTER ENERGY FUTURE®

Multi-Family Energy Efficiency Program

Case Study

MULTIFAMILY ENERGY EFFICIENCY PROGRAM CASE STUDY

Here's What They're Saying About Us

"The Duke Energy Multifamily program has been instrumental in reducing the cost of living in Bell communities, enhancing our environmental stewardship and differentiating our NC/SC properties in the marketplace. We look forward to a continued partnership with Franklin Energy and Duke Energy."

– Wes Winterstein, Vice President, Ancillary Services, Bell Partners Inc.

ESTIMATED SAVINGS FOR RESIDENTS

Annual Electric Savings	Annual Electric Bill Savings
1,015 kWh	**$107**

Value and Savings for Bell Partners and Its Residents Through 2018	
Annual Electric Savings	Value of Products and Energy Savings
2,771,664 kWh	**$434,089**

Going Green Makes a Difference		
	Cars Taken Off the Road	Trees Planted
So far Bell Partners and Duke Energy have delivered energy savings equivalent to:	**314**	**37,653**

DUKE ENERGY AND BELL PARTNERS ARE GOING GREEN!

To date, Bell Partners and Duke Energy have collaborated to make nine communities more energy efficient by replacing standard lighting with LED bulbs, replacing inefficient faucets and showerheads with water-saving products, and insulating hot water heater pipes. The cost to Bell Partners and its residents? Nothing!
In 2017 and 2018, Duke Energy provided and installed:

- $152,000 worth of energy-saving products
- Over 26,000 LED lights
- Nearly 5,600 water-saving faucet aerators
- Over 1,800 energy-saving showerheads
- Nearly 14,000 feet of pipe insulation

Bell Partners residents can save an average of $107 annually on their electric bill. The communities save ongoing O&M expenses. And with the help of Duke Energy, Bell Partners continues to be a leader in the green multifamily market.

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BELL PARTNERS
APARTMENT INVESTMENT & MANAGEMENT

Power Manager®

A. Description

Power Manager® ("Program") is a residential demand response program that helps ensure power reliability during peak demand periods or if continuity of service is threatened. Duke Energy Carolinas, LLC (the "Company") provides two program options designed to reduce load from air conditioning or electric heating when events are called.

The original Power Manager option utilizes a Load Control Device (LCD) installed near the outdoor unit of a qualifying AC. This enables a participating customer's AC's run-time to be reduced when the Company initiates a control event. The Company can perform cycling (allowing the AC to run a portion of each half hour during an event) or full-shed interruption (AC is prevented from running during an event).

The LCD option is available to qualifying single family homeowners. As incentive, participants receive an $8 monthly credit on their July through October bills ($32 annually).

The customer's AC system experiences no adverse impacts because the load control device has built-in safeguards to prevent the "short cycling" of the AC. The indoor fan is not controlled and may run, circulating air during an event.

Available since late December 2019, the program's Smart Thermostat option utilizes a qualifying wi-fi connected thermostat to remotely change participants' temperature setting when the Company initiates a control event. By adjusting the thermostat's setting (up for cooling/down for heating), the system's run-time and energy use can be reduced during an event.

The Company has engaged EnergyHub to provide support services for the Smart Thermostat option. Services include: the control system used in managing events, participant incentives, relationships with participating thermostat manufacturers, and coordinating marketing efforts between the Company and thermostat manufacturers.

The Smart Thermostat option is available to qualifying residential customers who have registered their thermostat(s) with participating manufacturers, currently: Alarm.com/Vivint, ecobee, Honeywell, Lux, Nest, Radio Thermostat and Sensi.

As incentive for participating, customers are emailed a $75 Visa e-gift card upon successful enrollment; and each subsequent year they remain on the program they are emailed a $25 Visa e-gift card.

Audience

The LCD option is available to the Company's qualifying residential customers residing in owner-occupied, single-family residences with a qualifying central air-conditioning unit.

For new enrollments, the Smart Thermostat option is available to the Company's qualifying residential customers, with thermostat-controlled central electric heating and cooling, who have installed, connected to the internet, and registered their qualifying smart thermostat with the thermostat's manufacturer.

Customers may participate in only one of the Power Manager options.

Power Manager®

B & C. Impacts, Participants and Expenses

PowerManager[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$82.9	$57.6	69%
Program Cost	$20.4	$16.8	82%
MW[2]	659.0	469.5	71%
MWH	0.0	N/A	-
Units[3]	620,406	442,013	71%

Notes on Tables:

1) Values are reflected at the system level.

2) MW capability at the generator derived from the average reduction during the June - September control season achieved by a full shed of participating air conditioners. At month-end, December 2021, we had the ability to shed 469.5 MW (at the plant), representing 71.2% of the as filed capability.

3) Units included in filing represent average kW at the meter during the June - September control season. YTD value is based on 296,246 Power Manager devices and 47,484 thermostats at month-end December 2021.

D. Qualitative Analysis

Power Manager Events

A brief full-shed LCD test event was conducted in June. The successful test was initiated by DEC's Energy Control Center. Several LCD test events were planned in late May and June but, given load forecasts and system conditions, were not called so that the full Power Manager reduction capacity would be available as an operating reserve should it have been needed.

On 12 days from July 1 through September 13, Power Manager events were called as part of the planned Evaluation, Measurement and Verification study conducted for the LCD and Smart Thermostat options.

By using sample subgroups, no customers were controlled more than six times during these event days.

No events were called for the winter-focused Smart Thermostat customers in 2021.

Covid Impacts

LCD Option

Although still a very real presence, COVID-19 did not materially affected Power Manager operations in 2021. The precautions and protocols developed in 2020 are still being used. These will continue for the foreseeable future as variants continue to increase infection rates throughout the country.

In 2021, Franklin Energy, the Company's field services contractor, had only one positive case in their DEC support team.

Smart Thermostat Option

Because enrollment and ongoing support of the smart thermostat option do not require field visits, COVID-19 has had no discernable impacts to 2021 operations.

Power Manager®

E. Marketing Strategy

LCD Option

Outbound telephone calling remains the primary marketing channel, with additional outreach via email, the Company's residential newsletter and ads on the Company's website.

By year-end 2021, 7,130 new customers had been enrolled in the LCD option (NC: 4,931 and SC: 2,199), representing 8,536 ACs. At year-end, there were 244,210 customers (NC: 184,175 and SC: 60,035) and 296,246 ACs on the program – an annual net increase of 3,659 customers.

Prior to the start of the event season, Power Manager customers were mailed a card reminding and thanking them for their participation in the program. This was larger than postcards used in the past and, on the inside, customers were provided a removable magnet with program information.

Smart Thermostat Option

The primary marketing channel for the smart thermostat option is through participating thermostat companies. Duke Energy, working through EnergyHub, collaborated with these companies in the development of Power Manager smart thermostat marketing messages.

Once their smart thermostat is installed and registered with the manufacturer, customers will be presented with information on the program by the thermostat company. Channels include the thermostat app, mobile app and email communications. Using these different channels, customers are provided access to the program's requirements, general information and enrollment opportunities.

The Company supplemented thermostat manufacturers' marketing with promotions of smart thermostats available through the Company's Online Savings Store. In addition, email, the Company's residential newsletter and website banner ads were used.

At year-end 2021, 36,368 customers (47,484 thermostats) were participating in the smart thermostat option – a net annual increase of 11,625 customers.

F. Evaluation, Measurement and Verification

Results for the Summer 2019 Power Manager program were completed in the second quarter of 2020. The results of the evaluation however, showed evidence of M&V feeder issues that led to lower than expected results. Subsequently, Duke Energy identified and corrected the issues. Nexant and Duke Energy agreed to conduct a subsequent impact analysis for the 2020 Power Manager season in order to verify those corrective measures and to re-calibrate the program's performance under fully operational conditions.

The results of the Summer 2020 Power Manager evaluation – completed in June 2021 - reflected a slight improvement to the Summer 2019 evaluation with an estimated load reduction of 1.59 kW based on the time temperature matrix to estimate future resource capability. Results of Summer 2020 were presented at the July 2021 DEC/DEP Collaborative.

The Summer 2021 evaluation which will estimate savings for DLC and BYOT programs is underway. An important change to note is the change in methodology. The evaluation will have a less complex RCT design and will mirror the methodology used for EnergyWise Home. The evaluation report is planned to be completed in the early months of Second Quarter 2022.

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G. Appendix

Power Manager®

Marketing Examples:

Duke Energy Carolinas Website

Banners on the Home Page

Reward yourself >

Enroll in Power Manager® this winter.

Fall in love with rewards. >

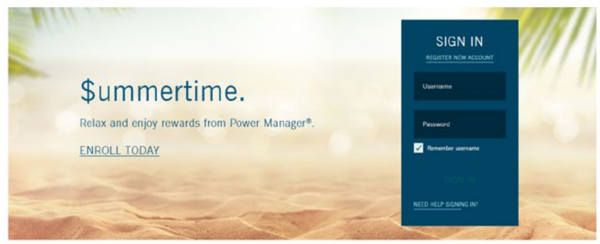
Make a difference in your community by enrolling in Power Manager®. You'll get up to $75 when you do.

Find some hidden rewards >

Make a difference in your community by enrolling in Power Manager®. Qualifying customers can get up to $75.

Relax and enjoy rewards >

Make a difference in your community by enrolling in Power Manager®. You'll get up to $75 when you do.



Rake in the rewards >

Get up to $75 with Power Manager® – plus make a difference for the environment and your community.

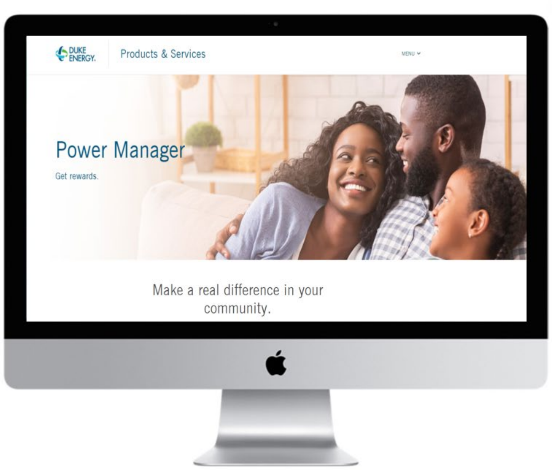
Rewards to smile about >

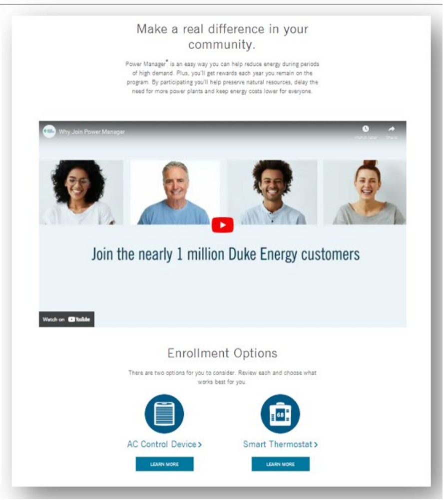
Enroll in Power Manager®. It's easy and you can get up to $75 while making a difference in your community.

Harvest the rewards >

Gather up to $75 with Power Manager®. It's easy – and you'll be making a real difference for your community.

New Power Manager Website

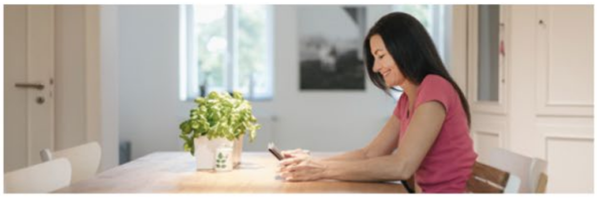




Power Manager®

Home Energy Report

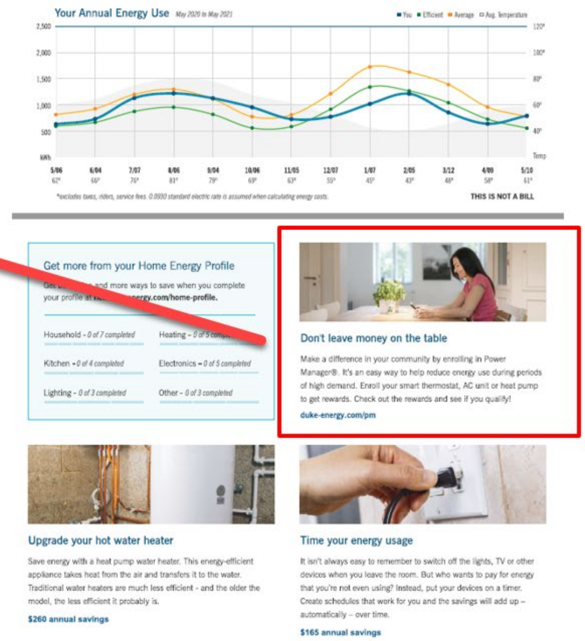
Home Energy Report Ads (Ran in March, May and June)



Don’t leave money on the table

Make a difference in your community by enrolling in Power Manager®. It’s an easy way to help reduce energy use during periods of high demand. Enroll your smart thermostat, AC unit or heat pump to get rewards. Check out the rewards and see if you qualify!

Learn more and sign up at: **duke-energy.com/pm**



September Report

Rake in the rewards!

Get up to $75 by enrolling in Power Manager®. Make a difference in your community by helping reduce energy use during periods of high demand. Enroll your smart thermostat, AC unit or heat pump to get rewards. See if you qualify!

Learn more and sign up at: duke-energy.com/Rake

Power Manager®

Residential Newsletter

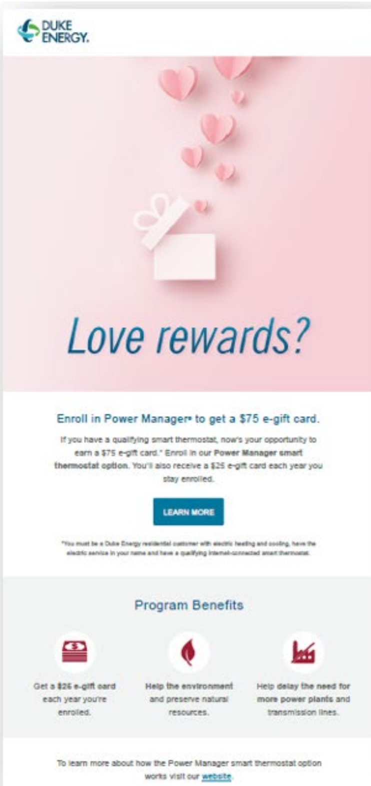
Residential Newsletter Ad (June and July)

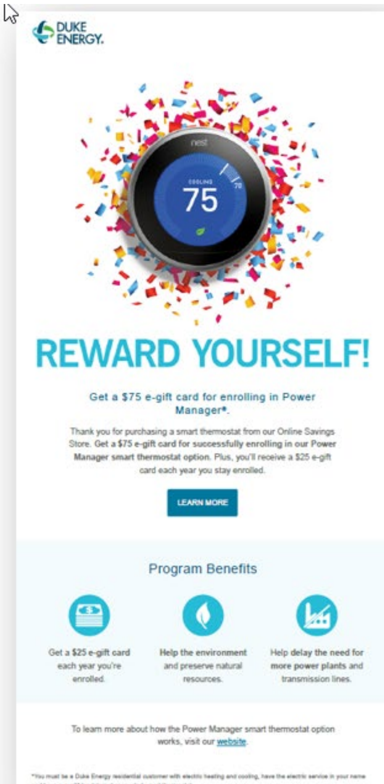
Enjoy sweet rewards.

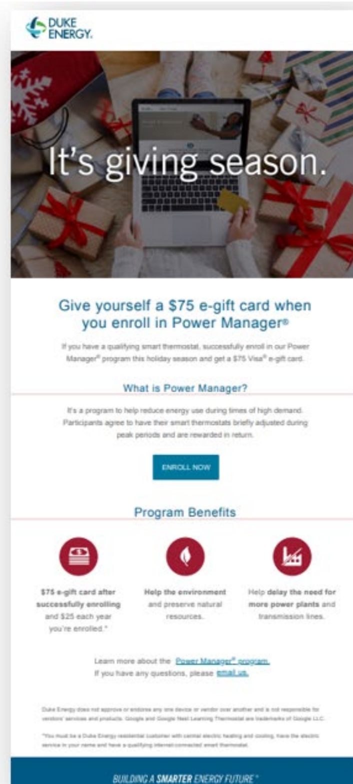
Make a difference in your community by enrolling in Power Manager®.

ENROLL TODAY

Smart Thermostat Emails

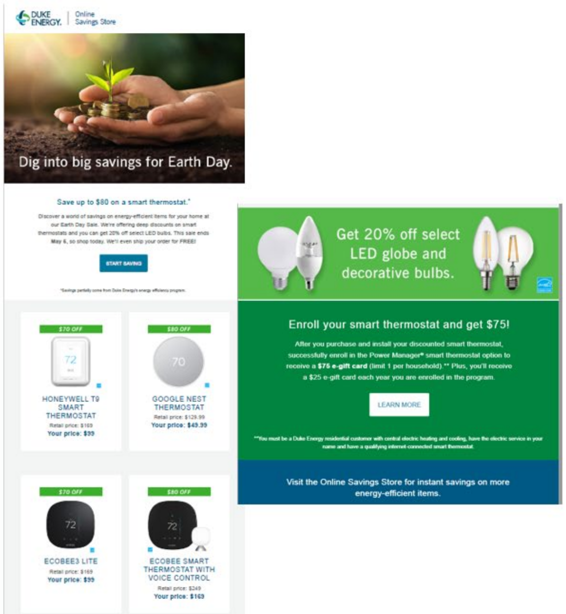


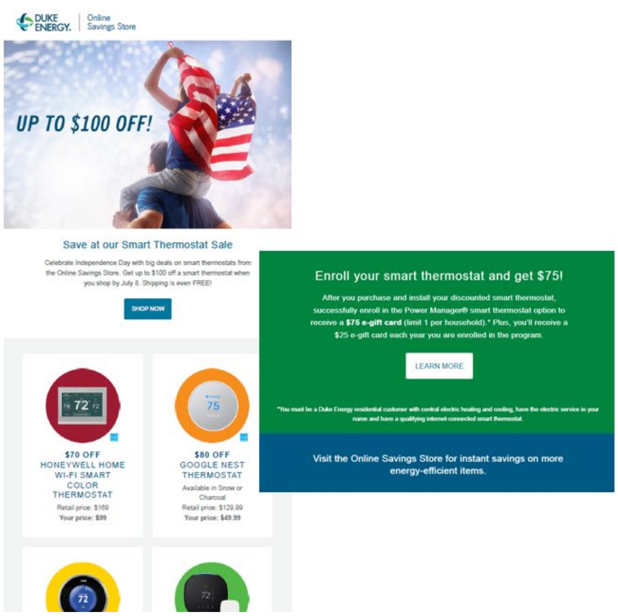


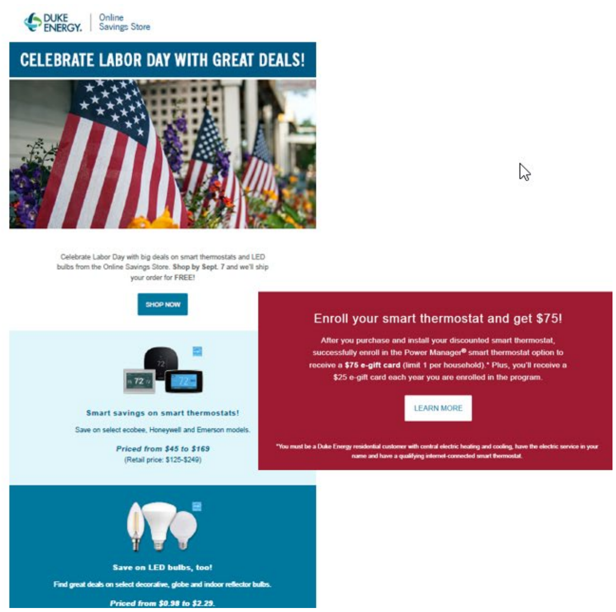


Power Manager®

Smart Thermostat and Online Savings Store Co-Marketing



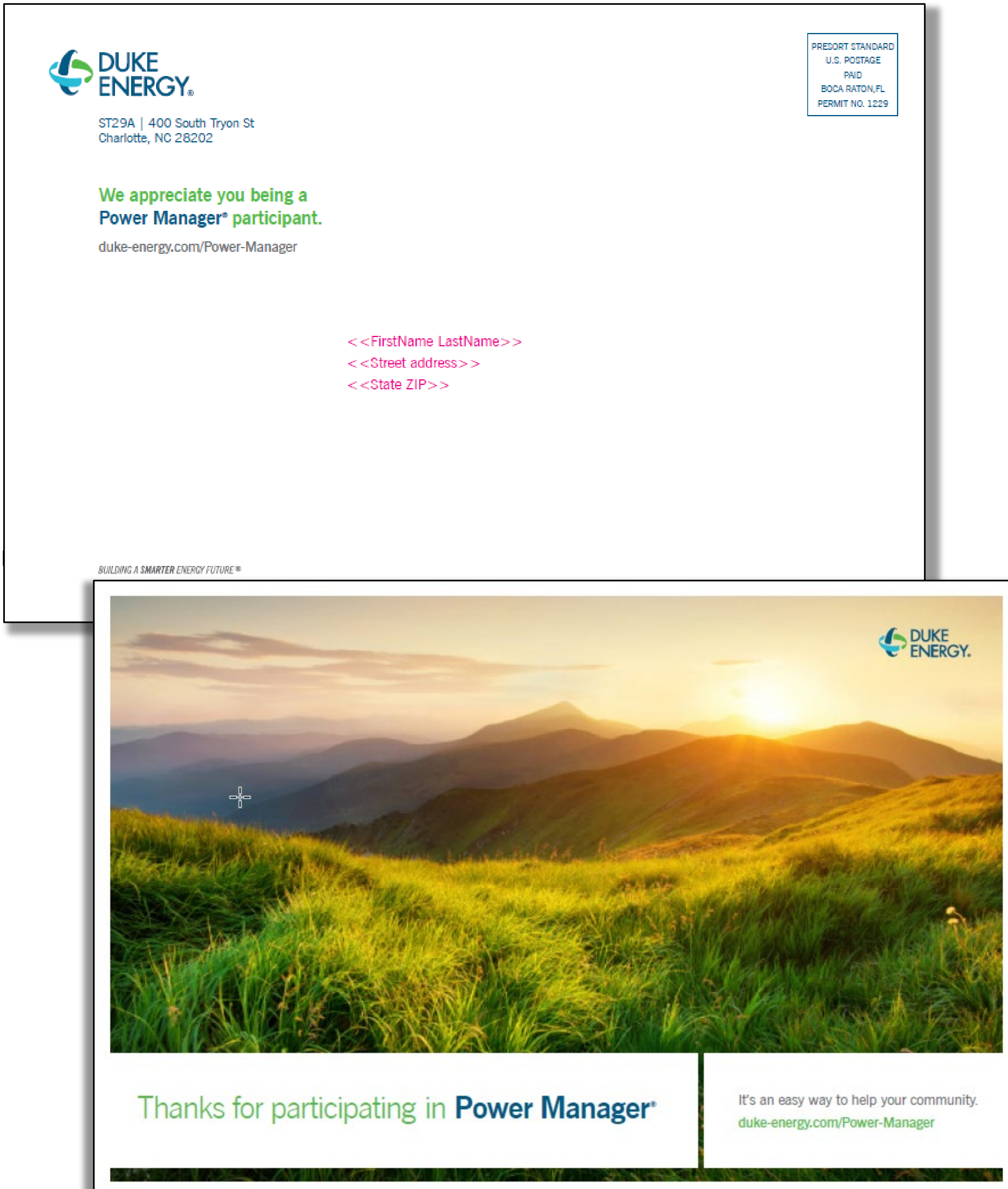




Power Manager®

LCD Customers' Season Reminder/Thank You Postcard

Outside



Power Manager®

Inside Left Panel

It's nearly summer!
Here are a few Power Manager® reminders.

Your AC's runtime may be reduced on a few select non-holiday weekday afternoons.

In an extremely rare system emergency, Power Manager could be used at any time to turn off your AC to avoid outages.

Tips during an event:

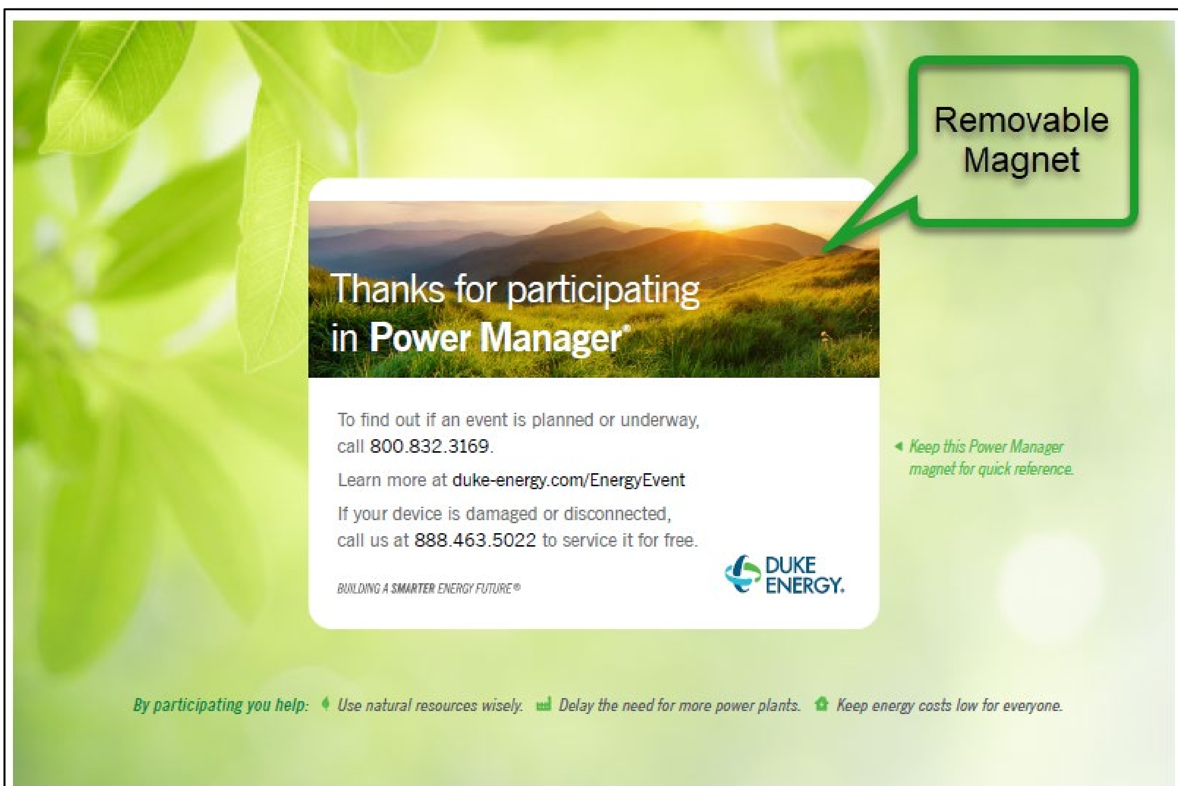
- ✓ **Close curtains and blinds** to keep the sun and heat out.
- ✓ **Don't do activities that produce a lot of heat** (cooking, vacuuming, etc.).
- ✓ **After an event, don't lower your thermostat setting.** Your home won't cool any faster, plus it can lead to extra energy use and a higher bill.

You'll benefit.

You get **$32 in credits** on your summer electric bills. An $8 credit is applied to your July through October bills.

What's Power Manager? *When energy demand is high, Power Manager may be used to reduce AC load on the electric grid. This decreases the use of less efficient and more expensive energy sources and helps keep energy costs low for everyone.*

Inside Right Panel



A. Description

The purpose of Duke Energy Carolinas, LLC's (the "Company's" or "DEC") Small Business Energy Saver program (the "Program") is to reduce energy usage through the direct installation of energy efficiency measures within qualifying small non-residential customer facilities. All aspects of the Program are administered by a single Company-authorized vendor. Program measures address major end uses in lighting, refrigeration, and HVAC applications.

Program participants receive a free, no-obligation energy assessment of their facility and a recommendation of energy efficiency measures along with the projected energy savings, costs of all materials and installation, and up-front incentive amount from the Company. If the customer decides to move forward with the proposed project, the customer will make the final determination of which measures will be installed. The vendor then schedules the measure installation by electrical subcontractors at a time convenient for the customer.

The Program is designed as a pay-for-performance offering, meaning that the Company-authorized vendor administering the Program is compensated only for energy savings produced through the installation of energy efficiency measures.

In 2020 a program modification was approved by the NC & SC utility commissions for SmartPath under the Small Business Energy Saver Program. SmartPath is meant to build upon the traditional Small Business Energy Saver Program by minimizing financial barriers to customer participation by allowing customers to finance and implement energy efficiency upgrades at little to no upfront costs to the customer. SmartPath is open to any opted in non-residential Duke Energy customer and is not implemented by one Vendor. The program is implemented by a qualified Trade Ally network who develop proposals and implement the projects on the program's behalf.

Audience

The Program is available to existing non-residential customers that are not opted-out of the Company's Energy Efficiency Rider. Program participants must have an average annual demand of 180 kW or less per active account.

The SmatPath modification to the Program is available to all existing non-residential customers that are not opted-out of the Company's Energy Efficiency Rider. SmartPath is not limited by the 180 kW rule that applies to Small Business Energy Saver.

B & C. Impacts, Participants and Expenses

Small Business Energy Saver[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$23.8	$18.6	78%
Program Cost	$11.0	$8.9	81%
MW	9.4	7.0	75%
MWH	50,790.4	38,560.8	76%
Units[2]	47,000,000	35,286,964	75%

1) Values are reflected at the system level.

2) Units reflect gross kWh.

D. Qualitative Analysis

Highlights

Lime Energy is the Company-authorized vendor administering the SBES Program in both DEC and DEP service areas.

In 2020, the Company and vendor experienced many difficulties as a result of the COVID-19 virus. Some of these difficulties continued into 2021. The Program was restricted from field activities during January do to the increasing COVID-19 cases. As a result of the restrictions in 2020 and January of 2021 the Program finished the first quarter of the year behind in sales and project completions.

Even with the shutdown, customers still showed interest in the Program. We experienced higher than plan participation per salesperson the Program could have in the field, but we also had customers unwilling to act due to the uncertainty of the market due to the impacts of COVID-19. As spread of the COVID-19 virus starts to slowdown and the vaccine distribution increases the uncertainty in the marketplace is resolved, we are starting to see customers willing to move forward with projects. The Program finished the second quarter very close to the quarterly budget.

The Company continues to administer a customer satisfaction survey to Program participants since the Program's launch in DEC. Customers continue to give the Program high scores and generating a positive view of the Company.

Issues

While LED lighting measures are expected to remain the primary driver of kWh savings in the Program for the foreseeable future, the Company has been actively working with our vendor Lime Energy to implement initiatives focused on increasing refrigeration and HVAC measure adoption. With the impacts of COVID, the Program experienced a decline in refrigeration and HVAC measures. Lime Energy kicked off the year with additional training of their sales staff to promote and sale not only the refrigeration and HVAC measures but also the new process measures added.

Potential Changes

SmartPath was approved in late 2020 but did not officially launch until the beginning of Q2 in 2021. Since the launch the program has been well received with over 15 Trade Allies enrolled to offer the program to Duke Energy customers. We have 6 projects enrolled in the program and in various stages in the process. We anticipate tripling that number by the end of 2021 and starting 2022 with a healthy pipeline of projects.

As the Program continues to mature, the Company will continue to evaluate opportunities to add incentivized measures which fit the direct install program model and are suitable for the small business market.

E. Marketing Strategy

The Program is marketed primarily using the following channels:

- Lime Energy field representatives
- Direct mail (letters and postcards to qualifying customers)
- Duke Energy Carolinas website
- Social media and search engine marketing
- Email & Duke Energy Business E-Newsletters
- Direct marketing & outreach via Program administrator
- Outreach via Duke Energy Business Energy Advisors
- Community events

All marketing efforts are designed to create customer awareness of the Program, to educate customers on energy saving opportunities and to emphasize the convenience of Program participation for the target market.

F. Evaluation, Measurement and Verification

Evaluation activities commenced in late 2020, with a completed report in the third quarter of 2021. The EM&V summary was presented at the July 2021 DEC/DEP Collaborative.

The evaluation covered the period from January 2019 through June 2020. The evaluation consisted of virtual verification of measure installations and estimated energy and peak demand savings (both summer and winter) via engineering analysis. The evaluation also assessed the NTG ratio through the use of online customer surveys. In addition, the process evaluation assessed the strengths and weaknesses of current program processes and customer perceptions of the program.

Non-Residential Smart $aver Prescriptive

A. Description

The Non-Residential Smart $aver® Prescriptive Program ("Program") provides incentives to Duke Energy Carolinas, LLC's (the "Company's") commercial and industrial customers to install high efficiency equipment. Incentives are provided based on the Company's cost effectiveness modeling to ensure cost effectiveness over the life of the measure.

Commercial and industrial customers can have significant energy consumption but may lack an understanding of the benefits of high efficiency alternatives. The Program provides financial incentives to help reduce the cost differential between standard and high efficiency equipment, offer a quicker return on investment, save money on customers' utility bills so it can be reinvested in their businesses, and foster a cleaner environment. In addition, the Program encourages dealers and distributors (or market providers) to stock and provide these high efficiency alternatives to meet increased demand for the products.

The Program promotes prescriptive incentives for the following technologies – lighting, HVAC, pumps, variable frequency drives, food services, process, and information technology equipment.

Audience

All of the Company's non-residential opt-in customers billed on an eligible Duke Energy Carolinas rate schedule may participate.

B & C. Impacts, Participants and Expenses [1]

Non Residential Smart Saver Prescriptive[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	**$100.2**	**$85.3**	**85%**
Program Cost	**$27.7**	**$23.4**	**85%**
MW	**29.7**	**24.1**	**81%**
MWH	**168,713.1**	**141,389.4**	**84%**
Units	**5,377,147**	**10,141,069**	**189%**

1) Values are reflected at the system level.

D. Qualitative Analysis

Highlights

The Program has developed multiple approaches, including paper and online options for incentive payment applications and instant incentives through the midstream marketing channel and the Online Energy Savings Store, for reaching a broad, diverse audience of business customers. Several 2021 program trends are listed below:

- Customers continue to show interest in energy efficiency; however, the program is still in the midst of a significant decline due to the negative effects of the COVID-19 pandemic on businesses.
- Customers continue to utilize the midstream marketing channel by taking advantage of instant incentives through participating equipment distributors; however, product shortages due to the pandemic have caused energy efficiency project delays.
- Outreach continue to support Trade Allies working with the program, with a mix of virtual and

[1] The information reflects results for the Non-Residential Smart $aver Prescriptive program in aggregate. Reference the Appendix for results by technology.

phone outreach to Trade Allies, as well as in-person meetings when safe
- A dedicated team of representatives responded to customer questions via phone and email, providing high levels of customer service.

Customers have several options for participating in the Program. The following chart summarizes 2021 total participating customers by Program channel:

Program Option	Participating Customers*	% 2021 Repeat Customer
Paper and Online Application Form	792	62%
Midstream Marketing Channel	2,390	55%
Online Energy Savings Store	1,123	34%
Multifamily Free Channel	7	14%

*May include multiple facilities/sites for one customer.
**The Multifamily Free Channel was suspended for the majority of 2021 due to COVID-19

PAPER AND ONLINE APPLICATIONS
In 2021, the Company paid incentives for 1,330 applications, consisting of 4,351 measures. Paid application volume was down in 2021 vs. 2020 by 17%. The average payment per paid application was $7,577.

Customers continue to take advantage of an optional process introduced in 2018 to pre-verify equipment eligibility to have certainty that their selected equipment qualifies for an incentive prior to purchase, which is designed to overcome another barrier that can delay investment in EE projects.

Many Trade Allies participating in the application process reduce the customer's invoice by the amount of the Smart $aver® Prescriptive incentive and then receive reimbursement from Duke Energy. Customers often prefer this method rather than paying the full equipment cost upfront and receiving an incentive check from Duke Energy.

Duke Energy utilizes an internal database that allows the Program to self-administer Program applications and track program data.

MIDSTREAM MARKETING CHANNEL
The midstream marketing channel provides instant incentives to eligible customers at a participating distributor's point of purchase. Approved midstream distributors validate eligible customers and selected lighting, HVAC, food service and IT products through an online portal and use that information to show customers the reduced price for high efficiency equipment. Upon purchase, the distributor reduces the customer's invoice for the eligible equipment by the amount of the Smart $aver® Prescriptive incentive. Distributors then provide the sales information to Duke Energy electronically for reimbursement. The incentives offered through the midstream channel are consistent with current program incentive levels.

ONLINE ENERGY SAVINGS STORE
Duke Energy also offers the Business Savings Store on the Duke Energy website, with orders fulfilled by a third-party vendor. The site provides customers the opportunity to take advantage of a limited number of incentivized measures by purchasing qualified products from an online store and receiving an instant incentive in the form of a reduced purchase price. The incentives offered in the online store are consistent with current program incentive levels.

MULTIFAMILY COMMON AREA FREE MEASURES
In order to grow the number of accounts participating in EE, particularly in market segments where knowledge of EE is limited, the Program is now collaborating with the Residential Multifamily Direct Install program to offer free low-cost measures to multifamily common areas as well as tenant spaces. Multifamily properties that are being approached by the Residential Multifamily program's vendor, Franklin Energy, are now eligible to add on limited quantities of common area measures. The common area must

be on an eligible commercial rate to participate. Measures such as LED screw-in lamps, LED exit signs, low flow shower heads, faucet aerators and pipe insulation are now being installed where possible in multifamily common areas as well as in residential spaces. For those properties that accept the measures, Franklin Energy will directly install them in the common areas when they are on site for the residential installations. Franklin Energy tracks the measures installed by property, as well as total installations and reports this information to the Smart $aver program team. This channel remained suspended along with the Residential Multifamily Direct Install program for the majority of 2021 due to COVID-19.

TRADE ALLY MANAGEMENT
Over the years, the Program has worked closely with Trade Allies to promote the program to our business customers at the critical point in time when customers are considering standard or high efficiency equipment options. The Smart $aver® outreach team builds and maintains relationships with Trade Allies in and around Duke Energy's service territory. Existing relationships continue to be cultivated while recruitment of new Trade Allies also remains a focus. In-person Trade Ally outreach activities were scaled back in 2021, however the Smart $aver® outreach team continued to provide support to Trade Allies virtually and via phone & email correspondence.

The Trade Ally outreach team educates Trade Allies on the program rules and the Smart $aver Program expectations for Trade Ally conduct. The Company continues to look for ways to engage the Trade Allies in promotion of the Program and to target Trade Allies based on market opportunities.

Issues

The primary issues that faced the program in 2021 were all related to responding and adapting to the new reality after the onset of the COVID-19 pandemic in 2020. Program participation experienced a sharp decline in mid-2020 and remained suppressed in 2021. Fortunately, very few program activities require face-to-face contact, so the Smart $aver® team is able to continue processing incentive applications and administering the program while working from home.

Potential Changes

Standards continue to change and new, more efficient technologies continue to emerge in the market. Duke Energy periodically reviews major changes to baselines, standards, and the market for equipment that qualifies for existing measures and explores opportunities to add measures to the approved Program for a broader suite of options.

Duke Energy is also considering new and innovative ways to reach out to customer segments that have had a lower rate of prescriptive incentive applications and considering options to partner with other Duke Energy EE programs to cover gaps in the market and ultimately, make it easier for customers to participate in Smart $aver incentives. Also, the Duke program team would like to drive deeper customer savings and increase participation in technologies beyond lighting.

E. Marketing Strategy

The marketing plan for 2021 included direct marketing such as email and direct mail, online marketing, print marketing and supporting partnerships.

The internal marketing channel consists of assigned Large Business Account Managers, small and medium Business Energy Advisors, and Local Government and Community Relations, who all identify potential opportunities as well as distribute program informational material to customers and Trade Allies. Duke Energy has Business Energy Advisors in the Carolinas area to perform outreach to unassigned small and medium business customers. The Business Energy Advisors follow up on customer leads, assist with program questions, and steer customers who are not already working with a trade ally to the trade ally search tool. In addition, the Business Energy Advisors contact customers with revenue between $60,000 and $250,000 to promote the Smart $aver® programs. The Economic and Business

Development groups also provide a channel to customers who are new to the service territory.

F. Evaluation, Measurement and Verification

A combined DEC/DEP evaluation is currently underway. The evaluation will consist of an impact evaluation and a limited process evaluation. Impacts will be determined from a mix of activities, including deemed savings, engineering desk reviews, participant surveys to refine input parameters, and onsite visits with a sample of main channel and midstream channel participants. NTG will be established through surveys with participants and trade allies.

The evaluation is scheduled to be completed in the third quarter of 2022.

G. Appendix

Non Residential Smart Saver Energy Efficient HVAC Products[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$2.4	$14.9	629%
Program Cost	$1.7	$4.9	283%
MW	1.1	3.3	297%
MWH	3,698.3	21,055.0	569%
Units	3,097,102	6,874,382	222%

1) Values are reflected at the system level.

Non Residential Smart Saver Energy Efficient Lighting Products[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$94.7	$69.0	73%
Program Cost	$24.3	$17.9	74%
MW	27.8	20.3	73%
MWH	156,866.5	116,784.5	74%
Units	2,242,099	3,253,789	145%

1) Values are reflected at the system level.

Non Residential Smart Saver Energy Efficient Food Service Products[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$1.4	$0.5	34%
Program Cost	$1.1	$0.2	19%
MW	0.2	0.1	38%
MWH	4,280.5	1,201.4	28%
Units	15,727	1,601	10%

1) Values are reflected at the system level.

I/A

Non-Residential Smart $aver Prescriptive

Non Residential Energy Efficient Pumps and Drives Products[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$1.2	$0.7	54%
Program Cost	$0.4	$0.2	48%
MW	0.4	0.2	56%
MWH	2,717.4	1,521.3	56%
Units	2,575	1,048	41%

1) Values are reflected at the system level.

Non Residential Energy Efficient ITEE[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$0.0	$0.0	1%
Program Cost	$0.0	$0.1	158%
MW	0.0	0.0	-
MWH	272.4	2.4	1%
Units	4,323	28	1%

1) Values are reflected at the system level.

Non Residential Energy Efficient Process Equipment Products[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$0.4	$0.3	67%
Program Cost	$0.1	$0.1	75%
MW	0.2	0.1	63%
MWH	878.0	824.8	94%
Units	15,321	10,222	67%

1) Values are reflected at the system level.

Non-Residential Smart $aver® Custom Assessment

A. Description

Duke Energy Carolinas, LLC's (the "Company's") Non-Residential Smart $aver® Custom Assessment (the "Program") offers financial assistance to qualifying commercial, industrial, and institutional customers to help fund an energy assessment and retro-commissioning design assistance in order to identify energy efficiency conservation measures of existing or new buildings or systems. The detailed study and subsequent list of suggested energy efficiency measures help customers to utilize the Non-Residential Smart $aver® Custom. The Program delivers a detailed energy report that includes the technical data needed for the Non-Residential Smart $aver® Custom Program and assistance with the Non-Residential Smart $aver® Application. All kWh and kW savings identified from measures implemented as a result of the pre-qualified assessments are attributed to Smart $aver Custom Program.

The intent of the Program is to encourage energy efficiency projects that would not otherwise be completed without the Company's technical and financial assistance. The Program's application requires pre-qualification for eligibility. Assessments are performed by a professional engineering firm pre-selected and contracted by the Company. The current engineering is Willdan.

The program was modified in 2017 to allows customers to choose one of the firms the Company contracted or to seek third party engineering assistance of their own selection and receive the same financial assistance. Pre-established criteria ensuring that the Program maintains high standards for engineering and work quality must be met for the funds to be released. This modification, which provided customers with more flexibility and choices, is expected to drive an increase in participation.

In 2019, the program again modified its approach again by utilizing a "virtual" approach to the assessment. Using energy modeling software called NEO from Willdan and collecting all building information remotely will allow the audit to be completed in 2-3 weeks for less cost. Each audit has a fixed cost of $5,000 which is covered 100% by the program. In 2020, the program was expanded to include buildings with process loads such as manufacturers. Program parameters are a focus on customers with a minimum demand of 180 kW with those below being serviced by Small Business Energy Saver®. The goal of the program is to perform 20-30 assessments annually.

Audience

Pre-qualified non-residential electric customers, except those that choose to opt out of the Program, are eligible.

B & C. Impacts, Participants and Expenses

Non Residential Smart Saver Custom Technical Assessments[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD June 30, 2021	% of Target
NPV of Avoided Cost	**$2.8**	**$0.0**	**0%**
Program Cost	**$1.1**	**$0.5**	**44%**
MW	**0.6**	**0.0**	**0%**
MWH	**5,482.4**	**0.0**	**0%**
Units	**3,492**	**0**	**0%**

1) Values are reflected at the system level.

D. Qualitative Analysis

Highlights

Participation in the first half of 2021 included 18 customers completing an application for an energy assessment. Of these, 11 assessments were completed while 6 customers thus far have selected projects to pursue resulting in a Smart $aver Custom application.

E. Marketing Strategy

The marketing strategy for the Program is to work with those customers that need technical and financial assistance as a companion to their internal resources. Given the facility-wide approach, many of the energy savings opportunities are complex and interactive in nature which fits well with the end-to-end involvement utilized in the Program. Typical customer marketing activity involves direct marketing from Business Account Managers, electronic postcards, e-mails, and information attained through the Company's website and direct customer inquiries. Marketing in the future may shift as the virtual modeling software becomes more applicable. The opportunity to receive a quick readout of a building's efficiency level for a nominal cost will be a compelling message to Duke Energy customers.

F. Evaluation Measurement and Verification

No evaluation activities are planned for 2021.

Non-Residential Smart $aver® Custom

A. Description

Duke Energy Carolinas, LLC's (the "Company's") Non-Residential Smart $aver® Custom Incentives (the "Program") offers financial assistance to qualifying commercial, industrial and institutional customers (that have not opted-out) to enhance their ability to install cost-effective electrical energy efficiency projects.

The Program is designed to meet the needs of the Company's customers with electrical energy saving projects involving more complicated or alternative technologies, or with measures not covered by the Non-Residential Smart $aver Prescriptive Program. The intent of the Program is to encourage energy efficiency projects that would not otherwise be completed without the Company's technical or financial assistance.

Unlike the Non-Residential Smart $aver Prescriptive Program, the Program requires pre-approval prior to the project initiation. Proposed energy efficiency measures may be eligible for customer incentives if they clearly reduce electrical consumption and/or demand.

The two approaches for applying for incentives for this Program are Classic Custom and Smart $aver Tools. Each approach has a method by which energy savings are calculated, but the documents required as part of the application process vary slightly between the two.

Currently the application forms listed below are located on the Company's website under the Smart $aver® Incentives (Business and Large Business tabs).

- Custom Application, offered in word and pdf format.
- Calculation Assistance
  - Third party assistance with completing application and collecting necessary documentation
- Energy savings calculation support:
  - Classic Custom excel spreadsheet approach (> 700,000 kWh or no applicable Smart $aver Tool)
    - Lighting worksheet (excel)
    - Variable Speed Drive (VFD) worksheet (excel)
    - Compressed Air worksheet (excel)
    - Energy Management System (EMS) worksheet (excel)
    - General worksheet (excel), to be used for projects not addressed by or not easily submitted using one of the other worksheets
  - Smart $aver Tools approach (< 700,000 kWh)
    - HVAC & Energy Management Systems
    - Lighting (no project size limit)
    - Process VFDs
    - Compressed Air
  - Calculation Assistance
    - Third-party calculation generation for a fixed fee based on technology type

The Company contracts with AESC to perform technical review of applications. All other program implementation and analysis is performed by Duke Energy employees or direct contractors.

Audience

All of the Company's non-residential electric accounts billed on eligible rate schedules, except those that choose to opt-out of the Program, are eligible.

Non-Residential Smart $aver® Custom

B & C. Impacts, Participants and Expenses

Non Residential Smart Saver Custom[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	**$29.2**	**$19.3**	**66%**
Program Cost	**$10.2**	**$7.5**	**74%**
MW	**7.6**	**6.6**	**87%**
MWH	**53,115.8**	**30,798.5**	**58%**
Units	**36,316**	**8,395**	**23%**

1) Values are reflected at the system level.

D. Qualitative Analysis

Highlights

Customers continue to identify energy efficiency opportunities eligible for incentives under this Program. In the first half of 2021, 83 new pre-approval applications were submitted, of which 34 were new construction projects. Additionally, 50 projects were enrolled in new construction which precedes a Smart $aver Custom application.
Smart $aver Custom Incentives program uses a flat rate incentive for both energy and demand savings.

Efforts to educate trade allies and vendors who sell energy efficient equipment have been very successful. In many cases, vendors will submit the paperwork for the customer, eliminating a barrier for customers that do not have the resources to devote to completing the application.

The Program launched a fast track option for 2017 which gives customers the ability to pay a fee to speed up their application processing time to seven business days. This fee is passed through to the vendor for its cost to expedite the application.

As of the end of 2019, Custom-to-Go was retired and replaced with the Smart $aver Tool. For the lighting tool only, the customer can submit one file for both Prescriptive and Custom reducing some of the customer's administrative burden.

In 2021, Application and Calculation Assistance were added. Application Assistance provides third party application completion. Calculation Assistance provides third party calculation generation. Both services are provided at a fixed cost to the customer based on application type and technology type.

Issues

The Program application process is considered burdensome by some customers due to the individual and technically intensive review required for all projects applying for a custom incentive. Each year, Program staff explores ways to reduce the length of the application. By streamlining processes, the average processing time has dipped to 20 days for all states/jurisdictions.

The technical review often requires customers (or their vendors) to quantify the projected energy savings from the proposed project. This process can be lengthy and may require some level of engineering expertise. Where necessary, this requirement will continue, thus ensuring that incentives are being paid for cost-effective verifiable efficiency gains. Indications are that the Smart $aver Tools and online application portal have relieved some of this burden.

Non-Residential Smart $aver® Custom

The custom program is subject to large fluctuations in performance due to the importance of a small number of large projects. Although the number of small projects is significant compared to the number of large projects, the large projects drive the majority of annual impacts.

The custom program is still limited by customers who are opted out of the EE Rider. Those customers who are opted out are not eligible to participate and any projects completed by those customers are lost opportunities. The custom program is actively working with internal resources (large account managers and Business Energy Advisors) to determine if opting in to the EE Rider for a potential project is the best option for customers currently opted out.

Finally, the custom program continues to see changes in available technologies as specific measures become eligible for Smart $aver Prescriptive.

Potential Changes

The Custom program continues to evaluate additional improvements to enhance participation, processing speed and program efficiency.

E. Marketing Strategy

The Company will continue the Program marketing efforts in 2020 through various marketing channels that include but are not limited to the following:

- Direct mail (letters and postcards to qualifying customers)
- Duke Energy website
- Community outreach events
- Small Business Group outreach events
- Paid advertising/mass media
- Social media promotions
- Trade ally outreach
- Account managers
- Business Energy Advisors

These marketing efforts are designed to create customer awareness of the Program, to educate customers on energy saving opportunities, and to emphasize the convenience of Program participation.

Non-residential customers learn of programs via targeted marketing material and communications. Information about incentives is also distributed to trade allies who sell equipment and services to all sizes of nonresidential customers. Large business or assigned accounts are targeted primarily through Company account managers. Unassigned small to medium business customers are supported by the Company's Business Energy Advisors. The Business Energy Advisors follow up on customer leads, assist with program questions, and steer customers who are not already working with a trade ally to the trade ally search tool. In addition, the Business Energy Advisors promote the program to customers with electrical costs between $60,000 and $250,000.

The internal marketing channel consists of Large Business Account Managers and Local Government and Community Relations who all identify potential opportunities as well as distribute program informational material to customers and trade allies. In addition, the Economic and Business Development groups also provide a channel to customers who are new to the service territory.

The Program launched a new marketing channel in 2017 called New Construction Energy Efficiency Design Assistance (NCEEDA) to identify energy efficiency projects for customers currently underserved in the SMB market. This channel will utilize the vendor Willdan Energy Solutions to help identify those opportunities, complete savings calculations, and submit applications for the customer. As of January 24, 2020, DEC has 233 active and completed enrolled projects in the NCEEDA offering, representing 32.3

Non-Residential Smart $aver® Custom

million square feet of area. Of these, the 187 Smart $aver Custom project applications represent 64.8 million kWh of energy savings.

F. Evaluation, Measurement and Verification

DEC Non-Residential Custom evaluation activities, combined with DEP, are currently underway with a final report planned for Fourth Quarter 2021.

Non-Residential Smart $aver® Performance Incentive

A. Description

Duke Energy Carolinas, LLC's (the "Company's") Non-Residential Smart $aver® Performance Incentives (the "Program") offers financial assistance to qualifying commercial, industrial and institutional customers (that have not opted-out) to enhance their ability to install cost-effective electrical energy efficiency projects.

The Program is designed to encourage the installation of high efficiency equipment in new and existing nonresidential establishments as well as the performance of efficiency-related repair activities designed to maintain or enhance efficiency levels in currently installed equipment. The Program provides incentive payments to offset a portion of the higher cost of energy efficient installations that are not eligible under either the Smart $aver® Prescriptive or Custom programs. The types of measures covered by the Program include projects with some combination of unknown building conditions or system constraints or uncertain operating, occupancy, or production schedules. The specific type of measures are agreed upon with the Customer. The Program is delivered in close coordination with the existing Custom program team and shares resources for administrative review and payment processing. The Program requires pre-approval prior to project initiation.

The intent of the Program is to broaden participation in the Company's non-residential efficiency programs by providing incentives for projects that previously were deemed too unreliable to calculate an acceptably accurate savings amount predictively and, therefore, were not offered incentives. The program is also expected to provide a platform for gaining a better understanding of new technologies.

The key difference between the Performance Incentive Program and the Custom Program is that the customers in the Performance Incentive Program are paid incentives based on actual measured performance. For each project, a plan is developed to verify the actual performance of the project once completed and is the basis for the performance portion of the incentive.

The Program incentives will typically be paid out in the following manner, though payment installment quantities and timing may vary:

- Incentive #1: For the portion of savings that are expected to be achieved with a high degree of confidence, an initial incentive will be paid. This incentive is paid once installation is complete.
- Incentive #2: After performance is measured and verified, the performance-based part of the incentive will be paid out as follows:
  - If performance exceeds expectations, the incentive payout may be larger.
  - If performance does not meet expectations, the incentive payout may be smaller.

Application forms for applying for incentives are located on the Company's website.

The Company contracts with Alternative Energy Systems Consulting, Inc. (AESC) to perform technical review of applications. All other program implementation is performed by Duke Energy employees or direct contractors.

Audience

All of the Company's non-residential electric accounts billed on eligible rate schedules, except those that choose to opt-out of the Program, are eligible.

Non-Residential Smart $aver® Performance Incentive

B & C. Impacts, Participants and Expenses

Non Residential Smart Saver Performance Incentive[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	$7.1	$4.2	60%
Program Cost	$2.4	$0.3	14%
MW	1.7	1.1	63%
MWH	14,901.6	8,247.4	55%
Units	17,758,407	50	0%

1) Values are reflected at the system level.

D. Qualitative Analysis

Highlights

As new technologies are introduced and changes occur in the energy efficiency marketplace, performance incentives are the perfect tool to influence and reward customers who invest in energy efficiency. The Smart $aver Performance Incentives program was launched on January 1, 2017. Efforts to encourage internal resources, trade allies and vendors who sell energy efficient equipment to promote the Program and assist customers to participate are continuous and on-going. In addition, the Program is marketed closely with the Smart $aver Custom Program.

In the first half of 2021, the program received 7 new applications.

The program experiences large fluctuations in performance due to long project lead times, long monitoring and verification times, and the timing and sizes of projects. With a compelling value proposition and internal resources and trade allies getting comfortable with this unique program offering, participation is expected to continue to be strong.

The program is now able to offer both top and bottom cycle CHP to customers.

Issues

Program management is monitoring a few areas.

- The preferred method for measurement and verification of performance is gathering, monitoring and analyzing customer billing history. However, energy savings are not significant enough at times to evaluate effectively through the review of billing information. If this is the case, sub-metering is required at the customer's expense and may be a hurdle due to the time and expense of monitoring and verifying savings.

- The Performance program cannot be offered to customers who are opted out of the EE Rider. Performance projects can easily carryover into multiple calendar years because of the monitoring and verification requirement, a situation which could make opting in more difficult to justify.

- Sometimes project M&V can span multiple years thus requiring a customer to be opted-in for multiple years. This is often not preferred, and we are beginning to see customers forfeit a portion of their project incentive to opt-out of the rider.

- Customers may not participate because of the risk of measured energy savings being less than expected and resulting in a smaller incentive payout.

- The program is having difficulty in finding cost effective projects. Typical Performance project with uncertainty in savings have been controls related, where savings are determined based on the part-load characteristics of the measure or system optimization. These types of projects typically have the following characteristics which makes costs-effectiveness challenging:

- High first costs
- Little demand savings – low avoided costs
- Low measure life

The program will continue to evaluate projects on a case by case basis to ensure cost effective projects are incentivized.

Potential Changes

The Company continuously considers functional improvements to enhance participation, processing speed and program efficiency.

E. Marketing Strategy

The 2020 marketing strategy for the Smart $aver Performance Incentive Program closely aligns with the Custom Program. The goal is to educate the Company's non-residential customers about the technologies incentivized through both programs, as well as the benefits of installing energy-efficient equipment. These efforts encompass a multi-channel approach including but not limited to the following:

- Email (targeted customers)
- Direct Mail (letters to qualified/targeted customers)
- Duke Energy Carolinas website
- Community outreach events
- Print advertising/mass media
- Target customer outreach
- Industry Associations
- Large Account Managers
- Business Energy Advisors
- Trade Ally Outreach

Marketing efforts are designed to create customer awareness of the Program, to educate customers on opportunities to save energy, and to emphasize the convenience of Program participation.

Non-residential customers learn of programs via targeted marketing material and communications. Information about incentives is also distributed to trade allies who sell equipment and services to all sizes of nonresidential customers. Large business or assigned accounts are targeted primarily through Company account managers. Unassigned small to medium business customers are supported by the Company's Business Energy Advisors. The Business Energy Advisors follow up on customer leads, assist with program questions, and steer customers who are not already working with a trade ally to the trade ally search tool. In addition, the Business Energy Advisors contact customers with electrical costs between $60,000 and $250,000 to promote the program.

The internal marketing channel consists of Large Business Account Managers, Business Energy Advisors, and Local Government and Community Relations who all identify potential opportunities as well as distribute program informational material to customers and trade allies. In addition, the Economic and Business Development groups also provide a channel to customers who are new to the service territory.

F. Evaluation, Measurement and Verification

Non-Residential Smart $aver® Performance Incentive

No evaluation activities are planned for 2021. Future evaluation timing will depend upon sufficient participation.

A. Description

PowerShare® ("Program") is a demand response program offered to commercial and industrial customers. The Program is comprised of Mandatory ("PS-M"), Generator ("PS-G"), and Voluntary ("PS-V") options, and customers can choose from a variety of offers. Under PS-M and PS-G, customers receive capacity credits for their willingness to shed load during times of peak system usage. Energy credits are also available for participation (shedding load) during curtailment events. The notice to curtail under these offers can be rather short (15-30 minutes), although every effort is made to provide as much advance notification as possible. Failure to comply during an event could result in penalties.

Audience

The Program is offered to Duke Energy Carolinas, LLC's (the "Company's") non-residential customers who have not opted-out and are able to meet the load shedding requirements.

B & C. Impacts, Participants and Expenses

PowerShare[1]

$ in millions, rounded	Vintage 2021 As Filed	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	**$43.5**	**$42.3**	**97%**
Program Cost	**$13.7**	**$13.6**	**99%**
MW[2]	**344.5**	**337.7**	**98%**
MWH	**0.0**	**N/A**	**-**
Units[3]	**324,287**	**317,887**	**98%**

Notes on Tables:

1) Values are reflected at the system level.

2) MW capability derived by taking average over specific PowerShare contract periods. At month-end December 2021, we had the ability to shed 317.9 MW (at the plant), representing 98% of the as filed capacity.

3) Units included in filing represented KW at meter, rather than number of participants.

D. Qualitative Analysis

Highlights

PS-M and PS-G continue to be well received by customers who have the flexibility to curtail load upon request in both North Carolina and South Carolina. The addition of new participants and a return of customer loads close to pre-pandemic levels resulted in a year-end PowerShare capability of 338MW.

There were no PowerShare curtailment events in 2021.

Issues

No current issues.

Potential Changes

No changes anticipated at this time.

E. Marketing Strategy

To date, marketing efforts for the Program have focused on the relationship between the Company's account executives and their assigned customers. As part of their normal contact with customers, the account executives introduce the Program, including any new options/offers, while explaining the value proposition to the customer. Account executives share in-house analytics that show the incentives for each offer as applied to the customer's specific load profile and provide marketing collateral to explain the details of all the Program offers.

F. Evaluation, Measurement and Verification

Planning for the PY 2020/2021 evaluation began late 2020. The evaluation will estimate verified demand (kW) impacts using a baseline testing approach (including regression-based and customer baseline, or, CBL) for the period June 1, 2020 through May 31, 2021, with a tentative final report in the fourth quarter of 2021. These impacts will include:

a. Average kW demand impact per customer for each event, and on average across all events
b. Total program kW demand impact for each event, and on average across all events

Note this evaluation is subject to events occurring during this time period. Guidehouse did not perform an evaluation for the 2019-2020 season, since no events occurred.

A. Description

Duke Energy Carolinas, LLC's (the "Company's" or "DEC") EnergyWise Business (the "Program") is an energy efficiency and demand response program for non-residential customers that allows the Company to reduce the operation of participants' air conditioning units to help manage the power grid. The Program provides customers with options for how they would like to participate. In exchange for participation, the Company applies an annual incentive directly to their bills.

For each air conditioning or heat pump unit that they have, Program participants can choose between a Wi-Fi thermostat or a load control switch professionally installed for free by the Program. In addition to choosing the equipment, participants also choose the cycling level at which they participate—30%, 50% or 75%. The levels represent the percentage of the normal on/off cycle of the unit that is reduced. During a conservation period, Company sends a signal to the thermostat or switch to reduce the amount of time a unit is on by the percentage the participant selected. For participating at the 30% level the customer receives a $50 annual bill credit for each unit, $85 for 50% cycling, and $135 for 75% cycling. Finally, participants that have a heat pump unit with electric resistance emergency/back up heat and choose the thermostat can also participate in a winter option that allows the Company to control the emergency/back up heat. For 100% control of the emergency/back up heat, the Company provides an additional $25 annual bill credit.

Participants choosing the thermostat are given access to a portal that allows them to control their units from anywhere they have internet access. They can set schedules, adjust the temperature set points and receive energy conservation tips and communications from the Company. In addition to the portal access, participants also receive conservation period notifications. Notifications allow participants to make adjustments to their schedules or notify their employees of the upcoming conservation period. Participants are allowed to override two conservation periods per year either before or during the conservation period.

Audience

The Program is available to existing non-residential customers that are not opted-out of the DSM portion of the Company's EE/DSM rider, Rider DSM; have at least one air conditioner or heat pump that operates to maintain a conditioned space on weekdays during the calendar months of May through September; and are not served under Schedules BC and HP, Riders NM, SCG, IS, PS or PSC. Also, customers must have an average minimum usage of 1,000 kWh during those same calendar months.

B & C. Impacts, Participants and Expenses

EnergyWise for Business[1]

$ in millions, rounded	Vintage 2021 As Filed[3]	Vintage 2021 YTD December 31, 2021	% of Target
NPV of Avoided Cost	**$3.5**	**$2.0**	**56%**
Program Cost	**$6.0**	**$2.5**	**41%**
MW	**20.8**	**11.2**	**54%**
MWH	**2,557.6**	**1,436.4**	**56%**
Units[2]	**23,266**	**13,272**	**57%**

1) Values are reflected at the system level.

2) Units represent average monthly kW at meter for demand response measures (11,954), plus individual participants for smart thermostat energy efficiency measure (1,318).

D. Qualitative Analysis

Highlights

During the first half of 2021, the Program was impacted by shutdowns due to COVID-19. The program was shutdown at the end of 2020 through January of 2021. These shutdowns reduced the number of install workorders in our backlog and prevented installs in January. Things improved over the first half of the year and the backlogs are returning to a healthy level.

During the 2020 shutdown and phased restart, the Program reduced the number of installers and canvassers. Currently the Program has 40% of the staff we had at the beginning of 2020. The staffing levels will stay at this level to only replace lost capacity as the Program moves to a maintenance mode and only replaced lost capacity.

Issues

With the program struggling with cost effectiveness, and the change in DEC from a summer peaking utility to mostly winter peaking, the program is going to move to a maintenance mode. We have negotiated price reductions with our vendor that will improve the cost effectiveness and allow the program to maintain its current capacity levels.

Potential Changes

The Company is investigating a new Program or Program options that will focus on winter peaking capacity and other end use technologies in addition to the HVAC units.

E. Marketing Strategy

In 2021 the Program continued the efforts of door-to-door marketing using a dedicated canvassing vendor. In addition to canvassing, the Program targets slightly larger and multi-location customers through Duke Energy's Business Energy Advisors.

F. Evaluation, Measurement and Verification

The evaluation for the Smart Thermostat (EE) measure for the period of January 2018 – February 2019 was completed in February 2021 and presented at the July 2021 DEC/DEP Collaborative. Impacts for the demand response portion (Summer 2021) for the program has subsequently begun with a final DR report scheduled for 2PndP Quarter 2022.

Evans Exhibit 7

Duke Energy Carolinas, LLC
Estimate - January 1, 2023 - December 31, 2023
Docket Number E-7, Sub 1265
Projected Program/Portfolio Cost Effectiveness - Vintage 2023

Program	UCT	TRC	RIM	PCT
Residential Programs				
· Energy Education Program for Schools	1.31	1.35	0.33	15.97
· Energy Efficient Appliances & Devices	2.69	2.64	0.71	6.04
· Residential – Smart $aver Energy Efficiency Program	1.26	1.04	0.70	1.69
· Income-Qualified EE Products & Services	0.81	0.81	0.51	2.13
· Multi-Family EE Products & Services	3.59	3.54	0.77	9.41
· My Home Energy Report	3.59	3.59	0.85	0.00
· Power Manager	4.45	9.28	4.45	0.00
· Residential Energy Assessments	1.57	1.52	0.52	21.92
· Residential New Construction	2.09	1.48	0.80	2.36
Residential Total	**2.70**	**2.84**	**1.07**	**5.00**
Non-Residential Programs				
· Custom Assessment & Incentive	2.07	1.16	0.83	2.07
· EnergyWise for Business	1.42	2.79	1.23	69.03
· Food Service Products	2.91	0.66	0.71	1.31
· HVAC	3.66	2.26	0.70	4.37
· Lighting	4.55	2.46	0.91	4.03
· Motors, Pumps & VFDs	2.64	1.88	0.75	3.67
· Non Res Information Technology	0.38	0.35	0.23	5.23
· Process Equipment	2.86	2.21	0.81	3.94
· Performance Incentive	4.54	1.27	0.98	1.85
· Small Business Energy Saver	3.23	1.93	0.98	2.88
· PowerShare	4.61	170.67	4.61	0.00
Non-Residential Total	**3.82**	**2.56**	**1.07**	**3.49**
Overall Portfolio Total	**3.25**	**2.67**	**1.07**	**3.96**

I/A

Evans Exhibit 8
Docket No. E-7, Sub 1265

Duke Energy Carolinas
Changes to DSM/EE Cost Recovery Vintage 2021 True Up January 1, 2021 - December 31, 2021
Changes from Prior Filing Due to Application of M&V and Participation
System kWh and kW Impacts Net Free Riders at the Plant

Residential Programs

Program Name	Filed in Docket E-7, Sub 1230 kWh	Filed in Docket E-7, Sub 1230 kW	Filed in Docket E-7, Sub 1265 kWh	Filed in Docket E-7, Sub 1265 kW	Overall Variance kWh	Overall Variance kW	E-7 Sub 1230 System Participation	E-7 Sub 1265 System Participation	Delta Participation	Variance attributable to Participation kWh	Variance attributable to Participation kW	Variance attributable to Mix of Measures kWh	Variance attributable to Mix of Measures kW	Variance attributable to EM&V kWh	Variance attributable to EM&V kW	Sum of Variances kWh	Sum of Variances kW
Energy Efficiency Education Program for Schools	7,951,567	997	7,013,162	(1,192)	(938,405)	(2,188)	29,354	13,894	(15,460)	(4,187,945)	(525)	-	-	3,249,540	(1,663)	(938,405)	(2,188)
Energy Efficient Appliances and Devices	56,621,851	9,790	51,700,635	8,813	(4,921,216)	(977)	1,563,048	2,404,963	841,915	(8,842,027)	(1,033)	3,661,861	1,107	258,950	(1,052)	(4,921,216)	(977)
Residential – Smart $aver Energy Efficiency Program	5,570,374	1,347	9,425,675	2,556	3,855,301	1,209	14,545	28,242	13,697	3,855,301	1,209	-	-	(0)	0	3,855,301	1,209
Income Qualified Energy Efficiency and Weatherization Assistance	8,977,504	1,635	2,545,882	493	(6,431,623)	(1,142)	12,214	2,377	(9,837)	(6,506,511)	(1,357)	161,900	221	(87,012)	(7)	(6,431,623)	(1,142)
Multi-Family Energy Efficiency	28,264,645	2,983	2,019,667	279	(26,244,978)	(2,704)	523,776	44,542	(479,234)	(26,100,289)	(2,741)	192,724	41	(337,413)	(5)	(26,244,978)	(2,704)
Energy Assessments	14,921,390	1,778	6,590,951	748	(8,330,439)	(1,030)	126,576	33,369	(93,207)	(8,330,543)	(1,030)	-	-	104	0	(8,330,439)	(1,030)
My Home Energy Report	342,160,803	94,985	336,292,411	93,380	(5,868,392)	(1,605)	1,408,963	1,376,708	(32,255)	(5,868,392)	(1,605)	-	-	-	-	(5,868,392)	(1,605)
PowerManager	-	658,987	-	456,664	-	(202,324)	620,406	442,013	(178,393)	-	447,229	-	(156,568)	-	(492,984)	-	(202,324)
Residential Programs Total	464,468,135	772,501	415,588,383	561,741	(48,879,752)	(210,760)	4,298,882	4,346,108	47,226	(55,980,406)	440,149	4,016,485	(155,198)	3,084,169	(495,711)	(48,879,752)	(210,760)

Non-Residential Programs

Program Name	Filed in Docket E-7, Sub 1230 kWh	Filed in Docket E-7, Sub 1230 kW	Filed in Docket E-7, Sub 1265 kWh	Filed in Docket E-7, Sub 1265 kW	Overall Variance kWh	Overall Variance kW	E-7 Sub 1230 System Participation	E-7 Sub 1265 System Participation	Delta Participation	Variance attributable to Participation kWh	Variance attributable to Participation kW	Variance attributable to Mix of Measures kWh	Variance attributable to Mix of Measures kW	Variance attributable to EM&V kWh	Variance attributable to EM&V kW	Sum of Variances kWh	Sum of Variances kW
Non Residential Smart Saver Custom Technical Assessments	5,482,371	626	921,248	110	(4,561,123)	(516)	3,492	1	(3,491)	-	-	(4,561,123)	(516)	-	-	(4,561,123)	(516)
Non Residential Smart Saver Custom	53,115,768	7,579	30,798,533	6,572	(22,317,235)	(1,007)	36,316	8,395	(27,921)	-	-	(22,317,235)	(1,007)	-	-	(22,317,235)	(1,007)
Non Residential Smart Saver Energy Efficient Food Service Products	4,280,461	212	1,201,408	80	(3,079,053)	(132)	15,727	1,601	(14,125)	(2,469,866)	(77)	(755,164)	(64)	145,977	9	(3,079,053)	(132)
Non Residential Smart Saver Energy Efficient HVAC Products	3,698,306	1,118	21,054,972	3,325	17,356,666	2,207	3,097,102	6,874,382	3,777,280	3,334,821	572	11,070,813	1,231	2,951,033	404	17,356,666	2,207
Non Residential Smart Saver Energy Efficient Lighting Products	156,866,525	27,805	116,783,529	20,325	(40,082,995)	(7,480)	2,242,099	3,253,784	1,011,685	(53,340,941)	(9,487)	2,073,030	494	11,184,915	1,513	(40,082,995)	(7,480)
Non Residential Smart Saver Energy Efficient Pumps and Drives Products	2,717,418	429	1,521,286	239	(1,196,131)	(190)	2,575	1,048	(1,527)	(1,511,792)	(239)	(72,806)	(11)	388,467	60	(1,196,131)	(190)
Non Residential Energy Efficient ITEE	272,355	-	2,353	-	(270,002)	-	4,323	28	(4,295)	(270,591)	-	-	-	589	-	(270,002)	-
Non Residential Smart Saver Energy Efficient Process Equipment Products	877,998	186	824,803	117	(53,195)	(69)	15,321	10,222	(5,099)	125,870	14	(317,078)	(105)	138,013	22	(53,195)	(69)
Non Residential Smart Saver Performance Incentive	14,901,572	1,701	8,247,437	1,079	(6,654,135)	(622)	17,758,407	50	(17,758,357)	-	-	(6,654,135)	(622)	-	-	(6,654,135)	(622)
Smart Energy in Offices	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small Business Energy Saver	50,790,447	9,404	38,560,812	7,011	(12,229,635)	(2,393)	47,000,000	35,655,347	(11,344,653)	(15,250,024)	(2,981)	1,919,855	410	1,100,534	178	(12,229,635)	(2,393)
Business Energy Report	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EnergyWise for Business	2,557,568	20,801	1,436,361	11,564	(1,121,206)	(9,237)	23,266	13,272	(9,993)	(1,842,187)	115,253	-	-	720,981	(124,490)	(1,121,206)	(9,237)
PowerShare	-	344,454	-	335,086	-	(9,368)	324,287	317,887	(6,400)	-	-	-	(9,368)	-	-	-	(9,368)
Non-Residential Programs Total	295,560,789	414,316	221,352,744	385,509	(74,208,045)	(28,806)	70,522,915	46,136,016	(24,386,898)	(71,224,710)	103,057	(19,613,843)	(9,558)	16,630,508	(122,305)	(74,208,045)	(28,806)
Total Residential and Non-Residential Programs	760,028,924	1,186,817	636,941,127	947,250	(123,087,797)	(239,567)	74,821,797	50,482,125	(24,339,672)	(127,205,116)	543,205	(15,597,358)	(164,756)	19,714,678	(618,016)	(123,087,797)	(239,567)

NOTE - The actual per unit impacts are reflective of the following EM&V reports:

Program Name As Filed	Docket	Report Reference	Effective Date
Income Qualified Energy Efficiency and Weatherization Assistance	E-7, Sub 1265	Duke Energy Carolinas Low Income Weatherization Program (2016-2018) Evaluation Report - Final	1/1/2019
PowerManager	E-7, Sub 1265	2019-2020 Power Manager Evaluation Report	1/1/2021
Residential – Smart $aver Energy Efficiency Program	E-7, Sub 1265	Duke Energy Carolinas & Duke Energy Progress Online Savings Store Program 2021 Evaluation Report - Final	Varies
Energy Efficiency Education Program for Schools	E-7, Sub 1265	K12 Education Program 2019-2020 Evaluation Report - Submitted to Duke Energy Carolinas and Duke Energy Progress	8/1/2020
Small Business Energy Saver	E-7, Sub 1265	EM&V Report for the Duke Energy Small Business Energy Saver Program 2019-2020	7/1/2020
EnergyWise for Business	E-7, Sub 1265	2020 EM&V Interim Report for the EnergyWise Business Program	3/1/2019

Duke Energy Carolinas, LLC
List of Industrial and Commercial Customers Opted Out of Vintage 2021
Docket E-7, Sub 1265

	Number of Accounts
DSM RIDER OPT OUT	**4,777**
EE RIDER OPT OUT	**4,461**

Customer Bill Name	DSM YR 21 (Jan 1-Dec 31) RIDER OPT OUT	EE YR 21 (Jan 1-Dec 31) RIDER OPT OUT	GRAND TOTAL
101 SOUTH TRYON LP	2	2	4
1515 MOCKINGBIRD CHARLOTTE OFFICE LLC	1	1	2
300 SOUTH TRYON LLC	5	5	10
301 COLLEGE STREET CENTER LLC	1	1	2
4000 Monroe LLC	2	2	4
4601 PARK CHARLOTTE OFFICE LLC	1	1	2
638 BREWING CO, INC	2	2	4
800 GREEN VALLEY ASSOCIATES LLC	1	1	2
A & T STATE UNIV	5	3	8
A W NORTH CAROLINA INC	5	5	10
ABB MOTORS AND MECHANICAL INC	4	4	8
ABCO AUTOMATION INC	1	1	2
ABERCROMBIE TEXTILES LLC	0	1	1
ACUCOTE INC	3	3	6
ADVANCE STORES CO	1	1	2
ADVANCED DRAINAGE SYSTEMS	2	2	4
ADVANCED MACHINE & FABRICATION, INC.	2	2	4
ADVANCED TECHNOLOGY	2	1	3
AE & T COMPANY INC	1	1	2
AEP INDUSTRIES INC	2	2	4
AERO ACCESSORIES INC	2	2	4
AERODYN WIND TUNNEL LLC	1	1	2
AFRO AMERICAN CULTUR	1	1	2
AIR PRODUCTS & CHEMICALS, INC	1	1	2
AIRGAS USA LLC	0	1	1
AKZO NOBEL SURFACE CHEMISTRY LLC	9	9	18
ALADDIN MANUFACTURING CORPORATION	0	1	1
ALAMANCE BURLINGTON SCHOOL SYSTEM	6	6	12
ALAMANCE COMMUNITY COLLEGE	8	8	16
ALAMANCE EXTENDED CARE, INC	1	1	2
ALAMANCE FOODS INC	0	5	5
ALAMANCE REGIONAL MEDICAL CENTER	2	2	4
ALBEMARLE U. S., INC	1	1	2
ALCAN PACKAGING FOOD AND TOBACCO,INC	2	2	4
ALDERSGATE	0	9	9
ALDI (NC) LLC	2	2	4
ALEXANDER COUNTY SCHOOLS	2	2	4
ALEXANDRIA REAL ESTATE EQUITIES INC	7	7	14
ALL GRANITE INC	3	3	6
ALLIANCE ONE INTERNATIONAL	1	1	2
ALLIED DIE CASTING CO OF NC	2	2	4

ALLOYWORKS, LLC	0	5	5
ALTEC INDUSTRIES INC	3	3	6
AMAZON FULFILLMENT SERVICES, INC	1	1	2
AMAZON.COM SERVICES, INC.	4	4	8
AMAZON.COMM.DEDC,LLC	1	1	2
AMERICAN & EFIRD LLC	8	9	17
AMERICAN AIRLINES	5	3	8
AMERICAN CAMPUS LLC	1	1	2
AMERICAN CONVERTING, CO. LTD	2	2	4
AMERICAN EXPRESS TRAVEL RELATED SERVICES COMPANY	1	1	2
AMERICAN FIBER & FINISHING	1	1	2
AMERICAN HEBREW ACADEMY	11	11	22
AMERICAN MULTI CINEMA INC	4	4	8
AMERICAN ROLLER BEARING CO	4	4	8
American Snuff	1	1	2
American Snuff Company, LLC	6	6	12
AMERICAN YARNS LLC	3	3	6
AMERICAN ZINC PRODUCTS LLC	1	1	2
AMERICOLD LOGISTICS LLC	1	1	2
AMSTAR SUGAR CORP	1	1	2
ANDALE INC	1	1	2
APPALACHIAN STATE UNIV	1	1	2
APPLE INC	2	2	4
AQUA PLASTICS INC	1	1	2
ARBOR ACRES UNITED METHODIST RETIREMENT COMMUN	9	9	18
ARCHER-DANIELS-MIDLAND CO	3	3	6
ARDAGH METAL BEVERAGE USA, INC	2	2	4
ARE-NC REGION NO 11, LLC	2	2	4
ARJOBEX AMERICA	2	2	4
ARMACELL LLC	8	8	16
ARROW INTERNATIONAL INC	2	2	4
ASHLEY FURNITURE INDUSTRIES INC	13	13	26
ASSOCIATED HEALTH SERVICES INC	2	2	4
AT&T BELLSOUTH	3	0	3
AT&T MOBILITY LLC	3	3	6
AT&T WIRELESS SERVICE	1	1	2
ATAPCO UEP, INC	2	2	4
ATLANTIC SWEETNER CO	2	2	4
ATLAS WELDING	3	3	6
ATOS IT OUTSOURCING SERVICES	1	1	2
ATOS IT SOLUTIONS AND SERVICES, INC	1	1	2
ATRIUM WINDOWS & DOORS	9	9	18
AUTOMATED SOLUTIONS LLC	2	2	4
AVAGO TECHNOLOGIES WIRELESS(USA) MANUFACTURING	1	1	2
AVDEL USA LLC	1	1	2
AVISTA PHARMA SOLUTIONS	4	4	8
B & E WOODTURNING INC	1	1	2
B & W FIBERGLASS	1	1	2
B V HEDRICK GRAVEL & SAND COMPANY	9	9	18
B&G FOODS SNACKS, INC	1	1	2
B/E AEROSPACE, INC	0	15	15
BAKER INTERIORS FURNITURE COMPANY	5	8	13

BAKERY FEEDS INC	2	2	4
BANK NOTE CORP	3	3	6
BANK OF AMERICA	3	2	5
BARNHARDT MANUFACTURING COMPANY INC	6	6	12
BARRDAY CORP	3	3	6
BARTIMAEUS BY DESIGN INC	3	3	6
BARTLETT MILLING CO	1	1	2
BASF AGRICULTURAL SOLUTIONS SEED US LLC	9	9	18
BASF CORPORATION	2	2	4
BAY STATE MILLING	5	5	10
BEAL HOLDINGS LLC	1	1	2
BEAL MANUFACTURING CORP	1	1	2
BEASLEY FLOORING PRODUCTS INC	2	2	4
BECO MANAGEMENT	2	2	4
BED,BATH & BEYOND	1	1	2
BEKAERT TEXTILES USA	4	4	8
BELK	7	7	14
BELL SOUTH MOBILITY	1	1	2
BELLSOUTH	10	10	20
BELLSOUTH BSC	13	0	13
BELLSOUTH TELECOMMUNICATIONS, LLC	1	1	2
BELMONT ABBEY COLLEGE	19	19	38
BEMIS MANUFACTURING CO	2	2	4
BENJAMIN THOMAS COOPER	0	1	1
BEOCARE INC	2	3	5
BERNHARDT FURNITURE COMPANY	8	8	16
BERRY TRI PLASTICS	0	1	1
BESTCO, LLC	6	7	13
BESTREADS INC	2	2	4
BEVERLY KNITS INC	6	6	12
BIC CORPORATION	5	5	10
BILLY GRAHAM EVANGELISTIC	6	6	12
BI-LO, LLC	8	8	16
BIOMERIEUX, INC	4	4	8
BISHOP MCGUINNESS CATHOLIC HIGH SCHOOL	3	3	6
BISSELL COMPANIES	1	1	2
BJ'S WHOLESALE CLUB	2	2	4
BLACKSTONE CHARLOTTE, LLC	1	1	2
BLOW MOLDED SOLUTIONS LLC	0	2	2
BLUE RIDGE COMMUNITY COLLEGE	17	15	32
BLUE RIDGE HEALTH CARE	1	1	2
BLUM, INC	1	1	2
BONSET AMERICA CORP	1	1	2
Boral Building Products Inc.	3	3	6
BORAL COMPOSITES INC.	4	4	8
Bosnere Inc	1	1	2
BOSTON GEAR LLC	1	1	2
BOWMAN DAIRY	1	1	2
BOXBOARD PROD INC	2	2	4
BRASS CRAFT MFG CO	1	1	2
BRAXTON SAWMILL INC	2	2	4
BRAY PROPERTIES, LLC	1	1	2

BRF-A1,LLC	1	1	2
BRI 1875 MERIDIAN, LLC	8	4	12
BRI 1881 INNOVATION PARK LLC	2	0	2
BRIDGESTONE AIRCRAFT TIRE USA INC	3	3	6
BRIGHT ENTERPRISES INC	2	2	4
BRIT-CHARLOTTE HOLDING LLC	1	1	2
BROAD RIVER WATER AUTHORITY	1	0	1
BSN MEDICAL INC	1	0	1
BUCKEYE FIRE EQUIPMENT COMPANY	4	4	8
BUD ANTLE, INC	1	1	2
BUDDERFLY, INC	3	3	6
BURKE COUNTY SCHOOLS	27	18	45
C P EAKES CO	1	1	2
CABARRUS COUNTY SCHOOLS	33	33	66
CALHOUN,DANIEL	3	3	6
CALICO TECHNOLOGIES INC	3	3	6
CAMBRIDGE ACQUISITIONS LLC	1	1	2
CAMBRO MANUFACTURING CO	4	4	8
CAMCO MANUFACTURING, LLC	5	5	10
CAMFIL USA INC	2	2	4
CANDLE CORPORATION OF AMERICA	2	2	4
CAPITOL BROADCASTING COMPANY INC	8	8	16
CARAUSTAR INC	4	0	4
CARAUSTAR IND & CONSUMER PRODUCTS GROUP	3	2	5
CARDINAL FLOAT GLASS	1	1	2
CARDINAL HEALTH	1	1	2
CARDINAL HEALTH 200, LLC	1	1	2
CARDINAL HEALTH INC	2	2	4
CARGILL, INCORPORATED	9	9	18
CARLIE C'S IGA OF MINERAL SPRINGS	1	1	2
CARLISLE FOOD SERVIC	3	3	6
CARMEL COUNTRY CLUB	27	27	54
CARMEL CTRY CLUB	1	1	2
CAROLINA BEVERAGE GROUP, LLC	3	3	6
CAROLINA CONTAINER	5	5	10
CAROLINA CUSTOM SURFACES LLC	2	2	4
CAROLINA GLOVE COMPANY	6	6	12
CAROLINA GRAPHIC SERVICES LLC	1	1	2
CAROLINA INVESMENT PROPERTIES	1	1	2
CAROLINA LASER CUTTING INC	1	1	2
CAROLINA MEADOWS INC	20	20	40
CAROLINA NONWOVENS LLC	1	1	2
CAROLINA PERLITE CO	1	1	2
CAROLINA PRECISION COMPONENTS, INC.	1	1	2
CAROLINA PRECISION PLASTICS LLC	6	6	12
CAROLINA STALITE CO	9	9	18
CAROLINA SUNROCK CORP	9	9	18
CAROLINA TRACTOR & EQUIPMENT COMPANY	4	4	8
CAROLINA VILLAGE	2	2	4
CAROLINAS HEALTHCARE SYSTEM	29	29	58
CAROMONT MEDICAL GROUP	1	1	2
CARPENTER COMPANY	4	4	8

CARRIER CORPORATION	2	2	4
CARTMAN HOTEL LLC	0	1	1
CASCADE DIE CASTING GRP INC	0	2	2
CASE FARMS	3	3	6
CASTLE & COOKE NORTH CAROLINA LLC	3	3	6
CATAWBA COLLEGE	2	2	4
CATAWBA COUNTY SCHOOLS	6	0	6
CATAWBA VALLEY MEDICAL CENTER	1	1	2
CATO CORP	2	2	4
CBL ASSOCIATES MANAGEMENT, INC	1	1	2
CBP RESOURCES	4	4	8
CCBCC OPERATIONS, LLC	5	5	10
CCC DEVELOPMENT PARTNERS, LLC	1	1	2
CCL LABEL INC	0	3	3
CDP DURHAM CENTER INVESTORS LLC	1	1	2
CEDAR FAIR SOUTHWEST, INC	3	3	6
CELGARD, LLC	1	1	2
CELLCO PARTNERSHIP	1	1	2
CENTRAL CAROLINA PLASTICS INC	1	2	3
CENTRAL CAROLINA PRODUCTS	1	1	2
CENTRAL REGIONAL HOSPITAL	0	5	5
CENTRILOGIC, INC	1	1	2
CENTURY FURNITURE, LLC	6	0	6
CERTAINTEED CORP	0	3	3
CHADC1 INVESTMENT, LLC	1	1	2
CHAPEL HILL/CARRBORO SCHOOLS	30	0	30
CHARLOTTE COLOCATION CENTER LLC	1	1	2
CHARLOTTE COUNTRY DAY SCHOOL	7	0	7
CHARLOTTE LATIN SCHOOLS, INC.	10	10	20
CHARLOTTE OBSERVER PUBLISHING COMPANY	1	1	2
CHARLOTTE PIPE & FOUNDRY	13	13	26
CHARTER COMMUNICATIONS	1	1	2
CHEMICAL SPECIALTIES	5	5	10
CHEROKEE BOYS CLUB	3	3	6
CHESAPEAKE TREATMENT COMPANY, LLC	1	1	2
CHICOPEE, INC	1	1	2
CINEBARRE, LLC	2	2	4
CISCO SYSTEMS INC	1	1	2
CITY OF ASHEVILLE	1	2	3
CITY OF BELMONT	2	2	4
CITY OF BURLINGTON	5	5	10
CITY OF CHARLOTTE	89	102	191
CITY OF CHARLOTTE REGIONAL VISITORS AUTHORITY	6	6	12
CITY OF DURHAM	9	9	18
CITY OF EDEN	0	1	1
CITY OF GASTONIA	3	3	6
CITY OF GRAHAM	2	2	4
CITY OF GREENSBORO	23	26	49
CITY OF HENDERSONVILLE	1	2	3
CITY OF HICKORY	3	3	6
CITY OF KANNAPOLIS	0	1	1
CITY OF LENOIR	5	7	12

CITY OF MARION	2	2	4
CITY OF MEBANE	1	1	2
CITY OF REIDSVILLE	2	2	4
CITY OF SALISBURY	10	9	19
CITY OF WINSTON-SALEM	22	27	49
CK RIDGE CREEK WEST II, LLC	1	1	2
CKS PACKAGING INC	4	4	8
CLAPPS NURSING HOME CENTER	1	1	2
CLARIANT CORPORATION	18	18	36
CLEARLIGHT GLASS AND MIRROR	2	2	4
CLEARWATER PAPER CORPORATION	5	5	10
CLEMENT PAPPAS NC, INC	4	4	8
CLEVELAND COUNTY FAMILY YOUNG MENS CHRISTIAN ASS	2	2	4
CLEVELAND COUNTY SCHOOLS	31	28	59
CMBE	116	0	116
CMC-NORTHEAST INC	8	8	16
CMHA	13	13	26
COATS AMERICAN	2	2	4
COATS HP INC	2	2	4
COLEY, LLC	1	1	2
COLONIAL PIPELINE	0	5	5
COLUMBIA PLYWOOD CORPORATION	6	7	13
COMMONWEALTH HOSIERY	3	3	6
COMMSCOPE, INC.	9	9	18
COMPAERO	1	1	2
CONCRETE SUPPLY	3	3	6
CONCRETE SUPPLY CO	7	7	14
CONCRETE SUPPLY COMPANY LLC	1	1	2
CONOVER LUMBER CO	2	2	4
CONRAD HILL FEED &	1	1	2
CONSENSUS PROTOCOL LLC	1	1	2
CONSOLIDATED CONTAINER COMPANY	5	5	10
CONSOLIDATED METCO INC	0	1	1
CONTINENTAL AUTOMOTIVE SYSTEMS, INC	2	2	4
CORE SCIENTIFIC INC	0	1	1
CORMETECH INC	1	1	2
CORNERSTONE CHARTER ACADEMY INC	2	2	4
CORNING CABLE SYSTEMS	4	4	8
CORNING INC	5	5	10
COSTCO WHOLESALE INC	6	6	12
COUSINS PROP INC	1	1	2
COUSINS PROPERTIES LP	3	3	6
CPCC	37	37	74
CPI/AHP University Place MOB Owner	1	1	2
CPU Shiloh LP	1	1	2
CRAFT REVOLUTION LLC	1	1	2
CREDIT SUISSE SECURITIES (USA) LLC	1	1	2
CREDIT SUISSE SECURITIES(USA) LLC CENTER OF EXCELL	1	1	2
CREE INC	10	10	20
CRONLAND LUMBER CO	1	1	2
CROWN CONVERTING	3	3	6
CRWW SPECIALTY COMPOSITES INC	1	1	2

CS CAROLINA INC	3	3	6
CSHV 615 COLLEGE LLC	2	2	4
CSHV SOUTHPARK 6100 FAIRVIEW, LLC	1	1	2
CSHV SOUTHPARK, LLC	1	1	2
CULP HOME FASHIONS	1	1	2
CULP INC	2	2	4
CURTISS-WRIGHT CONTROLS INC	3	3	6
CYRUSONE-NC LLC	3	3	6
DAIMLER TRUCKS NORTH AMERICA, LLC	5	0	5
DALCO NONWOVENS, LLC	2	2	4
DANNY TERRELL	2	2	4
DART CONTAINER CORPORATION OF GEORGIA	3	3	6
DATACHAMBERS, LLC	2	2	4
DAVIDSON COLLEGE	15	15	30
DAVIDSON COUNTY COMMUNITY COLLEGE	3	3	6
DAVIDSON WATER INC	0	1	1
DAVIE CONSTRUCTION	1	1	2
DC CHARLOTTE PLAZA LLLP	1	1	2
DC74 LLC	3	3	6
DE FEET INTERNATIONA	3	3	6
DEBOTECH INC	1	1	2
DEERE HITACHI CONST MACH	11	0	11
DELTA PHOENIX, INC.	1	1	2
DFA DAIRY BRANDS FLUID, LLC	1	1	2
DFA DAIRY BRANDS FLUIDS, LLC	1	1	2
DHOLLANDIA US, LLC	1	1	2
DIAMOND VIEW I LLC	2	2	4
DIAMOND VIEW II	2	2	4
DILLARDS DEPARTMENT STORE	6	6	12
DISCOVERY PLACE INC	1	1	2
DISNEY WORLDWIDE SERVICES INC	1	1	2
DIZE AWNING TENT CO	1	1	2
DIZE COMPANY	2	2	4
Dodge Mechanical Power Transmission	1	1	2
DOOSAN INFRACORE PORTABLE POWER - A DIVISION OF C	2	2	4
DOUGHTON MFG CO	3	3	6
DUCKWORTH'S 3106, LLC	2	2	4
DUKE UNIVERSITY	10	11	21
DUKE UNIVERSITY HEALTH SYSTEM INC	6	0	6
DUPONT SPECIALTY PRODUCTS USA LLC	1	1	2
DURHAM BULLS	2	2	4
DURHAM COCA COLA	3	3	6
DURHAM ID PHASE 1 DEVELOPER LLC	1	1	2
DURHAM OB GYN	1	1	2
DURHAM PUBLIC SCHLS	8	0	8
DURHAM PUBLIC SCHOOLS	54	0	54
DURHAM TECH COMM COL	1	0	1
DURHAM TW ALEXANDER LLC	1	1	2
DYNAYARN USA, L.L.C.	1	1	2
DYSTAR LIMITED PARTNERSHIP	1	1	2
DYSTAR LP	4	4	8
EAST COAST LUMBER CO	1	1	2

EAST WILKES HIGH SCHOOL	5	5	10
EASTERN BAND OF CHEROKEE INDIANS	1	1	2
EATON AEROQUIP INC	1	1	2
EATON CORP	2	2	4
ECMD INC	0	4	4
ECOFLO INC	3	3	6
EDS PALLETT WORLD INC	4	4	8
ELASTIC FABRICS OF AMERICA	2	1	3
ELECTRIC GLASS FIBER AMERICA,LLC	4	4	8
ELECTROLUX HOME PRODUCTS	2	2	4
ELECTROLUX HOME PRODUCTS, INC	2	2	4
ELEVATE TEXTILES, INC	0	1	1
ELITE COMFORT SOLUTIONS LLC	1	1	2
ELITE DISPLAYS & DESIGN INC	3	3	6
ELLEN BARNETTE	1	1	2
ELLIS LUMBER CO	3	3	6
ELON UNIVERSITY	66	67	133
EMC CORPORATION	2	2	4
EMERGEORTHO, P.A	1	1	2
ENDURA PRODUCTS INC	5	5	10
ENGINEERED CONTROLS INTERNATIONAL INC	4	4	8
ENSONO, INC	1	1	2
EPA	4	4	8
Essentra Filter Products	3	3	6
ESSENTRA PACKAGING US, INC	0	5	5
ETHAN ALLEN OPERATIONS INC	2	2	4
EUROPA CENTER LLC	1	1	2
EVANS,JAMES R	1	1	2
EWE WAREHOUSE INVESTMENTS XXXIII LTD	4	4	8
FAIRFIELD CHAIR CO	6	6	12
FAIRYSTONE FABRICS	4	4	8
FAIST CHEMTEC INC	2	2	4
FAMILY DOLLAR STORES OF NORTH CAROLINA INC	1	1	2
FEDERAL RES BANK	1	1	2
FEDEX GROUND PACKAGE SYS INC	3	3	6
FERGUSON SUPPLY & BOX	1	1	2
FFNC INC	5	5	10
FIBER & YARN PRODUCTS, INC	1	2	3
FIBER COMPOSITES CORPORATION	0	4	4
FIBRIX, LLC	2	2	4
FIDDLIN FISH BREWING COMPANY LLC	1	1	2
FIDELITY REAL ESTATE COMPANY, LLC	6	6	12
FIDELITY REAL ESTATE LLC	1	1	2
FILTRONA GREENSBORO, INC	3	3	6
FIRESTONE FIBERS & TEXTILES COMPANY, LLC	2	2	4
FIRST CITIZENS BANK & TRUST CO	1	1	2
FIRST PRESBY CHURCH	4	4	8
FISERV SOLUTIONS INC	1	1	2
FLETCHER HOSPITAL, INC.	8	9	17
FLEXENTIAL CORP	2	2	4
FLOW PROPERTIES	1	1	2
FLOWERS BAKING COMPANY	1	1	2

FLYNT AMTEX INC	1	1	2
FMC LITHIUM USA CORP	1	1	2
FOCKE & CO, INC	1	1	2
FOOD LION	222	219	441
FORBO MOVEMENT SYSTEMS	1	1	2
FORESTVIEW HIGH SCHOOL PTA	1	0	1
FORSYTH TECHNICAL COLLEGE	8	6	14
FOSS AUTO RECYCLING INC	5	5	10
FREUDENBERG PERFORMANCE MATERIALS LP	3	3	6
FRIENDLIEST HOTEL, LLC	1	1	2
FRITO-LAY, INC	1	1	2
FRONTIER COMMUNICATIONS CORPORATE SERVICES, INC	2	2	4
FRONTIER YARNS, INC	0	2	2
FRYE REGIONAL MEDICAL CENTER	9	9	18
FULLSTEAM BREWERY, LLC	1	0	1
FUNDER AMERICA INC	5	5	10
FURNITURELAND SOUTH	8	8	16
GALENOR DESIGNS, LLC	1	1	2
GALVAN INDUSTRIES INC	7	7	14
GARDNER WEBB UNIV	1	1	2
GASTON CO SCHOOLS	1	1	2
GASTON COLLEGE	7	7	14
GASTON COUNTY SCHOOLS	24	24	48
GATEWAY RESEARCH PARK, INC	4	4	8
GE LIGHTING SOLUTIONS LLC	6	6	12
GENERAL ELECTRIC	2	2	4
GENERICS BIDCO II, LLC	5	5	10
GENPAK LLC	5	6	11
GENUINE PARTS COMPANY	2	0	2
GERDAU AMERISTEEL US INC	2	2	4
GETRAG GEARS OF NA	2	2	4
GF LINAMAR LLC	1	1	2
GIGA DATA CENTER - 1 LLC	1	1	2
GILBARCO INC	1	0	1
GILDAN ACTIVEWEAR (EDEN) INC	4	2	6
GILDAN YARNS, LLC	0	1	1
GILKEY LUMBER CO INC	7	7	14
GKN DRIVELINE NORTH AMERICA, INC	1	1	2
GKN SINTER METALS	1	1	2
Glatfelter Mt Holly LLC	2	2	4
GLEN RAVEN INC	1	2	3
GLOBAL TEXTILE ALLIANCE INC	5	5	10
gold bond building products, llc	1	1	2
GOLDING FARMS FOODS	2	2	4
GOODWILL INDUSTRIES OF NW NC	0	1	1
GRANDEUR MFG	1	1	2
GRANGES AMERICAS INC	1	1	2
GRASCHE USA	1	1	2
GRASS AMERICA INC	4	4	8
GRAY MANUFACTURING TECHNOLOGIES LLC	2	2	4
GREENE STREET HOLDINGS	2	2	4
GREENEST HOTEL LLC	1	1	2

GREENSBORO COLLEGE	13	0	13
GREER LABORATORIES INC	4	0	4
Griffin Charlotte Airport Plaza LLC	1	1	2
Griffin Charlotte Park II LLC	1	1	2
Griffin Charlotte Park III LLC	1	1	2
GRIFFIN INDUSTRIES	2	2	4
GRIFOLS THERAPEUTICS INC	1	1	2
GUILFORD COLLEGE	42	31	73
GUILFORD COUNTY	8	8	16
GUILFORD COUNTY SCHOOLS	203	202	405
GUILFORD TECH COMM COLL	16	16	32
H ALVIS FAUST	2	2	4
H B D INC	1	1	2
HAECO CABIN SOLUTIONS	9	9	18
HAN FENG INC	0	1	1
HANCOCK & MOORE, LLC	6	5	11
HANES COMPANIES INC	2	3	5
HANES DYE & FINISHING	1	1	2
HANWHA ADVANCED MATERIALS AMERICA LLC	1	1	2
HARRIS TEETER INC	84	84	168
HASHMASTER TECH, LLC	0	1	1
HAYWARD INDUSTRIES, INC	3	3	6
HENDERSON COUNTY	5	5	10
HENDERSON COUNTY HOSPITAL CORP	6	6	12
HENDERSON COUNTY PUBLIC SCHOOLS	15	15	30
Henderson Ventures	1	1	2
HENDERSONVILLE HEALTH & REHAB	1	1	2
HENKEL CORPORATION	6	6	12
HERBALIFE INTERNATIONAL OF AMERICA INC	1	0	1
HERRON TEST LAB INC	1	1	2
HICKORY CITY SCHOOLS	10	0	10
HICKORY PRINTING SOLUTIONS, LLC	2	2	4
HICKORY SPRINGS MANUFACTURING COMPANY	21	22	43
HIGH ASSOCIATES, LTD	2	2	4
HIGH COUNTRY LUMBER AND MULCH LLC	0	2	2
HIGH DEFINITION TOOL CORPORATION	1	1	2
HIGHWOODS PARK PROPERTY OWNERS ASSOCIATI	1	0	1
HIGHWOODS REALTY LIMITED	11	11	22
HIGHWOODS REALTY LIMITED PARTNERSHIP	13	0	13
HIGHWOODS REALTY LTP	1	0	1
HILL HOSIERY MILLS	2	2	4
HISTORIC REVOLUTION LLC	3	3	6
HITACHI METALS NC LTD	1	1	2
HOME DEPOT	10	0	10
HONDA POWER EQUIPMENT MFG, INC	0	1	1
Hood Container Corp	1	1	2
HS MALLARD CREEK CENTER LLC	1	1	2
HSRE-HOCK PLAZA LLC	2	2	4
HTA-MOREHEAD MOB, LLC	1	1	2
HUGH CHATHAM MEM HOSPITAL	37	37	74
HUITT MILLS,INC	2	2	4
HUMACYTE INC	2	2	4

HUNTSMAN INTERNATIONAL LLC	2	2	4
IBM CORPORATION	6	7	13
IGM RESINS USA INC	0	1	1
IMAGE MARK BUSINESS SERVICES	1	1	2
IMAGES OF AMERICA	2	2	4
IMC-METALSAMERICA, LLC	1	1	2
IMERYS MICA KINGS MOUNTAIN INC	7	7	14
IMPERIAL HOTEL GROUP INC	3	3	6
INDEPENDENCE LUMBER COMPANY	3	3	6
INDEPENDENT BEVERAGE CORP	3	3	6
INDEPENDENT BEVERAGE CORPORATION	1	1	2
INDUSTRIAL WOOD PROD	3	3	6
INDUSTRIAL WOOD PRODUCTS	3	3	6
INFO-GEL, LLC	3	3	6
INGERSOLL-RAND COMPANY	7	7	14
INGLES MARKETS INC	24	24	48
INGLES MARKETS, INC.	40	40	80
INGREDION INCORPORATED	1	1	2
INSTEEL INDUSTRIES, INC	2	2	4
INSTITUTION FOOD HOUSE, INC	7	6	13
INTELLIGENT IMPLANT SYSTEMS	1	1	2
INTERNATIONAL PAPER COMPANY	4	4	8
INTERTECH CORP	1	1	2
IPEX USA, INC	0	1	1
IQE INC	2	2	4
IRVING PARTNERS, LTD	1	1	2
ISOTHERMAL COMMUNITY COLLEGE	5	5	10
ITG BRANDS LLC	2	2	4
J C PENNEY CO	1	1	2
JACKSON PAPER MFG CO	1	1	2
JAMES M PLEASANTS CO	1	0	1
JAMESTOWN YMCA	1	1	2
JDL CASTLE CORP	1	1	2
John and Jeff Schwarz LLC	0	1	1
JOHN JENKINS CO	1	1	2
JOHN T MILLS	0	1	1
JOHN UMSTEAD HOSPITAL	0	3	3
JOHNSON & WALES UNIVERSITY	3	3	6
JOHNSON CONTROLS BATTERY GROUP, INC	1	1	2
JOHNSON CONTROLS INC	2	0	2
JOWAT CORPORATION	8	8	16
JPS COMPOSITE MATERIALS CORP	0	1	1
KAYSER ROTH CORPORATION	2	2	4
KBI BIOPHARMA, INC	3	3	6
KBSIII CARILLON LLC	1	1	2
KEN SMITH YARN CO	1	1	2
KENDRION-SHELBY	1	1	2
KERRS HICKORY READY MIXED CONCRETE COMPANY INC	1	1	2
KEYSTONE POWDERED ME	1	1	2
KIMBERLY CLARK	2	2	4
KIMBERLY-CLARK	3	3	6
KINCAID FURNITURE	6	6	12

KINDER MORGAN SOUTHEAST TERMINAL	3	4	7
KINDER MORGAN TRANSMIX GROUP	1	1	2
KINDRED HOSPITALS EAST LLC	2	2	4
KINGS MOUNTAIN INTERNATIONAL INC	2	2	4
KOOPMAN DAIRIES INC	2	2	4
KOURY CORPORATION	50	50	100
KOURY VENTURES	5	5	10
KSM CASTINGS USA INC	2	2	4
KURZ TRANSFER PRODUCTS LP	4	4	8
KYOCERA INTERNATIONAL INC	1	1	2
L B PLASTICS INC	5	5	10
L S STARRETT CO	0	1	1
LAB CORP	6	7	13
LABELTECH INCORPORATED	2	2	4
LABORATORY CORPORATION OF AMERICA	1	1	2
LABORATORY CORPORATION OF AMERICA HOLDINGS	1	1	2
LAKE HICKORY COUNTRY CLUB	6	6	12
LANXESS CORP	0	3	3
LANXESS SOLUTIONS US INC	1	1	2
LASER INK CORPORATION	1	1	2
LEE INDUSTRIES	3	3	6
LEESONA CORP	1	1	2
LEGION BREWING COMPANY LLC	2	2	4
LELOUDIS LIONTIS, LLC	1	1	2
LENNY BOY LLC	1	1	2
LENOVO (UNITED STATES) INC	1	1	2
LEXINGTON FURNITURE IND	2	3	5
LIBERTY COMMMONS NURSING AND REHABILITATION CEN	1	1	2
LIBERTY COMMONS NURSING AND REHABILITATION CENT	1	1	2
LIBERTY HARDWARE	3	3	6
LIBERTY HEALTHCARE PROPERTIES OF BALLANTYNE LLC	1	1	2
LIBERTY HEALTHCARE PROPERTIES OF MECKLENBURG COU	1	1	2
LIDL US OPERATIONS LLC	1	1	2
LIDL US OPERATIONS, LLC	4	4	8
LIGGETT GROUP INC	1	1	2
LINCOLN COMMUNITY HEALTH CENTER INC	2	2	4
LINDYS HOMEMADE, LLC	1	1	2
LOPAREX LLC	2	2	4
LOTUS BAKERIES US MANUFACTURING, LLC	1	1	2
LOUISIANA-PACIFIC CORPORATION	1	1	2
LOWES FOODS	32	32	64
LOWES HOME CENTERS	2	1	3
LOWE'S HOME CENTERS, INC	88	0	88
LOWES OF FRANKLIN #717	1	0	1
LOWE'S OF FRANKLIN #717	1	0	1
LTF CONSTRUCTION COMPANY LLC	1	1	2
LUBRIZOL ADVANCED MATERIALS INC	3	3	6
LUTHERAN RETIREMENT MINISTRIES OF ALAMANCE CO	11	11	22
LYDALL THERMAL ACOUSTICAL INC	8	5	13
M STRATEGIC INDUSTRIAL COLLECTION LLC	1	1	2
MAERSK INC	1	1	2
MAGNOLIA CASTLE LLC	1	1	2

MANN+HUMMEL FILTRATION TECHNOLOGY US LLC	2	2	4
MANNINGTON MILLS INC	1	1	2
MANUAL WOODWORKERS & WEAVERS INC	2	2	4
MAPLE SPRINGS LAUNDRY INC	4	4	8
MARKET AMERICA	3	3	6
MARRIOTT INTERNATIONAL INC	0	2	2
MARSH FURNITURE CO	4	4	8
MARTIN MARIETTA MATERIALS INC	63	67	130
Maryland and Virginia Milk Products Corp	1	1	2
MASONIC & EASTERN STAR HOME	3	3	6
MATERIAL HANDLING INDUSTRY	1	1	2
MAUSER CORP	0	4	4
MAY DEPT STORE	3	3	6
MAYFLOWER VEHICLE SYSTEMS,LLC	2	2	4
MCCOMB INDUSTRIES LLLP	2	2	4
MCCREARY MODERN INC	8	0	8
MCDOWELL HOSPITAL INC	1	0	1
MCLEOD LEATHR & BELT	1	1	2
MCMICHAEL MILLS INC	2	2	4
MDI MANAGEMENT	1	0	1
MEAT AND SEAFOOD SOLUTIONS LLC	1	1	2
MECK AREA CATH SCHLS	0	3	3
MECKLENBURG COUNTY	22	0	22
MEDI MFG INC	1	1	2
MEDICAGO USA, INC	2	2	4
MERCHANTS DISTRIBUTORS , LLC	1	1	2
MERCK SHARP & DOHME CORP	4	5	9
MERCY HOSPITAL, INC	1	1	2
MEREDITH WEBB PRINT	3	3	6
MERIDIAN BRICK, LLC	1	1	2
MERIDIAN HOSPITALITY HOLDINGS LLC	1	1	2
MERIDIAN LABORATORY CORP	1	1	2
MERITOR HEAVY VEHICLE SYSTEMS	1	1	2
MERITOR HEAVY VEHICLE SYSTEMS LLC	1	1	2
MESSER LLC	1	1	2
METALS USA CARBON FLAT ROLLED INC	2	2	4
METROLINA GREENHOUSES INC	19	19	38
MICHELIN AIRCRAFT TIRE CO	1	1	2
MICHELIN NORTH AMERICA	2	2	4
MIDDLEHOUSE BUILDERS INC	1	0	1
MILES TALBOTT	2	2	4
MILLIKEN & COMPANY	2	2	4
MILLSOURCE INC	3	3	6
MINNESOTA MINING & MFG CO	2	2	4
MINT MUSEUM OF CRAFT & DESIGN	1	1	2
MITCHELL GOLD CO	4	4	8
MODERN DENSIFYING	0	2	2
MOHICAN MILLS	0	1	1
MOM BRANDS COMPANY, LLC	1	1	2
MONROE AUTOMOTIVE COMPANY LLC	1	1	2
MONROE MARKETPLACE PARTNERS LLC	1	1	2
MOORE WALLACE NORTH AMERICA INC	1	1	2

MOORESVILLE CITY SCHOOLS	11	11	22
MORINAGA AMERICA FOODS INC	0	1	1
MORRISETTE PAPER COMPANY INC	2	2	4
MORTON CUSTOM PLASTICS, LLC	2	2	4
MOSES CONE HEALTH SYS	16	16	32
MOUNT VERNON MILLS INC	1	2	3
MRR HOLDINGS, LLC	1	1	2
MULTI SHIFTER INC	1	1	2
N C FOAM IND INC	1	1	2
NANCY WILLIAMS	0	1	1
NATIONAL CONTAINER GROUP	1	1	2
NATIONAL GENERAL MANAGMENT CORP.	4	4	8
NATIONAL GYPSUM CO	1	1	2
NATIONAL PIPE & PLASTIC, INC	1	1	2
NATIONAL PIPE & PLASTICS	2	2	4
NC A&T UNIV FOUNDATION	1	1	2
NC A&T UNIVERSITY	7	6	13
NC AIR NATIONL GUARD	1	1	2
NC BAPTIST HOSPITAL	8	8	16
NC BLUMENTHAL PAC	2	2	4
NC CENTRAL UNIVERSITY	1	1	2
NC DEPT OF HEALTH & HUMAN SERVICES	29	29	58
NC DEPT OF PUBLIC SAFETY	15	18	33
NC DOT	1	0	1
NC STATE UNIVERSITY	1	1	2
NEPTCO INC	2	2	4
NETAPP, INC	2	2	4
NEW EXCELSIOR, INC	0	1	1
NEW SOUTH LUMBER COMPANY INC	3	3	6
NEWTON INSTRUMENTS CO INC	11	11	22
NFI INDUSTRIES INC	1	1	2
NGK CERAMICS USA	2	2	4
NIAGARA BOTTLING LLC	1	1	2
NORAFIN AMERICAS INC	2	2	4
NORDFAB	5	5	10
NORDIC WAREHOUSE INC	1	1	2
NORDSTROM INC	2	1	3
NORFOLK SOUTHERN	3	3	6
NORTHERN HOSP OF SURRY CO	2	2	4
NORTHROP GRUMMAN GUIDANCE & ELECTRONICS COMP/	2	2	4
NOVANT HEALTH INC	22	22	44
NOVO NORDISK PHARMACEUTICAL INDUSTRIES, LP	1	1	2
NOVOZYMES NORTH AMERICAN INC	1	1	2
NR CHARLOTTE LLC	1	1	2
NW BALLANTYNE ONE LP	1	1	2
NW BALLANTYNE THREE LP	1	1	2
NW BALLANTYNE TWO LP	1	1	2
NW BETSILL BUILDING LP	1	1	2
NW BOYLE BUILDINGS LP	2	2	4
NW BRIXHAM GREEN ONE LP	1	1	2
NW BRIXHAM GREEN THREE LP	1	1	2
NW BRIXHAM GREEN TWO LP	1	1	2

NW CALHOUN BUILDING LP	1	1	2
NW CHANDLER BUILDING LP	1	1	2
NW CRAWFORD BUILDING LP	1	1	2
NW CULLMAN PARK LP	1	1	2
NW EVERETT BUILDING LP	1	1	2
NW GRAGG BUILDING LP	1	1	2
NW HAYES BUILDING LP	1	1	2
NW HIXON BUILDING LP	1	1	2
NW IRBY BUILDING LP	1	1	2
NW JJH BUILDING LP	2	2	4
NW RICHARDSON BUILDING LP	1	1	2
NW SIMMONS BUILDING LP	1	1	2
NW WINSLOW BUILDING LP	1	1	2
NW WOODWARD BUILDING LP	1	1	2
NWBH 1 LP	2	2	4
NYPRO CAROLINA	3	3	6
O T SPORTS IND INC	1	1	2
OAK FOREST HEALTH AND REHABILITATION CO	1	1	2
OLD CAROLINA BRICK COMPANY	2	2	4
OLD RIVER FALLS SEWER	1	1	2
O'MARA, INC.	1	1	2
OMNISOURCE LLC	0	1	1
OMNISOURCE SOUTHEAST	5	5	10
OMNOVA SOLUTIONS	4	4	8
ONEAL STEEL INC	4	4	8
ORANGE WATER & SEWER AUTHORITY	8	8	16
OTTO INDUSTRIES	2	2	4
OWASA	9	9	18
OWENS & MINOR DISTRIBUTION INC	0	1	1
OWENS & MINOR INC.	0	2	2
OWENS & MINOR MEDICA	1	1	2
OWENS ILLINOIS, INC	2	2	4
P G MACHINE SHOP	1	1	2
PACKRITE LLC	5	5	10
PACTIV LLC	0	3	3
PALLETONE OF NC	6	6	12
PANTHERS STADIUM, LLC	2	0	2
PARKDALE AMERICA LLC	6	8	14
PARKDALE MILLS, INC	1	2	3
PARKER HANNIFIN CORPORATION	5	5	10
PARTON LUMBER CO	6	8	14
PATHER'S STADIUM, LLC	1	0	1
PATRICK YARN MILL	0	1	1
PBM GRAPHICS INC	4	4	8
PENN ENG & MANF CORP	2	2	4
PEPSI BOTTLING VENTURES, LLC	7	7	14
PERFORMANCE LIVESTOCK & FEED CO, INC.	1	1	2
PERMA TECH INC	1	1	2
PHARR YARNS, LLC	1	1	2
PHOENIX INDUSTRIES	0	1	1
PHONONIC DEVICES, INC	2	2	4
PIEDMONT CHEMICAL	2	0	2

PIEDMONT PUBLISHING	1	1	2
PIEDMONT ROW DRIVE, LLC	11	11	22
PIEDMONT TRIAD REG WATER AUTH	0	4	4
PILGRIM ASSOCIATES	2	2	4
PINE HALL BRICK COMPANY, INC	2	2	4
PINE NEEDLE LNG COMPANY	1	1	2
PIONEER COMMUNITY HOSPITAL OF STOKES	1	0	1
PIONEER DIVERSITIES CO	1	1	2
PITTSBURGH GLASS WORKS LLC	0	1	1
PLYCEM USA, INC	1	1	2
PNEUMAFIL CORPORATION	6	0	6
POLK COUNTY SCHOOLS	5	4	9
POLY PLASTIC PRODUCTS OF NC INC	4	4	8
POP MORROCROFT L.P.	5	5	10
POPPELMANN PLASTICS USA LLC	1	1	2
PowerHouse Recycling Inc.	1	1	2
PPG INDUSTRIES INC	2	2	4
PRECISION FABRICS GROUP INC	2	2	4
PRECISION MATERIALS-BLUE RIDGE LLC	2	2	4
PRECOR MANUFACTURING LLC	1	1	2
PREFERRED APARTMENT COMMUNITIES OPERATING PART	6	6	12
PRESBYTERIAN HOMES,INC	8	8	16
PRESBYTERIAN HOSPITAL	9	9	18
PRESBYTERIAN MEDICAL CARE CORP	1	1	2
PRESCART CORP	1	1	2
PRESTIGE FARMS	1	1	2
PRESTIGE FARMS INC	1	1	2
PRINTCRAFT CO INC	1	1	2
PRINTPACK INC	1	1	2
PROCTER & GAMBLE MANUFACTURING COMPANY	5	5	10
PRODUCTS SE PIPE LINE CORPORATION	4	4	8
Proficient Supply LLC	1	1	2
PROMISE FOODS INC	1	1	2
PRO-SYSTEM, INC	1	1	2
PRYSMIAN CABLE AND SYSTEMS USA, LLC	1	1	2
PUBLIC LIBRARY MECK CO	2	2	4
PUBLIX NORTH CAROLINA LP	21	21	42
PUROLATOR FACET INC	3	2	5
QG PRINTING II LLC	4	4	8
QORVO US , INC	1	1	2
QORVO US INC	1	1	2
QUALICAPS INC	3	3	6
R & R POWDER COATING INC	1	1	2
RACK ROOM SHOES	1	1	2
RALPH LAUREN CORPORATION	2	2	4
RALPHS FRAME WORKS	2	2	4
RANDOLPH CO BD OF ED	0	5	5
RANDY D MILLER	6	6	12
RAUMEDIC INCORPORATED	1	1	2
RAYMER BROTHERS INC.	1	1	2
RD AMERICA LLC	1	1	2
REEP-OFC WATER RIDGE NC HOLDCO LLC	4	4	8

REMATTR, INC	2	2	4
RENWOOD MILLS LLC	0	1	1
REPLACEMENTS LTD	0	7	7
RESEARCH TRIANGLE INSTITUTE	0	1	1
REVOLUTION TENANT, LLC	2	2	4
REYNOLDA MANUFACTURING SOLUTIONS, INC	3	3	6
RH MANUFACTURING LLC	2	2	4
Richa Forsyth LLC	1	1	2
RICHA INC	5	5	10
RILEY TECHNOLOGIES LLC	1	1	2
RITZ CARLTON CHARLOTTE	1	1	2
River wood Partners LLc	1	1	2
RJ REYNOLDS TOBACCO CO	5	5	10
ROCHLING ENGINEERED PLASTICS	3	3	6
ROCKINGHAM COMM COLLEGE	0	1	1
ROCKINGHAM COUNTY GOVERNMENT	2	2	4
ROCKINGHAM COUNTY SCHOOLS	4	4	8
ROCK-TENN CONVERTING COMPANY	1	1	2
ROGER MARK PENDLETON	4	4	8
RONNIE D MILES	1	1	2
ROUSH & YATES RACING ENGINES, LLC	4	4	8
ROWAN COUNTY	4	4	8
ROWAN SALISBURY SCHOOLS	5	0	5
RUGGABLE	1	0	1
RUTHERFORD HOSPITAL INC	3	3	6
SAFT AMERICA	4	4	8
SALEM ACADEMY & COLLEGE	11	11	22
SALEM BUSINESS PARK	0	1	1
SALISBURY MACHINERY	1	1	2
SAMS EAST INC	17	17	34
SANDVIK CORP	2	2	4
SANDY RDG GOLF CLUB	2	2	4
SANS TECHNICAL FIBERS, LLC	4	4	8
SAP ACQUISITION,LLC	5	5	10
SAPA BURLINGTON LLC	1	1	2
SARA LEE BAKERY GROUP	5	5	10
SCHAEFER SYSTEMS	7	0	7
SCHERING-PLOUGH	1	1	2
SCHNEIDER MILLS, INC	1	1	2
SCM METAL PRODUCTS INC	3	3	6
SEALED AIR CORPORATION	1	1	2
SEALED AIR CORPORATION (US)	1	1	2
SEALED AIR CORPORATION US	2	2	4
SEBR 804 LLC	1	1	2
SEBR CENTREPORT 101, LLC	1	1	2
SEBR CENTREPORT 202 LLC	1	1	2
SEBR CENTREPORT LLC	1	1	2
SEBR TRIAD DRIVE, LLC	1	1	2
SECURITY NATIONAL PROPERTIES HOLDINGS LLC	1	1	2
SELEE CORP	2	2	4
SELF HELP VENTURES FUND	1	1	2
SGL CARBON, LLC	1	1	2

SHAMROCK CORPORATION	4	0	4
SHANER HOTEL GRP LLP	1	1	2
SHEETZ DISTRIBUTION SERVICES LLC	1	1	2
SHERRILL FURNITURE	4	0	4
SHERWIN WILLIAMS COMPANY	5	0	5
SHUFORD YARNS,LLC	2	2	4
SHURTAPE TECHNOLOGIES	9	9	18
SIEMENS ENERGY INC	2	3	5
SIEMENS ENERGY, INC	2	2	4
SIERRA NEVADA BREWING CO	1	1	2
SIMON PROPERTIES GROUP	2	2	4
S-L SNACKS NATIONAL , LLC	1	1	2
SLANE HOSIERY MILLS INC	0	1	1
SNIDER TIRE,INC	2	2	4
Snyder's Lance Inc	1	1	2
SOCIAL SECURITY ADMINISTRATION	1	1	2
SONESTA INTL HOTELS CORP	1	0	1
SONOCO CORRFLEX DISPLAY & PACKAGING,LLC	2	2	4
SONOCO CRELLIN INC	2	2	4
SONOCO PRODUCTS COMPANY	2	3	5
SOP 200 N COLLEGE OWNER GP LLC	1	1	2
SOUTH COLLEGE STREET LLC	1	1	2
SOUTH FORK INDUSTRIES	2	2	4
SOUTH GRANVILLE WATER AND SEWER AUTHORITY	3	3	6
SOUTHCORR PACKAGING	1	1	2
SOUTHEASTERN CONTAINER INC	0	2	2
SOUTHERN CAST	2	2	4
SOUTHERN CUSTOM SHUTTERS, INC	1	1	2
SOUTHERN FURNITURE	4	0	4
SOUTHERN METALS CO	7	3	10
SOUTHERN PIPE INC	1	1	2
SOUTHERN PRECISION SPRING CO INC	2	2	4
SOUTHWESTERN COMMUNITY COLLEGE	1	2	3
SPARTAN DYERS INC	2	2	4
SPECIALIZED PACKAGING FLEXO	1	1	2
SPECIALTY MANUFACTURING INC	1	1	2
SPECTRUM PROPERTIES MANAGEMENT COMPANY	6	6	12
SPEED CHANNEL INC	1	1	2
SPENCERS INCORPORATED OF MOUNT AIRY, NC	1	0	1
SPORTS MENAGERIE	2	2	4
SPORTS SOLUTIONS INC	2	2	4
SPRINT	1	1	2
SPX FLOW INC.	1	1	2
SRE EV Burgess LLC	3	3	6
ST LUKES HOSPITAL	2	2	4
St. Johns Packaging (USA), Inc.	3	3	6
STAMPSOURCE	1	1	2
STANDARD TOOLS AND EQUIPMENT	2	2	4
STANLEY TOTAL LIVING CENTER	1	1	2
STAPLES INC	2	2	4
STAR PAPER TUBE INC	1	0	1
STARPORT I,LLC	1	1	2

STARWOOD RETAIL PARTNERS	1	1	2
STEEL SPECIALTIES	2	2	4
STEWART SUPERABSORBENTS, LLC	1	0	1
STONEFIELD CELLARS WINERY LLC	1	1	2
STONEVILLE LUMBER CO	2	2	4
STURM RUGER & CO INC	2	2	4
SUGAR CREEK BREWING COMPANY	3	3	6
SUMITOMO ELECTRIC ESC, INC	1	1	2
SUMMIT HOTEL TRS 135 LLC	1	1	2
SUNCOM WIRELESS PCS, INC	0	3	3
SUNTERRACE CASUAL FURNITURE, INC	2	2	4
SUNTRUST BANKS INC	1	1	2
SV CENTER LLC	2	2	4
SWIFT BEEF COMPANY	1	1	2
SYCAMORE BREWING LLC	1	1	2
SYNCOT PLASTICS, INC	5	5	10
SYNERGY BLUERIDGE INVESTMENTS, LLC	1	1	2
SYNERGY RECYCLING LLC	0	2	2
SYNGENTA CROP PROTECTION, INC	9	9	18
SYNGENTA CROP PROTECTION, LLC	1	0	1
SYNTAX SYSTEMS USA, LP	2	4	6
SYNTEC SEATING SOLUTIONS LLC	1	1	2
SYNTHETICS FINISHING	7	7	14
T@KINGS MOUNTAIN VII LLC	1	1	2
T5@KINGS MOUNTAIN II, LLC	1	1	2
TAILORED CHEMICAL PRODUCTS INC	1	1	2
TALBERT BUILDING SUPPLY INC	1	1	2
TARGET STORES	21	0	21
TAYLOR INVESTMENT PROPERTIES, LLC	3	3	6
TAYLOR KING FURNITUR	2	1	3
TCG OF THE CAROLINAS	1	1	2
TDY INDUSTRIES LLC	1	1	2
TE CONNECTIVITY CORPORATION	15	15	30
TEAM INDUSTRIES	1	1	2
TECHNIBILT LTD	2	2	4
TECHNICAL PRECISION PLASTICS	7	7	14
TECHNIMARK LLC	11	11	22
Teijin Automotive Technologies	3	3	6
TELERX MARKETING INC	1	1	2
TERRA-MULCH PRODUCTS, LLC	0	5	5
TEX TECH COATINGS LLC	4	4	8
THE CHARLOTTE-MECKLENBURG HOSPITAL AUTHORITY	2	2	4
THE CHRISTMAN COMPANY	2	2	4
THE CLEARING HOUSE PAYMENTS COMPANY LLC	1	1	2
THE CYPRESS OF CHARLOTTE CLUB, INC	11	11	22
THE DAVID H MURDOCK CORE LABORATORY BUILDING OW	1	1	2
THE EXCHANGE AT MEADOWMOUNT LLC	1	1	2
The Fish Warehouse LLC	1	1	2
THE INSPIRATIONAL NETWORK INC	2	2	4
THE LINCOLN NATIONAL LIFE INSURANCE COMPANY	2	2	4
THE MCCLATCHY COMPANY LLC	1	1	2
THE NC A&T UNIVERSITY	1	1	2

THE NC AT UNIVERSITY A&T FOUNDATION LLC	1	1	2
THE NC OFFICE OF INFORMATION TECHNOLOGY SERVICES	3	3	6
THE POLYMERS CENTER OF EXCELLENCE	2	2	4
THE TIMKEN COMPANY	3	3	6
THERMOFORM PLASTICS	1	1	2
THIEMAN MANUFACTURING TECHNOLOGIES LLC	1	1	2
THOMAS BUILT BUSES	3	3	6
THOMASVILLE,CITY OF	3	3	6
TICONA POLYMERS, INC	1	1	2
TIERPOINT, LLC	6	6	12
TIGHT LINES PARTNERS LLC	1	1	2
TIME WARNER CABLE SE LLC	15	15	30
TIME WARNER CABLE, INC.	1	1	2
TIMKENSTEEL CORPORATION	0	1	1
TKC 19	1	1	2
TKC MANAGEMENT SERVICES	1	1	2
TOBACCO WOOD BREWIG COMPANY, LLC	1	1	2
TORINGDON OFFICE OWNER LLC	6	6	12
TOSAF USA, INC	1	1	2
TOSHIBA GLOBAL COMMERCE SOLUTIONS	0	1	1
TOWN BREWING COMPANY, LLC	1	1	2
TOWN OF CHAPEL HILL	2	0	2
TOWN OF HILLSBOROUGH	2	2	4
TOWN OF MOORESVILLE	0	2	2
TOWN OF VALDESE	3	3	6
TR 121 W TRADE LLC	1	1	2
TRADE TRYON PLAZA CONDOMINIUM ASSOC INC	1	1	2
TRANSCONTINENTAL GAS	0	3	3
TRANSCONTINENTAL HOLDING CORP	11	11	22
TRANSYLVANIA COMMUNITY HOSPITAL	1	0	1
TRANSYLVANIA COUNTY	1	1	2
TRANSYLVANIA COUNTY SCHOOLS	11	11	22
TRELLEBORG COATED SYSTEMS US, INC	1	1	2
TRIAD CENTER GREENSBORO OFFICE, LLC	1	1	2
TRIAD HOSPITALITY CORPORATION	1	1	2
TRIBAL CASINO GAMING ENTERPRISES HARRAH'S CASINO 8	1	0	1
TRIDENT GRAPHICS NA LLC	1	1	2
TRI-HISHTIL, LLC	2	2	4
TRISTONE FLOWTECH USA INC	1	1	2
TROPICAL NUT & FRUIT CO	1	0	1
TRUIST BANK	4	4	8
Truist Bank Trustee Bolding	11	11	22
Tryon Cabosparkles LLC	1	1	2
TRYON PROPERTY OWNER LLC	2	2	4
TUBULAR TEXTILE MACH	1	0	1
TURBOCOATING CORP	1	1	2
TYSON FARMS INC	18	18	36
U S POSTAL SERVICE	5	5	10
U.S. COTTON, LLC	2	2	4
ULTIMATE TEXTILE INC	2	2	4
UNC - CHAPEL HILL	5	5	10
UNC CENTER FOR PUBLIC MEDIA	5	5	10

UNC GREENSBORO	16	17	33
UNC ROCKINGHAM HEALTH CARE	3	3	6
UNC SCHOOL OF THE ARTS	28	28	56
UNCC	0	16	16
UNC-CHAPEL HILL	6	6	12
UNC-CHARLOTTE- FACILITIES MGMT	9	9	18
UNC-GREENSBORO	7	7	14
UNDERWRITERS LABORATORIES	1	1	2
UNIFI INC	1	1	2
UNIFI MANUFACTURING, INC	0	5	5
UNILIN FLOORING NC LLC	1	1	2
UNILIN NORTH AMERICA, LLC	1	1	2
UNION COUNTY HABITAT FOR HUMANITY	1	1	2
UNIQUETEX	1	1	2
UNITED AIR FILTER CO	4	4	8
UNITED METAL FINISHING, INC	3	3	6
UNITED PARCEL SERV	3	3	6
UNITED PLASTICS CORPORATION	1	1	2
UNITED STATES COLD STORAGE	1	1	2
UNITED THERAPEUTICS CORPORATION	2	2	4
UNIVERSAL FOREST PRODUCTS	2	2	4
UNIVERSITY OF NC HOSPITALS	8	8	16
UNIX PACKAGING LLC	1	0	1
UPM - RAFLATAC, INC	1	1	2
UPS LOGISTICS	1	1	2
US FOODS, INC	1	1	2
US NATIONAL WHITEWATER CENTER, INC	13	13	26
V F CORPORATION	2	2	4
VALASSIS COMMUNICATIONS	1	1	2
VALDESE WEAVERS	6	6	12
VALLEY HILLS MALL	8	8	16
VANGUARD FURNITURE CO INC	8	8	16
VECO PLAN, LLC	0	1	1
VERIZON COMMUNICATIONS	3	3	6
VERIZON WIRELESS	6	6	12
VF JEANSWEAR LIMITED PARTNERSHIP	1	1	2
VF SERVICES INC	1	1	2
VP 300 SB LLC	1	1	2
VULCAN CONSTRUCTION MATERIALS, LLC	50	49	99

Duke Energy Carolinas, LLC Evans Exhibit 9B

List of Industrial and Commercial Customers Opted Into Vintage 2021

Docket E-7, Sub 1265

Customer Bill Name	Number of Accounts DSM YR 21 (Jan 1-Dec 31)	EE YR 21 (Jan 1-Dec 31)	GRAND TOTAL
A & T STATE UNIV		2	2
ABERCROMBIE TEXTILES LLC	1		1
AIRGAS USA LLC	1		1
ALADDIN MANUFACTURING CORPORATION	1		1
ALAMANCE FOODS INC	5		5
ALDERSGATE	1		1
ALLOYWORKS, LLC	5		5
ALLTEL MOBILE	1		1
AMERICAN & EFIRD LLC	1		1
AMERICAN AIRLINES		3	3
AT&T BELLSOUTH		2	2
B/E AEROSPACE, INC	4		4
BAKER INTERIORS FURNITURE COMPANY	4		4
BANK OF AMERICA		1	1
BELLSOUTH BSC		9	9
BEMIS MANUFACTURING CO	2		2
BEOCARE INC	1		1
BERRY TRI PLASTICS	1		1
BISSELL COMPANIES		13	13
BLOW MOLDED SOLUTIONS LLC	2		2
BLUE RIDGE COMMUNITY COLLEGE		2	2
BRI 1875 MERIDIAN, LLC		4	4
BROAD RIVER WATER AUTHORITY		1	1
BURKE COUNTY SCHOOLS		9	9
BURLINGTON COAT FACTORY		1	1
CARAUSTAR INC		2	2
CARAUSTAR IND & CONSUMER PRODUCTS GROUP		1	1
CAROLINAS HEALTHCARE SYSTEM		2	2
CASCADE DIE CASTING GRP INC	2	0	2
CATAWBA COUNTY SCHOOLS		6	6
CCL LABEL INC	3		3
CELGARD, LLC		2	2
CENTRAL REGIONAL HOSPITAL	5		5
CENTURY FURNITURE, LLC	7		7
CERTAINTEED CORP	2		2
CHAPEL HILL/CARRBORO SCHOOLS		45	45
CHARLOTTE COUNTRY DAY SCHOOL		7	7
CITY OF ASHEVILLE	1		1
CITY OF CHARLOTTE	15		15
CITY OF EDEN	2		2
CITY OF GREENSBORO	2		2
CITY OF HENDERSONVILLE	1		1
CITY OF KANNAPOLIS	1		1
CITY OF LENOIR	2		2
CITY OF SALISBURY		1	1
CITY OF WINSTON-SALEM	5		5
CLEMENT PAPPAS NC, INC		1	1

CLEVELAND COUNTY SCHOOLS		3	3
CMBE		173	173
COLONIAL PIPELINE	5		5
CONSOLIDATED METCO INC	1		1
CORE SCIENTIFIC INC	1		1
CPCC		6	6
DAIMLER TRUCKS NORTH AMERICA, LLC		4	4
DAVIDSON WATER INC	1		1
DEERE HITACHI CONST MACH		2	2
DUKE UNIVERSITY HEALTH SYSTEM INC		1	1
DURHAM PUBLIC SCHLS		11	11
DURHAM PUBLIC SCHOOLS		93	93
DURHAM TECH COMM COL		2	2
ELASTIC FABRICS OF AMERICA		1	1
ELEVATE TEXTILES, INC	1		1
ESSENTRA PACKAGING US, INC	4		4
FIBER & YARN PRODUCTS, INC	1		1
FIBER COMPOSITES CORPORATION	2		2
FLETCHER HOSPITAL, INC.	1		1
FOOD LION	2		2
FORSYTH TECHNICAL COLLEGE		2	2
FRONTIER YARNS, INC	2		2
GASTON COUNTY SCHOOLS		2	2
GENPAK LLC	1		1
GILBARCO INC		1	1
GILDAN ACTIVEWEAR (EDEN) INC		2	2
GILDAN YARNS, LLC	1		1
GOODWILL INDUSTRIES OF NW NC	1		1
GREENSBORO COLLEGE		9	9
GREER LABORATORIES INC		4	4
GUILFORD COLLEGE		12	12
GUILFORD COUNTY SCHOOLS		3	3
HANCOCK & MOORE, LLC	6		6
HANES COMPANIES INC	1		1
HASHMASTER TECH, LLC	1		1
HERBALIFE INTERNATIONAL OF AMERICA INC		1	1
HICKORY CITY SCHOOLS		12	12
HICKORY SPRINGS MANUFACTURING COMPANY	1		1
HIGH COUNTRY LUMBER AND MULCH LLC	2		2
HIGHWOODS REALTY LIMITED PARTNERSHIP		14	14
HIGHWOODS REALTY LTP		1	1
HOME DEPOT		16	16
HONDA POWER EQUIPMENT MFG, INC	1		1
IBM CORPORATION	1		1
IGM RESINS USA INC	1		1
INSTITUTION FOOD HOUSE, INC		1	1
IPEX USA, INC	1		1
JOHN UMSTEAD HOSPITAL	5		5
JOHNSON CONTROLS INC		2	2
JPS COMPOSITE MATERIALS CORP	1		1
KOHLS DEPARTMENT STORES	1		1
L S STARRETT CO	1		1
LANXESS CORP	3		3

LEXINGTON FURNITURE IND	1		1
LOWE'S HOME CENTERS, INC		54	54
LOWES OF FRANKLIN #717		3	3
LOWE'S OF FRANKLIN #717		1	1
LYDALL THERMAL ACOUSTICAL INC		3	3
MARRIOTT INTERNATIONAL INC	2		2
MARTIN MARIETTA MATERIALS INC	4		4
MAUSER CORP	4		4
MCCREARY MODERN INC		7	7
MCDOWELL HOSPITAL INC		1	1
MDI MANAGEMENT		1	1
MECK AREA CATH SCHLS	3		3
MECKLENBURG CO GENERAL SERVICE DEPT		2	2
MECKLENBURG COUNTY		6	6
MECKLENBURG COUNTY-CRISIS ASSISTANCE MIN		3	3
MODERN DENSIFYING	2		2
MORINAGA AMERICA FOODS INC	1		1
NC A&T UNIVERSITY		1	1
NC DEPT OF PUBLIC SAFETY	3		3
NEW EXCELSIOR, INC	1		1
NEW GENERATION YARNS	1		1
OMNISOURCE LLC	1		1
OWENS & MINOR DISTRIBUTION INC	1		1
P G DRY KILN CO	1		1
PACTIV LLC	3		3
PANTHERS STADIUM, LLC		2	2
PARKDALE AMERICA LLC	2		2
PARKDALE MILLS, INC	1		1
PARTON LUMBER CO	2		2
PATRICK YARN MILL	1		1
PHOENIX INDUSTRIES	1		1
PIEDMONT CHEMICAL		1	1
PIEDMONT TRIAD REG WATER AUTH	4		4
PITTSBURGH GLASS WORKS LLC	1		1
PNEUMAFIL CORPORATION	5		5
POLK COUNTY SCHOOLS		1	1
PUROLATOR FACET INC		1	1
RENWOOD MILLS LLC	1		1
RESEARCH TRIANGLE INSTITUTE	1		1
ROWAN SALISBURY SCHOOLS		5	5
RUTHERFORD COUNTY SCHOOLS		1	1
SALEM BUSINESS PARK	1		1
SCHAEFER SYSTEMS		7	7
SHAMROCK CORPORATION		4	4
SHERRILL FURNITURE	2		2
SIEMENS ENERGY INC	1		1
SLANE HOSIERY MILLS INC	1		1
SOUTHEASTERN CONTAINER INC	2		2
SOUTHERN METALS CO		4	4
STAR PAPER TUBE INC		1	1
SUNCOM WIRELESS PCS, INC	3		3
SWAIN COUNTY SCHOOLS		6	6
SYNERGY RECYCLING LLC	2		2

SYNGENTA CROP PROTECTION, LLC		1	1
SYNTAX SYSTEMS USA, LP	2		2
TARGET STORES		17	17
TE CONNECTIVITY CORPORATION	1		1
TERRA-MULCH PRODUCTS, LLC	1		1
TJX COMPANIES	3		3
TOWN OF MOORESVILLE	2		2
TRANSCONTINENTAL GAS	1		1
TRANSYLVANIA COMMUNITY HOSPITAL		1	1
TRIBAL CASINO GAMING ENTERPRISES HARRAH'		1	1
TUBULAR TEXTILE MACH	1		1
UNIFI MANUFACTURING, INC	2		2
UNIX PACKAGING LLC	1		1
VULCAN CONSTRUCTION MATERIALS, LLC		1	1
WAL-MART STORES EAST,LP	1		1
WELLS FARGO BANK NA	5		5
WEXFORD WINSTON-SALEM HOLDING, LLC	1		1
WINSTON-SALEM/FORSYTH CO SCHOOLS	4		4
ZINK IMAGING INC		1	1
Grand Total	204	627	831

Evans Exhibit 10

Duke Energy Carolinas, LLC
Shared Savings Incentive Calculation
Docket Number E-7 Sub 1265
Estimate January 1, 2023 - December 31, 2023

			System
NPV of AC - Res EE[1]		$	111,543,961
NPV of AC - Income Qualified EE			6,733,294
NPV of AC - Non Res EE			218,468,348
NPV of AC - DSM			142,656,626
Total NPV of Avoided Costs	**A**	**$**	**479,402,228**
Program Costs - Res EE[1]		$	50,358,015
Program Costs - Income Qualified EE			8,826,241
Program Costs - Non Res EE			62,345,286
Program Costs - DSM			34,793,612
Total Program Costs	**B**	**$**	**156,323,153**
Net Savings	**C=A-B**	**$**	**323,079,075**
Sharing Percentage	**D**		**10.60%**
Shared Savings - Res EE[1]		$	6,485,710
Shared Savings - PRI Res EE[2]			713,729
Shared Savings - Non Res EE			16,549,045
Shared Savings - DSM			11,433,480
Total Shared Savings	**E=(A-B)*D**	**$**	**35,181,963**

1) Excludes AC and Program Costs associated with Income Qualified Energy Efficiency and Weatherization Assistance programs.
2) Includes the Res EE Programs associated with Income Qualified Energy Efficiency and Weatherization Assistance.
These programs earn a PRI, Program Return Incentive, calculated on the NPV of Avoided Cost.

EM&V Activities

Planned Evaluation, Measurement and Verification (EM&V) Activities through the rate period (Dec. 31, 2022)

Evaluation is a term adopted by Duke Energy Carolinas (DEC), and refers generally to the systematic process of gathering information on program activities, quantifying energy and demand impacts, and reporting overall effectiveness of program efforts. Within evaluation, the activity of measurement and verification (M&V) refers to the collection and analysis of data at a participating facility/project. Together this is referred to as “EM&V.”

Refer to the accompanying Evans Exhibit 12 chart for a schedule of process and impact evaluation analysis and reports that are currently scheduled.

Energy Efficiency Portfolio Evaluation

DEC has contracted with independent, third-party evaluation consultants to provide the appropriate EM&V support, including the development and implementation of an evaluation plan designed to measure the energy and demand impacts of the residential and non-residential energy efficiency programs.

Typical EM&V activities:

- Develop evaluation action plan
- Process evaluation interviews
- Collect program data
- Verify measure installation and performance through surveys and/or on-site visits
- Program database review
- Impact data analysis
- Reporting

The process evaluation provides unbiased information on past program performance, current implementation strategies and opportunities for future program improvements. Typically, the data collection for process evaluation consists of surveys with program management, implementation vendor(s), program partner(s), and participants; and, in some cases, non-participants. A statistically representative sample of participants will be selected for the analysis.

The impact evaluation provides energy and demand savings resulting from the program. Impact analysis may involve engineering analysis (formulas/algorithms), billing analysis, statistically adjusted engineering methods, and/or building simulation models, depending on the program and the nature of the impacts. Data collection may involve surveys and/or site visits. A statistically representative sample of participants is selected for the analysis. Duke Energy Carolinas intends to follow industry-accepted methodologies for all measurement and verification activities, consistent with International Performance Measurement Verification Protocol (IPMVP) Options A, C or D depending on the measure.

The field of evaluation is constantly learning from ongoing data collection and analysis, and best practices for evaluation, measurement and verification continually evolve. As updated best practices are identified in the industry, DEC will consider these and revise evaluation plans as appropriate to provide accurate and cost-effective evaluation.

Demand Response Program Evaluation

DEC has contracted with independent, third-party evaluation consultants to provide an independent review of the evaluation plan designed to measure the demand impacts of the residential and non-residential demand response programs and the final results of that evaluation.

Typical EM&V activities:

- Collect program data
- Process evaluation interviews
- Verify operability and performance through on-site visits
- Collect interval data
- Program database review
- Benchmarking research
- Dispatch optimization modeling
- Impact data analysis
- Reporting

The process evaluation provides unbiased information on past program performance, current implementation strategies and opportunities for future improvements. Typically, the data collection for process evaluation consists of surveys with program management, implementation vendor(s), program partner(s), and participants; and, in some cases, non-participants. A statistically representative sample of participants will be selected for the analysis.

The impact evaluation provides demand savings resulting from the program. Impact analysis for Power Manager involves a simulation model to calculate the duty cycle reduction, and then an overall load reduction. Impact analysis for PowerShare involves statistical modeling of an M&V baseline load shape for a customer, then modeling the event period baseline load shape and comparing to the actual load curve of the customer during the event period.

The field of evaluation is constantly learning from ongoing data collection and analysis, and best practices for evaluation, measurement and verification continually evolve. As updated best practices are identified in the industry, DEC will consider these and revise evaluation plans as appropriate to provide accurate and cost-effective evaluation.

Evans Exhibit 12

EM&V EFFECTIVE DATE TIMELINE

This chart contains the expected timeline with end of customer data sample period for impact evaluation and when the impact evaluation report is expected to be completed.
Unless otherwise noted, original impact estimates are replaced with the first impact evaluation results, after which time subsequent impact evaluation results are applied prospectively.

Program	Program/Measure	2015				2016			
		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Appliance Recycling	Refrigerator, Freezer			2nd EM&V	Report				
Energy Efficiency Education (K12 Curriculum)	Energy Efficiency Education (K12 Curriculum)			3rd EM&V	Report				
Energy Efficient Appliance and Devices	Lighting - Smart Saver RCFL			3rd EM&V	Report				
	Lighting - Specialty Bulbs								
	SF Water EE Products			1st EM&V	Report				
	HP Water Heater & Pool Pumps								
HVAC Energy Efficiency	Residential Smart $aver AC and HP								
	Tune & Seal Measures								
Income-Qualified Energy Efficiency	Weatherization								
	Refrigerator Replacement								
	Low Income Neighborhood							2nd EM&V	Report
Multi-Family Energy Efficiency	MF Water EE Products			1st EM&V	Report			2nd EM&V	Report
	Lighting (CFL Property Manager)								3rd EM&V
My Home Energy Report	MyHER								
Residential Energy Assessments	Home Energy House Call								
Non-Residential Smart $aver Energy Efficiency Custom	Non-Res Smart$aver Custom Rebate								
Non-Residential Smart $aver Energy Efficiency Food Service	Non-Res Smart $aver Energy Efficiency Food Service				2nd EM&V				2nd EM&V
Non-Residential Smart $aver Energy Efficiency HVAC Products	Non-Res Smart $aver Energy Efficiency HVAC Products				2nd EM&V	Report			
Non-Residential Smart $aver Energy Efficiency Lighting	Non Re Smart Saver Prescriptive Lighting								
	Non Res Smart Saver Prescriptive Other							1st EM&V	Report
Non-Residential Smart $aver Energy Efficiency Motors Pumps Drives	Non-Res Smart$aver Prescriptive (VFDs or other)				2nd EM&V				
Non-Residential Smart $aver Energy Efficiency Process Equipment	Non-Res Smart $aver Energy Efficiency Process Equip				2nd EM&V				
Small Business Energy Saver	SBES								
Smart Energy in Offices	SEiO								

Key
- Original Estimate
- 1st EM&V
- 2nd EM&V
- 3rd EM&V
- 4th EM&V
- 5th EM&V
- 6th EM&V

Program	Program/Measure	2017				2018				2019				2020			
		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
~~Appliance Recycling~~	~~Refrigerator, Freezer~~																
Energy Efficiency Education (K12 Curriculum)	Energy Efficiency Education (K12 Curriculum)								4th EM&V	Report							5th EM&V
Energy Efficient Appliance and Devices	Lighting - Smart Saver RLED (Free LED)			1st EM&V	Report												
	Lighting - Smart Saver Retail					1st EM&V	Report										
	Lighting - Specialty Bulbs							2nd EM&V	Report								
	SF Water EE Products			2nd EM&V	Report								3rd EM&V	3rd EM&V	Report		
	HP Water Heater & Pool Pumps					1st EM&V	Report										
HVAC Energy Efficiency	Referral and Non-Referral HVAC Measures					2nd EM&V	Report										
Income-Qualified Energy Efficiency	Weatherization					1st EM&V	Report								2nd EM&V	2nd EM&V	2nd EM&V
	Refrigerator Replacement					1st EM&V	Report								2nd EM&V	2nd EM&V	2nd EM&V
	Low Income Neighborhood											3rd EM&V	Report				
Multi-Family Energy Efficiency	Lighting & Water EE Products												3rd EM&V	Report			
My Home Energy Report	MyHER	Report								4th EM&V	Report						
Residential Energy Assessments	Home Energy House Call							3rd EM&V	Report								
~~Business Energy Reports~~	~~BER~~				~~1st EM&V~~	~~Report~~				~~Report~~							
EnergyWise Business	EnergyWise Business (EE measure)	1st EM&V	Report				2nd EM&V	Report					3rd EM&V	3rd EM&V	3rd EM&V	3rd EM&V	3rd EM&V
Non-Residential Smart $aver Energy Efficiency Custom	Custom Rebate & Custom Assessment	Report						3rd EM&V	Report							4th EM&V	Report
Non-Residential Smart $aver Prescriptive	All Prescriptive Technologies					3rd EM&V	Report						4th EM&V	4th EM&V	4th EM&V	Report	
Non-Residential Energy Assessment			1st EM&V	Report													
Small Business Energy Saver	SBES						2nd EM&V	Report									3rd EM&V
Smart Energy in Offices	SEiO			1st EM&V	Report												

Note: Residential Smart $aver AC and HP and Non-Residential Prescriptive lighting measures have completed a additional EM&V report in the past. Future reports combine measures for the respective programs.

Program	Program/Measure	2021				2022				2023			
		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
~~Appliance Recycling~~	~~Refrigerator, Freezer~~												
Energy Efficiency Education (K12 Curriculum)	Energy Efficiency Education (K12 Curriculum)	5th EM&V	5th EM&V	Report					6th EM&V	6th EM&V	6th EM&V	Report	
Energy Efficient Appliance and Devices	~~Lighting - Smart Saver RLED (Free LED)~~	-	-	-	-	-	-	-	-	-	-	-	-
	Lighting - Smart Saver Retail						2nd EM&V	2nd EM&V	Report				
	Lighting - Specialty Bulbs/Retail Marketplace		3rd EM&V	3rd EM&V	Report						4th EM&V	4th EM&V	Report
	SF Water EE Products		4th EM&V	4th EM&V	4th EM&V	4th EM&V	Report					5th EM&V	5th EM&V
	HP Water Heater & Pool Pumps						2nd EM&V	2nd EM&V	2nd EM&V	2nd EM&V	Report		
HVAC Energy Efficiency	Referral and Non-Referral HVAC Measures						3rd EM&V	3rd EM&V	3rd EM&V	3rd EM&V	Report		
Income-Qualified Energy Efficiency	Weatherization	2nd EM&V	Report		3rd EM&V	3rd EM&V	3rd EM&V	3rd EM&V	Report			4th EM&V	4th EM&V
	Refrigerator Replacement	2nd EM&V	Report		3rd EM&	3rd EM&V	3rd EM&V	3rd EM&V	Report			4th EM&V	4th EM&V
	Low Income Neighborhood	4th EM&V	4th EM&V	4th EM&V	4th EM&V	Report			5th EM&V	5th EM&V	5th EM&V	5th EM&V	5th EM&V
Multi-Family Energy Efficiency	Lighting & Water EE Products	4th EM&V	4th EM&V	4th EM&V	4th EM&V	4th EM&V	Report			5th EM&V	5th EM&V	5th EM&V	5th EM&V
My Home Energy Report	MyHER	5th EM&V	5th EM&V	5th EM&V	5th EM&V	Report				6th EM&V	6th EM&V	6th EM&V	6th EM&V
Residential Energy Assessments	Home Energy House Call					4th EM&V	4th EM&V	4th EM&V	4th EM&V	Report			
~~Business Energy Reports~~	~~BER~~	-	-	-	-	-	-	-	-	-	-	-	-
EnergyWise Business	EnergyWise Business (EE measure)	Report					4th EM&V	4th EM&V	4th EM&V	Report			
Non-Residential Smart $aver Energy Efficiency Custom	Custom Rebate & Custom Assessment	4th EM&V	4th EM&V	4th EM&V	4th EM&V	4th EM&V	Report		5th EM&V	5th EM&V	5th EM&V	5th EM&V	5th EM&V
Non-Residential Smart $aver Prescriptive	All Prescriptive Technologies		5th EM&V	5th EM&V	5th EM&V	5th EM&V	5th EM&V	5th EM&V	Report				
Non-Residential Energy Assessment													
Small Business Energy Saver	SBES	3rd EM&V	Report							4th EM&V	4th EM&V	4th EM&V	Report
~~Smart Energy in Offices~~	~~SEiO~~												

Evans Exhibit 13

Duke Energy Carolinas, LLC
January 1, 2021 - December 31, 2021
Docket Number E-7, Sub 1265
Actual Program and Avoided Costs, January 1, 2016 - December 31, 2021

		2016		2017		2018		2019		2020		2021	
Market	Program	Program Costs	Avoided Costs	Program Costs	Avoided Costs	Program Costs	Avoided Costs	Program Costs	Avoided Costs	Program Costs	Avoided Costs	Program Costs	Avoided Costs
Residential	Appliance Recycling Program	$ (97,397)	$ 59,758	$ 5,307	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Residential	Energy Assessments	2,678,893	6,822,806	2,909,098	6,602,773	2,836,229	5,756,145	3,153,757	4,413,585	3,358,880	4,582,748	3,326,179	3,278,832
Residential	Energy Efficiency Education	2,126,509	3,695,507	2,077,611	3,597,724	1,992,260	2,863,153	1,644,077	2,519,645	1,113,485	1,312,408	1,147,501	1,513,478
Residential	Energy Efficient Appliances and Devices	24,069,774	82,262,218	30,340,728	105,352,687	42,687,244	135,840,645	40,433,533	101,640,687	22,124,101	60,871,143	10,824,171	25,474,094
Residential	Income Qualified Energy Efficiency and Weatherization Assistance	4,792,436	2,984,760	5,505,992	3,185,867	6,490,735	4,253,631	7,344,325	3,570,760	2,787,490	1,094,864	4,634,161	1,452,358
Residential	Multi-Family Energy Efficiency	2,518,988	8,950,706	3,168,422	13,539,656	3,604,921	13,613,278	3,681,262	10,815,659	1,613,839	2,156,883	517,454	993,893
Residential	My Home Energy Report	10,822,444	20,423,954	13,812,250	21,728,369	12,765,286	22,682,074	10,558,344	23,361,954	12,749,651	23,927,899	7,072,233	21,313,709
Residential	Power Manager	13,644,970	54,179,776	14,021,500	61,074,105	14,423,610	61,920,744	13,386,942	69,783,157	14,303,277	74,785,083	16,829,058	57,584,854
Residential	Residential – Smart $aver Energy Efficiency Program	7,839,566	7,476,100	7,403,327	7,287,263	6,955,146	7,087,718	7,402,907	7,079,940	7,538,303	7,811,427	8,156,036	8,402,753
Non-Residential	Business Energy Report	263,169	302,497	126,680	696	-	-	-	-	-	-	-	-
Non-Residential	Energy Management Information Services	-	-	-	-	-	-	-	-	-	-	-	-
Non-Residential	EnergyWise for Business (Non-Residential)	470,304	574,590	2,484,618	2,530,761	3,062,816	2,279,619	3,687,462	2,728,428	2,941,282	2,131,933	2,463,194	1,964,689
Non-Residential	Non Residential Smart Saver Custom	7,356,509	39,025,086	7,304,838	34,693,083	6,068,902	23,319,056	8,873,872	35,884,367	5,771,790	15,898,503	7,505,201	19,324,372
Non-Residential	Non Residential Smart Saver Energy Efficient IT Products	285,430	777,601	61,215	523	36,875	3,025	44,335	1,385	15,179	1,734	74,699	416
Non-Residential	Non Residential Smart Saver Custom Energy Assessments	2,034,308	9,572,687	2,139,875	10,272,302	407,293	67,297	296,006	691,285	330,629	518,862	293,539	432,158
Non-Residential	Non Residential Smart Saver Energy Efficient Food Service Products	324,117	2,474,312	306,488	959,251	235,605	431,621	339,996	412,886	533,411	230,241	203,130	479,963
Non-Residential	Non Residential Smart Saver Energy Efficient HVAC Products	1,473,991	3,344,669	1,560,769	2,958,336	1,620,748	2,809,849	2,208,364	5,516,665	2,450,713	7,423,034	4,899,800	14,900,228
Non-Residential	Non Residential Smart Saver Energy Efficient Lighting Products	39,622,944	120,392,639	66,689,770	240,054,511	25,872,380	146,516,321	20,834,766	105,608,459	13,098,851	71,994,024	17,924,291	68,949,662
Non-Residential	Non Residential Smart Saver Energy Efficient Process Equipment Product	125,947	279,184	162,413	530,295	67,509	226,697	119,843	416,343	29,681	236,299	87,540	257,010
Non-Residential	Non Residential Smart Saver Energy Efficient Pumps and Drives Products	471,930	1,574,965	528,937	3,070,044	277,785	1,617,544	189,172	720,816	167,464	757,993	202,615	666,628
Non-Residential	Non Residential Smart Saver Performance Incentive	35,670	-	320,559	8,958	479,610	1,671,568	785,165	2,238,186	751,724	2,035,780	342,826	4,234,077
Non-Residential	Power Share (Non-Residential)	14,291,024	43,889,394	13,316,535	41,482,644	12,922,977	36,008,770	13,022,816	42,072,382	12,082,697	34,867,428	13,583,912	42,254,098
Non-Residential	Small Business Energy Saver	15,360,852	55,685,830	17,350,972	63,169,894	15,977,993	46,827,028	11,421,399	25,661,729	6,933,130	15,315,818	8,935,952	18,680,538
Non-Residential	Smart Energy in Offices	1,061,729	1,843,559	891,010	1,067,480	219,748	143,266	-	-	-	-	-	-
Non-Residential	Disallowed Costs from 2015 Program Costs Audit (Order E-7 Sub 1105, da	-	-	-	-	-	-	-	-	-	-	-	-
		$ 151,574,107	$ 466,592,598	$ 192,488,915	$ 623,167,221	$ 159,005,671	$ 515,939,051	$ 149,428,343	$ 445,138,318	$ 110,695,578	$ 327,954,102	$ 109,023,491	$ 292,157,811

Costs as Filed in	Docket Number
2016	E-7, Sub 1192
2017	E-7, Sub 1230
2018	E-7, Sub 1265
2019	E-7, Sub 1265
2020	E-7, Sub 1265
2021	E-7, Sub 1265

Docket No. E-7, Sub 1265

Evans Exhibit 14

DEC - 2021 Find It Duke Allocations

Revenue

	Services		Amount	% of Total Received
1	Solar	$	44,240	9.5%
2	EV Charging		5,630	1.2%
3	Tree Services [a]		-	0.0%
4	Non-DEC Customers		20,983	4.5%
5	Total Non-DSM/EE	$	70,853	15.2%
6	DSM/EE		395,927	84.8%
7	Overall Total	$	466,780	100.0%

Costs

		% of Revenue		Total Cost		Allocated Costs
8	DSM/EE	84.8%	$	367,271	$	311,522
9	Non-DSM/EE	15.2%		367,271		55,748
10	Total Cost				$	367,271

Summary

		EE Rev Rqmt				Non-Utility Allocation			
			Before		Adjusted		Before		Adjusted
11	Costs	$	367,271	$	311,522	$	-	$	55,748
12	Revenues		466,780		395,927		-		70,853
13	Net Revenue Reqmt	$	(99,509)	$	(84,405)	$	-	$	(15,105)
14	Net Impact (Pre-PPI Impact)				15,105				(15,105)
15	PPI Impact (@11.5%)				(1,737)				-
16	Net Revenue Requirement Impact			$	13,368			$	(15,105)

Notes:

[a] no tree service revenue in 2021

I/A

Evans Exhibit 15

	Residential Programs	2020 Projection per Rider 11 System Energy Reduction (kWh)	2020 Actuals System Energy Reduction (kWh)	2020 Actuals Total Cost	2021 Projection per Rider 12 System Energy Reduction (kWh)	2021 Actuals System Energy Reduction (kWh)	2021 Actuals Total Cost
	EE Programs						
1	Energy Efficiency Education	7,034,771	4,746,423	$ 1,113,485	7,951,567	7,013,162	$ 1,147,501
2	Energy Efficient Appliances and Devices	47,578,710	110,986,906	$ 22,124,101	56,621,851	51,700,635	$ 10,824,171
3	HVAC Energy Efficiency	10,603,088	7,689,428	$ 7,538,303	5,570,374	9,425,675	$ 8,156,036
4	Low Income Energy Efficiency and Weatherization Assistance	4,245,993	2,039,928	$ 2,787,490	9,167,483	2,545,882	$ 4,634,161
5	Multi-Family Energy Efficiency	20,196,677	4,042,084	$ 1,613,839	28,264,645	2,019,667	$ 517,454
6	Residential Energy Assessments	6,119,618	7,891,628	$ 3,358,880	14,921,390	6,590,951	$ 3,326,179
7	Total for Residential Conservation Programs	95,778,857	137,396,395	38,536,099	122,497,311	79,295,972	28,605,502
8	My Home Energy Report	306,337,865	332,105,411	$ 12,749,651	342,160,803	336,292,411	$ 7,072,233
9	Total Residential Conservation and Behavioral Programs	402,116,722	469,501,806	51,285,750	464,658,114	415,588,383	35,677,734
10	Power Manager®	-	-	$ 14,303,277	-	-	$ 16,829,058
11	Total Residential	402,116,722	469,501,806	65,589,027	464,658,114	415,588,383	$ 52,506,792

	Non-Residential Programs	System Energy Reduction (kWh)	System Energy Reduction (kWh)	Total Cost	System Energy Reduction (kWh)	System Energy Reduction (kWh)	Total Cost
	EE Programs						
12	Non Residential Energy Efficienct ITEE	323,520	9,917	$ 15,179	272,355	2,353	$ 74,699
13	Non Residential Smart Saver Custom	67,082,262	21,156,703	$ 5,771,790	53,115,768	30,798,533	$ 7,505,201
14	Non Residential Smart Saver Custom Technical Assessments	7,950,216	1,413,836	$ 330,629	5,482,371	921,248	$ 293,539
15	Non Residential Smart Saver Energy Efficient Food Service Products	4,363,034	502,870	$ 533,411	4,280,461	1,201,408	$ 203,130
16	Non Residential Smart Saver Energy Efficient HVAC Products	2,546,698	9,270,812	$ 2,450,713	3,698,306	21,054,972	$ 4,899,800
17	Non Residential Smart Saver Energy Efficienct Lighting Products	131,137,431	109,556,031	$ 13,098,851	156,866,525	116,783,529	$ 17,924,291
18	Non Residential Smart Saver Energy Efficienct Process Equipment Products	547,055	567,122	$ 29,681	877,998	824,803	$ 87,540
19	Non Residential Smart Saver Energy Efficient Pumps and Drives Products	4,603,201	1,402,429	$ 167,464	2,717,418	1,521,286	$ 202,615
20	Smart $aver(R) Non Residential Performance Incentive Program	22,097,800	5,961,326	$ 751,724	14,901,572	8,247,437	$ 342,826
21	Small Business Energy Saver	50,048,128	32,007,385	$ 6,933,130	50,790,447	38,560,812	$ 8,935,952
22	Smart Energy in Offices	-	-	$ -	-	-	$ -
23	Total for Non-Residential Conservation Programs	290,699,344	181,848,432	30,082,573	293,003,221	219,916,383	$ 40,469,592
24	EnergyWise for Business	2,557,590	2,604,631	$ 2,941,282	2,557,568	1,436,361	$ 2,463,194
25	PowerShare®	-	-	$ 12,082,697	-	-	$ 13,583,912
26	Total for Non-Residential DSM Programs	2,557,590	2,604,631	15,023,979	2,557,568	1,436,361	$ 16,047,106
27	Total Non Residential	293,256,933	184,453,063	45,106,551	295,560,789	221,352,744	$ 56,516,699
28	Total All Programs	695,373,655	653,954,870	110,695,578	760,218,903	636,941,127	$ 109,023,491

Reimagine tomorrow.

My Home Energy Report Program Evaluation

Submitted to Duke Energy

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Contents

List of Figures

List of Tables

Equations

1 Executive Summary

1.1 Program Summary

This report describes process and impact findings for the Duke Energy Carolinas and Duke Energy Progress My Home Energy Report (MyHER) offered to residential customers who live in single-metered, single family homes with thirteen months of usage history. MyHER relies on principles of behavioral science to encourage customer engagement with home energy management and energy efficiency. The program accomplishes this primarily by delivering a personalized report comparing each customer's energy use to that of a peer group of similar homes.[1] MyHER motivates customers to reduce their energy consumption by:

- Showing customers a comparison of their household electricity consumption to that of similar homes;
- Presenting a month-ahead forecast of electricity consumption disaggregated by end-use category;
- Suggesting tips for reducing energy use by changing customers' behavior or installing energy efficient equipment;
- Educating them about the energy savings benefits of Duke Energy's demand side management (DSM) programs; and
- Encouraging active management of their home's energy consumption.

1.2 Evaluation Objectives and High Level Findings

Nexant estimated the energy impacts associated with MyHER delivery for the period June 2017 to May 2018. This report also presents measurements of customer satisfaction and engagement for MyHER participants. The MyHER program is implemented as a randomized controlled trial (RCT). Customers are randomly assigned to either "treatment" or "control" groups for the purpose of measuring energy savings. Treatment customers are MyHER recipients (participants). The control group is a set of customers from whom the MyHER is intentionally withheld. The control group serves as the baseline against which MyHER impacts are measured. As Duke Energy customers become eligible for the MyHER program, Duke Energy randomly assigns them to one of these two groups.

The energy savings generated by the DEC MyHER program are presented in Table 1-1, showing that the evaluated impacts of the program are 248 kWh per household. The energy savings generated by the DEP MyHER program are presented in Table 1-2, showing that the evaluated impacts of the program are 201 kWh per household. These evaluated energy savings for the MyHER program are net of additional energy savings achieved through increased

[1] Homes are grouped by characteristics such as location, size, vintage, and heating fuel. Energy use is compared on groups of similar homes.

participation by the MyHER treatment group in other Duke Energy programs. Additional information concerning the evaluation period is shown in Table 1-3.

Table 1-1: DEC Deemed and Evaluated Energy Impacts per Participating Household

	Energy (kWh)	Confidence/Precision
Evaluated Impacts	248	90/6
Deemed Impacts	230	N/A

*MyHER is an opt-out program. As such, all impacts are considered net impacts; Nexant also calculated the impacts of the MyHER program by removing savings achieved by MyHER participants via other Duke Energy Programs.

Table 1-2: DEP Deemed and Evaluated Energy Impacts per Participating Household

	Energy (kWh)	Confidence/Precision
Evaluated Impacts	201	90/9
Deemed Impacts	148	N/A

*MyHER is an opt-out program. As such, all impacts are considered net impacts; Nexant also calculated the impacts of the MyHER program by removing savings achieved by MyHER participants via other Duke Energy Programs.

Table 1-3: Sample Period Start and End Dates

Evaluation Component	Start	End
Impact Evaluation Period	June 2017	May 2018
Customer Survey Period	January 2019	March 2019

1.3 Evaluation Recommendations

This evaluation finds the DEC MyHER program realized 137% of its claimed impacts and the DEP MyHER program realized 108% of its claimed impacts. The MyHER program remains fully deployed at these two Duke Energy jurisdictions, due to semiannual introductions of newly eligible customers to the treatment and control program populations. The continual addition of new customers to the program means that there will always be a mix of participants with respect to the duration of the customers' exposure to the treatment. Impacts delivered by behavioral programs such as MyHER have been shown in many evaluations of behavioral programs to vary depending on the length of that exposure, reaching maturity after 1-2 years of exposure to the program. As such, Duke Energy should generally expect that the newest cohorts of MyHER treatment customers will deliver lower energy savings than the established cohorts. In the case of DEC, some cohorts are attaining an age of 8 years.

Duke Energy undertakes substantial work in partnership with their implementation contractor, Tendril, Inc., in planning and coordinating the delivery of MyHER reports to more than 1.1 million customers in the Carolinas and more than 680,000 customers at Duke Energy Progress. Duke Energy has developed a production process that allows for the customization of MyHER messages, tips, and promotions on the basis of customer information and exposure to Duke Energy's demand-side management programs. Since the prior MyHER evaluation[2], Tendril has implemented a number of improvements that have resulted in increased product quality, as evidenced by improved performance in Duke Energy's quality checks that take place before each batch of reports is sent to participants. The process evaluation finds that MyHER is successful in achieving its goal of enhancing customer motivation, awareness, and attention to saving energy in most areas probed by customer surveys.

Nexant has the following specific recommendations for enhancing Duke Energy's MyHER program:

- **Continue the commitment to simultaneous control and treatment assignment.** New assignments to treatment and control groups must be simultaneous and Tendril and Duke Energy should work to add all newly assigned treatment and control groups to their respective status in a single billing month, to the extent that is technically feasible.
- **Continue the practice of making assignments of new accounts to MyHER treatment and control groups once a year, or at most, twice a year.** The numbers of Duke Energy customers becoming eligible for the program each year do not facilitate more frequent assignments. This is due to the fact that sufficient numbers of customers must be set aside for the control group each time a group of customers is assigned to treatment in order for the evaluator to be able to measure the energy savings delivered by the new cohort.
- **Increase MyHER participant awareness of Interactive.** The process evaluation finds that current awareness of Interactive among DEP and DEC MyHER participants is very low; another program objective above increasing aware customers' engagement with Interactive is to more effectively get the word out about its existence and increase the number of aware customers.
- **Continue to drive engagement with the Interactive Portal.** MyHER Interactive's ability to deliver measurable energy savings is on the rise, as shown by this evaluation in comparison to the prior DEC evaluation, as well as the MyHER evaluations for other Duke Energy jurisdictions completed in the past year. We recommend that Duke Energy continue to drive more MyHER participants to the portal.
- **Continue to operate MyHER with an eye towards change management**. MyHER's implementer Tendril has made great strides in improving quality control performance since the prior DEC and DEP evaluations in the automation of quality control processes. Effective change management and stable staffing have been notable contributors to these improvements and they should continue to be emphasized in MyHER program

[2] DEC was previously evaluated in February 2016. DEP was previously evaluated in July 2017.

operations, especially as Tendril's new HER production platform, HOMERS (the Home Energy Reporting Service), is rolled out and its implementation is optimized.

- **Continue to prioritize the structuring of the processes and schedules for program elements**. Improved organization of tasks for elements such as the FFT report module has been a significant success in the operations of the MyHER program and has made reactive responses to impending deadlines and emergent challenges that characterized these operations in the past much less common. Program staff should seek out additional opportunities for the optimization of program schedules, tasks, and long term goals in this manner.

2 Introduction and Program Description

This section presents a brief description of the My Home Energy Report (MyHER) program as it is operated in the DEC and DEP service territories during the evaluation timeframe. This description is informed by document review, in-depth interviews with staff, and Nexant's understanding of program nuance developed through regular communication during the evaluation process.

2.1 Program Description

The MyHER program is a Duke Energy Carolinas and Duke Energy Progress behavioral product for demand-side management (DSM) of energy consumption and generation capacity requirements. The MyHER presents a comparison of participants' energy use to a peer group of similar homes. It is sent by direct mail eight times a year, and 12 times a year by email to customers that have provided Duke Energy with their email address.[3] The MyHER provides customer-specific information that allows customers to compare their energy use for the month and over the past year to the consumption of similar homes as well as homes considered to be energy-efficient. Reports include seasonal and household-appropriate energy savings tips and information on energy efficiency programs offered by Duke Energy. Many tips include low cost suggestions such as behavioral changes. An additional feature presents a month-ahead forecast of energy usage disaggregated by end-use type. Duke Energy contracts with Tendril Inc. for the management and delivery of its MyHER product.

Duke Energy also launched the MyHER Interactive Portal[4] in March 2015. MyHER Interactive seeks to engage customers in a responsive energy information and education dialogue. When customers enroll in the online portal they are given the opportunity to update and expand on information known to Duke Energy about their home and electricity consumption. Customers who have registered to use MyHER Interactive are also sent weekly energy management tips and conservation challenges via email. The general strategy of MyHER Interactive is to open communications between customers and the utility, as well as to explore new ways of engaging households in electricity consumption management.

Customers occupying single-family homes with an individual electric meter and at least thirteen months of electricity consumption history are eligible for MyHER in Duke Energy Carolinas and Duke Energy Progress territories in North Carolina and South Carolina. The program is an opt-out program: customers can notify Duke Energy if they no longer wish to receive a MyHER and will be subsequently removed from the program. Customers who receive both paper and email

[3] For clarity: MyHERs are only sent to customers randomly assigned to the treatment group. All of the customers in the treatment group receive paper MyHERs 8 times a year. Duke Energy has email contact information for some of the treatment customers – those email customers also receive email MyHERs 12 times a year. Therefore, the email customers receive both an email and paper MyHER 8 months of the year and only an email report 4 months of the year.

[4] We refer to the MyHER Interactive Portal simply as "Interactive" in the remainder of this report.

MyHERs may also opt out of the report format of their choice (i.e., elect to only receive MyHERs by email, or only receive them by U.S. Mail).

Duke Energy placed a portion of eligible customers into a control group to satisfy evaluation, measurement, and verification (EM&V) requirements. These control group customers are not eligible to participate in the MyHER program.

Duke Energy has several objectives for the MyHER program, including:

1. Generating cost effective energy savings;
2. Increasing customer awareness of household energy use, engagement with Duke Energy, and overall customer satisfaction with services provided by Duke Energy; and
3. Promoting other energy efficiency and demand response program options to residential customers.

2.2 Implementation

MyHER is implemented by Tendril Inc., a behavioral science and analytics contractor that prepares and distributes the MyHER reports according to a pre-determined annual calendar. Tendril also generates and disseminates the MyHER Interactive Portal content and email reports, energy savings tips, and energy savings challenges. Tendril and Duke Energy coordinate closely on the data transfer and preparation required to successfully manage the MyHER program, and they make adjustments as needed to provide custom tips and messages expected to reflect the characteristics of specific homes. A more detailed discussion of the roles and responsibilities of both organizations is provided in Section 4.

Eligibility

The single-family MyHER program targets residential customers living in single-family, single meter, non-commercial homes with at least thirteen months of electricity consumption history. Approximately 1,174,000 DEC and 695,000 DEP residential customers met those requirements as of May 2018 and are assigned to the MyHER treatment groups. Accounts could still be excluded from the program for reasons such as the following: different mailing and service addresses and enrollment in payment plans based on income (although Equal Payment Plan customers are eligible). Eligibility criteria for the MyHER program have changed over time, and in some cases, customers were assigned to either treatment or control but later determined to be ineligible for the program. Nexant estimates that approximately 2% of assigned DEC customers and 1% of assigned DEP customers have been deemed ineligible for the program after having been assigned. Nexant addresses this topic by applying an intention-to-treat analysis (ITT); refer to Section 3.1.2.

2.3 Key Research Objectives

The section describes our key research objectives and associated evaluation activities.

2.3.1 Impact Evaluation Objectives

The primary objective of the impact evaluation is to describe the impact of the program on energy consumption (kWh). Savings attributable to the program are measured across an average annual and monthly time period. The following research questions guided impact evaluation activities:

1. Is the process used to select customers into treatment and control groups unbiased?
2. What is the impact of MyHER on the uptake of other Duke Energy programs (downstream and upstream) in the market?
3. What net energy savings are attributable solely to MyHER reports after removing savings already claimed by Duke Energy's other energy efficiency programs?
4. What incremental savings are achieved by customers participating in the MyHER Interactive portal?

2.3.2 Process Evaluation Objectives

The program evaluation also seeks to identify improvements to the business processes of program delivery. Process evaluation activities focused on how the program is working and opportunities to make MyHER more effective. The following questions guided process data collection and evaluation activities:

1. Are there opportunities to make the program more efficient, more effective, or to increase participant engagement?
2. What components of the program are most effective and should be replicated or expanded?
3. What additional information, services, tips or other capabilities should MyHER consider?
4. Does MyHER participation increase customer awareness of their energy use and interest in saving energy?
5. What elements of the reports are useful to recipients?
6. How satisfied are recipients with MyHER reports?
7. To what extent does receiving MyHER increase customer engagement in energy saving behaviors and upgrades?
8. Do participants hold more favorable opinions of Duke Energy as a result of receiving the reports?
9. What encourages or prevents households from acting upon information or tips provided by MyHER?
10. To what degree are recipients aware of, and making use of, MyHER Interactive?
11. How can the program encourage additional action?

2.4 Organization of This Report

The remainder of this report contains the results of the impact analysis (Section 3); the results of the process evaluation activities, including the customer surveys (Section 4); and Nexant's conclusions and recommendations (Section 5).

3 Impact Evaluation

3.1 Methods

A key objective of the MyHER impact evaluation is to measure the change in electricity consumption (kWh) resulting from exposure to the normative comparisons and conservation messages presented in Duke Energy's My Home Energy Reports. The approach for estimating MyHER impacts is built into the program delivery strategy. Eligible accounts are randomly assigned to either a treatment (participant) group or a control group. The control group accounts are not exposed to MyHER in order to provide the baseline for estimating savings attributable to the Home Energy Reports. In this randomized controlled trial (RCT) design, the only explanation for the observed differences in energy consumption between the treatment and control group is exposure to MyHER.

The impact estimate is based on monthly billing data and program participation data provided by Duke Energy. The RCT delivery method of the program removes the need for a net-to-gross analysis as the billing analysis directly estimates the net impact of the program. After estimating the total change in energy consumption in treatment group homes, Nexant performed an "overlap analysis", which quantifies the savings associated with increased participation by treatment homes in other DEC or DEP energy efficiency offerings. These savings were claimed by other programs; therefore, they are subtracted from the MyHER impact estimates to eliminate double-counting.

3.1.1 Data Sources and Management

The MyHER impact evaluation relied on a large volume of participation and billing data from Duke Energy's data warehouse. Nexant provided a data request for the necessary information in July 2018. Key data elements include the following:

- **Participant List** – a table listing each of the homes assigned to the MyHER program since its 2010 inception in DEC and its 2014 inception in DEP. This table also indicated whether the account was in the treatment or control group and the date the home was assigned to either group. Duke Energy also provided a supplemental table of Acxiom demographic data for program participants.
- **Billing History** – a monthly consumption (kWh) history for each account in the treatment and control group. Records included all months since assignment as well as the pre-assignment usage history required for eligibility. This file also included the meter read date and the number of days in each billing cycle.
- **MyHER Report History** – a record of the approximate 'drop date' of each MyHER report sent to the treatment group accounts, the messaging included, and the recommended actions. This dataset also contained a supplemental table of treatment group accounts omitted from each MyHER mailing during the evaluation period, and the associated reason for omission.

- **Participation Tracking Data for Other Energy Efficiency Programs offered by Duke Energy** – a table of the Duke DSM program participation of MyHER control and treatment group accounts. Key fields for analysis include the measure name, quantity, participation date, and net annual kWh and peak demand impacts per unit for each MyHER recipient and control group account participating in other DSM programs offered by Duke Energy.

In preparation for the impact analysis, Nexant combined and cleaned the participation and billing data provided by the MyHER program staff and then combined with the cleaned dataset from Nexant's prior MyHER impact evaluation for that jurisdiction.[5] The combined billing dataset includes 1,652,515 distinct DEC accounts and 1,011,440 distinct DEP accounts (the actual number varies by month). A number of treatment and control accounts in this dataset have closed prior to the start of this evaluation period (May 2016) and they have been dropped from the analysis dataset. For DEC, there were 306,131 such treatment customers and 126,142 such control customers. For DEP, there were 86,346 such treatment customers and 12,722 such control customers.

Nexant also removed the following accounts or data points from the analysis (total for DEC and DEP):

- 7,459 accounts that had a negative value for billed kWh;
- 710 records with unrealistically high usage: any month with greater than six times the 99th percentile value for daily kWh usage, or approximately 900 kWh per day.

Like most electric utilities, Duke Energy does not bill its customers for usage within a standard calendar month interval. Instead, billing cycles are a function of meter read dates that vary across accounts. Since the interval between meter reads vary by customer and by month, the evaluation team "calendarized" the usage data to reflect each calendar month, so that all accounts represent usage on a uniform basis. The calendarization process includes expanding usage data to daily usage, splitting the billing month's usage uniformly among the days between reads. The average daily usage for each calendar month is then calculated by taking the average of daily usage within the calendar month.

3.1.2 Intention to Treat

Duke Energy maintains a number of eligibility requirements for continued receipt of MyHER. Not all accounts assigned to treatment remained eligible and received MyHER over the study horizon. Several programmatic considerations can prevent a treatment group home from receiving MyHER in a given month. Common reasons for an account not being mailed include the following:

[5] Rather than re-requesting all of the data necessary for this evaluation (pre-treatment and posttreatment usage data for all treatment and control customers), Nexant omitted any data that we already had from the first evaluation – the pre-treatment data for cohorts included in our prior evaluation is still necessary for this current evaluation.

- **Mailing Address Issues** – mailing addresses are subjected to deliverability verification by the printer. If an account fails this check due to an invalid street name or PO Box or has another issue, the home will not receive the MyHER.
- **Implausible Bill** – if a home's billed usage for the previous month is less than 150 kWh or greater than 10,000 kWh, Tendril does not mail the MyHER.
- **Insufficient Matching Households** – this filter is referred to as "Small Neighborhood" by Tendril and is a function of the clustering algorithm Tendril uses to produce the usage comparison. If a home can't be clustered with a sufficient number of other homes, it will not receive the MyHER.
- **No Bill Received** – if Tendril does not receive usage data for an account from Duke within the necessary time frame to print and mail, the home will not receive MyHER for the month.

The Nexant data cleaning steps listed in Section 3.1.1 do not impose these filters on the impact evaluation analysis dataset. This is necessary to preserve the RCT design because eligibility filters are not applied to the control group in the same manner as the treatment group. Instead, Nexant employed an "intention-to-treat" (ITT) analysis. In the ITT framework, the average energy savings per home *assigned* to the treatment is calculated via billing analysis. This impact estimate is then divided by the proportion of the treatment group homes analyzed that were active MyHER participants. The underlying assumption of this approach is all of the observed energy savings are being generated by the participating accounts.

Nexant relied on Duke Energy's monthly participation counts for the numerator of the proportion treated calculation. MyHER program staff calculates participation monthly according to the business rules and eligibility criteria in place at the time. The denominator of the proportion treated is the number of treatment group homes with billed kWh usage for the bill month. This calculation is presented by month in Table 3-1 and Table 3-2 for the study period. The average proportion of assigned accounts that were treated during the period of June 2017 to May 2018 was 98% for both DEC and DEP.

Table 3-1: DEC Calculation of Treatment Percentage by Bill Month

Month	Treatment Homes Analyzed	DEC Participant Count	% Treated
06/2017	1,231,705	1,197,462	97%
07/2017	1,218,640	1,198,133	98%
08/2017	1,207,107	1,171,813	97%
09/2017	1,195,242	1,172,053	98%
10/2017	1,185,902	1,172,053	99%
11/2017	1,225,916	1,195,285	98%
12/2017	1,216,916	1,191,881	98%
01/2018	1,208,915	1,193,353	99%
02/2018	1,200,827	1,178,403	98%
03/2018	1,192,681	1,177,960	99%
04/2018	1,183,803	1,157,514	98%
05/2018	1,173,821	1,151,896	98%
12-month Average Proportion			**98%**

Table 3-2: DEP Calculation of Treatment Percentage by Bill Month

Month	Treatment Homes Analyzed	DEP Participant Count	% Treated
06/2017	727,455	682,040	94%
07/2017	719,693	713,994	99%
08/2017	712,653	701,172	98%
09/2017	705,487	700,125	99%
10/2017	699,920	700,125	100%
11/2017	726,344	710,313	98%
12/2017	720,920	707,899	98%
01/2018	715,954	708,355	99%
02/2018	711,221	697,726	98%
03/2018	706,614	698,443	99%
04/2018	701,195	693,815	99%
05/2018	695,352	689,886	99%
12-month Average Proportion			**98%**

The monthly participation counts shown in Table 3-1 and Table 3-2 were also used by Nexant to estimate the aggregate impacts of the MyHER. Per-home kWh savings estimates for each bill month are multiplied by the number of participating homes to arrive at the aggregate MWh impact achieved by the program.

3.1.3 Sampling Plan and Precision of Findings

The MyHER program was implemented as an RCT in which individuals were randomly assigned to a treatment (participant) group or a control group for the purpose of estimating changes in energy use because of the program. Nexant's analysis methodology relies on a census analysis of the homes in both groups so the resulting impact estimates are free of sampling error. However, there is inherent uncertainty associated with the impact estimates because random assignment produces a statistical chance that the control group consumption would not vary in perfect harmony with the treatment group, even in the absence of MyHER exposure. The uncertainty associated with random assignment is a function of the size of the treatment and control groups. As group size increases, the uncertainty introduced by randomization decreases, and the precision of the estimates improves.

Nexant's MyHER impact estimates are presented with both an absolute precision and relative precision. Absolute precision estimates are expressed in units of annual energy consumption (kWh) or as a percentage of annual consumption.

The two following statements about the MyHER impact analysis reflect absolute precision:

- DEC MyHER saved an average of 247.7 kWh per home during the 12-month period June 2017 to May 2018, ± 16.0 kWh. Homes in the treatment group reduced electric consumption by an average of 1.69%, ± 0.11%.

- DEP MyHER saved an average of 201.2 kWh per home during the 12-month period June 2017 to May 2018, ± 18.9 kWh. Homes in the treatment group reduced electric consumption by an average of 1.25%, ± 0.12%.

In these examples, the uncertainty of the estimate, or margin of error (denoted by "±"), is presented in the same absolute terms as the impact estimate—that is, in terms of annual electricity consumption. Nexant also includes the relative precision of the findings. Relative precision expresses the margin of error as a percentage of the impact estimate itself. Consider the following examples:

- The average treatment effect of DEC MyHER during the 12-month period June 2017 to May 2018 is 247.7 kWh with a relative precision of ± 6.4%. In this case, ± 6.4% is determined by dividing the absolute margin of error by the impact estimate: 16.0÷247.7 = 0.064 = 6.4%.

- The average treatment effect of DEP MyHER during the 12-month period June 2017 to May 2018 is 201.2 kWh with a relative precision of ± 9.4%. In this case, ± 9.4% is determined by dividing the absolute margin of error by the impact estimate: 18.9÷201.2 = 0.094 = 9.4%.

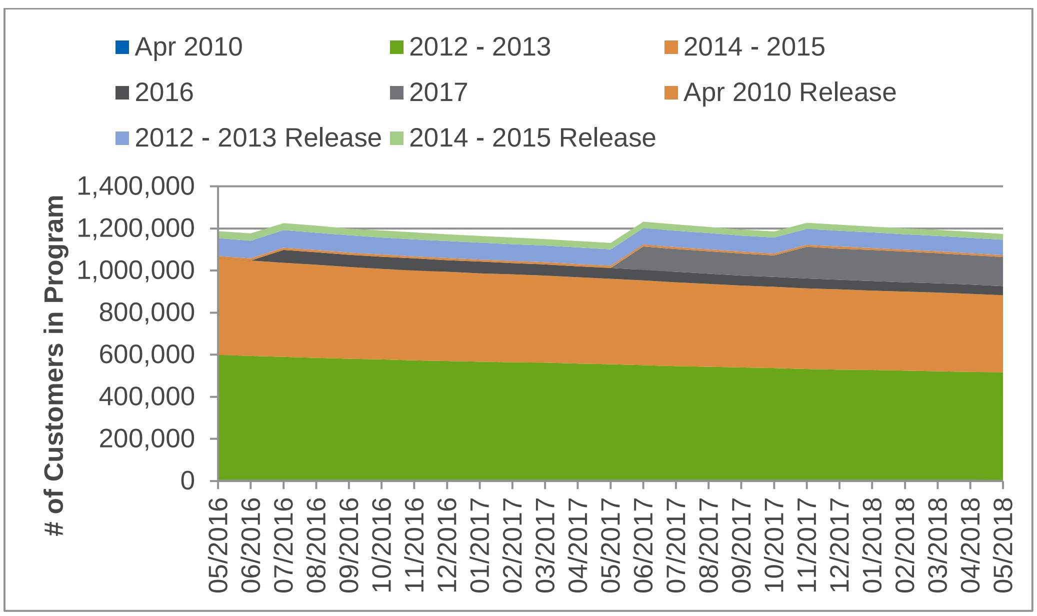
All of the precision estimates in this report are presented at the 90% confidence level and assume a two-tailed distribution.

3.1.4 Assignment Cohorts and Equivalence Testing

The DEC and DEP MyHER program has been growing over time since its DEC launch in 2010 and DEP launch in 2014. Nexant mapped the DEC MyHER population into eight cohorts and DEP MyHER population into six cohorts. The cohort groupings are defined on a temporal basis, generally following the major periods when customers were assigned to treatment and control groups. Cohorts that had been defined in prior evaluations of the DEC and DEP programs were maintained for consistency.

Figure 3-1 shows the timeline of DEC program expansion by cohort since May 2016. The original pilot cohort started the program in April 2010 which was followed by a large expansion of customers who were added in 2012 and 2013, mainly in September 2012. A second large cohort was added in 2014 and 2015, mainly in December 2014. The program has continued to expand since 2015, in more modest increments relative to the 2012 - 2013 and 2014 - 2015 expansions, as newer customers met the program's eligibility criteria. In October 2015, Duke Energy also released a small number of DEC customers originally assigned to the control group into treatment from the April 2010, 2012 - 2013, and 2014 – 2015 cohorts. These cohorts are denoted with "Release" in Figure 3-1.[6] These customers were released into treatment starting in October 2015, and began producing impacts in November 2015.

Figure 3-1: History of Cohort Assignments for DEC MyHER Program

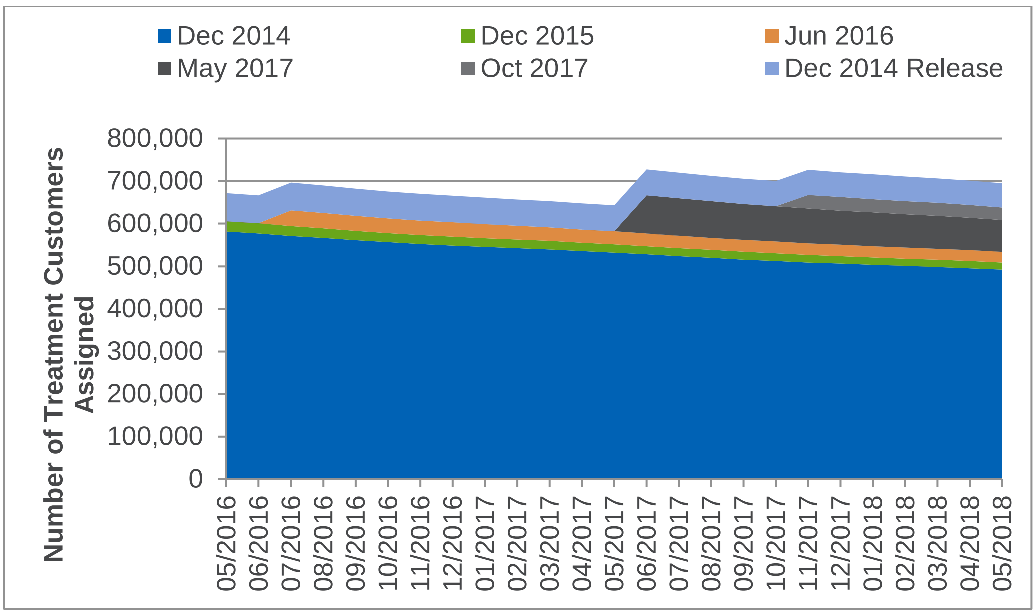


[6] Duke Energy commissioned a review of the MyHER control groups in 2015 to assess whether or not there were any control groups that were larger than necessary for the purpose of EM&V. Four relatively small releases (approximately 110,000 customers total) from the DEC jurisdiction was recommended by that review. Consequently, about 110,000 control group customers from the April 2010, September 2012, December 2014, and January 2015 cohorts were randomly selected for release into treatment.

Approximately 26% of DEC MyHER treatment customers were not assigned to the program simultaneously with a control group, and were bundled into cohorts with treatment customers assigned around the same time, consistent with the prior DEC evaluations. Nexant has advised Duke Energy to continue a simultaneous assignment protocol and to make assignments on an annual or biennial basis. Doing so will minimize any potential sources of bias that could occur due to a lack of simultaneous assignment to treatment and control.

Figure 3-2 shows the timeline of DEP program expansion by cohort since May 2016. A large original cohort started the program in December 2014. The program has continued to expand since 2014, in more modest increments relative to the original cohort, as newer customers met the program's eligibility criteria. In October 2015, Duke Energy also released a small number of DEP customers originally assigned to the control group into treatment from the December 2014 cohort. This cohort is denoted with "Release" in Figure 3-2.[7] These customers were released into treatment starting in October 2015, and began producing impacts in November 2015.

Figure 3-2: History of Cohort Assignments for DEP MyHER Program



Approximately 8% of DEP MyHER treatment customers were not assigned to the program simultaneously with a control group, and were bundled into cohorts with treatment customers assigned around the same time. These cohort definitions are consistent with those used in the previous evaluation. Simultaneous assignment will minimize any potential sources of bias that could occur due to a lack of simultaneous assignment to treatment and control.

Straightforward impact estimates are a fundamental property of the RCT design. Random assignment to treatment and control produces a situation in which the treatment and control

[7] Duke Energy commissioned a review of the MyHER control groups in 2015 to assess whether or not there were any control groups that were larger than necessary for the purpose of EM&V. A release of 60,000 customers from the DEP jurisdiction was recommended by that review. Consequently, about 60,000 control group customers from the December 2014 cohort were randomly selected for release into treatment.

groups are statistically identical on all dimensions prior to the onset of treatment; the only difference between the treatment and control groups is exposure to MyHER. The impact is therefore simply the difference in average electricity consumption between the two groups. The first step to assessing the impact of an experiment involving a RCT is to determine whether or not the randomization worked as planned.

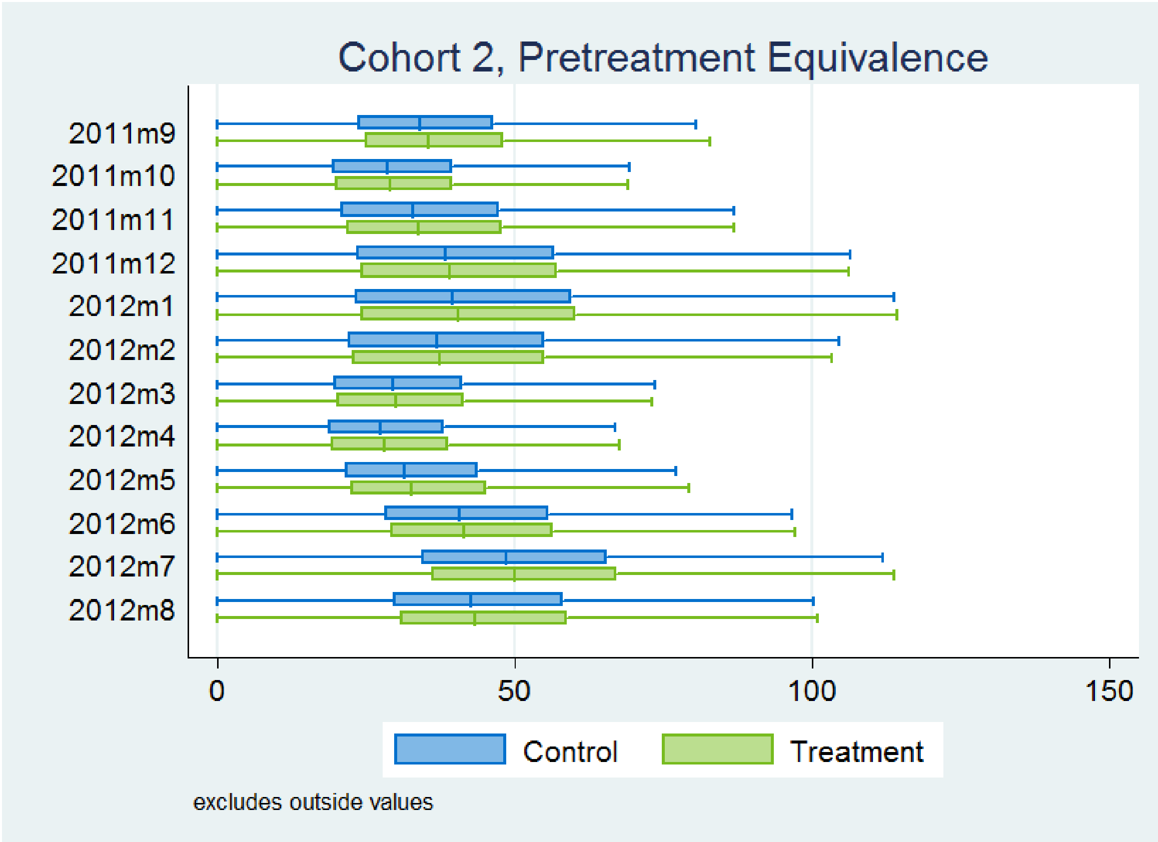
Table 3-3 presents summary information for each of the eight cohorts included in Nexant's DEC analysis, comparing the average annual kWh usage of each cohort's treatment and control group for the 12 months prior to the beginning of assignment. On an annual basis, the pre-assignment usage is relatively balanced between groups for each of these cohorts, where the largest difference occurs in Cohort 5 ("2017").

Table 3-3: DEC MyHER Cohort Summary Statistics

Cohort		Pretreatment Period		# Homes		Annual kWh in Pretreatment Period	
		Start	End	Control	Treatment	Control	Treatment
1	Apr 2010	04/2009	03/2010	9,535	6,173	17,871	17,893
2	2012 - 2013	09/2011	08/2012	30,566	527,684	14,392	14,528
3	2014 - 2015	12/2013	11/2014	26,376	383,024	14,782	14,684
4	2016	06/2015	05/2016	19,848	61,332	13,324	13,402
5	2017	05/2016	04/2017	27,388	161,317	13,204	13,554
6	Apr 2010 Release	04/2009	03/2010	9,535	10,689	17,871	17,732
7	2012 - 2013 Release	09/2011	08/2012	30,566	85,505	14,392	14,486
8	2014 - 2015 Release	12/2013	11/2014	26,376	35,809	14,782	14,660

Since MyHER is evaluated on a month basis, the more important equivalency check is on month-to-month comparability between treatment and control groups. Figure 3-3 is a box-and-whisker plot of the average pre-treatment consumption for the treatment and control groups of DEC Cohort 2 ("2012 - 2013"), the largest treatment cohort of the DEC MyHER program. The figure depicts the distribution of monthly average consumption from September 2011 to August 2012, the time period prior to the launch of the cohort. This figure represents usage of all accounts assigned to treatment and control in this cohort. The plot illustrates that usage patterns of the treatment and control customers are grossly similar, however t-tests on the mean consumption for treatment and control groups reveals statistically significant differences between treatment and control customers during much of the pretreatment period. For example, the cohort shown in Figure 3-3 has statistically significant differences between treatment and control groups in 11 of 12 months in the year immediately prior to the onset of treatment. Across all eight DEC cohorts, the number of pretreatment months that show statistically different differences between treatment and control customers ranges from 0 to 12. These differences will need to be addressed by the estimation procedure, as we describe later in this section.

Figure 3-3: DEC Difference in Average Pre-treatment Billed Consumption (kWh)



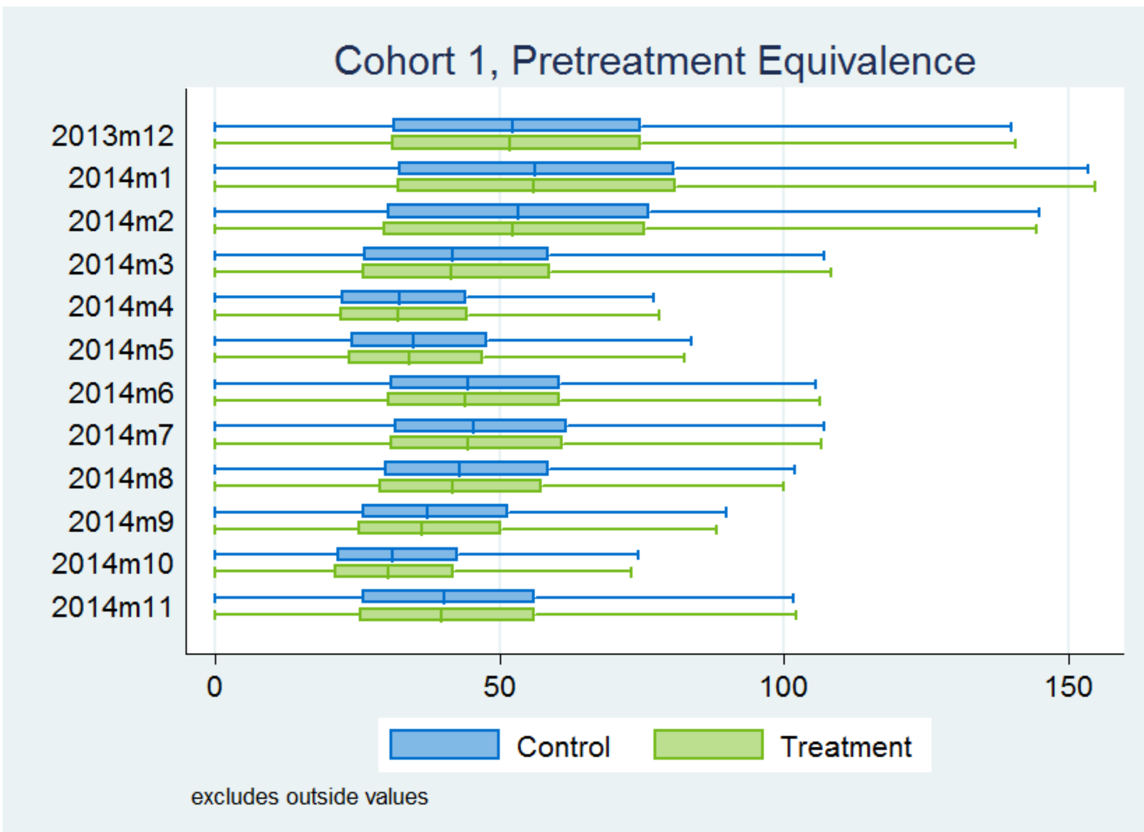
Considering the DEP program, Table 3-4 presents summary information for each of the six cohorts included in Nexant's analysis, comparing the average annual kWh usage of each cohort's treatment and control group for the 12 months prior to the beginning of assignment. Here as in DEC, on an annual basis, the pre-assignment usage is relatively balanced between groups for each of these cohorts, where the largest difference occurs in Cohort 5 ("October 2017") which is the smallest cohort in terms of the number of both treatment and control customers.

Table 3-4: DEP MyHER Cohort Summary Statistics

Cohort		Pre-Period		# Homes		Annual kWh in Pre-Period	
		Start	End	Control	Treatment	Control	Treatment
1	Dec 2014	12/2013	11/2014	72,590	565,291	16,852	16,773
2	Dec 2015	12/2014	11/2015	8,086	24,482	14,826	14,628
3	Jun 2016	06/2015	05/2016	16,579	37,011	13,765	13,860
4	May 2017	05/2016	04/2017	7,102	94,947	15,121	15,060
5	Oct 2017	10/2016	09/2017	12,401	33,879	13,636	13,838
6	Dec 2014 Release	12/2013	11/2014	72,590	65,869	16,852	16,847

On a month-to-month basis, DEP's cohorts perform similarly to DEC's cohorts in terms of equivalence in treatment and control group usage. Figure 3-4 is a box-and-whisker plot of the average pre-treatment consumption for the treatment and control groups of DEP Cohort 1 ("December 2014"), the largest treatment cohort of the DEP MyHER program. The figure depicts the distribution of monthly average consumption from December 2013 to November 2014, the time period prior to the launch of the cohort. This figure represents usage of all accounts assigned to treatment and control in this cohort. As was the case for DEC, this largest of DEP cohorts grossly demonstrates monthly equivalence of treatment and control group usage, but the differences in mean monthly consumption are actually statistically significant for all 12 months of the year immediately preceding the onset of treatment. Across the six DEP cohorts, the number of months of the year immediately prior to the onset of treatment that treatment and control group usage is statistically different ranges from 0 to 12. These differences will need to be taken into account during estimation.

Figure 3-4: DEP Difference in Average Pre-treatment Billed Consumption (kWh)



3.1.5 Regression Analysis

Separating the MyHER population into cohorts accounts for cohort maturation effects and improves statistical precision relative to differences among the cohorts. Nevertheless, as discussed above, there are still small, but significant, underlying differences between the cohort treatment and control groups that need to be netted out via a difference-in-differences approach. Nexant applied a linear fixed effects regression (LFER) model to account for the month-to-month differences in electricity usage observed in the pre-treatment period between the treatment and control groups. The basic form of the LFER model is shown in Equation 3-1. Average daily electricity consumption for treatment and control group customers is modeled using an indicator variable for the billing period of the study, a treatment indicator variable, and a customer-specific intercept term:

Equation 3-1: Fixed Effects Model Specification

$$\mathrm{kWh}_{\mathrm{ity}} = \mathrm{customer}_{\mathrm{i}} * \beta_{\mathrm{i}} + \sum_{t=1}^{12}\sum_{y=2009}^{2018} \mathrm{I}_{\mathrm{ty}} * \beta_{\mathrm{ty}} + \sum_{t=1}^{12}\sum_{y=2009}^{2018} \mathrm{I}_{\mathrm{ty}} * \tau_{ty} * \mathrm{treatment}_{\mathrm{ity}} + \varepsilon_{\mathrm{ity}}$$

Table 3-5 provides additional information about the terms and coefficients in Equation 3-1.

Table 3-5: Fixed Effects Regression Model Definition of Terms

Variable	Definition
$\mathrm{kWh}_{\mathrm{ity}}$	Customer i's average daily energy usage in billing month t of year y
$\mathrm{customer}_{\mathrm{i}}$	An indicator variable that equals one for customer i and zero otherwise. This variable models each customer's average energy use separately.
β_{i}	The coefficient on the customer indicator variable. Equal to the mean daily energy use for each customer.
I_{ty}	An indicator variable equal to one for each monthly billing period t, year y and zero otherwise. This variable captures the effect of each billing period's deviation from the customers' average energy use over the entire time series under investigation.
β_{ty}	The coefficient on the billing period t, year y indicator variable.
$\mathrm{treatment}_{\mathrm{ity}}$	The treatment variable. Equal to one when the treatment is in effect for the treatment group. Zero otherwise. Always zero for the control group.
τ_{ty}	The estimated treatment effect in kWh per day per customer in billing month t of year y; the main parameter of interest.
$\varepsilon_{\mathrm{ity}}$	The error term.

Nexant estimated the LFER model separately for each of the randomized cohorts included in the analysis for each jurisdiction. Detailed regression outputs can be found in Appendix A. The model specification includes an interaction term between the treatment indicator variable and the indicator variable for the bill month term. This specification generates a separate estimate of the MyHER daily impact for each month.

Table 3-6 illustrates the calculation of monthly impact estimates from the regression model coefficients for homes in the DEC 2012 - 2013 cohort (DEC Cohort 2). The monthly savings shown in Table 3-6 are the unweighted point estimates for that cohort. Each month's average treatment effect is multiplied by an assumed number of days in the month equal to 365.25/12 = 30.4375.

Table 3-6: Impact Calculation Example – DEC Cohort 2

Month	Daily Treatment Coefficient (τ)	Monthly Impact (kWh)
06/2017	-0.2310	-7.0
07/2017	0.1645	5.0
08/2017	0.1487	4.5
09/2017	-0.5932	-18.1
10/2017	-0.4416	-13.4
11/2017	-1.1360	-34.6
12/2017	-1.9676	-59.9
01/2018	-1.0220	-31.1
02/2018	-1.2419	-37.8
03/2018	-1.2941	-39.4
04/2018	-1.0254	-31.2
05/2018	-0.6825	-20.8
12-month Total		**-283.7**

Impact estimates by cohort were combined for each month using a weighted average where the weighting factor is the number of homes with billing data that had been assigned to the treatment group during a prior month (e.g., were in the post-treatment period). These estimates of the average MyHER impact per assigned home were then divided by the proportion of customers treated, as shown in Table 3-1 and Table 3-2, to estimate the average treatment effect per participating home.

3.1.6 Dual Participation Analysis

The regression model outputs and subsequent intention-to-treat adjustments discussed in Section 3.1.5 produce estimates of the total change in electricity consumption in homes exposed to MyHER. Some portion of the savings estimated by the regression is attributable to the propensity of MyHER treatment group homes to participate in other energy efficiency offerings at Duke Energy at a greater rate than control group homes. The primary purpose of the dual participation analysis is to quantify annual electricity savings attributable to this incremental DSM participation and subtract it from the MyHER impact estimates. This downward adjustment prevents savings from being double-counted by both the MyHER program and the program where savings were originally claimed.

A secondary objective of the dual participation analysis is to better understand the increased DSM participation, or "uplift" triggered by inclusion of marketing messages within MyHER. The ability to serve as a marketing tool for other DSM initiatives is an important part of what makes MyHER attractive as Duke Energy assumes the role of a trusted energy advisor with its customer base.

Duke Energy EM&V staff provided Nexant with a dataset of non-MyHER program participation records for the MyHER treatment and control group homes dating back to January 2015. This dataset included nearly 439,000 records of efficient measure installations by the MyHER treatment and control group and formed the basis of Nexant's dual participation analysis.

Table 3-7 and Table 3-8 shows the distribution of participation and savings during the 12-month period June 2017 to May 2018 across DEC and DEP's residential portfolio, respectively.

Table 3-7: DEC Total EE Program Participation among MyHER Customers

Program Name	Number of Records	Net MWh/year	Net kW/year
DE Residential EE Products & Services	181,353	36,612	12,092
DE Smart Saver Residential	243,630	152,553	31,754
Residential Energy Assessments	13,584	15,457	2,530
Total	**438,567**	**204,622**	**46,376**

Table 3-8: DEP Total EE Program Participation among MyHER Customers

Program Name	Number of Records	Net MWh/year	Net kW/year
DEP Home Energy Improvement	17,585	5,435	1,429
DEP Neighborhood Energy Saver	2,534	1,144	174
DEP New Construction Program	30	1	1
DEP ResEE Multi-Family	4,739	1,172	118
DEP Residential Energy Assessment	10,494	11,758	1,955
DEP Single Family Water Measures	115,504	30,605	10,199
DEP Smart Saver Residential	8,672	11,021	4,297
Total	**159,558**	**61,137**	**18,173**

The MyHER dual participation analysis included the following steps:

- Match the data to the treatment and control homes by Account ID
- Assign each transaction to a bill month based on the participation date field in the tracking data
- Exclude any installations that occurred prior to the home being assigned to the treatment or control group

- Calculate the daily net energy savings for each efficiency measure
- Sum the daily net energy impact by Account ID for measures installed prior to each bill month
- Calculate the average savings per day for the treatment and control groups by bill month. This calculation is performed separately for each cohort
- Calculate the incremental daily energy saved from energy efficiency (treatment – control) and multiply by the average number of days per bill month (30.4375)
- Take a weighted average across cohorts of the incremental energy savings observed in the treatment group
- Subtract this value from the LFER estimates of treatment effect for each bill month

Table 3-9 shows the dual participation calculations, by bill month, for homes in the DEC 2012 – 2013 Cohort (DEC Cohort 2). Savings from energy efficiency measures climb steadily over time in both groups as additional efficient technologies are installed through Duke Energy's residential energy efficiency portfolio. The treatment group's impacts increase at a slightly greater rate, so the incremental energy savings subtracted from the MyHER treatment effect generally grows as a cohort's duration of exposure lengthens.

Table 3-9: Incremental Energy Efficiency Savings Calculation Example – DEC Cohort 2

Month	Mean Daily EE kWh Impact (Control)	Mean Daily EE kWh Impact (Treatment)	Incremental Daily kWh from EE (Treatment – Control)	Uplift %	Incremental kWh Savings
06/2017	0.354	0.381	0.027	7.6%	0.82
07/2017	0.369	0.395	0.026	7.2%	0.80
08/2017	0.384	0.412	0.028	7.3%	0.85
09/2017	0.406	0.435	0.029	7.1%	0.88
10/2017	0.428	0.459	0.031	7.2%	0.94
11/2017	0.445	0.476	0.031	7.0%	0.95
12/2017	0.459	0.492	0.033	7.2%	1.01
01/2018	0.477	0.511	0.034	7.2%	1.04
02/2018	0.488	0.523	0.035	7.1%	1.06
03/2018	0.506	0.540	0.034	6.7%	1.04
04/2018	0.527	0.561	0.034	6.5%	1.05
05/2018	0.541	0.576	0.035	6.5%	1.06
12-month Total					**11.51**

While the incremental participation rate of the treatment group in other EE programs is modest when considered in total, increased uptake of measures immediately following promotional messaging within MyHER mailers could be much more dramatic. Each MyHER issued has space for one product promotion message that is used to market other Duke Energy programs or initiatives. Duke Energy provided Nexant with records of the exact messages received by each home. Table 3-10 and Table 3-11 show the number of homes that received each combination of messages for the DEC and DEP MyHER cycles from this evaluation period.

Table 3-10: DEC MyHER Promotional Messaging by Month

Source Month	Message 1 - Details	Message 2 - Details	Number of Homes
06/2017	Fire Up The Grill	Think Thermostat	207,609
06/2017	HEHC	Think Thermostat	291,650
06/2017	NC Greenpower	Think Thermostat	674,093
07/2017	Discover Ways To Save	Full Not Too Full	87
07/2017	Duke Energy Delivers	Full Not Too Full	1,153,123
07/2017	Safety First	Full Not Too Full	6,172
08/2017	Laundry Savings	Automate Energy Use	1,148,835
10/2017	Share The Warmth	To Preheat Or Not	1,171,806
11/2017	Great Escape	Unblock The Heat	96,953
11/2017	Weatherstrip	Unblock The Heat	447,864
12/2017	Share The Warmth	Think At The Sink	1,116,808
01/2018	Great Escape	Safety And Savings	273,800
01/2018	Let The Sun Shine	Safety And Savings	856,846
02/2018	Insulate And Seal	Caulk	428,407
02/2018	Johns Manville Ad (Intelligent)	None	44,173
02/2018	Johns Manville Ad (Traditional)	None	38,854
02/2018	Johns Manville eHER only Ad (Intelligent)	None	20,459
02/2018	Johns Manville eHER only Ad (Traditional)	None	20,267
03/2018	Equal Payment Plan	Interactive	446,161
03/2018	Power Manager 32	Interactive	443,381
03/2018	Ecobee Ad (Intelligent)	None	87,843
03/2018	Ecobee Ad (Traditional)	None	78,410
03/2018	Ecobee eHER only Ad (Intelligent)	None	20,442
03/2018	Ecobee eHER only Ad (Traditional)	None	20,329
04/2018	Find It Duke	Cool Off On Counter	425,744
04/2018	Lighting DEC Ad (Intelligent)	None	60,356
04/2018	Lighting DEC Ad (Traditional)	None	60,395
05/2018	Find It Duke	Let LEDs Lower Bills	952,111
05/2018	Online Store - May Lighting Ad A	None	99,426
05/2018	Online Store - May Lighting Ad B	None	99,070

Table 3-11: DEP MyHER Promotional Messaging by Month

Source Month	Message 1 - Details	Message 2 - Details	Number of Homes
06/2017	Fire Up The Grill	Think Thermostat	16,901
06/2017	HEHC	Think Thermostat	527,037
06/2017	NC Greenpower	Think Thermostat	145,351
07/2017	Discover Ways To Save	Full Not Too Full	38
07/2017	Don’t Forget The Bulbs	Full Not Too Full	678,448
07/2017	Safety First	Full Not Too Full	15
08/2017	Laundry Savings	Automate Energy Use	680,829
10/2017	It Takes More DEP	To Preheat Or Not	691,761
11/2017	Great Escape	Unblock The Heat	233,084
11/2017	Weatherstrip	Unblock The Heat	72,702
11/2017	Weatherstrip MF	Unblock The Heat MF	1,559
12/2017	It Takes More DEP	Think At The Sink	626,155
01/2018	Great Escape	Safety And Savings	494,476
01/2018	Let The Sun Shine	Safety And Savings	171,651
02/2018	Insulate And Seal	Caulk	196,546
02/2018	Johns Manville Ad (Intelligent)	None	23,627
02/2018	Johns Manville Ad (Traditional)	None	20,684
02/2018	Johns Manville eHER only Ad (Intelligent)	None	39,638
02/2018	Johns Manville eHER only Ad (Traditional)	None	39,871
03/2018	Energy Wise DEP	Interactive	269,480
03/2018	Equal Payment Plan	Interactive	2,417
03/2018	Equal Payment Plan DEP	Interactive	220,991
03/2018	Ecobee Ad (Intelligent)	None	39,307
03/2018	Ecobee Ad (Traditional)	None	35,126
03/2018	Ecobee eHER only Ad (Intelligent)	None	40,113
03/2018	Ecobee eHER only Ad (Traditional)	None	40,239
04/2018	Find It Duke	Cool Off On Counter	184,896
04/2018	Lighting DEP Ad (Intelligent)	None	62,604
04/2018	Lighting DEP Ad (Traditional)	None	54,374
05/2018	Find It Duke	Let LEDs Lower Bills	532,453
05/2018	Retail Lighting - May Lighting DEP Ad A	None	70,712
05/2018	Retail Lighting - May Lighting DEP Ad B	None	79,863

3.2 Impact Findings

3.2.1 Per-home kWh and Percent Impacts

Nexant estimates the average participating DEC MyHER home saved 247.7 kWh of electricity from June 2017 to May 2018. This represents a 1.69% reduction in total electricity consumption compared to the control group over the same period. The average DEP MyHER home saved 201.2 kWh of electricity from June 2017 to May 2018, which represents a 1.25% reduction in electricity consumption. These estimates reflect an upward adjustment to account for the intention-to-treat methodology and a downward adjustment to prevent double-counting of savings attributable to incremental participation of treatment groups in Duke Energy's energy efficiency programs.

Table 3-12 and Table 3-13 show the impact estimates in each bill month for the average home assigned to treatment in DEC and DEP, respectively. The table also shows the subsequent adjustment to account for the fact that only a subset of homes assigned to treatment was actively participating in MyHER during the study period.

Table 3-12: DEC MyHER Impact Estimates with ITT Adjustment, before EE Overlap Adjustment

Month	Treatment Homes Analyzed	DEC Participant Count	kWh impact in Assigned Homes	% Treated	kWh Impact in Treated Homes
06/2017	1,231,705	1,197,462	8.7	97%	9.0
07/2017	1,218,640	1,198,133	3.6	98%	3.7
08/2017	1,207,107	1,171,813	4.0	97%	4.1
09/2017	1,195,242	1,172,053	14.5	98%	14.7
10/2017	1,185,902	1,172,053	15.3	99%	15.5
11/2017	1,225,916	1,195,285	27.0	98%	27.6
12/2017	1,216,916	1,191,881	36.8	98%	37.6
01/2018	1,208,915	1,193,353	30.4	99%	30.7
02/2018	1,200,827	1,178,403	30.1	98%	30.7
03/2018	1,192,681	1,177,960	31.9	99%	32.3
04/2018	1,183,803	1,157,514	26.1	98%	26.7
05/2018	1,173,821	1,151,896	20.5	98%	20.9
12-month Total			**248.9**	**98%**	**253.6**

Table 3-13: DEP MyHER Impact Estimates with ITT Adjustment, before EE Overlap Adjustment

Month	Treatment Homes Analyzed	DEP Participant Count	kWh impact in Assigned Homes	% Treated	kWh Impact in Treated Homes
06/2017	727,455	682,040	18.3	94%	19.5
07/2017	719,693	713,994	17.2	99%	17.4
08/2017	712,653	701,172	19.5	98%	19.8
09/2017	705,487	700,125	4.1	99%	4.1
10/2017	699,920	700,125	-6.1	100%	-6.1
11/2017	726,344	710,313	19.3	98%	19.7
12/2017	720,920	707,899	31.2	98%	31.8
01/2018	715,954	708,355	29.2	99%	29.5
02/2018	711,221	697,726	21.4	98%	21.8
03/2018	706,614	698,443	15.5	99%	15.6
04/2018	701,195	693,815	16.3	99%	16.5
05/2018	695,352	689,886	17.4	99%	17.6
12-month Total			**203.3**	**98%**	**207.2**

An adjustment factor of 5.95 kWh per home for DEC and 6.02 kWh per home for DEP is applied to MyHER impact estimates in Table 3-14 to arrive at the final net verified program impact per home. Section 3.2.6 provides additional detail on the calculation of the adjustment for overlapping participation in other Duke EE programs.

Table 3-14: MyHER Impact Estimates Net of EE Overlap

Jurisdiction	Time Period	kWh Savings in Treated Homes	Incremental kWh from EE Programs	Net MyHER Impact Estimate	Control Group Usage (kWh)	Percent Reduction
DEC	June 2017 - May 2018	253.6	5.95	247.7	14,658	1.69%
DEP	June 2017 - May 2018	207.2	6.02	201.2	16,137	1.25%

3.2.2 Aggregate Impacts

The total impact of the MyHER program in each service territory is calculated by multiplying the per-home impacts (adjusted for ITT and incremental EE participation) for each bill month by the number of participating homes. Over the 12-month period June 2017 to May 2018, DEC MyHER participants conserved 292.2 GWh of electricity, while DEP MyHER participants conserved 141.1 GWh. The aggregate impacts presented in Table 3-15 and Table 3-16 are at the meter level so they do not reflect line losses which occur during transmission and distribution between the generator and end-use customer.

Table 3-15: DEC MyHER Aggregate Impacts

Month	DEC Participant Count	kWh Net Impact	GWh Net Impact
06/2017	1,197,462	8.5	10.2
07/2017	1,198,133	3.2	3.8
08/2017	1,171,813	3.6	4.2
09/2017	1,172,053	14.1	16.6
10/2017	1,172,053	14.8	17.4
11/2017	1,195,285	27.3	32.6
12/2017	1,191,881	37.2	44.3
01/2018	1,193,353	30.3	36.2
02/2018	1,178,403	30.2	35.6
03/2018	1,177,960	31.9	37.6
04/2018	1,157,514	26.2	30.3
05/2018	1,151,896	20.4	23.5
12-month Total		**247.7**	**292.2**

Table 3-16: DEP MyHER Aggregate Impacts

Month	DEP Participant Count	kWh Net Impact	GWh Net Impact
06/2017	682,040	19.1	13.0
07/2017	713,994	16.9	12.1
08/2017	701,172	19.3	13.6
09/2017	700,125	3.6	2.5
10/2017	700,125	-6.6	-4.6
11/2017	710,313	19.2	13.6
12/2017	707,899	31.3	22.1
01/2018	708,355	29.0	20.5
02/2018	697,726	21.3	14.9
03/2018	698,443	15.1	10.6
04/2018	693,815	16.0	11.1
05/2018	689,886	17.1	11.8
12-month Total		**201.2**	**141.1**

3.2.3 Precision of Findings

The margin of error of the per-home impact estimate is ± 16.0 kWh for DEC and ± 18.9 kWh for DEP at the 90% confidence interval. Nexant clustered the variation of the LFER model by

Account ID to produce a robust estimate of the standard error associated with treatment coefficients. The standard normal z-statistic for the 90% confidence level of 1.645 was then used to estimate the uncertainty associated with each cohort estimate. This uncertainty was then aggregated across cohorts to quantify the precision of the program-level impacts estimates (Table 3-17 and Table 3-18).

Table 3-17: 90% Confidence Intervals Associated with DEC MyHER Impact Estimates

Parameter	Lower Bound (90%)	Point Estimate	Upper Bound (90%)
Evaluation Period Savings per Home (kWh)	231.7	247.7	263.6
Percent Reduction	1.58%	1.69%	1.80%
Aggregate Impact (GWh)	273.4	292.2	311.0

Table 3-18: 90% Confidence Intervals Associated with DEP MyHER Impact Estimates

Parameter	Lower Bound (90%)	Point Estimate	Upper Bound (90%)
Evaluation Period Savings per Home (kWh)	182.3	201.2	220.1
Percent Reduction	1.13%	1.25%	1.36%
Aggregate Impact (GWh)	127.9	141.1	154.3

For DEC, the absolute precision of the result is ± 0.11% and the relative precision of ± 6.4% at the 90% confidence level. For DEP, the absolute precision of the result is ± 0.12% and the relative precision of ± 9.4% at the 90% confidence level.

3.2.4 Impact Estimates by Cohort

The per-home impact estimates shown in Table 3-15 and Table 3-16 reflect a weighted average impact across the eight cohorts of DEC MyHER customers analyzed and the six cohorts of DEP MyHER customers analyzed. The impact estimates for the individual cohorts varied across the study period. Table 3-19 and Table 3-20 show point estimates for each cohort during the period June 2017 to May 2018 for DEC and DEP, respectively. Three released cohorts for DEC and one release cohort for DEP were added to treatment in October 2015 and began producing impacts in November 2015.

Table 3-19: DEC Annual kWh Impact Estimates by Cohort

Month	Monthly Average Impact							
	Apr 2010	2012 - 2013	2014 - 2015	2016	2017	Apr 2010 Release	2012 - 2013 Release	2014 - 2015 Release
06/2017	-22.6	-7.0	-8.7	-7.0	-15.7	-6.4	-11.1	-10.1
07/2017	-22.0	5.0	-7.4	-5.0	-21.3	-9.6	-15.3	-8.8
08/2017	-23.5	4.5	-9.8	-3.9	-15.4	-12.6	-12.4	-13.8
09/2017	-29.4	-18.1	-11.4	-3.7	-14.6	-12.4	-10.1	-15.5
10/2017	-22.1	-13.4	-22.1	-8.5	-8.6	-10.7	-6.9	-15.6
11/2017	-19.8	-34.6	-28.3	-18.2	-12.2	-17.0	-8.4	-13.7
12/2017	-19.6	-59.9	-27.4	-23.9	-1.2	-19.0	-12.3	-18.3
01/2018	-24.9	-31.1	-45.7	-21.2	0.0	-26.9	-15.8	-23.4
02/2018	-23.5	-37.8	-33.5	-19.8	-10.3	-15.9	-11.5	-17.6
03/2018	-24.1	-39.4	-36.7	-19.5	-12.1	-20.9	-9.5	-16.4
04/2018	-20.2	-31.2	-26.7	-14.6	-21.7	-13.5	-8.3	-15.0
05/2018	-23.1	-20.8	-17.4	-11.9	-36.9	-15.2	-8.8	-19.0
12 Month Total	**-274.8**	**-283.7**	**-275.0**	**-157.1**	**-169.9**	**-180.1**	**-130.3**	**-187.2**

Table 3-20: DEP Annual kWh Impact Estimates by Cohort

Month	Monthly Average Impact					
	Dec 2014	Dec 2015	Jun 2016	May 2017	Oct 2017	Dec 2014 Release
06/2017	-22.3	-5.7	-15.3	-8.6	0.0	-3.0
07/2017	-21.0	-10.5	-19.2	-5.5	0.0	-2.6
08/2017	-24.3	-11.0	-16.2	-4.0	0.0	-4.0
09/2017	-2.8	-10.9	-16.8	-5.1	0.0	-5.8
10/2017	10.6	-5.8	-17.4	-2.7	0.0	-6.6
11/2017	-24.4	-9.1	-10.8	-8.6	10.0	-12.6
12/2017	-40.8	-18.9	-2.0	-14.8	30.2	-21.3
01/2018	-38.1	-24.4	-2.2	-13.4	32.6	-19.8
02/2018	-26.6	-8.4	-15.3	-13.0	14.9	-13.2
03/2018	-18.7	-5.4	-14.5	-9.0	11.1	-14.0
04/2018	-19.2	-1.1	-20.0	-6.4	-5.9	-12.2
05/2018	-21.1	-6.8	-22.1	-0.9	-17.9	-8.3
12 Month Total	**-248.8**	**-118.1**	**-171.8**	**-92.1**	**74.9**	**-123.4**

For DEC, cohorts 1, 2, and 3 (April 2010, 2012 - 2013, and 2014 - 2015) show the greatest impacts and are also the oldest cohorts. Cohort 2 is the largest cohort and contains roughly 44% of analyzed treatment customers. For DEP, cohorts 1 and 3 (December 2014 and June 2016) show the greatest impacts. Cohort 1 is the largest cohort in DEP and contains about 71% of analyzed treatment customers.

Table 3-21 and Table 3-22 show the margin of error at the 90% confidence level for each cohort's annual impact estimate for DEC and DEP, respectively. The combined margin of error for the entire program is lower than the error for any single cohort because the combined program impact estimate is based on a larger pool of customers. Individual cohort margins of error are high for the small cohorts due to the sizes of these groups relative to the underlying variation in consumption among the treatment and control groups constituting each cohort.

Table 3-21: DEC 90% Confidence Intervals Associated with Cohort Savings Estimates

Cohort	Margin of Error in kWh at 90% Confidence Level	Lower Bound (kWh)	Point Estimate (kWh)	Upper Bound (kWh)
Apr 2010	± 194	-468	-275	-81
2012 - 2013	± 72	-356	-284	-212
2014 - 2015	± 65	-340	-275	-210
2016	± 86	-243	-157	-71
2017	± 67	-237	-170	-102
Apr 2010 Release	± 166	-346	-180	-15
2012 - 2013 Release	± 83	-213	-130	-48
2014 - 2015 Release	± 94	-281	-187	-93

Table 3-22: DEP 90% Confidence Intervals Associated with Cohort Savings Estimates

Cohort	Margin of Error in kWh at 90% Confidence Level	Lower Bound (kWh)	Point Estimate (kWh)	Upper Bound (kWh)
Dec 2014	± 49	-298	-249	-199
Dec 2015	± 148	-266	-118	30
Jun 2016	± 105	-277	-172	-67
May 2017	± 144	-236	-92	52
Oct 2017	± 70	5	75	145
Dec 2014 Release	± 67	-191	-123	-56

3.2.5 Seasonal Trends

There is a clear seasonal pattern to the DEC and DEP MyHER savings profiles. DEC and DEP customers both consistently experience the greatest reductions in winter and the smallest, sometimes negative, reductions in summer. The green series in Figure 3-5 and Figure 3-6 show the average estimated monthly treatment effect for the program in each bill month from May 2016 to May 2018. The blue series in Figure 3-5 and Figure 3-6 show the average control customer's load during the same period of time. Even though annual electricity consumption for customers in both service territories is clearly bimodal (with peaks in both the summer and winter), MyHER impacts are not.

Figure 3-5: DEC Average kWh Savings by Month

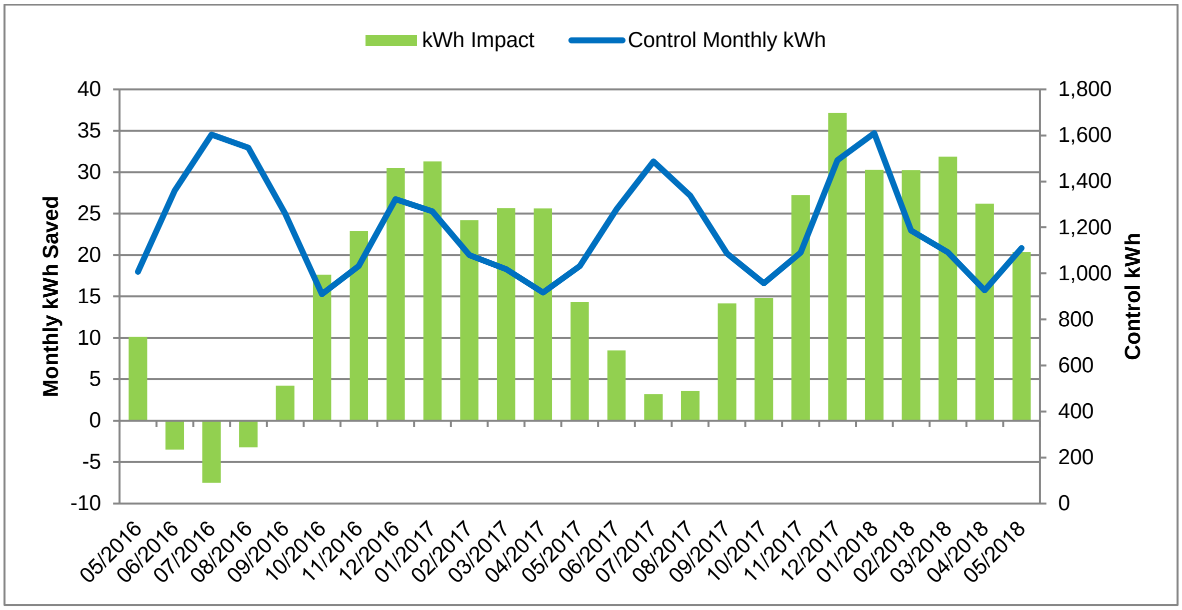
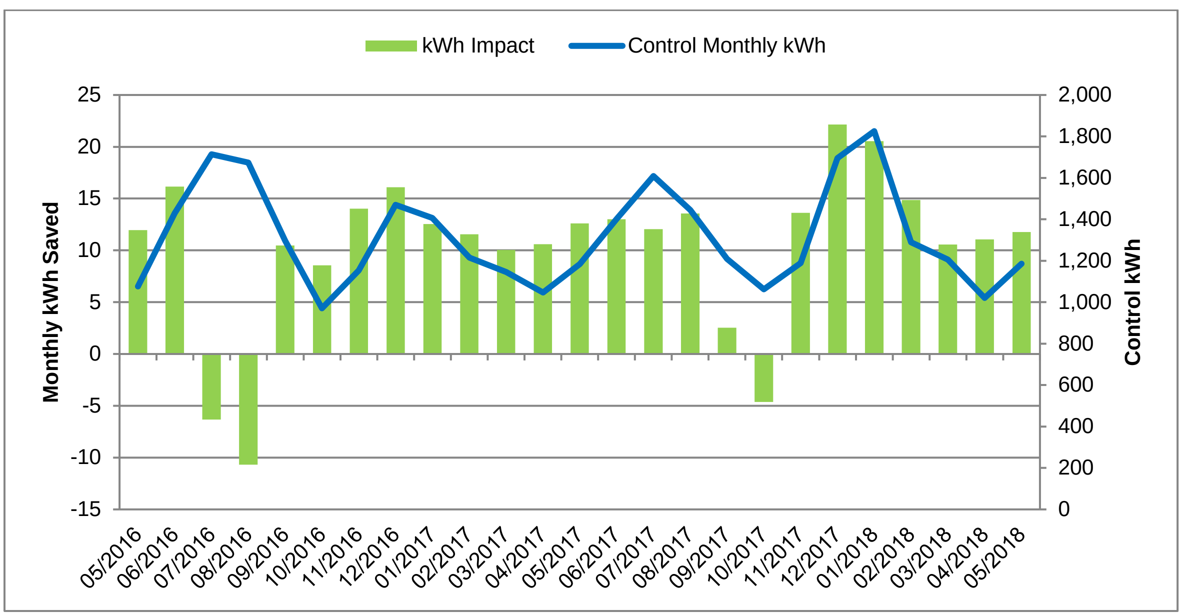


Figure 3-6: DEP Average kWh Savings by Month



Based on the observed savings trends, MyHER is realizing the greatest impacts in the winter and shoulder months, with the lowest impacts in the summer months. Seasonal trends in

MyHER average treatment effects likely reflect customers' differing abilities to respond by season. For example, winter heating demand can be mitigated by dressing more warmly, using more blankets in the home, or shutting off lights more often (there are fewer hours of daylight in the winter than the summer). The summer impacts still occur but the conservation options, and potentially willingness to conserve on cooling, options available to customers are fewer.

3.2.6 Uplift in Other Duke Energy Programs

Section 3.1.6 outlined the methodology Nexant used to calculate the annual kWh savings attributable to increased participation in other Duke Energy programs. Table 3-23 presents the downward adjustment per home that was applied to impacts in order to avoid double-counting savings from June 2017 to May 2018. For DEC, the uplift was determined to be 5.95 kWh per home, or 7.0 GWh in aggregate. For DEP, the uplift was determined to be 6.02 kWh per home, or 4.2 GWh in aggregate.

Table 3-23: Monthly Adjustment for Overlapping Participation in Other EE Programs

Month	DEC Incremental kWh from Other EE Programs	DEP Incremental kWh from Other EE Programs
06/2017	0.52	0.46
07/2017	0.52	0.48
08/2017	0.56	0.49
09/2017	0.60	0.53
10/2017	0.64	0.56
11/2017	0.40	0.52
12/2017	0.43	0.49
01/2018	0.45	0.49
02/2018	0.45	0.50
03/2018	0.45	0.50
04/2018	0.46	0.50
05/2018	0.46	0.50
12 Month Total	**5.95**	**6.02**

Although these additional savings must be subtracted from the MyHER effect to prevent double-counting, the MyHERs clearly played an important role in harvesting these savings.

Table 3-24 and Table 3-25 show the average daily energy savings attributable to tracked energy efficiency measures as of May 2018 by cohort and calculates an uplift percentage. In nearly every case the treatment group showed a higher propensity to adopt measures through Duke Energy programs than the control group.

Table 3-24: DEC Uplift Percentage by Cohort

Cohort		Monthly Net kWh Savings from EE (Treatment Group)	Monthly Net kWh Savings from EE (Control Group)	Uplift Percentage
1	Apr 2010	18.7	17.7	6.2%
2	2012 - 2013	14.6	13.7	7.0%
3	2014 - 2015	15.2	14.6	3.9%
4	2016	28.1	27.3	2.9%
5	2017	18.1	19.4	-6.4%
6	Apr 2010 Release	17.9	17.7	1.6%
7	2012 - 2013 Release	14.0	13.7	2.3%
8	2014 - 2015 Release	13.8	14.6	-5.3%

Table 3-25: DEP Uplift Percentage by Cohort

Cohort		Monthly Net kWh Savings from EE (Treatment Group)	Monthly Net kWh Savings from EE (Control Group)	Uplift Percentage
1	Dec 2014	9.3	8.7	6.76%
2	Dec 2015	9.2	8.0	13.98%
3	Jun 2016	9.8	9.1	7.64%
4	May 2017	7.8	7.8	0.14%
5	Oct 2017	6.9	7.2	-4.90%
6	Dec 2014 Release	9.1	8.7	4.93%

3.2.7 Duration of Exposure

Home energy report evaluations in North America consistently find a trend of increasing savings with length of treatment. Since the prior evaluation, Nexant has estimated impacts for three new cohorts in both service territories. The bulk of the cohorts were added to the DEC and DEP programs in June 2016, May 2017, and October 2017. In DEC, the newest cohorts (Cohorts 4 and 5) make up 15% of the treatment population by May 2018. In DEP, the newest cohorts (3, 4, and 5) make up 19% of the treatment population by May 2018. Figure 3-7 and Figure 3-8 compare the overall results with the results of the average customer who is not in one of the three newest cohorts for DEC and DEP, respectively. The older cohorts consistently realize higher impacts than their newer counterparts.

Figure 3-7: DEC Comparison of Average Customer Savings to the Savings of the Older Program Participants

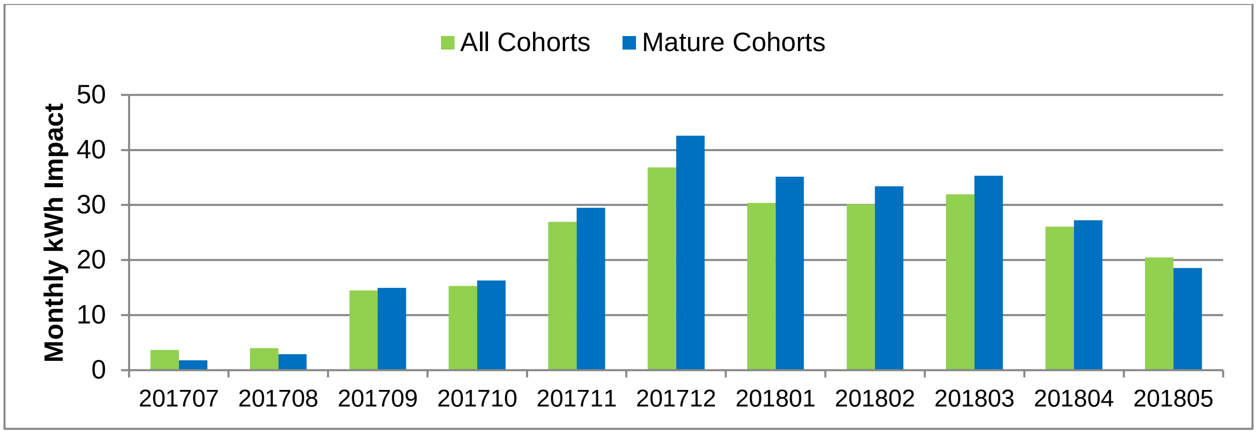


Figure 3-8: DEP Comparison of Average Customer Savings to the Savings of the Older Program Participants

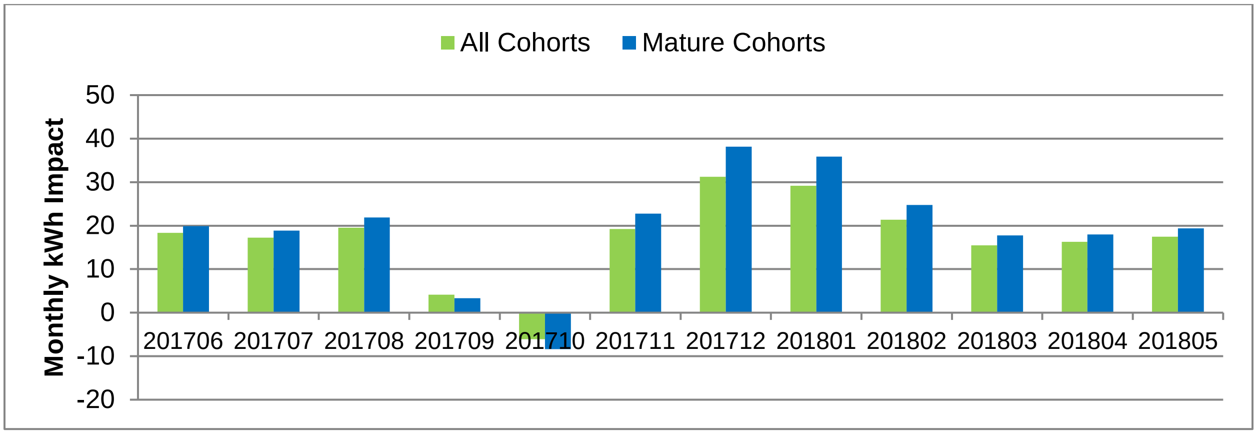
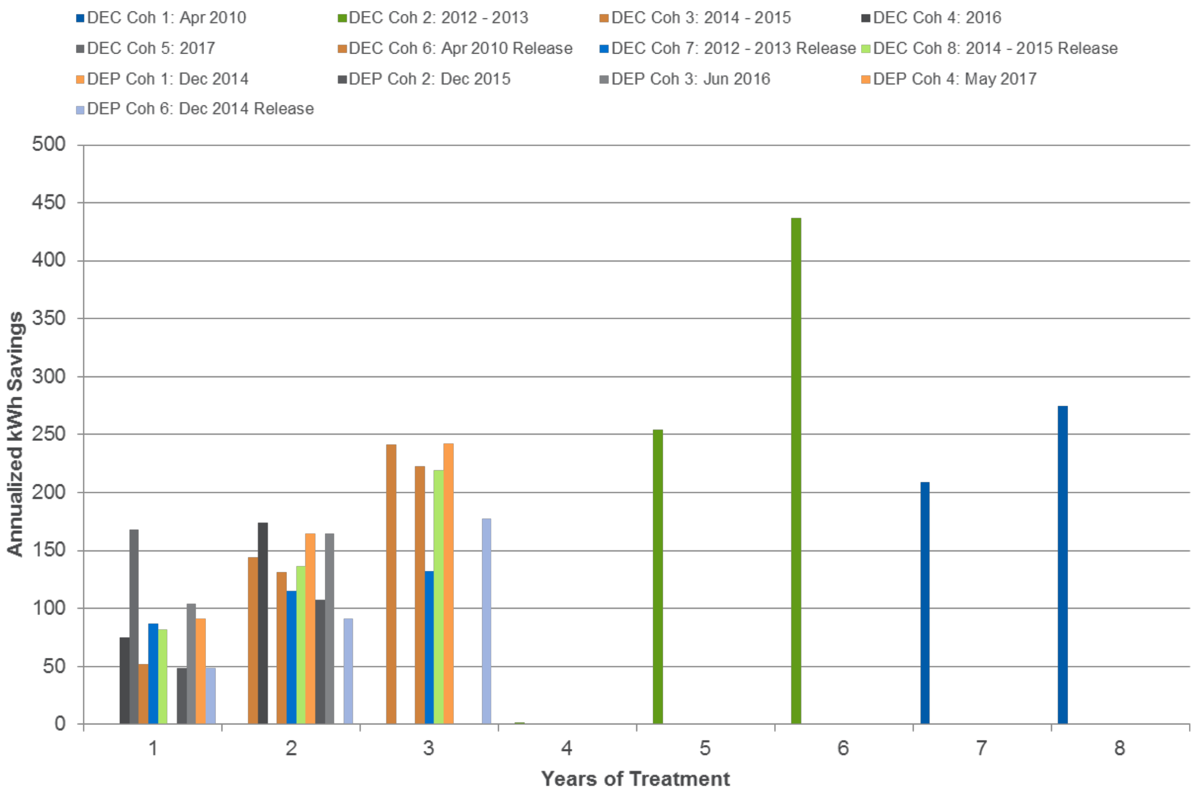


Figure 3-9 displays the annual savings by the number of years a cohort has been in the program. A general upward trend of savings occurs with longer exposure to treatment, however some exceptions are visible. The oldest cohort, which has been in treatment since 2010, shows lower impacts than those in earlier years of treatment. It should be noted that there are few program implementations of home energy report programs with durations in excess of five years and there is less information about what should be expected from implementations of that vintage. Additionally, with less than 6,000 treatment customers in this cohort, it is now one of the smallest cohorts in DEC. It is reasonable to expect the newer cohorts' impacts to increase with maturation of the cohorts, however the 2010 cohort's performance may be indicative of the existence of a point peak maturation after which mature impacts cannot be sustained. A literature review of home energy report programs in North America with participants exposed to treatment for eight years or more would be valuable to benchmark the performance of Duke Energy's oldest MyHER cohorts.

Figure 3-9: Annual Savings by Duration of Exposure



3.3 MyHER Interactive Portal

Nexant also evaluated the incremental energy savings generated by Duke Energy's enhancement to the standard MyHER report. Duke Energy launched the MyHER Interactive Portal in March 2015. The portal offers additional means for customers to customize or update Duke Energy's data on their premises, demographics, and other characteristics that affect consumption and MyHER's classification of each customer.

The portal provides additional custom tips based on updated data provided by the customer. MyHER Interactive also sends weekly email challenges that seek to engage customers in active energy management, additional efficiency upgrades, and conservation behaviors. Nexant evaluated the impacts of the MyHER Interactive Portal using a matched comparison group because MyHER Interactive is not deployed as a randomized controlled trial (RCT).

3.3.1 Estimation Procedures for MyHER Interactive

A matched comparison group is a standard approach for establishing a counterfactual baseline when there is no random assignment to treatment and control. The goal of matching estimators is to estimate impacts by matching treatment customers to similar customers that did not participate in the program. The key assumption to matched comparison approaches is that MyHER Interactive participants closely resemble non-participants, except for the fact that one of these two groups participated in the program while the other did not. When a strong comparison group is established, evaluators can reliably conclude that any differences observed after enrollment are due to program's stimulus. In using a matched comparison group to estimate energy savings due to exposure to MyHER Interactive, the same statistical modeling approach is used to estimate energy savings impacts as was used for estimating energy savings for the program overall (i.e., with linear fixed effects regression (LFER) estimation).

Duke Energy provided Nexant with MyHER participant enrollment information for the Interactive portal. A total of 38,190 DEC and 19,510 DEP MyHER treatment customers signed up to use the portal. For DEC, 13,523 of the 38,190 Interactive users signed into the portal more than once, and 6,880 signed in more than twice between December 2014 and May 2018. For DEP, 6,983 of the 19,510 Interactive users signed into the portal more than once, and 3,575 signed in more than twice between March 2015 and May 2018. The average DEC and DEP MyHER Interactive user has logged in to Interactive 2.6 times.

In order for the LFER regression model to generate monthly energy savings attributable to Interactive, the customer data that the regression model uses to make the estimates must use a year of exposure to MyHER reports prior to enrolling in Interactive. For DEC, 11,101 of the Interactive users (29%) had sufficient data available for the LFER analysis before their Interactive enrollment. 4,286 Interactive users (22%) in DEP had sufficient data to be included in the LFER analysis. Figure 3-10 and Figure 3-11 plot the total number of customers enrolled in MyHER Interactive as well as the subset in the analysis for each month of the 12-month period June 2017 to May 2018 for DEC and DEP, respectively.

Figure 3-10: DEC MyHER Interactive Portal Enrollment

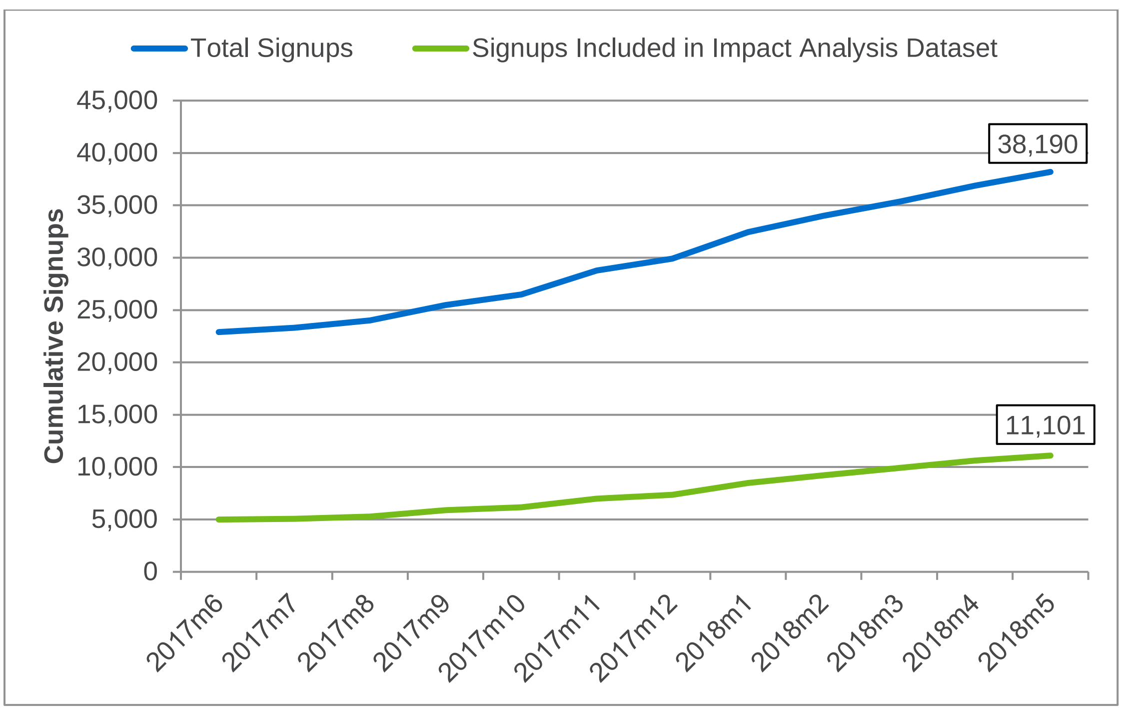
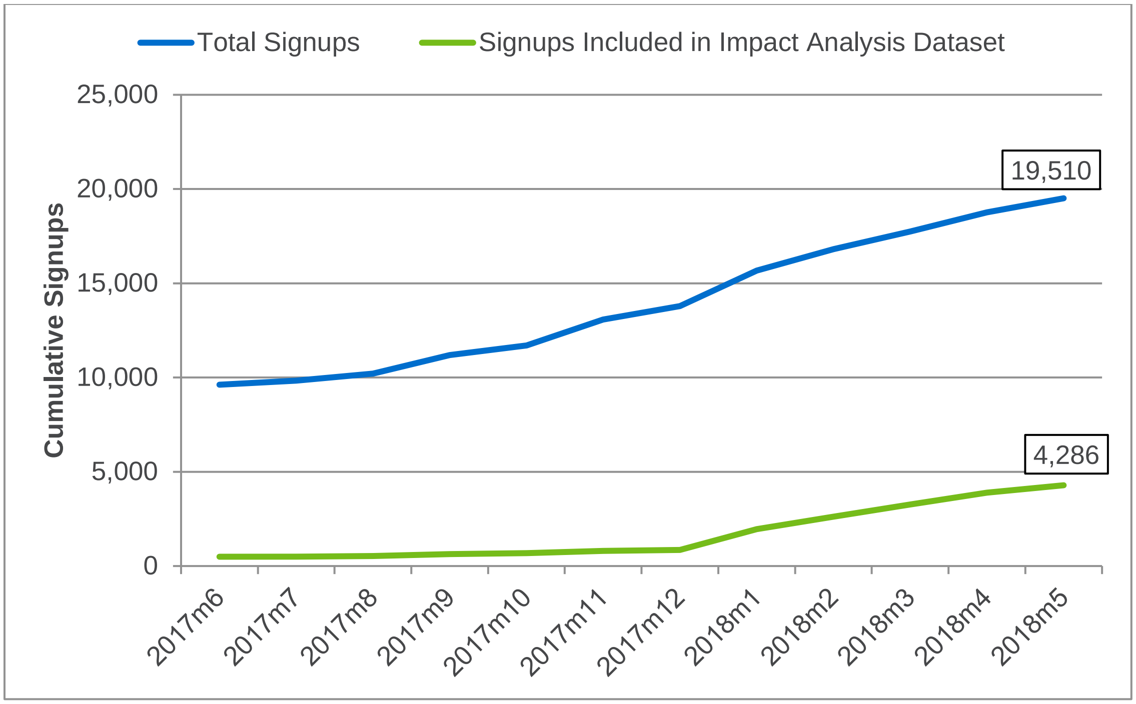
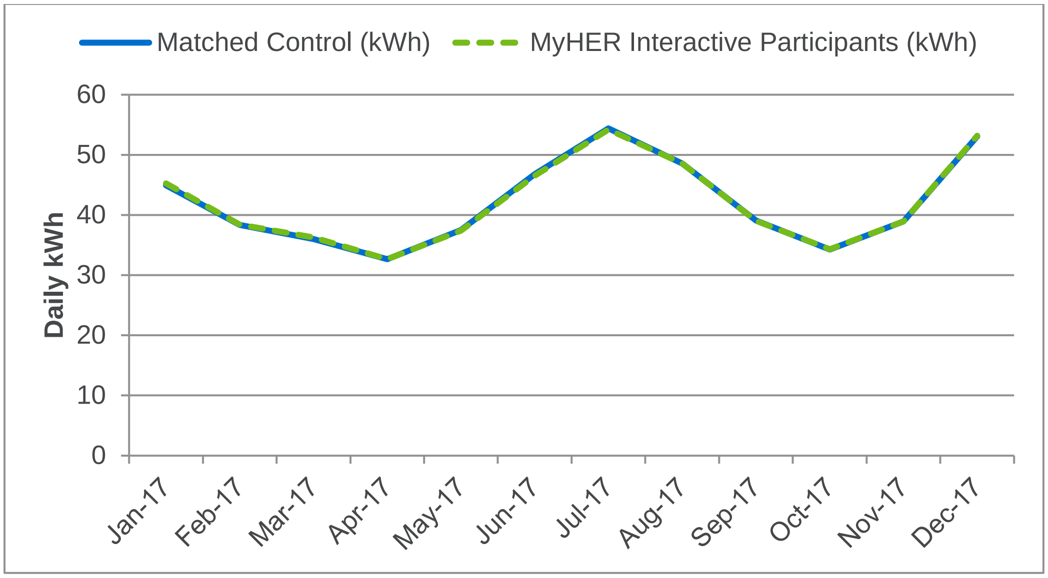


Figure 3-11: DEP MyHER Interactive Portal Enrollment



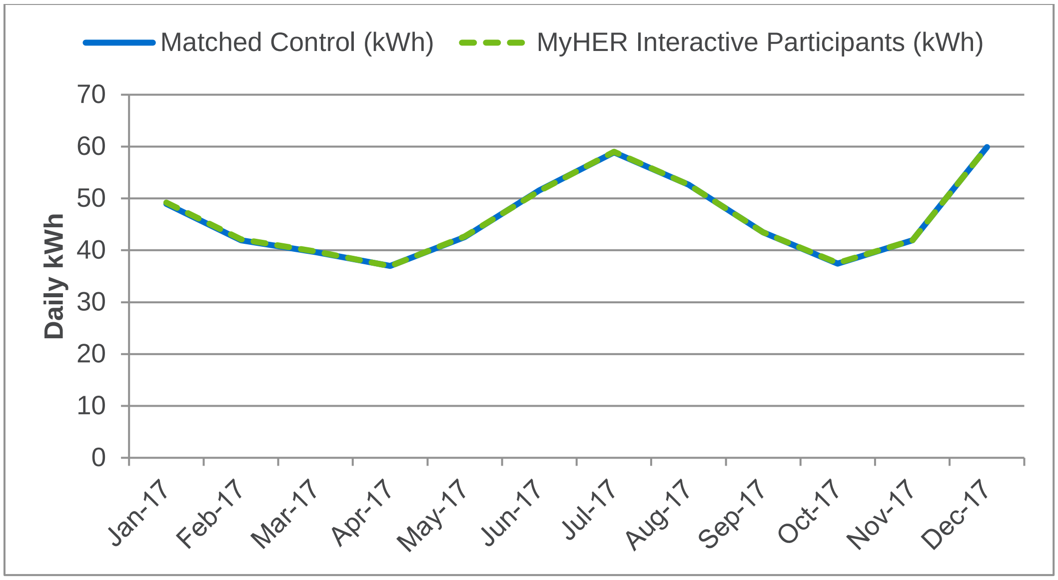
For DEC, many of the Interactive customers used in the estimation analysis were matched on their 2017 billing usage, but some customers who enrolled in Interactive at earlier points in time were matched on their 2014, 2015, or 2016 usage. Figure 3-12 presents the pre-treatment consumption for MyHER Interactive customers and a matched comparison group comprised of MyHER customers that have not enrolled in Interactive for the DEC customers matched on 2017 usage. The matching approach generates two groups with nearly identical consumption patterns over the time period prior to customers' enrollment in MyHER Interactive. On average, the difference in monthly usage between the matched control group and the DEC Interactive treatment group is -0.6% for the 2014 match, 0.4% for the 2015 match, 0.1% for the 2016 match, and 0.0% for the 2017 match. The fixed effects model specification Nexant applies controls for these pre-treatment differences, as discussed earlier in Section 3.1.5.

Figure 3-12: DEC MyHER Interactive Portal Customers and Matched Comparison Group – 2017 Pre-Interactive Enrollment Periods



For DEP, most of the Interactive customers used in the estimation analysis were matched on their 2017 billing usage, but some customers who enrolled in Interactive earlier were matched on their 2015 or 2016 usage. Figure 3-13 presents the pre-treatment consumption for MyHER Interactive customers and a matched comparison group comprised of MyHER customers that have not enrolled in Interactive for the DEP customers matched on 2017 usage. The matching approach generates two groups with nearly identical consumption patterns over the time period prior to customers' enrollment in MyHER Interactive. On average, the difference in monthly usage between the matched control group and the DEP Interactive treatment group is 0.3% for the 2015 match, -0.2% for the 2016 match, and 0.1% for the 2017 match. The fixed effects model specification Nexant applies controls for these pre-treatment differences, as discussed earlier in Section 3.1.5.

Figure 3-13: DEP MyHER Interactive Portal Customers and Matched Comparison Group – 2017 Pre-Interactive Enrollment Periods



3.3.2 Results and Precision

For DEC, the average monthly impact across the 12-month period June 2017 to May 2018 was 21.3 kWh or 255.1 kWh annually per customer, representing the uplift in savings that MyHER Interactive produces over and above the savings produced by the paper MyHER, and this impact is significant at the 90% level of confidence. In aggregate, the DEC MyHER Interactive Portal resulted in 7.38 GWh of annual savings, incremental to the MyHER reports. These high-level findings are summarized in Table 3-26.

Table 3-26: 90% Confidence Intervals Associated with DEC MyHER Interactive Impact Estimates

Parameter	Lower Bound (90%)	Point Estimate	Upper Bound (90%)
Evaluation Period Savings per Home (kWh)	41.4	255.1	468.8
Percent Reduction	0.27%	1.65%	3.02%
Aggregate Impact (GWh)	0.99	7.38	13.77

On a month-to-month basis, energy impacts were statistically significant during the months of April, May, June, August, September, October, November, and December and range from 0.6% to 2.6%, or from 9 to 36 kWh on an absolute basis.

Figure 3-14 illustrates average monthly energy usage for the DEC MyHER Interactive users (the blue line) and the same for the matched control group (the green line), along with the estimated impact and 90% confidence band (the orange lines and orange dashed lines) by month. Also shown as blue bars are counts of Interactive sign-ups.

Figure 3-14: DEC MyHER Interactive Portal Energy Impacts

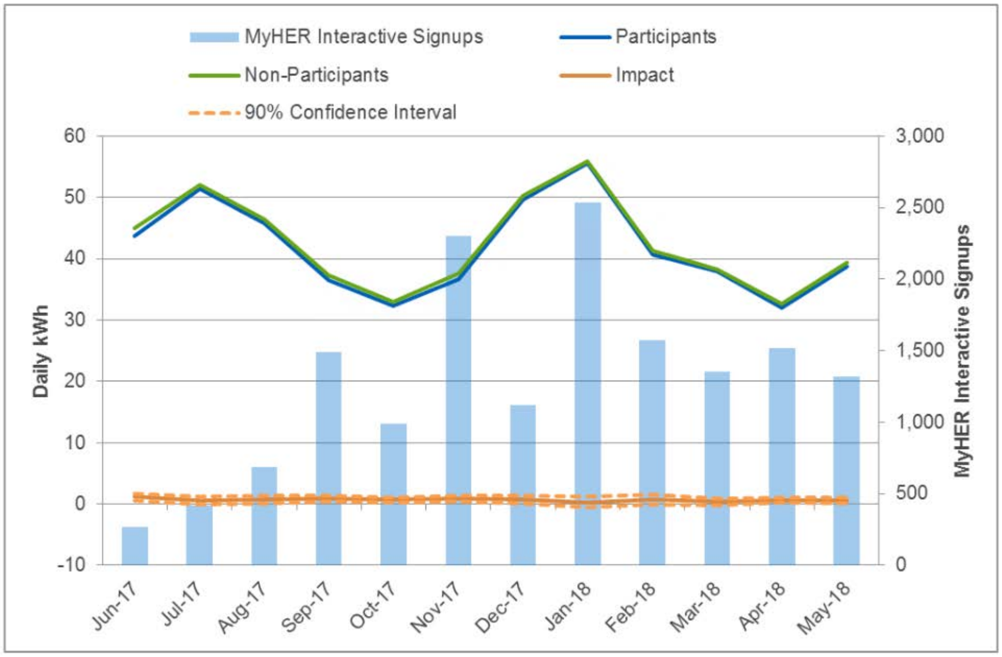


Table 3-27 provides impact model results for DEC, along with the margin of error for estimated impacts. The column at the right side of the table shows asterisks for those months where the energy savings are statistically significant at the 90% level of confidence.

Table 3-27: DEC MyHER Interactive Monthly Energy Savings

Month	Number of Participants Analyzed	MyHER Interactive Signups	Daily kWh			90% Conf. Interval		% Impact	
			Non-Participants	Participants	Impact				
Jun-17	4,993	270	44.9	43.8	1.2	0.6	1.8	2.6%	*
Jul-17	5,075	420	52.1	51.5	0.6	0.0	1.3	1.2%	
Aug-17	5,288	684	46.5	45.7	0.7	0.1	1.3	1.6%	*
Sep-17	5,880	1,490	37.3	36.5	0.9	0.4	1.3	2.3%	*
Oct-17	6,157	990	33.0	32.4	0.7	0.3	1.1	2.0%	*
Nov-17	6,976	2,301	37.6	36.7	0.9	0.5	1.4	2.5%	*
Dec-17	7,356	1,119	50.3	49.6	0.7	0.1	1.4	1.5%	*
Jan-18	8,491	2,537	56.0	55.6	0.3	-0.6	1.2	0.6%	
Feb-18	9,219	1,571	41.3	40.7	0.7	-0.1	1.5	1.6%	
Mar-18	9,910	1,351	38.3	37.9	0.4	-0.2	1.0	1.0%	
Apr-18	10,628	1,515	32.7	32.1	0.6	0.2	1.1	2.0%	*
May-18	11,101	1,316	39.4	38.8	0.6	0.1	1.1	1.6%	*
Average	**7,590**	**1,297**	**42.5**	**41.8**	**0.7**	**0.5**	**0.9**	**1.6%**	*

For DEP, the average monthly impact across the 12-month period June 2017 to May 2018 was 8.7 kWh, representing the uplift in savings that MyHER Interactive produces over and above the savings produced by the paper MyHER, but this estimate is not statistically significant at the 90% level of confidence. On a month-to-month basis, energy impacts were statistically significant only during June, which represented an impact of 4.2%, or 60 kWh on an absolute basis.

Figure 3-15 illustrates average monthly energy usage for the DEP MyHER Interactive users (the blue line) and the same for the matched control group (the green line), along with the estimated impact and 90% confidence band (the orange lines and orange dashed lines) by month. Also shown as blue bars are counts of Interactive sign-ups.

Table 3-28 provides impact model results for DEP, along with the margin of error for estimated impacts. The column at the right side of the table shows asterisks for those months where the energy savings are statistically significant at the 90% level of confidence. Impacts for DEP were only significant for June 2016, but not for the remaining months or for the year June 2017 through May 2018 overall.

I/A

Figure 3-15: DEP MyHER Interactive Portal Energy Impacts

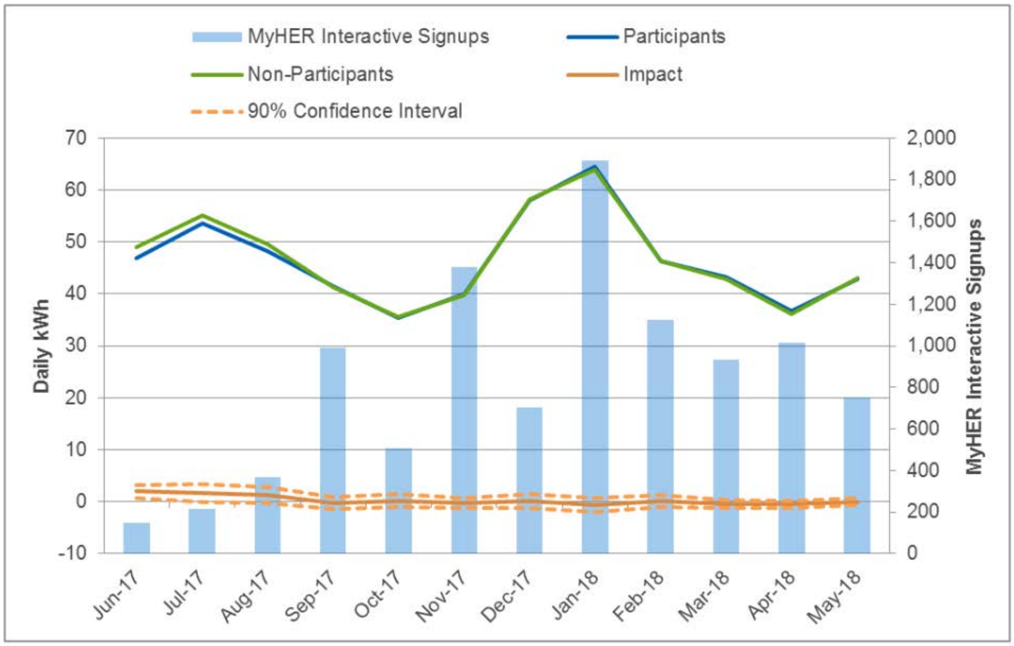


Table 3-28: DEP MyHER Interactive Monthly Energy Savings

Month	Number of Participants Analyzed	MyHER Interactive Signups	Daily kWh			90% Conf. Interval		% Impact	
			Non-Participants	Participants	Impact				
Jun-17	494	150	48.9	46.9	2.0	0.8	3.3	4.2%	*
Jul-17	505	213	55.2	53.5	1.6	-0.1	3.4	3.0%	
Aug-17	535	369	49.6	48.3	1.3	-0.2	2.8	2.6%	
Sep-17	631	992	41.3	41.5	-0.2	-1.3	0.9	-0.5%	
Oct-17	677	508	35.6	35.5	0.2	-1.1	1.4	0.5%	
Nov-17	800	1,381	39.8	40.0	-0.2	-1.2	0.8	-0.5%	
Dec-17	853	703	58.2	58.1	0.2	-1.2	1.5	0.3%	
Jan-18	1,960	1,894	63.9	64.5	-0.6	-2.0	0.7	-1.0%	
Feb-18	2,625	1,127	46.3	46.2	0.1	-1.1	1.2	0.2%	
Mar-18	3,262	934	42.8	43.3	-0.4	-1.2	0.3	-1.0%	
Apr-18	3,900	1,015	36.3	36.8	-0.5	-1.1	0.1	-1.4%	
May-18	4,286	754	43.0	43.0	0.0	-0.6	0.7	0.0%	
Average	**1,711**	**837**	**46.7**	**46.5**	**0.3**	**-0.6**	**1.1**	**0.6%**	

Nexant concludes that the DEC MyHER Interactive portal succeeded in generating additional statistically significant savings during much of the evaluation period from June 2017 to May

2018. The DEP MyHER Interactive portal only achieved additional statistically significant savings in the evaluation period during June 2017.

3.4 Impact Conclusions and Recommendations

Nexant's impact evaluation shows that Duke Energy's MyHER program continues to trigger a reduction in electric consumption among homes exposed to the program messaging.

MyHER programs also demonstrate an apparent maturation effect, typically on the order of 1-2 years. If Duke Energy continues to consistently introduce new cohorts to the program, program management should generally expect the newest cohorts to underperform relative to the established cohorts. Currently, 15% of DEC and 19% of DEP program participants should be considered as not fully mature.

Additionally, the findings from this evaluation suggest that savings of fully mature cohorts may eventually plateau or degrade over time – the oldest DEC cohort is in its 8th year on the program and displays impacts comparable to other cohorts that are in their second or third year on the program.

We find that MyHER also causes an uplift in participation in other energy efficiency programs. We have deducted the energy savings associated with that uplift so that Duke Energy does not claim the delivery of energy reductions associated with that uplift twice – those energy savings have already been claimed by those energy efficiency programs. This uplift in energy efficiency program participation means that MyHER is delivering on its secondary goal to encourage participation in other programs. We also find that the Interactive web portal has begun to show statistically significant energy savings in DEC, but not yet in DEP.

Nexant provides the following recommendations for Duke Energy's consideration:

- **Continue the commitment to simultaneous control and treatment assignment.** New assignments to treatment and control groups must be simultaneous and Tendril and Duke Energy should work to add all newly assigned treatment and control groups to their respective statuses in a single billing month, to the extent that is technically feasible.
- **Continue the practice of making assignments of new accounts to MyHER treatment and control groups once a year, or at most, twice a year.** The numbers of Duke Energy customers becoming eligible for the program each year do not facilitate more frequent assignments. This is due to the fact that sufficient numbers of customers must be set aside for the control group each time a group of customers is assigned to treatment in order for the evaluator to be able to measure the energy savings delivered by the new cohort.
- **Continue to drive engagement with the Interactive Portal.** MyHER Interactive's ability to deliver measurable energy savings is on the rise, as shown by this evaluation in comparison to the prior DEC evaluation, as well as the MyHER evaluations for other Duke Energy jurisdictions completed in the past year. We recommend that Duke Energy continue to drive more MyHER participants to the portal.

4 Process Evaluation

This section presents the results of process evaluation activities including in-depth interviews with Duke Energy and implementation staff and surveys of control and treatment households.

4.1 Methods

Process evaluations support continuous program improvement by identifying opportunities to improve the effectiveness and efficiency of program operations and services. Process evaluations also identify successful program components that should be enhanced or replicated. Process evaluation activities for MyHER sought to document program operational processes and to understand the experience of those receiving MyHER mailings. The customer survey given to MyHER recipients focused on investigating the recall and influence of MyHER messages among recipients, the extent to which MyHER affects customer engagement and satisfaction with Duke Energy, their use of MyHER Interactive, and subsequent actions taken by participants to reduce household energy consumption. A survey of control group households provided a point of comparison for estimating the effect of MyHER on behavior and attitudes of treatment households.

4.1.1 Data Collection and Sampling Plan

The process evaluation included two primary data collection activities: in-depth interviews with program management and implementation staff, and surveys of a random sample of households selected to receive MyHER reports as well as surveys of a random sample of control group households.

Nexant deployed the household surveys using a mixed-mode survey measurement protocol, the activities associated with which are summarized in Table 4-1 and Table 4-2. In this protocol, customers were contacted by letter on Duke Energy stationery (to assure recipients of the legitimacy of the survey) asking them to go online and complete the survey. The letter contained a two-dollar bill as a cost-effective measure to maximize the survey completion rates. The letter also included a personalized URL for the online survey that points the recipient to a unique location on the internet at which they were able to complete the survey. Customers for whom email addresses were available also received an email inviting them to take the survey online, which also included the same personalized URL that appeared in the letter leading to the survey website at the location where they could complete it. After two weeks, customers who did not respond to the web survey received another letter, this time containing a paper copy of the survey and a return postage-paid envelope asking them to complete the survey by mail. Survey recipients also had the option of calling a toll-free telephone number to complete the survey by telephone. Table 4-1 shows that 337[8] DEC treatment customers and 211 DEC control customers completed the survey, totaling 548 responses from DEC recipients. Two samples of

[8] 337 total DEC treatment respondents is the sum of 153 and 184 DEC completes by treatment sample.

treatment customers were used to accommodate an expanded set of questions used for comparison with control customers. A treatment-only survey was sent to a second sample of treatment customers that only contained questions specific to the MyHER experience. This approach to using a second treatment-only instrument was taken to prevent the treatment version of the survey from becoming too long. Among the 337 DEC treatment customers that completed the survey, 153 were in the sample that received the treatment-only survey and 184 were in the sample that received the primary instrument designed to compare the responses of treatment and control customers. A total of 211 DEC control customers completed the survey. By state, 420 DEC respondents are located in North Carolina and 128 DEC respondents are located in South Carolina.

Table 4-1: Summary of Process Evaluation Activities - DEC

Population	Approach	Population	Sample		Confidence/Precision	
			Expected	**Actual**	**Expected**	**Actual**
Program management and implementation	In-depth interviews	~10	2-5	4	Not Applicable	Not Applicable
Treatment group households; Treatment only instrument	Mixed-mode; mail, web, and phone	~1.4 M	188	153	90/6	90/6.7
Treatment group households; Primary instrument	Mixed-mode; mail, web, and phone	~1.4 M	188	184	90/6	90/6.0
Control group households; Primary instrument	Mixed-mode; mail, web, and phone	~133,000	188	211	90/6	90/5.7
Total Responses			**564**	**548**		

Table 4-2 shows that a total of 539 DEP customers responded to the survey. The DEP survey design was identical to that of DEC, with two treatment samples receiving surveys; one sample received surveys with only treatment-related questions, and the other sample of treatment customers received another survey with questions designed to compare the responses of treatment and control customers. A total of 192 DEP control customers completed the survey, while 171 DEP treatment customers completed the treatment-only survey, and 176 DEP treatment customers completed the primary comparison survey. By state, 473 DEP respondents reside in North Carolina and 29 DEP respondents reside in South Carolina.

Table 4-2: Summary of Process Evaluation Activities - DEP

Population	Approach	Population	Sample		Confidence/Precision	
			Expected	Actual	Expected	Actual
Program management and implementation	In-depth interviews	~10	2-5	4	Not Applicable	Not Applicable
Treatment group households; Treatment only instrument	Mixed-mode; mail, web, and phone	~842,000	186	171	90/06	90/6.3
Treatment group households; Primary instrument	Mixed-mode; mail, web, and phone	~842,000	186	176	90/06	90/6.2
Control group households; Primary instrument	Mixed-mode; mail, web, and phone	~117,000	186	192	90/06	90/5.9
Total Responses			**558**	**539**		

Nexant's survey instruments included demographic questions to support comparisons of the treatment and control respondents as well as to support overall comparisons to the jurisdiction's territory. We present summaries of the responses to the demographic questions in Section 4.2, after the summaries of the responses to the survey questions on customer attitudes, energy usage behaviors, energy-savings actions and purchases/investments, and experience with the MyHER program.

4.1.1.1 Interviews

Nexant conducted interviews with key contacts at Duke Energy and Tendril. The interviews built upon information obtained during previous evaluations of the Duke Energy MyHER program in multiple jurisdictions. The central objectives of the interviews were to understand program operations and the main activities required to develop and distribute the MyHER reports to DEP and DEC customers, as well as to understand any developments or enhancements in program delivery.

4.1.1.2 Household Surveys

Both treatment and control groups were surveyed. Treatment households were surveyed as two groups that received different surveys: The first group's survey included questions about the respondents' experience of the reports themselves as well as questions to assess engagement and understanding of household energy use, awareness of Duke Energy efficiency program offers, and satisfaction with the services Duke Energy provides to help households manage their energy use. The second treatment group and control group surveys were identical, and excluded questions about the information and utility of the MyHER reports, but included identical questions on the other aspects to facilitate comparison with each other, as well as to the first treatment group.

Nexant analyzed the survey results to identify differences between treatment and control group households on the following:

- Reported levels of stated intention for future action;
- Levels of awareness of and interest in household energy use;
- The level of behavioral action or equipment-based upgrades;
- Satisfaction with Duke Energy communications, service, and efficiency options;
- Barriers to energy saving behaviors and purchases; and
- Inclination to seek information on managing household energy use from Duke Energy.

This survey approach is consistent with the RCT design of the program and supports both the impact and process evaluation activities by providing additional insight into potential program effects.

Survey Disposition - DEC

We mailed 553 letters to randomly selected residential customers in the treatment group and 553 letters to the randomly selected residential customers in the control group for the primary survey. We also mailed 553 letters to the treatment customers for the treatment-only survey. The surveys were completed by a total of 337 treatment households (across both surveys) and 211 control households, representing a an overall treatment group response rate of 30% for DEC and a control group response rate of 38%. More than half (69% of the treatment group and 66% of the control group) of the surveys were completed online. Table 4-3 summarizes the treatment and control group survey dispositions in DEC.

Table 4-3: Survey Disposition - DEC

Mode	Treatment		Control	
	Count	Percent	Count	Percent
Completes by Mode				
Web-based Survey	232	69%	140	66%
Mail/Paper Survey	88	26%	58	27%
Inbound Phone Survey	17	5%	13	6%
Total Completes	**337**	**100%**	**211**	**100%**

Table 4-4 presents DEC response rates by state. Higher response rates are observed in both North and South Carolina for control customers relative to treatment customers. In North Carolina, 30% of treatment customers invited to take the survey completed it, as compared to a

36% response rate for control customers in North Carolina. South Carolina response rates were a bit higher: 31% of treatment customers in South Carolina and 45% of control customers in South Carolina completed the survey.

Table 4-4: Response Rates by State and Treatment Condition - DEC

State	Treatment			Control		
	Sampled	Completed	Response Rate	Sampled	Completed	Response Rate
North Carolina	866	262	30%	435	158	36%
South Carolina	240	75	31%	118	53	45%
Total	**1,106**	**337**	**30%**	**553**	**211**	**38%**

Survey Disposition - DEP

We mailed 552 letters to randomly selected residential customers in the treatment group and 552 letters to the randomly selected residential customers in the control group for the primary survey. We also mailed 552 letters to the treatment customers for the treatment-only survey. The surveys were completed by 347 treatment households (across both surveys) and 192 control households, representing a treatment group response rate of 31% and a control group response rate of 35%. More than half (63% of the treatment group and 61% of the control group) of the DEP surveys were completed online. Table 4-5 outlines the treatment and control group survey dispositions in DEP.

Table 4-5: Survey Disposition - DEP

Mode	Treatment		Control	
	Count	Percent	Count	Percent
Completes by Mode				
Web-based Survey	220	63%	117	61%
Mail/Paper Survey	104	30%	67	35%
Inbound Phone Survey	23	7%	8	4%
Total Completes	**347**	**100%**	**192**	**100%**

Table 4-6 summarizes DEP response rates by state and treatment condition. In North Carolina, 32% of treatment customers invited to take the survey completed it, as compared to a 35% response rate for control customers in North Carolina. South Carolina DEP response rates were on the whole a bit lower: 29% of treatment customers in South Carolina and 32% of control customers in South Carolina completed the survey.

Table 4-6: Response Rates by State and Treatment Condition - DEP

State	Treatment			Control		
	Sampled	Completed	Response Rate	Sampled	Completed	Response Rate
North Carolina	976	310	32%	462	163	35%
South Carolina	128	37	29%	90	29	32%
Total	**1,104**	**347**	**31%**	**552**	**192**	**35%**

4.2 Findings

This section presents the findings from in-depth interviews with staff and implementation contractors and the results of the customer surveys.

4.2.1 Program Processes and Operations

As in other Duke Energy jurisdictions, MyHER at DEP and DEC is managed primarily through a core team of three Duke Energy staff members: a Manager of Behavioral Programs with oversight of residential behavioral programs, a Program Manager in charge of the day-to-day operations of the MyHER program, and a Data Analyst that is responsible for the substantial data tracking and cleaning tasks required to support the contracted implementation team, as well as internal program reporting to Duke Energy management.

At Tendril, Duke Energy's contracted program implementer, MyHER is supported by a team of people including an Operations Manager, a Home Energy Report Product Manager, an Engineering Manager, a dedicated Operations Engineer, a Quality Control Engineer, an "Ask-the-Expert" technical writer, and an Account Manager responsible for ensuring that the Duke Energy MyHER products meet expectations for quality, timing, and customer satisfaction. Tendril staff track the number of reports sent, the quality of the reports, and the timing of when reports are mailed. Tendril's key performance indicators (KPIs) include in-home dates for each batch as well as the percentage of treatment customers actually treated.

MyHER is Duke Energy's flagship behavioral energy efficiency program. Its primary goals are to achieve energy savings, increase customer satisfaction, and cross-promote enrollment into Duke Energy's demand response and energy efficiency programs. Staff at both organizations described continuous, close coordination to ensure that the data behind the MyHER comparisons are accurate, the tips provided to specific households are appropriate, and that MyHERs are delivered as soon as possible after billing data is received, within the relatively short timeframe between bills.

Program operations are conducted with a customer-focused orientation where the commitment to producing a high-quality product is a demanding process that must be executed consistently each month of the year.

4.2.1.1 MyHER Production

During the period of time under study by this evaluation, MyHERs were mailed out to DEP and DEC customers on paper through the U.S. Mail service about eight times a year, where the mailing gaps generally occurred in January, April, September, and December. During the eight U.S. Mail treatment months, the reports are generated twice per week, a cadence that is designed to facilitate meeting one of Tendril's key performance indicators: that MyHERs arrive at the customers' homes at the cycle's mid-point (though, ideally, as soon as possible after the bill), so as to make the information presentment as useful and timely as possible. Additionally, any customer that has provided Duke Energy with their email address also receives their report by email, and in fact, MyHER reports are generated and emailed to those customers monthly, 12 times a year, while they continue to receive paper reports 8 times a year.[9]

The production process for any given treatment month begins as soon as meter reads for the first billing cycle are processed by Duke Energy's meter data management system. After processing, billing data is uploaded each afternoon, five times a week, to Tendril. Once the data has been received, production proceeds according to the following process, twice a week[10]: Tendril runs report production and conducts quality control checks. Then a flat file containing all the data from the reports in addition to drafts of every report (in PDF format) are sent to Duke Energy for an independent quality control check. Upon approval, Tendril then sends the PDFs to the printhouse, and the printhouse generates a final proof for Duke Energy approval. Finally, after the proof is approved, the printhouse prints and mails all the reports, Tendril emails eHERs on the specified day, and then commences the process of reporting the printing, mailing, and emailing to Duke Energy. There have been issues, however, in the iterative process of reconciling customer email addresses between Duke Energy and Tendril that has resulted in the loss of updated customer emails. There is interest in automating the email update process, but in the meantime in order to avoid further problems, Duke Energy is simply sending Tendril updates quarterly.

This production chain moves quickly: once Tendril generates a batch of reports, the time elapsed until transfer to the printhouse is generally 3-4 hours when all processes are completed according to plan. This timeframe has become the norm, but when quality control problems emerge, that elapsed time can increase significantly. Considering that the printhouse has one week to complete the mailing, and Standard Rate postage can take another week to deliver, making the mid-cycle in-home delivery goal something that takes dedicated effort to achieve.

Prior MyHER process evaluations in other Duke Energy jurisdictions where MyHER is also implemented found that this fast-moving process has seen improvements over time through the adoption of various changes: recently, these have been best characterized by an increased attention to developing procedures and schedules for a number of elements of the MyHER production process. These elements include the Duke Energy product request list, new quality

[9] Duke Energy will cease delivery of paper MyHER reports, and only send email reports, if the customer requests them to do so.

[10] During the months where only eHERs are produced, reports are generated in one batch per week, rather than two.

control processes at Tendril, and free form text (FFT) content development, as examples. These changes continue to deliver improvements in the number of problems found during report batch quality control checks, though Tendril continues to have some difficulty dealing with last minute requests from Duke Energy. Additionally, Tendril has implemented a number of back office process enhancements in the past year, such as migrating their computational platform to Amazon Web Services (AWS), providing a pre-promotion (i.e., draft) platform to enable Duke Energy staff to review draft PDF reports prior to promoting or finalizing them, and converting their email HER reports to Hypertext Markup Language (HTML) format which provides greater responsiveness and flexibility to Tendril operational staff.

4.2.1.2 Quality Control

Embedded in the early days of this production cycle is a quality control process that is undertaken to ensure that the reports contain accurate information and are of high quality. Duke Energy analyzes a dataset containing all of the information presented in the reports for each production cycle. This data is checked for essentially anything that could be erroneous, ranging from verifying that all the customers receiving reports are eligible to receive them, that no control customers are getting reports, that the reported electricity usage is correct, that no customers who have opted-out are getting reports, and that no one has gotten more than one report a month. Duke Energy also checks for unexpected cluster assignment changes, presentment of messaging and tips and overall print quality.

In the past, these checks have proven to be crucial as they occasionally revealed significant production problems, which were subsequently reviewed in Tendril's governance sessions with Duke Energy. This visibility has typically resulted in issue resolution on a going-forward basis.

Both Duke Energy and Tendril staff report that the incidence of significant production problems has also been dramatically reduced since Tendril implemented quality control automation. Issues that surfaced during this evaluation period were small in scope, and infrequent. In 6 months, roughly 20 incidents were identified by Duke Energy that required Tendril to remove errors it had missed in their initial round of quality control. Tendril's automated quality control process is described as follows, recalling that customer data is transferred to Tendril daily:

- Tendril pulls the Duke Energy billing data into a database (Amazon Redshift; part of the AWS suite) and organizes it in a way that allows it to be fed into the HERs. The HERs are then generated and rendered;
- The QC protocol, which is a set of SQL queries against the data, then runs. This process produces output (presented in Amazon S3; another part of the AWS suite) that reports the results of the checks, indicating the reports that were incorrectly created. Postfiltering is then done for the incorrect reports;
- Tendril staff execute visual checks to be sure nothing noticeable or significant has slipped through to final report presentment; and
- An approved file is then sent to Duke Energy, along with about 100 samples of both paper and electronic HERs.

This automated process has the added benefit of being able to be managed by one person, which has significantly reduced the problems that the "all hands on deck" approach to executing report production and quality control presented in the past.

Prior evaluations of MyHER revealed that some program processes could benefit from improved quality control performance. Improved quality control in these areas can reduce the risk associated with running a program with processes that too often fail quality control checks. Such issues present timing risks (reports may not be sent out on time), customer service risk (reports may be sent out with problems if problems someday are missed), and risk to the overall success of the program (if the QC process is overburdened with detecting too many problems, it can become an overly-leveraged component of program operations). Interviews for this evaluation revealed continued improvement since the prior DEC and DEP evaluations in terms of frequency and significance of issues detected by Duke Energy's quality control processes.

Tendril is currently implementing a new production platform, the Home Energy Reporting Service (HOMERS), that will allow for the production of reports for multiple billing cycles at once, which will dramatically improve the production process by, notably, eliminating what are referred to as "Batch 1" problems, which are related to the relatively large number of reports produced for the first cycle of the month. Data transfers to Duke will contain much smaller and consistent batch sizes. Additionally, this new platform allows for the continuous importation of customer usage data and production of reports. This will make preventing problems easier because it allows the QC software to be programmed in a way that can verify the proper execution of customer segmentation protocols, as well as larger scale descriptive analyses at a frequency chosen by Tendril, as opposed to having to wait for the entire batch run, as is the case with the legacy system. The development of this new platform is currently near completion at Tendril, and is expected to not only detect emergent problems, but also help prevent detected errors from recurring.

The improvements described above are likely a function of the continuation of Duke Energy and Tendril's collaborative activities for program success. Duke Energy and Tendril staff join for weekly status meetings, monthly operations meetings, and quarterly governance meetings. These meetings provide a venue for shared brainstorming and roadmapping activities and the ongoing maintenance of a product request list for Tendril. Tendril has additionally commissioned an internal HER Improvement Team with the mandate to make consistent progress on the product request list. This team meets quarterly to reassess the feasibility of each of the list's items (currently numbering about 25) and reprioritize these items, as needed, based on the priorities Duke Energy has expressed in collaborative meetings. Making progress on this list, for which Tendril produces quarterly reports, has been made a priority by Duke Energy and has resulted in the above described attention in meetings. In general, this prioritization has resulted in 3 items on this list being accomplished in the last quarter.

Duke Energy and Tendril staff have recognized in prior evaluations of Duke Energy's MyHER program in other jurisdictions, as well as this one, that production problems, when they occur, usually occur following changes to the report or report cycle process. However, our interviewees also recognized that a strength of Tendril lies in their willingness to dive deep into details and processes to solve problems that may only affect a relatively few number of customers, and to go the extra mile to help address problems that in fact may have originated on the Duke Energy side. Interviews for this evaluation additionally reveal that the Tendril operations team has stabilized in terms of staffing, and that Tendril has added a quality control engineer to program staff. Tendril has also implemented a “Batch 0” strategy where the first batch of reports following any changes to the report is produced not for distribution, but only for quality control purposes, which is reviewed prior to the production of any live batches of reports. This procedural innovation allows Tendril to support Duke Energy’s interest in fine-tuning any new features or changes to reports and to facilitate early detection of unexpected problems. Generally, both Duke Energy and Tendril staff continue to speak highly of the collaborative partnership shared by Duke Energy and Tendril in running the MyHER program and of the open lines of communication that exist and function very well at all levels of program and corporate management.

4.2.1.3 MyHER Components

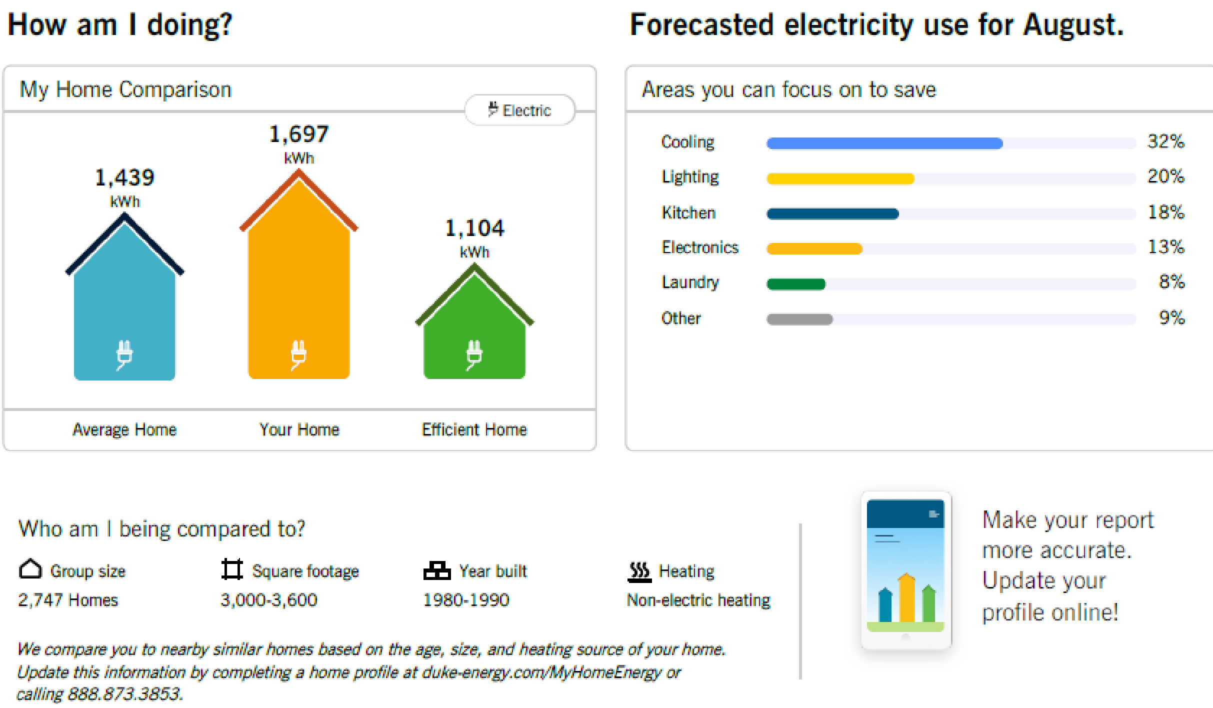
MyHER reports include several key elements that are customized each month: bar charts, tips, a trend chart, and messages. Duke Energy and Tendril implemented a general refresh of the MyHER report template in 2017, designed to improve readability and to keep the presentation fresh in the eyes of recipients. Graphics were updated and images were added to some modules (described below) that were previously text-only. A new module (also described below) was added that presents usage disaggregated by end use type. Overall, recipient response to this redesign was positive, though program staff did note some difficulty recipients had with interpreting the disaggregated end use presentation.

The front page includes two bar chart graphics. The first chart is a vertical bar chart (stylized in the shape of homes) comparing the subject home to the average and most efficient homes for an assigned cluster or “neighborhood” of similar homes. Previously, in Duke Energy jurisdictions with the earliest MyHER program implementations, these graphs were labeled with dollars, but this occasionally caused confusion among recipients if the dollar amount didn’t exactly match their recall of a recent bill. In March 2013, Duke Energy shifted to using kWh as the unit of measurement for the bar charts; Duke Energy conducted customer focus groups in an effort to understand the level of confusion this shift might cause and found that customers reported not paying attention to unit of measurement: they were simply absorbing the shape and directionality of the bar charts (Figure 4-1).

An infographic beneath the bar charts provides the size of the group of comparison homes, the assumed heating type, the approximate square footage, and the approximate age of the similar homes to which the customer’s home is being compared. According to MyHER staff, a common reason for customer phone calls relating to MyHERs is simply the customer’s desire to correct assumed information about a given home. For example, the MyHER could indicate that Duke Energy assumes a home has electric heat when it does not, or has assigned a home to the wrong size category. Any corrections provided in this manner are considered highly reliable and are not changed based on subsequent uploads of third party data.

To the right of the vertical bar chart is a horizontal bar chart that illustrates Tendril's forecast for subject home's electricity usage in the next month, disaggregated by end use type. This chart is intended to provide actionable insights to each customer as to where they might direct their energy savings efforts to make the greatest impact in their energy usage in the month ahead. Tendril staff continues to fine-tune the disaggregation in these forecasts, as a response to customer concerns about the accuracy of this component of the report. To help improve their accuracy, Duke Energy and Tendril continue to push customers to the Interactive portal where they are able to further customize or correct information about their homes that may impact the accuracy of the disaggregated usage forecasts.

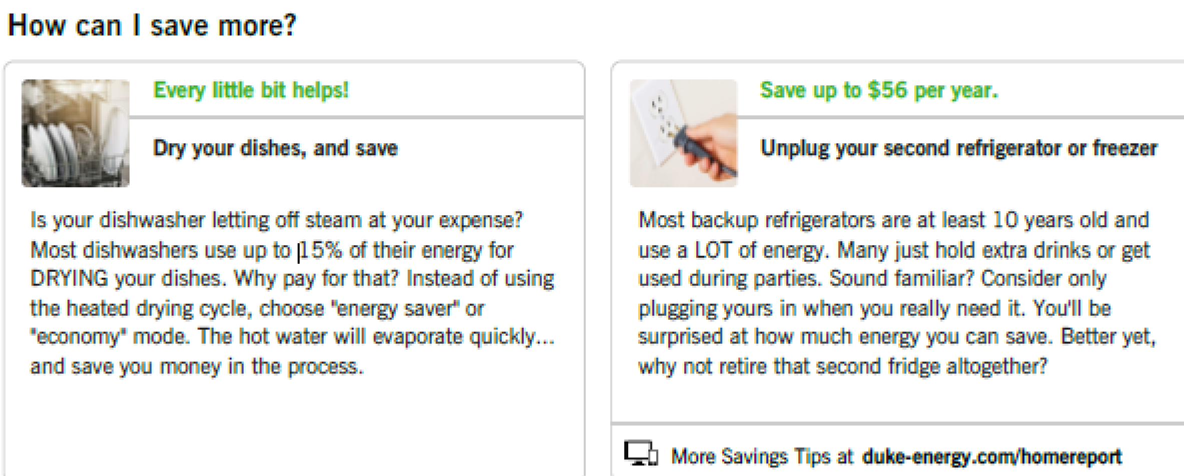
Figure 4-1: MyHER Electricity Usage Comparison and Forecasted Energy Use Bar Charts



In addition to the comparison graph, each MyHER includes a set of customized action tips under the heading "How can I save more?" (Figure 4-2).These tips are designed to provide information relevant to homes with similar characteristics, as presented in the box accompanying the comparison graph. These tips often are presented with monetary values (appropriately scaled to each customer receiving the tip) that estimate the bill savings that the customer might expect to realize by implementing the action tip.

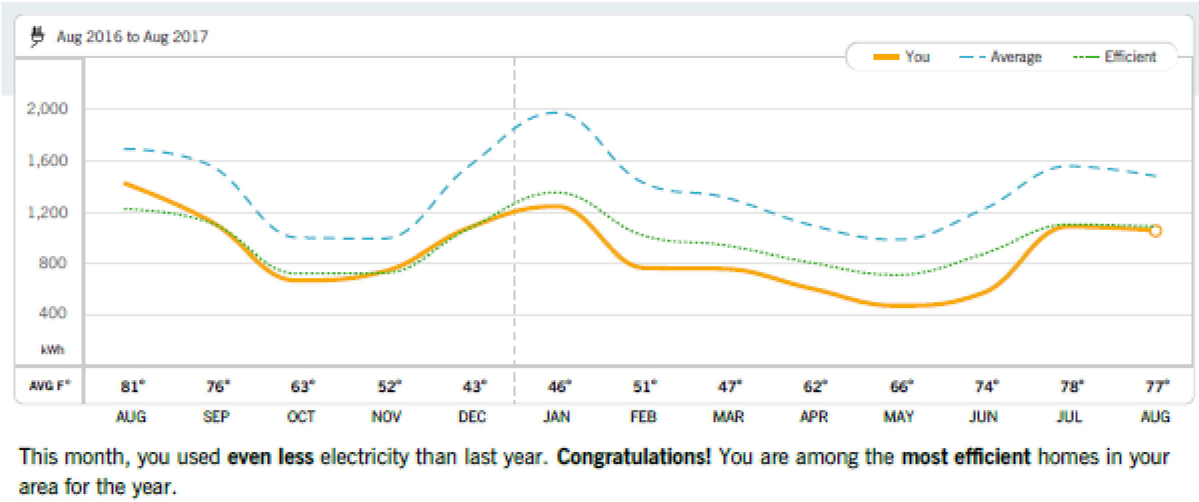
The Duke Energy MyHER program has a large library of action tips, numbering between 80 and 90. Half of them were initially developed internally at Duke Energy, and Tendril's "Ask the Expert" technical writer has continued to add to them over time. The large library has enabled the program to avoid any repeats to customers over lengthy periods of time (up to three years). Tip freshness is also managed with display rules that ensure that a diversity of tip types (both in the value of the tip and the area of the household they apply to) is shown, and this management sometimes results in the removal of tips that staff no longer deem relevant. Duke Energy validates the monetary values estimated by Tendril for each tip action for reasonableness. Duke Energy and Tendril have identified an opportunity for improvement with action tips in developing additional targeting algorithms for tip display. For example, more sophisticated targeting could be developed that cross-references age of home with relevancy for certain actions (e.g., only display a tip to install new windows to customers with older homes). This targeting of tips in this section are developing into “smart actions”, and have been established as a priority at both Duke Energy and Tendril. Tendril has made progress on, converting about 20% of all action tips to smart actions—that is, they are targeted to the appropriate audience. However, not all of the actions and tips in this section are amenable to being used in this fashion, as there is significant variability in their applicability: some tips are only applicable to a few segments, while others have broader customer applicability and have lower capacity to be used as a “targeted” action.

Figure 4-2: MyHER Tips on Saving Money and Energy



The back page of the MyHER reports includes a trend chart that displays how the recipient’s home compares to the average and efficient home in energy usage over a year (Figure 4-3). This trend chart can help customers identify certain months where their usage increased relative to the efficient or average home—helping them focus on the equipment and activities most likely to affect their usage. For example, if a home tracks the average home until mid-winter and then spikes well above, that could indicate the heating equipment should be checked.

Figure 4-3: MyHER 13-month Trend Chart



The back page of the MyHER report also reserves space for Duke Energy to include seasonal and programmatic messaging, referred to by program staff as free form text (FFT), that reflects Duke Energy-specific communication objectives. Ensuring that FFT messages are relevant and do not conflict with the actions or tips provided on the front page requires ongoing coordination and monitoring. Broad targeting efforts taking advantage of seasonal relevance, program eligibility, and the presence of end uses such as pools, are used to cross-promote Duke Energy programs. Customer participation databases are cross checked each month to ensure that customers only receive information about programs they have not already participated in; if a customer is found to have participated in the program being promoted in a given month, that customer will receive an alternate, typically more generic, message. Occasionally the action text on the front page will be disabled to accommodate FFT messaging.

FFT messages are developed by the MyHER team in cooperation with Duke Energy's marketing and communications group. Duke Energy staff strive to develop messages that are clever, relevant, and upbeat—some recognize events on the calendar (such as Earth Day) while others provide specific program promotional information or promote general home upgrades (even for measures outside of current programs).

Establishing an FFT calendar early in each year and attempting to avoid last-minute changes to the messages each month has been challenging to implement. Last minute changes have been common due to changes during the course of the year to Duke Energy program promotions and incentive levels. In addition to developing the messages included in each MyHER, the program team must also ensure that the messages conform to expectations established to protect the customer experience. This feature of MyHER is relatively resource-intensive with a lengthy revision-review-approval process with numerous stakeholders accompanying most changes to FFT messages.

To help prevent last minute changes that characterized FFT production in the past, there was renewed focus and energy on prioritizing it as much as possible in 2018 at both Tendril and

Duke Energy. A product of this renewed energy is an FFT tool under development at Tendril. It will allow for faster and more accurate rendering of FFT messaging, as well as the ability for Duke Energy stakeholders to participate directly in the FFT creation and review process; it is being built as a “self-serve” tool. The implementation of such a tool, due for launch in early 2019, is expected to streamline the FFT process significantly.

Finally, the back page of the reports also provides contact information for the MyHER program at Duke Energy. Customers occasionally contact Duke Energy with questions or concerns about MyHERs and, rarely, to opt-out. Duke Energy’s efforts to maintain a high-quality MyHER customer experience is reflected by the high value that is placed on program participant satisfaction and as such, it is closely monitored. Only 1% of MyHER customers contact Duke Energy annually and less than 0.5% of MyHER treatment customers contact Duke Energy to opt-out. The rigorous quality control efforts described earlier have kept quality-related issues from ever reaching customers.

4.2.1.4 MyHER Interactive

Enrollment in MyHER Interactive is still relatively low. The most reliably successful enrollment generators are email campaigns, sweepstakes, and cross-promotion with the High Bill Alerts program. Envelope messaging has also been used, but is less successful. Email campaigns are a very successful enrollment generator because they can use personalized uniform resource locator PURLs (to enable clicking through to the Interactive screen where the customers’ account number is auto-populated in the registration process). Program staff revamped the content and graphics of the email campaign in 2018.

Duke Energy continues to prioritize enrollment in Interactive. However, enrollment in MyHER Interactive was not as strong as was hoped, so Tendril is developing a marketing plan to increase enrollments in 2019.

Additionally, Duke Energy has 6 product requests in with Tendril for the “User Profile” section of MyHER Interactive, so as to improve the quality of customer-provided data and in turn, improve clustering models, load disaggregation, the applicability of targeted tips, and other applications that use the data. Duke Energy also continues to roll out AMI meters to customers in the DEC and DEP service territories. With the completion of the AMI deployment, the granularity of customer data will increase, which will directly benefit those who enroll in MyHER Interactive. Currently, about 57% of Interactive customers have AMI meters. For these customers, their usage data is available on MyHER Interactive. However, there have been problems with the transfer of this data to Tendril, which has caused some customer data displays to be erroneous. To remedy this, Tendril is in the process of upgrading their data ingester[11]. Duke Energy and Tendril are considering ways to effectively utilize and meaningfully leverage AMI data.

[11] Data ingestion refers to the process of importing, cleaning, and organizing large or complex sets of data for storage and/or analysis. Tendril’s upgraded data ingester will process AMI data from Duke Energy in a faster, more effective manner.

Few quality control or process issues pertaining to Interactive were reported in our interviews. However, it should be noted that there is currently no mechanism by which Duke Energy can use or check the quality of data presented on Interactive in a systematic or bulk fashion. All checks are made on an individual customer basis. The bulk of quality control for Interactive is carried out by Tendril.

One opportunity for improvement exists in MyHER Interactive's limitation such that a Duke Energy account can only be associated with one email, and only one email may be associated with any account. Currently, Tendril is evaluating the feasibility of a number of solutions to this problem, which has caused issues for customers attempting to enroll. First, they are attempting to shorten the time it takes to archive emails of customers who leave the program (to disassociate the email from the account). Secondly, they are exploring the possibility of allowing more than one email to be associated with an account. Lastly, they may disable the requirement that login ID's be email addresses. These solutions should open up eligibility to accounts associated with homes in ownership transition, rental transition, and will allow those who own more than one home to have all of their homes associated with their Interactive account.

4.2.1.5 Other MyHER Plans to Further Improve Program Operations

Looking forward, Duke Energy and Tendril are also contemplating other program enhancements that are anticipated to further improve program performance and the customer experience with the program:

- Developing new content specific to shoulder month email MyHERs;
- The full HOMERS rollout;
- Revised service-level agreements (SLAs);
- Duke Energy app; and
- Self-comparisons of energy usage (as opposed to "neighborhood" comparisons).

4.2.2 Customer Surveys - DEC

The customer surveys included questions focused specifically on the experience of and satisfaction with the information provided in MyHERs and awareness of MyHER Interactive—these questions were asked only of households in the treatment group.

Both treatment and control households answered the remaining questions, which focused on assessing:

- Awareness of Duke Energy efficiency program offers;
- Satisfaction with the Duke Energy, and services Duke Energy provides to help households manage their energy use;
- Levels of awareness of and interest in household energy use; motivations and perceived importance;
- Reported behavioral or equipment-based upgrades; and

- Barriers that prevent customers from undertaking energy savings actions.

4.2.2.1 Comparing Treatment and Control Responses - DEC

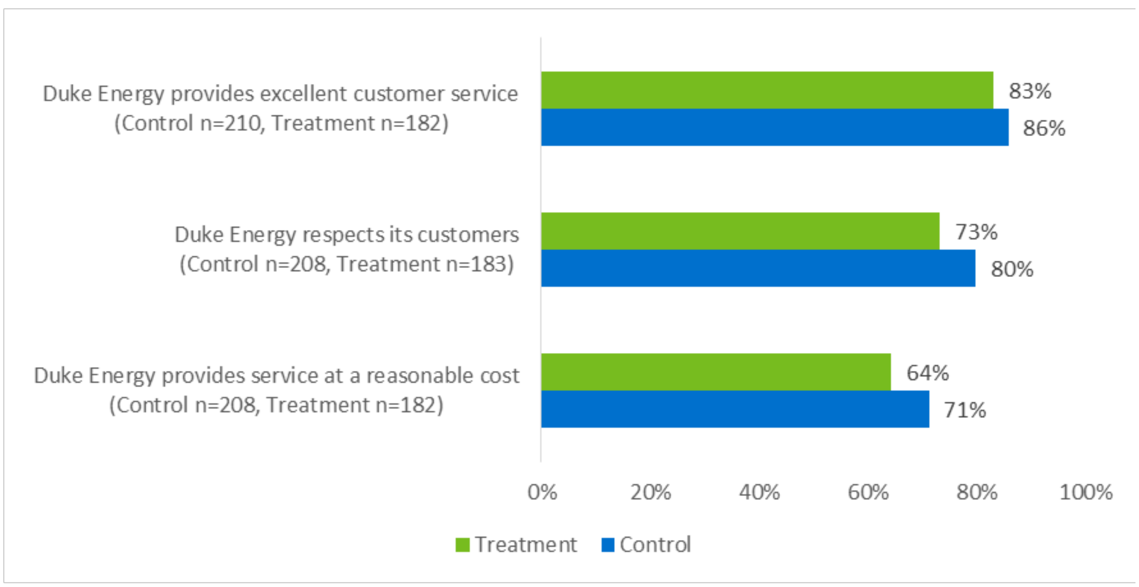
This section presents the results of survey questions asked of both treatment and control households in DEC and compares the response patterns. Statistically significant differences between treatment and control households are noted.

Duke Energy Customer Satisfaction

Both treatment and control groups' overall satisfaction with Duke Energy are high. Seventy-three percent of treatment customers and 78% of control customers are satisfied or very satisfied with Duke Energy as their electric supplier (rated 8 or higher on a 0-10 point scale); the difference is not statistically significant at the 90% level of confidence.

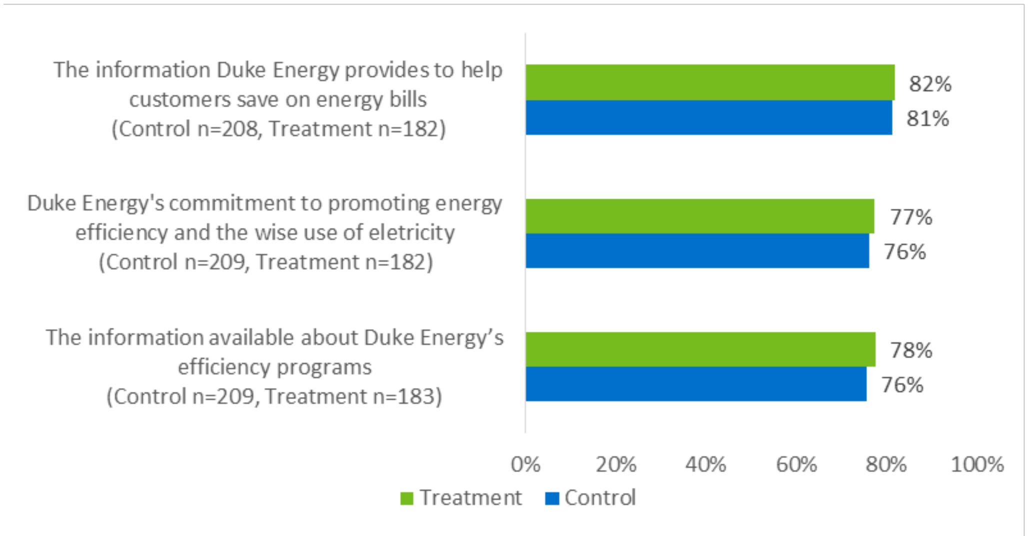
Control households rated Duke Energy higher on providing excellent customer service, respecting its customers, and providing service at a reasonable cost than treatment households. The differences between the control and treatment group are not statistically significant (Figure 4-4). MyHER does not result in a measurable change in stated customer satisfaction with Duke Energy in DEC.

Figure 4-4: Satisfaction with Various Aspects of Customer Service - DEC



Additionally, the differences between treatment and control customers with respect to satisfaction with the information available about Duke Energy's efficiency programs, the information Duke Energy provides to help customers save on energy bills, and Duke Energy's commitment to promoting energy efficiency and the wise use of electricity are not statistically significant (Figure 4-5), thus MyHER has not measurably changed customers' satisfaction with Duke Energy's promotion of energy efficiency at DEC.

Figure 4-5: Satisfaction with Energy Efficiency Offerings and Information - DEC



Engagement with Duke Energy's Website

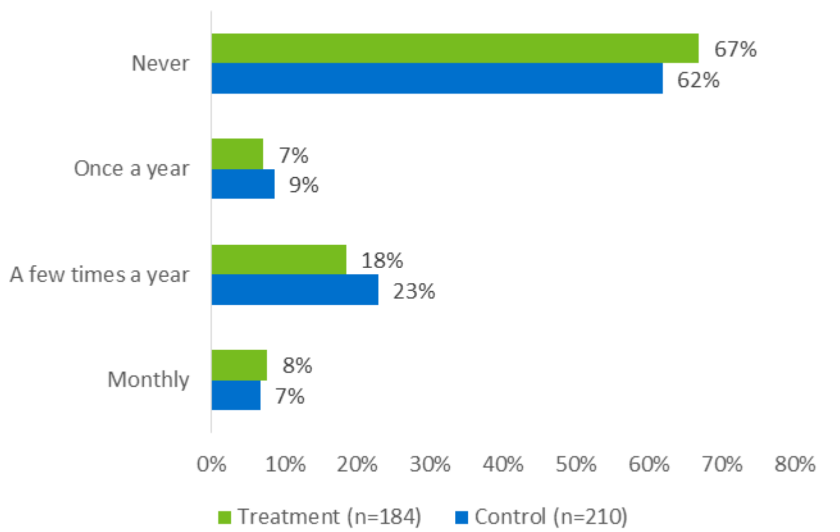
Both groups answered several questions about their use of the Duke Energy website, a proxy for overall engagement with information provided by the utility on energy efficiency and household energy use, and the results showed no significant differences. Table 4-5 shows that 36% of the treatment group and 37% of the control group reported they had never logged in to their Duke Energy accounts. Among those that had logged in, the most commonly reported purpose was to pay their bill.

Table 4-7: Use of Duke Energy Online Account - DEC

Online Account Activity	Treatment Group (n=180)	Control Group (n=204)
Never logged in	36%	37%
Pay my bill	36%	37%
Look for energy efficiency opportunities or ideas	16%	16%

As shown in Figure 4-6, control group households were more likely to report that they accessed the Duke Energy website to search for information about rebate programs, energy efficient products, or ways to make their home more energy efficient, but the difference is not statistically significant. Relatively small percentages of both groups report regular usage of the website for purposes other than bill payment.

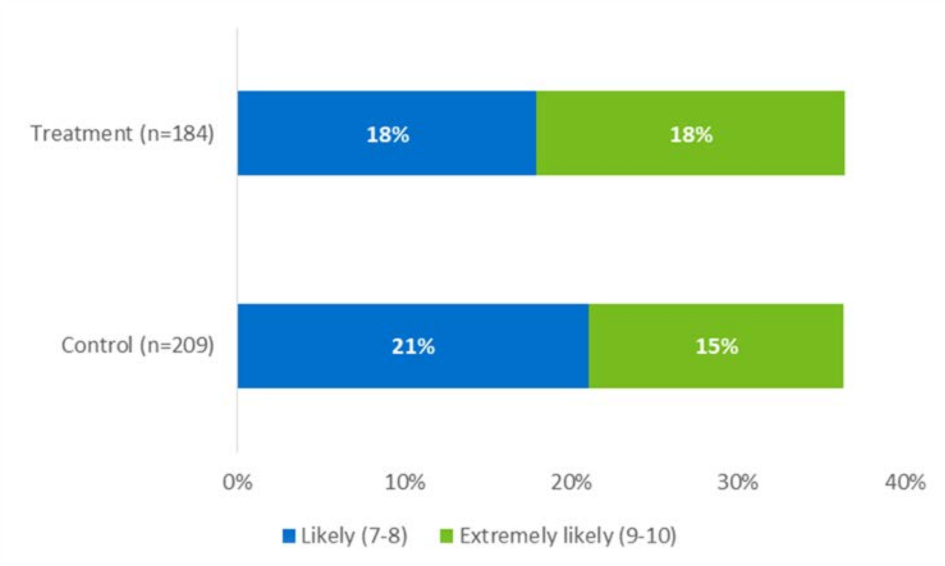
Figure 4-6: Frequency Accessing the Duke Energy Website to Search for Other Information - DEC



Thirty-six percent of control group and treatment group customers, respectively, reported they would be likely to check the Duke Energy website for information before purchasing major household equipment. The portion of respondents rating their likelihood a "7" or higher on an 11-point scale of likelihood is plotted in Figure 4-7. Overall, MyHER has not produced a measurable change in customer engagement with Duke Energy's standard online offerings (distinct from the online MyHER Interactive offering).

While we observe no effect on customer engagement with Duke Energy online resources attributable to MyHER, the survey responses across both treatment and control customers should be placed into context with their demographics. All survey respondents reside in single-family homes, since the MyHER program is only available to customers in single-family homes, so we should expect that the respondents of this survey should skew towards respondents who have attained a greater age than that might be expected of the general Duke Energy customer base. As we indeed show later in this section, the average age of respondents of this survey is older than what would be expected relative to U.S. Census estimates of the age distribution of the population in North and South Carolinas. About 43% of DEC treatment respondents are 65 years of age or older. About 47% of DEC control customers are included in that age bracket as well. This is in comparison to U.S. Census estimates that 16% of the population of the Carolinas falls into the same age bracket. Therefore, Duke Energy should interpret the responses of this survey as representing an older group of customers than their customer base overall. Residents of multi-family homes would expected to be younger, on average, and would be hypothesized to report higher rates of engagement with Duke Energy's online content.

Figure 4-7: Portion Likely to Check Duke Energy Website prior to Purchasing Major Home Equipment - DEC

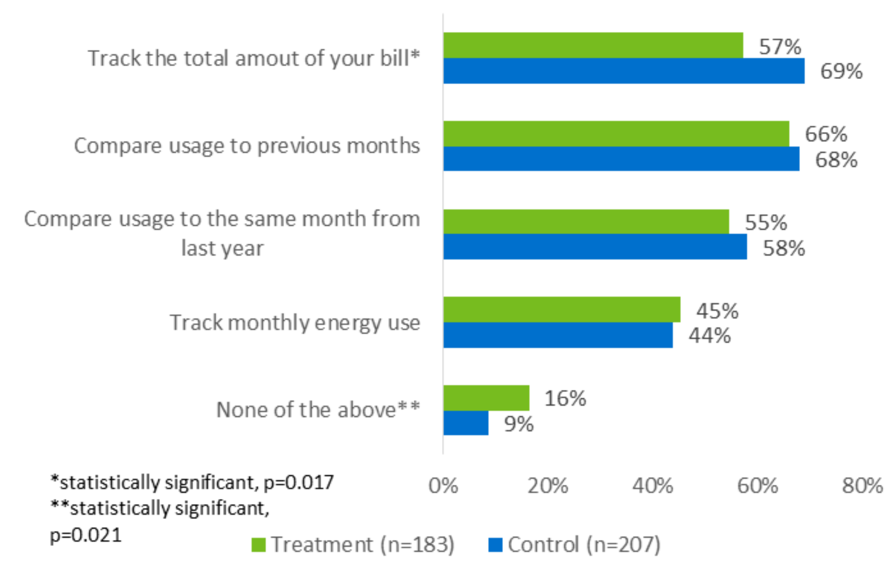


Reported Energy Saving Behaviors

Treatment customers were much more likely than control customers to report having undertaken behaviors to reduce household energy use or having made energy efficiency improvements to their home (73% to 63%; p = .013). Treatment and control customers track information (bills and usage) related to their household's energy usage in the following ways (Figure 4-8):

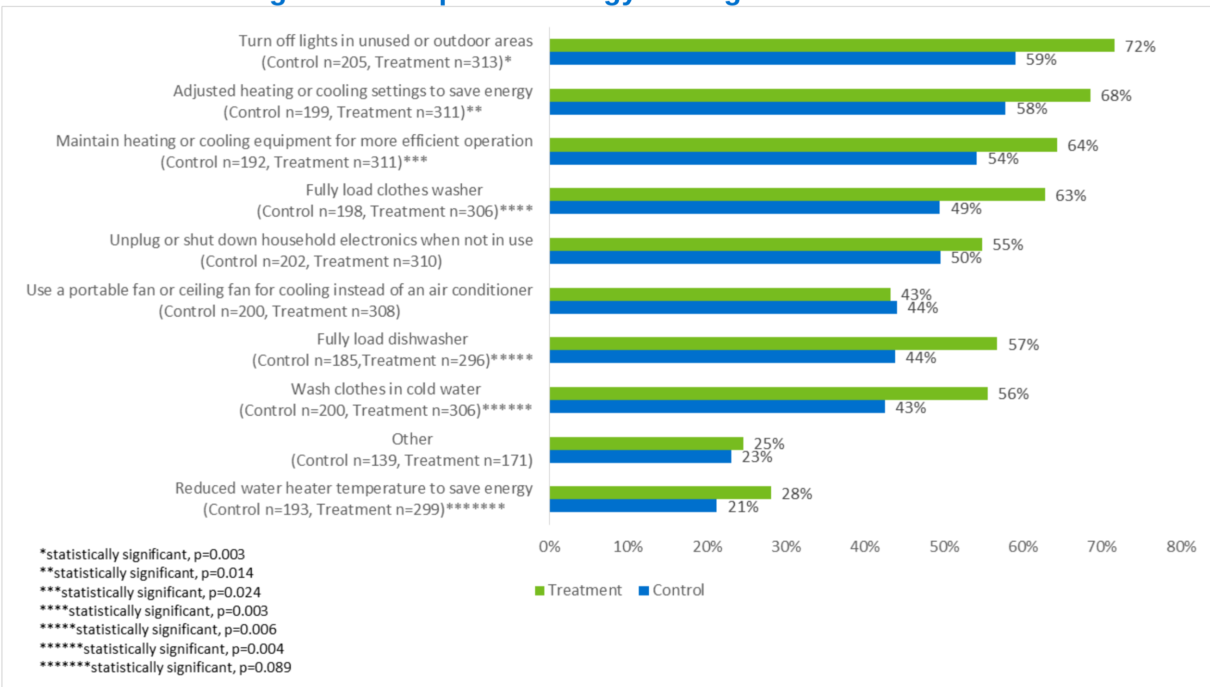
- Fifty-seven percent of the treatment customers and 69% of the control customers reported tracking the total amount of the bill. The difference is statistically significant at the 90% level of confidence.
- About two-thirds of respondents compared usage to previous months. The difference between the treatment and control groups is not statistically significant.
- More than half of respondents compare usage to the same month from last year, but the difference in responses here between treatment and control groups is not statistically significant at the 90% level of confidence.

Figure 4-8: "Which of the Following Do you Do with Regard to Your Household's Energy Use?" - DEC



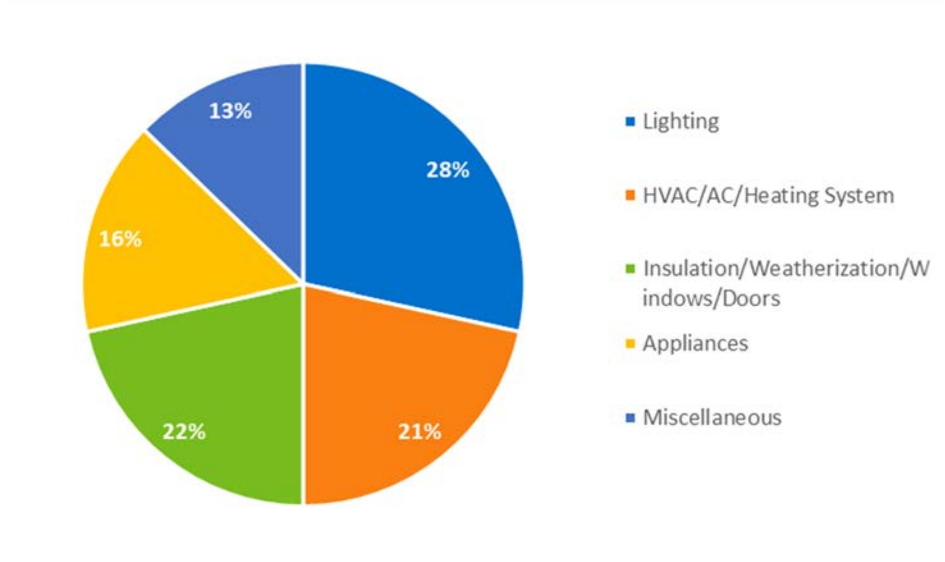
Treatment group respondents were significantly more likely to turn off lights in unused or outdoor areas, adjust heating or cooling setting to save energy, maintain heating or cooling equipment for more efficient operation, fully load clothes washer, fully load dishwasher, wash clothes in cold water, and reduce water heater temperature to save energy than the control group, as shown in Figure 4-9. These differences are statistically significant at the 90% level of confidence.

Figure 4-9: Reported Energy Saving Behaviors - DEC



Ninety-six respondents (treatment and control customers in total) reported other energy savings actions. Nexant categorized these actions and the results are shown in Figure 4-10. The most commonly reported action, mentioned by 29 respondents, pertains to lighting, such as switching to LED bulbs, etc.

Figure 4-10: Distribution of Other Energy Savings Behaviors - DEC



Reported Energy Efficiency Improvements Made

Respondents were provided with a list of energy efficiency improvements and asked if they had done each in the past year. The treatment group had a significantly higher percentage of customers reported having installed lighting with more energy efficient types than the control customers did (Table 4-8). None of the other differences were statistically significant at the 90% level of confidence.

Table 4-8: Portion Indicating They Had Made Each Energy Efficiency Upgrade - DEC

Upgrade	Control	Treatment
Install energy-efficient lighting (Control n=198, Treatment n=311)*	52%	60%
Purchase ENERGY STAR certified home electronic equipment (a television, for example) (Control n=187, Treatment n=298)	39%	43%
Install energy-efficient kitchen or laundry appliances (Control n=196, Treatment n=306)	34%	39%
Install energy-efficient heating/cooling equipment (Control n=196, Treatment n=302)	33%	34%
Install programmable thermostat or "smart" thermostat (Control n=197, Treatment n=307)	32%	34%
Caulk or weatherstrip (windows or doors) (Control n=194, Treatment n=307)	29%	36%
Install energy-efficient water heater (Control n=195, Treatment n=301)	26%	29%
Add insulation to attic, walls, or floors (Control n=197, Treatment n=301)	23%	23%
Replace windows or doors with more energy-efficient types (Control n=199, Treatment n=308)	20%	26%

*statistically significant, p=0.084

Behavior and Upgrade Category Variables

To examine broader patterns within the survey responses that cover many specific cases of energy saving behavior and upgrades, participant responses to the behavior and upgrade questions were combined into behavior vs. upgrade categories and were also combined into end-use categories. As shown in (Table 4-9), treatment group respondents were significantly more likely to engage in energy efficiency behaviors and improvements generally, and also undertook significantly more energy efficiency behaviors.

Table 4-9: Percent of Households That Have Undertaken Energy Efficiency Actions - DEC

Behaviors/Improvements	Treatment Group	Control Group
Any Energy Efficiency Behavior (Treatment n=314, Control n=206)*	73%	62%
Average Number of Behaviors**	5.13	4.24
Any Energy Efficiency Improvements (Treatment n=314, Control n=203)***	69%	61%
Average Number of Improvements	3.15	2.77

*statistically significant, p=0.009
**statistically significant, p=0.004
***statistically significant, p=0.046

Additionally, Table 4-10 shows the proportion of respondents that had undertaken at least one behavior or upgrade in each end use category. In six of the nine categories, treatment group members were significantly more likely to have undertaken at least one of these activities.

These results demonstrate that MyHERs have increased energy efficiency behaviors in treatment customers.

Table 4-10: Percent of Households That Had Undertaken Energy Efficiency Actions, by End Use Category - DEC

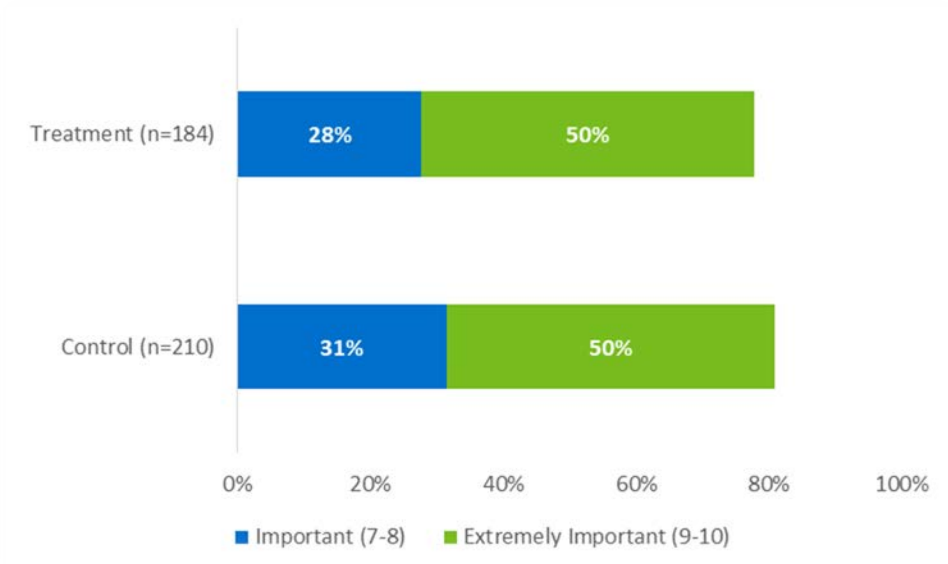
Behaviors/Improvements	Treatment Group	Control Group
Water Heating Behaviors and Upgrades (Treatment n=314, Control n=206)*	71%	61%
Water Heating Behaviors (Treatment n=314, Control n=204)**	71%	59%
Space Heating Behaviors and Upgrades (Treatment n=314, Control n=205)***	72%	62%
Space Heating Behaviors (Treatment n=314, Control n=205)****	72%	61%
Space Heating Upgrades (Treatment n=310, Control n=202)	45%	46%
Lighting Behaviors and Upgrades (Treatment n=314, Control n=206)*****	73%	61%
Electronics and Appliances Behaviors and Upgrades (Treatment n=314, Control n=205)******	68%	59%
Electronics and Appliances Upgrades (Treatment n=312, Control n=199)	52%	48%
Sealing and Insulation Behaviors and Upgrades (Treatment n=312, Control n=200)	47%	43%

*statistically significant, p=0.024
**statistically significant, p=0.007
***statistically significant, p=0.013
****statistically significant, p=0.009
*****statistically significant, p=0.005
******statistically significant, p=0.025

Customer Motivation and Awareness

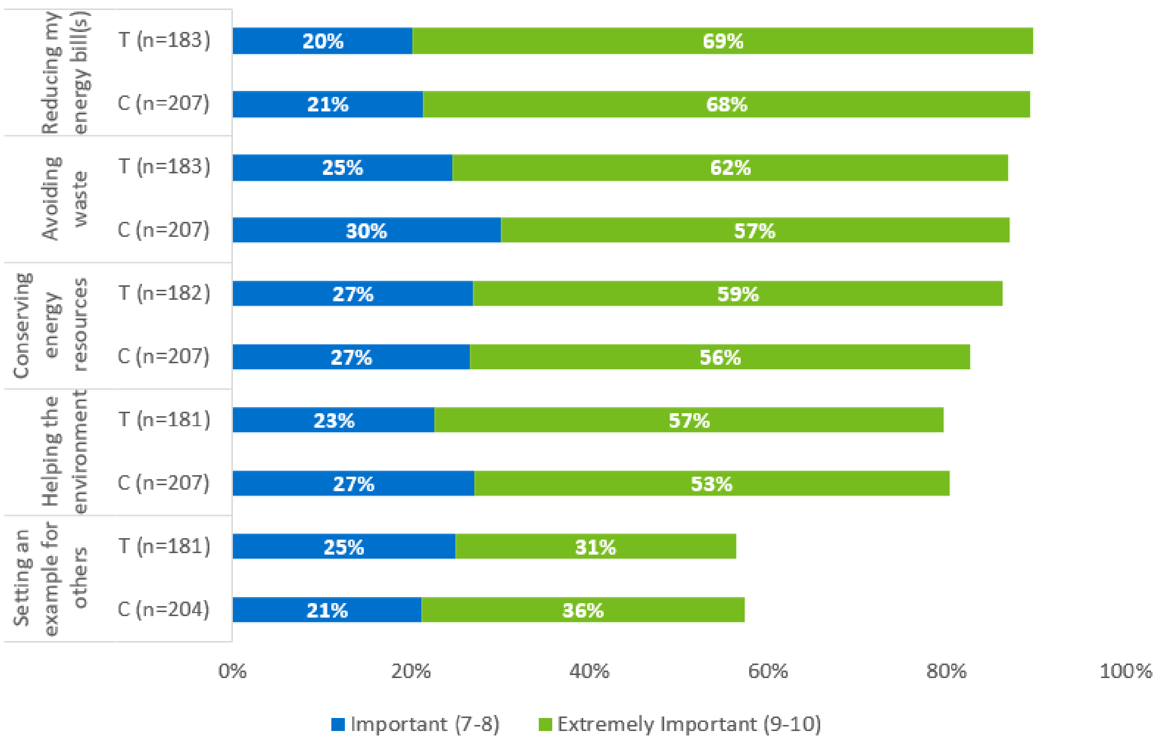
The control group and treatment groups report similar levels of motivation for saving energy. Eighty-one percent of control customers indicated that knowing they are using energy wisely is “important” or “extremely important”, compared to 78% of treatment customers. This difference is not statistically significant (Figure 4-11).

Figure 4-11: "How Important Is It for You to Know if Your Household is Using Energy Wisely?" - DEC



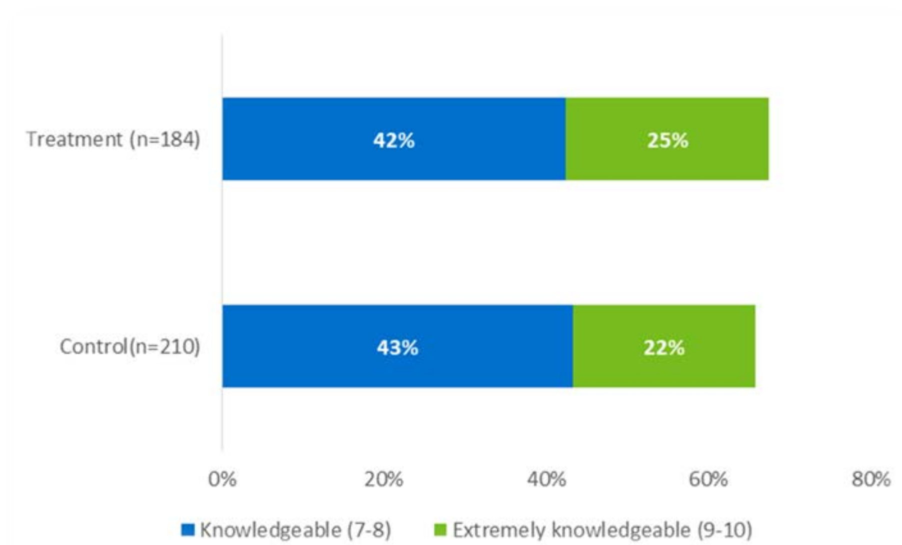
Customers were asked to rate, on a scale of 0 to 10, the importance of various reasons why they might try to reduce their home's energy use. The strongest motivation for both groups is saving money on their energy bills, where 89% of treatment respondents and 89% of control respondents reported that saving money on their energy bills was "important" or "extremely important". Eighty-seven percent of control respondents and treatment respondents respectively indicated that "avoiding waste" was "important" or "extremely important" to them. Eighty-six percent of treatment customers and 83% of control customers reported that "conserving energy resources" was "important" or "extremely important". Eighty percent of treatment customers and control customers respectively reported that "helping the environment" was "important" or "extremely important". None of the differences between treatment and control groups are statistically significant. Figure 4-12 contains the frequency of responses to this question, shown as a percentage for both treatment and control groups.

Figure 4-12: "Please Indicate How Important Each Statement Is to You" - DEC



As indicated by Figure 4-13, among treatment customers, 67% rated themselves above a seven on a 0-10 point scale of knowledgeability of ways to save energy, while 65% of control group customers rated themselves this way. The difference is not statistically significant at the 90% level of confidence.

Figure 4-13: "How Would You Rate Your Knowledge of the Different Ways You Can Save Energy in Your Home?" - DEC



Treatment respondents that took the treatment-only survey were asked how useful each MyHER feature was to their homes. A similar question was asked of both control group and treatment group respondents who took the primary survey rephrased to ask them how useful they *might expect* that information to be. Table 4-11 presents results of the portion rating each item a "7" or higher on an 11-point scale of the hypothetical usefulness from the control and treatment customers who took the primary survey, and Table 4-12 presents the comparison results between the actual usefulness of each item rated by treatment customers (treatment-only survey) and the hypothetical usefulness rated by control customers in the primary survey).[12]

The results from the hypothetical usefulness rating (Table 4-11) did not find statistically significant differences in expected usefulness of information that is found on MyHER reports. Comparisons between the responses of customers in the treatment-only survey and control customers in the primary survey show that treatment customers respond differently to questions about information presented in MyHERs if the questions are asked in the context of the actual MyHER reports, however the response patterns overall are similar – not much is seen by way of a significant separation between treatment and control customers in terms of usefulness of report content. However, there is one exception: Table 4-12 shows that control customers were significantly more likely to think that "Information about services and offers from Duke Energy" might be useful than treatment customers actually thought they were. This finding suggests that there may be an opportunity to improve the presentment of information in MyHERs about Duke Energy's services and offerings.

Table 4-11: Hypothetical Usefulness of HER Features Treatment and Control - DEC

HER Feature	Control Group_Primary Survey	Treatment Group_Primary Survey
Graphs that display your home's energy use over time	71% (n=204)	66% (n=181)
Information about services and offers from Duke Energy	67% (n=205)	65% (n=181)
Tips to help you save money and energy	67% (n=205)	72% (n=183)
Examples of the energy use associated with common household items	67% (n=203)	66% (n=182)
Your home's energy use compared to that of similar homes	57% (n=202)	60% (n=181)
Customized suggestions for your home	56% (n=200)	63% (n=180)

[12] The implementation of a treatment-only survey, in addition to a primary survey provided to both treatment and control customers, afforded an opportunity to test the responses of treatment customers to a question asking about a MyHER feature they have actually seen vs. asking generally about how useful the information is (outside of the context of MyHER). This test leads us to the conclusion that the way customers are asked about this question matters and we recommend that in future surveys, MyHER treatment customers see questions about report content placed specifically in the context of them having seen the content in their reports, as opposed to in the hypothetical.

Table 4-12: Actual Usefulness versus Hypothetical Usefulness of HER Features Treatment and Control - DEC

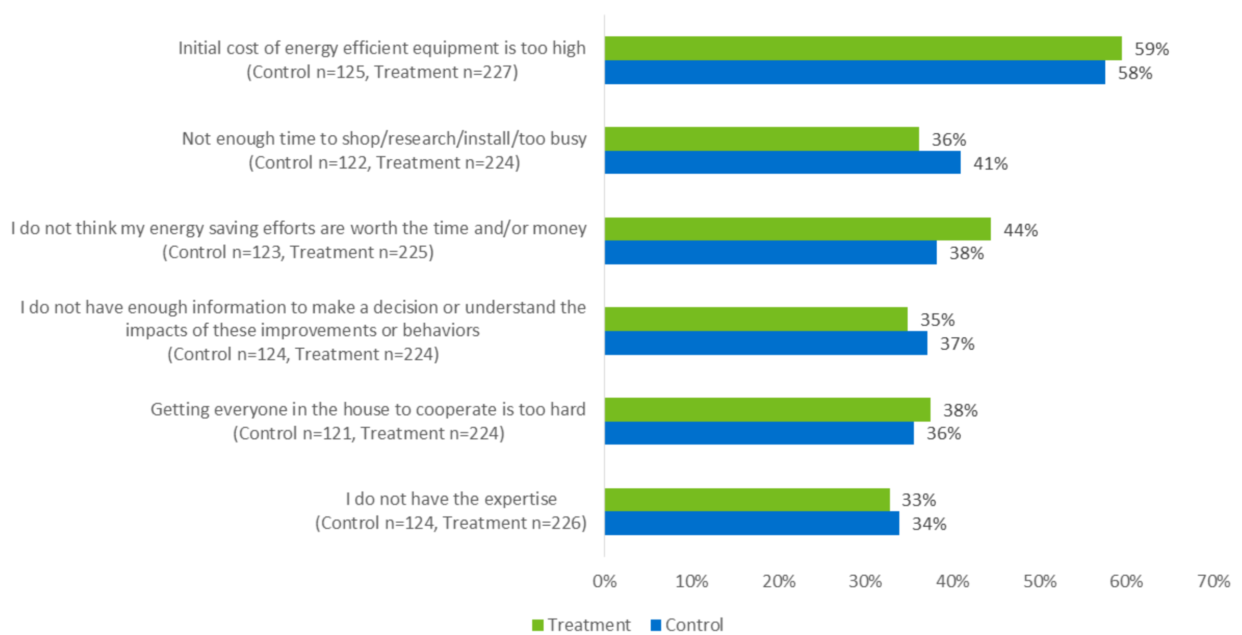
HER Feature	Control Group_Primary Survey	Treatment Group_Treatment Only Survey
Graphs that display your home's energy use over time	71% (n=204)	76% (n=135)
Information about services and offers from Duke Energy*	67% (n=205)	58% (n=134)
Tips to help you save money and energy	67% (n=205)	66% (n=135)
Examples of the energy use associated with common household items	67% (n=203)	64% (n=135)
Comparison to similar homes	57% (n=202)	53% (n=135)
Customized suggestions for your home	56% (n=200)	59% (n=134)

*statistically significant, p=0.089

Barriers to Customers Undertaking Energy Savings Actions

When asked the reasons why customers might not be able to save as much as energy as they would like, there were no statistically different response patterns between treatment and control customers, which indicates that MyHER is not making a measurable change in the potential barriers mentioned in this survey. The most commonly reported barrier is "the initial cost of energy efficient equipment is too high" (Figure 4-14): 59% of treatment respondents reported this as a barrier and 58% of control respondents did so as well. The least-commonly cited barrier was lack of expertise: 33% of treatment customers cited lack of expertise as a barrier as did 36% of control customers.

Figure 4-14: Barriers to Customers Undertaking Energy Savings Actions - DEC



Suggestions about Duke Energy Improving Service Offerings

The survey provided an open-ended question to elicit suggestions about Duke Energy improving its service offerings to help customers reduce energy use. Only 22% (119 of 548, treatment and control customers in total) offered suggestions, including sixteen who offered only appreciative comments. Among those offering suggestions for improvement, the most common request, mentioned by 42 of the 119 with suggestions, reflected a desire for more energy savings information, programs, free light bulbs, and more incentives:

- "*I would love to have a visit/walk through with someone who could look at our home and make suggestions*"
- "*Send free light bulbs"*
- *"Give rebates on appliances"*
- "*Continue to supply usage statistics*"
- "*Provide a smart device at the breaker box that would connect to your smartphone to tell you your energy consumption. Something real-time would be helpful. Then you would / could modify your daily activities real-time based on what you are seeing*"

Other comments centered on other suggestions, such as better communication and reducing price/providing senior and disability discounts. Nexant categorized these suggestions on the general basis of their content; the results are presented in Table 4-13.

Table 4-13: Suggestions about Duke Energy Improving Service Offerings - DEC

Suggestion	Count	Percent of Respondents Mentioning (n=119)	Percent of Total Mentions (n=130)
Provide more energy savings information, programs, free light bulbs and more incentives	42	35%	32%
Better communication	23	19%	18%
Reduce price/provide senior and disability discounts	22	18%	17%
Appreciation	16	13%	12%
Miscellaneous	7	6%	5%
Reduce power outages	6	5%	5%
Improve website	4	3%	3%
Provide more detailed info in MyHER/offer MyHER to Townhomes/do more survey	5	4%	4%
Expressed Frustration	5	4%	4%

Evidence of MyHER Effects

As noted above, while formal statistical testing found a number of differences among treatment and control group households for individual questions, the Nexant team sought to understand if the overall pattern of survey responses differed among treatment and control households. To do this, we categorized each survey question by topic area and then counted any survey item in which the treatment households provided a more positive response than the control households. Table 4-14 presents the categories, the count of questions in each category for which the treatment group provided a more favorable response than the control group, and the number of questions in each category. A response is considered "favorable" if the treatment group gave a response that is consistent with the program objectives of MyHER.

Table 4-14: Survey Response Pattern Index - DEC

Question Category	Count of Questions where T>C	Number of Questions in Topic Area	Portion of Questions where T>C
Duke Energy's Public Stance on Energy Efficiency	3	3	100%
Customer Engagement with Duke Energy Website	2	5	40%
Customers' Reported Energy-saving Behaviors	10	11	91%
Customer's Reported Energy Efficiency Improvements Made	9	9	100%
Customer Motivation, Engagement & Awareness of Energy Efficiency	4	11	36%
Barriers to Customer Undertaking Energy Savings Actions	3	6	50%
Customer Satisfaction with Duke Energy	0	4	0%
Total	**31**	**49**	**63%**

Nexant's approach consists of the following logical elements:

- Assume the number of positive responses between treatment and control customers will be equal if MyHER lacks influence;
- Count the total number of topics and questions asked of both groups – there are seven topic areas and 49 questions;
- Note any item for which the treatment group outperformed the control group – the treatment group outperformed the control group in 31 questions, or 63% of the total questions;
- Since this value is more than 50% we can conclude that MyHER had wide-ranging enhancing effects across all the various engagement and attitudinal areas probed by the survey.
- Calculate the probability that the difference in response patterns is due to chance, rather than an underlying difference in populations – 2% (p-value = 0.021). Since this probability is less than 10%, we reject the null hypothesis (that the number of positive responses for treatment and control customers are equal) at the 90% level of confidence.

Because this analysis compares the response patterns between the treatment and control group, if the MyHER program did not influence customers, one would expect the treatment group to “score higher” on roughly half of the questions. In other words, if the MyHER is not influencing treatment group customers, there is a 50/50 chance that they will “outperform” the control group as many times as not. For a more detailed description of the index framework, see Appendix G.

We call out the survey area covering general customer satisfaction with Duke Energy as an area of particular note: treatment customers reported lower satisfaction scores than control customers for all four general satisfaction questions. Nexant recommends that the MyHER program staff coordinate with any internal customer satisfaction data collection efforts to cross-reference these findings with any learnings on DEC customer satisfaction. The lower satisfaction scores for DEC treatment customers may indicate an opportunity for new MyHER messaging or content in DEC.

Respondent Demographics

Nearly all respondents—93% of treatment group customers and 94% of control group customers—own their residence. More than half of households surveyed have two or fewer residents, but about 19% of treatment households and 20% of control households have four or more residents. There are no statistically significant differences in the distribution of ownership or age of homes assigned to the treatment and control groups (Figure 4-15) (chi-squared test).

Figure 4-15: “In What Year Was Your Home Built?” - DEC

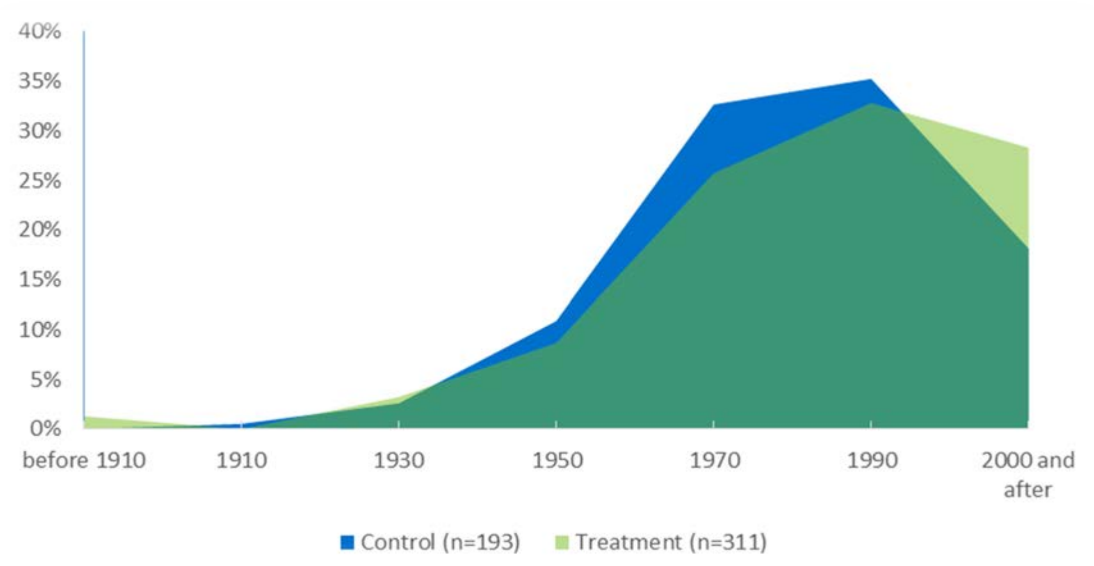
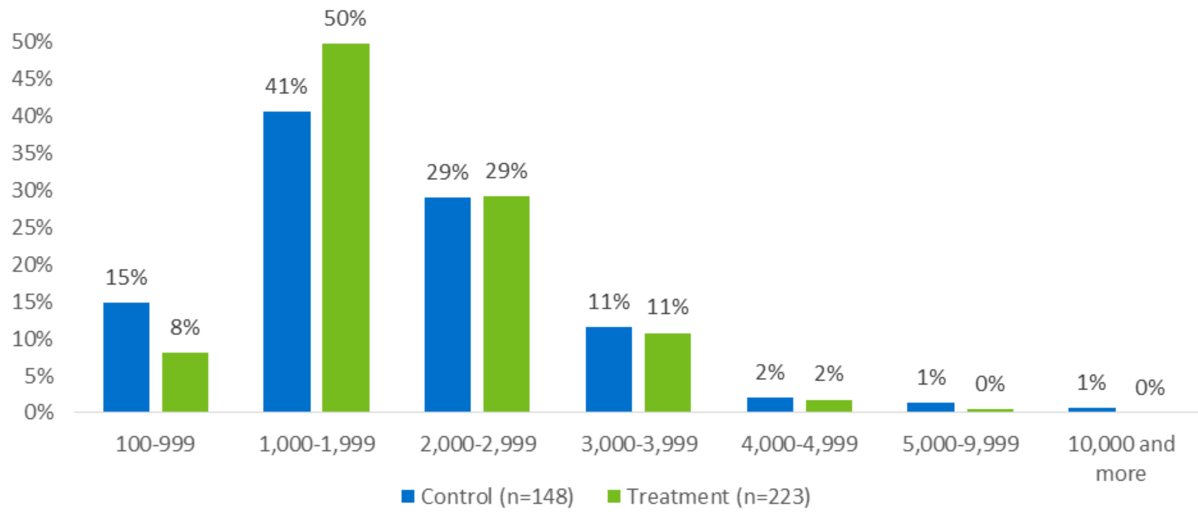


Figure 4-16 shows distribution of home square footage is similar between control and treatment households. The average square footage above ground is 2,031 for control households and 1,954 for treatment households, and the difference is not statistically significant.

Figure 4-16: How many square feet is above ground living space? - DEC



Respondent ages are relatively close to those reported by the U.S. Census American Community Survey (ACS) for Carolinas. The lowest age category (25-34) is often underrepresented when sampling based on residence in single family homes, given that many members of that population are in apartments, dormitories, or living with other family members. This common underrepresentation is true in this survey study, as well. Additionally, the average age is 62 for both control group respondents and treatment group respondents (see Table 4-15).

Table 4-15: Respondent Age Relative to American Community Survey - DEC

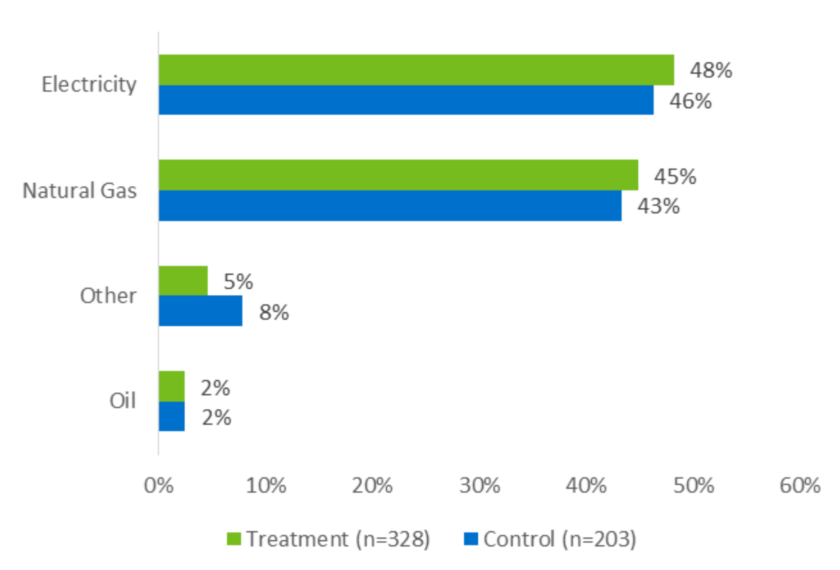
Age	Treatment Group (n=311)	Control Group (n=191)	2017 American Community Survey_Carolinas[13]
25-34	3%	3%	13%
35-44	8%	9%	13%
45-54	21%	19%	13%
55-64	25%	21%	13%
65 and over	43%	47%	16%

Figure 4-17 shows the primary heating fuel type used in control and treatment customers' households. Nearly half of treatment (48%) and control (46%) customers use electricity in their

[13] American Community Survey (ACS) is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_SPL_K200104&prodType=table

households for heating. Forty-five percent of treatment customers and 43% of control customers use natural gas for heating. These differences are not statistically significant.

Figure 4-17: Primary Heating Fuel in Households - DEC

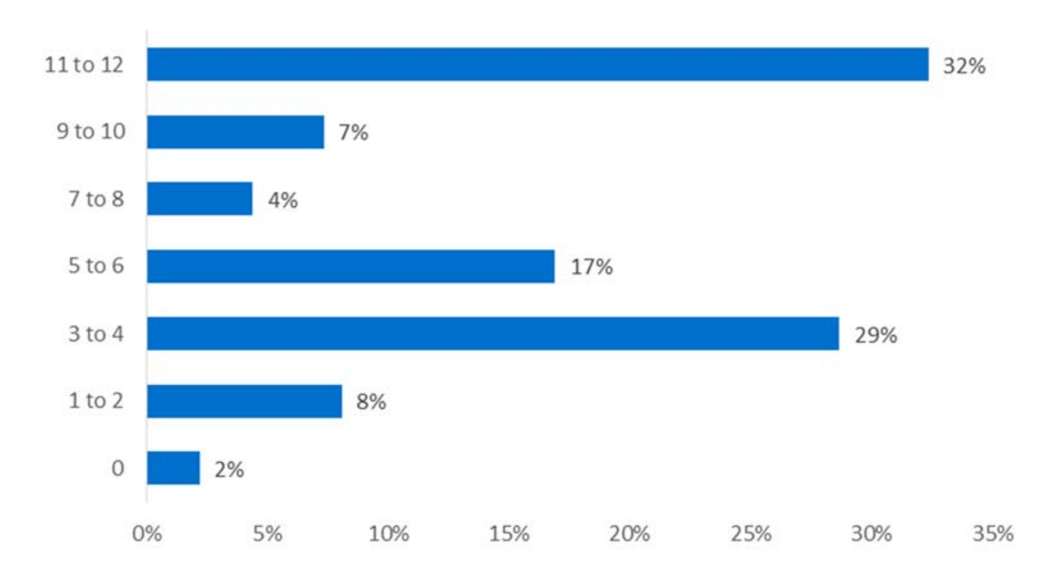


4.2.2.2 Treatment Households: Experience and Satisfaction with MyHER - DEC

A large majority of Treatment Only household respondents, 93%, (142 of 152) recalled receiving at least one of the MyHER reports.

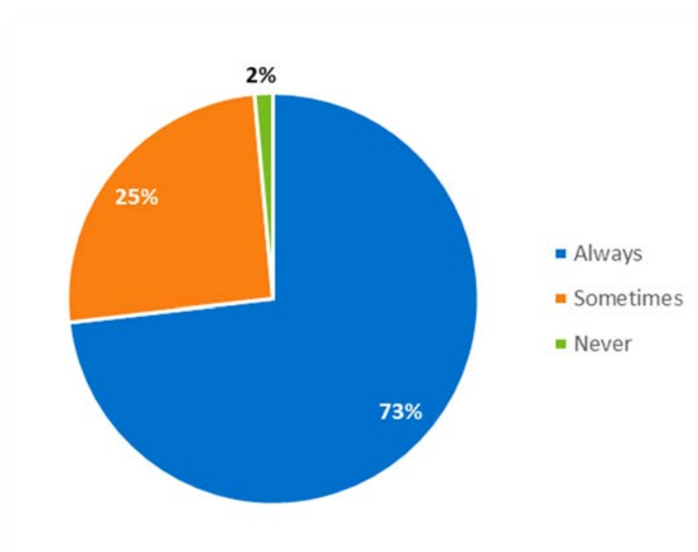
The survey asked those that could recall receiving at least one MyHER report if they could recall how many individual reports they had received “in the past 12 months” (Figure 4-18). The survey launched in January 2019, which means that most recipients would have received 8 MyHERs in the year since February 2018. Thirty-two percent (44 of 136) responded that they received 11 to 12 home energy reports in the past 12 months. The scattered distribution of responses related to recall is consistent with the difficulty of recalling an exact number of reports, however the question is valuable for grounding respondents in the experience of receiving a MyHER before asking them more specific questions about the document.

Figure 4-18: Reported Number of MyHERs Received "In the past 12 months" (n=136) - DEC



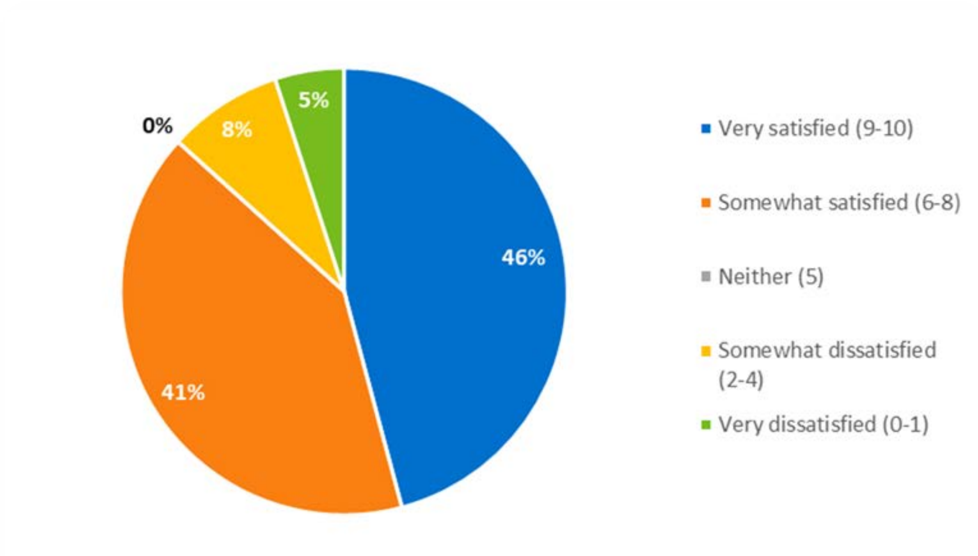
Survey respondents indicated high interest in the MyHER reports. As shown in Figure 4-19, when asked how often they read the reports, 99% of respondents indicated they "always" or "sometimes" read the reports. Two respondents (1%) indicated they do not read the reports.

Figure 4-19: How Often Customers Report Reading the MyHER (n=138) - DEC



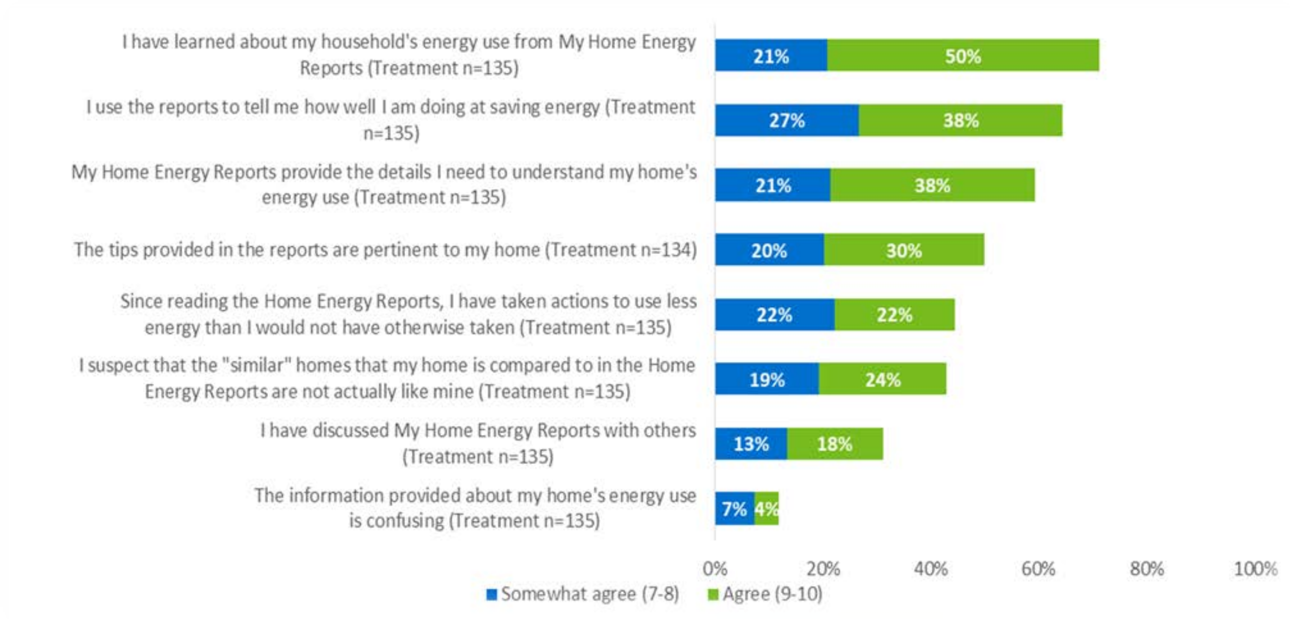
Eighty-seven percent (104 of the 120 respondents that provided a rating) reported being “somewhat” or “very” satisfied with the information contained in the reports (Figure 4-20). The survey asked a further question to the respondents of why they said so: sixty-one of the satisfied respondents provided reasons. Among customers who gave the highest satisfaction ratings, the most common comments on the MyHERs described the reports’ ability to engage the customer and provide greater awareness. The customers who reported being somewhat satisfied most often simply described the reports as “helpful.”

Figure 4-20: Satisfaction with the Information in MyHER Reports (n=120) - DEC



When asked to rate their agreement with a series of statements about MyHERs on a scale of 0 to 10, recipients largely agreed that the reports helped them understand their home’s energy use, with 71% of respondents rating their agreement a seven or higher on a 0-10 point scale, and that they use the report to gauge how successful they are at saving energy (65% rating a seven or higher). More than half (59%) agreed that the reports provided the details they needed to understand their home’s energy usage. Respondents provided weaker agreement to statements about the pertinence of the tips provided to their homes and whether they have taken actions to use less energy than they would not have since reading MyHERs. A relatively small percentage (11%) agreed with the statement that the information provided is confusing (Figure 4-21).

Figure 4-21: Level of Agreement with Statements about MyHER (0-10 Scale) - DEC



The survey provided an open-ended question to elicit suggestions about potential improvements to MyHER among those that had reported reading at least one report. Only 27% (37 of 136) offered suggestions, including seven who offered only appreciative comments. Among those offering suggestions for improvement, the most common request, mentioned by 16 of the 37 with suggestions, questioned accuracy of the comparison in the report. Fifteen of the 37 with suggestions reflected a desire for more specific information or details about their home and specific actions they should take. Some of these requests reflected interest in understanding at a more granular level how their home uses energy and energy consumption information related to appliances:

- "*By explaining what factors influence our rating*"
- "*I know it's probably not possible but it would be nice to see the actual percentage of what in the household is using what energy…"*
- *"Be more specific as to which appliances, etc. are using how much energy compared to a standard or an efficient use"*
- "*Narrow the comparison to homes closer in size and age along with the number of household members to each consumer*"
- "*Pinpoint possible problems that could be causing energy waste*"

Other comments centered on other suggestions (such as providing free energy assessment, etc.), and a few respondents that simply did not see value in the reports. Responses coded as recommending production changes focus on changing the delivery method of MyHER reports as follows:

- " *Send via email....*"

- "*Send them via email instead of wasting paper and stamps*"

Nexant categorized these suggestions on the general basis of their content; the results are presented in Table 4-16.

Table 4-16: Distribution Suggestions for Improvement (Multiple Responses Allowed) - DEC

Suggestion	Count	Percent of Respondents Mentioning (n=37)	Percent of Total Mentions (n=47)
Don't believe comparison/accuracy	16	43%	34%
Provide more specific information or details	15	41%	32%
Appreciate the Home Energy Report	7	19%	15%
Change production (mail, paper, format)	4	11%	9%
Expressed frustration	2	5%	4%
Other suggestions (such as providing home inspection, etc.)	2	5%	4%
Don't see value/dislike	1	3%	2%

Treatment households were also asked questions that focused on the awareness and use of MyHER Interactive, revealing low awareness of the online Interactive platform:

- Only 28% of treatment customers are aware of MyHER Interactive;
- Among aware customers, 92% reported that they had not signed up to use MyHER Interactive; and
- When asked why they haven't signed up to use MyHER Interactive, 30% of respondents reported that they were very busy, 22% reported that they were not interested in it, and 9% further reported that they did not know about it.

4.2.3 Customer Surveys - DEP

As was the case for DEC, the DEP customer surveys included a section of questions focused specifically on the experience of and satisfaction with the information provided in MyHERs, and the awareness of MyHER Interactive—these questions were asked only of households in the treatment group. Both treatment and control households answered the remaining questions, which focused on assessing:

- Awareness of Duke Energy efficiency program offers;
- Satisfaction with the Duke Energy, and services Duke Energy provides to help households manage their energy use;
- Levels of awareness of and interest in household energy use; motivations and perceived importance;
- Reported behavioral or equipment-based upgrades; and

- Barriers that prevent customers from undertaking energy savings actions.

4.2.3.1 Comparing Treatment and Control Responses

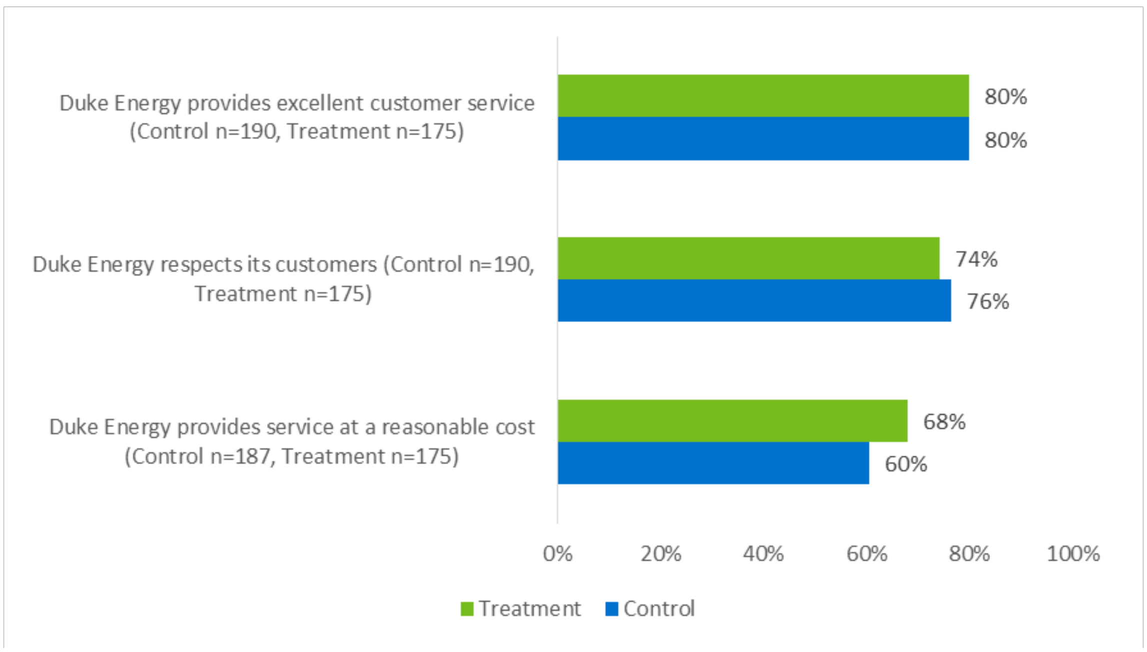
This section presents the results of survey questions asked of both treatment and control households in DEP and compares the response patterns between the two groups. Statistically significant differences between treatment and control households are noted.

Duke Energy Customer Satisfaction

Both treatment and control groups' overall satisfaction with Duke Energy are high. Seventy-six percent of treatment customers and 74% of control customers are satisfied or very satisfied with Duke Energy as their electric supplier (rated eight or higher on a 0-10 point scale); the difference is not statistically significant at the 90% level of confidence.

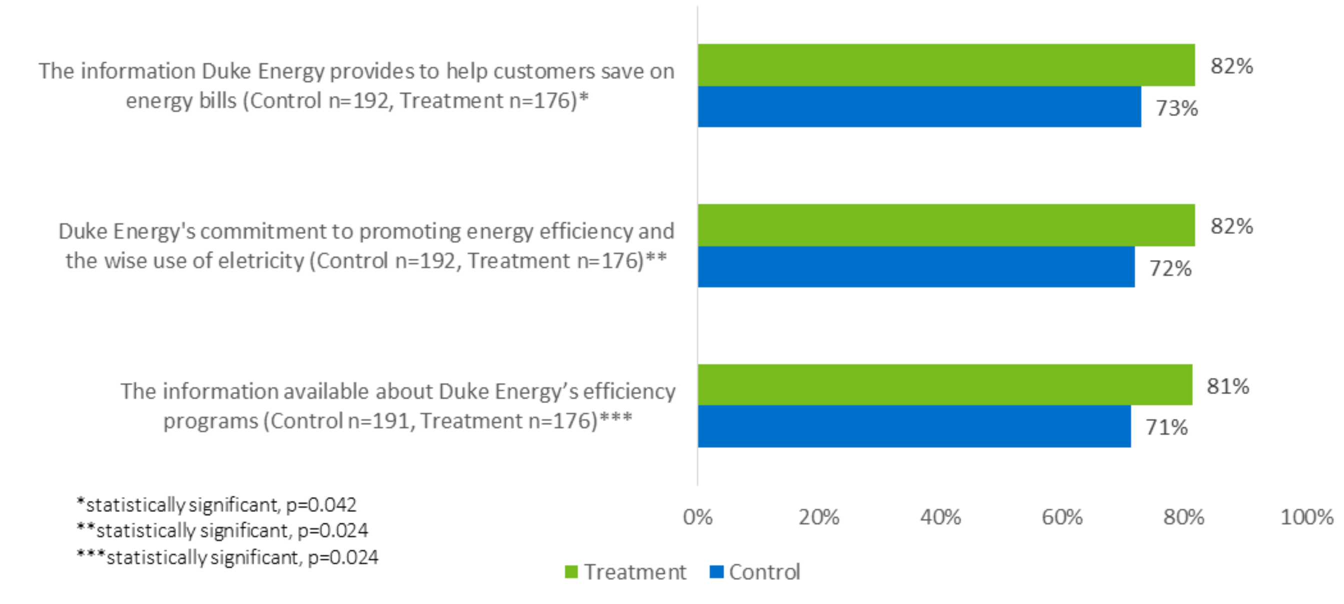
Treatment households rated Duke Energy higher on providing service at a reasonable cost, while control households rated Duke Energy higher on respecting its customers. These differences between treatment and control groups are also not statistically significant (Figure 4-22). Treatment and control households rated Duke Energy the same on providing excellent customer service. MyHER does not result in a measurable change in stated customer satisfaction with Duke Energy in DEP.

Figure 4-22: Satisfaction with Various Aspects of Customer Service - DEP



On the other hand, treatment group responses indicate that MyHER reports had a significant positive effect on customer satisfaction with certain aspects of Duke Energy's energy efficiency efforts (Figure 4-23). The differences between treatment and control customers with respect to satisfaction with the information available about Duke Energy's efficiency programs, the information Duke Energy provides to help customers save on energy bills, and Duke Energy's commitment to promoting energy efficiency and the wise use of electricity are statistically significant at the 90% level of confidence.

Figure 4-23: Portion Satisfied with Energy Efficiency Offerings and Information - DEP



Engagement with Duke Energy's Website

Both groups answered several questions about their use of the Duke Energy website, a proxy for overall engagement with information provided by the utility on energy efficiency and household energy use. Table 4-17 shows that 42% of the treatment group and 38% of the control group reported they had never logged in to their Duke Energy accounts. Among those that had logged in, the most commonly reported purpose was to pay their bill.

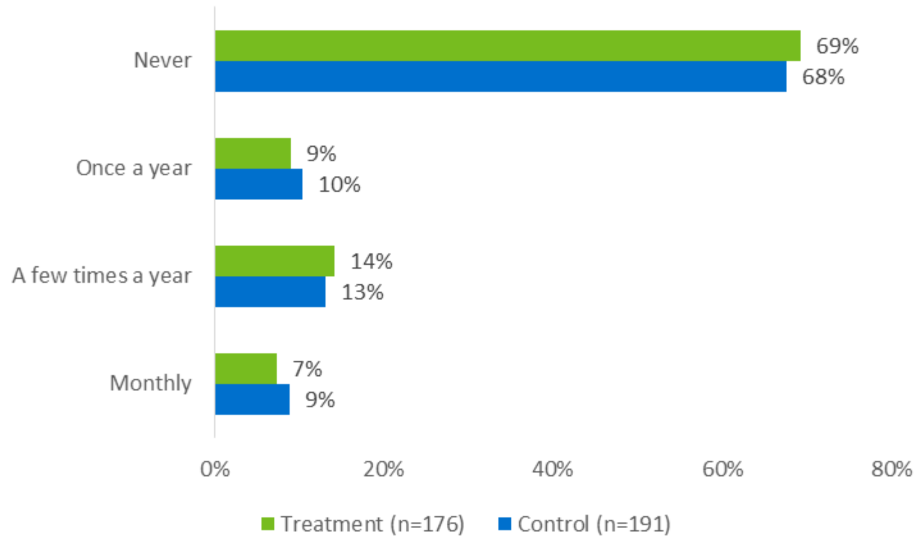
Table 4-17: Use of Duke Energy Online Account - DEP

Online Account Activity	Treatment Group (n=174)	Control Group (n=185)
Never logged in	42%	38%
Pay my bill	36%	38%
Look for energy efficiency opportunities or ideas	10%	8%

Treatment group households were more likely to report that they accessed the Duke Energy website to search for information about rebate programs, energy efficient products, or ways to make their home more energy efficient, but the difference is not statistically significant. Relatively small percentages of both groups report regular usage of the website for purposes other than bill payment, as shown in Figure 4-24.

I/A

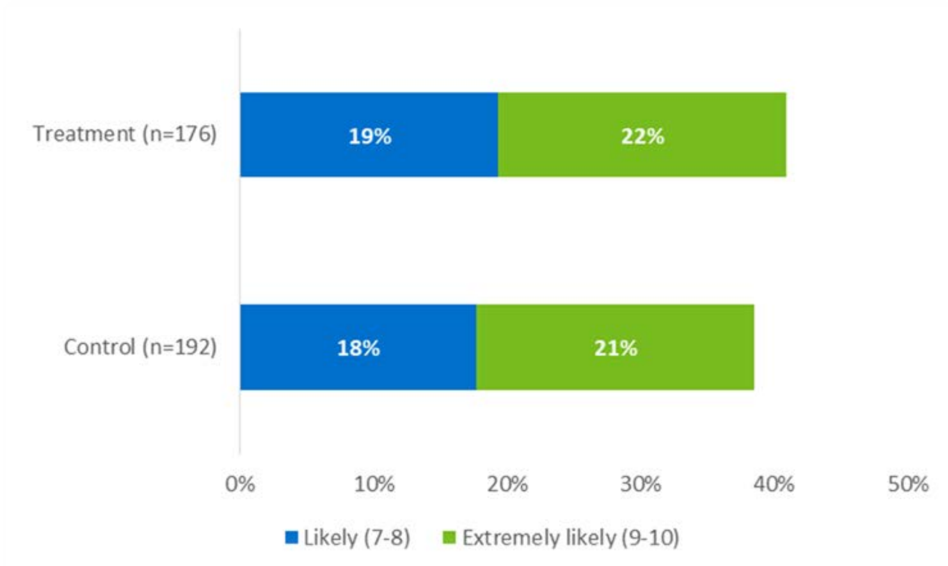
Figure 4-24: Frequency Accessing the Duke Energy Website to Search for Other Information - DEP



Thirty-nine percent of control group and 41% of treatment group customers reported they would be likely to check the Duke Energy website for information before purchasing major household equipment. The difference between the control and treatment group is not statistically significant at the 90% level of confidence. The portion of respondents rating their likelihood a “7” or higher on an 11-point scale of likelihood is plotted in Figure 4-25.

Overall, MyHER has not produced a measurable change in customer engagement with Duke Energy’s standard online offerings (distinct from the online MyHER Interactive offering) at DEP. As stated earlier in the presentation of DEC survey findings, these survey responses relating to engagement with Duke Energy’s online resources should be placed into context with the DEP respondents’ demographics. All DEP survey respondents reside in single-family homes, since the MyHER program is only available to customers in single-family homes. We therefore expect that the DEP respondents of this survey should skew towards respondents who have attained a greater age than that might be expected of the general Duke Energy customer base. We indeed find, as we discuss at greater length later in this section, that the average age of respondents of this survey is older than what would be expected relative to U.S. Census estimates of the age distribution of the population in North and South Carolinas. About 45% of DEP treatment respondents are 65 years of age or older. About 44% of DEP control customers are included in that age bracket as well. This is in comparison to U.S. Census estimates that 16% of the population of the Carolinas falls into the same age bracket. Therefore, Duke Energy should interpret the responses of this survey as representing an older group of customers than their customer base overall. Residents of multi-family homes would expected to be younger, on average, and would be hypothesized to report higher rates of engagement with Duke Energy’s online content.

Figure 4-25: Portion Likely to Check Duke Energy Website prior to Purchasing Major Home Equipment - DEP

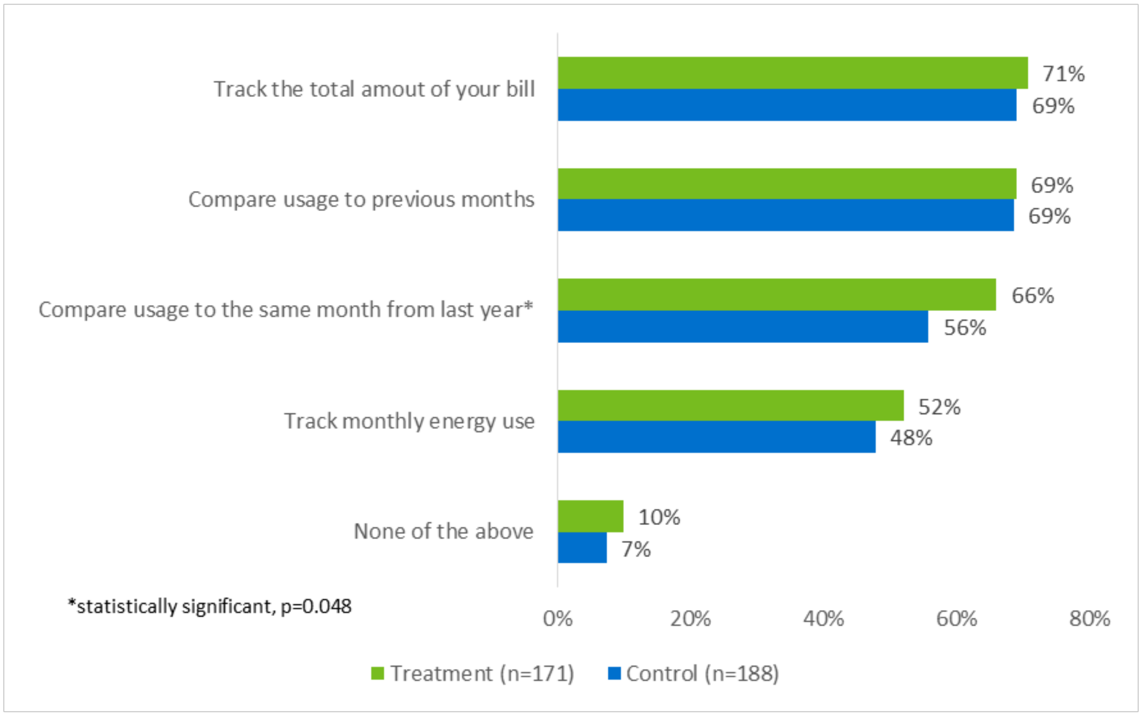


Reported Energy Saving Behaviors

Treatment and control customers track information (bills and usage) related to their household's energy usage in the following ways (Figure 4-26):

- Seventy-one percent of the treatment customers and 69% of the control customers reported tracking the total amount of the bill. The difference is not statistically significant at the 90% level of confidence.
- Sixty-nine percent of the treatment group and control group, respectively, compared usage to previous months. The difference is not statistically significant.
- Sixty-six percent of the treatment respondents and 56% of the control respondents compared usage to the same month from last year. The difference in responses here between treatment and control groups are statistically significant at the 90% level of confidence.

Figure 4-26: "Which of the Following Do you Do with Regard to Your Household's Energy Use?" - DEP

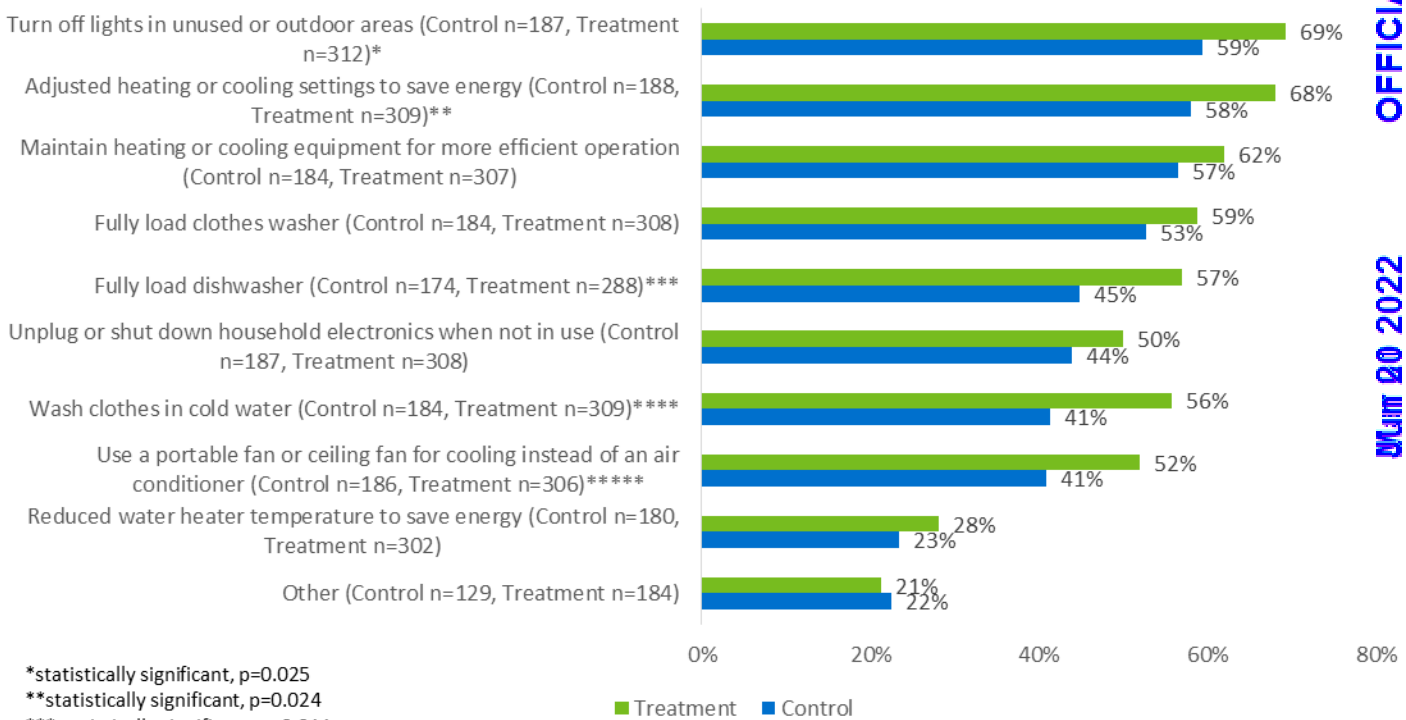


In general, treatment customers were more likely than control customers to report having undertaken behaviors to reduce household energy use or having made energy efficiency improvements to their home (71% to 60%; p = 0.008).

Specifically, the treatment group was more likely to turn off lights in unused or outdoor areas, adjust heating or cooling settings to save energy, fully load dishwasher, wash clothes in cold water and use a portable fan or ceiling fan for cooling than treatment group, as shown in Figure 4-27. These differences are statistically significant at the 90% level of confidence.

I/A

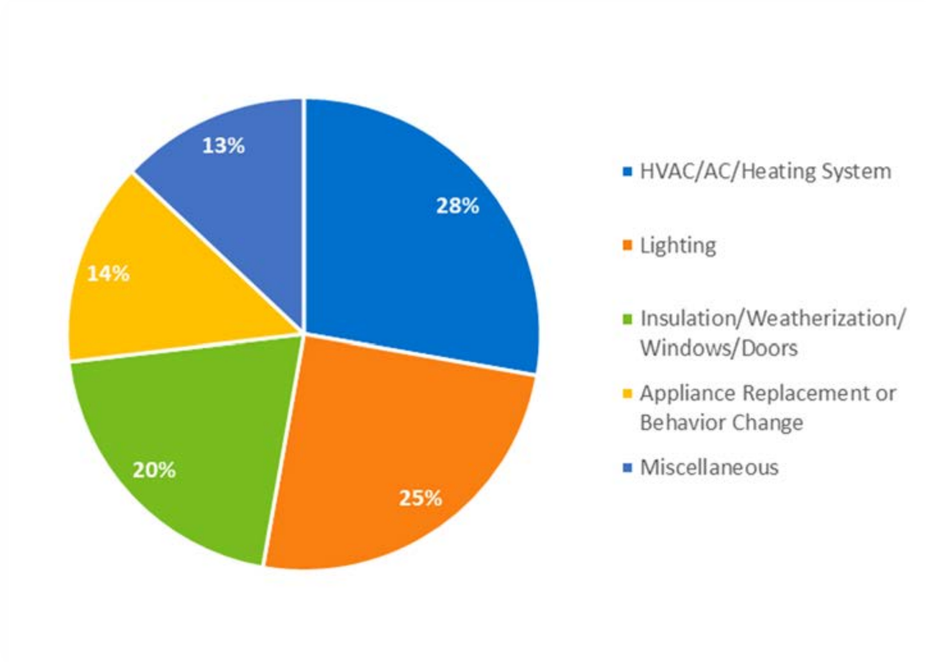
Figure 4-27: Reported Energy Saving Behaviors - DEP



*statistically significant, p=0.025
**statistically significant, p=0.024
***statistically significant, p=0.011
****statistically significant, p=0.002
*****statistically significant, p=0.017

Ninety-three respondents (treatment and control customers in total) reported other energy savings actions as free form text. Nexant categorized these actions and the results are shown in Figure 4-28. The most commonly reported action, mentioned by 30 respondents, pertains to HVAC/AC/Heating system, such as installing a new HVAC system.

Figure 4-28: Distribution of Other Energy Savings Behaviors - DEP



Reported Energy Efficiency Improvements Made

Respondents were provided with a list of energy efficiency improvements and asked if they had done each one in the past year. The treatment group had significantly higher percentages of customers who reported purchasing ENERGY STAR certified home electronic equipment, installing energy-efficient kitchen or laundry appliances, installing energy-efficient heating/cooling equipment, installing programmable thermostat or "smart" thermostat, and adding insulation to attic, walls, or floors than the control customers did (Table 4-18).

Table 4-18: Portion Indicating They had Made Each Energy Efficiency Upgrade - DEP

Upgrade	Control	Treatment
Install energy-efficient lighting (Control n=187, Treatment n=306)	50%	57%
Caulk or weatherstrip (windows or doors) (Control n=186, Treatment n=301)	35%	38%
Purchase ENERGY STAR certified home electronic equipment (a television, for example) (Control n=178, Treatment n=289)*	35%	45%
Install energy-efficient kitchen or laundry appliances (Control n=185, Treatment n=295)**	30%	45%
Install energy-efficient heating/cooling equipment (Control n=179, Treatment n=297)***	29%	38%
Install energy-efficient water heater (Control n=178, Treatment n=293)	28%	32%
Install programmable thermostat or "smart" thermostat (Control n=182, Treatment n=300)****	26%	36%
Replace windows or doors with more energy-efficient types (Control n=184, Treatment n=301)	22%	26%
Add insulation to attic, walls, or floors (Control n=180, Treatment n=299)*****	20%	28%

*statistically significant, p=0.049
**statistically significant, p=0.001
***statistically significant, p=0.054
****statistically significant, p=0.02
*****statistically significant, p=0.048

Behavior and Upgrade Category Variables

To examine broader patterns within the survey responses that cover many specific cases of energy saving behavior and upgrades, participant responses to the behavior and upgrade responses were combined into their respective categories, and were also combined into end-use categories. As shown in Table 4-19, treatment group respondents were significantly more likely to engage in energy efficiency behaviors and improvements, and also undertook significantly more energy efficiency behaviors and upgrades. These results demonstrate that MyHERs have increased energy efficiency behaviors in treatment customers in DEP.

Table 4-19: Percent of Households That Had Undertaken Energy Efficiency Actions - DEP

Behaviors/Improvements	Treatment Group	Control Group
Any Energy Efficiency Behavior (Treatment n=31, Control n=190)*	71%	60%
Average Number of Behaviors**	5.03	4.28
Any Energy Efficiency Improvements (Treatment n=313, Control n=189)***	70%	57%
Average Number of Improvements****	3.28	2.67

*statistically significant, p=0.008
**statistically significant, p=0.022
***statistically significant, p=0.003
****statistically significant, p=0.018

Further, Table 4-20 shows the proportion of respondents that had undertaken at least one behavior or upgrade in each end use category. In all nine categories, treatment group members were significantly more likely to have undertaken at least one of these activities. These results further demonstrate that MyHERs have increased energy efficiency behaviors in treatment customers.

Table 4-20: Percent of Households That Had Undertaken Energy Efficiency Actions, by End Use Category - DEP

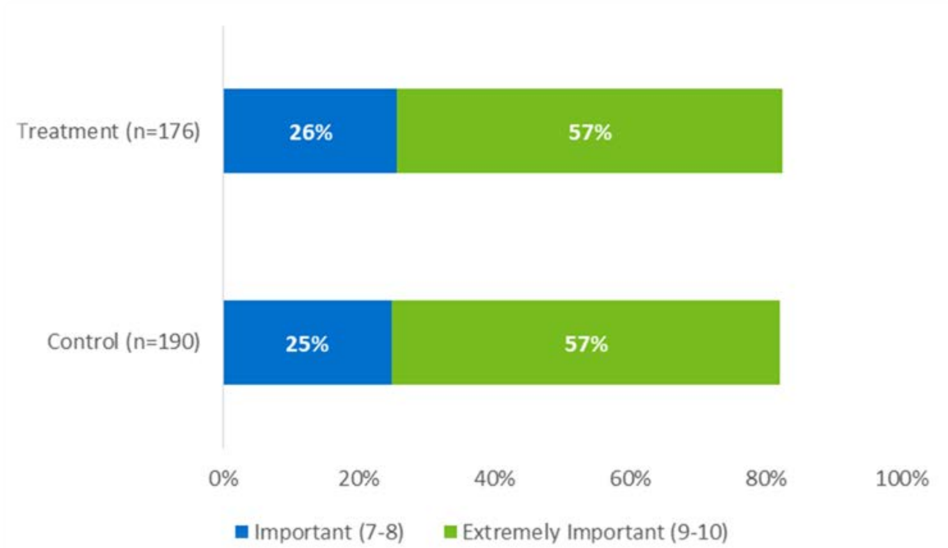
Behaviors/Improvements	Treatment Group	Control Group
Water Heating Behaviors/Upgrades (Treatment n=315, Control n=189)*	70%	59%
Water Heating Behaviors (Treatment n=315, Control n=187)**	70%	58%
Space Heating Behaviors/Upgrades (Treatment n=315, Control n=190)***	71%	60%
Space Heating Behaviors (Treatment n=315, Control n=190)****	71%	60%
Space Heating Upgrades (Treatment n=309, Control n=185)*****	49%	37%
Lighting Behaviors/Upgrades (Treatment n=314, Control n=190)******	71%	60%
Electronics and Appliances Behaviors/Upgrades (Treatment n=315, Control n=189)*******	68%	53%
Electronics and Appliances Upgrades (Treatment n=306, Control n=186)********	54%	43%
Sealing and Insulation Behaviors/Upgrades (Treatment n=306, Control n=187)*********	52%	42%

*statistically significant, p=0.001
**statistically significant, p=0.007
***statistically significant, p=0.01
****statistically significant, p=0.01
*****statistically significant, p=0.009
******statistically significant, p=0.011
*******statistically significant, p=0.001
********statistically significant, p=0.016
*********statistically significant, p=0.043

Customer Motivation and Awareness

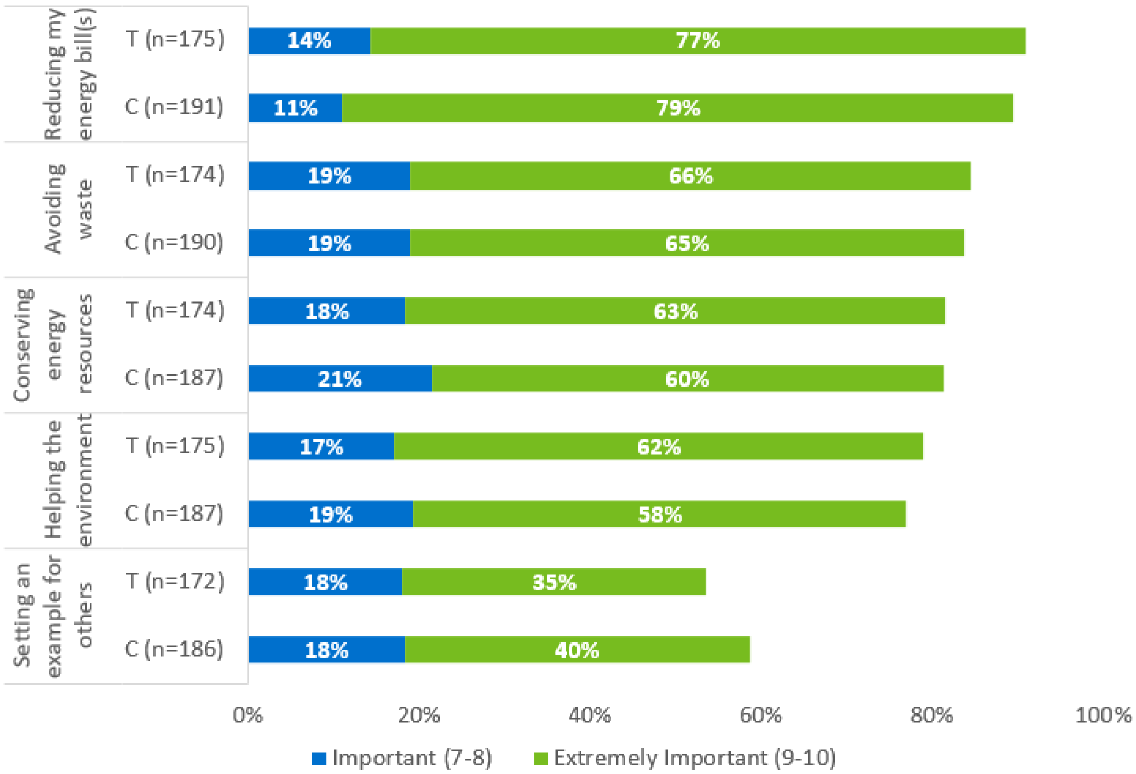
The control group and treatment groups report similar levels of motivation to save energy. Eighty-two percent of control customers and treatment customers respectively, indicated that knowing they are using energy wisely is important or "important" or "extremely important". (Figure 4-29). The reported percentage for the Treatment group differs from that in the figure due to rounding.

Figure 4-29: "How Important Is It for You to Know if Your Household is Using Energy Wisely?" - DEP



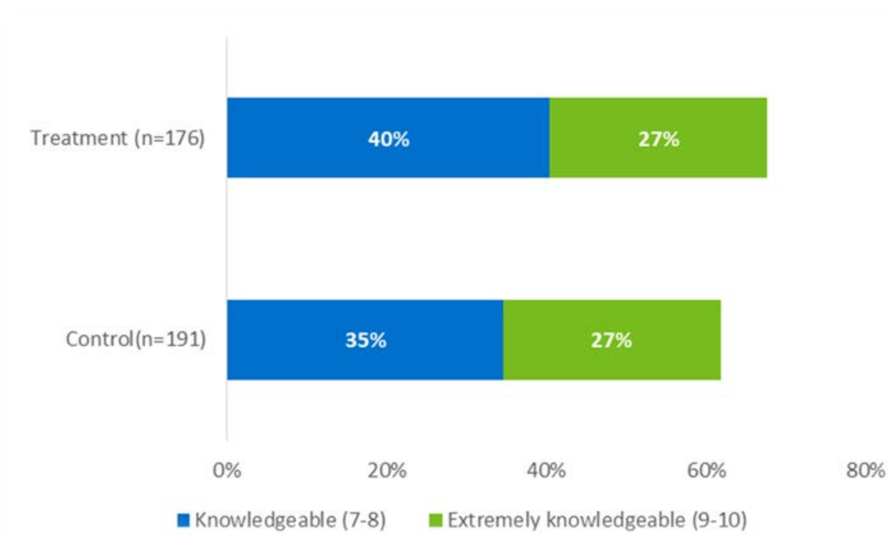
Customers were asked to rate, on a scale of 0 to 10, the importance of various reasons for why they might try to reduce their home's energy use. The strongest motivation for both groups is saving money on their energy bills, where 91% of treatment respondents and 90% of control respondents reported that saving money on their energy bills was "important" or "extremely important". Eighty-four percent of control respondents and 85% of treatment respondents, respectively, indicated that "avoiding waste" was important" or "extremely important" to them. Eighty-one percent of both treatment customers and control customers reported that "conserving energy resources" was important" or "extremely important". Seventy-nine percent of treatment customers and 77% of control customers reported that "helping the environment" was "important" or "extremely important". Those differences between the treatment and control group are not statistically significant. Figure 4-30 contains the frequency of responses to this question, shown as a percentage for both the treatment and control group.

Figure 4-30: "Please Indicate How Important Each Statement Is to You" - DEP



As indicated by Figure 4-31, 67% of treatment customers rated themselves above a seven on a 0-10 point scale of knowledgeability of ways to save energy, while 62% of control group customers rated themselves this way. The difference is not statistically significant at the 90% level of confidence.

Figure 4-31: "How Would You Rate Your Knowledge of the Different Ways You Can Save Energy in Your Home?" - DEP



Treatment respondents that took the treatment-only survey were asked how useful each MyHER feature was to their homes. A similar question was asked of both control group and treatment group respondents who took the primary survey rephrased to ask them how useful they *might expect* that information to be. Table 4-21 presents results of the portion, rating each item a "7" or higher on an 11-point scale of the hypothetical usefulness from the control and treatment customers who took the primary survey, and Table 4-22 presents the comparison results between the actual usefulness of each item rated by treatment customers (treatment-only survey) and the hypothetical usefulness rated by control customers in the primary survey).[14]

The results from the hypothetical usefulness rating (Table 4-21) did not find statistically significant differences in expected usefulness of information that is found on MyHER reports. Comparisons between the responses of customers in the treatment-only survey and control customers in the primary survey show that treatment customers respond differently to questions about information presented in MyHERs if the questions are asked in the context of the actual MyHER reports, however the response patterns show some limited significant separation between treatment and control customers in terms of usefulness of report content: Table 4-22 shows that control customers were significantly more likely to report that "Tips to help you save money and energy", "Information about services and offers from Duke Energy", and "Comparison to similar homes" would be useful than treatment customers reporting that they are actually useful. This finding suggests that there may be an opportunity to improve the presentment of this information in MyHERs.

Table 4-21: Hypothetical Usefulness of HER Features Treatment and Control - DEP

HER Feature	Control Group_Primary Survey	Treatment Group_Primary Survey
Tips to help you save money and energy	73% (n=188)	72% (n=173)
Graphs that display your home's energy use over time	72% (n=185)	73% (n=174)
Information about services and offers from Duke Energy	68% (n=186)	67% (n=172)
Examples of the energy use associated with common household items	67% (n=184)	67% (n=173)
Your home's energy use compared to that of similar homes	66% (n=183)	59% (n=173)
Customized suggestions for your home	60% (n=183)	66% (n=172)

[14] The implementation of a treatment-only survey, in addition to a primary survey provided to both treatment and control customers, afforded an opportunity to test the responses of treatment customers to a question asking about a MyHER feature they have actually seen vs. asking generally about how useful the information is (outside of the context of MyHER). This test leads us to the conclusion that the way customers are asked about this question matters and we recommend that in future surveys, MyHER treatment customers see questions about report content placed specifically in the context of them having seen the content in their reports, as opposed to in the hypothetical.

Table 4-22: Usefulness or Hypothetical Usefulness of HER Features Treatment and Control - DEP

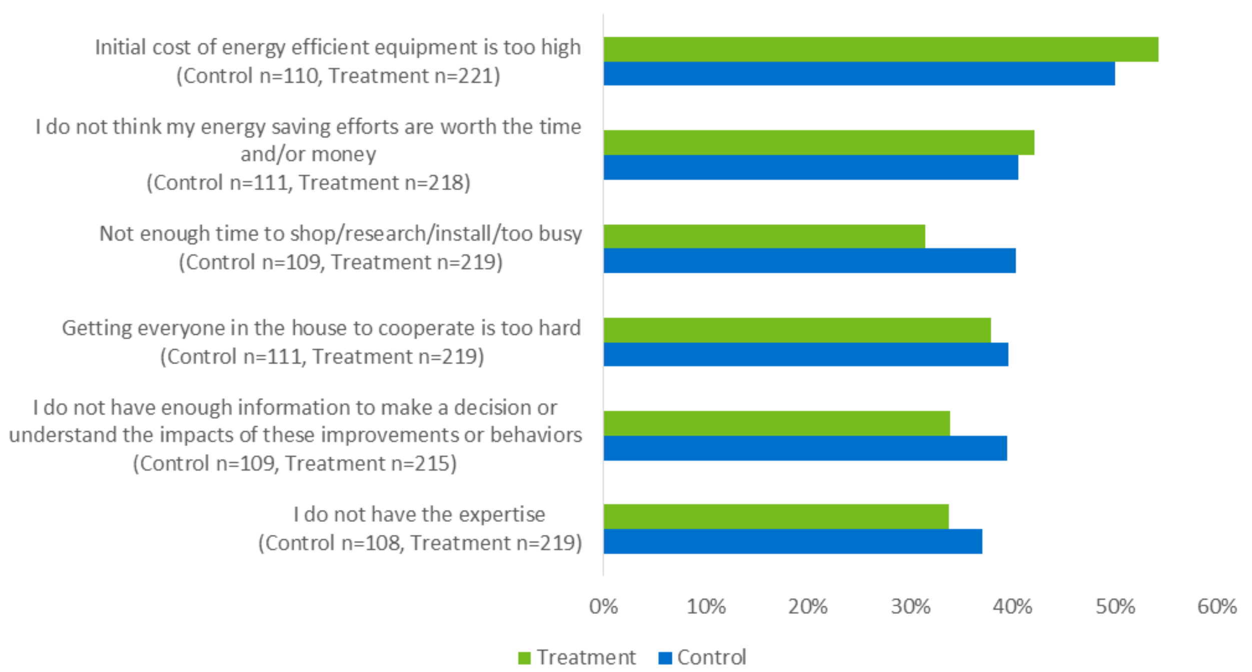
HER Feature	Control Group_Primary Survey	Treatment Group_Treatment Only Survey
Tips to help you save money and energy*	73% (n=188)	64% (n=146)
Graphs that display your home's energy use over time	72% (n=185)	73% (n=147)
Information about services and offers from Duke Energy**	68% (n=186)	54% (n=145)
Examples of the energy use associated with common household items	67% (n=184)	60% (n=146)
Comparison to similar homes***	66% (n=183)	46% (n=146)
Customized suggestions for your home	60% (n=183)	54% (n=147)

*statistically significant, p=0.073
**statistically significant, p=0.014
***statistically significant, p=0.000

Barriers to Customers Undertaking Energy Savings Actions

When asked the reasons why customers might not be able to save as much as energy as they would like, there were no statistically different response patterns between treatment and control customers, which indicates that MyHER is not making a measurable change in the potential barriers mentioned in this survey. The most commonly reported barrier is "the initial cost of energy efficient equipment is too high" (Figure 4-32): 54% of treatment respondents reported this as a barrier and 50% of control respondents did so as well. The least-commonly cited barrier was lack of expertise: 34% of treatment customers cited lack of expertise as a barrier as did 37% of control customers. The differences are not statistically significant.

Figure 4-32: Barriers to Customers Undertaking Energy Savings Actions - DEP



Suggestions about Duke Energy Improving Service Offerings

The survey provided an open-ended question to elicit suggestions about Duke Energy improving its service offerings to help customers reduce energy use. Only 22% (116 of 539, treatment and control customers in total) offered suggestions, including fourteen who offered only appreciative comments. Among those offering suggestions for improvement, the most common request, mentioned by 44 of the 116 with suggestions, reflected a desire for more energy savings information, programs, free light bulbs, and more incentives:

- "*They can make available those light bulbs, to us senior citizens that don't use computers. So we can order them*"
- "*Suggestions how to improve energy and reduce bill*"
- *"home energy inspections and a list of energy saving products that can be used to lower monthly costs"*
- "*Provide information regarding the amount of energy it takes to run dishwashers, lamps, televisions...*"
- "*Provide more rebates for large ticket items*"

Other comments centered on other suggestions, such as better communication, reducing price/providing senior and disability discounts, etc. Nexant categorized these suggestions on the general basis of their content; the results are presented in Table 4-23.

Table 4-23: Suggestions about Duke Energy Improving Service Offerings - DEP

Suggestion	Count	Percent of Respondents Mentioning (n=116)	Percent of Total Mentions (n=137)
Provide more energy savings information, programs, free light bulbs and more incentives	44	38%	32%
Better communication	26	22%	19%
Reduce price/provide senior and disability discounts	21	18%	15%
Miscellaneous	16	14%	12%
Appreciation	14	12%	10%
Express Frustration	10	9%	7%
Reduce power outages	4	3%	3%
Provide more detailed info in MyHER / offer MyHER to Townhomes / do more surveys	1	1%	1%
Improve website	1	1%	1%

Evidence of MyHER Effects

As noted above, while formal statistical testing found a number of differences among treatment and control group households for individual questions, the Nexant team sought to understand if the overall pattern of survey responses differed among treatment and control households. To do this, we categorized each survey question by topic area and then counted any survey item in which the treatment households provided a more positive response than the control households. Table 4-24 presents the categories, the count of questions in each category for which the treatment group provided a more favorable response than the control group, and the number of questions in each category. A response is considered "favorable" if the treatment group gave a response that is consistent with the program objectives of MyHER.

Table 4-24: Survey Response Pattern Index - DEP

Question Category	Count of Questions where T>C	Number of Questions in Topic Area	Portion of Questions where T>C
Duke Energy's Public Stance on Energy Efficiency	3	3	100%
Customer Engagement with Duke Energy Website	2	5	40%
Customers' Reported Energy-saving Behaviors	10	11	91%
Customer's Reported Energy Efficiency Improvements Made	9	9	100%
Customer Motivation, Engagement & Awareness of Energy Efficiency	10	11	91%
Barriers of Customer Not Undertaking Energy Savings Actions	4	6	67%
Customer Satisfaction with Duke Energy	2	4	50%
Total	**40**	**49**	**82%**

Nexant's approach consists of the following logical elements:

- Assume the number of positive responses between treatment and control customers will be equal if MyHER lacks influence;
- Count the total number of topics and questions asked of both groups – there are seven topic areas and 49 questions;
- Note any item for which the treatment group outperformed the control group – the treatment group outperformed the control group in 40 questions, or 82% of the total questions;
- Since this value is more than 50% we can conclude that MyHER had wide-ranging enhancing effects across all the various engagement and attitudinal areas probed by the survey.
- Considering these five areas, calculate the probability that the difference in response patterns is due to chance, rather than an underlying difference in populations – 0% (p-

value = 0.000). Since this probability is less than 10%, we reject the null hypothesis (that the number of positive responses for treatment and control customers is equal) at the 90% level of confidence.

Because this analysis compares the response patterns between the treatment and control group, if the MyHER program did not influence customers, one would expect the treatment group to "score higher" on roughly half of the questions. In other words, if the MyHER is not influencing treatment group customers, there is a 50/50 chance that they will "outperform" the control group as many times as not. For a more detailed description of the index framework, see Appendix G.

Respondent Demographics

Majority of all respondents—93% of treatment group customers and 88% of control group customers—own their residence. This difference is statistically significant. More than half of households surveyed have two or fewer residents, but about 22% of treatment households and control households respectively, have four or more residents. There are no statistically significant differences in the distribution of age of homes assigned to the treatment and control groups (Figure 4-33) (chi-squared test).

Figure 4-33: "In What Year Was Your Home Built?" - DEP

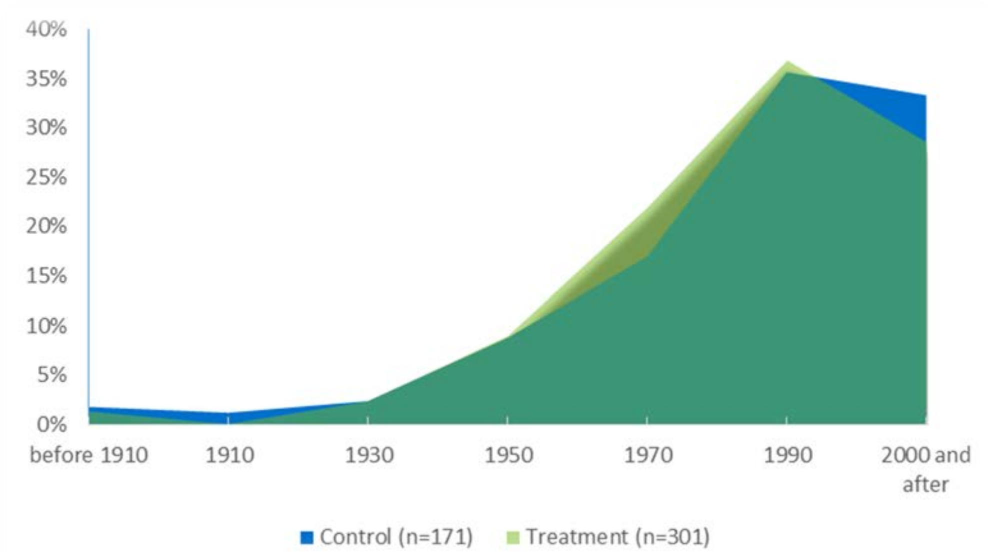
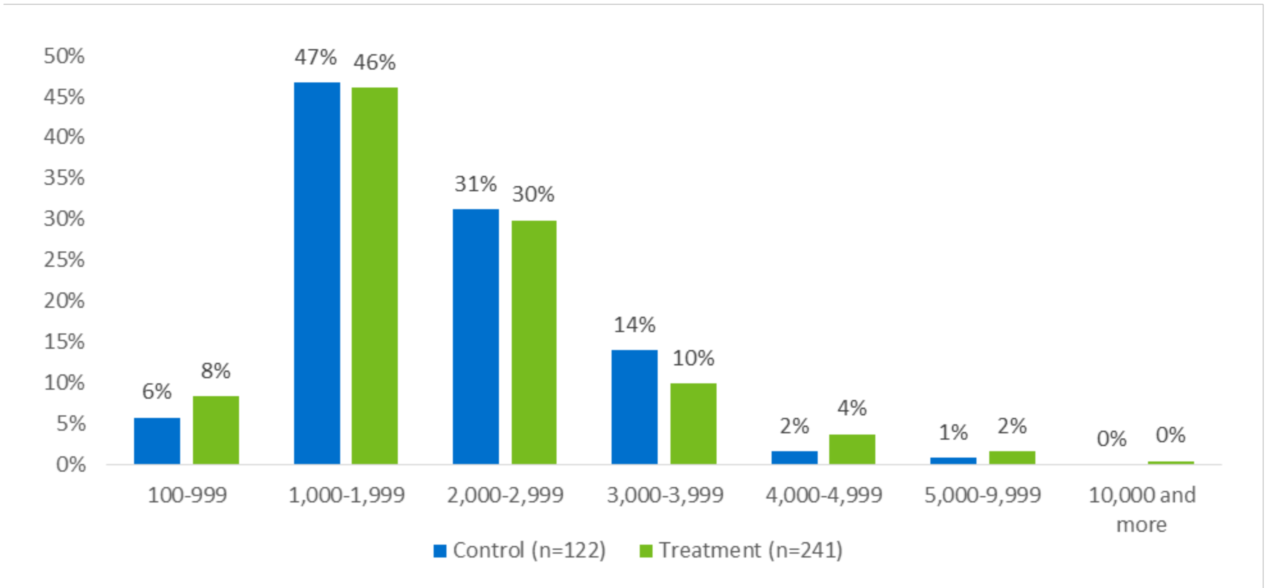


Figure 4-34 shows distribution of home square footage is similar between control and treatment households. The average square footage above ground is 2,022 for control households and 2,110 for treatment households.

Figure 4-34: How many square feet is above ground living space? - DEP



Respondent ages are relatively close to those reported by the U.S. Census American Community Survey (ACS) for Carolinas. The lowest age category (25-34) is often underrepresented when sampling based on residence in single family homes, given that many members of that population are in apartments, dormitories, or living with other family members. This common underrepresentation is true in this survey study, as well. The average age is 61 for control group respondents and 62 for treatment group respondents (see Table 4-25).

Table 4-25: Respondent Age Relative to American Community Survey - DEP

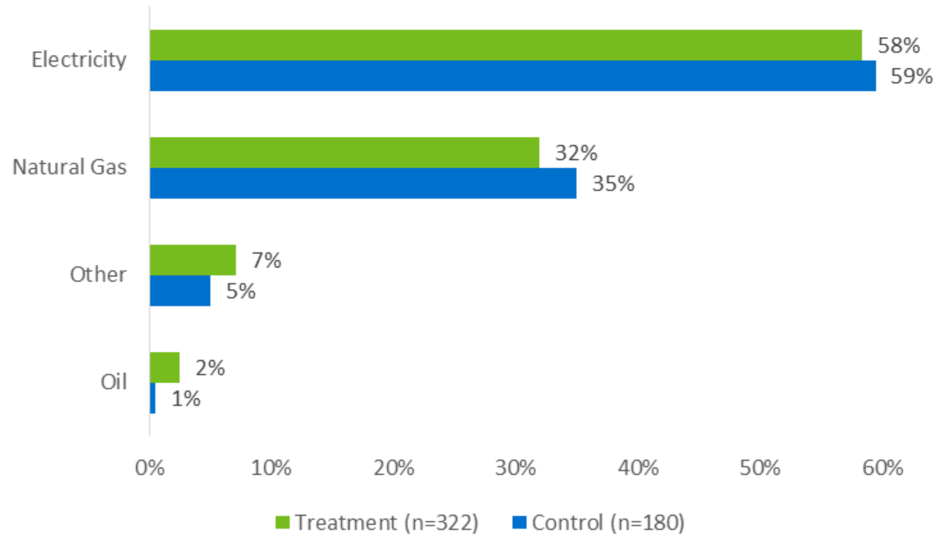
Age	Treatment Group (n=320)	Control Group (n=176)	2017 American Community Survey_Carolinas[15]
25-34	3%	3%	13%
35-44	14%	9%	13%
45-54	19%	18%	13%
55-64	19%	26%	13%
65 and over	45%	44%	16%

Figure 4-35 shows the primary heating fuel type used in control and treatment customers' households. More than half of treatment (58%) and control (59%) customers use electricity in

[15] American Community Survey (ACS) is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_SPL_K200104&prodType=table

their households for heating. Thirty-two percent of treatment customers and 35% of control customers use natural gas for heating.

Figure 4-35: Primary Heating Fuel in Households - DEP

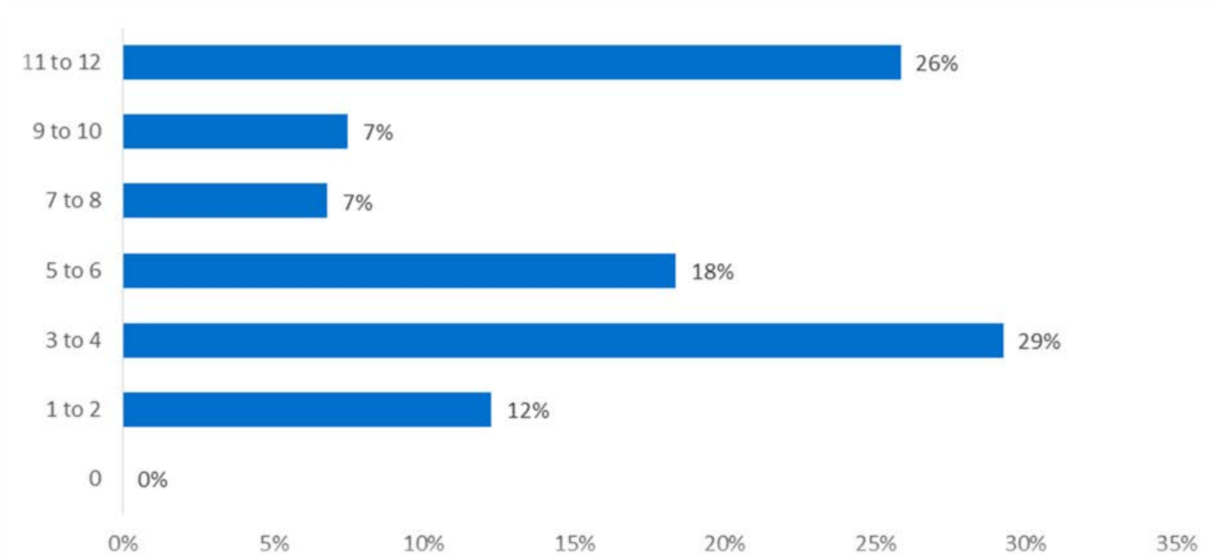


4.2.3.2 Treatment Households: Experience and Satisfaction with MyHER - DEP

A large majority of treatment household respondents, 94%, (160 of 170) recalled receiving at least one of the MyHER reports.

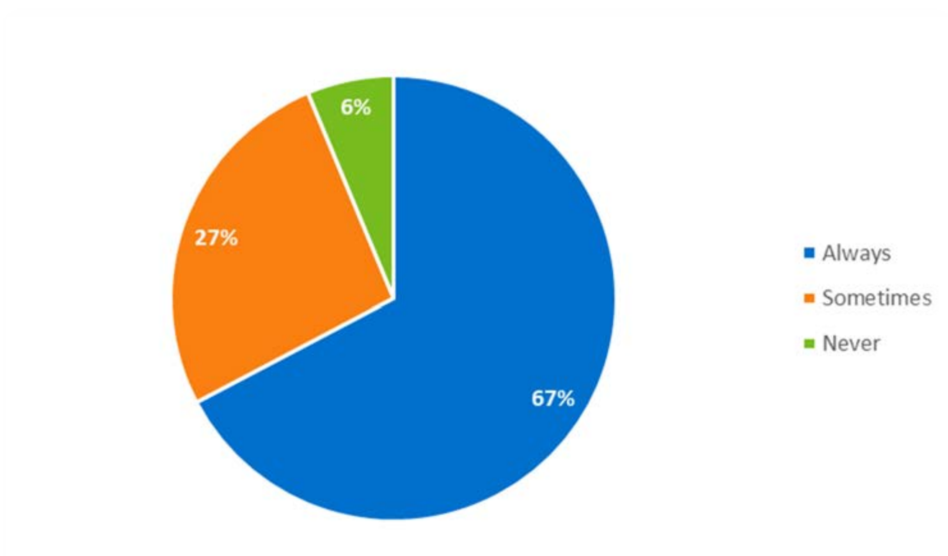
The survey asked those that could recall receiving at least one MyHER report if they could recall how many individual reports they had received "in the past 12 months" (Figure 4-36). The survey launched in January 2019, which means that most recipients would have received 8 MyHERs in the year since February 2018. Twenty-six percent (38 of 147) responded that they received 11 to 12 home energy reports in the past 12 months. The scattered distribution of responses related to recall is consistent with the difficulty of recalling an exact number of reports, however the question is valuable for grounding respondents in the experience of receiving a MyHER before asking them more specific questions about the document.

Figure 4-36: Reported Number of MyHERs Received "In the past 12 months" (n=147) - DEP



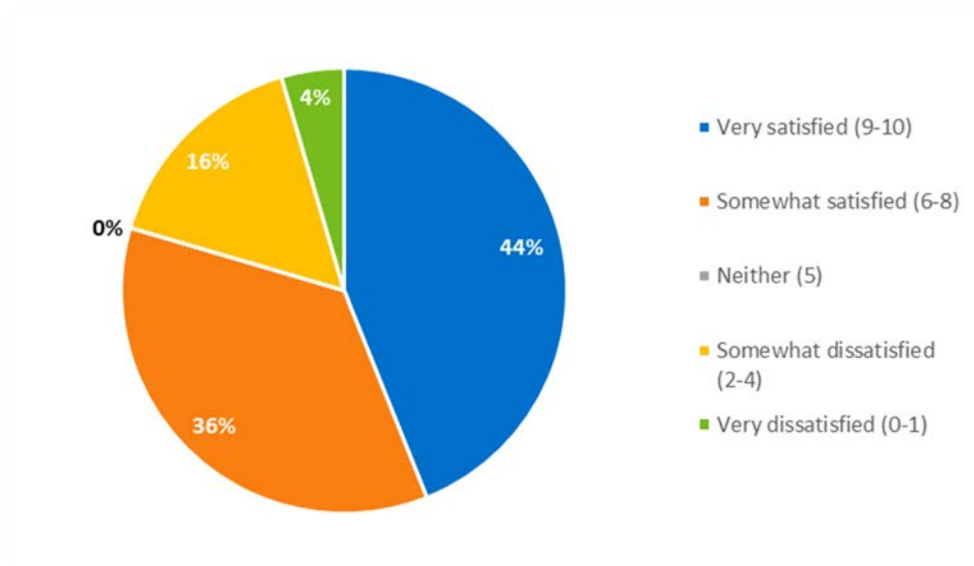
Survey respondents indicated high interest in the MyHER reports. As shown in Figure 4-37, when asked how often they read the reports, 94% of respondents indicated they "always" or "sometimes" read the reports. Ten respondents (6%) indicated they do not read the reports.

Figure 4-37: How Often Customers Report Reading the MyHER (n=159) - DEP



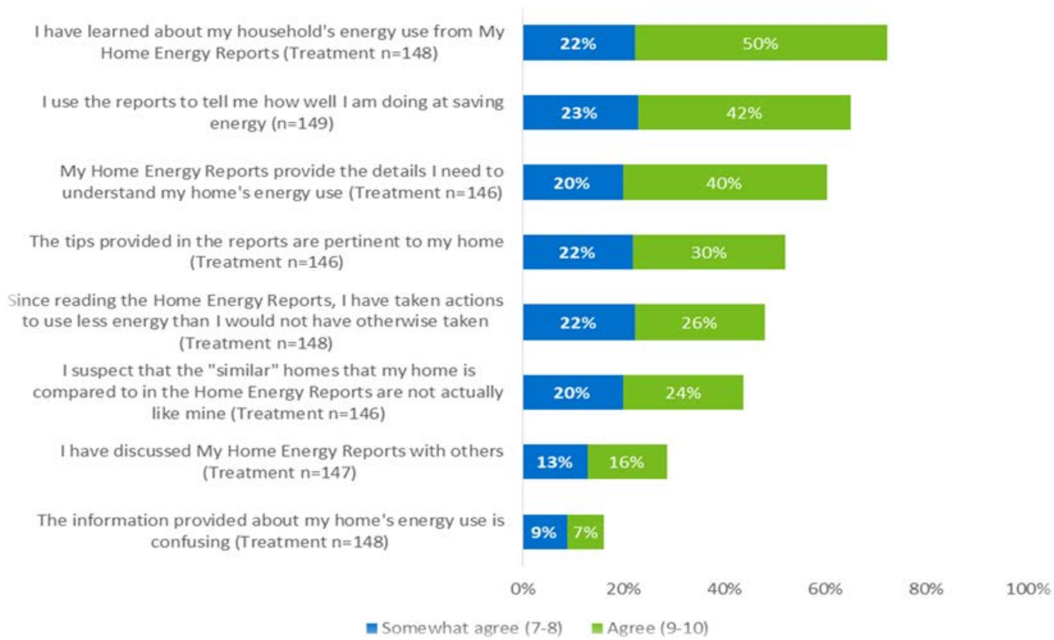
Eighty percent (105 of the 132 respondents that provided a rating) reported being “somewhat” or “very” satisfied with the information contained in the reports (Figure 4-38). The survey asked a further question to the respondents of why they said so: sixty-two of the satisfied respondents provided reasons. Among customers who gave the highest satisfaction ratings, the most common comments on the MyHERs described the reports’ ability to engage the customer and provide greater awareness. The customers who reported being somewhat satisfied most often simply described the reports as “useful.”

Figure 4-38: Satisfaction with the Information in MyHER Reports (n=132) - DEP



When asked to rate their agreement with a series of statements about MyHERs on a scale of 0 to 10, recipients largely agreed that the reports helped them understand their home’s energy use, with 72% of respondents rating their agreement a seven or higher on a 0-10 point scale, and that they use the report to gauge how successful they are at saving energy (65% rating a seven or higher). Sixty percent of respondents agreed that the reports provided the details they needed to understand their home’s energy usage. Respondents provided weaker agreement to statements about the pertinence of the tips provided to their homes and whether they have taken actions to use less energy than they would not have since reading MyHERs. A relatively small percentage (16%) agreed with the statement that the information provided is confusing. (Figure 4-39).

Figure 4-39: Level of Agreement with Statements about MyHER (0-10 Scale) - DEP



The survey provided an open-ended question to elicit suggestions about potential improvements to MyHER among those that had reported reading at least one report. Only 43% (64 of 149) offered suggestions, including six who offered only appreciative comments. Among those offering suggestions for improvement, the most common request, mentioned by 23 of the 64 with suggestions, reflected a desire for more specific information or details about their home and specific actions they should take. Some of these requests reflected interest in understanding at a more granular level how their home uses energy and energy consumption information related to appliances:

- "*How is energy distributed amongst outlets, appliances, etc.*"
- "*More specific about what electronics use the most energy so I can lower the usage"*
- *"Hours of use, including hours of the day, compare to previous months and or years"*
- "*Maybe by specifying where exactly do we need to focus in order to bring the bill payment down*"
- "*Provide size and age of houses compared to*"

Other comments centered on other suggestions (such as providing free energy assessment, etc.), disbelief in the relevance of comparison homes, and a few respondents that simply did not see value in the reports. Responses coded as recommending production changes focus on changing the delivery method of MyHER reports as follows:

- "*Make all these energy reports available online, so that consumer can view it any time*"
- "*Make it available online...*"

Nexant categorized these suggestions on the general basis of their content; the results are presented in Table 4-26.

Table 4-26: Distribution Suggestions for Improvement (Multiple Responses Allowed) - DEP

Suggestion	Count	Percent of Respondents Mentioning (n=64)	Percent of Total Mentions (n=75)
Provide more specific information or details	23	36%	31%
Don't believe comparison/accuracy	16	25%	21%
Other suggestions (such as providing information on solar panels, etc.)	8	13%	11%
Appreciate the Home Energy Report	9	14%	12%
Address unique home/circumstances	5	8%	7%
Expressed frustration	5	8%	7%
Provide discounts/incentives/equipment upgrades	5	8%	7%
Change production (mail, paper, format)	3	5%	4%
Don't see value/dislike	1	2%	1%

Treatment households were also asked questions that focused on the awareness and use of MyHER Interactive, revealing low awareness of the online Interactive platform:

- Only 35% of treatment customers are aware of MyHER Interactive;
- Among aware customers, 86% reported that they had not signed up to use MyHER Interactive; and
- When asked why they haven't signed up to use MyHER Interactive, 23% of respondents reported that they were very busy, 23% reported that they were not interested in it, 18% reported that they did not have either a computer or internet access, and another 10% reported that they actually did not know about it.

4.3 Summary of Process Evaluation Findings

In-depth interviews with MyHER implementation staff reveal that the DEP and DEC MyHER program has benefited from a number of enhancements to the program and improvements in process and program management, and continues to operate effectively. Electronic MyHERs are now sent via email to all treatment customers that have provided Duke Energy with an email address. This enhancement means that report production is now a year-round process since the email reports are sent on a monthly basis for each month of the year. The MyHER report template was also refreshed to increase visual appeal and value to the customer. The new template includes the addition of a module that presents energy usage disaggregated by end-use category, on a looking-forward basis for the month ahead. Also, the template update included the addition of images to the free form text (FFT) module of the reports. Lastly, the content and graphics of the email template was changed. There has also been increased enrollment for the MyHER Interactive online portal, which is emerging as a priority for Duke Energy and Tendril. The MyHER user experience is expected to be further enhanced in the future as the rollout of AMI meters and increased availability of AMI data continues.

From the backoffice perspective, Tendril, Duke Energy's MyHER program provider, implemented a number of process improvements. Tendril migrated their computational platform to Amazon Web Services (AWS), significantly reducing the time required to process data and generate batches of reports, and developed a pre-production platform to enable Duke Energy to review PDF drafts of MyHERs prior to promotion into production, which realized process efficiencies for Tendril. Additionally, Tendril has made progress on updating the "action tips" section of the report to "smart actions", by introducing the ability for these tips to be targeted to particular groups of MyHER recipients for which the tips are most appropriate. To date, roughly 20% of these tips are now "smart actions". Tendril also transitioned email MyHER production to Hypertext Markup Language (HTML) format to provide greater flexibility in Tendril's production processes.

Duke Energy and Tendril continue to collaborate for success through joint weekly status meetings, monthly operations meetings, and quarterly governance meetings. Working together, monthly key performance indicators (KPIs) such as in-home dates and percentage of treated customers treated are monitored. These meetings provide the venue for brainstorming and roadmapping activities as well as monitoring Duke Energy's MyHER product request list. This list is a priority for Duke Energy, and currently tracks about 25 items. Tendril has implemented an internal HER Improvement team to address the items on the list, and has made progress in this endeavor. Since the prior evaluation, Tendril has improved their performance in product quality, which is rigorously monitored by Duke Energy staff. These improvements have been attributed to a stable operations team at Tendril which has also expanded to include a quality control engineer. This engineer has designed and implemented automated QC checks, using AWS and other software, that have reduced errors in report production, increased the speed of the process, and reduced the staff necessary to manage it. This process will continue to change in 2019, as Tendril implements their HOMERS platform, allowing for increased efficiency in report production and quality control, as well as the implementation of the "self-serve" FFT tool that will eventually allow Duke Energy to produce and manage FFT content. This tool will eliminate the need for the highly resource-intensive collaboration procedure that has characterized FFT content production to this point.

Additionally, Tendril has also adopted a "Batch 0" strategy to implement significant changes to the MyHER reports on a test batch of data prior to producing a live batch to be mailed to customers. Batch 0 reports are tested for quality by both Tendril and Duke Energy and have allowed unexpected problems to be surfaced early and also to allow Duke Energy to fine tune the newly implemented changes. Improved product quality has resulted in fewer problems turning up in the quality control process.

In general, there was a strong emphasis on the development of procedures and strategies to prevent problems in the MyHER production process including a redesigned QC process, progress on the product request list, the management of messaging calendars, and the preparation for the rollout of HOMERS.

Though there has been continued success in communications and data transfers, there were some problems emerging from the process of reconciling customer email lists that resulted in the loss of emails that had been updated by Duke Energy customers, as well as some difficulty that Tendril experienced with importing AMI data from Duke Energy. The latter problem is being remedied with the implementation of a new data ingester, while the former is being addressed by a procedural change until the reconciliation process is automated. Other areas that were noted for potential improvement include improving the MyHER login requirements and Interactive profile questionnaire. The latter improvement is to address a larger concern among customers that the disaggregated energy use figures are not accurate.

Survey Findings - DEC

Surveys of DEC treatment and control customers show that, among treatment group households:

- 93% recalled receiving at least one MyHER and 99% of those indicated that they “always” or “sometimes” read the reports.
- 87% reported being “very” or “somewhat” satisfied with the information provided by MyHERs.
- Only 28% of MyHER recipients are aware of MyHER Interactive, and only 8% of the aware recipients report that they have signed up to use it. When asked why they haven’t signed up to use MyHER Interactive, 30% of respondents reported that they were too busy, 22% reported that they were not interested in it, and 9% further reported that they did not know about it.
- Seventy-one percent of respondents strongly agree with the statement “I have learned about my household’s energy use from My Home Energy Reports”. Very few (12%) strongly agree with the idea that the energy usage information presented by the reports is confusing.
- The most useful features of the reports, as rated by treatment customer respondents, are the graphs that illustrate the home’s energy usage over time. The least useful-rated feature is customized suggestions for homes.
- 44% of treatment customers reported that MyHERs spurred them to undertake energy saving actions that they would not otherwise have done.
- Most (72%) respondents had no feedback or suggestions to improve the program. Those that made suggestions most frequently questioned the accuracy of the comparison, and requested more specific or detailed information in their MyHERs.

In comparing responses of treatment and control group respondents, there were a number of areas where treatment customers provided responses that more favorably reflected increased awareness, engagement, or attitudes towards energy savings opportunities and actions relative to control customers:

- Treatment customers are significantly more likely than control customers to report having undertaken behaviors to reduce household energy use or having made energy efficiency improvements to their home (73% to 63%).
- Treatment group respondents were significantly more likely to have engaged in 7 (out of 10) energy saving behaviors and 1 (out of 9) energy efficiency improvement than control respondents.

An index designed to account for overall survey-wide differences in response patterns found a more positive response pattern (31 positive responses out of a total of 49 questions) for treatment customers in simple frequencies across many facets of the survey. Using standard statistical techniques (specifically, the non-parametric sign test), Nexant calculates the probability of randomly obtaining positive results for 31 of 49 questions is 2% and is not likely due to chance. We conclude that exposure to MyHER is positively affecting customer awareness of, engagement in, and attitudes towards energy savings opportunities and actions. MyHER is also implemented with the goal of increasing customer satisfaction with Duke Energy and its stance on Energy Efficiency. These survey results do not show evidence of a measurable uplift in satisfaction in DEC that can be attributed to MyHER.

Survey Findings - DEP

Surveys of DEP treatment and control customers show that, among treatment group households:

- 94% recalled receiving at least one MyHER and 94% of those indicated that they “always” or “sometimes” read the reports.
- 80% reported being “very” or “somewhat” satisfied with the information provided by MyHERs.
- Only 35% of MyHER recipients are aware of MyHER Interactive, and only 14% of the aware recipients report that they have signed up to use it. When those who hadn't signed up for MyHER Interactive were asked why, 23% of respondents reported that they were too busy, 23% reported that they were not interested in it, 18% reported that they did not have either a computer or internet access, and another 10% reported that they actually did not know about it.
- 48% of treatment-only group members reported that MyHERs spurred them to undertake energy saving actions that they would not otherwise have done.
- Seventy-two percent of respondents agree with the statement: “I have learned about my household’s energy use from My Home Energy Reports”. Few (16%) strongly agree with the idea that the energy usage information presented by the reports is confusing.
- The most useful features of the reports, as rated by treatment customer respondents, are the graphs that illustrate the home’s energy usage over time. The least useful-rated feature is comparison to similar homes.

- More than half (57%) of respondents had no feedback or suggestions to improve the program. Those that made suggestions most frequently reflected a desire for more specific information or details about their home and specific actions they should take in their MyHERs.

In comparing responses of treatment and control group respondents, there were a number of areas where treatment customers provided responses that more favorably reflected increased awareness, engagement, or attitudes towards energy savings opportunities and actions relative to control customers:

- Treatment customers significantly more likely than control customers to report having undertaken behaviors to reduce household energy use or having made energy efficiency improvements to their home (71% to 60%).
- Treatment group respondents were significantly more likely to have engaged in 5 (of 10) energy saving behaviors and 5 (of 9) energy efficiency improvements than control respondents.
- Treatment group respondents reported significantly higher levels of satisfaction with the information Duke Energy makes available about energy efficiency programs, with the information Duke Energy provides to help customers save on energy bills, and with Duke Energy's commitment to promoting energy efficiency and the wise use of electricity.

An index designed to account for overall survey-wide differences in response patterns finds a more positive response pattern for treatment customers in simple frequencies across the entire survey. Thirty-six out of 40 questions show more favorable responses for the treatment group. Using standard statistical techniques (specifically, the non-parametric sign test), Nexant calculates the probability of randomly obtaining this result is nearly 0% and thus extremely likely due to chance. We conclude that exposure to MyHER is increasing awareness of, engagement in, and attitudes towards energy savings opportunities of treatment customers relative to control customers.

5 Conclusions and Recommendations

Nexant finds that the MyHER program is an effective channel for increasing customer engagement with energy efficiency and demand side management. The RCT program design facilitates reliable estimates of program energy savings. Further, the energy savings generated by the program are corroborated by survey findings of respondent awareness of, engagement in, and focus on the importance of saving energy. As an additional benefit, Nexant finds that MyHER is a useful tool for enhancing Duke Energy and increases uptake in other Duke Energy efficiency programs. The MyHER program has achieved full deployment among Duke Energy Carolinas and Progress single-family home customers and Nexant recommends that Duke Energy continue to focus on program processes and operations to further increase the efficiency of program delivery.

Duke Energy also launched the MyHER Interactive portal in March 2015. The portal offers additional means for customers to customize or update Duke Energy's data on their premises, demographics, and other characteristics that affect consumption and the classification of each customer. The portal also provides additional custom tips based on updated data provided by the customer. MyHER Interactive sends email challenges to portal users that seek to engage customer in active energy management, additional efficiency upgrades, and conservation behavior. Nexant evaluated the impacts of the MyHER Interactive portal using a matched comparison group because the MyHER Interactive portal was not deployed as a randomized controlled trial (RCT).

5.1 Impact Findings

Nexant estimates that the MyHER program saved a total of 292.2 GWh at Duke Energy Carolinas and 141.1 GWh at Duke Energy Progress during the period June 2017 to May 2018. The confidence and relative precision of the estimate is 90% and 6.4%, respectively for DEC and 9.4% for DEP. This impact estimate accounts for the fact that MyHER increases uptake of other Duke Energy programs; 6.0 kWh has been subtracted from the average household program impact to account for the MyHER uplift in other programs in both DEC and DEP. Without such a correction, those savings (6.0, kWh per household per year) would be double counted by Duke Energy.

Nexant estimates that DEC customers that sign up to use the MyHER Interactive Portal saved an additional 21 kWh per month, representing an additional 1.6% in energy savings during the period June 2017 to May 2018. These savings are statistically significant at the 90% level of confidence and are incremental, or over and above the savings that MyHER alone delivers. However, only a relatively small group of DEC MyHER recipients are signed up to use the portal, as of May 2018 38,190 DEC customers are Interactive users, out of 1,151,896 DEC MyHER recipients overall. It's important to note that since MyHER Interactive portal customers volunteered to participate in the portal product, their savings may not represent the expected savings if all customers were assigned to the portal product by default. DEP MyHER participants do not generate statistically significant energy savings during the period June 2017 to May 2018.

5.2 Process Findings

The DEP and DEC MyHER programs are Duke Energy's most mature behavioral programs in terms of delivered energy savings in each jurisdiction. The large volume of data required to generate MyHER and support the program delivery schedule is the primary driver of program activities and focus. Duke Energy and its implementation contractor, Tendril, are successfully managing this process and providing DEP and DEC customers' valuable information for managing home energy consumption.

The DEP and DEC MyHER programs have benefited from a number of process and product management improvements. Careful change management and a stable operations team at Tendril have been key enablers of maintaining a production process that consistently meets MyHER quality control standards.

MyHER participants have been found in this evaluation's customer surveys to display higher levels or incidence of a number of energy savings behaviors, opinions, attitudes, and engagement with energy efficiency. MyHER is also positively affecting customer's perception of Duke Energy's public stance on energy efficiency for DEP, and some aspects of customers' monitoring and tracking household energy consumption habits in both DEC and DEP.

5.3 Program Recommendations

- **Continue the commitment to simultaneous control and treatment assignment.** New assignments to treatment and control groups must be simultaneous and Tendril and Duke Energy should work to add all newly assigned treatment and control groups to their respective statuses in a single billing month, to the extent that is technically feasible.
- **Continue the practice of making assignments of new accounts to MyHER treatment and control groups once a year, or at most, twice a year.** The numbers of Duke Energy customers becoming eligible for the program each year do not facilitate more frequent assignments. This is due to the fact that sufficient numbers of customers must be set aside for the control group each time a group of customers is assigned to treatment in order for the evaluator to be able to measure the energy savings delivered by the new cohort.
- **Increase MyHER participant awareness of Interactive.** The process evaluation finds that current awareness of Interactive among DEP and DEC MyHER participants is very low, so another program objective above actual engagement with Interactive is to more effectively get the word out about its existence.
- **Continue to drive engagement with the Interactive Portal.** MyHER Interactive's ability to deliver measurable energy savings is on the rise, as shown by this evaluation in comparison to the prior DEC evaluation, as well as the MyHER evaluations for other

Duke Energy jurisdictions completed in the past year. We recommend that Duke Energy continue to drive more MyHER participants to the portal.

- **Continue to operate MyHER with an eye towards change management**. MyHER's implementer Tendril has made great strides in improving quality control performance since the prior evaluation in the automating of this process. Effective change management and stable staffing have been notable contributors to these improvements and they should continue to be emphasized in MyHER program operations, especially as Tendril's new HER production platform, HOMERS (the Home Energy Reporting Service), is rolled out and its implementation is optimized.
- **Continue to prioritize the structuring of the processes and schedules for program elements**. This organization of tasks for elements such as the FFT report module has been a significant success in the operations of the MyHER program and has the made reactive responses to impending deadlines and emergent challenges that characterized these operations in the past much less common. Program staff should seek out additional opportunities for the optimization of program schedules, tasks, and long term goals in this manner.

Appendix A Summary Forms

MyHER Carolinas

Completed EMV Fact Sheet

Description of program

Duke Energy offers the My Home Energy Report (MyHER) to residential customers. MyHER relies on principles of behavioral science to encourage customer engagement with home energy management and energy efficiency. The program accomplishes this primarily by delivering a personalized report comparing each customer's energy use to a peer group of similar homes.

Date	July 10, 2019
Region(s)	Carolinas
Evaluation Period	June 2017 – May 2018
Annual kWh Savings	292,174,507 kWh (Report) 7,378,007 kWh (Portal)
Per Participant kWh Savings	247.7 kWh/home (Report) 255.1 kWh/home (Portal)
Coincident kW Impact	0.069 kW/home (Report) 0.071 kW/home (Portal)
Net-to-Gross Ratio	Not Applicable
Process Evaluation	Yes
Previous Evaluation(s)	2017 – Nexant 2014 – TecMarket Works

Evaluation Methodology

Impact Evaluation Activities

- *Eligible accounts are randomly assigned to either a treatment (participant) group or a control group. The control group accounts are not exposed to MyHER in order to provide the baseline for estimating savings attributable to the Home Energy Reports. In this randomized controlled trial (RCT) design, the only explanation for the observed differences in energy consumption between the treatment and control group is exposure to MyHER*.
- *The impact estimate is based on monthly billing data and program participation data provided by Duke Energy.*
- *The RCT delivery method of the program removes the need for a net-to-gross analysis as the billing analysis directly estimates the net impact of the program.*

Impact Evaluation Findings

- *Realization rate = 108% for energy impacts; 247.7 kWh per home (Report)*

Process Evaluation Activities

- *337 surveys of treatment customers, 211 surveys for control group customers and staff interviews.*

Process Evaluation Findings

- *93% of MyHER recipients recall receiving the reports.*
- *87% of MyHER recipients are "very" or "somewhat" satisfied with the information provided by the reports.*
- *28% of MyHER recipients are aware of MyHER Interactive.*
- *MyHER produces an uplift in customer awareness of, engagement in, and attitudes towards energy savings.* opportunities and actions

MyHER Progress

Completed EMV Fact Sheet

Duke Energy offers the My Home Energy Report (MyHER) to residential customers. MyHER relies on principles of behavioral science to encourage customer engagement with home energy management and energy efficiency. The program accomplishes this primarily by delivering a personalized report comparing each customer's energy use to a peer group of similar homes.

Date	July 10, 2019
Region(s)	Progress
Evaluation Period	June 2017 – May 2018
Annual kWh Savings	141,099,476 kWh
Per Participant kWh Savings	201.2 kWh/home
Coincident kW Impact	0.071 kW/home
Net-to-Gross Ratio	Not Applicable
Process Evaluation	Yes
Previous Evaluation(s)	2017 – Nexant

Evaluation Methodology

Impact Evaluation Activities

- *Eligible accounts are randomly assigned to either a treatment (participant) group or a control group. The control group accounts are not exposed to MyHER in order to provide the baseline for estimating savings attributable to the Home Energy Reports. In this randomized controlled trial (RCT) design, the only explanation for the observed differences in energy consumption between the treatment and control group is exposure to MyHER*.
- *The impact estimate is based on monthly billing data and program participation data provided by Duke Energy.*
- *The RCT delivery method of the program removes the need for a net-to-gross analysis as the billing analysis directly estimates the net impact of the program.*

Impact Evaluation Findings

- *Realization rate = 137% for energy impacts; 201.2 kWh per home*

Process Evaluation Activities

- *347 surveys of treatment customers, 192 surveys for control group customers and staff interviews.*

Process Evaluation Findings

- *94% of MyHER recipients recall receiving the reports.*
- *80% of MyHER recipients are "very" or "somewhat" satisfied with the information provided by the reports.*
- *35% of MyHER recipients are aware of MyHER Interactive.*
- *MyHER produces an uplift in customer awareness of, engagement in, and attitudes towards energy savings.* opportunities and actions

Appendix B Measure Impact Results

Table B-1: DSMore Measure Impact Results

Measure Category	Prod Code	Jurisdiction	Gross Energy Savings (kWh)	Gross Summer Coincident Demand (kW)	Gross Winter Coincident Demand (kW)	Net to Gross Ratio	Net Energy Savings (kWh)	Net Summer Coincident Demand (kW)	Net Winter Coincident Demand (kW)	Measure Life
NC_ My Home Energy Report	HECR	DEC	248	0.0691	N/A	100%	248	0.0691	N/A	1
MyHER Interactive		DEC	255	0.0712	N/A	100%	255	0.0712	N/A	1
NC_ My Home Energy Report	HECR	DEP	201	0.0712	N/A	100%	201	0.0712	N/A	1

Appendix C Survey Instruments

Primary Survey

Q1. Please rate how satisfied you are with Duke Energy as your electric supplier.

Not at all Satisfied										Completely Satisfied
0	1	2	3	4	5	6	7	8	9	10

Q2. Please rate your overall satisfaction with each of the following aspects of communications from Duke Energy.

	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied
The information available about Duke Energy's efficiency programs.	☐	☐	☐	☐	☐
Duke Energy's commitment to promoting energy efficiency and the wise use of electricity.	☐	☐	☐	☐	☐
The information Duke Energy provides to help customers save on energy bills.	☐	☐	☐	☐	☐

Q3. Have you logged in to your Duke Energy account to do any of the following? Check all that apply.

- ☐ I have never logged in
- ☐ Pay my bill
- ☐ Review energy consumption graphs
- ☐ Look for energy efficiency opportunities or ideas
- ☐ None of the above

Q4. How often do you access the Duke Energy website to search for information about rebate programs, energy efficient products, or ways to make your home more energy efficient? Select only one.

- ☐ Monthly
- ☐ A few times a year
- ☐ Once a year
- ☐ Never

Q5. If you needed to replace major home equipment or were considering improvements to your home's energy performance today, how likely would you be to check the Duke Energy website for information about energy efficient solutions or incentives?

Not at all Likely										Extremely Likely
0	1	2	3	4	5	6	7	8	9	10

Q6. How important is it for you to know if your household is using energy wisely?

Not at all Important										Extremely Important
0	1	2	3	4	5	6	7	8	9	10

Q7. How would you rate your knowledge of the different ways you can save energy in your home?

Not at all Knowledgeable										Extremely Knowledgeable
0	1	2	3	4	5	6	7	8	9	10

Q8. Over the past 12 months, have you or another member of your household taken any actions to reduce your household energy use, or made any energy efficiency improvements in your home?

☐ Yes ☐ No – **Skip to Q12**

Q9. Which actions have been taken?

	Yes	No	Don't Know
Adjusted heating or cooling settings to save energy	☐	☐	☐
Reduced water heater temperature to save energy	☐	☐	☐
Wash clothes in cold water	☐	☐	☐
Fully load clothes washer	☐	☐	☐
Fully load dishwasher	☐	☐	☐
Turn off lights in unused or outdoor areas	☐	☐	☐
Unplug or shut down household electronics when not in use	☐	☐	☐
Maintain heating or cooling equipment for more efficient operation	☐	☐	☐
Use a portable fan or ceiling fan for cooling instead of an air conditioner	☐	☐	☐
Other, please specify:			
Other, please specify:			

Q10. Which energy efficiency improvements have been made?

	Yes	No	Don't Know
Install energy-efficient kitchen or laundry appliances	☐	☐	☐
Install energy-efficient heating/cooling equipment	☐	☐	☐
Install energy-efficient water heater	☐	☐	☐
Replace windows or doors with more energy-efficient types	☐	☐	☐
Caulk or weatherstrip (windows or doors)	☐	☐	☐
Add insulation to attic, walls, or floors	☐	☐	☐
Install energy-efficient lighting	☐	☐	☐
Install programmable thermostat or "smart" thermostat	☐	☐	☐
Purchase ENERGY STAR certified home electronic equipment (a television, for example)	☐	☐	☐

Q11. Below are some reasons why you might not be able to save as much energy as you would like. How important are each of the following reasons? Scale: 0 = Not at all Important; 10 = Extremely Important

	Not at all Important										Extremely Important
Initial cost of energy efficient equipment is too high	0	1	2	3	4	5	6	7	8	9	10
Not enough time to shop/research/install /Too busy	0	1	2	3	4	5	6	7	8	9	10
I do not have the expertise	0	1	2	3	4	5	6	7	8	9	10
I do not have enough information to make a decision or understand the impacts of these improvements or behaviors	0	1	2	3	4	5	6	7	8	9	10
Getting everyone in the house to cooperate is too hard	0	1	2	3	4	5	6	7	8	9	10
I do not think my energy saving efforts are worth the time and/or money	0	1	2	3	4	5	6	7	8	9	10

Q12. Which of the following do you do with regard to your household's energy use? Check all that apply.

- ☐ Track monthly energy use
- ☐ Track the total amount of your bill
- ☐ Compare usage to previous months
- ☐ Compare usage to the same month from last year
- ☐ None of the above

Q13. Thinking about the information you could have about your home's energy use, please rate how useful each of the following items would be for your household. Scale: 0 = Not at all Useful; 10 = Extremely Useful

	Not at all Useful										Extremely Useful
Your home's energy use compared to that of similar homes	0	1	2	3	4	5	6	7	8	9	10
Tips to help you save money and energy	0	1	2	3	4	5	6	7	8	9	10
Examples of the energy use associated with common household items	0	1	2	3	4	5	6	7	8	9	10
Customized suggestions for your home	0	1	2	3	4	5	6	7	8	9	10
Graphs that display your home's energy use over time	0	1	2	3	4	5	6	7	8	9	10
Information about services and offers from Duke Energy	0	1	2	3	4	5	6	7	8	9	10

Q14. The statements below provide reasons why households might try to reduce their home's energy use. Please indicate how important each statement is to you. Scale: 0 = Not at all Important; 10 = Extremely Important

	Not at all Important										Extremely Important
Reducing my energy bill(s)	0	1	2	3	4	5	6	7	8	9	10
Helping the environment	0	1	2	3	4	5	6	7	8	9	10
Setting an example for others	0	1	2	3	4	5	6	7	8	9	10
Avoiding waste	0	1	2	3	4	5	6	7	8	9	10
Conserving energy resources	0	1	2	3	4	5	6	7	8	9	10

Q15. Please indicate your level of agreement with each of the following statements:

	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree
Duke Energy provides excellent customer service	☐	☐	☐	☐	☐
Duke Energy respects its customers	☐	☐	☐	☐	☐
Duke Energy provides service at a reasonable cost	☐	☐	☐	☐	☐

Q16. Before today, were you aware that you could order free or discounted lighting products through the Duke Energy website?

☐ Yes ☐ No – **Skip to Q17**

Q16a. How many **free** light bulbs have you ordered through the Duke Energy website this year? ________

Q16b. How many **discounted** light bulbs have you ordered through the Duke Energy website this year? ________

Q17. How could Duke Energy improve upon its service offerings to help you reduce your energy usage?

____

____

____

Q18. Do you own or rent this residence? ☐ Own ☐ Rent

Q19. Including yourself, how many people live in your home? ________

Q20. In what year was your home built? ________

Q21. How many square feet is the above-ground living space? ________

Q22. What is your primary heating fuel? ☐ Electricity ☐ Natural Gas ☐ Oil ☐ Other

Q23. In what year were you born? ________

Thank you! Please return your completed survey using the enclosed envelope.

NEXID

Treatment-only Survey

Q1. Duke Energy sends a personalized report called *My Home Energy Report* to a select group of homes. These reports are mailed in a standard envelope every few months and are meant to provide you with information on how your home's electric energy usage compares with similar homes. Have you seen one of these reports?

☐ Yes ☐ No – **Skip to Q13**

Q2. About how many *My Home Energy Reports* have you received in the past 12 months?____ **If zero, skip to Q13**

Q3. How often do you read the *My Home Energy Reports*?

☐ Always ☐ Sometimes ☐ Never – **Skip to Q13**

Q4. How much do you agree or disagree with the following statements about *My Home Energy Reports*?
Scale: 0 = Strongly Disagree; 10 = Strongly Agree

	Strongly Disagree										Strongly Agree
I have learned about my household's energy use from *My Home Energy Reports*.	0	1	2	3	4	5	6	7	8	9	10
I use the reports to tell me how well I am doing at saving energy.	0	1	2	3	4	5	6	7	8	9	10
The tips provided in the reports are pertinent to my home.	0	1	2	3	4	5	6	7	8	9	10
My Home Energy Reports provide the details I need to understand my home's energy use.	0	1	2	3	4	5	6	7	8	9	10
I have discussed *My Home Energy Reports* with others.	0	1	2	3	4	5	6	7	8	9	10
The information provided about my home's energy use is confusing.	0	1	2	3	4	5	6	7	8	9	10
I suspect that the "similar" homes that my home is compared to in the *Home Energy Reports* are not actually like mine.	0	1	2	3	4	5	6	7	8	9	10
I like receiving the *Home Energy Reports*.	0	1	2	3	4	5	6	7	8	9	10
Since reading the *Home Energy Reports*, I have taken actions to use less energy than I would not have otherwise taken.	0	1	2	3	4	5	6	7	8	9	10

Q5. How could Duke Energy make *My Home Energy Reports* more useful for your household? Please provide any suggestions you may have to improve the reports.

____

____

____

Q6. Please rate how useful each feature of the *Home Energy Report* is to you.
Scale: 0 = Not at all Useful; 10 = Extremely Useful

	Not at all Useful										Extremely Useful
Comparison to similar homes	0	1	2	3	4	5	6	7	8	9	10
Tips to help you save money and energy	0	1	2	3	4	5	6	7	8	9	10
Examples of the energy use associated with common household items	0	1	2	3	4	5	6	7	8	9	10
Customized suggestions for your home	0	1	2	3	4	5	6	7	8	9	10
Graphs that display your home's energy use over time	0	1	2	3	4	5	6	7	8	9	10
Information about services and offers from Duke Energy	0	1	2	3	4	5	6	7	8	9	10

Q7. Overall, how satisfied are you with the information in the *My Home Energy Reports* you've received?
Scale: 0 = Not at all Satisfied; 10 = Completely Satisfied

Not at all Satisfied										Completely Satisfied
0	1	2	3	4	5	6	7	8	9	10

Q7a. Why do you say that? ____________________

Q8. Are you aware that you can go online to *My Home Energy Interactive* to access more information, above and beyond that found in the *My Home Energy Report*, which describes more ways to save energy?

☐ Yes ☐ No – **Skip to Q9**

Q8a. Have you signed up to use *My Home Energy Interactive*?

☐ Yes ☐ No – **Skip to Q8c**

Q8b. How useful is *My Home Energy Interactive* to you for saving energy?
Scale: 0 = Not at all Useful; 10 = Extremely Useful

Not at all Useful										Extremely Useful
0	1	2	3	4	5	6	7	8	9	10

Q8c. Why haven't you signed up to use *My Home Energy Interactive*?

____

____

____

Q9. Over the past 12 months, have you or another member of your household taken any actions to reduce your household energy use, or made any energy efficiency improvements in your home?

☐ Yes ☐ No – **Skip to Q13**

Q10. Which actions have been taken?

	Yes	No	Don't Know
Adjusted heating or cooling settings to save energy	☐	☐	☐
Reduced water heater temperature to save energy	☐	☐	☐
Wash clothes in cold water	☐	☐	☐
Fully load clothes washer	☐	☐	☐
Fully load dishwasher	☐	☐	☐
Turn off lights in unused or outdoor areas	☐	☐	☐
Unplug or shut down household electronics when not in use	☐	☐	☐
Maintain heating or cooling equipment for more efficient operation	☐	☐	☐
Use a portable fan or ceiling fan for cooling instead of an air conditioner	☐	☐	☐
Other, please specify:			
Other, please specify:			

Q11. Which energy efficiency improvements have been made?

	Yes	No	Don't Know
Install energy-efficient kitchen or laundry appliances	☐	☐	☐
Install energy-efficient heating/cooling system	☐	☐	☐
Install energy-efficient water heater	☐	☐	☐
Replace windows or doors with more energy-efficient types	☐	☐	☐
Caulk or weatherstrip (windows or doors)	☐	☐	☐
Add insulation to attic, walls, or floors	☐	☐	☐
Install energy-efficient lighting	☐	☐	☐
Install programmable thermostat or "smart" thermostat	☐	☐	☐
Purchase ENERGY STAR-certified home electronic equipment (a television, for example)	☐	☐	☐

I/A

Q12. Below are some reasons why you might not be able to save as much energy as you would like. How important are each of the following reasons? Scale: 0 = Not at all Important; 10 = Extremely Important

	Not at all Important										Extremely Important
Initial cost of energy efficient equipment is too high	0	1	2	3	4	5	6	7	8	9	10
Not enough time to shop/research/install /Too busy	0	1	2	3	4	5	6	7	8	9	10
I do not have the expertise	0	1	2	3	4	5	6	7	8	9	10
I do not have enough information to make a decision or understand the impacts of these improvements or behaviors	0	1	2	3	4	5	6	7	8	9	10
Getting everyone in the house to cooperate is too hard	0	1	2	3	4	5	6	7	8	9	10
I do not think my energy saving efforts are worth the time and/or money	0	1	2	3	4	5	6	7	8	9	10

Q13. Do you own or rent this residence? ☐ Own ☐ Rent

Q14. Including yourself, how many people live in your home? __________

Q15. In what year was your home built? __________

Q16. How many square feet is the above-ground living space? __________

Q17. What is your primary heating fuel? ☐ Electricity ☐ Natural Gas ☐ Oil ☐ Other

Q18. In what year were you born? __________

Thank you! Please return your completed survey using the enclosed envelope.

NEXID

Appendix D Survey Frequencies: DEC

PRI_Q1. Please rate how satisfied you are with Duke Energy as your electric supplier.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	2	1	0	1	2	11	6	24	37	40	86	1	211
Percent	**1**	**0**	**0**	**0**	**1**	**5**	**3**	**11**	**18**	**19**	**41**	**0**	**100**
Treatment	2	0	1	1	1	14	7	23	35	35	65	0	184
Percent	**1**	**0**	**1**	**1**	**1**	**8**	**4**	**13**	**19**	**19**	**35**	**0**	**100**
Total	4	1	1	2	3	25	13	47	72	75	151	1	395
Percent	**1**	**0**	**0**	**1**	**1**	**6**	**3**	**12**	**18**	**19**	**38**	**0**	**100**

PRI_Q2 Please rate your overall satisfaction with each of the following aspects of communications from Duke Energy.

PRI_Q2_1 The information available about Duke Energy's efficiency programs.

Group	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied	No Response	Total
Control	86	72	38	6	7	2	211
Percent	**41**	**34**	**18**	**3**	**3**	**1**	**100**
Treatment	82	60	28	5	8	1	184
Percent	**45**	**33**	**15**	**3**	**4**	**1**	**100**
Total	168	132	66	11	15	3	395
Percent	**43**	**33**	**17**	**3**	**4**	**1**	**100**

PRI_Q2_2 Duke Energy's commitment to promoting energy efficiency and the wise use of electricity.

Group	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied	No Response	Total
Control	93	66	35	8	7	2	211
Percent	**44**	**31**	**17**	**4**	**3**	**1**	**100**
Treatment	80	61	27	5	9	2	184
Percent	**43**	**33**	**15**	**3**	**5**	**1**	**100**
Total	173	127	62	13	16	4	395
Percent	**44**	**32**	**16**	**3**	**4**	**1**	**100**

PRI_Q2_3 The information Duke Energy provides to help customers save on energy bills.

Group	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied	No Response	Total
Control	93	76	23	11	5	3	211
Percent	**44**	**36**	**11**	**5**	**2**	**1**	**100**
Treatment	90	59	18	7	8	2	184
Percent	**49**	**32**	**10**	**4**	**4**	**1**	**100**
Total	183	135	41	18	13	5	395
Percent	**46.33**	**34**	**10**	**5**	**3**	**1**	**100**

PRI_Q3 Have you logged in to your Duke Energy account to do any of the following? Check all that apply.

PRI_Q3_1 I have never logged in

Group	Not Checked	Checked	Total
Control	129	75	204
Percent	**63**	**37**	**100**
Treatment	115	65	180
Percent	**64**	**36**	**100**
Total	244	140	384
Percent	**64**	**36**	**100**

PRI_Q3_2 Pay my bill

Group	Not Checked	Checked	Total
Control	128	76	204
Percent	**63**	**37**	**100**
Treatment	116	64	180
Percent	**64**	**36**	**100**
Total	244	140	384
Percent	**64**	**36**	**100**

PRI_Q3_3 Review energy consumption graphs

Group	Not Checked	Checked	Total
Control	163	41	204
Percent	**80**	**20**	**100**
Treatment	146	34	180
Percent	**81**	**19**	**100**
Total	309	75	384
Percent	**80**	**20**	**100**

PRI_Q3_4 Look for energy efficiency opportunities or ideas

Group	Not Checked	Checked	Total
Control	172	32	204
Percent	**84**	**16**	**100**
Treatment	151	29	180
Percent	**84**	**16**	**100**
Total	323	61	384
Percent	**84**	**16**	**100**

PRI_Q3_5 None of the above

Group	Not Checked	Checked	Total
Control	171	33	204
percent	**84**	**16**	**100**
Treatment	149	31	180
percent	**83**	**17**	**100**
Total	320	64	384
percent	**83**	**17**	**100**

PRI_ Q4. How often do you access the Duke Energy website to search for information about rebate programs, energy efficient products, or ways to make your home more energy efficient? Select only one.

Group	Monthly	Once a year	A few times a year	Never	No Response	Total
Control	14	18	48	130	1	211
Percent	**7**	**9**	**23**	**62**	**0**	**100**
Treatment	14	13	34	123	0	184
Percent	**8**	**7**	**18**	**67**	**0**	**100**
Total	28	31	82	253	1	395
Percent	**7**	**8**	**21**	**64**	**0**	**100**

PRI_Q5. If you needed to replace major home equipment or were considering improvements to your home's energy performance today, how likely would you be to check the Duke Energy website for information about energy efficient solutions or incentives?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	47	12	14	14	4	20	22	21	23	18	14	2	211
Percent	22	6	7	7	2	9	10	10	11	9	7	1	100
Treatment	46	10	9	10	7	27	8	13	20	12	22	0	184
Percent	25	5	5	5	4	15	4	7	11	7	12	0	100
Total	93	22	23	24	11	47	30	34	43	30	36	2	395
Percent	24	6	6	6	3	12	8	9	11	8	9	1	100

PRI_Q6. How important is it for you to know if your household is using energy wisely?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	1	2	1	3	3	11	19	26	40	34	70	1	211
Percent	0	1	0	1	1	5	9	12	19	16	33	0	100
Treatment	3	1	2	0	2	22	11	22	29	24	68	0	184
Percent	2	1	1	0	1	12	6	12	16	13	37	0	100
Total	4	3	3	3	5	33	30	48	69	58	138	1	395
Percent	1	1	1	1	1	8	8	12	17	15	35	0	100

PRI_Q7. How would you rate your knowledge of the different ways you can save energy in your home?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	2	0	8	6	6	31	19	43	48	26	21	1	211
Percent	1	0	4	3	3	15	9	20	23	12	10	0	100
Treatment	2	1	4	2	5	28	18	32	46	21	25	0	184
Percent	1	1	2	1	3	15	10	17	25	11	14	0	100
Total	4	1	12	8	11	59	37	75	94	47	46	1	395
Percent	1	0	3	2	3	15	9	19	24	12	12	0	100

PRI_Q8 & TRE_Q9. Over the past 12 months, have you or another member of your household taken any actions to reduce your household energy use, or made any energy efficiency improvements in your home?

Group	Yes	No	No Response	Missing	Total
Control	129	77	5	0	211
Percent	61	36	2	0	100
Treatment	229	85	6	17	337
Percent	68	25	2	5	100
Total	358	162	11	17	548
Percent	65	30	2	3	100

PRI_Q9 & TRE_Q10. Which actions have been taken?

PRI_Q9_1 & TRE_Q10_1. Adjusted heating or cooling settings to save energy

Group	Yes	No	Don't Know	No Response	Total
Control	115	7	2	5	129
Percent	89	5	2	4	100
Treatment	213	13	1	2	229
Percent	93	6	0	1	100
Total	328	20	3	7	358
Percent	92	6	1	2	100

PRI_Q9_2 & TRE_Q10_2. Reduced water heater temperature to save energy

Group	Yes	No	Don't Know	No Response	Total
Control	41	75	6	7	129
Percent	32	58	5	5	100
Treatment	84	130	8	7	229
Percent	37	57	3	3	100
Total	125	205	14	14	358
Percent	35	57	4	4	100

PRI_Q9_3 & TRE_Q10_3. Wash clothes in cold water

Group	Yes	No	Don't Know	No Response	Total
Control	85	38	1	5	129
Percent	66	29	1	4	100
Treatment	170	51	5	3	229
Percent	74	22	2	1	100
Total	255	89	6	8	358
Percent	71	25	2	2	100

PRI_Q9_4 & TRE_Q10_4. Fully load clothes washer

Group	Yes	No	Don't Know	No Response	Total
Control	98	23	3	5	129
Percent	76	18	2	4	100
Treatment	192	29	5	3	229
Percent	84	13	2	1	100
Total	290	52	8	8	358
Percent	81	15	2	2	100

PRI_Q9_5 & TRE_Q10_5. Fully load dishwasher

Group	Yes	No	Don't Know	No Response	Total
Control	81	27	12	9	129
Percent	63	21	9	7	100
Treatment	168	43	12	6	229
Percent	73	19	5	3	100
Total	249	70	24	15	358
Percent	70	20	7	4	100

PRI_Q9_6 & TRE_Q10_6. Turn off lights in unused or outdoor areas

Group	Yes	No	No Response	Total
Control	121	7	1	129
Percent	94	5	1	100
Treatment	224	4	1	229
Percent	98	2	0	100
Total	345	11	2	358
Percent	96	3	1	100

PRI_Q9_7 & TRE_Q10_7. Unplug or shut down household electronics when not in use

Group	Yes	No	No Response	Total
Control	100	25	4	129
Percent	78	19	3	100
Treatment	170	55	4	229
Percent	74	24	2	100
Total	270	80	8	358
Percent	75	22	2	100

PRI_Q9_8 & TRE_Q10_8. Maintain heating or cooling equipment for more efficient operation

Group	Yes	No	Don't Know	No Response	Total
Control	104	11	5	9	129
Percent	**81**	**9**	**4**	**7**	**100**
Treatment	200	26	2	1	229
Percent	**87**	**11**	**1**	**0**	**100**
Total	304	37	7	10	358
Percent	**85**	**10**	**2**	**3**	**100**

PRI_Q9_9 & TRE_Q10_9. Use a portable fan or ceiling fan for cooling instead of an air conditioner

Group	Yes	No	Don't Know	No Response	Total
Control	88	35	3	3	129
Percent	**68**	**27**	**2**	**2**	**100**
Treatment	133	90	5	1	229
Percent	**58**	**39**	**2**	**0**	**100**
Total	221	125	8	4	358
Percent	**62**	**35**	**2**	**1**	**100**

PRI_Q9_10 & TRE_Q10_10. Other, please specify:

Group	Yes	No	Don't Know	No Response	Total
Control	32	30	41	26	129
Percent	**25**	**23**	**32**	**20**	**100**
Treatment	42	44	98	45	229
Percent	**18**	**19**	**43**	**20**	**100**
Total	74	74	139	71	358
Percent	**21**	**21**	**39**	**20**	**100**

PRI_Q9_11 & TRE_Q10_11. Other, please specify:

Group	Yes	No	Don't Know	No Response	Total
Control	8	48	44	29	129
Percent	**6**	**37**	**34**	**22**	**100**
Treatment	15	59	107	48	229
Percent	**7**	**26**	**47**	**21**	**100**
Total	23	107	151	77	358
Percent	**6**	**30**	**42**	**22**	**100**

PRI_Q10 & TRE_Q11. Which energy efficiency improvements have been made?

PRI_Q10_1 & TRE_Q11_1. Install energy-efficient kitchen or laundry appliances

Group	Yes	No	Don't Know	No Response	Total
Control	66	53	6	4	129
Percent	**51**	**41**	**5**	**3**	**100**
Treatment	120	101	6	2	229
Percent	**52**	**44**	**3**	**1**	**100**
Total	186	154	12	6	358
Percent	**52**	**43**	**3**	**2**	**100**

PRI_Q10_2 & TRE_Q11_2. Install energy-efficient heating/cooling equipment

Group	Yes	No	Don't Know	No Response	Total
Control	65	54	5	5	129
Percent	**50**	**42**	**4**	**4**	**100**
Treatment	104	113	10	2	229
Percent	**45**	**49**	**4**	**1**	**100**
Total	169	167	15	7	358
Percent	**47**	**47**	**4**	**2**	**100**

PRI_Q10_3 & TRE_Q11_3. Install energy-efficient water heater

Group	Yes	No	Don't Know	No Response	Total
Control	51	67	6	5	129
Percent	**40**	**52**	**5**	**4**	**100**
Treatment	88	128	10	3	229
Percent	**38**	**56**	**4**	**1**	**100**
Total	139	195	16	8	358
Percent	**39**	**54**	**4**	**2**	**100**

PRI_Q10_4 & TRE_Q11_4. Replace windows or doors with more energy-efficient types)

Group	Yes	No	Don't Know	No Response	Total
Control	39	83	1	6	129
Percent	**30**	**64**	**1**	**5**	**100**
Treatment	79	144	3	3	229
Percent	**35**	**63**	**1**	**1**	**100**
Total	118	227	4	9	358
Percent	**33**	**63**	**1**	**3**	**100**

PRI_Q10_5 & TRE_Q11_5. Caulk or weatherstrip (windows or doors)

Group	Yes	No	Don't Know	No Response	Total
Control	57	60	6	6	129
Percent	**44**	**47**	**5**	**5**	**100**
Treatment	111	111	3	4	229
Percent	**48**	**48**	**1**	**2**	**100**
Total	168	171	9	10	358
Percent	**47**	**48**	**3**	**3**	**100**

PRI_Q10_6 & TRE_Q11_6. Add insulation to attic, walls, or floors

Group	Yes	No	Don't Know	No Response	Total
Control	45	75	3	6	129
Percent	**35**	**58**	**2**	**5**	**100**
Treatment	69	147	4	9	229
Percent	**30**	**64**	**2**	**4**	**100**
Total	114	222	7	15	358
Percent	**32**	**62**	**2**	**4**	**100**

PRI_Q10_7 & TRE_Q11_7. Install energy-efficient lighting

Group	Yes	No	Don't Know	No Response	Total
Control	103	18	3	5	129
Percent	**80**	**14**	**2**	**4**	**100**
Treatment	186	40	2	1	229
Percent	**81**	**17**	**1**	**0**	**100**
Total	289	58	5	6	358
Percent	**81**	**16**	**1**	**2**	**100**

PRI_Q10_8 & TRE_Q11_8. Install programmable thermostat or "smart" thermostat

Group	Yes	No	Don't Know	No Response	Total
Control	64	56	4	5	129
Percent	**50**	**43**	**3**	**4**	**100**
Treatment	103	119	4	3	229
Percent	**45**	**52**	**2**	**1**	**100**
Total	167	175	8	8	358
Percent	**47**	**49**	**2**	**2**	**100**

PRI_Q10_9 & TRE_Q11_9. Purchase ENERGY STAR certified home electronic equipment (a television, for example)

Group	Yes	No	Don't Know	No Response	Total
Control	73	37	12	7	129
Percent	**57**	**29**	**9**	**5**	**100**
Treatment	128	85	13	3	229
Percent	**56**	**37**	**6**	**1**	**100**
Total	201	122	25	10	358
Percent	**56**	**34**	**7**	**3**	**100**

PRI_Q11 & TRE_Q12. Below are some reasons why you might not be able to save as much energy as you would like. How important are each of the following reasons?

PRI_Q11_1 & TRE_Q12_1. Initial cost of energy efficient equipment is too high

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	10	2	3	5	7	19	7	18	15	14	25	4	129
Percent	**8**	**2**	**2**	**4**	**5**	**15**	**5**	**14**	**12**	**11**	**19**	**3**	**100**
Treatment	14	8	8	7	8	39	8	21	33	16	65	2	229
Percent	**6**	**3**	**3**	**3**	**3**	**17**	**3**	**9**	**14**	**7**	**28**	**1**	**100**
Total	24	10	11	12	15	58	15	39	48	30	90	6	358
Percent	**7**	**3**	**3**	**3**	**4**	**16**	**4**	**11**	**13**	**8**	**25**	**2**	**100**

PRI_Q11_2 & TRE_Q12_2. Not enough time to shop/research/install/too busy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	20	3	7	7	3	23	9	15	10	9	16	7	129
Percent	**16**	**2**	**5**	**5**	**2**	**18**	**7**	**12**	**8**	**7**	**12**	**5**	**100**
Treatment	39	12	11	10	8	57	6	17	26	10	28	5	229
Percent	**17**	**5**	**5**	**4**	**3**	**25**	**3**	**7**	**11**	**4**	**12**	**2**	**100**
Total	59	15	18	17	11	80	15	32	36	19	44	12	358
Percent	**16**	**4**	**5**	**5**	**3**	**22**	**4**	**9**	**10**	**5**	**12**	**3**	**100**

PRI_Q11_3 & TRE_Q12_3. I do not have the expertise

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	22	4	6	6	7	28	9	11	9	8	14	5	129
Percent	**17**	**3**	**5**	**5**	**5**	**22**	**7**	**9**	**7**	**6**	**11**	**4**	**100**
Treatment	41	12	8	12	9	57	13	21	14	11	28	3	229
Percent	**18**	**5**	**3**	**5**	**4**	**25**	**6**	**9**	**6**	**5**	**12**	**1**	**100**
Total	63	16	14	18	16	85	22	32	23	19	42	8	358
Percent	**18**	**4**	**4**	**5**	**4**	**24**	**6**	**9**	**6**	**5**	**12**	**2**	**100**

PRI_Q11_4 & TRE_Q12_4. I do not have enough information to make a decision or understand the impacts of these improvements or behaviors

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	23	4	6	6	7	23	9	19	12	6	9	5	129
Percent	**18**	**3**	**5**	**5**	**5**	**18**	**7**	**15**	**9**	**5**	**7**	**4**	**100**
Treatment	40	6	14	9	9	48	20	16	22	5	35	5	229
Percent	**17**	**3**	**6**	**4**	**4**	**21**	**9**	**7**	**10**	**2**	**15**	**2**	**100**
Total	63	10	20	15	16	71	29	35	34	11	44	10	358
Percent	**18**	**3**	**6**	**4**	**4**	**20**	**8**	**10**	**10**	**3**	**12**	**3**	**100**

PRI_Q11_5 & TRE_Q12_5. Getting everyone in the house to cooperate is too hard

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	26	6	3	7	6	22	8	6	7	5	25	8	129
Percent	**20**	**5**	**2**	**5**	**5**	**17**	**6**	**5**	**5**	**4**	**19**	**6**	**100**
Treatment	60	12	9	5	7	37	10	14	22	10	38	5	229
Percent	**26**	**5**	**4**	**2**	**3**	**16**	**4**	**6**	**10**	**4**	**17**	**2**	**100**
Total	86	18	12	12	13	59	18	20	29	15	63	13	358
Percent	**24**	**5**	**3**	**3**	**4**	**16**	**5**	**6**	**8**	**4**	**18**	**4**	**100**

PRI_Q11_6 & TRE_Q12_6. I do not think my energy saving efforts are worth the time and/or money

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	23	9	5	5	8	20	6	4	12	8	23	6	129
Percent	**18**	**7**	**4**	**4**	**6**	**16**	**5**	**3**	**9**	**6**	**18**	**5**	**100**
Treatment	38	16	12	10	3	37	9	13	23	13	51	4	229
Percent	**17**	**7**	**5**	**4**	**1**	**16**	**4**	**6**	**10**	**6**	**22**	**2**	**100**
Total	61	25	17	15	11	57	15	17	35	21	74	10	358
Percent	**17**	**7**	**5**	**4**	**3**	**16**	**4**	**5**	**10**	**6**	**21**	**3**	**100**

PRI_Q12 Which of the following do you do with regard to your household's energy use? Check all that apply.

PRI_Q12_1 Track monthly energy use

Group	Not Checked	Checked	Total
Control	116	91	207
Percent	**56**	**44**	**100**
Treatment	100	83	183
Percent	**55**	**45**	**100**
Total	216	174	390
Percent	**55**	**45**	**100**

PRI_Q12_2 Track the total amount of your bill

Group	Not Checked	Checked	Total
Control	64	143	207
Percent	**31**	**69**	**100**
Treatment	78	105	183
Percent	**43**	**57**	**100**
Total	142	248	390
Percent	**36**	**64**	**100**

PRI_Q12_3 Compare usage to previous months

Group	Not Checked	Checked	Total
Control	66	141	207
Percent	**32**	**68**	**100**
Treatment	62	121	183
Percent	**34**	**66**	**100**
Total	128	262	390
Percent	**33**	**67**	**100**

PRI_Q12_4 Compare usage to the same month from last year

Group	Not Checked	Checked	Total
Control	87	120	207
Percent	42	58	100
Treatment	83	100	183
Percent	45	55	100
Total	170	220	390
Percent	44	56	100

PRI_Q12_5 None of the above

Group	Not Checked	Checked	Total
Control	189	18	207
Percent	91	9	100
Treatment	153	30	183
Percent	84	16	100
Total	342	48	390
Percent	88	12	100

PRI_Q13. Thinking about the information you could have about your home's energy use, please rate how useful each of the following items would be for your household.

PRI_Q13_1. Your home's energy use compared to that of similar homes

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	17	5	5	11	4	34	10	27	22	21	46	9	211
Percent	8	2	2	5	2	16	5	13	10	10	22	4	100
Treatment	18	5	7	3	7	24	8	26	25	11	47	3	184
Percent	10	3	4	2	4	13	4	14	14	6	26	2	100
Total	35	10	12	14	11	58	18	53	47	32	93	12	395
Percent	9	3	3	4	3	15	5	13	12	8	24	3	100

PRI_Q13_2. Tips to help you save money and energy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	5	2	2	3	7	32	16	24	26	24	64	6	211
Percent	2	1	1	1	3	15	8	11	12	11	30	3	100
Treatment	10	3	3	4	2	24	5	28	29	17	58	1	184
Percent	5	2	2	2	1	13	3	15	16	9	32	1	100
Total	15	5	5	7	9	56	21	52	55	41	122	7	395
Percent	4	1	1	2	2	14	5	13	14	10	31	2	100

PRI_Q13_3. Examples of the energy use associated with common household items

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	6	2	5	2	9	31	12	27	25	21	63	8	211
Percent	3	1	2	1	4	15	6	13	12	10	30	4	100
Treatment	16	3	3	2	3	24	11	27	28	20	45	2	184
Percent	9	2	2	1	2	13	6	15	15	11	24	1	100
Total	22	5	8	4	12	55	23	54	53	41	108	10	395
Percent	6	1	2	1	3	14	6	14	13	10	27	3	100

PRI_Q13_4. Customized suggestions for your home

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	13	1	10	7	9	35	14	22	16	19	54	11	211
Percent	6	0	5	3	4	17	7	10	8	9	26	5	100
Treatment	15	5	4	7	2	23	11	23	28	19	43	4	184
Percent	8	3	2	4	1	13	6	13	15	10	23	2	100
Total	28	6	14	14	11	58	25	45	44	38	97	15	395
Percent	7	2	4	4	3	15	6	11	11	10	25	4	100

PRI_Q13_5. Graphs that display your home's energy use over time

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	11	2	7	3	2	25	10	26	30	19	69	7	211
Percent	5	1	3	1	1	12	5	12	14	9	33	3	100
Treatment	13	5	3	5	4	25	7	26	24	20	49	3	184
Percent	7	3	2	3	2	14	4	14	13	11	27	2	100
Total	24	7	10	8	6	50	17	52	54	39	118	10	395
Percent	6	2	3	2	2	13	4	13	14	10	30	3	100

PRI_Q13_6. Information about services and offers from Duke Energy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	9	1	4	4	5	30	14	20	28	24	66	6	211
Percent	4	0	2	2	2	14	7	9	13	11	31	3	100
Treatment	11	2	5	4	5	27	9	29	20	13	56	3	184
Percent	6	1	3	2	3	15	5	16	11	7	30	2	100
Total	20	3	9	8	10	57	23	49	48	37	122	9	395
Percent	5	1	2	2	3	14	6	12	12	9	31	2	100

PRI_Q14. The statements below provide reasons why households might try to reduce their home's energy use. Please indicate how important each statement is to you.

PRI_Q14_1. Reducing my energy bill(s)

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	1	0	1	0	1	11	8	15	29	20	121	4	211
Percent	0	0	0	0	0	5	4	7	14	9	57	2	100
Treatment	3	0	1	1	1	8	5	16	21	27	100	1	184
Percent	2	0	1	1	1	4	3	9	11	15	54	1	100
Total	4	0	2	1	2	19	13	31	50	47	221	5	395
Percent	1	0	1	0	1	5	3	8	13	12	56	1	100

PRI_Q14_2. Helping the environment

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	2	0	3	4	4	18	10	22	34	18	92	4	211
Percent	1	0	1	2	2	9	5	10	16	9	44	2	100
Treatment	4	2	2	4	5	14	6	21	20	24	79	3	184
Percent	2	1	1	2	3	8	3	11	11	13	43	2	100
Total	6	2	5	8	9	32	16	43	54	42	171	7	395
Percent	2	1	1	2	2	8	4	11	14	11	43	2	100

PRI_Q14_3. Setting an example for others

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	14	5	8	6	5	33	16	20	23	10	64	7	211
Percent	7	2	4	3	2	16	8	9	11	5	30	3	100
Treatment	21	6	1	5	9	26	11	24	21	16	41	3	184
Percent	11	3	1	3	5	14	6	13	11	9	22	2	100
Total	35	11	9	11	14	59	27	44	44	26	105	10	395
Percent	9	3	2	3	4	15	7	11	11	7	27	3	100

PRI_Q14_4. Avoiding waste

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	1	0	3	2	2	13	6	22	40	24	94	4	211
Percent	0	0	1	1	1	6	3	10	19	11	45	2	100
Treatment	2	1	0	2	4	8	7	15	30	29	85	1	184
Percent	1	1	0	1	2	4	4	8	16	16	46	1	100
Total	3	1	3	4	6	21	13	37	70	53	179	5	395
Percent	1	0	1	1	2	5	3	9	18	13	45	1	100

PRI_Q14_5. Conserving energy resources

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	1	0	2	4	1	17	11	22	33	23	93	4	211
Percent	0	0	1	2	0	8	5	10	16	11	44	2	100
Treatment	3	1	0	2	1	13	5	24	25	33	75	2	184
Percent	2	1	0	1	1	7	3	13	14	18	41	1	100
Total	4	1	2	6	2	30	16	46	58	56	168	6	395
Percent	1	0	1	2	1	8	4	12	15	14	43	2	100

PRI_Q15. Please indicate your level of agreement with each of the following statements

PRI_Q15_1. Duke Energy provides excellent customer service

Group	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree	No Response	Total
Control	3	7	20	87	93	1	211
Percent	1	3	9	41	44	0	100
Treatment	1	4	26	72	79	2	184
Percent	1	2	14	39	43	1	100
Total	4	11	46	159	172	3	395
Percent	1	3	12	40	44	1	100

PRI_Q15_2. Duke Energy respects its customers

Group	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree	No Response	Total
Control	5	14	23	76	90	3	211
Percent	**2**	**7**	**11**	**36**	**43**	**1**	**100**
Treatment	3	10	36	66	68	1	184
Percent	**2**	**5**	**20**	**36**	**37**	**1**	**100**
Total	8	24	59	142	158	4	395
Percent	**2**	**6**	**15**	**36**	**40**	**1**	**100**

PRI_Q15_3. Duke Energy provides service at a reasonable cost

Group	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree	No Response	Total
Control	7	23	30	100	48	3	211
Percent	**3**	**11**	**14**	**47**	**23**	**1**	**100**
Treatment	4	22	39	75	42	2	184
Percent	**2**	**12**	**21**	**41**	**23**	**1**	**100**
Total	11	45	69	175	90	5	395
Percent	**3**	**11**	**17**	**44**	**23**	**1**	**100**

PRI_Q16. Before today, were you aware that you could order free or discounted lighting products through the Duke Energy website?

Group	Yes	No	No Response	Total
Control	156	52	3	211
Percent	**74**	**25**	**1**	**100**
Treatment	118	63	3	184
Percent	**64**	**34**	**2**	**100**
Total	274	115	6	395
Percent	**69**	**29**	**2**	**100**

PRI_Q16a. How many free light bulbs have you ordered through the Duke Energy website this year?

Group	0	1	2	3	4	5	6	8	10	12	14	15	16	20	24	30	50	N.R.	M.	T.
Control	92	8	3	1	1	1	3	4	2	15	1	4	0	1	1	1	1	3	14	156
Percent	**59**	**5**	**2**	**1**	**1**	**1**	**2**	**3**	**1**	**10**	**1**	**3**	**0**	**1**	**1**	**1**	**1**	**2**	**9**	**100**
Treatment	71	8	0	0	1	1	5	3	3	12	0	0	2	2	0	0	0	0	10	118
Percent	**60**	**7**	**0**	**0**	**1**	**1**	**4**	**3**	**3**	**10**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**8**	**100**
Total	163	16	3	1	2	2	8	7	5	27	1	4	2	3	1	1	1	3	24	274
Percent	**59**	**6**	**1**	**0**	**1**	**1**	**3**	**3**	**2**	**10**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**1**	**9**	**100**

PRI_Q16b. How many discounted light bulbs have you ordered through the Duke Energy website this year?

Group	0	1	2	4	5	6	8	12	15	16	20	24	30	No Response	Missing	Total
Control	128	1	0	1	0	0	1	5	1	0	2	2	1	1	13	156
Percent	**82**	**1**	**0**	**1**	**0**	**0**	**1**	**3**	**1**	**0**	**1**	**1**	**1**	**1**	**8**	**100**
Treatment	95	3	1	1	1	2	0	0	0	2	1	0	0	0	12	118
Percent	**81**	**3**	**1**	**1**	**1**	**2**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**0**	**10**	**100**
Total	223	4	1	2	1	2	1	5	1	2	3	2	1	1	25	274
Percent	**81**	**1**	**0**	**1**	**0**	**1**	**0**	**2**	**0**	**1**	**1**	**1**	**0**	**0**	**9**	**100**

PRI_Q18 & TRE_Q13. Do you own or rent this residence?

Group	Own	Rent	Missing	Total
Control	192	13	6	211
Percent	**91**	**6**	**3**	**100**
Treatment	306	24	7	337
Percent	**91**	**7**	**2**	**100**
Total	498	37	13	548
Percent	**91**	**7**	**2**	**100**

PRI_Q19 & TRE_Q14. Including yourself, how many people live in your home?

Group	1	2	3	4	5	6	7	9	10	No Response	Missing	Total
Control	43	95	27	26	11	1	1	0	1	0	6	211
Percent	**20**	**45**	**13**	**12**	**5**	**0**	**0**	**0**	**0**	**0**	**3**	**100**
Treatment	65	149	50	40	16	5	1	1	0	1	9	337
Percent	**19**	**44**	**15**	**12**	**5**	**1**	**0**	**0**	**0**	**0**	**3**	**100**
Total	108	244	77	66	27	6	2	1	1	1	15	548
Percent	**20**	**45**	**14**	**12**	**5**	**1**	**0**	**0**	**0**	**0**	**3**	**100**

PRI_Q22 & TRE_Q17. What is your primary heating fuel?

Group	Electricity	Natural Gas	Oil	Other	Missing	Total
Control	94	88	5	16	8	211
Percent	**45**	**42**	**2**	**8**	**4**	**100**
Treatment	158	147	8	15	9	337
Percent	**47**	**44**	**2**	**4**	**3**	**100**
Total	252	235	13	31	17	548
Percent	**46**	**43**	**2**	**6**	**3**	**100**

TRE_Q1. Duke Energy sends a personalized report called My Home Energy Report to a select group of homes. These reports are mailed in a standard envelope every few months and are meant to provide you with information on how your home's electric energy usage compares with similar homes. Have you seen one of these reports?

Group	Yes	No	No Response	Total
Treatment	142	10	1	153
Percent	**93**	**7**	**1**	**100**

TRE_Q2. About how many My Home Energy Reports have you received in the past 12 months?

Group	0	1	2	3	4	5	6	7	8	9	10	11	12	24	No Response	Missing	Total
Treatment	3	2	9	12	27	3	20	1	5	3	7	2	42	1	5	1	143
Percent	**2**	**1**	**6**	**8**	**19**	**2**	**14**	**1**	**4**	**2**	**5**	**1**	**29**	**1**	**4**	**1**	**100**

TRE_Q3. How often do you read the My Home Energy Reports?

Group	Always	Sometimes	Never	No Response	Missing	Total
Treatment	100	35	2	1	2	140
Percent	**71**	**25**	**1**	**1**	**1**	**100**

TRE_Q4. How much do you agree or disagree with the following statements about My Home Energy Reports?

TRE_Q4_1. I have learned about my household's energy use from My Home Energy Reports.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	2	2	0	6	7	13	9	17	11	20	48	1	2	138
Percent	**1**	**1**	**0**	**4**	**5**	**9**	**7**	**12**	**8**	**14**	**35**	**1**	**1**	**100**

TRE_Q4_2. I use the reports to tell me how well I am doing at saving energy.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	6	2	3	6	5	20	6	18	18	12	39	1	2	138
Percent	**4**	**1**	**2**	**4**	**4**	**14**	**4**	**13**	**13**	**9**	**28**	**1**	**1**	**100**

TRE_Q4_3. The tips provided in the reports are pertinent to my home.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	4	5	6	5	7	19	21	9	18	13	27	2	2	138
Percent	**3**	**4**	**4**	**4**	**5**	**14**	**15**	**7**	**13**	**9**	**20**	**1**	**1**	**100**

TRE_Q4_4. My Home Energy Reports provide the details I need to understand my home's energy use.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	6	2	2	5	9	17	14	16	13	15	36	1	2	138
Percent	**4**	**1**	**1**	**4**	**7**	**12**	**10**	**12**	**9**	**11**	**26**	**1**	**1**	**100**

TRE_Q4_5. I have discussed My Home Energy Reports with others.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	36	17	6	4	7	16	7	8	10	2	22	1	2	138
Percent	**26**	**12**	**4**	**3**	**5**	**12**	**5**	**6**	**7**	**1**	**16**	**1**	**1**	**100**

TRE_Q4_6. The information provided about my home's energy use is confusing.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	51	24	10	12	6	14	2	5	5	3	3	1	2	138
Percent	**37**	**17**	**7**	**9**	**4**	**10**	**1**	**4**	**4**	**2**	**2**	**1**	**1**	**100**

TRE_Q4_7. I suspect that the "similar" homes that my home is compared to in the Home Energy Reports are not actually like mine.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	13	11	4	6	4	29	10	14	12	9	23	1	2	138
Percent	**9**	**8**	**3**	**4**	**3**	**21**	**7**	**10**	**9**	**7**	**17**	**1**	**1**	**100**

TRE_Q4_8. Since reading the Home Energy Reports, I have taken actions to use less energy than I would not have otherwise taken.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	11	5	5	4	12	28	10	17	13	9	21	1	2	138
Percent	**8**	**4**	**4**	**3**	**9**	**20**	**7**	**12**	**9**	**7**	**15**	**1**	**1**	**100**

TRE_Q6. Please rate how useful each feature of the Home Energy Report is to you.

TRE_Q6_1. Comparison to similar homes

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	15	9	7	8	5	9	11	18	23	9	21	1	2	138
Percent	**11**	**7**	**5**	**6**	**4**	**7**	**8**	**13**	**17**	**7**	**15**	**1**	**1**	**100**

TRE_Q6_2. Tips to help you save money and energy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	5	0	2	2	7	20	10	21	24	9	35	1	2	138
Percent	**4**	**0**	**1**	**1**	**5**	**14**	**7**	**15**	**17**	**7**	**25**	**1**	**1**	**100**

TRE_Q6_3. Examples of the energy use associated with common household items

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	6	1	2	7	5	19	9	18	21	13	34	1	2	138
Percent	**4**	**1**	**1**	**5**	**4**	**14**	**7**	**13**	**15**	**9**	**25**	**1**	**1**	**100**

TRE_Q6_4. Customized suggestions for your home

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	9	2	2	6	8	19	9	22	18	10	29	2	2	138
Percent	**7**	**1**	**1**	**4**	**6**	**14**	**7**	**16**	**13**	**7**	**21**	**1**	**1**	**100**

TRE_Q6_5. Graphs that display your home's energy use over time

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	5	2	3	1	2	10	9	13	20	19	51	1	2	138
Percent	**4**	**1**	**2**	**1**	**1**	**7**	**7**	**9**	**14**	**14**	**37**	**1**	**1**	**100**

TRE_Q6_6. Information about services and offers from Duke Energy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	4	4	1	3	7	28	9	21	17	9	31	2	2	138
Percent	**3**	**3**	**1**	**2**	**5**	**20**	**7**	**15**	**12**	**7**	**22**	**1**	**1**	**100**

TRE_Q7. Overall, how satisfied are you with the information in the My Home Energy Reports you've received?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	5	1	5	2	3	0	8	20	21	15	40	16	2	138
Percent	**4**	**1**	**4**	**1**	**2**	**0**	**6**	**14**	**15**	**11**	**29**	**12**	**1**	**100**

TRE_Q8. Are you aware that you can go online to My Home Energy Interactive to access more information, above and beyond that found in the My Home Energy Report, which describes more ways to save energy?

Group	Yes	No	No Response	Missing	Total
Treatment	38	97	1	2	138
Percent	**28**	**70**	**1**	**1**	**100**

TRE_Q8a. Have you signed up to use My Home Energy Interactive?

Group	Yes	No	Missing	Total
Treatment	3	35	3	41
Percent	**7**	**85**	**7**	**100**

TRE_Q8b. How useful is My Home Energy Interactive to you for saving energy?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	0	0	0	0	0	1	0	0	0	0	2	0	3	6
Percent	**0**	**0**	**0**	**0**	**0**	**17**	**0**	**0**	**0**	**0**	**33**	**0**	**50**	**100**

Appendix E Survey Frequencies: DEP

PRI_Q1. Please rate how satisfied you are with Duke Energy as your electric supplier.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	1	0	0	4	2	10	10	22	37	35	69	2	192
Percent	1	0	0	2	1	5	5	11	19	18	36	1	100
Treatment	0	1	0	2	0	10	11	18	38	23	69	4	176
Percent	0	1	0	1	0	6	6	10	22	13	39	2	100
Total	1	1	0	6	2	20	21	40	75	58	138	6	368
Percent	0	0	0	2	1	5	6	11	20	16	38	2	100

PRI_Q2 Please rate your overall satisfaction with each of the following aspects of communications from Duke Energy.

PRI_Q2_1 The information available about Duke Energy's efficiency programs.

Group	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied	No Response	Total
Control	71	65	44	5	6	1	192
Percent	37	34	23	3	3	1	100
Treatment	83	60	22	7	4	0	176
Percent	47	34	13	4	2	0	100
Total	154	125	66	12	10	1	368
Percent	42	34	18	3	3	0	100

PRI_Q2_2 Duke Energy's commitment to promoting energy efficiency and the wise use of electricity.

Group	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied	Total
Control	70	68	40	8	6	192
Percent	36	35	21	4	3	100
Treatment	83	61	18	9	5	176
Percent	47	35	10	5	3	100
Total	153	129	58	17	11	368
Percent	42	35	16	5	3	100

PRI_Q2_3 The information Duke Energy provides to help customers save on energy bills.

Group	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied	Total
Control	70	70	37	10	5	192
Percent	**36**	**36**	**19**	**5**	**3**	**100**
Treatment	83	61	16	12	4	176
Percent	**47**	**35**	**9**	**7**	**2**	**100**
Total	153	131	53	22	9	368
Percent	**41.58**	**36**	**14**	**6**	**2**	**100**

PRI_Q3 Have you logged in to your Duke Energy account to do any of the following? Check all that apply.

PRI_Q3_1 I have never logged in

Group	Not Checked	Checked	Total
Control	114	71	185
Percent	**62**	**38**	**100**
Treatment	101	73	174
Percent	**58**	**42**	**100**
Total	215	144	359
Percent	**60**	**40**	**100**

PRI_Q3_2 Pay my bill

Group	Not Checked	Checked	Total
Control	114	71	185
Percent	**62**	**38**	**100**
Treatment	112	62	174
Percent	**64**	**36**	**100**
Total	226	133	359
Percent	**63**	**37**	**100**

PRI_Q3_3 Review energy consumption graphs

Group	Not Checked	Checked	Total
Control	145	40	185
Percent	**78**	**22**	**100**
Treatment	141	33	174
Percent	**81**	**19**	**100**
Total	286	73	359
Percent	**80**	**20**	**100**

PRI_Q3_4 Look for energy efficiency opportunities or ideas

Group	Not Checked	Checked	Total
Control	170	15	185
Percent	**92**	**8**	**100**
Treatment	156	18	174
Percent	**90**	**10**	**100**
Total	326	33	359
Percent	**91**	**9**	**100**

PRI_Q3_5 None of the above

Group	Not Checked	Checked	Total
Control	154	31	185
percent	**83**	**17**	**100**
Treatment	142	32	174
percent	**82**	**18**	**100**
Total	296	63	359
percent	**82**	**18**	**100**

PRI_ Q4. How often do you access the Duke Energy website to search for information about rebate programs, energy efficient products, or ways to make your home more energy efficient? Select only one.

Group	Monthly	One a year	A few times a year	Never	No Response	Total
Control	17	20	25	129	1	192
Percent	**9**	**10**	**13**	**67**	**1**	**100**
Treatment	13	16	25	122	0	176
Percent	**7**	**9**	**14**	**69**	**0**	**100**
Total	30	36	50	251	1	368
Percent	**8**	**10**	**14**	**68**	**0**	**100**

PRI_Q5. If you needed to replace major home equipment or were considering improvements to your home's energy performance today, how likely would you be to check the Duke Energy website for information about energy efficient solutions or incentives?

Group	0	1	2	3	4	5	6	7	8	9	10	Total
Control	53	9	5	9	1	29	12	13	21	8	32	192
Percent	**28**	**5**	**3**	**5**	**1**	**15**	**6**	**7**	**11**	**4**	**17**	**100**
Treatment	39	6	8	11	6	28	6	18	16	19	19	176
Percent	**22**	**3**	**5**	**6**	**3**	**16**	**3**	**10**	**9**	**11**	**11**	**100**
Total	92	15	13	20	7	57	18	31	37	27	51	368
Percent	**25**	**4**	**4**	**5**	**2**	**15**	**5**	**8**	**10**	**7**	**14**	**100**

PRI_Q6. How important is it for you to know if your household is using energy wisely?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	3	0	2	3	0	15	11	15	32	30	79	2	192
Percent	**2**	**0**	**1**	**2**	**0**	**8**	**6**	**8**	**17**	**16**	**41**	**1**	**100**
Treatment	3	0	2	3	0	14	9	19	26	29	71	0	176
Percent	**2**	**0**	**1**	**2**	**0**	**8**	**5**	**11**	**15**	**16**	**40**	**0**	**100**
Total	6	0	4	6	0	29	20	34	58	59	150	2	368
Percent	**2**	**0**	**1**	**2**	**0**	**8**	**5**	**9**	**16**	**16**	**41**	**1**	**100**

PRI_Q7. How would you rate your knowledge of the different ways you can save energy in your home?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	5	1	5	5	5	29	23	35	31	30	22	1	192
Percent	**3**	**1**	**3**	**3**	**3**	**15**	**12**	**18**	**16**	**16**	**11**	**1**	**100**
Treatment	2	3	0	4	2	29	17	29	42	27	21	0	176
Percent	**1**	**2**	**0**	**2**	**1**	**16**	**10**	**16**	**24**	**15**	**12**	**0**	**100**
Total	7	4	5	9	7	58	40	64	73	57	43	1	368
Percent	**2**	**1**	**1**	**2**	**2**	**16**	**11**	**17**	**20**	**15**	**12**	**0**	**100**

PRI_Q8 & TRE_Q9. Over the past 12 months, have you or another member of your household taken any actions to reduce your household energy use, or made any energy efficiency improvements in your home?

Group	Yes	No	No Response	Missing	Total
Control	114	76	2	0	192
Percent	**59**	**40**	**1**	**0**	**100**
Treatment	225	90	10	22	347
Percent	**65**	**26**	**3**	**6**	**100**
Total	339	166	12	22	539
Percent	**63**	**31**	**2**	**4**	**100**

PRI_Q9 & TRE_Q10. Which actions have been taken?

PRI_Q9_1 & TRE_Q10_1. Adjusted heating or cooling settings to save energy

Group	Yes	No	Don't know	No Response	Total
Control	109	3	0	2	114
Percent	**96**	**3**	**0**	**2**	**100**
Treatment	210	9	2	4	225
Percent	**93**	**4**	**1**	**2**	**100**
Total	319	12	2	6	339
Percent	**94**	**4**	**1**	**2**	**100**

PRI_Q9_2 & TRE_Q10_2. Reduced water heater temperature to save energy

Group	Yes	No	Don't know	No Response	Total
Control	42	62	3	7	114
Percent	**37**	**54**	**3**	**6**	**100**
Treatment	85	127	8	5	225
Percent	**38**	**56**	**4**	**2**	**100**
Total	127	189	11	12	339
Percent	**37**	**56**	**3**	**4**	**100**

PRI_Q9_3 & TRE_Q10_3. Wash clothes in cold water

Group	Yes	No	Don't know	No Response	Total
Control	76	32	2	4	114
Percent	**67**	**28**	**2**	**4**	**100**
Treatment	172	47	2	4	225
Percent	**76**	**21**	**1**	**2**	**100**
Total	248	79	4	8	339
Percent	**73**	**23**	**1**	**2**	**100**

PRI_Q9_4 & TRE_Q10_4. Fully load clothes washer

Group	Yes	No	Don't know	No Response	Total
Control	97	11	2	4	114
Percent	85	10	2	4	100
Treatment	181	37	2	5	225
Percent	80	16	1	2	100
Total	278	48	4	9	339
Percent	82	14	1	3	100

PRI_Q9_5 & TRE_Q10_5. Fully load dishwasher

Group	Yes	No	Don't know	No Response	Total
Control	78	20	5	11	114
Percent	68	18	4	10	100
Treatment	164	34	16	11	225
Percent	73	15	7	5	100
Total	242	54	21	22	339
Percent	71	16	6	6	100

PRI_Q9_6 & TRE_Q10_6. Turn off lights in unused or outdoor areas

Group	Yes	No	No Response	Total
Control	111	0	3	114
Percent	97	0	3	100
Treatment	216	6	3	225
Percent	96	3	1	100
Total	327	6	6	339
Percent	96	2	2	100

PRI_Q9_7 & TRE_Q10_7. Unplug or shut down household electronics when not in use

Group	Yes	No	Don't know	No Response	Total
Control	82	29	1	2	114
Percent	72	25	1	2	100
Treatment	154	64	4	3	225
Percent	68	28	2	1	100
Total	236	93	5	5	339
Percent	70	27	1	1	100

PRI_Q9_8 & TRE_Q10_8. Maintain heating or cooling equipment for more efficient operation

Group	Yes	No	Don't know	No Response	Total
Control	104	4	3	3	114
Percent	**91**	**4**	**3**	**3**	**100**
Treatment	190	27	6	2	225
Percent	**84**	**12**	**3**	**1**	**100**
Total	294	31	9	5	339
Percent	**87**	**9**	**3**	**1**	**100**

PRI_Q9_9 & TRE_Q10_9. Use a portable fan or ceiling fan for cooling instead of an air conditioner

Group	Yes	No	Don't know	No Response	Total
Control	76	34	1	3	114
Percent	**67**	**30**	**1**	**3**	**100**
Treatment	159	57	5	4	225
Percent	**71**	**25**	**2**	**2**	**100**
Total	235	91	6	7	339
Percent	**69**	**27**	**2**	**2**	**100**

PRI_Q9_10 & TRE_Q10_10. Other, please specify:

Group	Yes	No	Don't know	No Response	Total
Control	29	24	34	27	114
Percent	**25**	**21**	**30**	**24**	**100**
Treatment	39	55	78	53	225
Percent	**17**	**24**	**35**	**24**	**100**
Total	68	79	112	80	339
Percent	**20**	**23**	**33**	**24**	**100**

PRI_Q9_11 & TRE_Q10_11. Other, please specify:

Group	Yes	No	Don't know	No Response	Total
Control	10	36	39	29	114
Percent	**9**	**32**	**34**	**25**	**100**
Treatment	15	71	82	57	225
Percent	**7**	**32**	**36**	**25**	**100**
Total	25	107	121	86	339
Percent	**7**	**32**	**36**	**25**	**100**

PRI_Q10 & TRE_Q11. Which energy efficiency improvements have been made?

PRI_Q10_1 & TRE_Q11_1. Install energy-efficient kitchen or laundry appliances

Group	Yes	No	Don't know	No Response	Total
Control	56	53	3	2	114
Percent	**49**	**46**	**3**	**2**	**100**
Treatment	133	72	11	9	225
Percent	**59**	**32**	**5**	**4**	**100**
Total	189	125	14	11	339
Percent	**56**	**37**	**4**	**3**	**100**

PRI_Q10_2 & TRE_Q11_2. Install energy-efficient heating/cooling equipment

Group	Yes	No	Don't know	No Response	Total
Control	52	51	8	3	114
Percent	**46**	**45**	**7**	**3**	**100**
Treatment	112	95	14	4	225
Percent	**50**	**42**	**6**	**2**	**100**
Total	164	146	22	7	339
Percent	**48**	**43**	**6**	**2**	**100**

PRI_Q10_3 & TRE_Q11_3. Install energy-efficient water heater

Group	Yes	No	Don't know	No Response	Total
Control	50	52	9	3	114
Percent	**44**	**46**	**8**	**3**	**100**
Treatment	95	108	17	5	225
Percent	**42**	**48**	**8**	**2**	**100**
Total	145	160	26	8	339
Percent	**43**	**47**	**8**	**2**	**100**

PRI_Q10_4 & TRE_Q11_4. Replace windows or doors with more energy-efficient types)

Group	Yes	No	Don't know	No Response	Total
Control	41	67	3	3	114
Percent	**36**	**59**	**3**	**3**	**100**
Treatment	78	133	6	8	225
Percent	**35**	**59**	**3**	**4**	**100**
Total	119	200	9	11	339
Percent	**35**	**59**	**3**	**3**	**100**

PRI_Q10_5 & TRE_Q11_5. Caulk or weatherstrip (windows or doors)

Group	Yes	No	Don't know	No Response	Total
Control	66	44	3	1	114
Percent	**58**	**39**	**3**	**1**	**100**
Treatment	115	96	6	8	225
Percent	**51**	**43**	**3**	**4**	**100**
Total	181	140	9	9	339
Percent	**53**	**41**	**3**	**3**	**100**

PRI_Q10_6 & TRE_Q11_6. Add insulation to attic, walls, or floors

Group	Yes	No	Don't know	No Response	Total
Control	36	68	5	5	114
Percent	**32**	**60**	**4**	**4**	**100**
Treatment	84	125	8	8	225
Percent	**37**	**56**	**4**	**4**	**100**
Total	120	193	13	13	339
Percent	**35**	**57**	**4**	**4**	**100**

PRI_Q10_7 & TRE_Q11_7. Install energy-efficient lighting

Group	Yes	No	Don't know	No Response	Total
Control	93	18	3	0	114
Percent	**82**	**16**	**3**	**0**	**100**
Treatment	173	43	5	4	225
Percent	**77**	**19**	**2**	**2**	**100**
Total	266	61	8	4	339
Percent	**78**	**18**	**2**	**1**	**100**

PRI_Q10_8 & TRE_Q11_8. Install programmable thermostat or "smart" thermostat

Group	Yes	No	Don't know	No Response	Total
Control	47	59	3	5	114
Percent	**41**	**52**	**3**	**4**	**100**
Treatment	108	102	8	7	225
Percent	**48**	**45**	**4**	**3**	**100**
Total	155	161	11	12	339
Percent	**46**	**47**	**3**	**4**	**100**

PRI_Q10_9 & TRE_Q11_9. Purchase ENERGY STAR certified home electronic equipment (a television, for example)

Group	Yes	No	Don't know	No Response	Total
Control	63	39	10	2	114
Percent	**55**	**34**	**9**	**2**	**100**
Treatment	129	70	16	10	225
Percent	**57**	**31**	**7**	**4**	**100**
Total	192	109	26	12	339
Percent	**57**	**32**	**8**	**4**	**100**

PRI_Q11 & TRE_Q12. Below are some reasons why you might not be able to save as much energy as you would like. How important are each of the following reasons?

PRI_Q11_1 & TRE_Q12_1. Initial cost of energy efficient equipment is too high

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	8	4	3	4	6	19	11	11	9	12	23	4	114
Percent	**7**	**4**	**3**	**4**	**5**	**17**	**10**	**10**	**8**	**11**	**20**	**4**	**100**
Treatment	20	6	4	8	13	35	15	24	27	10	59	4	225
Percent	**9**	**3**	**2**	**4**	**6**	**16**	**7**	**11**	**12**	**4**	**26**	**2**	**100**
Total	28	10	7	12	19	54	26	35	36	22	82	8	339
Percent	**8**	**3**	**2**	**4**	**6**	**16**	**8**	**10**	**11**	**6**	**24**	**2**	**100**

PRI_Q11_2 & TRE_Q12_2. Not enough time to shop/research/install/too busy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	17	7	4	2	5	25	5	15	12	6	11	5	114
Percent	**15**	**6**	**4**	**2**	**4**	**22**	**4**	**13**	**11**	**5**	**10**	**4**	**100**
Treatment	42	8	9	13	16	49	13	18	17	7	27	6	225
Percent	**19**	**4**	**4**	**6**	**7**	**22**	**6**	**8**	**8**	**3**	**12**	**3**	**100**
Total	59	15	13	15	21	74	18	33	29	13	38	11	339
Percent	**17**	**4**	**4**	**4**	**6**	**22**	**5**	**10**	**9**	**4**	**11**	**3**	**100**

PRI_Q11_3 & TRE_Q12_3. I do not have the expertise

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	22	5	7	8	6	16	4	22	3	2	13	6	114
Percent	**19**	**4**	**6**	**7**	**5**	**14**	**4**	**19**	**3**	**2**	**11**	**5**	**100**
Treatment	42	10	8	13	8	53	11	21	14	7	32	6	225
Percent	**19**	**4**	**4**	**6**	**4**	**24**	**5**	**9**	**6**	**3**	**14**	**3**	**100**
Total	64	15	15	21	14	69	15	43	17	9	45	12	339
Percent	**19**	**4**	**4**	**6**	**4**	**20**	**4**	**13**	**5**	**3**	**13**	**4**	**100**

PRI_Q11_4 & TRE_Q12_4. I do not have enough information to make a decision or understand the impacts of these improvements or behaviors

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	22	7	7	1	4	19	6	16	10	3	14	5	114
Percent	**19**	**6**	**6**	**1**	**4**	**17**	**5**	**14**	**9**	**3**	**12**	**4**	**100**
Treatment	37	13	13	11	8	52	8	18	15	8	32	10	225
Percent	**16**	**6**	**6**	**5**	**4**	**23**	**4**	**8**	**7**	**4**	**14**	**4**	**100**
Total	59	20	20	12	12	71	14	34	25	11	46	15	339
Percent	**17**	**6**	**6**	**4**	**4**	**21**	**4**	**10**	**7**	**3**	**14**	**4**	**100**

PRI_Q11_5 & TRE_Q12_5. Getting everyone in the house to cooperate is too hard

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	34	7	3	2	5	12	4	12	9	3	20	3	114
Percent	**30**	**6**	**3**	**2**	**4**	**11**	**4**	**11**	**8**	**3**	**18**	**3**	**100**
Treatment	53	12	11	5	6	42	7	19	16	10	38	6	225
Percent	**24**	**5**	**5**	**2**	**3**	**19**	**3**	**8**	**7**	**4**	**17**	**3**	**100**
Total	87	19	14	7	11	54	11	31	25	13	58	9	339
Percent	**26**	**6**	**4**	**2**	**3**	**16**	**3**	**9**	**7**	**4**	**17**	**3**	**100**

PRI_Q11_6 & TRE_Q12_6. I do not think my energy saving efforts are worth the time and/or money

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	26	4	5	3	5	19	4	4	10	3	28	3	114
Percent	**23**	**4**	**4**	**3**	**4**	**17**	**4**	**4**	**9**	**3**	**25**	**3**	**100**
Treatment	47	12	15	5	8	30	9	20	19	11	42	7	225
Percent	**21**	**5**	**7**	**2**	**4**	**13**	**4**	**9**	**8**	**5**	**19**	**3**	**100**
Total	73	16	20	8	13	49	13	24	29	14	70	10	339
Percent	**22**	**5**	**6**	**2**	**4**	**14**	**4**	**7**	**9**	**4**	**21**	**3**	**100**

PRI_Q12 Which of the following do you do with regard to your household's energy use? Check all that apply.

PRI_Q12_1 Track monthly energy use

Group	Not Checked	Checked	Total
Control	98	90	188
Percent	**52**	**48**	**100**
Treatment	82	89	171
Percent	**48**	**52**	**100**
Total	180	179	359
Percent	**50**	**50**	**100**

PRI_Q12_2 Track the total amount of your bill

Group	Not Checked	Checked	Total
Control	58	130	188
Percent	**31**	**69**	**100**
Treatment	50	121	171
Percent	**29**	**71**	**100**
Total	108	251	359
Percent	**30**	**70**	**100**

PRI_Q12_3 Compare usage to previous months

Group	Not Checked	Checked	Total
Control	59	129	188
Percent	**31**	**69**	**100**
Treatment	53	118	171
Percent	**31**	**69**	**100**
Total	112	247	359
Percent	**31**	**69**	**100**

PRI_Q12_4 Compare usage to the same month from last year

Group	Not Checked	Checked	Total
Control	83	105	188
Percent	**44**	**56**	**100**
Treatment	58	113	171
Percent	**34**	**66**	**100**
Total	141	218	359
Percent	**39**	**61**	**100**

PRI_Q12_5 None of the above

Group	Not Checked	Checked	Total
Control	174	14	188
Percent	**93**	**7**	**100**
Treatment	154	17	171
Percent	**90**	**10**	**100**
Total	328	31	359
Percent	**91**	**9**	**100**

PRI_Q13. Thinking about the information you could have about your home's energy use, please rate how useful each of the following items would be for your household.

PRI_Q13_1. Your home's energy use compared to that of similar homes

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	19	3	4	5	3	22	6	19	26	24	52	9	192
Percent	**10**	**2**	**2**	**3**	**2**	**11**	**3**	**10**	**14**	**13**	**27**	**5**	**100**
Treatment	23	3	4	7	4	16	14	19	18	19	46	3	176
Percent	**13**	**2**	**2**	**4**	**2**	**9**	**8**	**11**	**10**	**11**	**26**	**2**	**100**
Total	42	6	8	12	7	38	20	38	44	43	98	12	368
Percent	**11**	**2**	**2**	**3**	**2**	**10**	**5**	**10**	**12**	**12**	**27**	**3**	**100**

PRI_Q13_2. Tips to help you save money and energy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	14	3	3	0	5	20	6	15	22	31	69	4	192
Percent	**7**	**2**	**2**	**0**	**3**	**10**	**3**	**8**	**11**	**16**	**36**	**2**	**100**
Treatment	9	2	2	2	4	22	8	10	28	26	60	3	176
Percent	**5**	**1**	**1**	**1**	**2**	**13**	**5**	**6**	**16**	**15**	**34**	**2**	**100**
Total	23	5	5	2	9	42	14	25	50	57	129	7	368
Percent	**6**	**1**	**1**	**1**	**2**	**11**	**4**	**7**	**14**	**15**	**35**	**2**	**100**

PRI_Q13_3. Examples of the energy use associated with common household items

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	14	6	2	3	5	22	9	21	24	19	59	8	192
Percent	7	3	1	2	3	11	5	11	13	10	31	4	100
Treatment	11	3	1	2	6	25	9	16	32	24	44	3	176
Percent	6	2	1	1	3	14	5	9	18	14	25	2	100
Total	25	9	3	5	11	47	18	37	56	43	103	11	368
Percent	7	2	1	1	3	13	5	10	15	12	28	3	100

PRI_Q13_4. Customized suggestions for your home

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	23	3	6	3	8	23	8	21	15	21	52	9	192
Percent	12	2	3	2	4	12	4	11	8	11	27	5	100
Treatment	11	3	3	4	4	25	9	16	22	22	53	4	176
Percent	6	2	2	2	2	14	5	9	13	13	30	2	100
Total	34	6	9	7	12	48	17	37	37	43	105	13	368
Percent	9	2	2	2	3	13	5	10	10	12	29	4	100

PRI_Q13_5. Graphs that display your home’s energy use over time

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	20	2	3	0	4	17	5	15	27	21	71	7	192
Percent	10	1	2	0	2	9	3	8	14	11	37	4	100
Treatment	12	4	1	2	3	14	11	13	30	25	59	2	176
Percent	7	2	1	1	2	8	6	7	17	14	34	1	100
Total	32	6	4	2	7	31	16	28	57	46	130	9	368
Percent	9	2	1	1	2	8	4	8	15	13	35	2	100

PRI_Q13_6. Information about services and offers from Duke Energy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	19	1	4	0	5	22	9	22	23	23	58	6	192
Percent	10	1	2	0	3	11	5	11	12	12	30	3	100
Treatment	10	4	1	5	7	22	8	22	26	17	50	4	176
Percent	6	2	1	3	4	13	5	13	15	10	28	2	100
Total	29	5	5	5	12	44	17	44	49	40	108	10	368
Percent	8	1	1	1	3	12	5	12	13	11	29	3	100

PRI_Q14. The statements below provide reasons why households might try to reduce their home's energy use. Please indicate how important each statement is to you.

PRI_Q14_1. Reducing my energy bill(s)

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	4	2	1	0	0	11	2	7	14	28	122	1	192
Percent	**2**	**1**	**1**	**0**	**0**	**6**	**1**	**4**	**7**	**15**	**64**	**1**	**100**
Treatment	3	0	1	1	2	5	4	4	21	27	107	1	176
Percent	**2**	**0**	**1**	**1**	**1**	**3**	**2**	**2**	**12**	**15**	**61**	**1**	**100**
Total	7	2	2	1	2	16	6	11	35	55	229	2	368
Percent	**2**	**1**	**1**	**0**	**1**	**4**	**2**	**3**	**10**	**15**	**62**	**1**	**100**

PRI_Q14_2. Helping the environment

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	9	1	2	3	2	17	9	13	23	13	95	5	192
Percent	**5**	**1**	**1**	**2**	**1**	**9**	**5**	**7**	**12**	**7**	**49**	**3**	**100**
Treatment	7	0	3	5	3	10	9	14	16	24	84	1	176
Percent	**4**	**0**	**2**	**3**	**2**	**6**	**5**	**8**	**9**	**14**	**48**	**1**	**100**
Total	16	1	5	8	5	27	18	27	39	37	179	6	368
Percent	**4**	**0**	**1**	**2**	**1**	**7**	**5**	**7**	**11**	**10**	**49**	**2**	**100**

PRI_Q14_3. Setting an example for others

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	28	4	2	7	6	21	9	13	21	16	59	6	192
Percent	**15**	**2**	**1**	**4**	**3**	**11**	**5**	**7**	**11**	**8**	**31**	**3**	**100**
Treatment	23	6	3	7	7	22	12	12	19	15	46	4	176
Percent	**13**	**3**	**2**	**4**	**4**	**13**	**7**	**7**	**11**	**9**	**26**	**2**	**100**
Total	51	10	5	14	13	43	21	25	40	31	105	10	368
Percent	**14**	**3**	**1**	**4**	**4**	**12**	**6**	**7**	**11**	**8**	**29**	**3**	**100**

PRI_Q14_4. Avoiding waste

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	7	2	3	2	0	12	5	7	29	22	101	2	192
Percent	**4**	**1**	**2**	**1**	**0**	**6**	**3**	**4**	**15**	**11**	**53**	**1**	**100**
Treatment	4	0	2	1	3	11	6	11	22	25	89	2	176
Percent	**2**	**0**	**1**	**1**	**2**	**6**	**3**	**6**	**13**	**14**	**51**	**1**	**100**
Total	11	2	5	3	3	23	11	18	51	47	190	4	368
Percent	**3**	**1**	**1**	**1**	**1**	**6**	**3**	**5**	**14**	**13**	**52**	**1**	**100**

PRI_Q14_5. Conserving energy resources

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Total
Control	8	1	2	1	1	15	7	15	25	17	95	5	192
Percent	**4**	**1**	**1**	**1**	**1**	**8**	**4**	**8**	**13**	**9**	**49**	**3**	**100**
Treatment	4	0	2	2	2	15	7	8	24	25	85	2	176
Percent	**2**	**0**	**1**	**1**	**1**	**9**	**4**	**5**	**14**	**14**	**48**	**1**	**100**
Total	12	1	4	3	3	30	14	23	49	42	180	7	368
Percent	**3**	**0**	**1**	**1**	**1**	**8**	**4**	**6**	**13**	**11**	**49**	**2**	**100**

PRI_Q15. Please indicate your level of agreement with each of the following statements

PRI_Q15_1. Duke Energy provides excellent customer service

Group	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree	No Response	Total
Control	7	9	22	69	83	2	192
Percent	**4**	**5**	**11**	**36**	**43**	**1**	**100**
Treatment	2	10	23	62	78	1	176
Percent	**1**	**6**	**13**	**35**	**44**	**1**	**100**
Total	9	19	45	131	161	3	368
Percent	**2**	**5**	**12**	**36**	**44**	**1**	**100**

PRI_Q15_2. Duke Energy respects its customers

Group	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree	No Response	Total
Control	8	11	26	57	88	2	192
Percent	**4**	**6**	**14**	**30**	**46**	**1**	**100**
Treatment	4	9	32	54	76	1	176
Percent	**2**	**5**	**18**	**31**	**43**	**1**	**100**
Total	12	20	58	111	164	3	368
Percent	**3**	**5**	**16**	**30**	**45**	**1**	**100**

PRI_Q15_3. Duke Energy provides service at a reasonable cost

Group	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree	No Response	Total
Control	6	25	43	69	44	5	192
Percent	**3**	**13**	**22**	**36**	**23**	**3**	**100**
Treatment	5	27	24	86	33	1	176
Percent	**3**	**15**	**14**	**49**	**19**	**1**	**100**
Total	11	52	67	155	77	6	368
Percent	**3**	**14**	**18**	**42**	**21**	**2**	**100**

PRI_Q16. Before today, were you aware that you could order free or discounted lighting products through the Duke Energy website?

Group	Yes	No	No Response	Total
Control	39	150	3	192
Percent	**20**	**78**	**2**	**100**
Treatment	39	134	3	176
Percent	**22**	**76**	**2**	**100**
Total	78	284	6	368
Percent	**21**	**77**	**2**	**100**

PRI_Q16a. How many free light bulbs have you ordered through the Duke Energy website this year?

Group	0	1	4	6	10	12	14	30	Missing	Total
Control	32	1	0	0	0	1	0	0	5	39
Percent	**82**	**3**	**0**	**0**	**0**	**3**	**0**	**0**	**13**	**100**
Treatment	32	0	1	1	1	0	1	1	2	39
Percent	**82**	**0**	**3**	**3**	**3**	**0**	**3**	**3**	**5**	**100**
Total	64	1	1	1	1	1	1	1	7	78
Percent	**82**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**9**	**100**

PRI_Q16b. How many discounted light bulbs have you ordered through the Duke Energy website this year?

Group	0	6	10	12	20	24	25	30	Missing	Total
Control	32	0	0	1	0	1	1	0	4	39
Percent	**82**	**0**	**0**	**3**	**0**	**3**	**3**	**0**	**10**	**100**
Treatment	33	1	1	0	1	0	0	1	2	39
Percent	**85**	**3**	**3**	**0**	**3**	**0**	**0**	**3**	**5**	**100**
Total	65	1	1	1	1	1	1	1	6	78
Percent	**83**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**8**	**100**

PRI_Q18 & TRE_Q13. Do you own or rent this residence?

Group	Own	Rent	Missing	No Response	Total
Control	161	21	8	2	192
Percent	**84**	**11**	**4**	**1**	**100**
Treatment	310	24	10	3	347
Percent	**89**	**7**	**3**	**1**	**100**
Total	471	45	18	5	539
Percent	**87**	**8**	**3**	**1**	**100**

PRI_Q19 & TRE_Q14. Including yourself, how many people live in your home?

Group	1	2	3	4	5	6	7	8	9	19	No Response	Missing	Total
Control	49	66	28	22	11	4	0	1	1	1	1	8	192
Percent	**26**	**34**	**15**	**11**	**6**	**2**	**0**	**1**	**1**	**1**	**1**	**4**	**100**
Treatment	65	155	39	47	17	5	1	0	0	1	7	10	347
Percent	**19**	**45**	**11**	**14**	**5**	**1**	**0**	**0**	**0**	**0**	**2**	**3**	**100**
Total	114	221	67	69	28	9	1	1	1	2	8	18	539
Percent	**21**	**41**	**12**	**13**	**5**	**2**	**0**	**0**	**0**	**0**	**1**	**3**	**100**

PRI_Q22 & TRE_Q17. What is your primary heating fuel?

Group	Electricity	Natural Gas	Oil	Other	Don't know	No Response	Missing	Total
Control	107	63	1	9	3	1	8	192
Percent	**56**	**33**	**1**	**5**	**2**	**1**	**4**	**100**
Treatment	188	103	8	23	3	3	19	347
Percent	**54**	**30**	**2**	**7**	**1**	**1**	**5**	**100**
Total	295	166	9	32	6	4	27	539
Percent	**55**	**31**	**2**	**6**	**1**	**1**	**5**	**100**

TRE_Q1. Duke Energy sends a personalized report called My Home Energy Report to a select group of homes. These reports are mailed in a standard envelope every few months and are meant to provide you with information on how your home's electric energy usage compares with similar homes. Have you seen one of these reports?

Group	Yes	No	No Response	Total
Treatment	160	10	1	171
Percent	**94**	**6**	**1**	**100**

TRE_Q2. About how many My Home Energy Reports have you received in the past 12 months?

Group	1	2	3	4	5	6	7	8	9	10	11	12	No Response	Missing	Total
Treatment	4	14	14	29	6	21	2	8	2	9	1	37	13	1	161
Percent	**2**	**9**	**9**	**18**	**4**	**13**	**1**	**5**	**1**	**6**	**1**	**23**	**8**	**1**	**100**

TRE_Q3. How often do you read the My Home Energy Reports?

Group	Always	Sometimes	Never	No Response	Missing	Total
Treatment	107	42	10	1	1	161
Percent	**66**	**26**	**6**	**1**	**1**	**100**

TRE_Q4. How much do you agree or disagree with the following statements about My Home Energy Reports?

TRE_Q4_1. I have learned about my household's energy use from My Home Energy Reports.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	5	2	2	4	2	16	10	14	19	22	52	1	2	151
Percent	**3**	**1**	**1**	**3**	**1**	**11**	**7**	**9**	**13**	**15**	**34**	**1**	**1**	**100**

TRE_Q4_2. I use the reports to tell me how well I am doing at saving energy.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	6	1	5	10	6	16	6	20	14	19	44	2	2	151
Percent	**4**	**1**	**3**	**7**	**4**	**11**	**4**	**13**	**9**	**13**	**29**	**1**	**1**	**100**

TRE_Q4_3. The tips provided in the reports are pertinent to my home.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	4	3	7	10	9	22	15	13	19	15	29	3	2	151
Percent	**3**	**2**	**5**	**7**	**6**	**15**	**10**	**9**	**13**	**10**	**19**	**2**	**1**	**100**

TRE_Q4_4. My Home Energy Reports provide the details I need to understand my home's energy use.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	5	2	6	3	6	24	12	14	15	15	44	3	2	151
Percent	**3**	**1**	**4**	**2**	**4**	**16**	**8**	**9**	**10**	**10**	**29**	**2**	**1**	**100**

TRE_Q4_5. I have discussed My Home Energy Reports with others.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	43	19	10	8	6	13	6	10	9	5	18	2	2	151
Percent	**28**	**13**	**7**	**5**	**4**	**9**	**4**	**7**	**6**	**3**	**12**	**1**	**1**	**100**

TRE_Q4_6. The information provided about my home's energy use is confusing.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	41	24	17	18	7	13	4	6	7	4	7	1	2	151
Percent	**27**	**16**	**11**	**12**	**5**	**9**	**3**	**4**	**5**	**3**	**5**	**1**	**1**	**100**

TRE_Q4_7. I suspect that the "similar" homes that my home is compared to in the Home Energy Reports are not actually like mine.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	15	6	12	13	7	22	7	7	22	9	26	3	2	151
Percent	**10**	**4**	**8**	**9**	**5**	**15**	**5**	**5**	**15**	**6**	**17**	**2**	**1**	**100**

TRE_Q4_8. Since reading the Home Energy Reports, I have taken actions to use less energy than I would not have otherwise taken.

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	13	5	6	9	7	27	10	17	16	12	26	1	2	151
Percent	**9**	**3**	**4**	**6**	**5**	**18**	**7**	**11**	**11**	**8**	**17**	**1**	**1**	**100**

TRE_Q6. Please rate how useful each feature of the Home Energy Report is to you.

TRE_Q6_1. Comparison to similar homes

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	19	10	3	7	12	21	7	17	18	7	25	3	2	151
Percent	**13**	**7**	**2**	**5**	**8**	**14**	**5**	**11**	**12**	**5**	**17**	**2**	**1**	**100**

TRE_Q6_2. Tips to help you save money and energy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	3	7	4	3	8	20	8	16	22	17	38	3	2	151
Percent	**2**	**5**	**3**	**2**	**5**	**13**	**5**	**11**	**15**	**11**	**25**	**2**	**1**	**100**

TRE_Q6_3. Examples of the energy use associated with common household items

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	8	3	3	2	3	30	10	15	24	13	35	3	2	151
Percent	**5**	**2**	**2**	**1**	**2**	**20**	**7**	**10**	**16**	**9**	**23**	**2**	**1**	**100**

TRE_Q6_4. Customized suggestions for your home

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	4	4	11	2	12	25	9	16	20	13	31	2	2	151
Percent	**3**	**3**	**7**	**1**	**8**	**17**	**6**	**11**	**13**	**9**	**21**	**1**	**1**	**100**

TRE_Q6_5. Graphs that display your home's energy use over time

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	3	3	1	5	5	12	10	13	24	20	51	2	2	151
Percent	**2**	**2**	**1**	**3**	**3**	**8**	**7**	**9**	**16**	**13**	**34**	**1**	**1**	**100**

TRE_Q6_6. Information about services and offers from Duke Energy

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	4	7	8	5	13	21	8	14	19	16	30	4	2	151
Percent	**3**	**5**	**5**	**3**	**9**	**14**	**5**	**9**	**13**	**11**	**20**	**3**	**1**	**100**

TRE_Q7. Overall, how satisfied are you with the information in the My Home Energy Reports you've received?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	4	2	0	15	6	0	10	18	19	15	43	17	2	151
Percent	**3**	**1**	**0**	**10**	**4**	**0**	**7**	**12**	**13**	**10**	**28**	**11**	**1**	**100**

TRE_Q8. Are you aware that you can go online to My Home Energy Interactive to access more information, above and beyond that found in the My Home Energy Report, which describes more ways to save energy?

Group	Yes	No	No Response	Missing	Total
Treatment	50	93	6	2	151
Percent	**33**	**62**	**4**	**1**	**100**

TRE_Q8a. Have you signed up to use My Home Energy Interactive?

Group	Yes	No	Missing	Total
Treatment	7	44	7	58
Percent	**12**	**76**	**12**	**100**

TRE_Q8b. How useful is My Home Energy Interactive to you for saving energy?

Group	0	1	2	3	4	5	6	7	8	9	10	No Response	Missing	Total
Treatment	0	0	1	0	0	1	1	0	2	1	1	0	7	14
Percent	**0**	**0**	**7**	**0**	**0**	**7**	**7**	**0**	**14**	**7**	**7**	**0**	**50**	**100**

Appendix F Detailed Regression Outputs/Models

Table F-1: Regression Coefficients for DEC Cohort 1

Number of obs	=	1762110
F(211,1746190)	=	3462.28
Prob>F	=	0.0000
R-squared	=	0.6990
AdjR-squared	=	0.6963
Root MSE	=	14.2230

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2008	5.191487	.2007457	25.86	0.000	4.798033	5.584942
01/2009	8.474034	.2007376	42.21	0.000	8.080595	8.867473
02/2009	4.944045	.2007376	24.63	0.000	4.550607	5.337484
03/2009	-4.473073	.2007376	-22.28	0.000	-4.866511	-4.079634
04/2009	-10.36862	.2007399	-51.65	0.000	-10.76206	-9.975177
05/2009	-5.134012	.2007376	-25.58	0.000	-5.52745	-4.740573
06/2009	8.447003	.2007622	42.07	0.000	8.053516	8.84049
07/2009	12.29769	.2007376	61.26	0.000	11.90425	12.69113
08/2009	10.50211	.2007376	52.32	0.000	10.10867	10.89554
09/2009	-1.928812	.2007376	-9.61	0.000	-2.322251	-1.535373
10/2009	-10.3154	.2007376	-51.39	0.000	-10.70884	-9.921959
11/2009	-5.556012	.2007376	-27.68	0.000	-5.949451	-5.162574
12/2009	12.49879	.2007376	62.26	0.000	12.10535	12.89222
01/2010	17.97165	.2007376	89.53	0.000	17.57821	18.36509
02/2010	12.75866	.2007376	63.56	0.000	12.36522	13.1521
03/2010	-2.580372	.2007376	-12.85	0.000	-2.973811	-2.186933
05/2010	-1.914499	.2193415	-8.73	0.000	-2.3444	-1.484597
06/2010	13.97785	.2193415	63.73	0.000	13.54795	14.40775
07/2010	21.27298	.2193415	96.99	0.000	20.84308	21.70289
08/2010	16.37607	.2193517	74.66	0.000	15.94615	16.806
09/2010	3.002323	.2193415	13.69	0.000	2.572421	3.432225
10/2010	-10.85536	.2193415	-49.49	0.000	-11.28526	-10.42546
11/2010	-2.931544	.2193415	-13.37	0.000	-3.361445	-2.501642
12/2010	15.42983	.2193415	70.35	0.000	14.99993	15.85973
01/2011	16.05199	.2193467	73.18	0.000	15.62208	16.4819
02/2011	1.516525	.2193467	6.91	0.000	1.086613	1.946437

I/A

03/2011	-8.668877	.2193467	-39.52	0.000	-9.098789	-8.238966
04/2011	-10.7024	.2193467	-48.79	0.000	-11.13231	-10.27249
05/2011	-2.066455	.2193467	-9.42	0.000	-2.496367	-1.636544
06/2011	11.27938	.2193467	51.42	0.000	10.84947	11.70929
07/2011	18.50946	.2193467	84.38	0.000	18.07955	18.93937
08/2011	15.38748	.2193467	70.15	0.000	14.95757	15.81739
09/2011	-2.419517	.2193467	-11.03	0.000	-2.849429	-1.989605
10/2011	-11.95917	.2193467	-54.52	0.000	-12.38908	-11.52925
11/2011	-6.773594	.2193467	-30.88	0.000	-7.203506	-6.343682
12/2011	.3503983	.2193467	1.60	0.110	-.0795136	.7803101
01/2012	2.137307	.2193467	9.74	0.000	1.707396	2.567219
02/2012	-2.023987	.2193467	-9.23	0.000	-2.453899	-1.594075
03/2012	-10.96786	.2193467	-50.00	0.000	-11.39777	-10.53795
04/2012	-12.02501	.2193467	-54.82	0.000	-12.45493	-11.5951
05/2012	-5.344883	.2193467	-24.37	0.000	-5.774795	-4.914972
06/2012	5.043491	.2193467	22.99	0.000	4.613579	5.473403
07/2012	15.05386	.2193467	68.63	0.000	14.62395	15.48378
08/2012	7.429274	.2193467	33.87	0.000	6.999362	7.859186
09/2012	-4.481343	.2193467	-20.43	0.000	-4.911255	-4.051431
10/2012	-11.71996	.2193467	-53.43	0.000	-12.14987	-11.29005
11/2012	-3.644662	.2193467	-16.62	0.000	-4.074574	-3.21475
12/2012	-.3900915	.2193467	-1.78	0.075	-.8200034	.0398203
01/2013	3.125439	.2193467	14.25	0.000	2.695527	3.555351
02/2013	4.334034	.2193467	19.76	0.000	3.904122	4.763946
03/2013	-1.639171	.2193467	-7.47	0.000	-2.069083	-1.209259
04/2013	-10.92128	.2193467	-49.79	0.000	-11.3512	-10.49137
05/2013	-9.073495	.2193467	-41.37	0.000	-9.503407	-8.643583
06/2013	1.977657	.2193467	9.02	0.000	1.547745	2.407569
07/2013	6.9278	.2193467	31.58	0.000	6.497888	7.357712
08/2013	4.202586	.2193467	19.16	0.000	3.772674	4.632497
09/2013	-3.535703	.2193467	-16.12	0.000	-3.965615	-3.105791
10/2013	-12.08457	.2193467	-55.09	0.000	-12.51448	-11.65466
11/2013	-4.151322	.2193467	-18.93	0.000	-4.581234	-3.72141
12/2013	5.982545	.2193467	27.27	0.000	5.552633	6.412457
01/2014	13.94471	.2193467	63.57	0.000	13.5148	14.37462
02/2014	6.439797	.2193467	29.36	0.000	6.009885	6.869709
03/2014	-4.763844	.2193467	-21.72	0.000	-5.193755	-4.333932
04/2014	-11.30048	.2193467	-51.52	0.000	-11.73039	-10.87057
05/2014	-5.923049	.2193518	-27.00	0.000	-6.352971	-5.493127
06/2014	5.586936	.2193518	25.47	0.000	5.157014	6.016858
07/2014	6.807551	.2193518	31.03	0.000	6.377629	7.237473

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08/2014	4.594464	.2193467	20.95	0.000	4.164553	5.024376
09/2014	-2.844089	.2193467	-12.97	0.000	-3.274001	-2.414177
10/2014	-12.83725	.2193467	-58.52	0.000	-13.26717	-12.40734
11/2014	-3.794079	.2193467	-17.30	0.000	-4.223991	-3.364168
12/2014	5.624176	.2193415	25.64	0.000	5.194275	6.054078
01/2015	7.697574	.2193415	35.09	0.000	7.267672	8.127475
02/2015	8.480056	.2193415	38.66	0.000	8.050154	8.909958
03/2015	-6.031693	.2193415	-27.50	0.000	-6.461595	-5.601791
04/2015	-13.39654	.2193415	-61.08	0.000	-13.82644	-12.96664
05/2015	-5.456317	.2193415	-24.88	0.000	-5.886219	-5.026415
06/2015	7.45144	.2193415	33.97	0.000	7.021538	7.881341
07/2015	13.00821	.2193415	59.31	0.000	12.57831	13.43811
08/2015	8.063715	.2193415	36.76	0.000	7.633813	8.493616
09/2015	-5.04434	.2193415	-23.00	0.000	-5.474241	-4.614438
10/2015	-14.22894	.2193415	-64.87	0.000	-14.65884	-13.79903
11/2015	-10.26639	.2193415	-46.81	0.000	-10.69629	-9.836487
12/2015	-4.744726	.2193415	-21.63	0.000	-5.174627	-4.314824
01/2016	4.96105	.2193465	22.62	0.000	4.531139	5.390962
02/2016	2.108975	.2193816	9.61	0.000	1.678995	2.538955
03/2016	-11.48936	.2195124	-52.34	0.000	-11.9196	-11.05912
04/2016	-13.86226	.2197353	-63.09	0.000	-14.29294	-13.43159
05/2016	-7.251094	.2199293	-32.97	0.000	-7.682147	-6.82004
06/2016	7.00792	.2201299	31.84	0.000	6.576473	7.439367
07/2016	15.72801	.2204102	71.36	0.000	15.29602	16.16001
08/2016	11.98578	.2206354	54.32	0.000	11.55334	12.41821
09/2016	1.356097	.220921	6.14	0.000	.9230997	1.789095
10/2016	-12.62069	.221172	-57.06	0.000	-13.05418	-12.1872
11/2016	-9.658069	.2213335	-43.64	0.000	-10.09188	-9.224264
12/2016	-.6289618	.2215121	-2.84	0.005	-1.063118	-.1948056
01/2017	-2.849558	.2216975	-12.85	0.000	-3.284077	-2.415039
02/2017	-8.607431	.221851	-38.80	0.000	-9.042251	-8.172611
03/2017	-10.77751	.2220055	-48.55	0.000	-11.21263	-10.34238
04/2017	-13.76509	.2222722	-61.93	0.000	-14.20073	-13.32944
05/2017	-8.217315	.2225359	-36.93	0.000	-8.653478	-7.781152
06/2017	1.158951	.2228875	5.20	0.000	.722099	1.595803
07/2017	8.833328	.2231686	39.58	0.000	8.395925	9.270731
08/2017	4.53006	.2234059	20.28	0.000	4.092192	4.967928
09/2017	-5.786104	.2236804	-25.87	0.000	-6.22451	-5.347698
10/2017	-11.066	.2239339	-49.42	0.000	-11.5049	-10.62709
11/2017	-8.475153	.2241597	-37.81	0.000	-8.914499	-8.035808
12/2017	4.758375	.2243693	21.21	0.000	4.318619	5.198131

I/A

01/2018	9.863339	.2246289	43.91	0.000	9.423074	10.3036
02/2018	-5.781853	.2248725	-25.71	0.000	-6.222595	-5.34111
03/2018	-9.912905	.2250997	-44.04	0.000	-10.35409	-9.471718
04/2018	-13.94758	.2253348	-61.90	0.000	-14.38923	-13.50593
05/2018	-6.950921	.2255593	-30.82	0.000	-7.393009	-6.508832
i.ym#c.treatment						
05/2010	-.1910499	.2394967	-0.80	0.425	-.6604551	.2783552
06/2010	-.2860475	.2394967	-1.19	0.232	-.7554527	.1833577
07/2010	-.5401676	.2394967	-2.26	0.024	-1.009573	-.0707624
08/2010	-.4921973	.239506	-2.06	0.040	-.9616208	-.0227738
09/2010	-.463216	.2394967	-1.93	0.053	-.9326212	.0061891
10/2010	-.5357518	.2394967	-2.24	0.025	-1.005157	-.0663467
11/2010	-.1931776	.2394967	-0.81	0.420	-.6625827	.2762276
12/2010	.0610646	.2394967	0.25	0.799	-.4083406	.5304697
01/2011	.0866716	.2395014	0.36	0.717	-.3827428	.556086
02/2011	.0078406	.2395126	0.03	0.974	-.4615958	.477277
03/2011	-.454115	.2395126	-1.90	0.058	-.9235514	.0153213
04/2011	-.484397	.2395126	-2.02	0.043	-.9538333	-.0149606
05/2011	-.7348654	.2395238	-3.07	0.002	-1.204324	-.2654072
06/2011	-.5874111	.2395126	-2.45	0.014	-1.056847	-.1179747
07/2011	-.8212494	.2395126	-3.43	0.001	-1.290686	-.3518131
08/2011	-.6037938	.2395126	-2.52	0.012	-1.07323	-.1343574
09/2011	-.5673285	.2395126	-2.37	0.018	-1.036765	-.0978922
10/2011	-.5760798	.2395126	-2.41	0.016	-1.045516	-.1066434
11/2011	-.4092845	.2395126	-1.71	0.087	-.8787209	.0601518
12/2011	-.3575161	.2395126	-1.49	0.136	-.8269524	.1119203
01/2012	-.2747792	.2395126	-1.15	0.251	-.7442156	.1946571
02/2012	-.3863291	.2395126	-1.61	0.107	-.8557654	.0831073
03/2012	-.556866	.2395126	-2.32	0.020	-1.026302	-.0874297
04/2012	-.685426	.2395126	-2.86	0.004	-1.154862	-.2159896
05/2012	-.5552546	.2395126	-2.32	0.020	-1.024691	-.0858182
06/2012	-.6511456	.2395126	-2.72	0.007	-1.120582	-.1817092
07/2012	-.5138519	.2395126	-2.15	0.032	-.9832883	-.0444155
08/2012	-.6455145	.2395126	-2.70	0.007	-1.114951	-.1760781
09/2012	-.5557067	.2395126	-2.32	0.020	-1.025143	-.0862704
10/2012	-.6565749	.2395014	-2.74	0.006	-1.125989	-.1871605
11/2012	-.983766	.2395014	-4.11	0.000	-1.45318	-.5143516
12/2012	-.4109544	.2395014	-1.72	0.086	-.8803688	.05846
01/2013	-.2759519	.2395014	-1.15	0.249	-.7453663	.1934625
02/2013	-.3054777	.2395014	-1.28	0.202	-.7748921	.1639367

I/A

03/2013	-.5427792	.2395014	-2.27	0.023	-1.012194	-.0733648
04/2013	-.582956	.2395014	-2.43	0.015	-1.05237	-.1135416
05/2013	-.7678896	.2395014	-3.21	0.001	-1.237304	-.2984752
06/2013	-.8816336	.2395014	-3.68	0.000	-1.351048	-.4122192
07/2013	-1.034716	.2395014	-4.32	0.000	-1.504131	-.565302
08/2013	-.9875511	.2395014	-4.12	0.000	-1.456966	-.5181367
09/2013	-.6532961	.2395014	-2.73	0.006	-1.122711	-.1838818
10/2013	-.6239904	.2395014	-2.61	0.009	-1.093405	-.154576
11/2013	-.3569448	.2395014	-1.49	0.136	-.8263592	.1124696
12/2013	-.1515506	.2395014	-0.63	0.527	-.620965	.3178638
01/2014	-.2228782	.2395014	-0.93	0.352	-.6922926	.2465362
02/2014	-.1320108	.2395014	-0.55	0.582	-.6014252	.3374036
03/2014	-.36386	.2395014	-1.52	0.129	-.8332744	.1055544
04/2014	-.6727505	.2395014	-2.81	0.005	-1.142165	-.2033362
05/2014	-.6869799	.2395061	-2.87	0.004	-1.156403	-.2175563
06/2014	-.9441145	.2395061	-3.94	0.000	-1.413538	-.474691
07/2014	-.9629565	.2395061	-4.02	0.000	-1.43238	-.4935329
08/2014	-.9183834	.2395014	-3.83	0.000	-1.387798	-.448969
09/2014	-.7614144	.2395014	-3.18	0.001	-1.230829	-.292
10/2014	-.6365438	.2395014	-2.66	0.008	-1.105958	-.1671294
11/2014	-.4433267	.2395014	-1.85	0.064	-.9127411	.0260877
12/2014	-.2697246	.2394967	-1.13	0.260	-.7391298	.1996806
01/2015	-.2573507	.2394967	-1.07	0.283	-.7267559	.2120545
02/2015	-.3339995	.2394967	-1.39	0.163	-.8034046	.1354057
03/2015	-.5212122	.2394967	-2.18	0.030	-.9906174	-.0518071
04/2015	-.6320871	.2394967	-2.64	0.008	-1.101492	-.1626819
05/2015	-.6295939	.2394967	-2.63	0.009	-1.098999	-.1601887
06/2015	-.5415726	.2394967	-2.26	0.024	-1.010978	-.0721674
07/2015	-.4877207	.2394967	-2.04	0.042	-.9571259	-.0183156
08/2015	-.5460176	.2394967	-2.28	0.023	-1.015423	-.0766125
09/2015	-.6018334	.2394967	-2.51	0.012	-1.071239	-.1324282
10/2015	-.6344547	.2394967	-2.65	0.008	-1.10386	-.1650496
11/2015	-.4519346	.2394967	-1.89	0.059	-.9213398	.0174705
12/2015	-.2701377	.2394967	-1.13	0.259	-.7395429	.1992674
01/2016	-.0118044	.2395238	-0.05	0.961	-.4812627	.457654
02/2016	.0119737	.2396241	0.05	0.960	-.4576812	.4816286
03/2016	-.3992353	.2399267	-1.66	0.096	-.8694835	.0710128
04/2016	-.5908526	.2403388	-2.46	0.014	-1.061908	-.1197969
05/2016	-.6390015	.2408954	-2.65	0.008	-1.111148	-.1668549
06/2016	-.6533725	.2413804	-2.71	0.007	-1.12647	-.1802753
07/2016	-.6972425	.2419413	-2.88	0.004	-1.171439	-.223046

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08/2016	-.5881896	.2424409	-2.43	0.015	-1.063365	-.1130138
09/2016	-.533938	.2431858	-2.20	0.028	-1.010574	-.0573022
10/2016	-.6331126	.243749	-2.60	0.009	-1.110852	-.1553731
11/2016	-.4772002	.2442789	-1.95	0.051	-.9559785	.001578
12/2016	-.3995216	.2446356	-1.63	0.102	-.8789989	.0799558
01/2017	-.5412792	.244975	-2.21	0.027	-1.021422	-.0611367
02/2017	-.4773872	.2453217	-1.95	0.052	-.9582092	.0034348
03/2017	-.5299467	.2456578	-2.16	0.031	-1.011427	-.048466
04/2017	-.6764316	.2462687	-2.75	0.006	-1.15911	-.1937534
05/2017	-.6656495	.2469533	-2.70	0.007	-1.149669	-.1816296
06/2017	-.7430946	.2477597	-3.00	0.003	-1.228695	-.2574941
07/2017	-.723818	.2483676	-2.91	0.004	-1.21061	-.2370262
08/2017	-.7733249	.2489882	-3.11	0.002	-1.261333	-.2853167
09/2017	-.9654595	.2495057	-3.87	0.000	-1.454482	-.476437
10/2017	-.725397	.2499668	-2.90	0.004	-1.215323	-.2354707
11/2017	-.6503956	.2504678	-2.60	0.009	-1.141304	-.1594875
12/2017	-.6432011	.2509038	-2.56	0.010	-1.134964	-.1514384
01/2018	-.8176798	.2513993	-3.25	0.001	-1.310414	-.3249459
02/2018	-.7727947	.2518814	-3.07	0.002	-1.266473	-.2791159
03/2018	-.7919056	.2523102	-3.14	0.002	-1.286425	-.2973863
04/2018	-.6624927	.2527603	-2.62	0.009	-1.157894	-.1670912
05/2018	-.7587147	.2532945	-3.00	0.003	-1.255163	-.2622664
06/2018	-.8077236	.2681764	-3.01	0.003	-1.33334	-.2821072
cons	45.77712	.1655728	276.48	0.000	45.4526	46.10163

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Table F-2: Regression Coefficients for DEC Cohort 2

Number of obs	=	66019536
F(184,65383332)	=	107813.97
Prob>F	=	0.0000
R-squared	=	0.6861
AdjR-squared	=	0.6831
Root MSE	=	14.5232

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2008	15.60621	3.538483	4.41	0.000	8.670906	22.54151
01/2009	18.55965	3.538483	5.25	0.000	11.62435	25.49495
02/2009	15.16359	3.538483	4.29	0.000	8.228292	22.09889
03/2009	6.65773	3.538483	1.88	0.060	-.2775681	13.59303
04/2009	.6109856	3.538482	0.17	0.863	-6.324312	7.546284
05/2009	4.159499	3.538482	1.18	0.240	-2.775798	11.0948
06/2009	14.83888	3.538482	4.19	0.000	7.903585	21.77418
07/2009	18.6593	3.538481	5.27	0.000	11.72401	25.5946
08/2009	17.93512	3.538481	5.07	0.000	10.99982	24.87041
09/2009	6.611174	3.538481	1.87	0.062	-.3241207	13.54647
10/2009	.494279	3.53848	0.14	0.889	-6.441015	7.429573
11/2009	5.650804	3.53848	1.60	0.110	-1.28449	12.5861
12/2009	21.0607	3.53848	5.95	0.000	14.1254	27.99599
01/2010	25.40384	3.53848	7.18	0.000	18.46855	32.33914
02/2010	21.15344	3.538479	5.98	0.000	14.21814	28.08873
03/2010	7.036302	3.538479	1.99	0.047	.1010102	13.97159
04/2010	-.1561714	3.538479	-0.04	0.965	-7.091462	6.779119
05/2010	6.554885	3.538478	1.85	0.064	-.3804053	13.49017
06/2010	20.61625	3.538478	5.83	0.000	13.68096	27.55154
07/2010	26.5117	3.538477	7.49	0.000	19.57641	33.44699
08/2010	22.42108	3.538477	6.34	0.000	15.48579	29.35637
09/2010	10.95032	3.538477	3.09	0.002	4.015031	17.88561
10/2010	.0531436	3.538477	0.02	0.988	-6.882143	6.988431
11/2010	7.951184	3.538476	2.25	0.025	1.015897	14.88647
12/2010	24.3034	3.538476	6.87	0.000	17.36811	31.23868
01/2011	24.59635	3.538476	6.95	0.000	17.66107	31.53164
02/2011	12.14872	3.538476	3.43	0.001	5.213439	19.08401
03/2011	3.271488	3.538475	0.92	0.355	-3.663796	10.20677
04/2011	.0254961	3.538475	0.01	0.994	-6.909788	6.96078
05/2011	6.722884	3.538475	1.90	0.057	-.2123994	13.65817
06/2011	18.30611	3.538475	5.17	0.000	11.37082	25.24139

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07/2011	24.57749	3.538474	6.95	0.000	17.6422	31.51277
08/2011	21.24229	3.538474	6.00	0.000	14.307	28.17757
09/2011	6.32984	3.538474	1.79	0.074	-.605441	13.26512
10/2011	-.7090731	3.538473	-0.20	0.841	-7.644354	6.226207
11/2011	4.789263	3.538473	1.35	0.176	-2.146016	11.72454
12/2011	11.08201	3.538473	3.13	0.002	4.146733	18.01729
01/2012	12.99586	3.538472	3.67	0.000	6.060582	19.93114
02/2012	9.304971	3.538472	2.63	0.009	2.369693	16.24025
03/2012	.2922054	3.538472	0.08	0.934	-6.643072	7.227483
04/2012	-1.444199	3.538472	-0.41	0.683	-8.379476	5.491079
05/2012	3.84496	3.538476	1.09	0.277	-3.090325	10.78025
06/2012	13.37637	3.538477	3.78	0.000	6.441086	20.31166
07/2012	22.48779	3.538472	6.36	0.000	15.55251	29.42307
08/2012	15.61638	3.53847	4.41	0.000	8.681104	22.55165
10/2012	-.1389972	3.539339	-0.04	0.969	-7.075974	6.797979
11/2012	6.747932	3.539339	1.91	0.057	-.1890448	13.68491
12/2012	11.72247	3.539339	3.31	0.001	4.785494	18.65945
01/2013	15.2848	3.539339	4.32	0.000	8.347819	22.22177
02/2013	16.0512	3.539339	4.54	0.000	9.114225	22.98818
03/2013	10.31997	3.539329	2.92	0.004	3.383015	17.25693
04/2013	.7307316	3.539329	0.21	0.836	-6.206225	7.667688
05/2013	2.014527	3.539329	0.57	0.569	-4.92243	8.951484
06/2013	10.40249	3.539329	2.94	0.003	3.465537	17.33945
07/2013	15.21497	3.539329	4.30	0.000	8.278016	22.15193
08/2013	12.16316	3.539329	3.44	0.001	5.226203	19.10012
09/2013	4.993709	3.539329	1.41	0.158	-1.943248	11.93067
10/2013	-.5978868	3.539329	-0.17	0.866	-7.534844	6.33907
11/2013	8.227127	3.539329	2.32	0.020	1.29017	15.16408
12/2013	17.12029	3.539329	4.84	0.000	10.18333	24.05724
01/2014	23.99797	3.539329	6.78	0.000	17.06102	30.93493
02/2014	18.12497	3.539329	5.12	0.000	11.18801	25.06192
03/2014	8.762832	3.539329	2.48	0.013	1.825875	15.69979
04/2014	.3260062	3.539329	0.09	0.927	-6.610951	7.262963
05/2014	3.696197	3.539329	1.04	0.296	-3.24076	10.63315
06/2014	13.51021	3.539329	3.82	0.000	6.57325	20.44716
07/2014	13.74943	3.539329	3.88	0.000	6.812471	20.68639
08/2014	12.28417	3.539329	3.47	0.001	5.347213	19.22113
09/2014	5.353721	3.539329	1.51	0.130	-1.583237	12.29068
10/2014	-1.159543	3.539329	-0.33	0.743	-8.096501	5.777415
11/2014	8.391809	3.539329	2.37	0.018	1.454851	15.32877
12/2014	16.67983	3.539329	4.71	0.000	9.742874	23.61679

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01/2015	19.03981	3.539328	5.38	0.000	12.10285	25.97677
02/2015	21.99416	3.539329	6.21	0.000	15.0572	28.93112
03/2015	7.006767	3.539329	1.98	0.048	.0698103	13.94372
04/2015	-1.618107	3.539329	-0.46	0.648	-8.555064	5.31885
05/2015	4.506174	3.539329	1.27	0.203	-2.430783	11.44313
06/2015	16.51763	3.539329	4.67	0.000	9.580674	23.45459
07/2015	20.28945	3.539329	5.73	0.000	13.35249	27.22641
08/2015	15.72859	3.539329	4.44	0.000	8.791636	22.66555
09/2015	4.758353	3.539329	1.34	0.179	-2.178604	11.69531
10/2015	-2.040086	3.539329	-0.58	0.564	-8.977043	4.896871
11/2015	2.449674	3.539329	0.69	0.489	-4.487283	9.386632
12/2015	7.374783	3.539329	2.08	0.037	.4378261	14.31174
01/2016	16.87508	3.539329	4.77	0.000	9.93812	23.81204
02/2016	14.81747	3.53933	4.19	0.000	7.880515	21.75443
03/2016	1.449485	3.539335	0.41	0.682	-5.487484	8.386454
04/2016	-1.655205	3.539341	-0.47	0.640	-8.592187	5.281777
05/2016	2.03059	3.539348	0.57	0.566	-4.906405	8.967584
06/2016	13.63592	3.539355	3.85	0.000	6.698916	20.57293
07/2016	21.68849	3.539363	6.13	0.000	14.75146	28.62551
08/2016	19.69544	3.539369	5.56	0.000	12.75841	26.63248
09/2016	10.20204	3.539377	2.88	0.004	3.264991	17.13909
10/2016	-1.283525	3.539383	-0.36	0.717	-8.220589	5.653538
11/2016	2.897853	3.539389	0.82	0.413	-4.039222	9.834927
12/2016	12.58997	3.539395	3.56	0.000	5.652881	19.52705
01/2017	10.76085	3.539401	3.04	0.002	3.823751	17.69795
02/2017	4.390035	3.539406	1.24	0.215	-2.547074	11.32714
03/2017	2.278205	3.539411	0.64	0.520	-4.658913	9.215322
04/2017	-1.117221	3.539417	-0.32	0.752	-8.05435	5.819909
05/2017	2.517216	3.539423	0.71	0.477	-4.419927	9.454358
06/2017	10.64104	3.539432	3.01	0.003	3.703883	17.5782
07/2017	17.42826	3.539439	4.92	0.000	10.49109	24.36544
08/2017	12.37889	3.539445	3.50	0.000	5.441705	19.31608
09/2017	4.11828	3.539452	1.16	0.245	-2.81892	11.05548
10/2017	-.1526433	3.539458	-0.04	0.966	-7.089855	6.784568
11/2017	4.710299	3.539466	1.33	0.183	-2.226926	11.64752
12/2017	18.23206	3.539472	5.15	0.000	11.29482	25.16929
01/2018	21.79532	3.539477	6.16	0.000	14.85807	28.73257
02/2018	7.776363	3.539483	2.20	0.028	.8391038	14.71362
03/2018	4.591732	3.539489	1.30	0.195	-2.345538	11.529
04/2018	-1.023749	3.539494	-0.29	0.772	-7.961031	5.913532
05/2018	4.715948	3.539501	1.33	0.183	-2.221346	11.65324

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06/2018	8.871852	3.539601	2.51	0.012	1.934362	15.80934
i.ym#c.treatment						
10/2012	-.840534	.0857929	-9.80	0.000	-1.008685	-.672383
11/2012	-.6158147	.0849309	-7.25	0.000	-.7822762	-.4493533
12/2012	-.9676389	.0849346	-11.39	0.000	-1.134108	-.8011701
01/2013	-.6976332	.0849016	-8.22	0.000	-.8640373	-.5312291
02/2013	-.8442805	.0848814	-9.95	0.000	-1.010645	-.6779161
03/2013	-.9611976	.084455	-11.38	0.000	-1.126726	-.7956688
04/2013	-.5014042	.0844052	-5.94	0.000	-.6668354	-.335973
05/2013	-.6168377	.0844077	-7.31	0.000	-.7822737	-.4514016
06/2013	.2525404	.0844003	2.99	0.003	.0871189	.417962
07/2013	.1679476	.0843964	1.99	0.047	.0025337	.3333615
08/2013	-.1075249	.0843856	-1.27	0.203	-.2729176	.0578677
09/2013	.185229	.0843737	2.20	0.028	.0198595	.3505985
10/2013	-.6812523	.0843209	-8.08	0.000	-.8465182	-.5159864
11/2013	-1.086973	.0842983	-12.89	0.000	-1.252195	-.9217514
12/2013	-.9384901	.0842995	-11.13	0.000	-1.103714	-.773266
01/2014	-.8469811	.0842631	-10.05	0.000	-1.012134	-.6818285
02/2014	-1.160827	.0842618	-13.78	0.000	-1.325977	-.9956765
03/2014	-1.102494	.0842631	-13.08	0.000	-1.267647	-.9373415
04/2014	-.8452056	.0842631	-10.03	0.000	-1.010358	-.680053
05/2014	-.3981435	.0842655	-4.72	0.000	-.5633009	-.2329861
06/2014	-.0148477	.084268	-0.18	0.860	-.1800099	.1503146
07/2014	.3927861	.0842692	4.66	0.000	.2276214	.5579508
08/2014	-.3569773	.0842717	-4.24	0.000	-.5221468	-.1918078
09/2014	.146575	.0842717	1.74	0.082	-.0185945	.3117445
10/2014	-.8074913	.0842742	-9.58	0.000	-.9726656	-.642317
11/2014	-.8933922	.0842742	-10.60	0.000	-1.058567	-.7282179
12/2014	-.5790381	.0842482	-6.87	0.000	-.7441616	-.4139147
01/2015	-.753809	.084247	-8.95	0.000	-.9189301	-.5886879
02/2015	-1.536854	.0842507	-18.24	0.000	-1.701982	-1.371726
03/2015	-1.178561	.0842507	-13.99	0.000	-1.343689	-1.013432
04/2015	-.7316073	.0842532	-8.68	0.000	-.8967405	-.5664741
05/2015	-.216203	.0842544	-2.57	0.010	-.3813386	-.0510673
06/2015	-.0699967	.0842557	-0.83	0.406	-.2351348	.0951414
07/2015	.0738049	.0842569	0.88	0.381	-.0913357	.2389455
08/2015	.0956977	.0842583	1.14	0.256	-.0694454	.2608409
09/2015	-.2657058	.0842583	-3.15	0.002	-.430849	-.1005626
10/2015	-.8266346	.0842608	-9.81	0.000	-.9917828	-.6614864
11/2015	-1.18499	.0842609	-14.06	0.000	-1.350139	-1.019842
12/2015	-.8655857	.084261	-10.27	0.000	-1.030734	-.7004371

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01/2016	-.7369833	.0842738	-8.75	0.000	-.9021568	-.5718098
02/2016	-1.372489	.0843195	-16.28	0.000	-1.537752	-1.207226
03/2016	-1.1059	.0845333	-13.08	0.000	-1.271582	-.9402177
04/2016	-.9229459	.0848208	-10.88	0.000	-1.089192	-.7567001
05/2016	-.3351069	.085112	-3.94	0.000	-.5019234	-.1682904
06/2016	.3111512	.0854262	3.64	0.000	.143719	.4785835
07/2016	.416008	.0857828	4.85	0.000	.2478768	.5841393
08/2016	.3587588	.086059	4.17	0.000	.1900863	.5274312
09/2016	-.0348806	.0864056	-0.40	0.686	-.2042326	.1344713
10/2016	-.7398302	.0866785	-8.54	0.000	-.909717	-.5699435
11/2016	-.961785	.0869257	-11.06	0.000	-1.132156	-.7914139
12/2016	-1.424701	.0871976	-16.34	0.000	-1.595605	-1.253797
01/2017	-1.330731	.0874459	-15.22	0.000	-1.502122	-1.159341
02/2017	-.9211357	.0876705	-10.51	0.000	-1.092967	-.7493047
03/2017	-1.004827	.0878734	-11.43	0.000	-1.177056	-.8325988
04/2017	-1.222549	.0881431	-13.87	0.000	-1.395306	-1.049791
05/2017	-.530477	.0884276	-6.00	0.000	-.7037919	-.3571621
06/2017	-.2310028	.088785	-2.60	0.009	-.4050183	-.0569873
07/2017	.164544	.0891015	1.85	0.065	-.0100917	.3391797
08/2017	.1487353	.0893719	1.66	0.096	-.0264303	.3239009
09/2017	-.593236	.0896693	-6.62	0.000	-.7689846	-.4174875
10/2017	-.4416378	.0899238	-4.91	0.000	-.6178851	-.2653905
11/2017	-1.13602	.0902223	-12.59	0.000	-1.312853	-.959188
12/2017	-1.967648	.0904728	-21.75	0.000	-2.144971	-1.790324
01/2018	-1.022046	.0907028	-11.27	0.000	-1.199821	-.8442722
02/2018	-1.24192	.0909442	-13.66	0.000	-1.420167	-1.063672
03/2018	-1.294107	.0911858	-14.19	0.000	-1.472828	-1.115386
04/2018	-1.025383	.0914225	-11.22	0.000	-1.204567	-.8461979
05/2018	-.6825252	.0916871	-7.44	0.000	-.8622286	-.5028219
06/2018	.5910098	.0958751	6.16	0.000	.403098	.7789215
07/2018	4.231694	3.611954	1.17	0.241	-2.847607	11.31099
cons	32.27554	3.538422	9.12	0.000	25.34036	39.21072

Table F-3: Regression Coefficients for DEC Cohort 3

Number of obs	=	40604310
F(157,40091478)	=	70899.87
Prob>F	=	0.0000
R-squared	=	0.6872
AdjR-squared	=	0.6832
Root MSE	=	14.5430

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2008	4.800107	3.052301	1.57	0.116	-1.182292	10.78251
01/2009	8.610748	3.0523	2.82	0.005	2.628349	14.59315
02/2009	5.412161	3.052299	1.77	0.076	-.5702365	11.39456
03/2009	-3.517968	3.052299	-1.15	0.249	-9.500363	2.464428
04/2009	-8.94665	3.052298	-2.93	0.003	-14.92904	-2.964255
05/2009	-5.550734	3.052297	-1.82	0.069	-11.53313	.4316593
06/2009	5.096909	3.052297	1.67	0.095	-.8854824	11.0793
07/2009	9.083436	3.052296	2.98	0.003	3.101046	15.06583
08/2009	8.128167	3.052295	2.66	0.008	2.145779	14.11055
09/2009	-3.162188	3.052294	-1.04	0.300	-9.144574	2.820198
10/2009	-9.100818	3.052293	-2.98	0.003	-15.0832	-3.118434
11/2009	-4.361905	3.052292	-1.43	0.153	-10.34429	1.620478
12/2009	11.13158	3.052292	3.65	0.000	5.149194	17.11396
01/2010	14.49521	3.052291	4.75	0.000	8.512831	20.47759
02/2010	10.89715	3.05229	3.57	0.000	4.914774	16.87953
03/2010	-3.095136	3.05229	-1.01	0.311	-9.077514	2.887242
04/2010	-9.618042	3.052289	-3.15	0.002	-15.60042	-3.635665
05/2010	-3.324066	3.052288	-1.09	0.276	-9.306441	2.658308
06/2010	10.91221	3.052287	3.58	0.000	4.929841	16.89459
07/2010	16.63914	3.052286	5.45	0.000	10.65677	22.62151
08/2010	12.89966	3.052286	4.23	0.000	6.917294	18.88203
09/2010	1.158567	3.052285	0.38	0.704	-4.823801	7.140936
10/2010	-9.297072	3.052284	-3.05	0.002	-15.27944	-3.314705
11/2010	-2.228662	3.052283	-0.73	0.465	-8.211028	3.753704
12/2010	13.72268	3.052281	4.50	0.000	7.740317	19.70504
01/2011	14.22493	3.05228	4.66	0.000	8.242569	20.20729
02/2011	1.972608	3.05228	0.65	0.518	-4.009751	7.954967
03/2011	-6.208965	3.052279	-2.03	0.042	-12.19132	-.226607
04/2011	-9.801175	3.052279	-3.21	0.001	-15.78353	-3.818819
05/2011	-2.970979	3.052278	-0.97	0.330	-8.953334	3.011376
06/2011	8.251382	3.052277	2.70	0.007	2.269028	14.23374

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07/2011	15.05179	3.052276	4.93	0.000	9.069437	21.03414
08/2011	11.00737	3.052276	3.61	0.000	5.025023	16.98972
09/2011	-3.53773	3.052275	-1.16	0.246	-9.520079	2.444619
10/2011	-10.13682	3.052274	-3.32	0.001	-16.11917	-4.154473
11/2011	-5.304448	3.052274	-1.74	0.082	-11.2868	.6778992
12/2011	1.088651	3.052274	0.36	0.721	-4.893697	7.070998
01/2012	2.56618	3.052274	0.84	0.400	-3.416166	8.548527
02/2012	-.4115271	3.052273	-0.13	0.893	-6.393873	5.570819
03/2012	-9.293764	3.052273	-3.04	0.002	-15.27611	-3.311419
04/2012	-10.83941	3.052272	-3.55	0.000	-16.82175	-4.857068
05/2012	-5.790665	3.052271	-1.90	0.058	-11.77301	.1916767
06/2012	4.227752	3.05227	1.39	0.166	-1.754588	10.21009
07/2012	12.66149	3.052269	4.15	0.000	6.679154	18.64383
08/2012	6.13941	3.052268	2.01	0.044	.1570739	12.12175
09/2012	-5.064978	3.052267	-1.66	0.097	-11.04731	.9173565
10/2012	-10.21502	3.052267	-3.35	0.001	-16.19735	-4.232688
11/2012	-3.700038	3.052266	-1.21	0.225	-9.68237	2.282293
12/2012	1.193116	3.052264	0.39	0.696	-4.789211	7.175444
01/2013	4.405621	3.052262	1.44	0.149	-1.576703	10.38794
02/2013	5.09963	3.05226	1.67	0.095	-.882689	11.08195
03/2013	-.4906964	3.052257	-0.16	0.872	-6.473011	5.491619
04/2013	-9.723053	3.052255	-3.19	0.001	-15.70536	-3.740742
05/2013	-8.05872	3.052253	-2.64	0.008	-14.04103	-2.076414
06/2013	.551404	3.05225	0.18	0.857	-5.430897	6.533705
07/2013	5.409738	3.052248	1.77	0.076	-.5725577	11.39203
08/2013	2.308546	3.052245	0.76	0.449	-3.673745	8.290836
09/2013	-5.072823	3.052243	-1.66	0.097	-11.05511	.9094641
10/2013	-10.80706	3.052241	-3.54	0.000	-16.78934	-4.824778
11/2013	-2.349596	3.052239	-0.77	0.441	-8.331875	3.632683
12/2013	6.189431	3.052238	2.03	0.043	.2071557	12.17171
01/2014	12.71102	3.052238	4.16	0.000	6.728742	18.6933
02/2014	6.987426	3.052235	2.29	0.022	1.005156	12.9697
03/2014	-2.046078	3.052237	-0.67	0.503	-8.028352	3.936196
04/2014	-10.05183	3.052231	-3.29	0.001	-16.03409	-4.069567
05/2014	-6.329871	3.052232	-2.07	0.038	-12.31214	-.347607
06/2014	3.61481	3.052228	1.18	0.236	-2.367448	9.597068
07/2014	3.793964	3.052227	1.24	0.214	-2.188291	9.776219
08/2014	2.388031	3.052224	0.78	0.434	-3.594219	8.370281
09/2014	-4.630212	3.052221	-1.52	0.129	-10.61246	1.352033
10/2014	-11.21452	3.052222	-3.67	0.000	-17.19677	-5.232276
11/2014	-1.953173	3.052218	-0.64	0.522	-7.935411	4.029064

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01/2015	8.419659	3.05412	2.76	0.006	2.433694	14.40562
02/2015	12.0633	3.053307	3.95	0.000	6.078928	18.04767
03/2015	-2.622299	3.053307	-0.86	0.390	-8.606671	3.362072
04/2015	-10.99208	3.053307	-3.60	0.000	-16.97645	-5.00771
05/2015	-4.858547	3.053307	-1.59	0.112	-10.84292	1.125825
06/2015	6.97091	3.053307	2.28	0.022	.9865374	12.95528
07/2015	10.56639	3.053307	3.46	0.001	4.582019	16.55076
08/2015	6.219886	3.053307	2.04	0.042	.2355132	12.20426
09/2015	-4.476623	3.053307	-1.47	0.143	-10.461	1.507749
10/2015	-11.29456	3.053307	-3.70	0.000	-17.27893	-5.31019
11/2015	-7.138996	3.053307	-2.34	0.019	-13.12337	-1.154623
12/2015	-2.345706	3.053307	-0.77	0.442	-8.330078	3.638667
01/2016	7.305592	3.053004	2.39	0.017	1.321814	13.28937
02/2016	5.167734	3.053005	1.69	0.091	-.8160463	11.15151
03/2016	-7.910725	3.053013	-2.59	0.010	-13.89452	-1.92693
04/2016	-10.89657	3.053025	-3.57	0.000	-16.88039	-4.91275
05/2016	-7.143642	3.053036	-2.34	0.019	-13.12748	-1.1598
06/2016	4.332453	3.05305	1.42	0.156	-1.651414	10.31632
07/2016	12.35783	3.053063	4.05	0.000	6.373932	18.34172
08/2016	10.63225	3.053075	3.48	0.000	4.648337	16.61617
09/2016	1.210586	3.053091	0.40	0.692	-4.773363	7.194534
10/2016	-10.36873	3.053103	-3.40	0.001	-16.3527	-4.384755
11/2016	-6.557732	3.053113	-2.15	0.032	-12.54172	-.5737399
12/2016	2.734994	3.053123	0.90	0.370	-3.249018	8.719005
01/2017	1.080316	3.053131	0.35	0.723	-4.903711	7.064344
02/2017	-5.081815	3.05314	-1.66	0.096	-11.06586	.9022294
03/2017	-7.07275	3.053148	-2.32	0.021	-13.05681	-1.088689
04/2017	-10.3789	3.05316	-3.40	0.001	-16.36298	-4.394817
05/2017	-6.473595	3.05317	-2.12	0.034	-12.4577	-.4894912
06/2017	1.672422	3.053184	0.55	0.584	-4.311709	7.656553
07/2017	8.493432	3.053196	2.78	0.005	2.509278	14.47759
08/2017	3.566817	3.053209	1.17	0.243	-2.417362	9.550996
09/2017	-4.763079	3.053222	-1.56	0.119	-10.74728	1.221127
10/2017	-8.978536	3.053233	-2.94	0.003	-14.96276	-2.99431
11/2017	-4.669028	3.053244	-1.53	0.126	-10.65328	1.315221
12/2017	8.236015	3.053254	2.70	0.007	2.251748	14.22028
01/2018	12.3005	3.053262	4.03	0.000	6.31622	18.28479
02/2018	-1.551407	3.05327	-0.51	0.611	-7.535706	4.432893
03/2018	-4.526992	3.053278	-1.48	0.138	-10.51131	1.457323
04/2018	-10.04692	3.053288	-3.29	0.001	-16.03126	-4.062587
05/2018	-3.988248	3.053299	-1.31	0.191	-9.972604	1.996108

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06/2018	.6335512	3.053467	0.21	0.836	-5.351135	6.618238
i.ym#c.treatment						
01/2015	.0377955	.114059	0.33	0.740	-.1857559	.261347
02/2015	-.833235	.0892735	-9.33	0.000	-1.008208	-.6582621
03/2015	-.7262734	.0892039	-8.14	0.000	-.9011097	-.551437
04/2015	-.5938088	.0891373	-6.66	0.000	-.7685147	-.419103
05/2015	-.306374	.0891457	-3.44	0.001	-.4810964	-.1316517
06/2015	.1450813	.0889965	1.63	0.103	-.0293486	.3195113
07/2015	.3757419	.0889162	4.23	0.000	.2014694	.5500144
08/2015	.0726542	.0888267	0.82	0.413	-.1014431	.2467514
09/2015	-.4029971	.0887425	-4.54	0.000	-.5769292	-.2290651
10/2015	-.682674	.0887454	-7.69	0.000	-.8566118	-.5087363
11/2015	-.6008986	.0887482	-6.77	0.000	-.7748419	-.4269552
12/2015	-.6356207	.0887498	-7.16	0.000	-.8095671	-.4616743
01/2016	-.9710795	.0774821	-12.53	0.000	-1.122942	-.8192174
02/2016	-.8419055	.0775239	-10.86	0.000	-.9938496	-.6899613
03/2016	-.7040577	.077845	-9.04	0.000	-.8566311	-.5514843
04/2016	-.6087804	.0783888	-7.77	0.000	-.7624197	-.4551411
05/2016	-.3715941	.0788764	-4.71	0.000	-.5261889	-.2169992
06/2016	-.0540306	.0794407	-0.68	0.496	-.2097315	.1016704
07/2016	.1053861	.0799999	1.32	0.188	-.0514108	.262183
08/2016	-.1484794	.0805214	-1.84	0.065	-.3062985	.0093396
09/2016	-.2846716	.081177	-3.51	0.000	-.4437757	-.1255676
10/2016	-.53451	.081661	-6.55	0.000	-.6945627	-.3744573
11/2016	-.6804318	.0820996	-8.29	0.000	-.841344	-.5195196
12/2016	-.6992574	.082492	-8.48	0.000	-.8609388	-.537576
01/2017	-.8758714	.0828364	-10.57	0.000	-1.038228	-.7135151
02/2017	-.8394719	.0831888	-10.09	0.000	-1.002519	-.6764248
03/2017	-.8224493	.0835177	-9.85	0.000	-.986141	-.6587576
04/2017	-.5234548	.0839714	-6.23	0.000	-.6880358	-.3588738
05/2017	-.4768314	.0844012	-5.65	0.000	-.6422547	-.3114082
06/2017	-.2849351	.0849403	-3.35	0.001	-.4514151	-.1184552
07/2017	-.2419255	.0854177	-2.83	0.005	-.4093411	-.0745099
08/2017	-.3216228	.0859063	-3.74	0.000	-.4899961	-.1532495
09/2017	-.37507	.0864309	-4.34	0.000	-.5444715	-.2056684
10/2017	-.7246407	.0868411	-8.34	0.000	-.8948461	-.5544353
11/2017	-.9305442	.0872721	-10.66	0.000	-1.101594	-.7594939
12/2017	-.8993463	.0876383	-10.26	0.000	-1.071114	-.7275784
01/2018	-1.502409	.0879592	-17.08	0.000	-1.674806	-1.330012
02/2018	-1.09973	.0882721	-12.46	0.000	-1.27274	-.9267195
03/2018	-1.204989	.0885769	-13.60	0.000	-1.378596	-1.031381

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04/2018	-.8783212	.0889505	-9.87	0.000	-1.052661	-.7039813
05/2018	-.5710127	.0893625	-6.39	0.000	-.7461601	-.3958654
06/2018	-.7933233	.0953859	-8.32	0.000	-.9802761	-.6063704
07/2018	-1.619952	3.283889	-0.49	0.622	-8.056256	4.816353
cons	40.62169	3.05215	13.31	0.000	34.63958	46.60379

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Table F-4: Regression Coefficients for DEC Cohort 4

Number of obs	=	2786506
F(66,2704706)	=	11996.52
Prob>F	=	0.0000
R-squared	=	0.6768
AdjR-squared	=	0.6670
Root MSE	=	13.4629

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
11/2014	-2.129968	.5160509	-4.13	0.000	-3.141409	-1.118526
12/2014	.7995394	.1809991	4.42	0.000	.4447874	1.154291
01/2015	3.89335	.159155	24.46	0.000	3.581412	4.205288
02/2015	5.849923	.1488146	39.31	0.000	5.558252	6.141594
03/2015	-9.51515	.1428783	-66.60	0.000	-9.795186	-9.235113
04/2015	-15.97402	.1391285	-114.81	0.000	-16.24671	-15.70133
05/2015	-9.411435	.1361754	-69.11	0.000	-9.678333	-9.144536
06/2015	1.840266	.1343183	13.70	0.000	1.577007	2.103525
07/2015	5.658733	.1337927	42.29	0.000	5.396504	5.920962
08/2015	2.205322	.1337911	16.48	0.000	1.943097	2.467548
09/2015	-7.724652	.1337896	-57.74	0.000	-7.986875	-7.462429
10/2015	-13.9259	.1337888	-104.09	0.000	-14.18812	-13.66368
11/2015	-9.326421	.1337878	-69.71	0.000	-9.58864	-9.064201
12/2015	-4.45948	.133787	-33.33	0.000	-4.721698	-4.197262
01/2016	5.543039	.1337978	41.43	0.000	5.2808	5.805278
02/2016	3.400328	.1337861	25.42	0.000	3.138111	3.662544
03/2016	-9.983961	.1337864	-74.63	0.000	-10.24618	-9.721744
04/2016	-12.95555	.133787	-96.84	0.000	-13.21777	-12.69333
05/2016	-9.032726	.1337919	-67.51	0.000	-9.294954	-8.770499
07/2016	9.598957	.1560437	61.51	0.000	9.293117	9.904797
08/2016	8.037947	.1566562	51.31	0.000	7.730906	8.344988
09/2016	-.8432209	.157321	-5.36	0.000	-1.151565	-.5348773
10/2016	-12.11847	.1579077	-76.74	0.000	-12.42796	-11.80898
11/2016	-8.161454	.1584371	-51.51	0.000	-8.471985	-7.850923
12/2016	1.069164	.1589149	6.73	0.000	.7576961	1.380631
01/2017	-.5059034	.1593422	-3.17	0.001	-.8182085	-.1935983
02/2017	-6.49126	.1597712	-40.63	0.000	-6.804406	-6.178114
03/2017	-8.551896	.1602284	-53.37	0.000	-8.865938	-8.237854
04/2017	-11.85432	.1608505	-73.70	0.000	-12.16958	-11.53906
05/2017	-7.881329	.1613408	-48.85	0.000	-8.197551	-7.565107
06/2017	.0995906	.1620685	0.61	0.539	-.218058	.4172392

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07/2017	6.745274	.1628356	41.42	0.000	6.426122	7.064426
08/2017	2.178437	.1635059	13.32	0.000	1.857971	2.498903
09/2017	-5.947133	.1640964	-36.24	0.000	-6.268756	-5.62551
10/2017	-10.11436	.1645538	-61.47	0.000	-10.43688	-9.791838
11/2017	-6.043799	.1651138	-36.60	0.000	-6.367416	-5.720181
12/2017	6.906876	.1655694	41.72	0.000	6.582366	7.231386
01/2018	11.01763	.1659428	66.39	0.000	10.69239	11.34287
02/2018	-2.829121	.1663363	-17.01	0.000	-3.155134	-2.503107
03/2018	-6.102164	.1667903	-36.59	0.000	-6.429067	-5.775261
04/2018	-11.26316	.1672252	-67.35	0.000	-11.59092	-10.9354
05/2018	-4.986363	.1679172	-29.70	0.000	-5.315475	-4.657251
i.ym#c.treatment						
07/2016	.1828978	.113821	1.61	0.108	-.0401874	.4059831
08/2016	.0753366	.1150448	0.65	0.513	-.1501472	.3008203
09/2016	.0573918	.1164161	0.49	0.622	-.1707796	.2855632
10/2016	-.0432637	.1175481	-0.37	0.713	-.2736539	.1871265
11/2016	-.2011198	.1185656	-1.70	0.090	-.4335042	.0312646
12/2016	-.3388227	.11946	-2.84	0.005	-.5729601	-.1046853
01/2017	-.4191447	.1202964	-3.48	0.000	-.6549213	-.1833681
02/2017	-.322171	.1211429	-2.66	0.008	-.5596067	-.0847353
03/2017	-.3026794	.1220086	-2.48	0.013	-.5418119	-.0635469
04/2017	-.305068	.1231544	-2.48	0.013	-.5464463	-.0636897
05/2017	-.2628031	.1240657	-2.12	0.034	-.5059675	-.0196386
06/2017	-.2290852	.1254093	-1.83	0.068	-.4748829	.0167126
07/2017	-.1646681	.1268028	-1.30	0.194	-.4131971	.0838609
08/2017	-.1280379	.1280134	-1.00	0.317	-.3789398	.1228639
09/2017	-.1215365	.1290981	-0.94	0.346	-.3745642	.1314913
10/2017	-.2776967	.129931	-2.14	0.033	-.5323568	-.0230365
11/2017	-.5977234	.1309114	-4.57	0.000	-.8543051	-.3411417
12/2017	-.7841506	.1317133	-5.95	0.000	-1.042304	-.5259972
01/2018	-.6980149	.1323786	-5.27	0.000	-.9574723	-.4385574
02/2018	-.6492616	.1330744	-4.88	0.000	-.9100827	-.3884404
03/2018	-.6414613	.1338591	-4.79	0.000	-.9038203	-.3791022
04/2018	-.4786892	.1346351	-3.56	0.000	-.7425691	-.2148092
05/2018	-.3898461	.1357834	-2.87	0.004	-.6559768	-.1237155
06/2018	-.2791806	.1445601	-1.93	0.053	-.5625133	.004152
cons	40.93424	.1251303	327.13	0.000	40.68899	41.17949

Table F-5: Regression Coefficients for DEC Cohort 5

Number of obs	=	5015283
F(55,4813508)	=	24906.39
Prob>F	=	0.0000
R-squared	=	0.6783
AdjR-squared	=	0.6648
Root MSE	=	13.3705

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
11/2014	-.5435081	.5493008	-0.99	0.322	-1.620118	.5331018
12/2014	2.555639	.1699153	15.04	0.000	2.222611	2.888667
01/2015	5.198331	.1671576	31.10	0.000	4.870708	5.525954
02/2015	7.457801	.164184	45.42	0.000	7.136006	7.779595
03/2015	-8.452811	.1610993	-52.47	0.000	-8.76856	-8.137062
04/2015	-16.87648	.1581985	-106.68	0.000	-17.18654	-16.56642
05/2015	-11.28277	.1552743	-72.66	0.000	-11.5871	-10.97844
06/2015	-.2107536	.1507475	-1.40	0.162	-.5062134	.0847061
07/2015	2.855071	.1288381	22.16	0.000	2.602553	3.107589
08/2015	-2.192529	.1159251	-18.91	0.000	-2.419738	-1.96532
09/2015	-11.72147	.1103524	-106.22	0.000	-11.93775	-11.50518
10/2015	-16.57337	.106735	-155.28	0.000	-16.78257	-16.36417
11/2015	-11.69213	.1046589	-111.72	0.000	-11.89726	-11.487
12/2015	-7.018907	.102948	-68.18	0.000	-7.220681	-6.817132
01/2016	3.029555	.1017131	29.79	0.000	2.830201	3.228909
02/2016	.2910354	.1006586	2.89	0.004	.0937482	.4883227
03/2016	-12.67847	.0996331	-127.25	0.000	-12.87374	-12.48319
04/2016	-15.18306	.0987026	-153.83	0.000	-15.37651	-14.9896
05/2016	-11.15793	.0979399	-113.93	0.000	-11.34989	-10.96597
06/2016	.2973939	.0971935	3.06	0.002	.1068981	.4878897
07/2016	7.903994	.0965266	81.88	0.000	7.714806	8.093183
08/2016	6.071698	.0959907	63.25	0.000	5.883559	6.259836
09/2016	-2.666698	.0956047	-27.89	0.000	-2.85408	-2.479316
10/2016	-13.20457	.0955226	-138.24	0.000	-13.3918	-13.01735
11/2016	-8.784182	.0955225	-91.96	0.000	-8.971403	-8.596961
12/2016	.493144	.0955222	5.16	0.000	.3059239	.6803641
01/2017	-1.243375	.095522	-13.02	0.000	-1.430595	-1.056156
02/2017	-7.227807	.0955222	-75.67	0.000	-7.415027	-7.040587
03/2017	-9.279795	.0955247	-97.15	0.000	-9.46702	-9.09257
04/2017	-12.69417	.0955735	-132.82	0.000	-12.88149	-12.50685
06/2017	-.9581217	.1736778	-5.52	0.000	-1.298524	-.6177193

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07/2017	5.859184	.1751748	33.45	0.000	5.515847	6.20252
08/2017	1.226236	.1766362	6.94	0.000	.8800355	1.572437
09/2017	-6.870248	.1780275	-38.59	0.000	-7.219175	-6.52132
10/2017	-11.16482	.1791494	-62.32	0.000	-11.51594	-10.81369
11/2017	-6.590741	.1181327	-55.79	0.000	-6.822276	-6.359205
12/2017	5.810316	.1184699	49.04	0.000	5.57812	6.042513
01/2018	9.980797	.1187885	84.02	0.000	9.747976	10.21362
02/2018	-3.575404	.1191229	-30.01	0.000	-3.80888	-3.341927
03/2018	-6.785102	.1194497	-56.80	0.000	-7.019219	-6.550985
04/2018	-11.58747	.1198312	-96.70	0.000	-11.82234	-11.35261
05/2018	-4.981079	.1203004	-41.41	0.000	-5.216863	-4.745294
i.ym#c.treatment						
06/2017	-.5173647	.1557323	-3.32	0.001	-.8225946	-.2121349
07/2017	-.6983529	.1575726	-4.43	0.000	-1.00719	-.3895162
08/2017	-.5044947	.1593592	-3.17	0.002	-.8168331	-.1921563
09/2017	-.4812305	.1610643	-2.99	0.003	-.7969108	-.1655502
10/2017	-.2823175	.1624306	-1.74	0.082	-.6006757	.0360408
11/2017	-.4001677	.0892927	-4.48	0.000	-.5751782	-.2251573
12/2017	-.0392246	.0899129	-0.44	0.663	-.2154507	.1370015
01/2018	-.0004226	.0904822	-0.00	0.996	-.1777645	.1769192
02/2018	-.3374415	.091078	-3.70	0.000	-.5159511	-.1589318
03/2018	-.3964715	.0916601	-4.33	0.000	-.5761219	-.216821
04/2018	-.7122844	.092324	-7.72	0.000	-.8932362	-.5313325
05/2018	-1.211497	.0931284	-13.01	0.000	-1.394026	-1.028969
06/2018	-1.349513	.0995255	-13.56	0.000	-1.54458	-1.154447
cons	41.63829	.0909139	458.00	0.000	41.4601	41.81647

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Table F-6: Regression Coefficients for DEC Cohort 6

Number of obs	=	932468
F(79,912163)	=	4651.03
Prob>F	=	0.0000
R-squared	=	0.6947
AdjR-squared	=	0.6879
Root MSE	=	14.3218

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2008	5.041887	.1955036	25.79	0.000	4.658706	5.425067
01/2009	8.460343	.1955007	43.28	0.000	8.077168	8.843518
02/2009	4.973629	.1955007	25.44	0.000	4.590455	5.356804
03/2009	-4.451376	.1955007	-22.77	0.000	-4.834551	-4.068201
04/2009	-10.17105	.1955022	-52.03	0.000	-10.55422	-9.787869
05/2009	-4.912101	.1955007	-25.13	0.000	-5.295276	-4.528927
06/2009	8.786893	.1955198	44.94	0.000	8.403681	9.170105
07/2009	12.66884	.1955007	64.80	0.000	12.28567	13.05202
08/2009	10.79143	.1955007	55.20	0.000	10.40826	11.17461
09/2009	-1.687633	.1955007	-8.63	0.000	-2.070807	-1.304458
10/2009	-10.13697	.1955007	-51.85	0.000	-10.52015	-9.753796
11/2009	-5.4866	.1955007	-28.06	0.000	-5.869774	-5.103425
12/2009	12.36428	.1955007	63.24	0.000	11.98111	12.74746
01/2010	17.60885	.1955007	90.07	0.000	17.22567	17.99202
02/2010	12.61609	.1955007	64.53	0.000	12.23291	12.99926
03/2010	-2.469856	.1955007	-12.63	0.000	-2.853031	-2.086681
11/2015	-10.18717	.2210844	-46.08	0.000	-10.62049	-9.753851
12/2015	-4.665506	.2210844	-21.10	0.000	-5.098824	-4.232187
01/2016	5.039164	.2210892	22.79	0.000	4.605837	5.472491
02/2016	2.188841	.2211231	9.90	0.000	1.755447	2.622235
03/2016	-11.4052	.2212496	-51.55	0.000	-11.83884	-10.97155
04/2016	-13.77942	.2214656	-62.22	0.000	-14.21349	-13.34536
05/2016	-7.164986	.2216541	-32.33	0.000	-7.59942	-6.730551
06/2016	7.092381	.2218493	31.97	0.000	6.657564	7.527198
07/2016	15.79796	.2221225	71.12	0.000	15.36261	16.23332
08/2016	12.0507	.2223425	54.20	0.000	11.61492	12.48648
09/2016	1.411673	.2226219	6.34	0.000	.9753416	1.848004
10/2016	-12.57083	.2228677	-56.40	0.000	-13.00764	-12.13401
11/2016	-9.608094	.223026	-43.08	0.000	-10.04522	-9.17097
12/2016	-.5816872	.2232015	-2.61	0.009	-1.019155	-.1442198
01/2017	-2.80344	.2233837	-12.55	0.000	-3.241264	-2.365615

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02/2017	-8.565695	.2235348	-38.32	0.000	-9.003816	-8.127574
03/2017	-10.73747	.2236869	-48.00	0.000	-11.17589	-10.29905
04/2017	-13.73371	.2239498	-61.32	0.000	-14.17265	-13.29478
05/2017	-8.190045	.22421	-36.53	0.000	-8.629489	-7.750601
06/2017	1.173897	.2245572	5.23	0.000	.7337723	1.614021
07/2017	8.841137	.2248349	39.32	0.000	8.400468	9.281806
08/2017	4.531975	.2250696	20.14	0.000	4.090846	4.973104
09/2017	-5.786436	.2253412	-25.68	0.000	-6.228098	-5.344775
10/2017	-11.07195	.2255921	-49.08	0.000	-11.51411	-10.6298
11/2017	-8.484853	.2258159	-37.57	0.000	-8.927445	-8.042262
12/2017	4.745923	.2260237	21.00	0.000	4.302925	5.188922
01/2018	9.844017	.2262811	43.50	0.000	9.400514	10.28752
02/2018	-5.799516	.2265228	-25.60	0.000	-6.243493	-5.355538
03/2018	-9.931726	.2267483	-43.80	0.000	-10.37615	-9.487307
04/2018	-13.96921	.2269819	-61.54	0.000	-14.41409	-13.52433
05/2018	-6.979706	.2272049	-30.72	0.000	-7.42502	-6.534392
i.ym#c.treatment						
11/2015	.08458	.2079576	0.41	0.684	-.3230099	.4921699
12/2015	.1099624	.2079576	0.53	0.597	-.2976275	.5175523
01/2016	-.2175456	.2079633	-1.05	0.296	-.6251467	.1900555
02/2016	-.1796001	.2080442	-0.86	0.388	-.5873598	.2281596
03/2016	-.0315635	.2083977	-0.15	0.880	-.440016	.3768891
04/2016	-.0395616	.2088236	-0.19	0.850	-.4488488	.3697257
05/2016	-.0551549	.2092673	-0.26	0.792	-.4653118	.3550019
06/2016	-.0480782	.2097605	-0.23	0.819	-.4592019	.3630455
07/2016	-.0691823	.2103488	-0.33	0.742	-.4814589	.3430942
08/2016	-.0422501	.2108154	-0.20	0.841	-.4554414	.3709411
09/2016	-.1268783	.2114394	-0.60	0.548	-.5412925	.2875358
10/2016	-.208193	.2118933	-0.98	0.326	-.6234967	.2071108
11/2016	-.4404545	.2123196	-2.07	0.038	-.8565939	-.0243151
12/2016	-.5706292	.2127374	-2.68	0.007	-.9875875	-.153671
01/2017	-.6035371	.2131731	-2.83	0.005	-1.021349	-.185725
02/2017	-.3146924	.2134679	-1.47	0.140	-.7330823	.1036975
03/2017	-.2962436	.2137588	-1.39	0.166	-.7152036	.1227165
04/2017	-.1736185	.2143096	-0.81	0.418	-.5936581	.2464212
05/2017	-.1094373	.2148385	-0.51	0.610	-.5305137	.311639
06/2017	-.2106441	.2155687	-0.98	0.328	-.6331515	.2118633
07/2017	-.3139904	.2161692	-1.45	0.146	-.7376749	.1096941
08/2017	-.4149419	.2166938	-1.91	0.056	-.8396545	.0097707
09/2017	-.4059735	.2172397	-1.87	0.062	-.8317561	.0198091
10/2017	-.351112	.2177589	-1.61	0.107	-.7779122	.0756882

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11/2017	-.5587344	.2182237	-2.56	0.010	-.9864456	-.1310232
12/2017	-.62449	.2186823	-2.86	0.004	-1.0531	-.19588
01/2018	-.8825185	.2191279	-4.03	0.000	-1.312002	-.4530352
02/2018	-.5237236	.2196562	-2.38	0.017	-.9542425	-.0932047
03/2018	-.6866934	.2200998	-3.12	0.002	-1.118082	-.2553052
04/2018	-.4439611	.2206005	-2.01	0.044	-.8763306	-.0115916
05/2018	-.499444	.2210376	-2.26	0.024	-.9326702	-.0662177
06/2018	-.6342094	.2331416	-2.72	0.007	-1.091159	-.1772597
cons	45.58088	.1674973	272.13	0.000	45.25259	45.90917

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Table F-7: Regression Coefficients for DEC Cohort 7

Number of obs	=	8299134
F(108,8180957)	=	22249.73
Prob>F	=	0.0000
R-squared	=	0.7006
AdjR-squared	=	0.6963
Root MSE	=	14.8302

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2008	6.63468	.1067528	62.15	0.000	6.425448	6.843912
01/2009	10.50638	.1067023	98.46	0.000	10.29725	10.71552
02/2009	7.248244	.1066483	67.96	0.000	7.039217	7.457271
03/2009	-1.858576	.1065871	-17.44	0.000	-2.067483	-1.649669
04/2009	-7.724038	.106532	-72.50	0.000	-7.932836	-7.515239
05/2009	-4.904396	.1064595	-46.07	0.000	-5.113053	-4.695739
06/2009	5.135311	.1063953	48.27	0.000	4.926781	5.343842
07/2009	8.90383	.1063155	83.75	0.000	8.695456	9.112205
08/2009	8.088819	.1062409	76.14	0.000	7.880591	8.297047
09/2009	-2.589432	.1061753	-24.39	0.000	-2.797532	-2.381332
10/2009	-7.883209	.1060962	-74.30	0.000	-8.091154	-7.675264
11/2009	-2.734342	.1060323	-25.79	0.000	-2.942161	-2.526522
12/2009	12.9659	.1059685	122.36	0.000	12.7582	13.17359
01/2010	16.56347	.1059189	156.38	0.000	16.35587	16.77106
02/2010	12.76491	.105867	120.57	0.000	12.55741	12.9724
03/2010	-1.560876	.1058037	-14.75	0.000	-1.768248	-1.353505
04/2010	-8.540132	.1057297	-80.77	0.000	-8.747359	-8.332906
05/2010	-2.732645	.1056449	-25.87	0.000	-2.939705	-2.525584
06/2010	10.76693	.1055719	101.99	0.000	10.56001	10.97385
07/2010	16.23684	.1054992	153.90	0.000	16.03006	16.44361
08/2010	12.6379	.1054367	119.86	0.000	12.43124	12.84455
09/2010	1.491803	.1053833	14.16	0.000	1.285256	1.698351
10/2010	-8.168209	.1053197	-77.56	0.000	-8.374632	-7.961786
11/2010	-.5088313	.1052718	-4.83	0.000	-.7151602	-.3025024
12/2010	15.77979	.1052173	149.97	0.000	15.57357	15.98601
01/2011	16.31188	.1051705	155.10	0.000	16.10575	16.51801
02/2011	3.798693	.1051237	36.14	0.000	3.592654	4.004731
03/2011	-4.666683	.105064	-44.42	0.000	-4.872605	-4.460761
04/2011	-8.529953	.1050072	-81.23	0.000	-8.735764	-8.324143
05/2011	-2.30731	.1049513	-21.98	0.000	-2.513011	-2.101609
06/2011	8.407116	.1048911	80.15	0.000	8.201534	8.612699

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07/2011	14.8288	.1048115	141.48	0.000	14.62337	15.03422
08/2011	11.00042	.1047064	105.06	0.000	10.7952	11.20564
09/2011	-2.913439	.1045977	-27.85	0.000	-3.118447	-2.708432
10/2011	-8.915685	.1045466	-85.28	0.000	-9.120592	-8.710777
11/2011	-3.662732	.1045456	-35.03	0.000	-3.867638	-3.457827
12/2011	2.784185	.1045443	26.63	0.000	2.579281	2.989088
01/2012	4.476587	.1045273	42.83	0.000	4.271717	4.681457
02/2012	1.30326	.10448	12.47	0.000	1.098483	1.508037
03/2012	-7.954345	.1044434	-76.16	0.000	-8.15905	-7.74964
04/2012	-9.741258	.1044409	-93.27	0.000	-9.945959	-9.536558
05/2012	-4.950153	.1044409	-47.40	0.000	-5.154854	-4.745453
06/2012	4.580658	.104441	43.86	0.000	4.375958	4.785359
07/2012	12.81242	.1044409	122.68	0.000	12.60772	13.01712
08/2012	6.515639	.104441	62.39	0.000	6.310938	6.720339
11/2015	-6.372445	.1256059	-50.73	0.000	-6.618628	-6.126262
12/2015	-1.447519	.1256059	-11.52	0.000	-1.693702	-1.201336
01/2016	8.053045	.1256142	64.11	0.000	7.806845	8.299244
02/2016	5.993706	.125644	47.70	0.000	5.747449	6.239964
03/2016	-7.376266	.1257824	-58.64	0.000	-7.622795	-7.129737
04/2016	-10.48149	.1259675	-83.21	0.000	-10.72838	-10.2346
05/2016	-6.797012	.1261557	-53.88	0.000	-7.044273	-6.549752
06/2016	4.808092	.1263586	38.05	0.000	4.560434	5.055751
07/2016	12.85767	.1265898	101.57	0.000	12.60956	13.10578
08/2016	10.86405	.126768	85.70	0.000	10.61559	11.11251
09/2016	1.366338	.126994	10.76	0.000	1.117434	1.615242
10/2016	-10.12053	.127172	-79.58	0.000	-10.36978	-9.871275
11/2016	-5.940203	.1273335	-46.65	0.000	-6.189772	-5.690634
12/2016	3.746748	.1275126	29.38	0.000	3.496828	3.996668
01/2017	1.91543	.1276766	15.00	0.000	1.665188	2.165672
02/2017	-4.458172	.1278252	-34.88	0.000	-4.708705	-4.207639
03/2017	-6.570818	.1279588	-51.35	0.000	-6.821613	-6.320024
04/2017	-9.967335	.1281367	-77.79	0.000	-10.21848	-9.716192
05/2017	-6.33538	.1283256	-49.37	0.000	-6.586894	-6.083867
06/2017	1.787446	.1285641	13.90	0.000	1.535465	2.039426
07/2017	8.571358	.1287744	66.56	0.000	8.318965	8.823751
08/2017	3.520584	.1289543	27.30	0.000	3.267838	3.77333
09/2017	-4.741817	.1291531	-36.71	0.000	-4.994952	-4.488681
10/2017	-9.012064	.1293237	-69.69	0.000	-9.265534	-8.758594
11/2017	-4.150784	.1295249	-32.05	0.000	-4.404649	-3.89692
12/2017	9.370016	.129694	72.25	0.000	9.115821	9.624212
01/2018	12.93185	.1298495	99.59	0.000	12.67735	13.18635

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02/2018	-1.087792	.1300131	-8.37	0.000	-1.342613	-.8329714
03/2018	-4.273792	.1301772	-32.83	0.000	-4.528935	-4.018649
04/2018	-9.890106	.1303374	-75.88	0.000	-10.14556	-9.634649
05/2018	-4.150729	.1305172	-31.80	0.000	-4.406538	-3.89492
i.ym#c.treatment						
11/2015	-.0371516	.0982694	-0.38	0.705	-.2297561	.1554529
12/2015	-.1025569	.0982697	-1.04	0.297	-.295162	.0900482
01/2016	-.0952013	.0982833	-0.97	0.333	-.2878331	.0974305
02/2016	-.1078629	.0983325	-1.10	0.273	-.300591	.0848653
03/2016	-.1347891	.0985748	-1.37	0.172	-.3279923	.058414
04/2016	-.1659005	.0989088	-1.68	0.093	-.3597582	.0279572
05/2016	-.181293	.0992522	-1.83	0.068	-.3758239	.0132378
06/2016	-.2988676	.0996305	-3.00	0.003	-.4941399	-.1035953
07/2016	-.3339437	.1000505	-3.34	0.001	-.5300392	-.1378483
08/2016	-.3068337	.1003827	-3.06	0.002	-.5035802	-.1100872
09/2016	-.2748773	.1007907	-2.73	0.006	-.4724236	-.0773311
10/2016	-.1441438	.1011125	-1.43	0.154	-.3423207	.054033
11/2016	-.123375	.1014063	-1.22	0.224	-.3221278	.0753777
12/2016	-.2335462	.1017181	-2.30	0.022	-.4329101	-.0341823
01/2017	-.2909031	.1020073	-2.85	0.004	-.4908337	-.0909724
02/2017	-.2518571	.1022726	-2.46	0.014	-.4523077	-.0514065
03/2017	-.2672344	.1025103	-2.61	0.009	-.4681508	-.0663179
04/2017	-.3105615	.1028324	-3.02	0.003	-.5121093	-.1090138
05/2017	-.3154442	.1031603	-3.06	0.002	-.5176348	-.1132536
06/2017	-.3646096	.1035768	-3.52	0.000	-.5676165	-.1616027
07/2017	-.5011984	.1039479	-4.82	0.000	-.7049326	-.2974642
08/2017	-.4079286	.1042687	-3.91	0.000	-.6122916	-.2035657
09/2017	-.3313687	.1046242	-3.17	0.002	-.5364284	-.126309
10/2017	-.2276498	.1049184	-2.17	0.030	-.4332861	-.0220135
11/2017	-.2772142	.1052634	-2.63	0.008	-.4835266	-.0709018
12/2017	-.4037421	.1055507	-3.83	0.000	-.6106177	-.1968664
01/2018	-.5183084	.1058129	-4.90	0.000	-.7256979	-.3109189
02/2018	-.3762491	.1060947	-3.55	0.000	-.5841909	-.1683073
03/2018	-.3108275	.1063713	-2.92	0.003	-.5193115	-.1023435
04/2018	-.2742283	.1066624	-2.57	0.010	-.4832827	-.0651739
05/2018	-.2879504	.1069818	-2.69	0.007	-.4976308	-.07827
06/2018	-.3500807	.1116893	-3.13	0.002	-.5689878	-.1311737
cons	40.30704	.0950932	423.87	0.000	40.12066	40.49342

Table F-8: Regression Coefficients for DEC Cohort 8

Number of obs	=	5307646
F(135,5231818)	=	9498.05
Prob>F	=	0.0000
R-squared	=	0.7128
AdjR-squared	=	0.7087
Root MSE	=	14.9134

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2008	4.665554	.1284077	36.33	0.000	4.41388	4.917229
01/2009	7.884682	.1283026	61.45	0.000	7.633213	8.13615
02/2009	4.619858	.1282018	36.04	0.000	4.368587	4.871129
03/2009	-3.759741	.1281051	-29.35	0.000	-4.010823	-3.50866
04/2009	-9.435569	.1279839	-73.72	0.000	-9.686413	-9.184726
05/2009	-5.94497	.1278607	-46.50	0.000	-6.195572	-5.694367
06/2009	4.577267	.1277431	35.83	0.000	4.326895	4.827639
07/2009	8.525671	.1275873	66.82	0.000	8.275604	8.775737
08/2009	7.816227	.1274158	61.34	0.000	7.566497	8.065958
09/2009	-3.59539	.1272721	-28.25	0.000	-3.844838	-3.345941
10/2009	-9.605671	.1271463	-75.55	0.000	-9.854873	-9.356468
11/2009	-4.805069	.1270129	-37.83	0.000	-5.05401	-4.556128
12/2009	10.12117	.1269192	79.74	0.000	9.872409	10.36992
01/2010	14.09355	.1268292	111.12	0.000	13.84497	14.34213
02/2010	10.33827	.1267061	81.59	0.000	10.08993	10.58661
03/2010	-3.474907	.1265927	-27.45	0.000	-3.723024	-3.22679
04/2010	-10.14663	.1264552	-80.24	0.000	-10.39448	-9.898786
05/2010	-3.688045	.126273	-29.21	0.000	-3.935536	-3.440555
06/2010	10.36194	.1261212	82.16	0.000	10.11475	10.60914
07/2010	16.14098	.125978	128.13	0.000	15.89406	16.38789
08/2010	12.15247	.1258577	96.56	0.000	11.90579	12.39914
09/2010	.6684701	.1257539	5.32	0.000	.421997	.9149432
10/2010	-10.00717	.125636	-79.65	0.000	-10.25342	-9.760931
11/2010	-2.711028	.1255112	-21.60	0.000	-2.957026	-2.465031
12/2010	13.08271	.1248498	104.79	0.000	12.83801	13.32741
01/2011	13.41232	.1247462	107.52	0.000	13.16782	13.65682
02/2011	1.505877	.1246218	12.08	0.000	1.261622	1.750131
03/2011	-6.780822	.1245043	-54.46	0.000	-7.024846	-6.536798
04/2011	-10.25104	.1243865	-82.41	0.000	-10.49483	-10.00724
05/2011	-3.707322	.1242591	-29.84	0.000	-3.950865	-3.463779
06/2011	7.670862	.1241328	61.80	0.000	7.427567	7.914158

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07/2011	14.08484	.1239602	113.62	0.000	13.84188	14.3278
08/2011	10.43422	.123824	84.27	0.000	10.19153	10.67691
09/2011	-4.085844	.1236838	-33.03	0.000	-4.32826	-3.843428
10/2011	-10.76552	.1235026	-87.17	0.000	-11.00758	-10.52346
11/2011	-5.747247	.1233199	-46.60	0.000	-5.98895	-5.505545
12/2011	.4708192	.1231544	3.82	0.000	.2294409	.7121975
01/2012	2.229247	.1229934	18.12	0.000	1.988185	2.47031
02/2012	-1.142252	.1227078	-9.31	0.000	-1.382755	-.9017493
03/2012	-10.24984	.1216331	-84.27	0.000	-10.48824	-10.01144
04/2012	-11.85453	.1205722	-98.32	0.000	-12.09084	-11.61821
05/2012	-7.040986	.1194806	-58.93	0.000	-7.275164	-6.806809
06/2012	2.522609	.1180561	21.37	0.000	2.291224	2.753995
07/2012	10.63797	.1164128	91.38	0.000	10.4098	10.86613
08/2012	4.200655	.1159483	36.23	0.000	3.9734	4.427909
09/2012	-6.141831	.1158662	-53.01	0.000	-6.368924	-5.914737
10/2012	-10.94715	.1157883	-94.54	0.000	-11.17409	-10.72021
11/2012	-4.144843	.115706	-35.82	0.000	-4.371622	-3.918063
12/2012	.5006342	.1156251	4.33	0.000	.2740131	.7272553
01/2013	4.159401	.1154921	36.01	0.000	3.933041	4.385761
02/2013	4.623465	.1141373	40.51	0.000	4.399759	4.84717
03/2013	-1.691674	.1119129	-15.12	0.000	-1.911019	-1.472328
04/2013	-10.71707	.1108811	-96.65	0.000	-10.93439	-10.49975
05/2013	-9.385884	.1105303	-84.92	0.000	-9.602519	-9.169249
06/2013	-.8121385	.1104983	-7.35	0.000	-1.028711	-.5955657
07/2013	4.019102	.1104702	36.38	0.000	3.802584	4.235619
08/2013	1.097629	.1104415	9.94	0.000	.8811679	1.314091
09/2013	-5.601978	.1104156	-50.74	0.000	-5.818388	-5.385567
10/2013	-11.1088	.1103913	-100.63	0.000	-11.32516	-10.89244
11/2013	-2.61966	.1103726	-23.73	0.000	-2.835986	-2.403333
12/2013	5.934792	.1103622	53.78	0.000	5.718486	6.151097
01/2014	12.70092	.1103539	115.09	0.000	12.48463	12.91721
02/2014	7.079014	.1103435	64.15	0.000	6.862744	7.295283
03/2014	-1.800152	.110331	-16.32	0.000	-2.016397	-1.583907
04/2014	-10.18771	.1103205	-92.35	0.000	-10.40394	-9.971489
05/2014	-6.75133	.1103119	-61.20	0.000	-6.967538	-6.535123
06/2014	2.93814	.1103014	26.64	0.000	2.721953	3.154327
07/2014	3.363768	.1102713	30.50	0.000	3.14764	3.579896
08/2014	1.527332	.1097456	13.92	0.000	1.312235	1.74243
09/2014	-5.125591	.1092542	-46.91	0.000	-5.339726	-4.911457
10/2014	-11.57056	.1087406	-106.41	0.000	-11.78369	-11.35743
11/2014	-2.212373	.1083036	-20.43	0.000	-2.424644	-2.000102

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11/2015	-7.786029	.1195374	-65.13	0.000	-8.020318	-7.55174
12/2015	-2.99641	.1195383	-25.07	0.000	-3.2307	-2.762119
01/2016	6.667491	.1195434	55.77	0.000	6.43319	6.901792
02/2016	4.529995	.1195698	37.89	0.000	4.295642	4.764348
03/2016	-8.547934	.1197704	-71.37	0.000	-8.78268	-8.313189
04/2016	-11.53369	.1201094	-96.03	0.000	-11.7691	-11.29828
05/2016	-7.779562	.1204119	-64.61	0.000	-8.015565	-7.543559
06/2016	3.698339	.1207616	30.63	0.000	3.46165	3.935027
07/2016	11.72515	.1211075	96.82	0.000	11.48778	11.96251
08/2016	10.00137	.1214333	82.36	0.000	9.763361	10.23937
09/2016	.5802458	.1218473	4.76	0.000	.3414294	.8190622
10/2016	-10.99863	.1221547	-90.04	0.000	-11.23805	-10.75921
11/2016	-7.187041	.1224334	-58.70	0.000	-7.427006	-6.947076
12/2016	2.105999	.1226829	17.17	0.000	1.865545	2.346453
01/2017	.4515227	.1229016	3.67	0.000	.2106399	.6924054
02/2017	-5.710318	.1231276	-46.38	0.000	-5.951644	-5.468993
03/2017	-7.701129	.1233379	-62.44	0.000	-7.942867	-7.459391
04/2017	-11.00663	.1236309	-89.03	0.000	-11.24894	-10.76432
05/2017	-7.101803	.1239091	-57.31	0.000	-7.344661	-6.858946
06/2017	1.044401	.1242602	8.40	0.000	.8008555	1.287947
07/2017	7.866372	.1245683	63.15	0.000	7.622222	8.110521
08/2017	2.939208	.1248888	23.53	0.000	2.69443	3.183985
09/2017	-5.390468	.1252344	-43.04	0.000	-5.635923	-5.145013
10/2017	-9.605647	.1255052	-76.54	0.000	-9.851633	-9.359661
11/2017	-5.296113	.1257904	-42.10	0.000	-5.542657	-5.049568
12/2017	7.608321	.1260331	60.37	0.000	7.361301	7.855342
01/2018	11.67184	.1262456	92.45	0.000	11.4244	11.91927
02/2018	-2.180505	.1264529	-17.24	0.000	-2.428348	-1.932662
03/2018	-5.155833	.1266551	-40.71	0.000	-5.404072	-4.907593
04/2018	-10.67642	.1269045	-84.13	0.000	-10.92515	-10.42769
05/2018	-4.617779	.1271795	-36.31	0.000	-4.867046	-4.368512
i.ym#c.treatment						
11/2015	-.104931	.110377	-0.95	0.342	-.321266	.1114041
12/2015	-.0904764	.110382	-0.82	0.412	-.3068212	.1258684
01/2016	-.240037	.1103935	-2.17	0.030	-.4564043	-.0236696
02/2016	-.365843	.1104566	-3.31	0.001	-.582334	-.1493521
03/2016	-.2549059	.1109388	-2.30	0.022	-.472342	-.0374698
04/2016	-.2275735	.1117059	-2.04	0.042	-.4465131	-.0086339
05/2016	-.2434956	.1124013	-2.17	0.030	-.4637981	-.0231931
06/2016	-.2538641	.1132241	-2.24	0.025	-.4757794	-.0319488
07/2016	-.1666165	.1140145	-1.46	0.144	-.3900809	.056848

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08/2016	-.1863185	.1147453	-1.62	0.104	-.4112152	.0385783
09/2016	-.205087	.1156041	-1.77	0.076	-.4316669	.021493
10/2016	-.2845099	.1162077	-2.45	0.014	-.5122729	-.0567469
11/2016	-.2214904	.1167966	-1.90	0.058	-.4504076	.0074269
12/2016	-.2502649	.1173095	-2.13	0.033	-.4801873	-.0203425
01/2017	-.3032699	.1177743	-2.58	0.010	-.5341034	-.0724364
02/2017	-.3129059	.1182413	-2.65	0.008	-.5446545	-.0811573
03/2017	-.3410571	.1186914	-2.87	0.004	-.573688	-.1084262
04/2017	-.3438212	.1192805	-2.88	0.004	-.5776067	-.1100358
05/2017	-.3832894	.1198336	-3.20	0.001	-.618159	-.1484199
06/2017	-.3325817	.1205142	-2.76	0.006	-.5687853	-.096378
07/2017	-.2901547	.1211789	-2.39	0.017	-.5276611	-.0526483
08/2017	-.4532241	.1218012	-3.72	0.000	-.6919501	-.214498
09/2017	-.5107921	.1224879	-4.17	0.000	-.750864	-.2707202
10/2017	-.5119521	.1230486	-4.16	0.000	-.7531229	-.2707812
11/2017	-.4492225	.1236348	-3.63	0.000	-.6915423	-.2069026
12/2017	-.6012704	.1240946	-4.85	0.000	-.8444913	-.3580494
01/2018	-.7673052	.124539	-6.16	0.000	-1.011397	-.5232132
02/2018	-.5773163	.1249784	-4.62	0.000	-.8222695	-.332363
03/2018	-.5391807	.1253574	-4.30	0.000	-.7848768	-.2934845
04/2018	-.4942607	.1258908	-3.93	0.000	-.7410022	-.2475191
05/2018	-.6235547	.126472	-4.93	0.000	-.8714354	-.375674
06/2018	-.6160671	.1352241	-4.56	0.000	-.8811016	-.3510327
cons	40.88909	.093722	436.28	0.000	40.7054	41.07278

Table F-9: Regression Coefficients for DEP Cohort 1

Number of obs	=	33350747
F(95,32692933)	=	116722.9
Prob>F	=	0.0000
R-squared	=	0.7049
AdjR-squared	=	0.6990
Root MSE	=	14.7490

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2013	12.2834	.0643833	190.79	0.000	12.15721	12.40959
01/2014	16.09035	.0642157	250.57	0.000	15.96449	16.21621
02/2014	11.61602	.0641994	180.94	0.000	11.49019	11.74184
03/2014	.194614	.0641805	3.03	0.002	.0688227	.3204054
04/2014	-9.439009	.0641602	-147.12	0.000	-9.56476	-9.313257
05/2014	-7.483544	.0641366	-116.68	0.000	-7.60925	-7.357838
06/2014	3.605807	.0641143	56.24	0.000	3.480145	3.731469
07/2014	3.776511	.0640892	58.93	0.000	3.650899	3.902124
08/2014	.7913161	.0640772	12.35	0.000	.6657271	.9169051
09/2014	-4.432772	.0640772	-69.18	0.000	-4.558361	-4.307183
10/2014	-10.87639	.0640773	-169.74	0.000	-11.00198	-10.7508
11/2014	-.953653	.0640774	-14.88	0.000	-1.079242	-.8280636
01/2015	12.46407	.0808453	154.17	0.000	12.30562	12.62252
02/2015	15.36702	.0808455	190.08	0.000	15.20857	15.52547
03/2015	-7.267612	.0808463	-89.89	0.000	-7.426068	-7.109157
04/2015	-13.06598	.0808473	-161.61	0.000	-13.22444	-12.90752
05/2015	-7.276841	.0808513	-90.00	0.000	-7.435307	-7.118376
06/2015	6.42289	.0808513	79.44	0.000	6.264424	6.581356
07/2015	9.933711	.0808515	122.86	0.000	9.775245	10.09218
08/2015	4.242141	.0808502	52.47	0.000	4.083677	4.400605
09/2015	-5.783397	.0808505	-71.53	0.000	-5.941861	-5.624933
10/2015	-13.42975	.0808515	-166.10	0.000	-13.58821	-13.27128
11/2015	-9.268152	.080852	-114.63	0.000	-9.426619	-9.109685
12/2015	-2.697141	.0808502	-33.36	0.000	-2.855605	-2.538678
01/2016	8.638449	.0808523	106.84	0.000	8.479981	8.796916
02/2016	5.955176	.0808522	73.66	0.000	5.796709	6.113644
03/2016	-8.873138	.080874	-109.72	0.000	-9.031648	-8.714628
04/2016	-13.3391	.0808945	-164.89	0.000	-13.49765	-13.18055
05/2016	-9.483721	.0809217	-117.20	0.000	-9.642325	-9.325117
06/2016	2.159006	.081034	26.64	0.000	2.000182	2.31783
07/2016	11.7407	.0811849	144.62	0.000	11.58158	11.89982

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08/2016	10.27816	.0813185	126.39	0.000	10.11877	10.43754
09/2016	-2.21304	.0814679	-27.16	0.000	-2.372714	-2.053366
10/2016	-13.0337	.081593	-159.74	0.000	-13.19362	-12.87378
11/2016	-7.00772	.0817209	-85.75	0.000	-7.16789	-6.84755
12/2016	3.412713	.0818273	41.71	0.000	3.252335	3.573092
01/2017	1.293354	.0819326	15.79	0.000	1.132769	1.453939
02/2017	-5.060346	.0820269	-61.69	0.000	-5.221116	-4.899576
03/2017	-7.398162	.0821172	-90.09	0.000	-7.559108	-7.237215
04/2017	-10.65626	.0822438	-129.57	0.000	-10.81745	-10.49506
05/2017	-6.130672	.0823515	-74.45	0.000	-6.292078	-5.969266
06/2017	1.350413	.0824829	16.37	0.000	1.188749	1.512076
07/2017	8.146761	.0826304	98.59	0.000	7.984809	8.308714
08/2017	2.655059	.0827752	32.08	0.000	2.492823	2.817296
09/2017	-5.745961	.0829125	-69.30	0.000	-5.908467	-5.583456
10/2017	-10.83542	.0830296	-130.50	0.000	-10.99816	-10.67269
11/2017	-5.806494	.0831559	-69.83	0.000	-5.969476	-5.643511
12/2017	11.02851	.0832607	132.46	0.000	10.86532	11.1917
01/2018	15.14194	.0833635	181.64	0.000	14.97855	15.30533
02/2018	-2.588517	.0834621	-31.01	0.000	-2.7521	-2.424934
03/2018	-5.478516	.0835579	-65.57	0.000	-5.642286	-5.314745
04/2018	-11.58877	.0836662	-138.51	0.000	-11.75275	-11.42478
05/2018	-6.145086	.0837831	-73.35	0.000	-6.309298	-5.980874
i.ym#c.treatment						
01/2015	-.4817097	.0607594	-7.93	0.000	-.600796	-.3626235
02/2015	-.436845	.0606836	-7.20	0.000	-.5557827	-.3179072
03/2015	-.1174143	.0606575	-1.94	0.053	-.2363008	.0014722
04/2015	-.0673995	.0606275	-1.11	0.266	-.1862273	.0514283
05/2015	-.1747214	.0606331	-2.88	0.004	-.29356	-.0558828
06/2015	-.4916212	.0605496	-8.12	0.000	-.6102963	-.3729461
07/2015	-1.060098	.0604023	-17.55	0.000	-1.178484	-.9417117
08/2015	-.0259156	.0603607	-0.43	0.668	-.1442204	.0923892
09/2015	.5182035	.0603221	8.59	0.000	.3999744	.6364326
10/2015	-.5007566	.0603235	-8.30	0.000	-.6189885	-.3825246
11/2015	-.5913001	.0603244	-9.80	0.000	-.7095337	-.4730665
12/2015	-.8549834	.0603219	-14.17	0.000	-.9732122	-.7367546
01/2016	-.9830312	.0603248	-16.30	0.000	-1.101266	-.8647967
02/2016	-1.071648	.0603251	-17.76	0.000	-1.189883	-.9534131
03/2016	-.6991122	.0603606	-11.58	0.000	-.8174168	-.5808076
04/2016	-.5303321	.060395	-8.78	0.000	-.6487041	-.41196
05/2016	-.6681653	.0604398	-11.06	0.000	-.7866251	-.5497055
06/2016	-.9008946	.0606266	-14.86	0.000	-1.019721	-.7820686

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07/2016	.3912485	.0608749	6.43	0.000	.2719359	.510561
08/2016	.6585321	.0610927	10.78	0.000	.5387926	.7782715
09/2016	-.5908955	.0613353	-9.63	0.000	-.7111105	-.4706806
10/2016	-.4819024	.0615381	-7.83	0.000	-.6025148	-.36129
11/2016	-.8080836	.0617412	-13.09	0.000	-.9290941	-.6870732
12/2016	-.9301903	.0619118	-15.02	0.000	-1.051535	-.8088453
01/2017	-.7288759	.0620791	-11.74	0.000	-.8505488	-.607203
02/2017	-.6644125	.0622298	-10.68	0.000	-.7863807	-.5424443
03/2017	-.5728819	.0623733	-9.18	0.000	-.6951314	-.4506325
04/2017	-.6203572	.0625727	-9.91	0.000	-.7429974	-.497717
05/2017	-.747571	.0627427	-11.91	0.000	-.8705444	-.6245977
06/2017	-.734003	.0629484	-11.66	0.000	-.8573796	-.6106264
07/2017	-.6906028	.0631787	-10.93	0.000	-.8144309	-.5667748
08/2017	-.7995024	.0634028	-12.61	0.000	-.9237696	-.6752353
09/2017	-.0924717	.0636168	-1.45	0.146	-.2171584	.032215
10/2017	.3488348	.063798	5.47	0.000	.2237929	.4738767
11/2017	-.8007647	.0639923	-12.51	0.000	-.9261874	-.6753421
12/2017	-1.339632	.0641537	-20.88	0.000	-1.46537	-1.213893
01/2018	-1.25309	.0643109	-19.48	0.000	-1.379137	-1.127043
02/2018	-.8744615	.0644618	-13.57	0.000	-1.000804	-.7481186
03/2018	-.6129992	.0646076	-9.49	0.000	-.7396277	-.4863707
04/2018	-.6321574	.0647741	-9.76	0.000	-.7591122	-.5052025
05/2018	-.6934061	.0649537	-10.68	0.000	-.8207129	-.5660992
06/2018	-.9752954	.0654621	-14.90	0.000	-1.103599	-.846992
cons	44.96266	.0614262	731.98	0.000	44.84226	45.08305

Table F-10: Regression Coefficients for DEP Cohort 2

Number of obs	=	1324363
F(83,1291654)	=	5018.47
Prob>F	=	0.0000
R-squared	=	0.6873
AdjR-squared	=	0.6793
Root MSE	=	14.3698

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2013	10.59739	.2911435	36.40	0.000	10.02676	11.16802
01/2014	18.6943	.284998	65.59	0.000	18.13571	19.25288
02/2014	14.98298	.282832	52.97	0.000	14.42864	15.53732
03/2014	.0714642	.2802071	0.26	0.799	-.4777321	.6206605
04/2014	-9.570875	.2778032	-34.45	0.000	-10.11536	-9.02639
05/2014	-10.6451	.2752273	-38.68	0.000	-11.18453	-10.10566
06/2014	3.708345	.2729562	13.59	0.000	3.17336	4.24333
07/2014	4.282465	.2704597	15.83	0.000	3.752373	4.812557
08/2014	-3.142081	.2451161	-12.82	0.000	-3.6225	-2.661662
09/2014	-9.089674	.2293094	-39.64	0.000	-9.539113	-8.640236
10/2014	-12.47666	.2211061	-56.43	0.000	-12.91002	-12.0433
11/2014	-3.60765	.2168758	-16.63	0.000	-4.032719	-3.182581
12/2014	4.460534	.2154846	20.70	0.000	4.038191	4.882876
01/2015	10.01601	.215483	46.48	0.000	9.593666	10.43834
02/2015	12.8998	.2154815	59.87	0.000	12.47747	13.32214
03/2015	-8.531963	.215477	-39.60	0.000	-8.954291	-8.109636
04/2015	-14.4935	.2154747	-67.26	0.000	-14.91582	-14.07118
05/2015	-9.523378	.2154734	-44.20	0.000	-9.945698	-9.101057
06/2015	2.650262	.21547	12.30	0.000	2.227948	3.072576
07/2015	5.867211	.2154669	27.23	0.000	5.444903	6.289519
08/2015	1.184402	.2154642	5.50	0.000	.7620995	1.606705
09/2015	-7.280168	.2154631	-33.79	0.000	-7.702468	-6.857867
10/2015	-13.87055	.2154625	-64.38	0.000	-14.29285	-13.44825
11/2015	-9.83021	.2154619	-45.62	0.000	-10.25251	-9.407912
01/2016	7.759313	.2538258	30.57	0.000	7.261823	8.256803
02/2016	5.457167	.2538377	21.50	0.000	4.959654	5.954681
03/2016	-9.121958	.2540502	-35.91	0.000	-9.619888	-8.624028
04/2016	-13.48322	.2542302	-53.04	0.000	-13.9815	-12.98494
05/2016	-10.04955	.2545241	-39.48	0.000	-10.54841	-9.550696
06/2016	.5504089	.2554268	2.15	0.031	.0497812	1.051037
07/2016	9.391358	.2564471	36.62	0.000	8.88873	9.893986

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08/2016	8.828805	.2573584	34.31	0.000	8.324392	9.333219
09/2016	-2.198706	.2586277	-8.50	0.000	-2.705608	-1.691805
10/2016	-12.65787	.2597651	-48.73	0.000	-13.167	-12.14874
11/2016	-7.470831	.2608013	-28.65	0.000	-7.981993	-6.959669
12/2016	2.649381	.2619808	10.11	0.000	2.135907	3.162854
01/2017	.8161692	.2626015	3.11	0.002	.3014793	1.330859
02/2017	-5.108788	.2633038	-19.40	0.000	-5.624854	-4.592721
03/2017	-7.10749	.2639027	-26.93	0.000	-7.62473	-6.590249
04/2017	-10.36758	.2649704	-39.13	0.000	-10.88691	-9.848242
05/2017	-6.229106	.265656	-23.45	0.000	-6.749783	-5.708429
06/2017	.6069767	.2664214	2.28	0.023	.0847999	1.129153
07/2017	7.115578	.267587	26.59	0.000	6.591117	7.640039
08/2017	2.278062	.2686861	8.48	0.000	1.751447	2.804678
09/2017	-5.002681	.2696091	-18.56	0.000	-5.531106	-4.474257
10/2017	-9.639181	.2704857	-35.64	0.000	-10.16932	-9.109038
11/2017	-5.715277	.2715362	-21.05	0.000	-6.247478	-5.183075
12/2017	10.73481	.2722424	39.43	0.000	10.20122	11.2684
01/2018	15.18117	.2728966	55.63	0.000	14.6463	15.71604
02/2018	-2.281692	.2734719	-8.34	0.000	-2.817688	-1.745696
03/2018	-4.950265	.274138	-18.06	0.000	-5.487566	-4.412964
04/2018	-10.96508	.2748404	-39.90	0.000	-11.50376	-10.4264
05/2018	-5.712968	.2756631	-20.72	0.000	-6.253259	-5.172678
i.ym#c.treatment						
01/2016	-.2940158	.1902775	-1.55	0.122	-.6669533	.0789217
02/2016	-.3127838	.1902194	-1.64	0.100	-.6856073	.0600396
03/2016	.140052	.1906249	0.73	0.463	-.2335662	.5136702
04/2016	.1417772	.1909861	0.74	0.458	-.2325491	.5161035
05/2016	-.0330458	.1915494	-0.17	0.863	-.4084761	.3423844
06/2016	-.372274	.1932973	-1.93	0.054	-.75113	.0065821
07/2016	-.4670928	.1953296	-2.39	0.017	-.8499321	-.0842535
08/2016	-.3679604	.1971357	-1.87	0.062	-.7543396	.0184187
09/2016	-.0095294	.1995383	-0.05	0.962	-.4006176	.3815588
10/2016	.0961081	.2016543	0.48	0.634	-.2991274	.4913436
11/2016	.0530629	.2035533	0.26	0.794	-.3458947	.4520205
12/2016	-.1555799	.2055601	-0.76	0.449	-.5584707	.2473108
01/2017	.06298	.2067812	0.30	0.761	-.342304	.4682641
02/2017	.0083661	.2080313	0.04	0.968	-.3993681	.4161003
03/2017	-.034834	.2091218	-0.17	0.868	-.4447055	.3750376
04/2017	-.0862931	.2109464	-0.41	0.682	-.4997408	.3271546
05/2017	-.2581741	.2121577	-1.22	0.224	-.6739959	.1576478
06/2017	-.1880658	.2136218	-0.88	0.379	-.6067572	.2306255

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07/2017	-.3441835	.2155689	-1.60	0.110	-.7666912	.0783241
08/2017	-.3619368	.217431	-1.66	0.096	-.7880942	.0642205
09/2017	-.3588089	.2190726	-1.64	0.101	-.7881838	.0705659
10/2017	-.1918852	.2205187	-0.87	0.384	-.6240943	.240324
11/2017	-.2994767	.2222814	-1.35	0.178	-.7351407	.1361874
12/2017	-.6200525	.2235098	-2.77	0.006	-1.058124	-.181981
01/2018	-.8011186	.2246129	-3.57	0.000	-1.241352	-.360885
02/2018	-.2764544	.2256365	-1.23	0.220	-.7186943	.1657855
03/2018	-.1774399	.2267308	-0.78	0.434	-.6218245	.2669448
04/2018	-.0360123	.2279476	-0.16	0.874	-.4827819	.4107573
05/2018	-.2245772	.2293994	-0.98	0.328	-.6741923	.2250378
06/2018	-.5141316	.2321059	-2.22	0.027	-.9690513	-.0592119
cons	42.70114	.2000864	213.41	0.000	42.30898	43.0933

Table F-11: Regression Coefficients for DEP Cohort 3

Number of obs	=	1870493
F(77,1816295)	=	7279.54
Prob>F	=	0.0000
R-squared	=	0.6797
AdjR-squared	=	0.6701
Root MSE	=	14.2891

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2013	10.82818	.2712209	39.92	0.000	10.2966	11.35977
01/2014	18.34483	.2662765	68.89	0.000	17.82293	18.86672
02/2014	11.2674	.2652203	42.48	0.000	10.74758	11.78722
03/2014	1.056151	.2635461	4.01	0.000	.5396102	1.572692
04/2014	-6.794034	.2621178	-25.92	0.000	-7.307776	-6.280292
05/2014	-13.44633	.2607022	-51.58	0.000	-13.95729	-12.93536
06/2014	5.899975	.2591258	22.77	0.000	5.392098	6.407853
07/2014	4.434636	.2570903	17.25	0.000	3.930748	4.938524
08/2014	-5.645866	.2546092	-22.17	0.000	-6.144891	-5.146841
09/2014	-8.477301	.252634	-33.56	0.000	-8.972454	-7.982147
10/2014	-13.62876	.2503069	-54.45	0.000	-14.11935	-13.13817
11/2014	1.833326	.2473004	7.41	0.000	1.348626	2.318026
12/2014	7.201564	.2141278	33.63	0.000	6.781881	7.621247
01/2015	8.699186	.1891209	46.00	0.000	8.328515	9.069856
02/2015	11.62882	.1760723	66.05	0.000	11.28373	11.97392
03/2015	-10.73633	.1675336	-64.08	0.000	-11.0647	-10.40797
04/2015	-17.14845	.1621513	-105.76	0.000	-17.46626	-16.83064
05/2015	-10.3839	.1579611	-65.74	0.000	-10.6935	-10.0743
06/2015	1.264688	.1549842	8.16	0.000	.9609247	1.568452
07/2015	3.672569	.1536792	23.90	0.000	3.371363	3.973775
08/2015	-.4947735	.1536774	-3.22	0.001	-.7959758	-.1935712
09/2015	-8.55043	.1536764	-55.64	0.000	-8.851631	-8.24923
10/2015	-14.85945	.1536758	-96.69	0.000	-15.16065	-14.55825
11/2015	-10.77076	.153676	-70.09	0.000	-11.07196	-10.46956
12/2015	-4.687162	.1536744	-30.50	0.000	-4.988359	-4.385966
01/2016	6.938365	.1536736	45.15	0.000	6.63717	7.23956
02/2016	4.435331	.1536731	28.86	0.000	4.134137	4.736525
03/2016	-9.808236	.1536719	-63.83	0.000	-10.10943	-9.507044
04/2016	-14.08789	.1536704	-91.68	0.000	-14.38908	-13.7867
05/2016	-10.66267	.1536698	-69.39	0.000	-10.96386	-10.36148
07/2016	9.336595	.1778265	52.50	0.000	8.988062	9.685129

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08/2016	8.777054	.178728	49.11	0.000	8.426754	9.127355
09/2016	-3.221495	.1797014	-17.93	0.000	-3.573704	-2.869287
10/2016	-12.94114	.1804582	-71.71	0.000	-13.29483	-12.58745
11/2016	-7.751709	.1810579	-42.81	0.000	-8.106576	-7.396842
12/2016	2.048704	.1816174	11.28	0.000	1.692741	2.404668
01/2017	.3949252	.1823009	2.17	0.030	.0376217	.7522286
02/2017	-5.390989	.182895	-29.48	0.000	-5.749457	-5.032521
03/2017	-7.458004	.1835123	-40.64	0.000	-7.817681	-7.098326
04/2017	-10.65468	.1842414	-57.83	0.000	-11.01579	-10.29358
05/2017	-6.517875	.1849133	-35.25	0.000	-6.880298	-6.155451
06/2017	.4418084	.1857929	2.38	0.017	.0776607	.805956
07/2017	6.906229	.1868015	36.97	0.000	6.540104	7.272353
08/2017	1.924281	.1877588	10.25	0.000	1.55628	2.292282
09/2017	-5.264901	.1886116	-27.91	0.000	-5.634574	-4.895229
10/2017	-9.717548	.1892761	-51.34	0.000	-10.08852	-9.346573
11/2017	-6.194776	.1900108	-32.60	0.000	-6.567191	-5.822362
12/2017	9.584095	.1906094	50.28	0.000	9.210507	9.957683
01/2018	14.15336	.191097	74.06	0.000	13.77882	14.52791
02/2018	-2.432517	.1916147	-12.69	0.000	-2.808076	-2.056959
03/2018	-5.172238	.1921078	-26.92	0.000	-5.548763	-4.795714
04/2018	-11.03074	.1928141	-57.21	0.000	-11.40865	-10.65283
05/2018	-5.66916	.1936228	-29.28	0.000	-6.048654	-5.289666
i.ym#c.treatment						
07/2016	-.2364876	.1381473	-1.71	0.087	-.5072516	.0342764
08/2016	-.3991652	.1399745	-2.85	0.004	-.6735103	-.1248201
09/2016	-.3619444	.1419405	-2.55	0.011	-.6401429	-.0837459
10/2016	-.2975852	.1434501	-2.07	0.038	-.5787425	-.0164279
11/2016	-.0660174	.1446492	-0.46	0.648	-.3495248	.21749
12/2016	.0485513	.1457605	0.33	0.739	-.2371342	.3342368
01/2017	.0044539	.1470077	0.03	0.976	-.2836761	.2925838
02/2017	-.2270715	.14815	-1.53	0.125	-.5174404	.0632974
03/2017	-.2801664	.1493279	-1.88	0.061	-.5728438	.012511
04/2017	-.3360605	.1507459	-2.23	0.026	-.6315172	-.0406038
05/2017	-.3775782	.1520177	-2.48	0.013	-.6755276	-.0796289
06/2017	-.5042509	.153686	-3.28	0.001	-.8054702	-.2030316
07/2017	-.6311936	.1555855	-4.06	0.000	-.9361358	-.3262514
08/2017	-.5327004	.1573394	-3.39	0.001	-.8410802	-.2243207
09/2017	-.5532146	.1589	-3.48	0.000	-.8646531	-.2417761
10/2017	-.5722229	.1600786	-3.57	0.000	-.8859713	-.2584744
11/2017	-.3548008	.1613668	-2.20	0.028	-.6710741	-.0385276
12/2017	-.0669128	.1624294	-0.41	0.680	-.3852689	.2514432

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01/2018	-.070757	.1633214	-0.43	0.665	-.3908613	.2493473
02/2018	-.5025356	.1642171	-3.06	0.002	-.8243954	-.1806758
03/2018	-.4768844	.1651377	-2.89	0.004	-.8005486	-.1532202
04/2018	-.6556493	.1663534	-3.94	0.000	-.9816961	-.3296024
05/2018	-.7246817	.1677257	-4.32	0.000	-1.053418	-.3959451
06/2018	-.7034253	.1699905	-4.14	0.000	-1.036601	-.3702498
cons	43.09341	.1406951	306.29	0.000	42.81765	43.36917

Table F-12: Regression Coefficients for DEP Cohort 4

Number of obs	=	3127601
F(53,3025223)	=	18311.52
Prob>F	=	0.0000
R-squared	=	0.6566
AdjR-squared	=	0.6450
Root MSE	=	16.0197

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
01/2015	42.0015	.3640951	115.36	0.000	41.28789	42.71511
02/2015	25.7931	.2910192	88.63	0.000	25.22271	26.36349
03/2015	.0888886	.2507836	0.35	0.723	-.4026383	.5804156
04/2015	-14.44873	.2431523	-59.42	0.000	-14.9253	-13.97216
05/2015	10.60925	.2426207	43.73	0.000	10.13372	11.08477
06/2015	19.84851	.2420862	81.99	0.000	19.37403	20.32299
07/2015	8.1361	.2393017	34.00	0.000	7.667077	8.605123
08/2015	9.29721	.2359954	39.40	0.000	8.834668	9.759753
09/2015	3.484304	.2338265	14.90	0.000	3.026012	3.942596
10/2015	-13.16111	.2321962	-56.68	0.000	-13.61621	-12.70602
11/2015	-9.894599	.2312317	-42.79	0.000	-10.34781	-9.441393
12/2015	-4.300453	.230293	-18.67	0.000	-4.751819	-3.849087
01/2016	8.334057	.2296242	36.29	0.000	7.884001	8.784112
02/2016	4.889433	.2290246	21.35	0.000	4.440553	5.338313
03/2016	-9.80188	.2283662	-42.92	0.000	-10.24947	-9.35429
04/2016	-13.17324	.2278224	-57.82	0.000	-13.61976	-12.72671
05/2016	-9.909555	.2276834	-43.52	0.000	-10.35581	-9.463304
06/2016	1.198147	.2276833	5.26	0.000	.751896	1.644399
07/2016	17.49121	.2276832	76.82	0.000	17.04496	17.93747
08/2016	17.71617	.2276828	77.81	0.000	17.26992	18.16242
09/2016	-.5585539	.2276826	-2.45	0.014	-1.004804	-.1123039
10/2016	-11.81609	.2276824	-51.90	0.000	-12.26234	-11.36984
11/2016	-6.418996	.2276823	-28.19	0.000	-6.865245	-5.972746
12/2016	4.27747	.2276823	18.79	0.000	3.83122	4.723719
01/2017	2.675342	.2276823	11.75	0.000	2.229093	3.121591
02/2017	-3.752356	.227682	-16.48	0.000	-4.198605	-3.306107
03/2017	-5.521757	.2276941	-24.25	0.000	-5.96803	-5.075485
04/2017	-9.230526	.2278002	-40.52	0.000	-9.677007	-8.784046
06/2017	1.854392	.2929733	6.33	0.000	1.280175	2.42861
07/2017	8.380718	.2942959	28.48	0.000	7.803908	8.957527
08/2017	3.328861	.2957553	11.26	0.000	2.749191	3.908531

I/A

09/2017	-.3274947	.2971527	-1.10	0.270	-.9099035	.2549142
10/2017	-3.762946	.2981534	-12.62	0.000	-4.347316	-3.178576
11/2017	-4.289536	.2992498	-14.33	0.000	-4.876055	-3.703017
12/2017	11.58691	.3003237	38.58	0.000	10.99829	12.17553
01/2018	16.63571	.301101	55.25	0.000	16.04556	17.22586
02/2018	-1.299607	.3019557	-4.30	0.000	-1.891429	-.707784
03/2018	-3.266138	.3028899	-10.78	0.000	-3.859791	-2.672484
04/2018	-10.0344	.3040123	-33.01	0.000	-10.63025	-9.438546
05/2018	-4.759072	.3050362	-15.60	0.000	-5.356933	-4.161212
i.ym#c.treatment						
06/2017	-.2840964	.2083152	-1.36	0.173	-.6923868	.1241941
07/2017	-.1798442	.2105184	-0.85	0.393	-.5924529	.2327645
08/2017	-.1314894	.2128982	-0.62	0.537	-.5487623	.2857835
09/2017	-.1687879	.2151689	-0.78	0.433	-.5905113	.2529356
10/2017	-.0873951	.2167886	-0.40	0.687	-.5122931	.337503
11/2017	-.283198	.2185507	-1.30	0.195	-.7115497	.1451537
12/2017	-.4871267	.2202422	-2.21	0.027	-.9187937	-.0554597
01/2018	-.4412774	.2214845	-1.99	0.046	-.8753793	-.0071755
02/2018	-.4264186	.2228336	-1.91	0.056	-.8631647	.0103275
03/2018	-.2953128	.2242871	-1.32	0.188	-.7349076	.1442821
04/2018	-.2095437	.2260123	-0.93	0.354	-.6525198	.2334324
05/2018	-.030492	.2276016	-0.13	0.893	-.4765831	.4155991
06/2018	-.1604255	.2305315	-0.70	0.486	-.6122591	.2914082
cons	42.04246	.2220709	189.32	0.000	41.60721	42.47772

Table F-13: Regression Coefficients for DEP Cohort 5

Number of obs	=	1042278
F(46,995879)	=	5675.15
Prob>F	=	0.0000
R-squared	=	0.6913
AdjR-squared	=	0.6769
Root MSE	=	13.8521

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
02/2015	7.859332	1.03145	7.62	0.000	5.837724	9.880939
03/2015	-14.72819	.5009908	-29.40	0.000	-15.71012	-13.74627
04/2015	-19.22476	.4593114	-41.86	0.000	-20.12499	-18.32452
05/2015	-12.46654	.4538566	-27.47	0.000	-13.35609	-11.577
06/2015	-2.073978	.4480566	-4.63	0.000	-2.952154	-1.195802
07/2015	-.6775616	.4404268	-1.54	0.124	-1.540783	.1856601
08/2015	-4.209871	.4292188	-9.81	0.000	-5.051125	-3.368616
09/2015	-11.54887	.4149626	-27.83	0.000	-12.36218	-10.73555
11/2015	-14.48223	.3958936	-36.58	0.000	-15.25817	-13.70629
12/2015	-9.743026	.3854937	-25.27	0.000	-10.49858	-8.987471
01/2016	-.4357276	.375123	-1.16	0.245	-1.170956	.2995008
02/2016	-3.248327	.3616983	-8.98	0.000	-3.957243	-2.53941
03/2016	-16.40977	.3412315	-48.09	0.000	-17.07857	-15.74096
04/2016	-20.83725	.2979269	-69.94	0.000	-21.42118	-20.25332
05/2016	-14.20739	.2083906	-68.18	0.000	-14.61583	-13.79895
06/2016	-3.413052	.175071	-19.50	0.000	-3.756185	-3.069919
07/2016	6.838243	.1635854	41.80	0.000	6.517621	7.158865
08/2016	5.001092	.1577112	31.71	0.000	4.691983	5.310201
09/2016	-4.802548	.1547891	-31.03	0.000	-5.105929	-4.499166
10/2016	-14.16475	.1541552	-91.89	0.000	-14.46689	-13.86261
11/2016	-9.006045	.154155	-58.42	0.000	-9.308183	-8.703906
12/2016	1.722556	.1541532	11.17	0.000	1.420421	2.024691
01/2017	.118167	.1541529	0.77	0.443	-.1839676	.4203015
02/2017	-6.008087	.1541516	-38.98	0.000	-6.310219	-5.705955
03/2017	-7.882833	.1541514	-51.14	0.000	-8.184965	-7.580702
04/2017	-11.17579	.1541501	-72.50	0.000	-11.47792	-10.87366
05/2017	-7.152663	.1541477	-46.40	0.000	-7.454788	-6.850539
06/2017	-.2981455	.1541465	-1.93	0.053	-.6002675	.0039764
07/2017	5.948751	.1541447	38.59	0.000	5.646632	6.250869
08/2017	1.368454	.1541421	8.88	0.000	1.066341	1.670568
09/2017	-4.875907	.1542055	-31.62	0.000	-5.178145	-4.57367

I/A

11/2017	-6.410534	.1874958	-34.19	0.000	-6.77802	-6.043049
12/2017	8.676972	.1881879	46.11	0.000	8.30813	9.045814
01/2018	13.12556	.1888482	69.50	0.000	12.75542	13.4957
02/2018	-3.244625	.1895723	-17.12	0.000	-3.61618	-2.873069
03/2018	-5.659177	.1902589	-29.74	0.000	-6.032078	-5.286276
04/2018	-10.97504	.1910124	-57.46	0.000	-11.34941	-10.60066
05/2018	-5.355889	.1918697	-27.91	0.000	-5.731947	-4.979831
i.ym#c.treatment						
11/2017	.3283646	.1541795	2.13	0.033	.0261781	.6305512
12/2017	.9927588	.1554924	6.38	0.000	.687999	1.297519
01/2018	1.069641	.1566775	6.83	0.000	.7625586	1.376724
02/2018	.4895946	.1579523	3.10	0.002	.1800135	.7991757
03/2018	.3649788	.1591562	2.29	0.022	.053038	.6769196
04/2018	-.1933651	.1604854	-1.20	0.228	-.507911	.1211808
05/2018	-.5897201	.161981	-3.64	0.000	-.9071974	-.2722427
06/2018	-.7145588	.1645078	-4.34	0.000	-1.036989	-.3921291
cons	42.01288	.1400189	300.05	0.000	41.73845	42.28731

Table F-14: Regression Coefficients for DEP Cohort 6

Number of obs	=	5818963
F(75,5679812)	=	25017.65
Prob>F	=	0.0000
R-squared	=	0.7158
AdjR-squared	=	0.7089
Root MSE	=	14.2181

Variable	Coefficient	Std. Err.	t	P > |t|	95% Conf. Interval	
i.ym						
12/2013	11.70871	.070371	166.39	0.000	11.57079	11.84663
01/2014	15.49768	.0697846	222.08	0.000	15.3609	15.63445
02/2014	12.08945	.0697845	173.24	0.000	11.95267	12.22622
03/2014	-.1279688	.0697845	-1.83	0.067	-.2647439	.0088064
04/2014	-10.09903	.0697843	-144.72	0.000	-10.2358	-9.962251
05/2014	-6.837694	.0697841	-97.98	0.000	-6.974468	-6.70092
06/2014	3.284255	.0697841	47.06	0.000	3.147481	3.42103
07/2014	4.081132	.069784	58.48	0.000	3.944358	4.217906
08/2014	1.764097	.0697838	25.28	0.000	1.627324	1.900871
09/2014	-3.757227	.069784	-53.84	0.000	-3.894001	-3.620452
10/2014	-10.33492	.0697845	-148.10	0.000	-10.4717	-10.19815
11/2014	-1.688237	.0697846	-24.19	0.000	-1.825012	-1.551461
11/2015	-9.232248	.0779718	-118.40	0.000	-9.38507	-9.079426
12/2015	-2.661476	.0779701	-34.13	0.000	-2.814295	-2.508657
01/2016	8.674027	.077972	111.25	0.000	8.521205	8.82685
02/2016	5.9907	.077972	76.83	0.000	5.837878	6.143522
03/2016	-8.838062	.0779925	-113.32	0.000	-8.990925	-8.6852
04/2016	-13.30352	.0780119	-170.53	0.000	-13.45643	-13.15062
05/2016	-9.44699	.0780375	-121.06	0.000	-9.599941	-9.294039
06/2016	2.194711	.0781436	28.09	0.000	2.041552	2.34787
07/2016	11.77389	.0782866	150.39	0.000	11.62045	11.92733
08/2016	10.30823	.0784133	131.46	0.000	10.15454	10.46192
09/2016	-2.183175	.0785551	-27.79	0.000	-2.33714	-2.029209
10/2016	-13.0053	.078674	-165.31	0.000	-13.1595	-12.8511
11/2016	-6.980919	.0787958	-88.60	0.000	-7.135356	-6.826482
12/2016	3.439117	.0788971	43.59	0.000	3.284481	3.593752
01/2017	1.318201	.0789975	16.69	0.000	1.163369	1.473033
02/2017	-5.036775	.0790875	-63.69	0.000	-5.191783	-4.881766
03/2017	-7.376649	.0791736	-93.17	0.000	-7.531826	-7.221471
04/2017	-10.63689	.0792945	-134.14	0.000	-10.7923	-10.48147
05/2017	-6.112698	.0793975	-76.99	0.000	-6.268314	-5.957082

I/A

06/2017	1.366243	.079523	17.18	0.000	1.210381	1.522105
07/2017	8.161536	.0796641	102.45	0.000	8.005397	8.317675
08/2017	2.668037	.0798028	33.43	0.000	2.511626	2.824448
09/2017	-5.734664	.0799342	-71.74	0.000	-5.891332	-5.577996
10/2017	-10.82592	.0800463	-135.25	0.000	-10.98281	-10.66903
11/2017	-5.79847	.0801673	-72.33	0.000	-5.955595	-5.641345
12/2017	11.03428	.0802677	137.47	0.000	10.87696	11.1916
01/2018	15.14574	.0803662	188.46	0.000	14.98822	15.30325
02/2018	-2.586148	.0804608	-32.14	0.000	-2.743848	-2.428448
03/2018	-5.476302	.0805527	-67.98	0.000	-5.634182	-5.318422
04/2018	-11.58772	.0806566	-143.67	0.000	-11.7458	-11.42963
05/2018	-6.145941	.0807687	-76.09	0.000	-6.304244	-5.987637
i.ym#c.treatment						
11/2015	-.1657308	.0794857	-2.09	0.037	-.32152	-.0099416
12/2015	-.2809974	.0794828	-3.54	0.000	-.4367809	-.1252139
01/2016	-.4857805	.0794845	-6.11	0.000	-.6415674	-.3299937
02/2016	-.5875254	.0794857	-7.39	0.000	-.7433146	-.4317362
03/2016	-.3260493	.079533	-4.10	0.000	-.4819312	-.1701674
04/2016	-.1940438	.0795805	-2.44	0.015	-.3500187	-.0380688
05/2016	-.1250364	.0796366	-1.57	0.116	-.2811213	.0310485
06/2016	-.0957303	.0798921	-1.20	0.231	-.252316	.0608554
07/2016	-.0052869	.0802199	-0.07	0.947	-.162515	.1519411
08/2016	-.0813614	.0805005	-1.01	0.312	-.2391395	.0764166
09/2016	-.1006956	.0808235	-1.25	0.213	-.2591068	.0577156
10/2016	-.197732	.0810956	-2.44	0.015	-.3566765	-.0387876
11/2016	-.324476	.0813496	-3.99	0.000	-.4839184	-.1650337
12/2016	-.3983929	.0815737	-4.88	0.000	-.5582744	-.2385113
01/2017	-.3999776	.0817827	-4.89	0.000	-.5602688	-.2396864
02/2017	-.3528999	.0819735	-4.31	0.000	-.513565	-.1922349
03/2017	-.326023	.0821581	-3.97	0.000	-.4870499	-.1649961
04/2017	-.2227447	.0824171	-2.70	0.007	-.3842792	-.0612102
05/2017	-.1700432	.082627	-2.06	0.040	-.3319892	-.0080972
06/2017	-.097265	.0829011	-1.17	0.241	-.2597482	.0652182
07/2017	-.0851771	.0831946	-1.02	0.306	-.2482355	.0778814
08/2017	-.1316635	.0834652	-1.58	0.115	-.2952524	.0319254
09/2017	-.1896956	.0837418	-2.27	0.023	-.3538266	-.0255646
10/2017	-.2170639	.0839737	-2.58	0.010	-.3816494	-.0524785
11/2017	-.4155898	.0842191	-4.93	0.000	-.5806562	-.2505234
12/2017	-.7004644	.084429	-8.30	0.000	-.8659422	-.5349866
01/2018	-.6509102	.0846283	-7.69	0.000	-.8167788	-.4850417
02/2018	-.4346815	.0848319	-5.12	0.000	-.600949	-.268414

I/A

03/2018	-.4591289	.0850171	-5.40	0.000	-.6257594	-.2924984
04/2018	-.3998165	.0852301	-4.69	0.000	-.5668645	-.2327686
05/2018	-.2731368	.0854661	-3.20	0.001	-.4406473	-.1056262
06/2018	-.2636914	.0861242	-3.06	0.002	-.4324918	-.0948909
cons	45.07433	.058409	771.70	0.000	44.95985	45.18881

Appendix G Awareness and Engagement

The increased engagement and awareness generated by the MyHER program can be difficult to measure. Nexant designed a survey approach that measures different aspects of the MyHER effect, but no one survey question can fully capture the numerous and subtle effects of MyHER that ultimately resulted in the observed energy impacts. Instead, one might expect the overall pattern of survey responses to signal a difference in behavior and attitudes between the MyHER treatment and control group.

Nexant developed a framework for measuring this pattern of MyHER influence by applying straightforward statistical concepts to develop a holistic look at the program's influence on customer behavior. While a single survey question may not result in statistically significant differences between the treatment and control group, if the treatment group responds more favorably than the control group to a set of survey questions, then we can estimate the probability that the collection of responses fits a hypothesis of MyHER influence.

Nexant assigned each survey question a category. Table G-1 and Table G-2 shows the categories, the count of questions in each category for which the treatment group provided a more favorable response than the control group, and the number of questions in each category, for each jurisdiction. A response is considered "favorable" if the treatment group gave a response that is consistent with the program objectives of MyHER.

Table G-1: Classification of Survey Responses and Treatment Group "Success Rate" - DEC

Question Category	Count of Questions where T>C	Number of Questions in Topic Area	Portion of Questions where T>C
Duke Energy's Public Stance on Energy Efficiency	3	3	100%
Customer Engagement with Duke Energy Website	2	5	40%
Customers' Reported Energy-savings Behaviors	10	11	91%
Customer's Reported Energy Efficiency Improvements Made	9	9	100%
Customer Motivation, Engagement & Awareness of Energy Efficiency	4	11	36%
Barriers of Customer Not Undertaking Energy Savings Actions	3	6	50%
Customer Satisfaction with Duke Energy	0	4	0%
Total	**31**	**49**	**63%**

Table G-2: Classification of Survey Responses and Treatment Group "Success Rate" - DEP

Question Category	Count of Questions where T>C	Number of Questions in Topic Area	Portion of Questions where T>C
Duke Energy's Public Stance on Energy Efficiency	3	3	100%
Customer Engagement with Duke Energy Website	2	5	40%
Customers' Reported Energy-saving Behaviors	10	11	91%
Customer's Reported Energy Efficiency Improvements Made	9	9	100%
Customer Motivation, Engagement & Awareness of Energy Efficiency	10	11	91%
Barriers of Customer Not Undertaking Energy Savings Actions	4	6	67%
Customer Satisfaction with Duke Energy	2	4	50%
Total	**40**	**49**	**82%**

If the MyHER program had no effect on participants' awareness, attitudes, and opinions, then we would expect the control group to score better than the treatment group on approximately half of the survey questions. The DEC treatment group provided answers consistent with a MyHER treatment effect in approximately 63% of the survey questions, and 82% in the case of DEP, which represents an uplift from the expected percentage of 50% if the null hypothesis were true. Thus we cannot make the case that MyHER had wide-ranging enhancing effects across all the various engagement and attitudinal areas probed by the survey. Using standard statistical techniques (the non-parametric sign test), Nexant calculates the probability of randomly obtaining this result in the case of DEC is 2% and in the case of DEP essentially 0%.

What do those 2% and 0% probabilities mean? Consider a series of coin flips. What is the probability of obtaining 40 heads in 49 coin flips if there is a 50/50 chance of obtaining a heads or tails on any one coin flip? This same principle can be applied to the survey: what is the probability that the treatment group gives a more favorable response to 40 out of 49 survey questions if MyHER has no influence on customer engagement and energy usage behavior? The answer, 0%, is "exceedingly low". The same logic applies to the 2% probability we calculate for DEC. Thus we conclude that the survey responses in these two jurisdictions favorably affects DEC and DEP customer attitudes and actions related to energy-saving behavior.[16]

[16] The technical way of putting this is to say that we reject the hypothesis that MyHERs have no effect on customer engagement with energy-saving behaviors.

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Docket No. E-7, Sub 1265

Evans Exhibit 17

2020

Residential Energy Assessments	Product Code	System Energy Reduction (kWh)	System NPV of Avoided Costs	Total Cost	Incentive	NC Retail kWh Sales Allocation Factor	NC Revenue Requirement	NC Lost Revenue 2020	NC Lost Revenue 2021
12873: Home Energy House Call - Smart Thermostat -Elec	HCNSTE	6,414	2,266	$ 15,700	$ (750)	73.2212736%	$ 10,946	$ 46	$ 354
12874: Home Energy House Call - Smart Thermostat -Only CAC Fuel Htd	HCNSTE	19,564	6,910					$ 86	$ 751
12875: Home Energy House Call - Specialty Candelabra LED	HCCNDL	122,474	79,466	$ -	$ 9,139	73.2212736%	$ 6,691	$ 1,537	$ 5,977
12876: Home Energy House Call - Specialty Globe LED	HCGLOB	78,599	42,419	$ -	$ 4,878	73.2212736%	$ 3,572	$ 1,052	$ 4,362
12877: Home Energy House Call - Specialty Recessed LED	HCRCSD	117,720	63,532	$ -	$ 7,306	73.2212736%	$ 5,350	$ 1,331	$ 5,411
12878: Home Energy House Call - Specialty Showerhead	HCHHSH	16,002	5,455	$ -	$ 627	73.2212736%	$ 459	$ 207	$ 787
Power Manager®									
11429: Bring Your Own Thermostat	BYOT		2,633,902	$ 2,912,271	$ (32,012)	74.1953449%	$ 2,137,018		
Energy Efficient Appliances and Devices									
11790: Marketplace Dehumidifier	MPESDH	840	564	$ 451,688	$ (51,879)	73.2212736%	$ 292,745	$ 11	$ 34

2021

Residential Energy Assessments	Product Code	System Energy Reduction (kWh)	System NPV of Avoided Costs	Total Cost	Incentive	NC Retail kWh Sales Allocation Factor	NC Revenue Requirement	NC Lost Revenue 2021
12872: Home Energy House Call - Assess Kit w LEDs Blower Door	HCBLRD	3,316	1,694	$ -	$ 195	73.5233682%	$ 143	$ 4
12873: Home Energy House Call - Smart Thermostat -Elec	HCNSTE	150,098	45,726	$ 68,775	$ 1,720	73.5233682%	$ 51,830	$ 3,764
12874: Home Energy House Call - Smart Thermostat -Only CAC Fuel Htd	HCNSTE	124,761	38,007					$ 3,286
12875: Home Energy House Call - Specialty Candelabra LED	HCCNDL	156,244	81,793	$ 5,196	$ 8,809	73.5233682%	$ 10,296	$ 3,982
12876: Home Energy House Call - Specialty Globe LED	HCGLOB	138,969	59,717	$ 3,324	$ 6,485	73.5233682%	$ 7,212	$ 4,245
12877: Home Energy House Call - Specialty Recessed LED	HCRCSD	160,425	68,934	$ 3,150	$ 7,565	73.5233682%	$ 7,878	$ 4,100
12878: Home Energy House Call - Specialty Showerhead	HCHHSH	23,508	7,409	$ 1,082	$ 728	73.5233682%	$ 1,331	$ 591
Power Manager®								
11429: Bring Your Own Thermostat	BYOT		5,896,878	$ 4,172,109	$ 198,349	74.4110767%	$ 3,252,104	
Energy Efficient Appliances and Devices								
11790: Marketplace Dehumidifier	MPESDH	16,913	7,449	$ (447,921)	$ 52,368	73.5233682%	$ (290,824)	$ 330
Low Income Energy Efficiency and Weatherization Assistance								
12759: NES Attic Insulation	HWLI	24,779	39,698	$ 957,151	$ (100,990)	73.5233682%	$ 629,478	$ 299
12760: NES Air Sealing	HWLI	11,614	10,965					$ 155
12761: NES Duct Sealing	HWLI	21,157	24,573					$ 227
12762: NES Smart Thermostat	HWLI	12,279	3,741					$ 171
13980: Weatherization HVAC Replacement	WZELEC	506,462	368,433	$ 3,467,853	$ (279,729)	73.5233682%	$ 2,344,017	$ 12,462
14001: Low Income Weatherization Tier 2 Modified	WZELEC	916,880	666,996					$ 27,114
Multi-Family Energy Efficiency								
13858: LF Showerhead MF Direct 1.25 GPM	MFEESH	171,156	88,340	$ 83,633	$ 541	73.5233682%	$ 61,888	$ 4,378
Small Business Energy Saver								
13700: SMTPTH Existing Lighting w_Controls 8760	SMTPTH	365,982	109,380	$ 766,603	$ 48,340	73.5233682%	$ 599,174	$ 4,497
13709: SMTPTH New Lighting w_Controls 8760	SMTPTH	299,925	157,688					$ 3,884
13710: SMTPTH New Lighting w_Controls Daylighting	SMTPTH	798,867	586,052					$ 8,466
13714: SBBDIR C&I Equipment	SMTPTH	58	29					$ 0
13801: SMTPTH Lighting Daylighting	SMTPTH	455,023	333,806					$ 0

For Product Code HCNSTE, Incentive calculated on one measure using combined Avoided Costs and Program costs

Product Codes HWLI and MFEESH include other measures not included here that were previously existing prior to 2020. Thus costs are overstated compared to avoided costs in this view.

20. With the exception of Low-Income Programs or other non-cost-effective programs with similar societal benefits as approved by the Commission, all programs submitted for approval will have an estimated UCT result greater than 1.00. Additionally, for purposes of calculating cost-effectiveness for program approval, consistent with the Commission's Orders in Docket Nos. E-7, Sub 1130 and E-7, Sub 1164, the Company shall use projected avoided capacity and energy benefits specifically calculated for the program, as derived from the underlying resource plan, production cost model, and cost inputs that generated the avoided capacity and avoided energy credits reflected in the most recent Commission-approved Biennial Determination of Avoided Cost Rates for Electric Utility Purchases from Qualifying Facilities as of the date of the filing for the new program approval.

20A. However, for the calculation of the underlying avoided energy credits to be used to derive the program-specific avoided energy benefits, the calculation will be based on the projected EE portfolio hourly shape, rather than the assumed 24x7 100 MW reduction typically used to represent a qualifying facility. For purposes of determining cost-effectiveness, estimated incremental EM&V costs attributable to each program shall be included in program costs. Duke Energy Carolinas will comply, however, with Rule R8- 60(i)(6)(iii), which requires that Duke Energy Carolinas' biennial Integrated Resource Plan, revised as applicable in its annual report, include certain information regarding the measures and programs that it evaluated but rejected.

20B. Moreover, for the Calculation of the underlying avoided capacity benefits, when authorized pursuant to Commission Rule R8-69(c) and unless the Commission determines otherwise in a G.S. 62-133.9 DSM/EE Rider proceeding, the Company shall be permitted to recognize the impact of the Reserve Margin Adjustment Factor used in the determination of the PPI and PRI values for its energy efficiency programs.

The Reserve Margin Adjustment Factor is equivalent to (1 + Reserve Margin) / (Performance Adjustment Factor) and will be applied to the avoided capacity costs of all energy efficiency programs.

The Reserve Margin employed shall be based upon the value reflected in the most recent Commission accepted Integrated Resource Plan proceeding as of December 31 of the year immediately preceding the date of the annual DSM/EE rider filing. The Performance Adjustment Factor employed shall be based upon value reflected in the most recent Commission approved Biennial Avoided Cost proceeding as of December 31 of the year immediately preceding the date of the annual DSM/EE rider filing.

Duke Energy Carolinas

Low Income Weatherization Program (2016–2018) Evaluation Report – Final

April 16, 2021

Table of Contents

Table of Tables

Table of Figures

1. Evaluation Summary

This report presents findings from our impact and process evaluation of the Duke Energy Carolinas (DEC) Low Income Weatherization Program (hereafter referred to as the Weatherization Program or the program), covering the period of April 2016 to December 2018. The impact evaluation results are based on a combination of billing analysis and engineering analysis. Process evaluation results are based on a program materials review, interviews with program staff and participating agencies, and a telephone survey of program participants. In addition, this report includes a limited process evaluation of the new DEC Weatherization Pilot in Durham, North Carolina, based on an in-depth interview with pilot program staff and a program materials and tracking data review.

This report includes a high-level description of the evaluation methodologies as well as results, findings, and recommendations. The associated appendix includes additional detail on the impact methodology and results.

1.1 Program Summary

The Weatherization Program aims to improve the health, safety, and energy efficiency of income-qualified Duke Energy customer households by leveraging existing weatherization programs to provide a comprehensive package of electric conservation measures at no cost to DEC customers. Duke Energy's implementation partners are the program administrator (the North Carolina Community Action Association, or NCCAA); the database administrator (TRC; previously Lockheed Martin); and a network of local implementing agencies that include community action agencies (CAAs), local governments, and other nonprofit organizations that enroll customers and complete weatherization projects. DEC initially designed the program to leverage federally funded state weatherization assistance programs (State WAPs), in which implementing agencies already participate. DEC pays a fixed price per State WAP project completed at qualifying DEC customer's homes, with the requirement that agencies then use the funds to support future weatherization-related activities. In an effort to bypass strict DOE program funding rules and to encourage more participation in South Carolina, DEC introduced a new participation channel in 2018 in which agencies could submit qualifying weatherization projects originally funded from their operating budget or another source.

Weatherization Program participants must live in an individually metered single-family home with a household income less than or equal to 200% of the federal poverty guideline. The Weatherization Program offers two participation tiers for owner-occupied homes, as well as a refrigerator replacement offering to both owners and renters (with landlord approval). Tier I covers eligible projects at homes using less than 7 kWh per square foot annually and provides up to $600 for air sealing and low-cost energy efficiency upgrades like LEDs, domestic water heater tank insulation, low-flow shower heads, faucet aerators, and others. Tier II covers eligible projects at homes using at least 7 kWh per square foot annually and provides up to $4,000 for Tier I measures plus insulation improvements. Tier II projects can qualify for a higher funding cap of $6,000 if they include a qualifying heat pump upgrade or replacement. Refrigerator replacement is available even if the home did not receive any Tier I or Tier II measures. Refrigerator replacement eligibility and incentive levels are dependent on the old refrigerator's size and a two-hour metering test.

1.2 Evaluation Objectives

We established the following objectives for this evaluation:

- Review and update, as necessary, deemed savings estimates through a review of measure assumptions and calculations;

- Verify measure installation and persistence;
- Estimate program energy (kWh) and summer and winter peak demand (kW) savings;
- Determine participants' level of satisfaction with the program and measures received;
- Identify non-energy benefits realized by participants;
- Identify barriers to agency participation in the program and recommend strategies for addressing those barriers;
- Identify program strengths and potential ways that the program can increase average savings per household; and
- Compare the program design, participation levels, and savings potential of the Weatherization Program to early achievements of DEC's Durham Low Income Weatherization Pilot to assess Pilot performance and potential for savings.

To achieve these objectives, we completed a number of data collection and analytic activities:

- Impact evaluation activities included a review of program-tracking data, a deemed savings review, development of in-service rates (ISRs), an engineering analysis, and a consumption analysis.
- Process evaluation activities included a review of program materials; interviews with Duke Energy program staff, implementing agency staff, NCCAA and TRC staff, and Durham Pilot program managers; and a survey of participating customers.

1.3 High Level Findings

During the evaluation period, 1,706 households participated in the Weatherization Program, completing over 2,000 projects. The majority of participants (81%) completed a Tier II project; only 10% of participants completed a Tier I project. In addition, 24% received a replacement refrigerator, either as a stand-alone measure (8%) or in combination with Tier I or Tier II services (15%).

Impact Findings

Based on our impact analysis, we estimate that the projects completed during the evaluation period generate close to 3.2 million kWh of annual energy savings, 539 kW of annual summer coincident demand savings, and 935 kW of annual winter coincident demand savings. Tier II participants account for the largest share to program-level savings (89%) while Tier I participants and refrigerator replacements account for 1.3% and 9.6%, respectively, of total program energy savings.

Table 1 presents annual per-household and program-level net ex post savings for the evaluation period.

Table 1. Summary of Impact Results

Project Type	Number of Participants	Net Annual Savings Per Household			Net Annual Program Savings		
		Energy (kWh)	Summer Coincident Demand (kW)	Winter Coincident Demand (kW)	Energy (kWh)	Summer Coincident Demand (kW)	Winter Coincident Demand (kW)
Tier I	176	241	0.0724	0.0416	42,398	12.7	7.3
Tier II	1,387	2,042	0.3544	0.6438	2,832,531	491.5	892.9
Refrigerator Replacement	404	758	0.0864	0.0864	306,097	34.9	34.9
Total [a]	1,706				3,181,027	539.2	935.2

[a] The total number of unique participants is smaller than the sum of project types since some households complete more than one project.

Based on program-tracking data, almost all Tier I and Tier II participants (96% and 97%, respectively) received air sealing. The vast majority (91%) of Tier II participants also received insulation, and 74% received duct system sealing or insulation—measures not offered to Tier I participants. Larger shares of Tier II participants than Tier I participants received water heating measures, weatherstripping, lighting, and heating system tune-ups. Overall, 24% of participants received a new refrigerator and 19% an HVAC replacement or upgrade. Notably, 8% of participants only received a new refrigerator and 14% only received an HVAC replacement/upgrade.

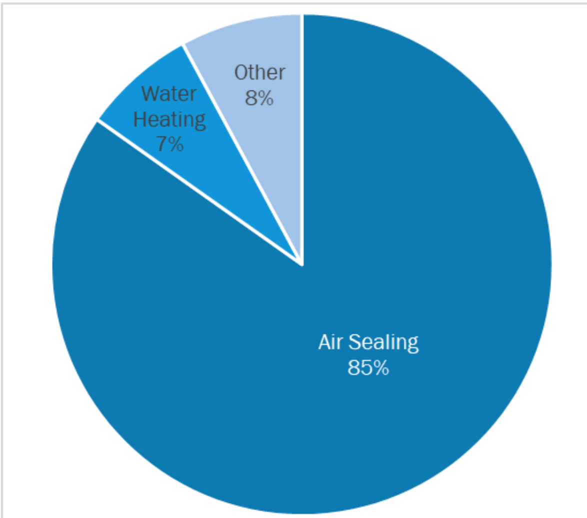
Table 2. Measure Mix

Measure Category	% of Participating Households Receiving Measure Category [a]		
	All Participants (N=1,706)	Tier I Participants (N=176)	Tier II Participants (N=1,146)
Air Sealing	75%	96%	97%
Insulation	61%	n/a	91%
Duct System	50%	n/a	74%
Water Heating	50%	31%	70%
Weatherstripping	43%	35%	59%
Lighting	26%	26%	35%
Heating System Tune-Up	19%	6%	27%
Refrigerator Replacement	24%	19%	17%
HVAC Replacement/Upgrade	19%	1%	7%

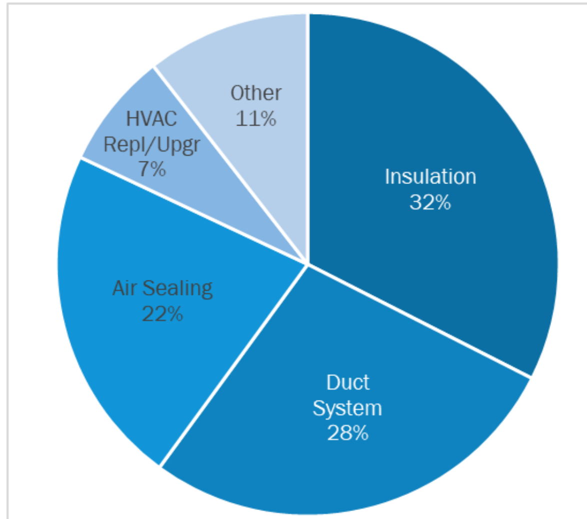
[a] Values are based on program-tracking data and do not incorporate ISRs.

Based on the engineering analysis, Tier I savings during the evaluation period came primarily from air sealing (85%). Another 7% came from water heating measures and 8% came from other Tier I measures (including heating system tune-ups, lighting measures, and weather-stripping). Tier II savings, on the other hand, were dominated by insulation (32%), duct sealing and insulation (28%), and air sealing (22%). HVAC replacements/upgrades accounted for 7% of engineering-based Tier II savings during the evaluation period, while other Tier II measures (including water heating measures, heating system tune-ups, lighting, and weather-stripping) contributed 11% (see Figure 1).

Figure 1. Measure Contribution to Total Tier I and Tier II Energy Savings



Tier I kWh Savings



Tier II kWh Savings

Process Findings

The process evaluation found that the DEC Weatherization Program continues to benefit from previously established relationships, implementation processes, and program-tracking systems. Program and implementation staff reported no major changes to the program since the previous evaluation aside from the new participation channel established in 2018. Participating agencies also reported minimal changes to how they implement and participate in the Weatherization Program, and many reported the DEC funds allow them to complete more weatherization jobs than they would have otherwise.

Key process findings include:

- **Program Participation.** Participation in the Weatherization Program has been increasing steadily since the program began in 2015. Agencies work hard to inform clients about the program through multiple advertising channels (newspaper ads, in-person events, agency websites, etc.) and half of interviewed agencies indicated the number of projects they complete each year is increasing.

- **New Participation Channel.** Prior to 2018, agencies could only submit projects originally funded by the State WAP for reimbursement from Duke Energy. Now, agencies may submit for reimbursement projects they originally funded through their operating budget or another source. This opened the possibility of non-CAA organizations, such as non-profit organizations, to participate in the program and bring Weatherization Program services to their clients. Half of the agencies we interviewed indicated they had used this new participation channel. One agency, a non-profit organization, indicated they used this participation channel exclusively and only performed refrigerator replacements since their organization was not equipped to perform more extensive weatherization on clients' homes.

- **Satisfaction.** The process evaluation showed high satisfaction with the Weatherization Program. Interviewed agency staff often provided unprompted praise for the program implementation team and underscored the importance of the program to their clients. Agencies found the logistical elements of the program—including program organization, communication, and reporting—to be key program strengths. Participants were also highly satisfied with the program overall. A key concern for participants is high energy bills, and survey results suggest the program is helping participants in this respect, with 73% and 58% of respondents reporting lower summer and winter electricity bills, respectively, following participation in the program.

- **Non-Energy Impacts.** In addition to lowering energy bills, the Weatherization Program provides substantial non-energy benefits to participants including improved home comfort in the summer and winter, reduced draftiness, and better lighting. To a lesser extent, survey respondents also reported lower outdoor noise levels and home maintenance costs, improved quality of life, safer homes, and increased water efficiency.

- **South Carolina Policy Barriers.** Despite the new participation channel—introduced in 2018 to encourage participation by South Carolina agencies—barriers to program participation remain high in South Carolina, and no projects were completed in the state during this evaluation period. While the new participation channel has not yet resulted in program participation in the state, program staff continue to conduct outreach and provide additional support to South Carolina agencies and to encourage future program participation.

- **Durham Pilot.** Between October 2018 and December 2019, Duke Energy offered a weatherization pilot in Durham, North Carolina, which served a total of 206 customers. One goal of this pilot was to determine if the current DEC Weatherization Program design and funding model could be improved to expand program services to South Carolina and into the Duke Energy Progress (DEP) service territory. The limited process evaluation of the Durham Pilot found key differences between the pilot and the Weatherization Program in program eligibility, implementation, and measure mix:

  - Not relying on agencies to implement the program made the Durham Pilot implementation smoother and more flexible, and access to customer data allowed Pilot staff to target the program to the customers who needed it most. Since the Durham Pilot was entirely funded by DEC, participants did not need to spend time completing federal or state assistance program applications, which greatly reduced administrative burden on participants.

  - Compared to DEC Weatherization projects in the evaluation period, Durham Pilot projects were more likely to include both weatherization measures and an HVAC upgrade. Additionally, Durham Pilot participants were more likely to receive a refrigerator replacement. Based on the measure mix, we believe that the Durham Pilot has the potential to provide per household savings on par with, or possibly greater than, the savings estimated for the DEC Weatherization Program. Since this evaluation did not include a formal impact assessment, however, more rigorous impact analysis would be required to quantify the savings of the Durham Pilot.

  Overall, pilot staff were highly satisfied with the performance of the pilot and indicated that participants were particularly grateful for program services they may have otherwise waited years to receive. Given the continuing policy barriers in South Carolina, despite the new participation channel, a program design similar to the Durham Pilot could be a good option for bringing weatherization services to customers in South Carolina and/or the DEP service territory.

1.4 Evaluation Recommendations

We have developed the following recommendations based on the results of our evaluation:

- **Consider tracking several additional parameters within the program-tracking system, if feasible. to enhance the accuracy of future deemed savings estimates.** Our deemed savings review (see Appendix B) identified a few parameters that are currently not tracked in program data: (1) pre- and post- blower door results in units of reduced cubic feet per minute (CFM); (2) presence or type of cooling at participating homes; (3) water heating fuel of participating homes; and (4) the installed location (e.g., bathroom, kitchen) for each low-flow faucet aerator. Some of this information is currently collected in the participant survey but having it in the program-tracking data for the population of participants would enhance the accuracy of future deemed savings estimates. We therefore recommend asking weatherization agencies to enter this information into the program's tracking system, if available.

- **Consider changing the reimbursement structure or increase reimbursement amounts.** The current Tier II incentive structure provides up to $6,000 for Tier II projects. TRC and NCCAA indicated that agencies may struggle covering the cost of HVAC replacements with the current reimbursement amount, which has not increased since the program began in 2015. In addition, this reimbursement cap may also prevent participants from receiving weatherization services in addition to HVAC replacements/upgrades: Based on program-tracking data, only 6% of Tier II projects include both HVAC replacements/upgrades and other Tier II measures, compared to 34% in the Durham Pilot, which provided higher incentives. Agencies may be able to provide additional energy saving measures in Tier II homes, leading to deeper savings, if the overall Tier II incentive amount was increased.

- **Increase support to agencies in program marketing and outreach.** Agencies noted that communication and organization of the program were key strengths and frequently provided unprompted praise for staff at Duke Energy and NCCAA. One area agency identified for potential additional Duke assistance was marketing and outreach to help increase customer awareness of the program. This could be through information about the program on customer bills or on Duke Energy's website, or by developing testimonials from past program participants with examples of bill savings and other benefits—such as non-energy impacts (NEIs) reported by many surveyed participants—derived from their weatherization projects.

- **Explore options to increase the uptake of comprehensive weatherization projects though the new participation channel.** The new participation channel allows non-profit and other organizations to provide program services to customers who may not have been able to receive them otherwise. One objective of this channel was to overcome barriers to participation in South Carolina, as State policies prevent CAAs from participating in the program. Based on program-tracking data through April 2020, however, the new channel has not been successful in encouraging South Carolina organizations to participate in the program. In addition, information from our agency interviews suggest that some non-CAAs may not be equipped to facilitate the implementation of weatherization projects and thus limit their activity to equipment replacement. The program should continue to explore ways to promote participation in South Carolina, by identifying suitable partner organizations (with prior weatherization expertise) and/or providing non-CAA organization with additional support in implementing weatherization services.

- **Consider expanding the Durham Pilot to include the South Carolina service territory.** Given the substantial policy barriers that continue to block participation in South Carolina, one way to provide weatherization upgrades to South Carolina customers is to introduce a program design similar to the Durham Pilot. Based on our review of project types and measures installed through the pilot, the savings potential for a program design similar to the pilot appears to be on par with, or even greater than, savings observed for the Weatherization Program. In addition, pilot participants and staff were very satisfied with the experience, and there were very few implementation challenges. If policy barriers persist, or the new participation channel fails to increase participation in South Carolina, this may be an option to expand services in the state.

2. Program Description

This section describes key elements of program design, implementation, and performance. The evaluation period addressed in this report is April 1, 2016 through December 31, 2018. This is the second evaluation of the DEC Weatherization Program; the first evaluation covered the period of February 1, 2015 through March 31, 2016.

2.1 Program Design

The Weatherization Program aims to improve the health, safety, and energy efficiency of income-qualified Duke Energy customer households. The program does so by providing customers with comprehensive home weatherization services and repairs that reduce electric energy consumption. The program distributes funding through a network of CAAs and other similar organizations (collectively referred to as "agencies"), which serve Duke Energy's residential electric customers. The program reimburses agencies for work completed at eligible homes.

The DEC Weatherization Program offers two tiers of funding for weatherization upgrades to owner-occupied homes, as well as refrigerator replacements to both homeowners and renters (with landlord approval). Tier I covers eligible projects at homes using less than 7 kWh per square foot annually and provides up to $600 for air sealing and low-cost energy efficiency upgrades like LEDs, domestic water heater tank insulation, low-flow shower heads, faucet aerators, and others. Tier II covers eligible projects at homes using at least 7 kWh per square foot annually and provides up to $4,000 for Tier I measures plus insulation improvements. Tier II projects can qualify for a higher funding cap of $6,000 if they include a qualifying heat pump upgrade or a heat pump system replacement. Refrigerator replacement is available even if the home did not receive any Tier I or Tier II measures. Refrigerator replacement eligibility and incentive levels are dependent on the old refrigerator's size and a two-hour metering test.

In 2018, the program introduced a new participation channel, which broadened the type of organizations that can participate in the program and the funding sources for projects. Prior to this change, only CAAs were eligible to participate, and they could only submit qualifying DOE/State WAP projects for reimbursement. Now, other organizations, such as non-profits, are also eligible to submit projects, and the projects do not have to be DOE/State WAP projects but could be funded from the organization's operating budget or another funding source. DEC made this change to offer an alternative participation channel that can work within the strict DOE guidelines in South Carolina.

2.2 Program Implementation

During the evaluation period, DEC contracted with NCCAA and their subcontractor TRC to implement the Weatherization Program. In total, 15 local agencies participated in the program—including CAAs, local and regional government offices, and other non-profit organizations. These agencies also implement a variety of poverty relief activities, including the State WAP. NCCAA and TRC oversee agency submittals, invoicing, and program-tracking; train agencies on the program and requirements; support participating agencies in making the most of program funding; and conduct outreach to potential new agencies.

2.3 Program Performance

During the evaluation period the program served 1,706 unique households. The majority of participants (81%) completed a Tier II project. Only 10% of participants completed a Tier I project and 24% received a replacement refrigerator. Based on the impact analysis, the program achieved average annual savings of 241 kWh per Tier I participant and 2,042 kWh per Tier II participant. Refrigerator recipients saved an additional 758 kWh per year. Table 3 summarizes program participation as well as per household energy and demand savings, by project type.

Table 3. Annual Per Household Savings

Project Type	Number of Participants	Net Annual Savings Per Household		
		Energy (kWh)	Summer Coincident Demand (kW)	Winter Coincident Demand (kW)
Tier I	176	241	0.0724	0.0416
Tier II	1,387	2,042	0.3544	0.6438
Refrigerator Replacement	404	758	0.0864	0.0864
Total [a]	1,706			

[a] The total number of participants is greater than the sum of project types since some households complete more than one project.

3. Overview of Evaluation Activities

3.1 Program Staff Interviews

We conducted in-depth interviews with Duke Energy program staff (supporting both the DEC Weatherization program and Duke's Durham Weatherization Pilot) and the DEC Weatherization Program administrator. The main purpose of each interview was to gain insight into program implementation processes and to develop research objectives for the evaluation. In particular, the interviews allowed us to identify consistencies and inconsistencies across the program, processes that are working well, and processes that could be improved moving forward.

3.1.1 Duke Energy Program Staff Interview

Opinion Dynamics conducted an in-depth interview with the DEC Weatherization Program manager in November 2019. The purpose of the interview was to gauge changes in program design and implementation since the last evaluation, and DEC's current expectations for the Weatherization Program, including the program's goals, successes, and challenges over the evaluation period. The interview also covered changes to the program's measure mix, agency participation, and barriers to program participation.

3.1.2 Program Administrator Staff Interview

We conducted one in-depth interview with NCCAA (the program administrator) and its subcontractor TRC. TRC maintains the program-tracking database and serves as the day-to-day contact for agencies, providing them with training and implementation support. This interview explored program-wide coordination, delivery, and enrollment processes. It provided insight into the program's reimbursement process and gauged the administrators' satisfaction with program elements. The interview also helped identify key similarities and differences across implementing agencies and any barriers to agency participation.

3.1.3 Duke Energy Durham Weatherization Pilot Staff Interview

As part of our limited process evaluation of the DEC Weatherization Pilot program in Durham, NC, we conducted one interview with the DEC Weatherization Pilot program manager and community outreach manager. The objective of the interview was to document the program design of the pilot, identify early implementation successes and challenges, and enable comparisons to the Weatherization Program.

3.2 Implementing Agency Staff Interviews

Fifteen agencies, all located in North Carolina, submitted projects to the DEC Weatherization Program during the evaluation period. These agencies each received funding for an average of 136 projects (range: 1 to 746 projects per agency). We conducted semi-structured in-depth interviews with a sample of six of the 15 participating agencies selected to represent varied types of organizations and levels of program participation. We explored changes to the program since the last evaluation, feedback on implementation processes and funding structure, as well as agencies' satisfaction with the program and views about successes and barriers to participation.

We completed these interviews in June and July 2020. Responding agencies completed 82% of the 2016–2018 projects. Table 4 summarizes the sample and outcome.

Table 4. Agency Interview Sample

Participating Agencies	Agencies in Sample	Completed Interviews	Cooperation Rate
15	6	6	100%

3.3 Program Materials Review

Opinion Dynamics reviewed the program's procedures manual and the program-tracking database. We reviewed changes made to the manual in October 2017 and October 2018, relative to the program's original 2015 manual. We found the manual sections relating to program operations, customer eligibility guidelines, and measure installation guidelines to be complete and of high quality.

3.4 Participant Survey

Opinion Dynamics implemented a computer-assisted telephone interviewing (CATI) survey in June and July 2020. The survey gathered data to verify participation in the program; develop measure-level estimates of installation, persistence, and in-service rates (ISRs); and support our process evaluation.

The survey sample design and sample size were based on customers who participated during the evaluation period. Of the 1,706 participants in the database, we drew a random sample of 620 valid telephone numbers. We used this sample to complete 102 participant telephone interviews. The average length of the interviews was approximately 15 minutes; the response rate was 18%.

We calculated the response rate using the standards and formulas set forth by the American Association for Public Opinion Research (AAPOR). We chose to use AAPOR Response Rate 3 (RR3), which includes an estimate of eligibility for sample units that we were unable to reach. We present the formulas used to calculate RR3 and the definition of each variable used in the formulas below.

$$RR3 = I \,/\, ((I + R + NC + O) + (e * U))$$

$$e = (I + R + NC) \,/\, (I + R + NC + E)$$

Table 5. Survey Disposition Category Key

Disposition Code	Disposition Category	Number of Customers
Complete interview	I	102
Eligible incomplete interview	N	7
Survey-ineligible household	X1	1
Not a household	X2	41
Household with undetermined survey eligibility	U1	331
Undetermined if household	U2	138
Estimated proportion of cases of unknown survey eligibility that are eligible	Incidence/e1	99%
Estimated proportion of cases of unknown household eligibility that are eligible	e2	91%

3.5 Consumption Analysis

Opinion Dynamics conducted a consumption analysis to determine the net energy savings attributable to the DEC Weatherization program during the evaluation period. We used separate linear fixed effects regression (LFER) models to estimate the overall net ex post program savings for Tier I and Tier II participants. The fixed effect in our models is the customer, which allows us to control for all household factors that do not vary over time. The consumption analysis used customers who participated from April 2016 through December 2018 as the treatment group and those who participated from January 2019 through March 2020 as the comparison group.

While we conducted consumption analysis for both Tier I and Tier II participants, this evaluation only relies on consumption analysis results for Tier II participants. For Tier I participants, we used a combination of engineering analysis results and impact results from the prior evaluation to assess program savings. We were not able to use Tier I consumption analysis results because they were not statistically significant.[1]

Section 4.1.1 provides a summary of the consumption analysis approach; Appendix A contains the detailed methodology description.

3.6 Engineering Analysis

The engineering analysis served several purposes: (1) to develop demand-to-energy savings ratios for Tier I and Tier II projects; (2) to develop ex post energy and demand savings for refrigerator replacements; (3) to understand the relative contribution of different measures to Tier I and Tier II savings; and (4) to develop inputs into Tier I energy savings.

The engineering analysis consisted of two components:

- Measure verification and development of measure-specific ISRs, and
- A deemed savings review of all program measures.

We verified measures and developed measure-specific ISRs based on responses to the participant survey. As part of the deemed savings review, we reviewed measure-level savings and revised input assumptions, as needed, to be consistent with standard industry practice and other Duke Energy Carolinas program assumptions and to align with applicable versions of reviewed TRMs (e.g., Illinois, Indiana, Mid-Atlantic). We also integrated data gathered through the participant survey, for example, the share of participating households with electric domestic water heating.

Appendix B provides more detail on the methods and input assumptions used in the deemed savings review and engineering analysis.

[1] Two factors likely contributed to the inability of the model to detect statistically significant savings: (1) the small number of Tier I participants and (2) the small expected savings of Tier I measures, relative to baseline household electricity usage.

4. Gross Impact Evaluation

4.1 Methodology

The gross impact analysis for the 2016–2018 DEC Weatherization Program included a consumption analysis as well as an engineering analysis. The consumption analysis determined the net evaluated energy (kWh) impacts for Tier II. The engineering analysis supplemented the consumption analysis by:

- Providing a ratio of demand savings (kW) to energy savings (kWh), which is then applied to the consumption analysis net energy savings to calculate net evaluated demand savings;
- Developing ex post energy and demand savings for refrigerator replacements;
- Providing insight into the relative contribution of different measures to Tier I and Tier II savings; and
- Developing inputs into Tier I energy savings.

While we conducted consumption analysis for both Tier I and Tier II participants, this evaluation only relies on consumption analysis results for Tier II participants. For Tier I participants, we used a combination of engineering analysis results and impact results from the prior evaluation to assess program savings. We were not able to use Tier I consumption analysis results because they were not statistically significant.

4.1.1 Consumption Analysis

Opinion Dynamics conducted a consumption analysis to determine the overall evaluated program savings from Tier I and Tier II projects. Consumption analysis is a statistical analysis of energy consumption recorded in utility billing records. Because billing records reflect whole-building energy use, the method is well suited for studying the combined impact of the Weatherization Program's mix of energy-efficiency measures per home. Total program savings from Tier I and Tier II projects are estimated by examining variation among participants' monthly electricity consumption pre- and post-program period, relative to the variation in a comparison group's electricity consumption during those times.

Data Cleaning and Preparation

Prior to specifying the models, we performed thorough cleaning of the consumption and participation data. We checked data for gaps and inconsistencies as well as for sufficiency. Among other checks, we ensured that the participants retained in the analysis had sufficient pre- and post-participation consumption data, participation dates were accurate, and the consumption data was free of outliers, such as bill periods with unreasonably small or unreasonably large consumption.

Comparison Group Selection

Incorporating a comparison group into the consumption analysis allows evaluators to control for changes in economic conditions and other non-program factors that might affect energy use during the study period. Like many other energy efficiency programs, the Weatherization Program was not designed as an experiment. As such, we leveraged a quasi-experimental approach to the evaluation by developing a comparison group of participants. There are multiple approaches to selecting a comparison group, including the use of future participants, past participants, or similar non-participants. When possible, using future program participants as a comparison group is a preferred method. The use of future participants—who are similar to the evaluated participants—as the comparison group allows to effectively control for self-selection biases. We relied on a comparison group of customers who participated in the Weatherization Program between January 1, 2019 and March 31, 2020.

We performed equivalency checks to assess the similarity of treatment and comparison groups in terms of energy consumption, weather, and housing characteristics in order to validate that the comparison group can serve as a valid baseline. We performed equivalency analysis by tier as well as among Tier II HVAC and weatherization customers separately to ensure balanced consumption among key Tier II subpopulations. Analysis of weather patterns indicates nearly perfect equivalency between the treatment and comparison group customers. Treatment and comparison group participants are also similar across key housing characteristics, such as home vintage, size, and type. As for the consumption data, Tier I treatment participants are a little more likely to have higher heating load than comparison group participants, while Tier II treatment participants are more likely to have a slightly higher cooling load. Both factors are controlled for in the model and are therefore not concerning from a potential bias perspective.

Controlling for Participation in Other Programs

Some customers participated in other Duke Energy programs after participating in the Weatherization Program. Including those customers in the consumption analysis would result in double counting of savings from other programs and artificially inflating the estimate of savings from the Weatherization Program. We dropped those customers from the analysis so that we can get the most accurate estimate of the effects of the Weatherization Program. As part of the analysis, we identified and dropped Weatherization Program participants who cross-participated in the Appliance Recycling Program,[2] the Residential Energy Efficient Products & Services Program, the Smart $avers Residential Program, and the Residential Energy Assessments Program.[3] Overall, we dropped 51% of Tier I and 53% of Tier II participants.

Table 6 below summarizes final participant counts used to develop consumption analysis models.

Table 6. Accounts Included in the Consumption Analysis Model

Program Component	Treatment Group	Comparison Group	Total
Tier I	55	65	120
Tier II	469	469	938
Tier II Weatherization Measures	*438*	*267*	*705*
HVAC Replacement/Upgrade	*40*	*228*	*268*

[2] The Appliance Recycling Program was discontinued at the end of 2015 but residual participation continued through June 2016.

[3] Notably, we only dropped cross-participants who participated in other programs during the 12-month post-period. We retained participants who participated more than a year after participating in the Weatherization Program.

Modeling

We used a Linear Fixed Effects Regression (LFER) model for this analysis. Each tier was analyzed in a separate regression model because the tiers are expected to provide different levels of per-home savings due to differing measures, features, and customer eligibility criteria.[4]

LFER models for each tier included a series of explanatory variables designed to improve our estimate of savings relative to the baseline (i.e., what participants' consumption might have been during the post-program period, had they not received program services). The relationship of interest is between the dependent variable (monthly energy use) and a "dummy" variable that indicates whether an individual participated in the Weatherization Program. Based upon Duke Energy's requests to isolate savings from refrigerator replacements separately from the package of measures provided for each tier, we included an indicator variable to capture the effect of a refrigerator replacement in addition to the tier-related measures, which removes the effect of the refrigerator from the effects of the rest of the measures installed. In addition to excluding savings from the refrigerator measure, Duke Energy was interested in understanding savings from the new HVAC replacement/upgrade measure within the Tier II program component. To accommodate that request, we estimated a Tier II model that included an indicator variable for HVAC replacement/upgrade so that we could separate the impact of this measure from the impact of other Tier II measures.

Consumption analyses typically include a series of additional variables to explain non-program variation in monthly energy use pre- and post-participation. Following best practice, we used a fixed-effects model, which captures the effect of household-specific characteristics that do not vary over time (as customer-specific intercepts).[5] We also included weather (heating degree days and cooling degree days) in the model. Additionally, we included monthly dummies to further control for seasonal differences in energy consumption overall. After controlling for all of these outside influences, the final model results for the DEC Weatherization Program reflect savings associated with installed measures and any behavioral changes from energy efficiency knowledge gained during their participation process.

Appendix A contains a detailed discussion of the consumption analysis methodology, including data cleaning steps, the equivalency assessment for the comparison group (including cross-participation), and the final model specification and outputs.

4.1.2 Engineering Analysis

As part of the impact evaluation, Opinion Dynamics conducted an engineering analysis for each Weatherization Program measure installed during the evaluation period. The engineering analysis consisted of two distinct steps: (1) measure verification and development of measure specific ISRs; and (2) a deemed savings review of all program measures. Both are described below.

[4] Note that participants who only received a refrigerator replacement were excluded from the consumption analysis.

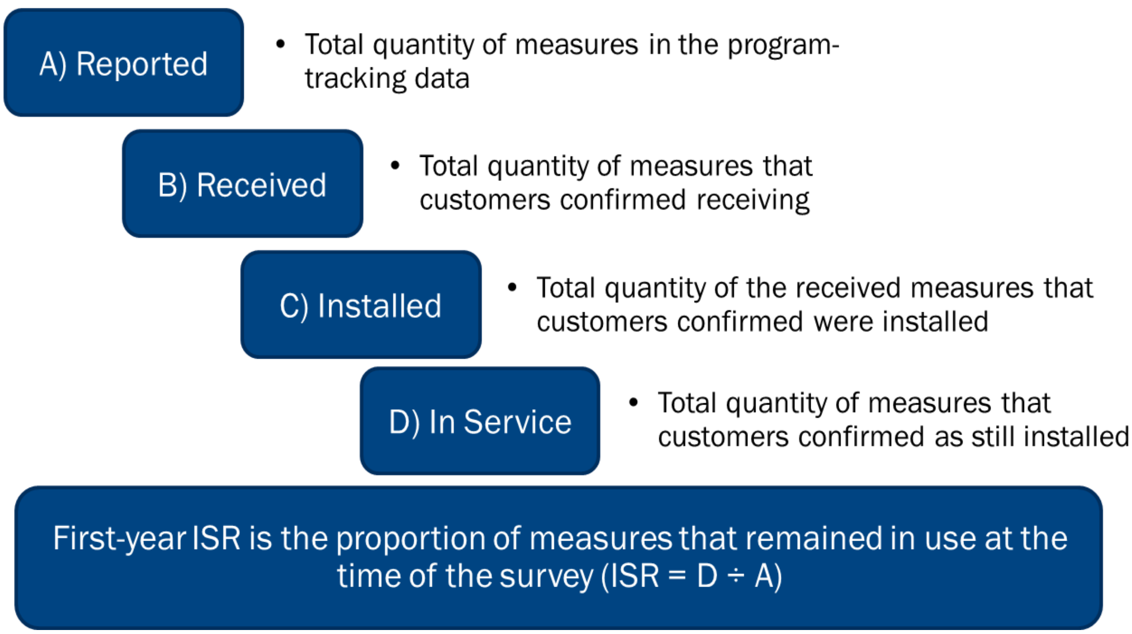
[5] This includes factors such as building square footage, appliance stock, habitual behaviors and preferences, household size, and others.

Measure Verification

The participant survey included questions designed to verify that participants received and installed program measures and that those measures remained in place and operational. The measure-level ISRs represent the share of measures in the program tracking data that was still in service at the time of the survey, based on 102 completed telephone interviews. Our engineering analysis applied the ISRs to ex post deemed savings to develop total engineering savings.

Figure 2 outlines the method for deriving the ISR for each measure. During the survey, we asked participants to confirm that they received the quantity of measures recorded in Duke Energy's program tracking data and, when necessary, to provide the correct quantity. We also asked participants to confirm the quantity of measures that were installed and remained in service at the time of the survey.

Figure 2. In-Service Rate Components



Based on the survey responses, we calculated the verification, installation, and persistence rates, as well as the resulting ISR–using the equations shown below–for each participant and each measure they received. We then developed averages of all four rates for each measure group.

1) $Verification\ Rate = \frac{(B) Received\ Quantity}{(A) Reported\ Quantity}$

2) $Installation\ Rate = \frac{(C) Installed\ Quantity}{(B) Received\ Quantity}$

3) $Persistence\ Rate = \frac{(D) In\ Service\ Quantity}{(C) Installed\ Quantity}$

4) $First\ Year\ InService\ Rate = \frac{(D) In\ Service\ Measures}{(A) Reported\ Measures}$

In previous evaluations of the DEC Weatherization Program and other DEC direct-install programs, Opinion Dynamics found that participants had difficulty verifying certain measures, and that the nature of certain measures made verification of installation and persistence unnecessary. As such, we made the following assumptions:

- **Water heater tank wrap, pipe wrap, and duct sealing/insulation:** For these measures, we assumed 100% for all four rates as participants are often not aware of the installation of these measures, but once installed, they are unlikely to be removed.
- **Door weather-stripping, refrigerator replacement, heating system upgrade, air sealing, and insulation:** We asked participants to verify receipt of these measures but assumed that agency staff installed 100% of the verified items. We also assume that 100% of installed air sealing and insulation remained installed as they are difficult to remove.

Ex Post Deemed Savings

We used several resources and assumptions to conduct our deemed savings review, including previous DEC low income program evaluations, relevant TRMs (specifically IL, IN, and Mid-Atlantic) and other secondary sources (such as ASHRAE Fundamentals and the US EPA air source heat pump calculator) to examine algorithms and assumptions. Where possible, we used DEC-specific assumptions to estimate measure-specific deemed savings including participant survey data, program-tracking data, and supplemental refrigerator test data. For more information on the algorithms and inputs that our engineering team used to develop deemed savings estimates for each measure, see Appendix B.

Total Program Gross Savings

We developed total program gross savings, by tier, by applying the measure-specific ISRs to the ex post deemed values. We then multiplied the adjusted deemed savings by the measure quantity provided in the program tracking database to arrive at total program savings. Where savings for certain measures rely on electric heating equipment or the presence of cooling equipment, our engineering team developed fuel-specific deemed values and applied them based on the HVAC equipment specified within the program tracking database. Since the database does not provide water heating fuel type, however, we developed weighted savings for water conservation measures based on participant survey responses, which indicated that 78% of participating homes have electric water heating.

We then estimated per household savings for each tier by dividing total tier savings by the number of households participating in that tier.

4.1.3 Tier I Savings

Because the consumption analysis did not generate statistically significant results for Tier I participants, we developed per household Tier I savings using a combination of engineering analysis results and results from the prior evaluation. Specifically, the analysis consisted of the following steps:

- **Step 1:** Develop a ratio of per household Tier I savings based on (1) engineering estimates from this evaluation and (2) normalized engineering estimates from the prior evaluation; and
- **Step 2:** Apply the Tier I savings ratio from Step 1 to Tier I consumption analysis results from the prior evaluation.

The goal of this analysis was to develop a measure of Tier I activity during this evaluation period relative to Tier I activity during the last evaluation period that can then be applied to Tier I consumption analysis results from the prior evaluation.[6] The following subsections provide more detail on the two steps.

Ratio of Tier I Engineering-based Savings

We developed the Tier I savings ratio using the following equation:

Tier I Savings Ratio = *Per HH Tier I Savings*$_{2016\text{-}18}$ */ Normalized per HH Tier I Savings*$_{2015\text{-}16}$

= *1,014 kWh / 1,103 kWh*

= *0.92*

The numerator in this equation (1,014 kWh) is the per household Tier I savings as estimated in the engineering analysis for this evaluation (see Section 4.1.2).

The denominator (1,103 kWh) is estimated by multiplying, for each Tier I measure, the 2015–16 ISR-adjusted quantity by the 2016–18 average Tier I savings value. We "normalized" the 2015–16 Tier I engineering analysis results with deemed savings values from this evaluation to isolate changes in program activity (i.e., changes in the measure mix and the average quantity of measures received by each Tier I participant) between the two evaluation periods. This normalization step was important because updates to deemed savings assumptions resulted in changes to deemed savings values between the two evaluations, in particular for air sealing, the dominant Tier I measure. These changes were made, in part, to develop more consistent assumptions between various Duke program evaluations (as requested by regulatory staff) and are not necessarily reflective of changes in the operation or outcomes of the Weatherization Program.

Final Tier I Savings

We estimated the final per household Tier I savings for the 2016–18 evaluation period as follows:

Final Per HH 2016–18 Tier I Savings = *Tier I Savings Ratio * 2015–16 Tier I Savings*$_{\text{Consumption Analysis}}$

= *0.92 * 262 kWh*

= *241 kWh*

The final Tier I per household savings thus leverage the Tier I consumption analysis results from the prior evaluation (262 kWh) but adjust those results by the change in Tier I activity (on a per household basis) between the two evaluation periods (92%).

[6] We selected this approach since the previous evaluation of this program found that engineering analysis results alone do not provide a good proxy for the consumption analysis. However, engineering analysis results from this evaluation, relative to those from the prior evaluation, provide a good indication of changes in program activity that can be used to adjust the consumption analysis results from the prior evaluation.

4.2 Results

4.2.1 Consumption Analysis

This section provides per-participant consumption analysis results. Appendix A contains the complete results of the models. Table 7 summarizes the results of the consumption analysis models for Tier I and Tier II. The variable “Post” represents the main effect of the treatment, i.e., the change in average daily consumption (ADC) attributable to participation in the DEC Weatherization Program, controlling for whether or not the participant had also received a refrigerator replacement and/or an HVAC replacement/upgrade (applicable to Tier II only). Local weather (expressed as Cooling Degree Days, CDD, and Heating Degree Days, HDD) also significantly impacted consumption.[7]

As can be seen in the table, the participation coefficient for Tier I is not statistically significant, indicating that the model did not establish a statistically significant relationship between participation in the program and energy consumption. For Tier II, all program-related coefficients are statistically significant and negative, indicating a negative relationship between participation and energy consumption, i.e., the presence of savings.

Table 7. Results of Tier I and Tier II Consumption Analysis Models

Variable	Tier 1 Coefficients	Tier 2 Coefficients
Post (Participation Date)	1.071	-5.685***
Refrigerator Replacement Indicator	1.592	-7.262***
HVAC Improvements	--	-4.682**
CDD (Cooling Degree Days)	0.024	0.031***
HDD (Heating Degree Days)	0.008**	0.017***
Constant (Average Intercept)	16.784***	31.924***
Observations (Number of customer bills)	4,816	38,325
Adjusted R-squared	0.527	0.677

* $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table 8 shows the estimated annual per-home savings for the program. As noted above, the results in the Tier I and Tier II rows reflect the effect of the Weatherization Program alone (any changes in energy use due to other programs are not included) and exclude impacts of the program refrigerator installations. For Tier II, the table isolates estimated savings for Tier II weatherization measures and HVAC replacement/upgrades, respectively.[8] It should be noted that the estimates of percent savings per home are based on the *modeled*

[7] The coefficients for the monthly dummies are presented in Appendix A.

[8] The category “Tier II weatherization measures” includes all Tier II measures other than HVAC Replacement/Upgrade, i.e., it includes measures such as lighting and water heating measures.

baseline usage, including the pre-period usage of both treatment and control group participants, controlling for weather. As such, Table 8 presents a single baseline usage estimate for overall Tier II savings as well as savings for Tier II weatherization measures and the HVAC replacement/upgrade measure.

The savings estimate for Tier I participants is not statistically significant at 90% confidence, indicating that the model could not detect a savings signal. The small sample size relative to the variability in the consumption data as well as the nature and depth of Tier I improvements (smaller expected savings) are likely the key drivers of the model performance. Savings for Tier II participants, on the other hand, are large and statistically significant. Tier II participants saved an average of 2,042 kWh per year, which represents 11.3% of their baseline usage. Savings from Tier II weatherization measures are 2,075 kWh per year, while savings from HVAC replacements/upgrades are 1,709 kWh per year.

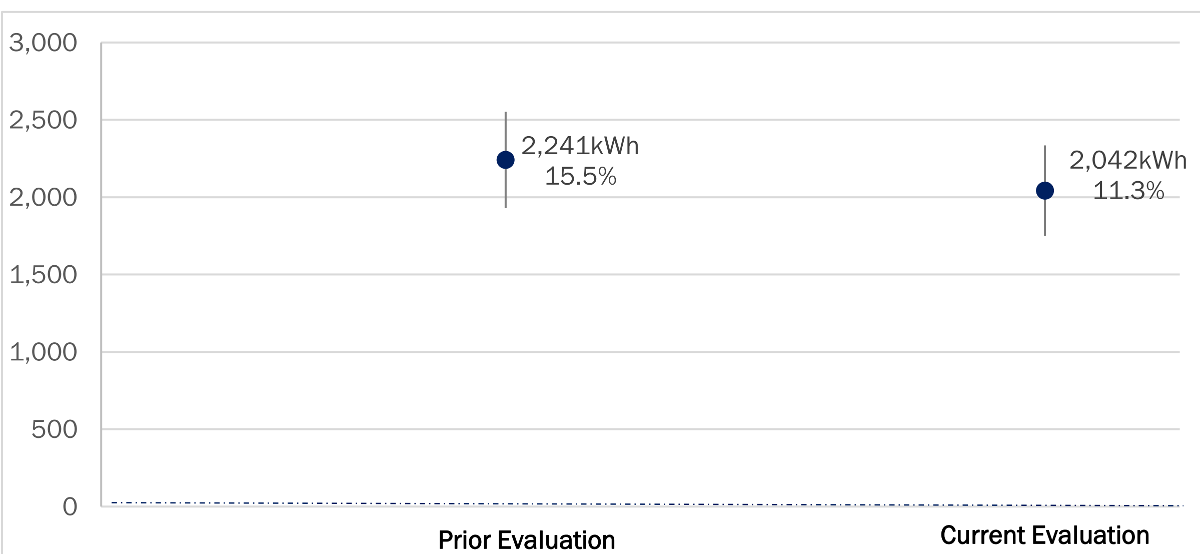
Table 8. Annual Per-Participant Energy Savings from Consumption Analysis

Program Component	Modeled Treatment Participants	Per-Participant Baseline Energy Use (kWh/yr)	Ex Post Annual Savings per Participant (kWh)	Average Annual Savings per Participant (% of Baseline Use)	
			kWh Savings	90% Confidence Interval	
Tier I	55	10,198	-391[a]	-1,107 to 325	-3.8%
Tier II	469	18,087	2,042	1,750 to 2,334	11.3%
Tier II Weatherization Measures	*438*	*18,087*	*2,075*	*1,767 to 2,383*	*11.5%*
HVAC Replacement/Upgrade	*40*	*18,087*	*1,709*	*472 to 2,945*	*9.5%*

[a] Savings for Tier I participants are not statistically significant at 90% confidence.

Compared to the prior evaluation, our Tier II results represent a small, but statistically not significant reduction in annual per household savings. Figure 3 compares the Tier II results from the two evaluations. As can be seen in the figure, the error bounds around the two savings estimates overlap, indicating that the difference between the two estimates is not statistically significant.

Figure 3. Comparison of Tier II Savings to Prior Evaluation



4.2.2 Engineering Analysis

This section provides the results of the engineering analysis, including ISRs and ex post deemed energy and demand savings estimates for each measure offered by the Weatherization Program. In addition, this section summarizes total program and per household savings estimates for the 2016–2018 evaluation period, by project type; provides insight into the contribution of various measures to Tier I and Tier I savings; and presents the Tier I and Tier II demand-to-energy ratios (used to develop Tier I and Tier II demand savings).

Measure Verification Results

Our measure verification analysis showed high ISRs for all measures, as shown in Table 9. DEC Weatherization participants reported that 100% of LEDs, 93% of door weather-stripping, and 85% of efficient showerheads remained in service at the time of the survey. Additionally, while 22% of participants did not recall receiving faucet aerators, 96% of those that did recall having them installed reported that they were still installed at the time of the survey.

Table 9. First Year Measure In-Service Rates

Measure Category	Verification Rate	Installation Rate	Persistence Rate	ISR[a]
LEDs	100%	100%	100%	100%
Faucet Aerators	78%	100%	96%	74%
Showerheads	94%	100%	90%	85%
Door Weather-stripping	99%	Not Asked	91%	93%
Air Sealing	96%	Not Asked	Not Asked	96%
Insulation	98%	Not Asked	Not Asked	98%
Refrigerator	95%	Not Asked	100%	95%
Heating System	100%	Not Asked	100%	100%
Pipe Insulation*				100%
Water Heater Insulation Wrap*				100%
Duct Sealing/Insulation*				100%
CFLs**				84%
Water Heater Temp Adjustment**				100%
Heating System Tune-Up**				90%

[a] Note that each rate is developed as the average of respondent-level rates. As such, the ISR may not equal the product of the three other rates.

* Not verified through the participant survey and assumed 100% ISR

** ISR based on 2015 DEC Weatherization participant survey

Ex Post Deemed Savings Results

Table 10 provides the estimated gross per-unit energy and demand savings for all measures installed through the DEC Weatherization Program. As described in Section 4.1.2, we based the measure-level savings on secondary research and applied Weatherization Program-specific assumptions on household characteristics, where applicable.

Table 10. Ex-Post Per-Unit Deemed Savings Estimates

Measure	Tier	Per-Unit Energy Savings (kWh)	Per-Unit Summer peak demand (kW)	Per-Unit Winter peak demand (kW)
Water Heating				
DWH Pipe Insulation (10' sections)	Tier I	142	0.016	0.016
DWH Tank Insulation	Tier I	82	0.009	0.009
Water Heater Temp Adjustment	Tier I	59	0.007	0.007
Low-Flow Showerhead	Tier I	118	0.009	0.017
Low-Flow Aerator	Tier I	74	0.005	0.010
Lighting				
13W CFL	Tier I	16	0.002	0.001
18W CFL	Tier I	35	0.005	0.003
5W Generic LED	Tier I	20	0.003	0.001
5W Specialty LED	Tier I	20	0.003	0.001
9W LED	Tier I	34	0.005	0.002
Air Sealing and Weather Stripping				
Air Sealing (per home)*	Tier I	896	0.310	0.150
Door Weather Stripping (per door)*	Tier I	28	0.010	0.005
Insulation				
Attic Insulation - Cellulose, Blown - R-30*	Tier II	1.0	0.0001	0.0004
Attic Insulation - Cellulose, Blown - R-38*	Tier II	1.1	0.0001	0.0004
Attic Insulation - Fiberglass, Blown - R-30*	Tier II	1.0	0.0001	0.0004
Attic Insulation - Fiberglass, Blown - R-38*	Tier II	1.1	0.0001	0.0004
Belly Fiberglass Loose*	Tier II	0.9	0.0001	0.0003
Floor Insulation - Fiberglass, Batts - R-19*	Tier II	0.9	0.0001	0.0004
Wall Insulation - Fiberglass, Blown - R-13*	Tier II	0.8	0.0001	0.0003
Wall Insulation - Cellulose, Blown - R-13*	Tier II	0.8	0.0001	0.0003
Knee Wall Insulation*	Tier II	0.9	0.0001	0.0004
Manufactured Home Roof Cavity*	Tier II	0.9	0.0001	0.0004
Heating System				
Heating System Tune-up (per system)	Tier I	488	0.023	0.088
Duct Insulation (per system)*	Tier II	261	0.042	0.095
Duct Sealing (per system)*	Tier II	1,316	0.210	0.479
HVAC Upgrade/Replacement				
Heat Pump Upgrade (per heat pump)	Tier II	834	0.096	0.313
Heat Pump Replacement (per heat pump)	Tier II	1,438	0.168	0.541
Refrigerator				
ENERGY STAR® Refrigerator (15 cu. ft.)	Tier I	936	0.107	0.107
ENERGY STAR® Refrigerator (18 cu. ft.)	Tier I	692	0.079	0.079
ENERGY STAR® Refrigerator (21 cu. ft.)	Tier I	835	0.095	0.095

* Weighted based on mix of 2016–18 participants with different heating fuel and cooling equipment.

Total Program and Per-Household Savings

We calculated total program savings for the evaluation period by applying the ISRs shown in Table 9 to the per-unit estimates shown in Table 10. We then multiplied these ISR-adjusted per-unit estimates by the respective measure quantities in the program tracking database.

Table 11 summarizes total gross program energy and demand savings, by measure, for the 2016–2018 evaluation period. It also shows average measure quantity per participating household.

Table 11. Engineering Analysis Total Gross Savings by Measure

Measure	Unit	Energy Savings (kWh)	Summer Peak Demand (kW)	Winter Peak Demand (kW)	Average Qty per Household
Water Heating					
DWH Pipe Insulation	Water heaters	92,443	10.55	10.55	0.4
DWH Tank Insulation	Water heaters	45,237	5.16	5.16	0.3
Water Heater Temp Adjustment	Water heaters	3,557	0.41	0.41	< 0.1
Low-Flow Showerhead	Showerheads	54,085	3.93	7.85	0.3
Low-Flow Aerator	Aerators	46,290	3.15	6.30	0.5
Lighting					
13W CFL	Lamps	21,352	3.16	1.53	0.8
18W CFL	Lamps	23,842	3.53	1.71	0.4
5W Generic LED	Lamps	669	0.10	0.05	< 0.1
5W Specialty LED	Lamps	669	0.10	0.05	< 0.1
9W LED	Lamps	24,529	3.63	1.76	0.4
Air Sealing and Weather Stripping					
Air Sealing	Households	1,160,999	378.85	218.77	0.72
Door Weather Stripping	Households	44,890	14.46	8.66	0.88
Insulation					
Attic Insulation - Cellulose, Blown - R-30	Sq. Feet	49,514	6.88	19.07	28
Attic Insulation - Cellulose, Blown - R-38	Sq. Feet	85,168	11.83	32.80	46
Attic Insulation - Fiberglass, Blown - R-30	Sq. Feet	357,907	49.71	137.84	202
Attic Insulation - Fiberglass, Blown - R-38	Sq. Feet	377,195	52.39	145.27	204
Belly Fiberglass Loose	Sq. Feet	172,431	23.95	66.41	110
Floor Insulation - Fiberglass, Batts - R-19	Sq. Feet	359,150	49.88	138.32	229
Wall Insulation - Fiberglass, Blown - R-13	Sq. Feet	19,646	2.73	7.57	10
Wall Insulation - Cellulose, Blown - R-13	Sq. Feet	13,602	1.89	5.24	15
Knee Wall Insulation	Sq. Feet	7,657	1.06	2.95	5
Manufactured Home Roof Cavity	Sq. Feet	79,721	11.07	30.70	51
Heating System					
Heating System Tune-up	Households	161,797	6.03	30.28	0.2
Duct Insulation	Households	3,682	0.50	1.43	< 0.1
Duct Sealing	Households	1,265,635	176.00	487.21	0.5

Measure	Unit	Energy Savings (kWh)	Summer Peak Demand (kW)	Winter Peak Demand (kW)	Average Qty per Household
HVAC Upgrade/Replacement					
Heat Pump Upgrade	Households	158,449	18.30	59.54	0.1
Heat Pump Replacement	Households	185,559	21.66	69.73	0.1
Refrigerator					
ENERGY STAR Refrigerator (15 cu. ft.)	Refrigerators	68,827	7.85	7.85	< 0.1
ENERGY STAR Refrigerator (18 cu. ft.)	Refrigerators	112,883	12.88	12.88	0.1
ENERGY STAR Refrigerator (21 cu. ft.)	Refrigerators	124,387	14.19	14.19	0.1

Table 12 summarizes total and per household gross program energy and demand savings, by project type.

Table 12. Engineering Analysis Gross Program Savings

Project Type	Unique Participating Households	Energy Savings (kWh)	Summer Peak Demand (kW)	Winter Peak Demand (kW)
Total Program Savings				
Tier I	176	178,487	53.6	30.8
Tier II	1,387	4,662,487	809.0	1,469.8
Tier II Weatherization Measures	*1,146*	*4,318,480*	*769.1*	*1,340.6*
HVAC Replacement/Upgrade	*318*	*344,008*	*40.0*	*129.3*
Refrigerator Replacement	404	306,097	34.9	34.9
Total	1,706	5,147,071	897.6	1,535.6
Average Savings per Household				
Tier I	176	1,014	0.305	0.175
Tier II	1,387	3,362	0.583	1.060
Tier II Weatherization Measures	*1,146*	*3,768*	*0.671*	*1.170*
HVAC Replacement/Upgrade	*318*	*1,082*	*0.126*	*0.406*
Refrigerator Replacement	404	758	0.086	0.086

Measure Mix and Contribution to Tier I and Tier II Savings

Based on program-tracking data, almost all Tier I and Tier II participants (96% and 97%, respectively) received air sealing. The vast majority (91%) of Tier II participants also received insulation, and 74% received duct system sealing or insulation—measures not offered to Tier I participants. Larger shares of Tier II participants than Tier I participants received water heating measures, weather-stripping, lighting, and heating system tune-ups. Overall, 24% of participants received a new refrigerator and 19% an HVAC replacement or upgrade. Notably, 8% of participants only received a new refrigerator and 14% only received an HVAC replacement/upgrade.

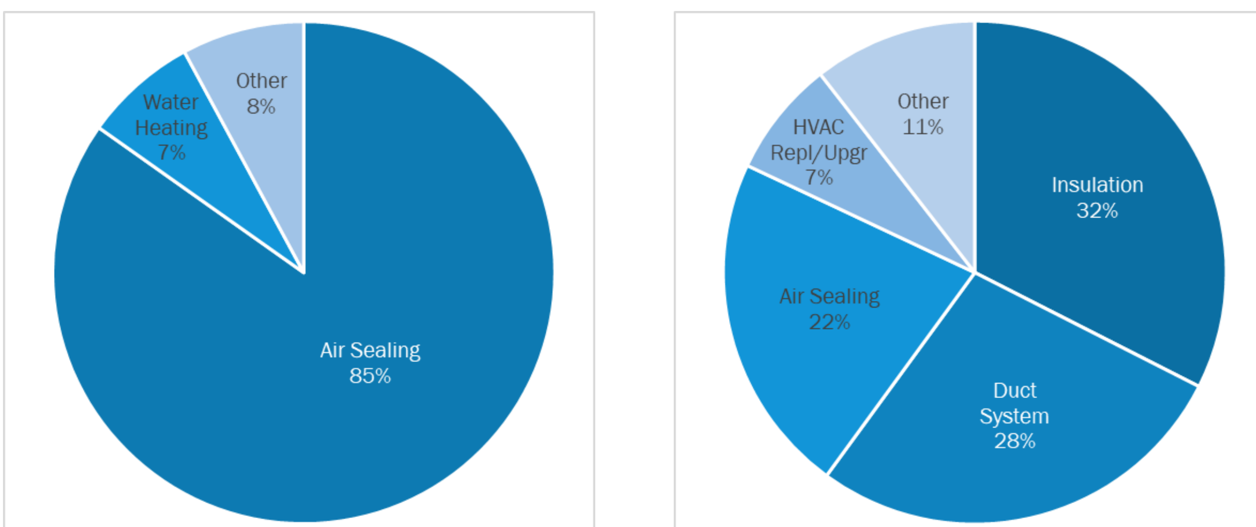
Table 13. Measure Mix

Measure Category	% of Participating Households Receiving Measure Category [a]		
	All Participants (N=1,706)	Tier I Participants (N=176)	Tier II Participants (N=1,146)
Air Sealing	75%	96%	97%
Insulation	61%	n/a	91%
Duct System	50%	n/a	74%
Water Heating	50%	31%	70%
Weather-stripping	43%	35%	59%
Lighting	26%	26%	35%
Heating System Tune-Up	19%	6%	27%
Refrigerator Replacement	24%	19%	17%
HVAC Replacement/Upgrade	19%	1%	7%

[a] Values are based on program-tracking data and do not incorporate ISRs.

Based on ex post gross engineering analysis results, Tier I savings during the evaluation period came primarily from air sealing (85%). Another 7% came from water heating measures and 8% came from other Tier I measures (including heating system tune-ups, 3%; lighting measures, 3%; and weather-stripping, 2%). Tier II savings, on the other hand, were dominated by insulation (32%), duct system sealing and insulation (28%), and air sealing (22%). HVAC replacements/upgrades accounted for 7% of engineering-based Tier II savings during the evaluation period, while other Tier II measures (including water heating measures, 5%; heating system tune-ups, 3%; and lighting and weather-stripping, 1% each) contributed 11% (see Figure 4).

Figure 4. Measure Contribution to Total Tier I and Tier II Energy Savings



Tier I kWh Savings

Tier II kWh Savings

Demand-to-Energy Ratios

Using the estimated savings from Table 12, we calculated overall kW-per-kWh savings ratios, by Tier (see Table 14). We used these ratios to estimate per household net demand savings for Tier I and Tier II.

Table 14. Engineering Demand-to-Energy Ratios

Project Type	Total Gross Energy Savings (kWh)	Summer Coincident Peak Savings (kW)	Winter Coincident Peak Savings (kW)	Summer Ratio Multiplier (summer demand/energy savings)	Winter Ratio Multiplier (winter demand/energy savings)
Tier I	178,487	53.62	30.80	0.0003004	0.0001726
Tier II	4,662,487	809.04	1,469.84	0.0001735	0.0003152

4.2.3 Tier I Savings

A comparison of installed units (inclusive of evaluation-specific ISRs) between the two evaluation periods shows that participants during the 2016–2018 evaluation period were more likely to complete air sealing and received more weather stripping than participants during the 2015–16 evaluation period but installed fewer efficient lamps (CFLs or LEDs). In addition, the average Tier I home during the 2016–18 evaluation period was less likely to receive a heating system tune-up or implement any of the five water heating measures offered by the program.

Applying 2016–2018 per unit savings for Tier I participants to installed units results in annual per household Tier I savings of 1,014 kWh during the current evaluation period, compared with 1,103 kWh for the prior evaluation period. The resulting Tier I Savings Ratio is 0.92 (1,014 kWh / 1,103 kWh), meaning that based on the measure mix and installed measure quantities, per household Tier I savings for the 2016–18 evaluation period could be expected to be 92% of Tier I savings for the 2015-16 evaluation period.

Table 15 summarizes the comparison between Tier I participants in the two evaluation periods.

Table 15. Tier I Savings Comparison with Participants from Prior Evaluation

Measure	Savings Unit	Installed Units / Participant [a]		2016-18 per Unit kWh Savings [b]	Per Participant kWh Savings	
		2015-16	2016-18		2015-16	2016-18
Air Sealing and Weather Stripping						
Air Sealing	Home	0.90	0.92	926.6	831	852
Door Weather Stripping	Door	0.56	0.62	30.2	17	19
Lighting						
CFL 13W	Lamp	2.20	0.41	16.2	36	7
CFL 18W	Lamp	0.64	0.29	35.5	23	10
LED 5W Generic	Lamp	-	0.03	20.3	-	1
LED 5W Specialty	Lamp	-	0.08	20.3	-	2
LED 9W	Lamp	-	0.36	34.5	-	12
Heating System						
Heating System Tune Up	System	0.11	0.05	603.9	65	31

Measure	Savings Unit	Installed Units / Participant [a]		2016-18 per Unit kWh Savings [b]	Per Participant kWh Savings	
		2015-16	2016-18		2015-16	2016-18
Water Heating						
DWH Pipe Insulation	10' Section	0.28	0.19	141.8	40	27
DWH Tank Insulation	System	0.26	0.21	82.1	21	17
Water Heater Temp Adjustment	System	0.10	0.02	59.3	6	1
Low Flow Showerheads	Showerhead	0.23	0.14	118.1	27	17
Low Flow Aerators	Aerator	0.50	0.24	74.4	37	18
Total Tier I Savings					1,103	1,014

[a] Inclusive of evaluation-specific ISRs

[b] Savings represent averages for Tier I participants only and are exclusive of ISRs.

Applying the Tier I Savings Ratio of 0.92 to the Tier I consumption analysis result from the prior evaluation (262 kWh per household) results in estimated per household Tier I savings of 241 kWh for the 2016–18 evaluation period:

$$\textit{Final Per Household Tier I Savings} = 0.92 * 262\ kWh = 241\ kWh$$

4.3 References

The following sources were used in the engineering analysis:

- ASHRAE Fundamentals. Appendix: Design Conditions for Selected Locations. Chapter 14
- ENERGY STAR® Air Source Heat Pump Calculator
- Illinois Technical Reference Manual. Version 6.0. February 11, 2016
- Indiana Technical Reference Manual. Version 2.2. July 28, 2015
- Michigan Evaluation Working Group Showerhead and Faucet Aerator Meter Study Memorandum. June 2013
- Mid-Atlantic Technical Reference Manual. Version 9.0. October 2019
- Baseline refrigerator energy consumption based on test measurement data provided by Duke Energy for 142 refrigerators
- 2016–2018 DEC LI Weatherization program tracking database
- 2016–2018 DEC LI Weatherization participant survey conducted by Opinion Dynamics in 2020
- Opinion Dynamics Corporation. Duke Energy Carolinas – 2015 Low Income Weatherization Program Evaluation Report. June 13, 2018.

5. Process Evaluation—Weatherization Program

5.1 Researchable Questions

Based on discussions with Duke Energy program and evaluation, measurement, and verification (EM&V) staff, the evaluation team developed the following process-related research questions:

- Have there been any major process changes since the last evaluation, and what effects have they had on CAA participation levels, measure mix, and per-household savings?
- What are the major strengths of the program? Are there specific ways that the program could be improved to be more effective in the future?
- Are participating agencies satisfied with the program? What are their barriers to program participation (i.e., are there limiting factors to achieving greater participation)?
- What policy barriers to agency participation still exist in the South Carolina portion of DEC's service area? What, if any, program process improvements can DEC make to enhance its impact in that state?
- Are participants satisfied with the program and measures received? What types of non-energy benefits have they received since participating?

5.2 Methodology

Our process evaluation relied on (1) interviews with program staff, the program coordinators (NCCAA and TRC), and six participating agencies; (2) review of program materials and program-tracking data; and (3) analysis of the participant survey.

The full survey instrument can be found in Appendix C.

5.3 Key Findings

5.3.1 Program Participation

The 2016–2018 program comprised the second, third, and fourth years of the DEC Weatherization Program. Between April 1, 2016 and December 31, 2018, 15 participating agencies in North Carolina served 1,706 households. The majority of participating households (81%) completed a Tier II project; 10% completed a Tier I project; and 24% received a new refrigerator (either in combination with a Tier I or Tier II project, or as a stand-alone measure).

Of the 15 participating agencies, eleven were already active during the prior evaluation period and four were new to the program. The 15 agencies submitted between 1 and 746 weatherization projects, with an average of 136 (Table 16.

Table 16. 2016-2018 CAA Projects by Tier

Agency	Tier I	Tier II	Refrigerator Replacement	Total
Blue Ridge Community Action Inc.	102	497	147	746
Blue Ridge Opportunity Commission	9	39	3	51
Cabarrus County Planning & Development Services	7	27	9	43
Central Piedmont Community Action Inc.*	0	2	0	2
Charlotte Area Fund Inc.*	0	0	18	18
Community Action Opportunities	12	159	25	196
Four Square Community Action Inc.	5	17	24	46
I CARE Inc.	1	13	1	15
Macon County Government	3	40	0	43
Mountain Projects Inc.	1	28	4	33
Piedmont Triad Regional Council	4	451	118	573
Rebuilding Together of the Triangle*	0	1	0	1
Resources for Seniors	14	39	16	69
Salisbury-Rowan Community Action Inc.*	1	8	1	10
Yadkin Valley Economic Development District Inc.	17	145	38	200

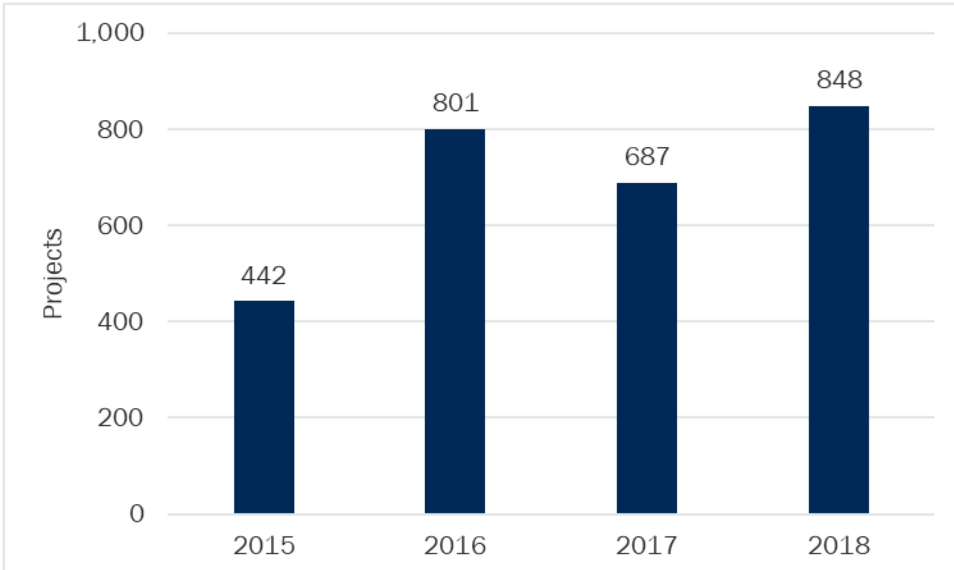
*Denotes agencies new to the DEC Weatherization program in the 2016–2018 evaluation period, based on a review of participating agencies in the 2015–2016 evaluation period.

During the evaluation period, the program provided incentives for over 2,000 projects at 1,706 homes, all in North Carolina.[9] On an annual basis, 2018 represented the largest number of projects (848) since program initiation in 2015 while 2017 saw a dip in project completion (687) compared to 2016 (801).

Figure 5 shows the total number of projects completed each year, from 2015 through 2018. It should be noted that 2016 includes 290 projects from the prior evaluation period (which included January through March 2016).

9 Projects are defined by project numbers found in the tracking database, which denotes HVAC and refrigerator replacements as separate projects when a participant also receives Tier I or Tier II measures.

Figure 5. DEC Weatherization Projects Per Year 2015-2018

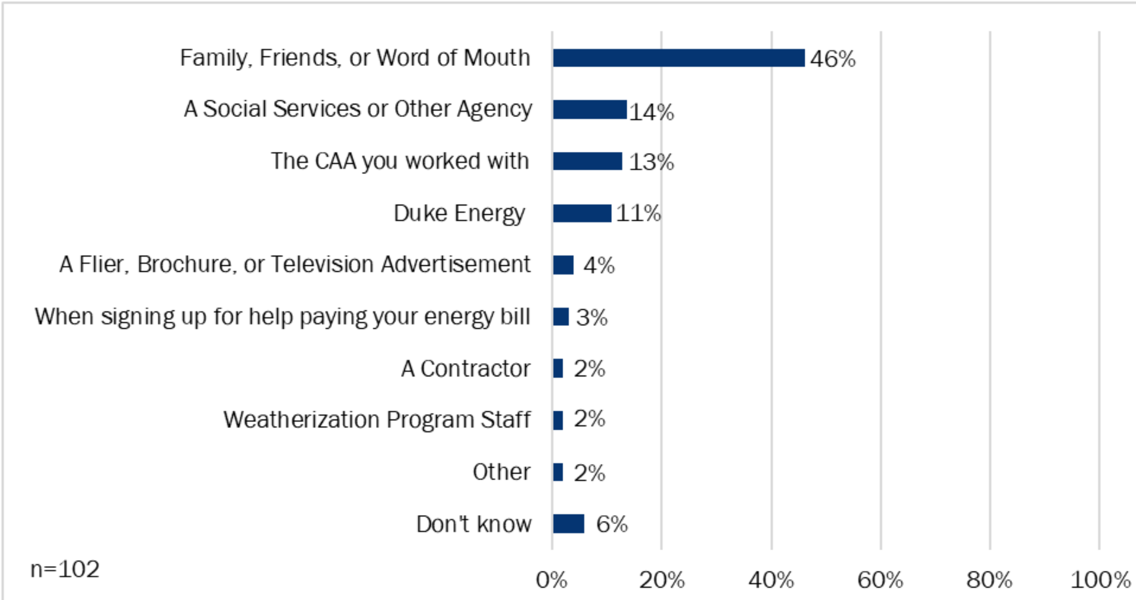


5.3.2 Program Outreach and Motivators of Participation

Agencies complete their own marketing and outreach to generate a local pipeline of State and DOE weatherization projects; Duke Energy does not conduct any additional marketing. Interviewed agencies (n=6) most often reported marketing the program through newspaper ads, fliers, in-person marketing (events and door-to-door canvassing), partnerships with other organizations, and their own websites (4/6). Only half of interviewed agencies market the program on social media and even fewer use mail (2/6) or television ads (1/6).

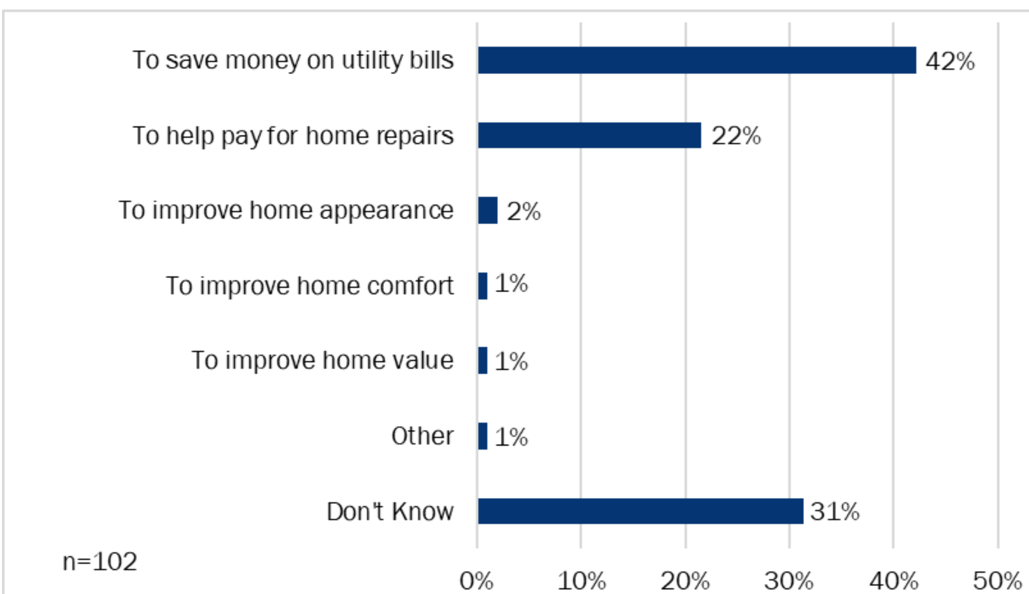
According to responses to the participant survey, nearly half (47%) of participants learned about the Weatherization Program through word of mouth; smaller shares of participants learned about the program through social services or another agency (14%), their CAA (13%), or directly from Duke Energy (11%) (see Figure 6).

Figure 6. How Participants First Heard About the DEC Weatherization Program (Multiple Response)



The main driver of customer participation is to save money on utility bills (42%) or to help pay for home repairs (22%) (see Figure 7). Interestingly, making the home more comfortable is not a main motivator for participation, even though it is a main non-energy benefit identified by participants (see Section 5.3.4).

Figure 7. Participants' Main Motivation in Signing Up for Weatherization



5.3.3 Participating Agencies' Program Experience

In general, agency staff expressed great appreciation for the DEC Weatherization Program and emphasized the high level of need for weatherization services among their clients. DEC Weatherization projects represent a large portion of weatherization jobs completed by the agencies and half of interviewed agencies utilized the new participation channel in which they can submit projects for reimbursement that were not originally DOE or State WAP projects. Most interviewed agencies provide additional services for their clients outside of weatherization, but all reported their clients have difficulty paying high energy bills. Agencies did not significantly change how they implement or participate in the program since the last evaluation, and policy barriers in South Carolina continued to prevent program participation in the state.

Agency Participation Summary

All but one agency we interviewed (5/6) had been involved with the DEC Weatherization Program prior to the current evaluation period; the only new agency we interviewed reported first participating in the DEC Weatherization Program in May 2016. Most interviewed agencies (5/6) reported they complete weatherization projects through DOE/State WAP while half (3/6) also complete projects through LIHEAP. One agency reported they only complete refrigerator replacement projects for the DEC Weatherization Program, although they provide other services to their clients outside of the Weatherization Program. Three agencies indicated they had utilized the new participation channel, in which they completed and submitted projects that were not originally DOE or State WAP projects. Overall, agencies submit an average of 81% of their total weatherization projects to DEC for reimbursement. All interviewed agencies reported that they submit 100% of eligible projects for DEC Weatherization Program reimbursement. Table 17 presents an overview of agency activity and program participation during the evaluation period.

Table 17. Agency Activity and Participation

Agency Metrics	Average	Range
Number of DEC projects (n=6)	306	18 to 746
Share of DEC projects relative to all weatherization jobs (n=5)	81%	64% to 91%
Percent of all weatherization jobs that were originally DOE funded (n=5)	21%	15% to 40%
Percent of all weatherization jobs that were originally LIHEAP funded (n=3)	66%	60% to 70%
Percent of eligible projects submitted for DEC Weatherization Program reimbursement (n=5)	100%	100% to 100%

Key Services and Customer Concerns

Most interviewed agencies (4/6) perform a wide variety of services in their communities beyond weatherization; only two interviewed agencies reported they exclusively provide weatherization services and health and safety upgrades to their clients' homes. Half of agencies (3/6) also have senior assistance and/or nutrition programs, and many agencies perform other necessary work in their communities through workforce development programs (2/6), childcare and education programs (1/6), and environmental compliance programs (1/6).

All six interviewed agencies reported that the biggest housing/energy concern their clients face are extremely high energy bills, which can be a struggle to pay on a low or fixed income. Half of interviewed agencies (3/6) also noted their clients' homes were in need of repairs or upgrades, such as gaps in doors or missing insulation. Two agencies reported their clients have trouble maintaining adequate indoor temperatures. One interviewee reported their clients sometimes resort to dangerous ways of warming their homes, saying "when your heat breaks you wind up … getting gallon jugs and putting kerosene in them and getting a kerosene heater and bringing it into your house. Then it smokes your house up but you're warm and it's dangerous.”

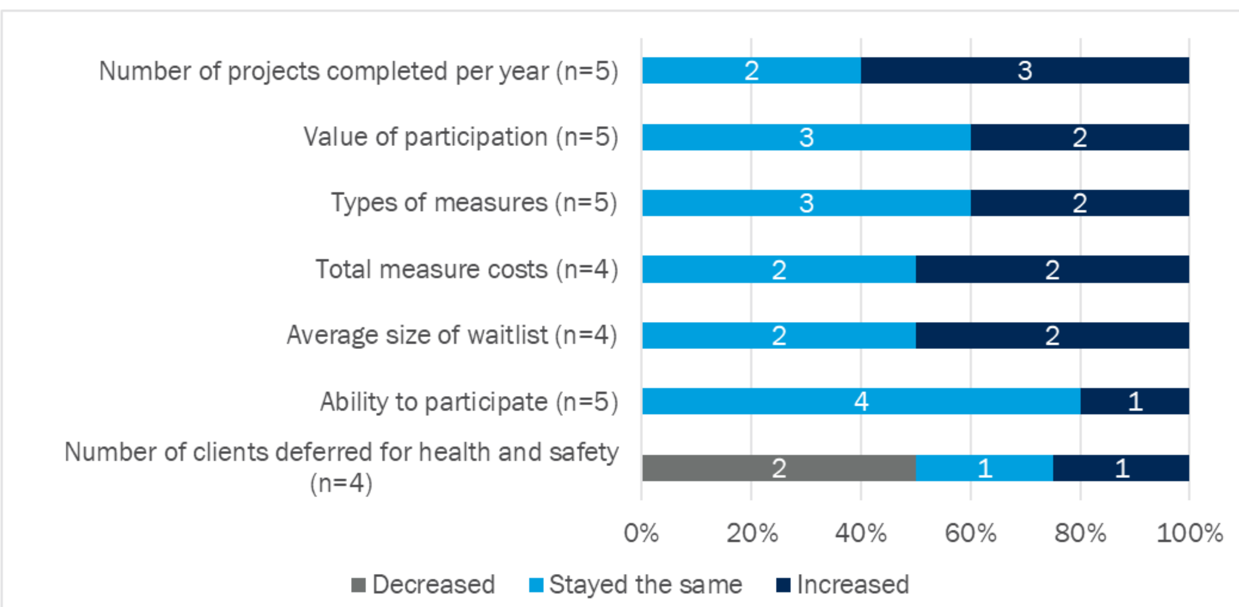
Program Changes

In 2018, the DEC Weatherization Program introduced a new participation channel in which agencies could submit for reimbursement qualifying weatherization projects funded from their operating budget or another source. Prior to this change, agencies could only submit qualifying DOE/State WAP projects for DEC Weatherization reimbursement. This change allowed agencies other than CAAs, such as non-profit organizations, to be able to deliver program services to their clients in North and South Carolina. DEC made this change in an effort to bypass the strict DOE rules for how agencies spend weatherization funds and to increase program participation in South Carolina. Three out of six agencies indicated they used this new participation channel, utilizing grants, operating budgets, and credit at local home improvement stores to fund the projects before they received reimbursement from DEC.

Interviewed agencies that also participated in the program during the prior evaluation period (2015 to Q1 2016, n=5) noted only minimal changes in how they delivered or participated in the DEC Weatherization Program during the evaluation period. Two of these five agencies reported they did not change anything about how they delivered or participated in the program since the last evaluation. One agency noted they were able to hire additional staff and serve more clients on their deferral list, and another agency noted they started submitting for HVAC replacement projects during this evaluation period. One agency reported they decreased spending on health and safety due to the loss of a $3,000 per house payment for health and safety measures from DEC. The agency noted this occurred in 2017 or 2018, when the funds for the Helping Home Fund (HHF) ran out.

To further understand specific changes to program implementation, we asked agency staff to identify changes that may have occurred in a variety of program areas over the past four years. The most frequently reported change was an increase in the number of projects completed per year (3/5). Figure 8 summarizes agency responses.

Figure 8. Changes to Agency Participation



Agency staff noted that changes to the types of measures installed include HVAC replacements (1/6) and the new measures DEC added to the program during this evaluation period, including roof cool seal (1/6). One agency noted their ability to participate increased over the last four years since they were able to complete weatherization jobs at more homes.

We also asked the returning agencies if there have been any changes over the last four years in how they coordinate the implementation of multiple weatherization programs. Half of agencies reported no changes (2/4). One agency reported their coordination efforts tend to change within their funding cycle, rather than from year to year, but have not changed substantially over the last four years. Another agency reported they increased outreach efforts to other community agencies and nonprofits, and ensure their partnering agencies are aware of Weatherization Program requirements so they can get referrals.

Policy Barriers

Our last evaluation identified significant policy barriers to agency participation in the DEC Weatherization Program in both states but specifically in South Carolina. During the current (2016–2018) evaluation period, many interviewed agencies in North Carolina reported being able to complete more projects per year and reduce the number of people they defer for health or safety reasons; however, policy barriers remain in South Carolina, and not one South Carolina agency participated during the evaluation period.

In 2015, DOE's policies in North Carolina required that agencies spend DEC funding within the same program year. This limited agencies' willingness to participate in the first year of the program because they were not certain that they could spend both the DEC and State WAP funding. This hesitancy led North Carolina agencies to request less than the full value of available funds. Since then, DOE revised its policy, allowing North Carolina agencies to use DEC Weatherization funds as 'unrestricted' income beginning in 2016. As noted above, participating agencies are now requesting funding for 100% of their eligible projects. The North Carolina agencies' annual number of DEC program-eligible State WAP projects provided an upper bound to the amount of funding Duke Energy reasonably expected to distribute each year until the recent addition of the new participation channel. This new participation channel allows participating agencies to submit completed DEC Weatherization projects for reimbursement, regardless of the original funding source. Three of the six interviewed agencies indicated they used this new participation channel, and used funds from other programs, grants, or their operating budgets to pay for the project before receiving reimbursement from Duke Energy.

In South Carolina, agencies continue to struggle to participate in the DEC Weatherization Program. According to NCCAA, South Carolina has a relatively high need for weatherization services and could benefit greatly from DEC Weatherization funding. DOE considers DEC Weatherization Program reimbursements in South Carolina "program income," and agencies must return any unspent program income to DOE at the end of the WAP fiscal year. This could result in DOE reducing funding allocations to the South Carolina agencies in future program years. To prevent this, the State WAP does not allow South Carolina agencies to participate in the DEC Weatherization Program. In addition, NCCAA reported that CAAs in South Carolina are entirely state funded, and CAA employees are considered "state-paid employees." While CAAs receive enough funding from the state to cover their payroll, they often do not have funds left over to pay for weatherization projects, and CAA employees are barred from working on projects using privately funded grants, including DEC Weatherization projects. One of the goals of the new participation channel was to overcome these barriers by allowing non-profits or other non-CAA organizations to provide program services. The program has so far remained unsuccessful in expanding program services into South Carolina, however, despite this new participation channel. NCCAA and TRC believe that the program will continue to struggle in South Carolina as long as these state policies remain in place.

Growing the Program

During the previous evaluation, 12 agencies participated in the DEC Weatherization Program. Since then, one agency left and four new agencies joined the program, bringing the total number of participating agencies in the 2016–2018 evaluation period to 15. Program administration staff reported that they do not perform agency recruitment for the program, and new agencies typically start participating in the program due to reassigned service territories. Program administration staff indicated that some new agencies tend to complete HVAC or refrigerator replacement projects due to the “safer” nature of those projects (in terms of agencies knowing the reimbursement amount upfront), and oftentimes homes are in need of HVAC replacements (if they do not have working heat) before they can receive weatherization services through the State WAP. Program administration staff also noted that participating agencies can be non-profit agencies that do not specialize in weatherization or home upgrades due to the new flexible participation channel. This option is particularly attractive for South Carolina as restrictions surrounding State WAP and the use of private funds continue to be a policy barrier for weatherization agencies in the state.

A minor barrier to agency interest found in the last evaluation was a limited capacity to spending program funding once agencies received it due to funding restrictions surrounding State WAP projects, particularly in South Carolina. Although no new projects were completed in South Carolina during the evaluation period, many agencies in North Carolina were able to spend their DEC Weatherization reimbursements, and three of six interviewed agencies indicated they could weatherize more homes or otherwise increase their participation in the program if the program offered more money.

5.3.4 Non-Energy Impacts

NEIs include a range of occupant health, safety, and economic outcomes that participants may realize beyond the energy and cost savings of energy-efficient upgrades. NEIs can provide significant additional benefits to participants and can be a powerful motivator for program participation.

The participant survey included questions about changes in electricity bills and in different aspects of the home’s comfort following program participation. Most Weatherization Program participants reported that their summer and winter electricity bills were lower compared to before they participated in the program and that they experienced other beneficial changes. Beneficial NEIs reported by two-thirds or more of participants include increased home comfort in both summer and winter, reduced draftiness, and better lighting. Fewer than half of respondents reported a reduction in outdoor noise and home maintenance costs (Table 18). In addition, a small share of respondents (less than 20%) reported other beneficial changes as a result of their participation, including improved quality of life, improved water efficiency in their homes, and improved home safety.

Table 18. Impacts Reported by Participants

Impact Category	Positive Change	No Change/ About the Same	Negative Change
Energy Impacts			
Summer electricity bills (n=99)[a]	73% *Bills are lower*	24%	3% *Bills are higher*
Winter electricity bills (n=99)[a]	58% *Bills are lower*	32%	10% *Bills are higher*
Non-Energy Impacts			
Home comfort in the summer (n=102)	76% *More comfortable*	22%	2% *Less comfortable*
Home comfort in the winter (n=101)	70% *More comfortable*	26%	4% *Less comfortable*
Home draftiness (n=100)	68% *Less drafty*	26%	6% *More drafty*
Lighting (n=9)[b]	67% *Better*	33%	0% *Worse*
Amount of outdoor noise heard when all windows are closed (n=98)	46% *Less noise*	49%	5% *More noise*
Home maintenance costs (n=96)	33% *Lower costs*	53%	14% *Higher costs*

[a]Asked only of those who pay their own electric bill.

[b]Asked only of those who received LEDs.

These findings suggest the Weatherization Program provides value to participants beyond energy savings. Increased home comfort and reduced draftiness could be beneficial for customer health and safety, especially as climate change alters temperature patterns. Improved lighting provides a higher sense of safety in and around the home. Lower energy bills and home maintenance costs help alleviate energy burdens and allow customers to spend their money on essential items, such as food and medicine.

DEC should consider providing information regarding improved home comfort, draftiness, and lighting quality to agencies to help them market the program. Duke could also use this information to recruit new agencies to the program whose clients face high energy bills or uncomfortable homes in the winter and summer.

5.3.5 Program Satisfaction and Strengths

Overall, program administration staff, implementing agency staff, and participants are all highly satisfied with the DEC Weatherization Program:

- **NCCAA and TRC program administration staff gave the program a satisfaction score of six out of six, saying they were very satisfied and “we’d love to do more but we’ve got what we’ve got, and it’s made a big difference.”** Program administration staff are particularly pleased with the new flexible participation channel for agencies, who are no longer required to complete DOE or LIHEAP projects to be reimbursed by DEC. This allows for other nonprofits, not just CAAs, to participate in the program, which could help reduce the policy barriers to participation in South Carolina. Program administration staff are also extremely pleased with their interactions with Duke Energy and reported that Duke Energy has been a great partner to them and the CAAs. They also reported the program has likely reduced the size of agency waitlists and agencies have been able to serve more people than they would have otherwise. In addition, program administration staff noted HVAC and refrigerator replacement projects as program strengths, which allow other agencies or non-profits to participate in the program, as well as the recent increase in the incentive for refrigerator replacements. Program administration staff noted they would like to increase participation, but they are satisfied with the work they do, and it makes a big difference in the lives of clients.

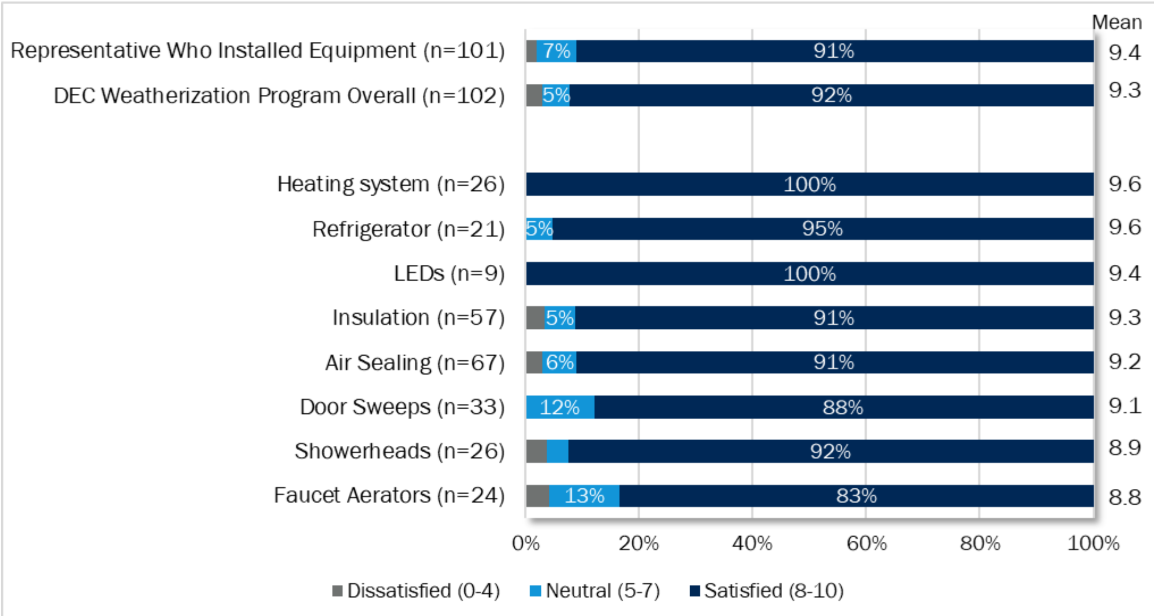
- **Agency staff are very satisfied with the program as well, giving it an average rating of 5.9 out of 6 (n=6).** Agency staff reported few issues with implementation and underscored the value of the program to their communities. Agencies are particularly satisfied with logistical elements of the program, and most interviewed agency staff members noted program organization, communication, and the ease of participation and reporting requirements as key program strengths (5/6). One staff member mentioned the flexibility of reimbursements was a key program strength and another highlighted the program's role in their agency serving more clients. Agency staff frequently provided unprompted praise for program administrative staff during our interviews, one saying "… the folks that were back and just willing to help you any way they could to implement and get this program going. The resources were phenomenal, the teamwork. I've never seen anything like it. It was just great."

  As noted above, only one of the interviewed agencies indicated they began participating in the program during the evaluation period. This agency reported no issues with blending Duke funds with other sources of funding, obtaining DEC reimbursements, or meeting participation or documentation requirements. This agency also participates in the State WAP and the Blue Cross Blue Shield home upgrade program. When asked to compare the DEC Program to the other weatherization and home upgrade programs they participate in, this agency staff member reported there were no major implementation differences, aside from the State WAP eligibility guidelines surrounding heating fuel type.

- **Participants are also satisfied with all components of the program.** As shown in Figure 9, 94% of participants reported that they were satisfied with the program overall, and 93% reported that they were satisfied with the weatherization representative who installed the equipment.[10] Moreover, across the measures we verified, most participants were satisfied with the equipment they received (ranging from 83% of those who received faucet aerators to 100% of participants who received LEDs and efficient heating systems). Common reasons for dissatisfaction with equipment include participants not satisfied with the performance of the equipment (low pressure from faucet aerators or showerheads) and not noticing a difference in their home following installation of air sealing or insulation.

[10] Satisfied is defined as a rating of 8 to 10 on a scale of 0 to 10, where 0 means "not at all satisfied" and 10 means "very satisfied."

Figure 9. Participant Satisfaction with DEC Weatherization Program and Equipment



- **The DEC Weatherization Program helps to alleviate the biggest home and energy concern agencies reported their customers faced: high energy bills.** All interviewed agencies reported paying their energy bills was a key issue for their customers and saving money on energy bills was the most common motivator for participating in the program (reported by 42% of survey respondents). Survey results suggest the program is helping participants in this respect, with 73% of respondents reporting lower summer electricity bills and 58% of respondents reporting lower winter electricity bills following participation in the program.

- **The program is delivering substantial non-energy benefits to program participants including improved home comfort in the summer and winter, reduced draftiness, better lighting, and, to some extent, lower outdoor noise levels and home maintenance costs.** Several survey respondents also mentioned additional benefits they have experienced since participating in the program, including improved quality of life, safer homes, and increased water efficiency. Participating agencies can utilize this research as a way to market the program to hesitant clients.

5.3.6 Program Challenges and Opportunities for Improvement

While all interviewed agencies were highly satisfied with the program overall, most (4/6) also noted some challenges in program implementation. Two agencies reported they wished the program provided more funds to agencies, either through more measures covered by the program, such as stove or natural gas furnace replacements, or increased funds for health and safety repairs. Two agencies also noted they experienced internal staffing issues during the evaluation period, which prevented them from completing more projects. One of these agencies reported the biggest challenge they had was recruiting employees to perform the actual weatherization work on homes and explained that when they informed applicants of the nature of the job, many turned the position down. One agency reported a challenge for them was getting new participants to provide firsthand testimonials for use in marketing materials. This agency staff member explained that new participants were often wary of letting others know they participated in the program because “you don't want everybody to know that you got your heating system fixed because they might come steal it.”

Interviewed NCCAA and TRC staff acknowledged one particular challenge for participating agencies is the reimbursement amount for energy saving measures, particularly for HVAC and refrigerator replacements. While the incentive amount for refrigerator replacements recently increased, the incentive for HVAC replacements has not, and agencies struggle to pay for these measures in the allotted cost cap. Program administrators also noted that the inconsistent funding environment CAAs often have to deal with is a challenge, since the program year starts July 1 but CAAs do not receive state funds until October 1. CAAs would often have to lay-off staff during the summer because they simply do not have the funds available to spend on payroll.

Suggestions for Program Changes

When asked for suggestions on how Duke Energy could improve the program to be more effective in the future, most agencies (4/6) reported the program could be improved by providing program funds for more measures, such as stove/oven replacements, natural gas furnace replacements, or additional health and safety upgrades. Agency staff also suggested Duke Energy could increase program marketing efforts (2/6), provide educational materials to customers about the program and the benefits of energy efficiency in their homes (2/6), and provide additional training to agency staff (2/6).

Program administration staff suggested revising the fixed payment model and pivoting to a reimbursement model. For example, program administration staff suggested providing agencies up to $4,000 for Tier II measures, and not just reimbursing a fixed cost for each unit of the approved measures each agency installs. They also suggest “stacking” Tier II and HVAC replacement dollars, so a single home could be eligible for $4,000 in Tier II measures plus $6,000 for an HVAC replacement.

Program administrators also suggest increasing health and safety funds. Agency staff cannot weatherize a home that is unsafe. Many homes are being left out of the program, due to lack of funds for needed health and safety improvements, and Duke Energy does not realize any savings from those homes. Programs like the HHF provide some support for health and safety, but many agencies have to fund these upgrades from their operating budget or another source so they can complete weatherization. Program administration staff suggest an HHF-type program that covers the DEC service territory to provide funding for health and safety upgrades.

6. Process Evaluation—Durham Pilot

In 2018, Duke Energy launched a new weatherization pilot based in Durham, North Carolina. The Durham Pilot provided weatherization services and health and safety upgrades to 206 income-qualified Durham residents between October 2018 and December 2019.

As part of our evaluation of the DEC Low Income Weatherization Program, we conducted a limited process evaluation of the Durham Pilot, addressing the following research objectives:

- How do program design, implementation, and participation of the Durham Pilot compare to the DEC Weatherization Program?
- What are the relative advantages and disadvantages of the two program designs?
- How do the two offerings compare in terms of per-home savings potential?

This limited process evaluation included an in-depth interview with pilot staff and a focused program-tracking database analysis to document program design, identify early implementation successes and challenges, and make comparisons to the Weatherization Program.

6.1.1 Pilot Overview

Duke Energy launched the Durham Pilot in 2018, with the intent to determine how and if the current DEC Weatherization Program design could be improved and expanded into Duke Energy Progress (DEP) service territory. A secondary intent of the pilot was to determine if a different funding model could be used to expand weatherization services into South Carolina, where current DEC Weatherization Program funds qualify as program income, which limits CAA participation in the program.

Duke Energy conducted this pilot in Durham, North Carolina due to a combination of factors. DEC ran the Low Income Neighborhood Energy Savers (NES) Program in Durham, and preliminary customer data collected from the NES Program indicated there was a high density of potentially qualified customers in the Durham area. Durham Pilot staff noted that many people who participated in the NES Program could derive additional benefits from weatherization services, and DEC would realize greater electric savings if they provided those services to customers. In addition, the program administrator, NCCAA, is headquartered in Raleigh, making the logistics of launching the pilot there appealing to pilot staff.

The Durham Pilot was designed to bring weatherization services to customers who may not have been able to receive these services from a CAA. The pilot had eligibility requirements similar to Tier II of the Weatherization Program (income of no more than 200% of Federal Poverty Guidelines and energy usage of at least 7 kWh per square foot) and offered the same measures (prioritizing insulation, air sealing, and duct sealing, and offering baseload lighting and DHW measures). The pilot did not offer a Tier I option for lower usage customers. Similar to the Weatherization Program, it offered HVAC upgrades and replacements as part of Tier II services as well as refrigerator replacements.

6.1.2 Comparison to DEC Weatherization Program

Although DEC designed the Durham Pilot to provide the same services to customers as the DEC Weatherization Program, there are a few key differences in the design and implementation of the two offerings:

- **Program Implementation.** The Durham Pilot relied on Duke Energy staff and NCCAA, rather than agencies, to complete weatherization projects. Durham Pilot staff were responsible for providing all funding, program services, and oversight for each Durham Pilot project. Pilot staff hired independent, qualified contractors to go to homes to complete assessments and install energy saving measures. Durham Pilot staff were also responsible for following up with participants on any issues.
- **Program Eligibility.** Participation in the pilot was limited to income-eligible customers with energy usage of at least 7 kWh per square foot. Unlike the Weatherization Program, the pilot did not offer a Tier I option for lower usage customers.
- **Marketing and Outreach.** The Durham Pilot conducted proactive marketing and outreach for the program by microtargeting NES Program participants and other potentially qualified customers with letters and other program materials. This is in stark contrast to the Weatherization Program, wherein CAAs are responsible for marketing the program. Durham Pilot staff reported that "with this design, we have the information where we're going to the customers versus sitting back and waiting for the customers to come to us." Durham Pilot Staff also reported that qualified customers were often not aware of the pilot or that Duke Energy provided energy saving programs like this.
- **Customer Prioritization:** The Durham Pilot served qualified customers on a first come, first served basis. In contrast, CAAs operating through the Weatherization Program must prioritize homes with lead, small children, or elderly occupants when providing weatherization services due to DOE and State WAP requirements. This can result in some customers waiting several years for vital weatherization services. Durham Pilot staff recalled a particular customer, a veteran, who waited nine years for weatherization services since they did not meet the high priority criteria.
- **Measure Cost:** Duke Energy paid the full cost of each measure in the Durham Pilot, compared to a percentage of each measure in the Weatherization Program. CAAs are responsible for covering the remainder of the measure cost, either through funds from another program (such as State WAP or LIHEAP) or through their operating budget. While this funding approach is less cost-effective than rebating a portion of the cost, it allowed for higher percentage of more comprehensive projects than the Weatherization Program. It might also allow Duke Energy to expand weatherization services into DEP territory and South Carolina. Weatherization Program funds qualify as program income in South Carolina, which affects federal funding for CAAs in the state and prevents them from participating in the program.

6.1.3 Early Successes and Pilot Advantages

Although pilot staff did not formally survey customers, they reported high participant satisfaction with the program and the services they received. The program served customers who, according to pilot staff, may have had to wait for years before receiving services from the DEC Weatherization Program. Interviewed staff relayed participant feedback that the contractors were respectful, worked hard to help them, and often understood the participants' situation. Pilot staff were commonly told by participants that they did not know Duke Energy offered any programs of this nature and felt they could trust program staff. As one pilot staff member put it, "We can count on one hand the number of issues that arose, and those issues that did arise were resolved pretty quickly."

Interviewed pilot staff remarked that it was easier to work directly with the program administrator, as opposed to delegating the work to CAAs. Additionally, Pilot staff identified having access to important customer data as another advantage of not relying on CAAs for implementation. This customer data enabled Pilot staff to identify and target customers most in need of weatherization services and provide education on ways to lower energy costs and burden. Pilot staff also reported that customers may be hesitant to participate in the DEC Weatherization Program due to the bureaucracy associated with applying for a federal or state assistance program. Since the Durham Pilot did not leverage DOE or State WAP projects, the administrative burden on customers was greatly reduced.

6.1.4 Pilot Challenges

Although Durham Pilot staff were generally satisfied with how the Pilot performed, they did encounter a few implementation challenges. Some customers (about 5% of applicants) who made initial contact with Durham Pilot staff did not follow up with their information, which left Pilot staff uncertain if these customers were still interested in the program. Program staff also reported it was a challenge to get some qualified customers to schedule their in-home assessment with a qualified contractor. Program staff sent letters to customers informing them they would lose their spot in the program if they did not make an appointment.

Another issue for the Durham Pilot was having to turn down customers because the health and safety upgrades their homes required exceeded the resources of the program. This is a common issue for many weatherization programs, including the Weatherization Program, and the Durham Pilot staff partnered with other programs and agencies such as Habitat for Humanity and the HHF to provide health and safety upgrades for many participants.

Finally, the funding approach of covering the full project cost without contributions by agencies might make this program design difficult to implement on a larger scale.

6.1.5 Pilot Participation and Outcomes

The Durham Pilot served 206 customers between October 2018 and December 2019. In total, the pilot funded 148 Tier II projects, including 52 HVAC replacements, and replaced 123 refrigerators. The pilot partnered with the HHF to provide up to $3,000 for health and safety upgrades before providing weatherization services. The pilot did not have any savings or participation goals, nor did pilot staff have any expectations of how the pilot would perform.

Durham Pilot staff did not directly compare participant characteristics or pilot activity to the Weatherization Program, and limited data prevents a full savings comparison between the two offerings. As part of our limited process evaluation, we analyzed program tracking data and compared key participant metrics across the two offerings. Key differences include:

- Participants in the Durham Pilot, on average, had slightly smaller homes and slightly higher energy use intensities.
- A smaller percentage of Durham Pilot participants have electric heat.
- A larger percentage of Durham Pilot participants live in multifamily homes.

Table 19. Comparison of Participant Characteristics

Participant Metrics	Durham Pilot (N=206)	Weatherization Program (N=1,706)
Average Annual Income	$20,138	$17,477
Average Square Footage	1,189	1,311
Estimate Annual Electricity Usage (kWh)	13,808	14,030
Estimated Energy Use Intensity (kWh/sqft)	11.6	10.7
Participants with Electric Heating	57%	65%
Participants in Multifamily Homes	19%	5%
Participants in Single Family Homes	81%	95%

While a full savings comparison between the pilot and the Weatherization Program was not possible within the scope of this evaluation, a comparison of the types of projects completed through the two offerings and the measure mix provides interesting insights into potential savings. It should be noted, however, that these insights are merely directional and intended for guidance purposes only.

Table 20 compares the percentage of participants who completed various types of weatherization projects. As noted above, the pilot did not offer a Tier I option, while 10% of Weatherization Program participants completed a (lower-savings) Tier I project. While a higher percentage of Weatherization Program participants completed a Tier II project (81% compared to 72%), pilot Tier II projects were more likely to include both weatherization measures and an HVAC replacement/upgrade (34% compared to 6%). In addition, a much higher percentage of pilot participants received a new refrigerator (60% compared to 24%), and more than half of them also completed a Tier II project (similar to Weatherization Program refrigerator recipients). This comparison suggests a higher savings potential (based on project type alone) for pilot participants compared to Weatherization Program participants.

Table 20. Comparison of Project Types

Project Type	% of All Participants	
	Durham Pilot (N=206)	Weatherization Program (N=1,706)
Tier I	0%	10%
Tier II	72%	81%
Wx Measures & HVAC Replacement/Upgrade	*34%*	*6%*
Weatherization Measures Only	*65%*	*77%*
HVAC Replacement/Upgrade Only	*1%*	*17%*
Refrigerator Replacements	60%	24%
Refrigeration Replacement & Weatherization	*52%*	*55%*
Refrigerator Replacements Only	*48%*	*45%*

A comparison of measures included in Tier II projects (see Table 21) shows additional differences between the pilot and the Weatherization Program. While both offerings provided most Tier II participants with air sealing and insulation, pilot participants were less likely to receive duct system insulation/sealing and much less likely to receive water heating measures and weather stripping. No pilot Tier II participants received a heating system tune-up, compared to 27% of Weatherization Program participants. On the other hand, higher shares of pilot participants received lighting measures (57% compared to 35%) and HVAC replacements/upgrades (35% compared to 7%).

Given the relatively high savings impact of air sealing, insulation, and duct sealing/insulation, and the significant savings associated with HVAC replacements/upgrades, this comparison suggest a savings potential of the pilot on par with or even higher than for the Weatherization Program.[11] However, it also appears that some opportunities for savings might have been missed as few pilot participants received water heating measures, weather stripping, and heating system tune-ups. Given that the pilot targeted Durham, NC—an area previously served by the NES Program, which offered some of the same measures—it is possible that some of the participants not provided with these measures did not have a need for them.

Table 21. Comparison of Tier II Measure Mix

Measure Category	% of Tier II Participants	
	Durham Pilot (N=148)	Weatherization Program (N=1,387)
Air Sealing	92%	97%
Insulation	90%	91%
Duct System	65%	74%
Lighting	57%	35%
HVAC Replacement/Upgrade	35%	7%
Water Heating	22%	70%
Weather Stripping	9%	59%
Heating System Tune-Up	0%	27%

[11] It should be noted that savings from many of these measures depend on installed quantities as well as home characteristics, such as space and water heating fuel types. Detailed consideration of these factors was out of the scope of this analysis.

7. Key Findings and Recommendations

During the evaluation period, 1,706 households participated in the Weatherization Program, completing over 2,000 projects. The majority of participants (81%) completed a Tier II project; only 10% of participants completed a Tier I project. In addition, 24% received a replacement refrigerator, either as a stand-alone measure (8%) or in combination with Tier I or Tier II services (15%).

7.1 Key Impact Findings

Based on our impact analysis, we estimate that the projects completed during the evaluation period generate close to 3.2 million kWh of annual energy savings, 539 kW of annual summer coincident demand savings, and 935 kW of annual winter coincident demand savings. Tier II participants account for the largest share to program-level savings (89%) while Tier I participants and refrigerator replacements account for 1.3% and 9.6%, respectively, of total program energy savings.

Table 22 presents annual per-household and program-level net ex post savings for the evaluation period.

Table 22. Summary of Impact Results

Project Type	Number of Participants	Net Annual Savings Per Household			Net Annual Program Savings		
		Energy (kWh)	Summer Coincident Demand (kW)	Winter Coincident Demand (kW)	Energy (kWh)	Summer Coincident Demand (kW)	Winter Coincident Demand (kW)
Tier I	176	241	0.0724	0.0416	42,398	12.7	7.3
Tier II	1,387	2,042	0.3544	0.6438	2,832,531	491.5	892.9
Refrigerator Replacement	404	758	0.0864	0.0864	306,097	34.9	34.9
Total [a]	1,706				3,181,027	539.2	935.2

[a] The total number of unique participants is smaller than the sum of project types since some households complete more than one project.

7.2 Key Process Findings

The process evaluation found that the DEC Weatherization Program continues to benefit from previously established relationships, implementation processes, and program-tracking systems. Program and implementation staff reported no major changes to the program since the previous evaluation aside from the new participation channel established in 2018. Participating agencies also reported minimal changes to how they implement and participate in the Weatherization Program, and many reported the DEC funds allow them to complete more weatherization jobs than they would have otherwise.

Key process findings include:

- **Program Participation.** Participation in the Weatherization Program has been increasing steadily since the program began in 2015. Agencies work hard to inform clients about the program through multiple advertising channels (newspaper ads, in-person events, agency websites, etc.) and half of interviewed agencies indicated the number of projects they complete each year is increasing.

- **New Participation Channel.** Prior to 2018, agencies could only submit projects originally funded by the State WAP for reimbursement from Duke Energy. Now, agencies may submit for reimbursement projects they originally funded through their operating budget or another source. This opened the possibility of non-CAA organizations, such as non-profit organizations, to participate in the program and bring Weatherization Program services to their clients. Half of the agencies we interviewed indicated they had used this new participation channel. One agency, a non-profit organization, indicated they used this participation channel exclusively and only performed refrigerator replacements since their organization was not equipped to perform more extensive weatherization on clients' homes.

- **Satisfaction.** The process evaluation showed high satisfaction with the Weatherization Program. Interviewed agency staff often provided unprompted praise for the program implementation team and underscored the importance of the program to their clients. Agencies found the logistical elements of the program—including program organization, communication, and reporting—to be key program strengths. Participants were also highly satisfied with the program overall. A key concern for participants is high energy bills, and survey results suggest the program is helping participants in this respect, with 73% and 58% of respondents reporting lower summer and winter electricity bills, respectively, following participation in the program.

- **Non-Energy Impacts.** In addition to lowering energy bills, the Weatherization Program provides substantial non-energy benefits to participants including improved home comfort in the summer and winter, reduced draftiness, and better lighting. To a lesser extent, survey respondents also reported lower outdoor noise levels and home maintenance costs, improved quality of life, safer homes, and increased water efficiency.

- **South Carolina Policy Barriers.** Despite the new participation channel—introduced in 2018 to encourage participation by South Carolina agencies—barriers to program participation remain high in South Carolina, and no projects were completed in the state during this evaluation period. While the new participation channel has not yet resulted in program participation in the state, program staff continue to conduct outreach and provide additional support to South Carolina agencies and to encourage future program participation.

- **Durham Pilot.** Between October 2018 and December 2019, Duke Energy offered a weatherization pilot in Durham, North Carolina, which served a total of 206 customers. One goal of this pilot was to determine if the current DEC Weatherization Program design and funding model could be improved to expand program services to South Carolina and into the Duke Energy Progress (DEP) service territory. The limited process evaluation of the Durham Pilot found key differences between the pilot and the Weatherization Program in program eligibility, implementation, and measure mix:

  - Not relying on agencies to implement the program made the Durham Pilot implementation smoother and more flexible, and access to customer data allowed Pilot staff to target the program to the customers who needed it most. Since the Durham Pilot was entirely funded by DEC, participants did not need to spend time completing federal or state assistance program applications, which greatly reduced administrative burden on participants.

  - Compared to DEC Weatherization projects in the evaluation period, Durham Pilot projects were more likely to include both weatherization measures and an HVAC upgrade. Additionally, Durham Pilot participants were more likely to receive a refrigerator replacement. Based on the measure mix, we believe that the Durham Pilot has the potential to provide per household savings on par with, or possibly greater than, the savings estimated for the DEC Weatherization Program. Since this evaluation did not include a formal impact assessment, however, more rigorous impact analysis would be required to quantify the savings of the Durham Pilot.

Overall, pilot staff were highly satisfied with the performance of the pilot and indicated that participants were particularly grateful for program services they may have otherwise waited years to receive. Given the continuing policy barriers in South Carolina, despite the new participation channel, a program design similar to the Durham Pilot could be a good option for bringing weatherization services to customers in South Carolina and/or the DEP service territory.

7.3 Evaluation Recommendations

We have developed the following recommendations based on the results of our evaluation:

- **Consider tracking several additional parameters within the program-tracking system to enhance the accuracy of future deemed savings estimates.** Our deemed savings review (see Appendix B) identified a few parameters that are currently not tracked in program data: (1) pre- and post- blower door results in units of reduced cubic feet per minute (CFM); (2) presence or type of cooling at participating homes; (3) water heating fuel of participating homes; and (4) the installed location (e.g., bathroom, kitchen) for each low-flow faucet aerator. Some of this information is currently collected in the participant survey but having it in the program-tracking data for the population of participants would enhance the accuracy of future deemed savings estimates. We therefore recommend asking weatherization agencies to enter this information into the program's tracking system, if available.

- **Consider changing the reimbursement structure or increase reimbursement amounts.** The current Tier II incentive structure provides up to $6,000 for Tier II projects. TRC and NCCAA indicated that agencies may struggle covering the cost of HVAC replacements with the current reimbursement amount, which has not increased since the program began in 2015. In addition, this reimbursement cap may also prevent participants from receiving weatherization services in addition to HVAC replacements/upgrades: Based on program-tracking data, only 6% of Tier II projects include both HVAC replacements/upgrades and other Tier II measures, compared to 34% in the Durham Pilot, which provided higher incentives. Agencies may be able to provide additional energy saving measures in Tier II homes, leading to deeper savings, if the overall Tier II incentive amount was increased.

- **Increase support to agencies in program marketing and outreach.** Agencies noted that communication and organization of the program were key strengths and frequently provided unprompted praise for staff at Duke Energy and NCCAA. One area agency identified for potential additional Duke assistance was marketing and outreach to help increase customer awareness of the program. This could be through information about the program on customer bills or on Duke Energy's website, or by developing testimonials from past program participants with examples of bill savings and other benefits—such as non-energy impacts (NEIs) reported by many surveyed participants—derived from their weatherization projects.

- **Explore options to increase the uptake of comprehensive weatherization projects though the new participation channel.** The new participation channel allows non-profit and other organizations to provide program services to customers who may not have been able to receive them otherwise. One objective of this channel was to overcome barriers to participation in South Carolina, as State policies prevent CAAs from participating in the program. Based on program-tracking data through April 2020, however, the new channel has not been successful in encouraging South Carolina organizations to participate in the program. In addition, information from our agency interviews suggest that some non-CAAs may not be equipped to facilitate the implementation of weatherization projects and thus limit their activity to equipment replacement. The program should continue to explore ways to promote participation in South Carolina, by identifying suitable partner organizations (with prior weatherization expertise) and/or providing non-CAA organization with additional support in implementing weatherization services.

- **Consider expanding the Durham Pilot to include the South Carolina service territory.** Given the substantial policy barriers that continue to block participation in South Carolina, one way to provide weatherization upgrades to South Carolina customers is to introduce a program design similar to the Durham Pilot. Based on our review of project types and measures installed through the pilot, the savings potential for a program design similar to the pilot appears to be on par with, or even greater than, savings observed for the Weatherization Program. In addition, pilot participants and staff were very satisfied with the experience, and there were very few implementation challenges. If policy barriers persist, or the new participation channel fails to increase participation in South Carolina, this may be an option to expand services in the state.

8. Summary Form

Duke Energy Carolinas
Low Income Weatherization Program

Completed EM&V Fact Sheet

Program Description

The DEC Weatherization Program reimburses local implementing agencies that have recently completed qualifying weatherization projects at Duke Energy customer homes. Electric conservation measures are provided at no cost to the customer. A tiered project structure is used to allocate reimbursements to agencies: Tier I applies to low usage homes and offers air sealing and low-cost energy efficiency upgrades (including lighting and low-flow aerators and showerheads); Tier II applies to higher usage homes and offers more comprehensive energy efficiency measures (including insulation and HVAC upgrades/ replacements) in addition to Tier I measures.

Date	April 16, 2021
Region(s)	Duke Energy Carolinas
Evaluation Period	April 1, 2016–December 31, 2018
Annual kWh Savings (ex post net)	3,181,027 kWh
Coincident kW Impact (ex post net)	Summer: 539.2 kW Winter: 935.2 kW
Per Participant kWh Savings	Tier I: 241 kWh Tier II: 2,042 kWh Refrigerator: 758 kWh
Measure Life	Not evaluated
Net-to-Gross Ratio	N/A
Process Evaluation	Yes
Previous Evaluation(s)	June 2018

Evaluation Methodology

The evaluation team performed a process and gross impact evaluation.

The process evaluation included a participant survey and interviews with participating surveys. We also performed a limited process analysis of the Durham Pilot.

The gross impact evaluation included an engineering analysis and a consumption analysis and leveraged results from the prior evaluation.

Impact Evaluation Details

- We determined annual per household energy savings for Tier II participants using consumption analysis.
- We determined annual per household energy savings for Tier I participants based on a combination of engineering analysis results and results from the prior evaluation.
- We estimated demand savings for Tier I and Tier II participants based on engineering analysis-based demand-to-energy ratios, applied to energy savings.
- We developed savings for refrigerator replacements and HVAC replacements/ upgrades through engineering analysis.
- The engineering analysis applied deemed savings values to measures distributed and in service. In-service rates were calculated based on information collected in the participant survey.

9. DSMore Table

The Excel spreadsheet containing measure-level inputs for Duke Energy Analytics is provided below. Per-measure savings values in the spreadsheet are based on the impact analyses reported above. The evaluation scope did not include updates to measure life assumptions.

DSMore - DEC
Weatherization Prog

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I/A

Nexant
Reimagine tomorrow.

2019-2020 Power Manager Evaluation Report

Submitted to Duke Energy Carolinas

June 23, 2021

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Contents

List of Figures

List of Tables

Equations

1 Executive Summary

This report presents the results of the 2019 Power Manager impact and process evaluations for the Duke Energy Carolinas territory, as well as results of a supplemental 2020 impact analysis. Power Manager is a voluntary demand response program that offers incentives to residential customers who allow Duke Energy to reduce the use of their central air conditioner's outdoor compressor and fan during summer days with high energy usage. Through the program, events may be called to help lessen electricity use during times of high demand. During normal shed events, a remote signal is sent to participating load control devices that reduce customers' air conditioner use. During emergency shed operations, all devices are initiated to quickly shed loads and deliver larger demand reductions.

1.1 Impact Evaluation Key Findings

The 2019 impact evaluation is based on a randomized control trial. All Power Manager program participants who had a load control device installed by the start of the summer were randomly assigned to one of six groups – a primary group made up of 75% of the population, and five research groups, each made up of 5% of the population. During each event, one or more of the smaller research groups (each comprising approximately 11,000 customers) is withheld as a control group in order to provide an estimate of energy load profiles absent a Power Manager event. During the summer of 2019, approximately 238,000 households were actively participating in Power Manager and had load control devices.

Impacts were estimated using an RCT approach for all but two events called in 2019. By design, the test event called on August 9 dispatched the full program population and did not withhold a control group. The general population event on September 9 also lacked a control group due to event programming error. As a result, an RCT design could not be applied for these two events. Instead, impacts for these events were estimated using a within-subjects approach, summarized in Section 5. The event called on 7/19 included a side-by-side test of emergency and normal operations in order to estimate the incremental demand reductions due to emergency operations. Table 1-1 summarizes the demand reductions attained during each event in 2019.

A few key findings of the 2019 impact analysis are worth highlighting:

- Demand reductions were 0.73 kW per household for the average general population event.
- On average, emergency shed produced impacts that were 0.45 kW greater than normal shed events.
- In general, the magnitude of demand reductions grows larger when temperatures are higher and resources are needed most.
- The time-temperature matrix predicts 1.54 kW load reduction per household for a 1-hour event at 100°F beginning at 4:00PM.

Table 1-1: Demand Reductions for Individual 2019 Events

Event Date	Shed Type	Event Period	Reference Load	Impact	90% Confidence		% Impact	90%Confidence		Max Event Temp[1]
					Lower Bound	Upper Bound		Lower Bound	Upper Bound	
7/15/2019	Normal	4:00PM - 6:00PM	3.65	-0.92	-0.96	-0.88	-25.2%	-24.1%	-26.2%	91.3°F
7/19/2019	Emergency	4:00PM - 4:30PM	3.60	-1.09	-1.13	-1.05	-30.4%	-29.3%	-31.5%	92.6°F
8/9/2019	Emergency	4:30PM - 5:00PM	3.45	-1.26	-1.08	-1.45	-36.6%	-31.2%	-41.9%	92.1°F
8/19/2019	Normal	12:00PM - 1:00PM	2.84	-0.58	-0.63	-0.53	-20.4%	-18.7%	-22.1%	89.9°F
	Normal	2:00PM - 3:00PM	3.33	-0.65	-0.70	-0.60	-19.6%	-18.1%	-21.2%	91.3°F
9/9/2019	Normal	4:00PM - 4:00PM	3.26	-0.69	-0.79	-0.58	-21.1%	-17.9%	-24.3%	90.8°F
9/12/2019	Normal	3:00PM - 6:00PM	3.43	-0.75	-0.78	-0.71	-21.8%	-20.7%	-22.9%	92.9°F
9/17/2019	Regular	12:00PM - 1:00PM	2.11	-0.29	-0.33	-0.25	-13.8%	-11.7%	-15.9%	88.3°F
	Regular	2:00PM - 4:00PM	2.77	-0.37	-0.43	-0.32	-13.4%	-11.5%	-15.3%	89.6°F
	Regular	4:00PM - 6:00PM	3.14	-0.68	-0.72	-0.64	-21.8%	-20.5%	-23.0%	89.5°F
	Regular	6:00PM - 7:00PM	3.16	-0.55	-0.61	-0.50	-17.5%	-15.7%	-19.2%	87.1°F
9/26/2019	Regular	4:00PM - 6:00PM	2.94	-0.58	-0.62	-0.55	-19.8%	-18.6%	-21.1%	89.0°F
Average General Population Event			**3.32**	**-0.73**	**-0.79**	**-0.68**	**-22.0%**	**-20.3%**	**-23.6%**	**90.4°F**

The findings from 2019 indicated that the impacts were likely affected by one or more issues arising from regional/locational dispatch signals, complexities stemming from the EM&V feeder group assignments, or possibly some other unidentifiable factor(s). Following the 2019 event season, Duke Energy undertook efforts to identify and address the possible issues and requested that Nexant complete a subsequent impact analysis on the 2020 event season. The results of the 2020 impact analysis are presented independently in Section 8 of this report.

The 2020 analysis methodology differed from the analysis approach used in 2019 in a few fundamental ways. First, the 2020 impact analysis relied entirely on a within-subjects analysis framework rather than a RCT. This alternate approach was required in order to accommodate the simplified configuration of the program population, which dispatched events at the full program level without any control group. Second, the 2020 analysis also utilized a small subset of customers from among the program's population who were discovered to have 15-minute interval meter data, rather than the expected 30-minute interval data. This group benefitted the analysis by enabling Nexant to better assess impacts achieved during events having durations that were not multiples of 30 minutes (i.e. events lasting 15 or 45 minutes), but did not supplant the full program population as the basis for the 2020 impact analysis.

Key findings of the 2020 impact analysis are summarized as follows:

- Emergency shed event impacts ranged from 0.89 kW to 1.17 kW.
- The general population event held on September 11 produced load impacts of 0.60 kW.
    - The magnitude of impacts observed during the September 11 event can be explained by relatively low temperatures observed on that day; the event was

[1] Maximum event temperatures are based on system average temperatures among eight weather stations.

called by the Energy Control Center in order to maintain system integrity rather than in response to extreme weather.

- The 2020 event impacts are similar to those in 2019 when controlling for similar dispatch conditions.
- If emergency shed becomes necessary on a day where the event temperature is 100°F, Power Manager can deliver 1.59 kW of demand reductions per household during a one-hour event at 4:00PM.

Table 1-2: Demand Reductions for Individual 2020 Events

Event Date	Shed Type	Event Period	Reference Load	Impact	90% Confidence		% Impact	90%Confidence		Max Event Temp
					Lower Bound	Upper Bound		Lower Bound	Upper Bound	
6/3/2020	Emergency	3:30PM - 3:45PM	2.93	-0.89	-0.72	-1.06	-30.5%	-24.6%	-36.3%	87.1
6/22/2020	Emergency	4:30PM - 4:45PM	3.14	-1.17	-0.88	-1.46	-37.2%	-27.9%	-46.5%	85.6
8/27/2020	Emergency	4:30PM - 4:45PM	3.30	-1.04	-0.77	-1.32	-31.5%	-23.2%	-39.9%	87.4
9/2/2020	Emergency	4:30PM - 4:57PM	3.47	-1.05	-0.89	-1.22	-30.4%	-25.7%	-35.1%	89.9
9/11/2020	Normal	4:30PM - 5:12PM	3.02	-0.60	-0.41	-0.80	-20.0%	-13.5%	-26.4%	83.5

1.2 Time-Temperature Matrix and Demand Reduction Capability

A key objective of the 2019 impact evaluation was to quantify the relationship between demand reductions, temperature, hour-of-day, and cycling levels. This was accomplished by estimating loads under historical weather conditions and applying observed percent load reductions from the 2019 events. The resulting tool, referred to as the time-temperature matrix, allows users to predict the program's load reduction capability under a wide range of temperature and event conditions.

In an ideal program year, a large number of events would be called under a variety of different weather conditions, dispatch windows and cycling strategies so that demand reduction capability could be estimated for a wide range of operating and planning scenarios. In actuality, opportunities for program events can be sporadic and based on uncertain weather projections, such that they occur infrequently and under fairly similar conditions. The time-temperature matrix is based on a total of 12 events called on eight separate event days during the 2019 program season. Event periods ranged from 30 minutes to 3 hours in length, and occurred on days with maximum event period temperatures ranging from 87°F to 93°F.[2]

Figure 1-1 shows the demand reduction capability of the program if emergency shed becomes necessary on a day with a maximum temperature of 100°F during the event window and a 1-hour event duration. Individual customers are expected to deliver 1.54 kW demand reduction.

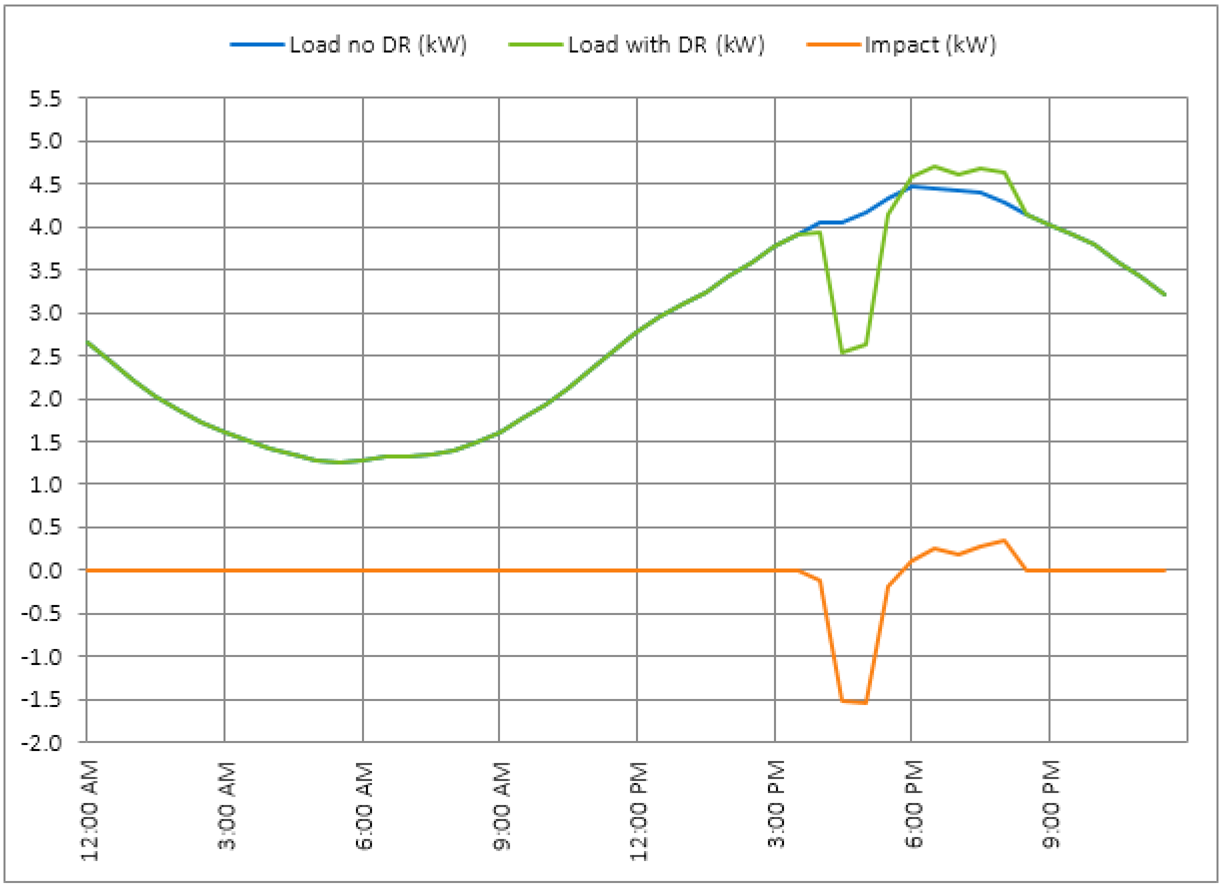
[2] Due to the scale of the DEC territory, temperatures referenced here are average temperatures (i.e. "system temperatures"), based on eight weather stations throughout the DEC territory.

Because there are approximately 238,000 customers, the expected aggregate system load reduction is 365 MW.

Figure 1-1: 2019 Demand Reduction Capability - 100°F Maximum Temperature

Inputs	
Dispatch Type	Emergency Dispatch
Event Start Time	4 PM
Event Duration	1
Event Period Max Temp	100
# Customers	238,000

Event Window Average Impacts		
Load without DR	4.12	kW per customer
Load with DR	2.58	kW per customer
Impact per Customer	-1.54	kW per customer
Program Impact	-365.4	MW
% Impact	-37.3	%



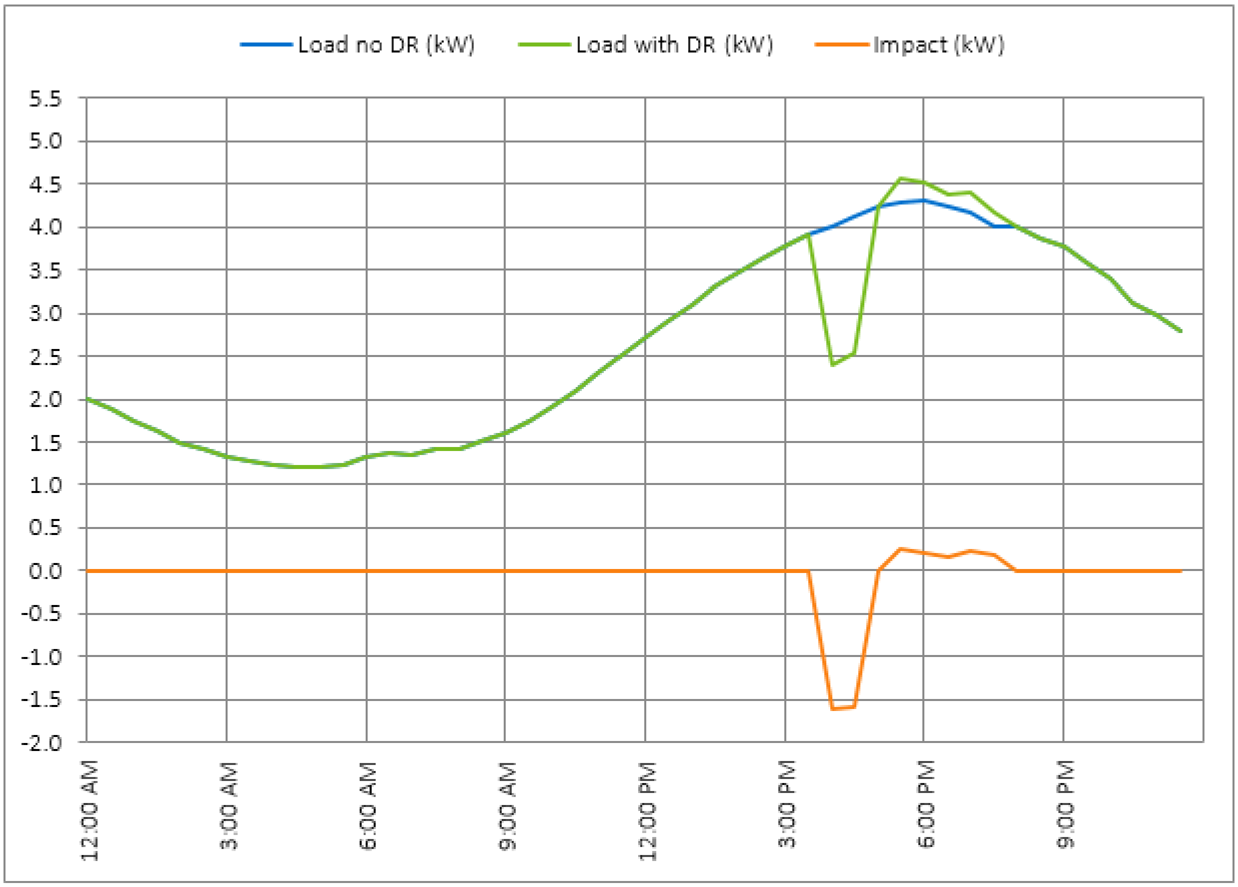
The additional data provided by the 2020 impact analysis allowed for a reconditioned time-temperature matrix to be developed utilizing a combined dataset of 2019 and 2020 event impacts. To produce this combined time-temperature matrix, models were developed based on a hot, one-hour emergency event starting at 4:00 PM and a 24-hour temperature profile with a temperature of 100°F from 4:00 PM to 5:00 PM. Additionally, because no emergency events in 2019 or 2020 exceeded 30 minutes in duration, a ratio was applied to adjust the half-hour impact to a full-hour impact using 2019 events that were at least one hour in duration.

Using the combined time-temperature matrix, based on a combined set of event data from 2019 and 2020, the tool predicts that a one-hour emergency event starting at 4:00 PM with an event temperature of 100°F will deliver 1.59 kW of demand reduction capability per customer dispatched. With a program population of approximately 238,000 customers, the expected aggregate reduction is 380 MW.

Figure 1-2: Demand Reduction Capability – 100°F Event Period Temperature

Inputs	
Dispatch Type	Emergency Dispatch
Event Start Time	4 PM
Event Duration	1
Event Period Max Temp	100
# Customers	238,000

Event Window Average Impacts		
Load without DR	4.06	kW per customer
Load with DR	2.47	kW per customer
Impact per Customer	-1.59	kW per customer
Program Impact	-379.5	MW
% Impact	-39.3	%



1.3 Process Evaluation Key Findings

The process evaluation was designed to inform efforts to continuously improve the program by identifying strengths and weaknesses, opportunities to improve program operations, adjustments likely to increase overall effectiveness, and sources of satisfaction or dissatisfaction among participating customers. The process evaluation consisted of telephone interviews with key program managers and implementers, a post-event survey implemented immediately after an event, and a nonevent survey implemented on the event day, but dispatched only to customers for whom the event was not called.

Key findings from the process evaluation include:

- 145 Power Manager participants were surveyed within 24 hours of the July 15 event, which had a high temperature of 92°F with a maximum heat index of 97°F.
- Of the 145 customers interviewed, 72 customers experienced the event and 73 customers did not experience the event. This nonevent group survey was used to establish a baseline for comfort, event awareness, and other key metrics.
- A majority of all respondents, 72%, reported that they are familiar with the Power Manager program, down from the last evaluation cycle.
- About 18% of both sets of survey respondents—those who had and those who had not experienced the event—reported that their homes were uncomfortable. There is no increase in customers' thermal discomfort due to Power Manager events.
- 52% of respondents reported that "Earning a credit on my bill" is the primary reason they are Power Manager participants.
- Overall, 87% of participants are "very" or "somewhat" likely to remain in the program.
- 83% of respondents "strongly" or "somewhat" agreed that they would recommend the Power Manager program to others.
- New installations and quality control reinstallations, replacements, and repairs substantially exceeded goals.
- The Power Manager staff and vendors are customer focused and undertake a number of activities before, during, and after the load control season to ensure that the program administration and implementation runs smoothly, and that participants are satisfied with their Power Manager program experience.
- Yukon software system has been upgraded with the "Assets" package that provides increased functionality and granularity in calling Power Manager events.
- Effective communication strategies amongst stakeholders is an ongoing strength of the program.

2 Introduction

This report presents the results the 2019 Power Manager program impact and process evaluations, as well as results of a supplemental 2020 impact analysis, for the Duke Energy Carolinas (DEC) jurisdiction. Power Manager is a voluntary demand response program that provides incentives to residential customers who allow Duke Energy to reduce the use of their central air conditioner's outdoor compressor and fan on summer days with high energy usage.

Because Duke Energy has full deployment of smart meters in DEC territory, and has access to Power Manager customers' interval data, the impact evaluation is predominantly based on a randomized control trial that randomly assigned customers to six different groups prior to the 2019 event season. During each event, at least one of the groups is withheld to serve as a control group and provide an estimate of customer's load usage profiles absent a Power Manager event. The randomized control trial approach was applied to all normal Power Manager operations where a valid control group was available, as well as to test events designed to address a set of specific research questions.

In addition to estimating load impacts during 2019 events, this study enables the estimation of the program's demand reduction capability under a range of weather and dispatch conditions. Average customer load reductions, as well as aggregate system capacity, is estimated as a function of event type, event start time, event duration, and maximum event temperature.

The process evaluation uses survey data from both treatment and control customers, as assigned for impact analysis, gathered during a non-emergency event. As in the impact analysis, responses from control group customers served as a baseline from which treatment effects on the customer experience may be measured. In addition, the evaluation uses interview data and analyses of program documentation and the program database to offer analytic context for evaluating survey results, as well as to offer insight into program operations.

2.1 Key Research Questions

The study data collection and analysis activities were designed to address the following research questions:

2.1.1 Impact Evaluation Research Questions

- What demand reductions were achieved during each event called in 2019?
- Do impacts vary based on the hour(s) of dispatch?
- Do impacts vary based on temperature conditions?
- What is the magnitude of the program's aggregate load reduction capability during extreme conditions?

2.1.2 Process Evaluation Research Questions

- What is the extent to which participants are aware of events, bill credits, and other key program features?

- What is the participant experience during events?
- What are the motivations and potential barriers for participation?
- What are the processes associated with operations and program delivery?
- What are the program's strengths and areas for potential improvement?

2.2 Program Description

Power Manager is a voluntary demand response program that provides incentives to residential customers who allow Duke Energy to reduce their central air conditioner's outdoor compressor and fans on summer days with high energy usage. All Power Manager participants have a load cycling switch device installed on the outdoor unit of their qualifying air conditioners. If customers have more than one air conditioner, all units must be equipped with a load control device. The device enables the customer's air conditioner to be cycled off and on to reduce load when a Power Manager event is called. Duke Energy initiates events by sending a signal to participating devices through its own paging network, which instructs the switch devices to systematically cycle the air conditioning system on and off, reducing the aggregate runtime of the unit during events.

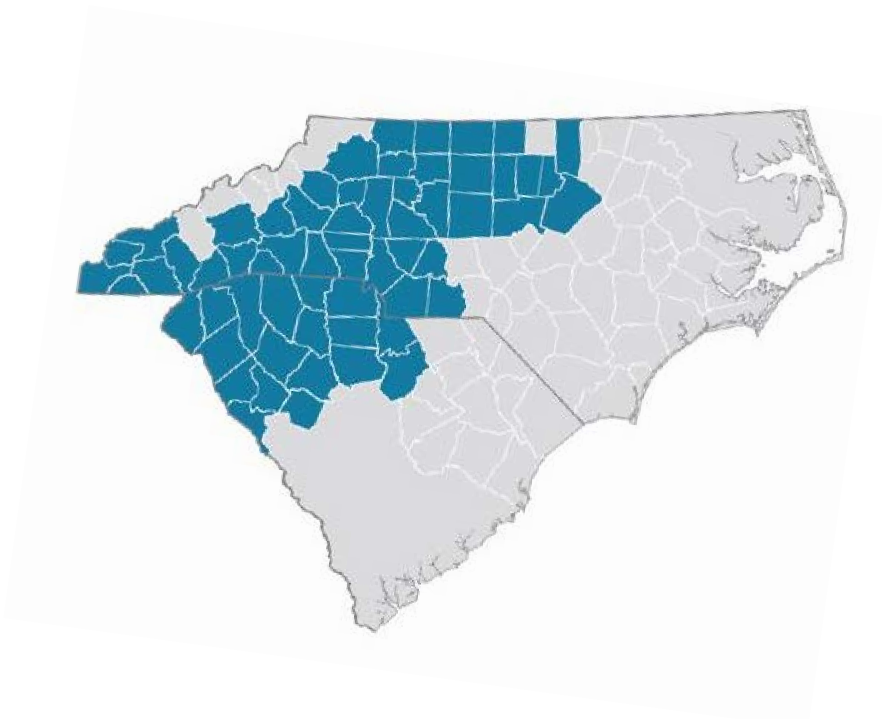
Power Manager events typically occur from June through September in DEC territory, but are not limited to these months. Participants receive financial incentives for their participation in the form of $8 credits applied to their July through October electric bills ($32 in annual credits).

In DEC territory, Duke Energy uses a cycling algorithm known as *TrueCycle*. The algorithm uses learning days to estimate air conditioners' runtime (or duty cycle) as a function of hour-of-day and temperature at each specific site, and aims to curtail load demand by a specified amount. In general, Power Manager events fall into two categories: regular shed events, during which customers are cycled at 64% or the less frequently used 50%, and emergency full-shed events, during which customers are shed at 100%. For purposes of regulatory reporting, emergency full-shed is used to estimate program capability.

2.3 Participant Characteristics

Duke Energy serves approximately 2.25 million residential customers in DEC service territory, which spans a large portion of the western half of North Carolina and northwestern South Carolina (Figure 2-1). During the summer 2019, nearly 238,000 customers - or more than 10% of the residential population - were part of Power Manager.

Figure 2-1: Duke Energy Carolinas Service Territory



To enroll in Power Manager, customers must own a single-family home located in DEC service territory and have a functional central air conditioning unit with an outdoor compressor. Figure 2-2 depicts Power Manager program enrollment over time.

Figure 2-2: Power Manager Participation Over Time[3]

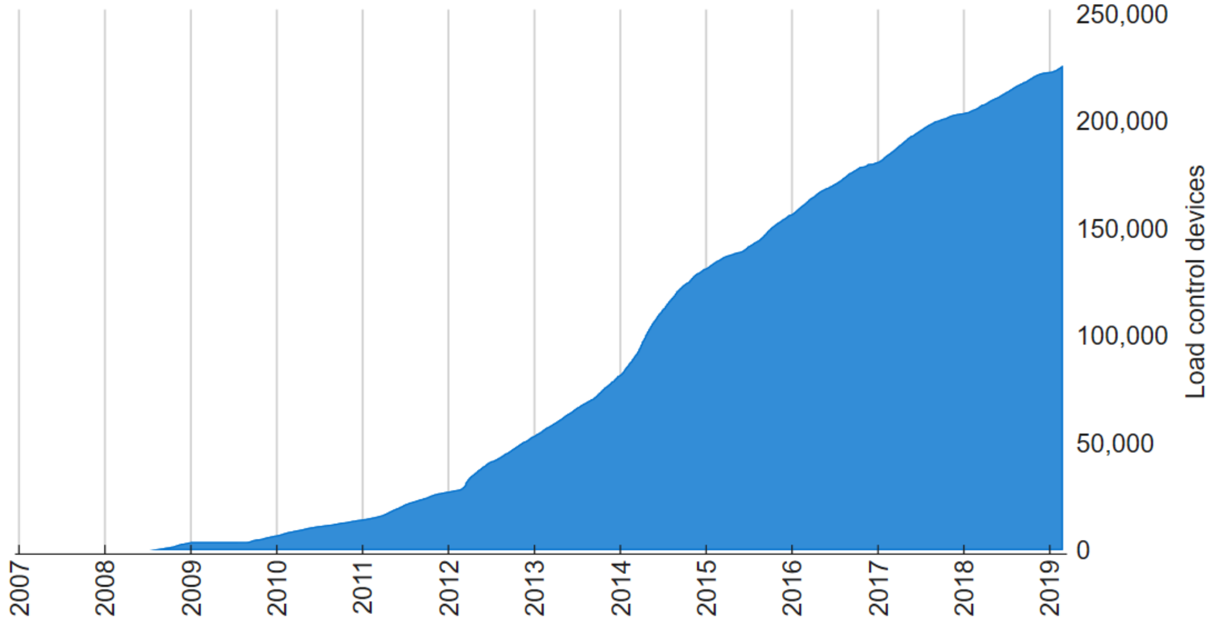
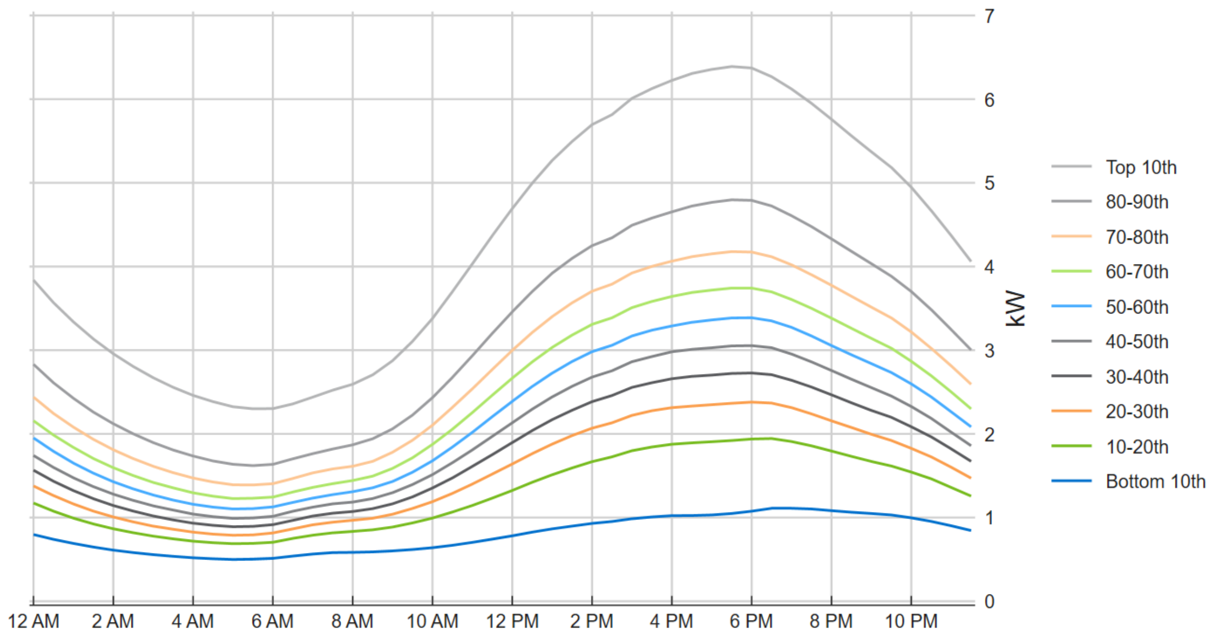


Figure 2-3 shows the hourly household loads for different customer groups. The customers were classified into ten equally sized groups, known as deciles, based on their household consumption during hot, non-event days. Each line represents the hourly loads for the average customer in each decile.

[3] Participation growth presented in Figure 2-2 is based on historical enrollment records made available to Nexant for the Power Manager program, and do not reflect participation and/or enrollments in prior load control programs that were integrated into the current Power Manager program.

Figure 2-3: Household Loads by Size Decile



Household loads varied substantially, reflecting different occupancy schedules, comfort preferences, and thermostat settings.[4] Roughly 30% of loads exceeded 4 kW during the peak period. As with any program, some enrollees use little or no air conditioning during late afternoon hours on hotter days. These customers are, in essence, free riders. The bulk of the costs for recruitment, equipment, and installation have already been sunk for these customers and, as a result, removing these customers may not improve cost effectiveness substantially. However, given the availability of smart meter data, Nexant recommends assessing nonparticipant afternoon loads on hotter days prior to marketing in order to target customers who are cost effective to enroll.

2.4 2019 Event Characteristics

Duke Energy dispatched Power Manager events 12 times in 2019. All general population events occurred either between 4:00PM and 6:00PM or between 3:00PM and 6:00PM. Emergency events were dispatched twice, once on July 19 as part of a side-by-side event, where emergency dispatch was released simultaneously alongside normal dispatch operations, and once on August 9, where all customers were dispatched at once under emergency shed. The side-by-side dispatch framework allowed for direct comparison of emergency event performance compared to general dispatch. Temperatures during events ranged from 87°F to 93°F.[5] Table 2-1 summarizes 2019 event conditions.

[4] It is assumed that household-level demand on these days is predominantly due to AC use; however, other factors could contribute to the varying customer loads.

[5] Due to the scale of the DEC territory, temperatures referenced here are average temperatures (i.e. “system temperatures”), based on eight weather stations throughout the DEC territory. Actual daily maximum temperatures on event days ranged from 91°F to 98°F across the jurisdiction.

Table 2-1: 2019 Event Operations and Characteristics

Event Date	Event Period	Type of Event	Customers Dispatched	Control Group	Max Event Temp	Notes
7/15/2019	4:00PM - 6:00 PM	GP	180,444	6,919	91.3°F	Normal shed Feeder 1 control
7/19/2019	4:00PM - 4:30PM	M&V	6,917	180,317	92.6°F	Emergency shed Feeder 1 dispatched
	4:00PM - 5:00PM	M&V	-	-	-	No feeders dispatched (Programming error)
8/9/2019	4:30PM - 5:00PM	M&V	186,258	-	92.1°F	Emergency shed Full population dispatched
8/19/2019	12:00PM - 1:00PM	M&V	6,886	172,561	89.9°F	Normal shed Feeder 1 dispatched
	1:00PM - 2:00PM	M&V	-		-	Feeder 2 not dispatched (Programming error)
	2:00PM - 3:18PM*	M&V	6,432		91.3°F	Normal shed Feeder 3 dispatched
9/9/2019	4:00PM - 6:00PM	GP	184,981	-	90.8°F	Normal shed No control group
9/12/2019	3:00PM - 6:00PM	GP	178,487	6,357	92.9°F	Normal shed Feeder 3 control
9/17/2019	12:00PM - 1:00PM	M&V	6,854	6,339	88.3°F	Normal shed Feeder 1 dispatched
	1:00PM - 2:00PM	M&V	-		-	No feeders dispatched (Programming error)
	2:00PM - 4:00PM	M&V	6,353		89.6°F	Normal shed Feeder 3 dispatched
	4:00PM - 6:00PM	M&V	158,249		89.5°F	Normal shed Feeder 10 dispatched
	6:00PM - 7:00PM	M&V	6,884		87.1°F	Normal shed Feeder 4 dispatched
9/26/2019	4:00PM - 6:00PM	GP	177,525	6,858	89.0°F	Normal shed Feeder 4 control

** Event was ended early due to rain.*

Duke Energy dispatched three research events during 2019. The first was held on July 19 and overlaid a group of customers dispatched under emergency shed operations simultaneously alongside a group dispatched under normal shed operations. Here, the objective was to assess how the magnitude of emergency shed impacts compares to traditional operations. Two subsequent events, called on August 19 and September 17, were designed to measure the effect of time-of-day on event impacts. During these “cascading events” multiple groups of customers were dispatched successively such that, as one group’s dispatch was ending, the next group’s dispatch was beginning.

3 Methodology and Data Sources

This section details the study design, data sources, sample sizes, and analysis protocols for the impact and process evaluations.

3.1 Data Sources

3.1.1 Impact Evaluation Data Sources

The impact analysis relied on four primary datasets:

1) Participant data that identified customer account numbers and feeder assignments;
2) End-use AMI data in 30-minute intervals for all participants for the entire program event season (May thru September);
3) Event data for all DEC Power Manager events in 2019, which identified treatment and control feeders, event type, and start/end times for each event, and;
4) Hourly weather data for the entire summer, which informed the selection of proxy days for the within-subjects analysis, as well as establish the impact-weather relationship for the time-temperature matrix.

The data was provided by Duke Energy at the end of the 2019 Power Manager season. All subsequent datasets used for impact analysis were created from a combination of these primary datasets.

3.1.2 Process Evaluation Data Sources

The process analysis relied on four primary data sources:

1) Program documentation and program database
2) In-depth interviews with key program stakeholders
3) Post-event participant surveys
4) Nonevent program participant surveys

Program documentation was provided before, during, and after the 2019 Power Manager season, while interview and survey data was gathered during the 2019 Power Manager season.

3.2 Data Management and Cleaning

All data sets were thoroughly cleaned and validated to ensure that impacts were estimated using only reliable observations from customers who were properly dispatched on event days. The analysis benefitted from a full population-based approach, allowing Nexant to logically exclude customers who were found to have incomplete or questionable load data, while still maintaining large enough sample sizes to produce highly precise estimates.

Recent evaluations of DEC Power Manager found incidence of device failure, signaling deficiency, or other technical dysfunction that prevented a portion of customers from being dispatched as planned for certain events. Specifically, in 2016, Nexant found that approximately 6.5% of load control devices were not functioning properly during the event season, and were unable to contribute load impacts to the program. With this in mind, and working with a more robust set of customer data, Nexant was careful to monitor individual groups' responses to each event called in 2019, and to adapt the analysis wherever appropriate in order to produce the most accurate and authentic results.

During the course of the 2019 analysis, Nexant discovered that, in many cases, an entire feeder group was not dispatched according to program planning. In other cases, smaller, but still detectable, portions of feeder groups were not dispatched as programmed. Table 3-1 summarizes the dispatch issues that affected the 2019 Power Manager events. Subsequent discussions with Duke Energy revealed that most dispatch issues were the result of programming error associated with the establishment of the randomized control trial feeder groups, and not due to any paging tower or other technical dysfunction with the program's equipment.

Table 3-1: 2019 Event Data Issues Summary

Affected Segment(s)	Affected Event(s)		Summary of Issue	Resolution
Feeder 2	7/15/2019 7/19/2019	8/19/2019 9/17/2019	Feeder 2 was not dispatched as planned for all general population events due to programming error.	Affected segment was excluded from the analysis for all affected events.
Control groups	9/9/2019 9/12/2019	9/17/2019 9/26/2019	A portion of control groups showed signs of dispatch during events, resulting in biased reference loads.	Affected customers were excluded from the analysis for all affected event days.
Customers with outlier usage	All events		A portion of groups observed abnormal usage patterns during events, resulting in biased reference loads.	10% of customers with abnormal usage were removed from the analysis.

In general, Nexant was able to work around the issues described in Table 3-1 by excluding customers from the analysis whose systems did not behave as planned on given event days and, in most cases, the analysis was unaffected. However, one prevalent outcome of the issues described in Table 3-1 is that feeder 2 presented aberrant usage behavior in virtually all events where they were designated as treatment. Because the issues associated with feeder 2 were so widespread, Nexant opted to eliminate the entire group from the impact analysis. As a result, the September 9 event was affected such that feeder 2 was no longer usable as a control group, as planned. In lieu of a control group, Nexant performed a within-subjects analysis to estimate impacts for the September 9 event rather than an RCT.

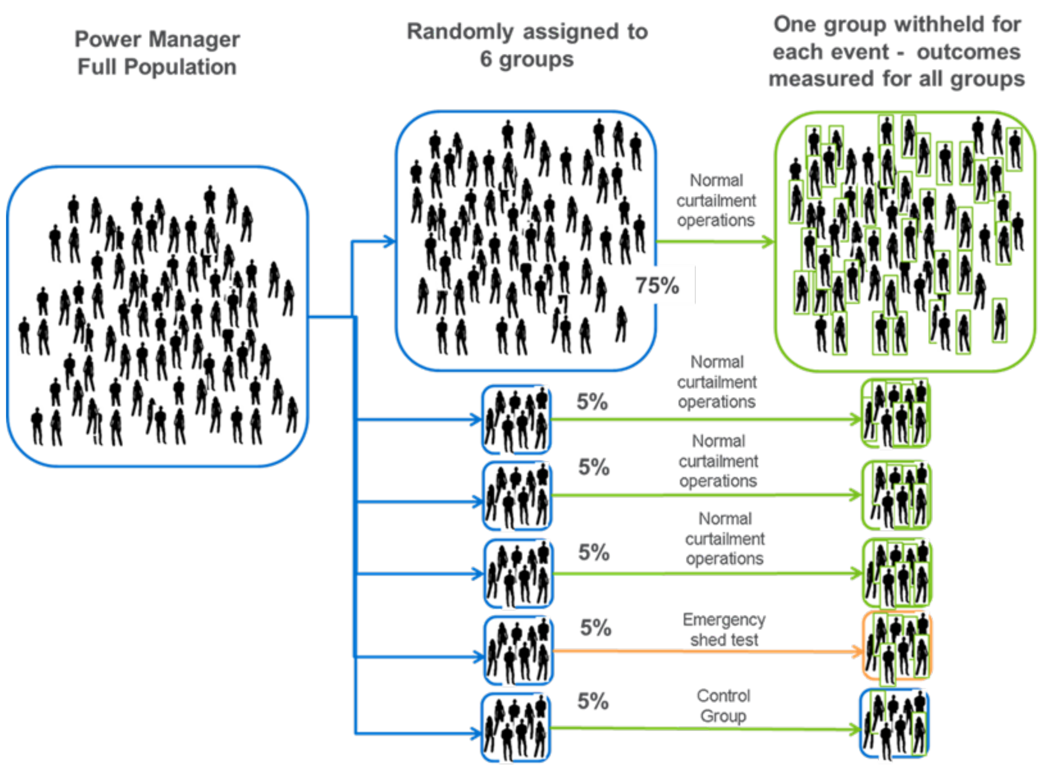
3.3 Randomized Control Trial Analysis Design

Randomized control trials are well-recognized as the gold standard for obtaining accurate impact estimates and have several advantages over other methods:

- They require fewer assumptions than engineering-based calculations;
- They allow for simpler modeling procedures that are effectively immune to model specification error; and
- They are guaranteed to produce accurate and precise impact estimates, provided proper randomization and large sample sizes.

The RCT design randomly assigns the Power Manager population into six groups – a primary group consisting of 75% of the population and five research groups, each consisting of 5% of the population. For each event, groups are assigned as either treatment or control according to Duke Energy's operational plan.[6] All devices assigned to the treatment group are controlled during the event window, while devices assigned to the control group are withheld and continue to operate normally. As a result of random group assignment, the only systematic difference between the treatment and control groups is that one set of customers is curtailed while the other group was not. Figure 3-1 shows the conceptual framework of the random assignment.

Figure 3-1: Randomized Control Trial Design



[6] The emergency shed test event on August 9 dispatched all program participants and therefore, no control group was withheld.

All customers who were enrolled in the program and had addressable load control devices installed by the start of the 2019 summer were randomly assigned into six distinct groups.[7] Table 3-2 summarizes the number of devices and the number of accounts assigned to each group. By design, the primary general population group includes 75% of participants, approximately 170,000 participants. The remaining five research groups each include 5% of participants, or roughly 11,000 customers each.

Table 3-2: Feeder Group Assignment[8,9]

Feeder Group	Number of Accounts	Number of Devices
10	169,326	203,428
1	11,221	13,458
2	11,225	13,586
3	11,312	13,510
4	11,306	13,560
5	11,311	13,668
Total	**225,701**	**271,210**

The purpose of creating six distinctive, randomly assigned groups was twofold. First, it allowed for side-by-side testing of cycling strategies, event start times, or other operational aspects to help optimize the program. Second, it allowed Duke Energy to alternate the group being withheld as control for each event, increasing fairness and helping to avoid exhausting individual customers by dispatching them too often solely for research purposes.

To ensure that random group assignment was properly implemented, average loads for each of the six groups were compared to each other for all non-event days with temperatures reaching 90°F or higher.[10] Figure 3-2 shows average loads for each feeder group on these hottest, non-event days. Feeder loads are nearly identical, which provides strong evidence that the random group assignment effective. It also emphasizes the high degree of precision provided by an effective RCT design for estimating the counterfactual.

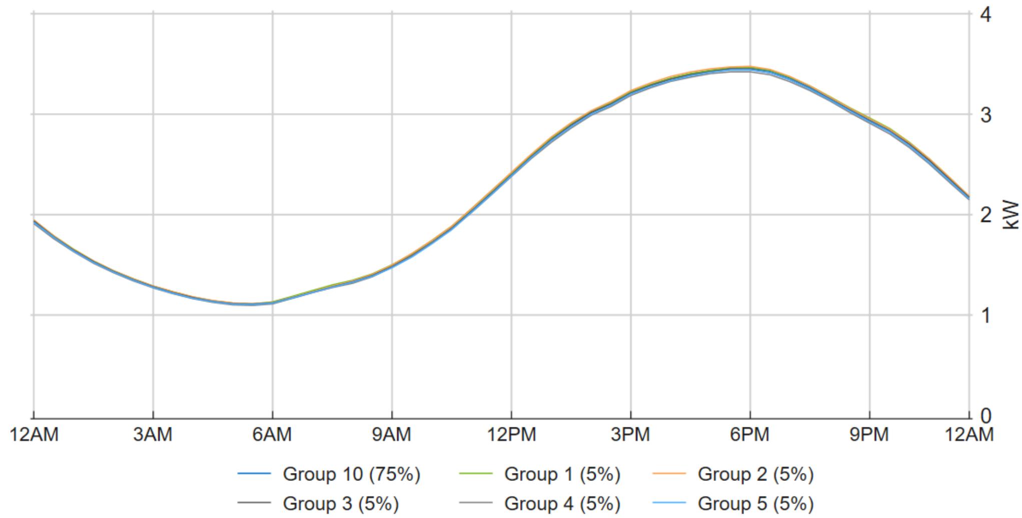
7 Some households have multiple load control devices; in these instances the homes were randomly assigned such that all devices in a given home were in the same group.

8 The number of accounts and devices presented in Table 3-2 reflect the enrollment counts included in the participation extract provided to Nexant following the summer 2019 Power Manager season and used in the original 2019 evaluation. They do not represent the updated program population of approximately 238,000 accounts and 288,000 devices enrolled at the time of the report submission.

9 Account and device counts exclude participants who were not assigned to a feeder group in the dataset received by Nexant.

10 A total of 18 non-event weekdays reached at least 90°F in 2019.

Figure 3-2: Average Customer Loads on the Hottest Non-Event Days by Feeder



For each event, one of the five smaller research groups was withheld to serve as a control group and establish the electricity load patterns in the absence of curtailment, i.e. the baseline. Within the experimental framework of a RCT, the average usage for control group customers provides an unbiased estimate of what the average usage for treatment customers would have been if an event had not been called. Therefore, estimating event day load impacts requires simply calculating the difference in loads between the treatment and control groups during each interval of the event window, as well as for the hours immediately following the event when snapback can occur. Demand reductions calculated in this way reflect the net impacts and inherently account for offsetting factors, such as device failures, paging network communication issues, and customers' use of fans to compensate for curtailment of air conditioners.

Impacts are calculated simply by taking the difference in loads between the treatment and control groups. However, additional statistical metrics, such as standard error, are calculated in order to evaluate whether these differences are meaningful, as well as whether different cycling strategies could produce significantly different impacts. The standard error is then used to calculate 90% confidence bands, which are additional measures used to describe the statistical accuracy of the impact estimate. The standard error is calculated using the formula shown in Equation 1.

Equation 1: Standard Error Calculation for Randomized Control Trial

$$Std. Error\ of\ Difference\ between\ Means_i = \sqrt{\frac{sd_c^2}{n_c} + \frac{sd_t^2}{n_c}}$$

Where:

- *sd* = standard deviation
- *n* = sample size
- *t* = indicator for treatment group
- *c* = indicator for control group
- *i* = individual time intervals

3.4 Within-Subjects Analysis Design

Although an RCT approach has many implicit advantages that make it the preferred method for estimating impacts, it is not applicable when no valid control group is available to establish the counterfactual. In these cases, when events were called absent a control group, a within-subjects approach was used, whereby customer loads observed on similar non-event days were used to establish the counterfactual against which to compare treatment loads. This approach works because the program intervention is introduced on some days, and withheld on other days that could otherwise be considered event-worthy, allowing for comparison of load patterns with and without load control.

A key consideration of the within-subjects design is how to select a model that generates the most precise and accurate counterfactual, and by extension impacts. In many cases, multiple counterfactuals may be plausible, but result in varying estimations of impacts. Using non-event days with similar temperature conditions, regression modeling was applied to estimate the demand reduction as the difference between the predicted baseline loads and the actual event day loads. In order to identify the regression model that best predicts the counterfactual, a rigorous model selection process is applied, whereby ten distinct model specifications were tested and ranked using various accuracy and precision metrics. The best performing model was selected and used to estimate the counterfactual for actual event days. Figure 3-3 summarizes the regression model selection process.

Figure 3-3: Within-Subjects Regression Model Selection

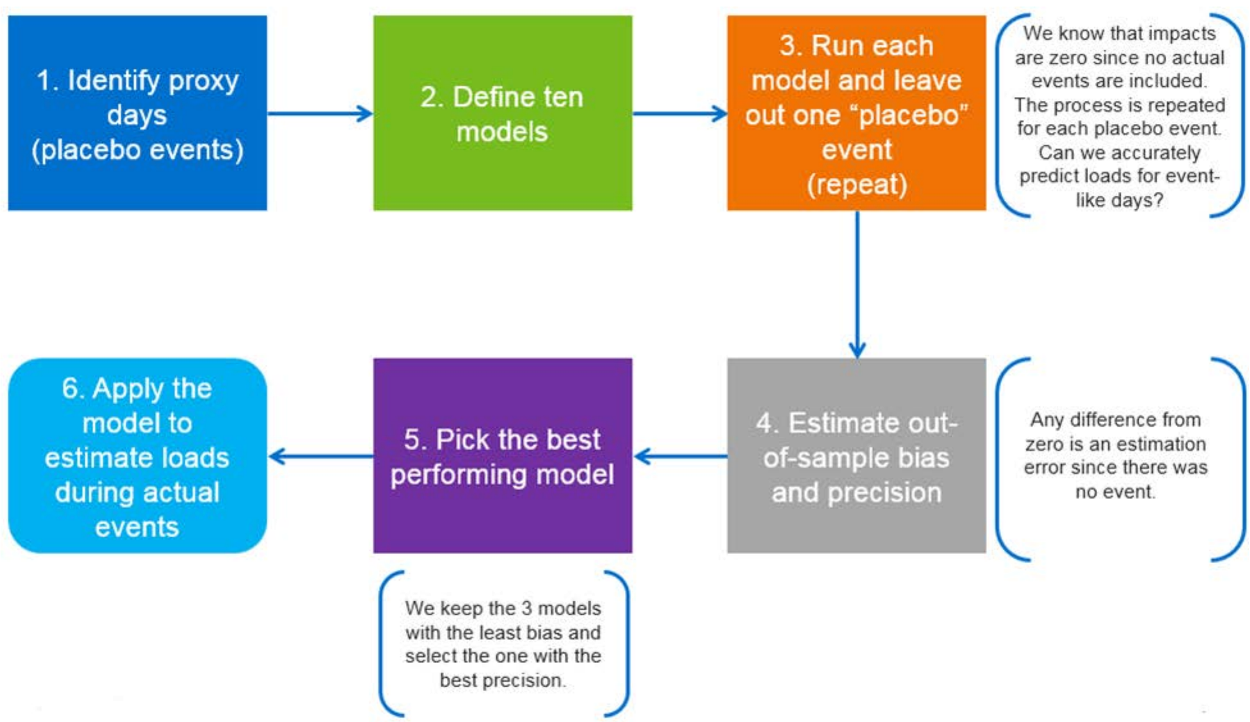


Table 3-3 summarizes metrics for bias and precision. Bias metrics measure the tendency of different approaches to over or under predict and are measured over multiple out-of-sample days. The mean percent error (MPE) describes the relative magnitude and direction of the bias.

A negative value indicates a tendency to under predict and a positive value indicates a tendency to over predict. The precision metrics describe the magnitude of errors for individual event days and are always positive. The closer they are to zero, the more precise the model prediction. The absolute value of the mean percentage error is used to select the three model candidates with the lowest bias. The coefficient of variation of the root mean square error, or CV(RMSE), metric is used to identify the most precise model from the three models with the least bias.

Table 3-3: Measures of Bias and Precision

Type of Metric	Metric	Description	Mathematical Expression
Bias	Average Error	Absolute error, on average	$AE = \frac{1}{n}\sum_{i=1}^{n}(\hat{y}_i - y_i)$
	Mean Percentage Error (MPE)	Indicates the percentage by which the measurement, on average, over or underestimates the true demand reduction	$MPE = \frac{\frac{1}{n}\sum_{i=1}^{n}(\hat{y}_i - y_i)}{\bar{y}}$
Precision	Root Mean Squared Error	Measures how close the results are to the actual answer in absolute terms, penalizes large errors more heavily	$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(\hat{y}_i - y_i)^2}$
	CV(RMSE)	Measures the relative magnitude of errors across event days, regardless of positive or negative direction (typical error)	$CV(RMSE) = \frac{RMSE}{\bar{y}}$

3.5 Process Evaluation Methodology

Table 3-4: Summary of Process Evaluation Activities

Data Collection Technique	Description of Analysis Activities Using Collected Data	Sample Size	Precision / Confidence Level
Document and database review	Review of program documentation, including program manuals, customer communications, as well as the program database. These materials provide evidence of program operations, as well as how these operations are aligned with program savings and other goals.	NA	NA
Interviews of key contacts	Interviews with Duke Energy staff will document program processes, identify strengths/weaknesses and provide a foundation for understanding the customer experience.	4	NA
Post-event survey	Phone and web survey of Power Manager customers who experienced an event, to assess event awareness, satisfaction, customer experience and comfort during events, and motivations for participation.	72	90/10
Nonevent survey	Phone and web survey of Power Manager customers for whom an event was not called. Nonevent survey data provide a baseline with which to compare post-event responses, to establish levels of event awareness, satisfaction, customer experience and comfort during events, and motivations for participation.	73	90/10

The process evaluation included four primary data collection tasks in order to achieve the research objectives listed in Table 3-4.

Review program documentation and analyze program database—Process evaluation should be guided by a thorough understanding of the primary activities of any program, the marketing messages used to recruit and support participants, and any formal protocols that guide processes. For demand response programs, it is particularly important to understand the event notification procedures, any opt-out processes that exist, and how bill credits are communicated and applied. It is also important to understand how the program opportunity is communicated and the types of encouragement provided to participating households. These communications are often the source of program expectations, which can affect participant satisfaction. To support this task, Nexant requested copies of internal program manuals and guidelines as well as copies of marketing materials. The program database analysis consisted of an examination of program tenure, load curtailed per household, and other variables that inform indications of program progress.

In-depth interviews with key program stakeholders—Program stakeholders include program staff and implementation contractors with insight into program plans and operations, emerging issues, and the expected customer experience. The interviews conducted for the 2019 evaluation informed the customer survey design and confirmed the evaluation team's understanding of key program components.

Goals of the interviews included:

- Understanding marketing and recruitment efforts, including lessons learned about the key drivers of enrollment;
- Identifying "typical" Power Manager households, including characteristics of households that successfully participate for multiple years;
- Describing event processes;
- Understanding opt-out procedures;
- Confirming enrollment incentive levels and how event incentives are explained to customers;
- Understanding the customer experience;
- Identifying any numeric or other program performance goals (kW enrollment, number of households, notification timelines) established for Power Manager;
- Describing the working relationship between Duke Energy and the program implementers, including the allocation of program responsibilities; and
- Understanding emergent and future concerns, and plans to address them.

Post-event surveys—Guided by information obtained from stakeholder interviews and a review of program guidance documents (including any notification protocols), Nexant developed a survey for participating customers that was deployed immediately following a demand response event. The survey was designed to be deployed via phone and email to maximize response rate in the 24- to 48-hour window following an event. The post-event survey addressed the following topics:

- Awareness of the specific event day and comfort during the event;
- Any actions taken during the event to increase household comfort: Do participants report changing AC settings, using other equipment (including window units, portable units, or ceiling fans) to mitigate heat buildup? Were participants home during the event? Are they usually home during that time period?
- Satisfaction with the Power Manager program, the event bill credits earned, and the number of events typically called;
- Expectations and motivations for enrolling: What did participants expect to gain from enrollment? To what extent are they motivated to earn incentive payments versus altruistic motivations such as helping to address electricity shortfalls during periods of high peak demand and/or reducing the environmental effects of energy production?; and
- Retention and referral: Do participants expect to remain enrolled in the program in future years? Would they recommend the program to others?

To ensure that the survey accurately assessed the experiences of customers during a curtailment event, questions were finalized and fully programmed prior to the event, to enable deployment within 24 hours after an event. Working with Duke Energy and the impact evaluation team, Nexant prepared a random sample of participant households prior to event notification to receive the post-event survey. This sample was linked to the survey software and ready to deploy as soon as the event ended. Any participants for whom email addresses were available received an email invitation with a link to the survey URL. Up to half of the expected sample (34 households) were surveyed by phone to ensure completes by both modes and improve representativeness.

Nonevent program surveys—In addition to the post-event survey, the evaluation team prepared a survey to be deployed immediately following a hot, nonevent day. This nonevent day survey was nearly identical to the post-event survey to facilitate comparison with the results of the event day survey, with only references to specific event awareness removed. Like the post-event survey, the nonevent survey was developed, approved, and programmed prior to the demand response season to enable immediate deployment on a sufficiently comparable nonevent day. The nonevent survey sample was developed prior to the demand response season and linked to the programmed survey. Similar to the post-event survey, a survey link was sent via email to participants with email addresses, simultaneous with the phone deployment, improving the representativeness of the sample.

4 Randomized Control Trial Results

One of the primary goals of the impact evaluation is to understand the load impacts associated with the Power Manager program under a variety of temperature and event conditions. General population events were targeted to understand the available load reduction capacity under a variety of temperature conditions during normal operations, while emergency shed events were used to demonstrate the program's capacity for shorter duration events under more extreme conditions. In addition, three of the event days were used for experimental events intended to answer specific research questions. Section 4.1 presents overall program results for all event days, including general population and emergency shed events. Section 4.2 details the results of the research events. Section 4.3 investigates weather sensitivity of impacts for 2019 RCT events.

4.1 Overall Program Results

The load impact estimates resulting from the RCT analysis for the general population events and research events are presented in Table 4-1. The load impacts presented for each event, along with their confidence intervals, are the average per household changes in load during the indicated dispatch windows. Results for the jurisdiction wide emergency event called on August 9, as well as the general population event September 9 event, are presented separately in Section 5.

Table 4-1: Randomized Control Trial per Customer Impacts

Event Date	Shed Type	Event Period	Reference Load	Impact (kW)	90% Confidence		% Impact	90%Confidence		Max Event Temp
					Lower Bound	Upper Bound		Lower Bound	Upper Bound	
7/15/2019	Normal	4:00PM - 6:00PM	3.65	-0.92	-0.96	-0.88	-25.2%	-24.1%	-26.2%	91.3°F
7/19/2019	Emergency	4:00PM - 4:30PM	3.60	-1.09	-1.13	-1.05	-30.4%	-29.3%	-31.5%	92.6°F
8/19/2019	Normal	12:00PM - 1:00PM	2.84	-0.58	-0.63	-0.53	-20.4%	-18.7%	-22.1%	89.9°F
	Normal	2:00PM - 3:00PM	3.33	-0.65	-0.70	-0.60	-19.6%	-18.1%	-21.2%	91.3°F
9/12/2019	Normal	3:00PM - 6:00PM	3.43	-0.75	-0.78	-0.71	-21.8%	-20.7%	-22.9%	92.9°F
9/17/2019	Normal	12:00PM - 1:00PM	2.11	-0.29	-0.33	-0.25	-13.8%	-11.7%	-15.9%	88.3°F
	Normal	2:00PM - 4:00PM	2.77	-0.37	-0.43	-0.32	-13.4%	-11.5%	-15.3%	89.6°F
	Normal	4:00PM - 6:00PM	3.14	-0.68	-0.72	-0.64	-21.8%	-20.5%	-23.0%	89.5°F
	Normal	6:00PM - 7:00PM	3.16	-0.55	-0.61	-0.50	-17.5%	-15.7%	-19.2%	87.1°F
9/26/2019	Normal	4:00PM - 6:00PM	2.94	-0.58	-0.62	-0.55	-19.8%	-18.6%	-21.1%	89.0°F
Average General Population Event			**3.32**	**-0.73**	**-0.79**	**-0.68**	**-22.0%**	**-20.3%**	**-23.6%**	**90.4°F**

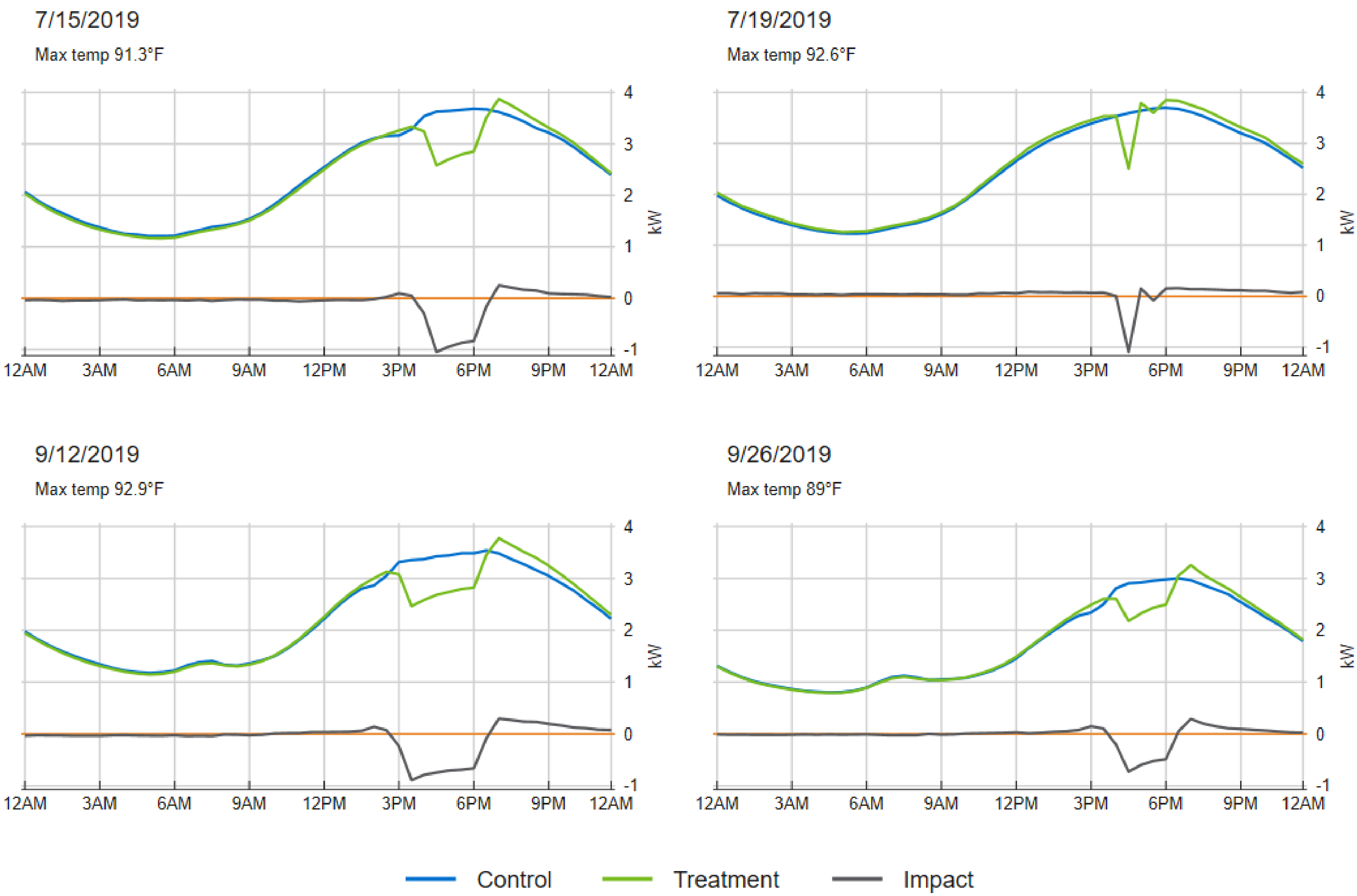
Overall load impacts for the average customer ranged between 0.58 kW and 0.92 kW during normal operations. The emergency shed event produced higher load impacts compared to general population events, with an average per household impact of 1.09 kW.

At least 5% of the population was held back as a control group during each event (excluding the jurisdiction-wide emergency test event) in order to establish the baseline. While withholding a control group is an essential component of the RCT research design, it adversely affects the aggregate performance of the program, since customers being withheld do not contribute load reduction to the total impact. In order to extrapolate the total load reduction achieved by the entire program during a given event, the average per household impact is multiplied by the total number of enrolled participants. For example, had all program customers been dispatched under normal operation on July 15, the program would have delivered approximately 208 MW load reduction. If instead, all customers had been dispatched using emergency operations on July 19, the aggregate program impact would have been 246 MW.

The RCT results implicitly take device inoperability (and other offsetting factors) into account. Because randomized group assignment was utilized effectively, each of the individual test groups accurately represents the overall percentage of customers with inoperable devices from among the entire population. As such, the estimated load impacts are appropriately de-rated by the inherent equivalence of non-working devices included in each of the test groups, and do not require any independent adjustment to account for device inoperability.

Event impacts are displayed graphically in Figure 4-1, with the average customer load profiles shown for the treatment and control groups. In Figure 4-1, the blue line represents the average load from control group customers, the green line reflects average load of the customers participating in the event, and the black line shows the average load impact (the difference between the control group and participant customer loads). All of the events show a clear drop in treatment group loads during the event dispatch period, as well as a small snapback in energy usage during the hours immediately following the events. Furthermore, most events show an instantaneous and prominent load drop during the first 30-minute interval of the dispatch period, underpinning the immediate, collective response of the load control devices once the event signal is received.

Figure 4-1: Average Customer Loads and Impacts for RCT Event Days



4.2 Comparison of Impacts by Event Start Time

Two events in 2019 were called in a cascading fashion, designed to assess the effect of dispatch time on event impacts. Cascading events are characterized by a rotating sequence of discrete events, where individual groups are dispatched separately at different times throughout the day. The design of these events allows for a comparison of achievable impacts at different times of day.

The first event, called on August 19, involved two separate dispatches at 12:00PM and 2:00PM, respectively. Although it was intended to include various other dispatch groups at other times, the sequence was ended early due to inclement weather that caused a sudden drop in temperatures throughout the service territory. Despite this, Nexant was able to generate useable impacts for the two events dispatched. The second series of cascading events was called on September 17 and included four distinct events called at varying times between 12:00PM and 6:00PM. Impacts for each of these days are presented together in Figure 4-2.

Figure 4-2: Load Profiles for Cascading Operations on August 19 and September 17

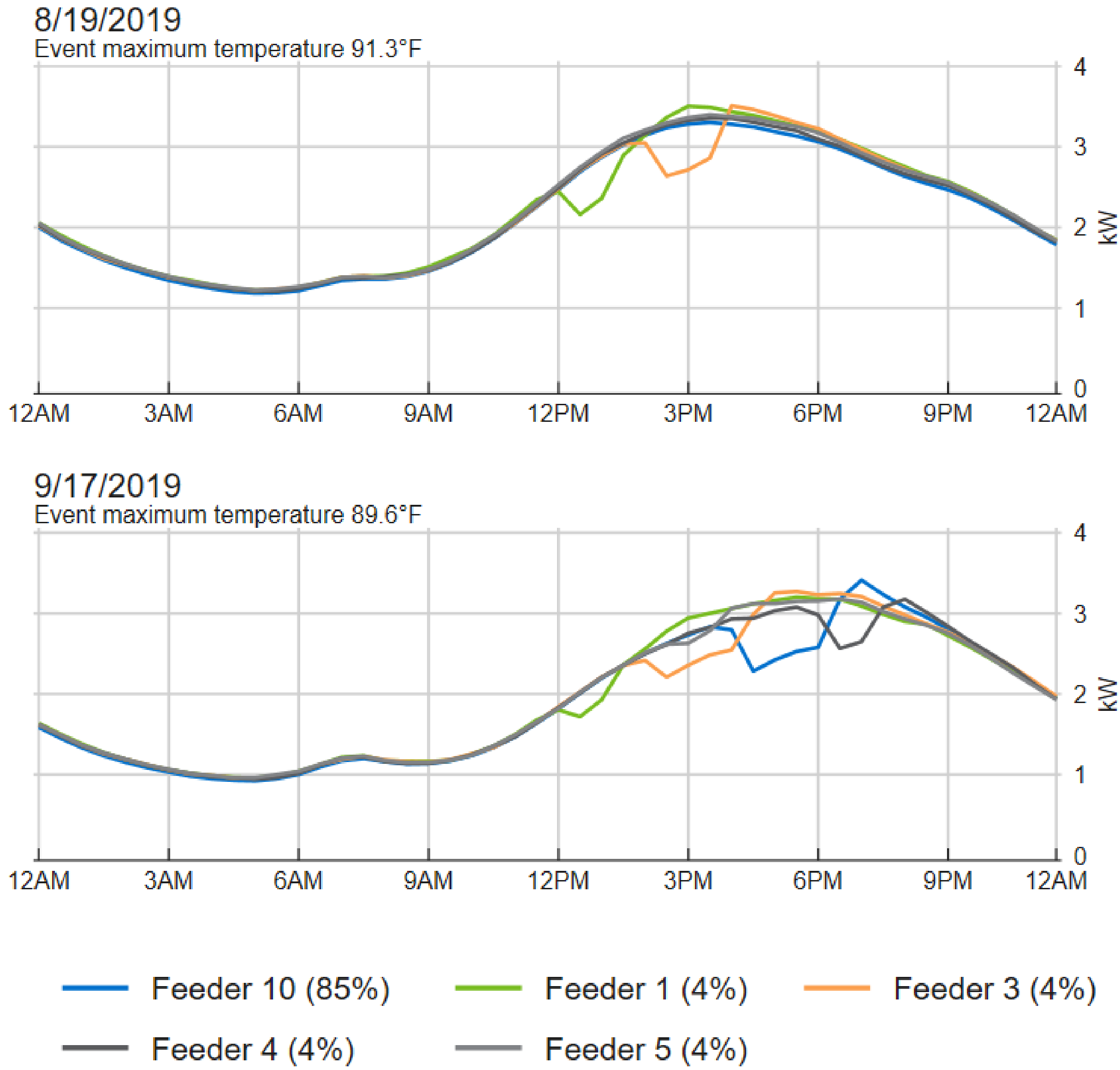


Table 4-2 summarizes impacts by event dispatch time resulting from the two cascading event days observed in 2019, based on available data. A key takeaway from the cascading comparisons is that the customers dispatched outside of peak hours (4:00PM to 6:00PM) appear to have produced load impacts that are smaller than the customers dispatched during the peak period. Nonetheless, the program generates discernible impacts throughout the afternoon.

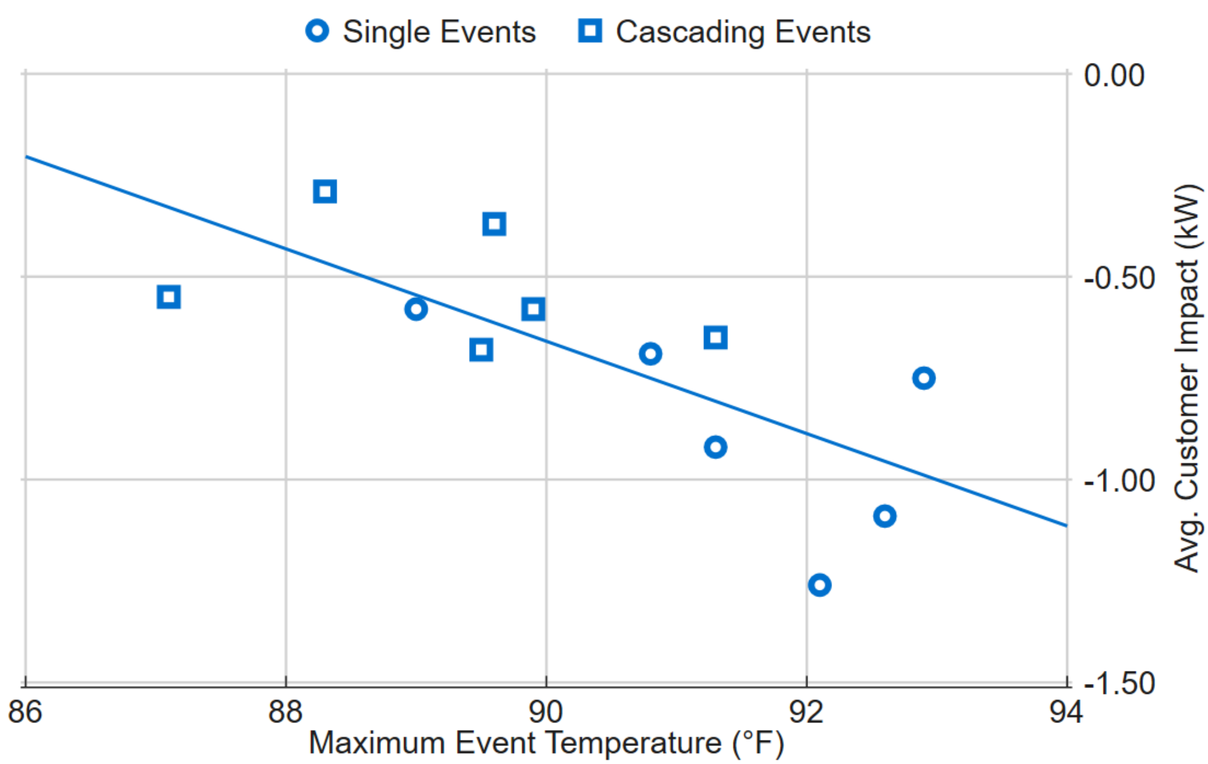
Table 4-2: Average Impacts by Event Start Time (2019)

Event Time	Average per Household Impacts		
	Aug 19	Sept 17	Average
12PM - 1PM	-0.58 kW	-0.29 kW	-0.44 kW
2PM - 4PM	-0.65 kW[11]	-0.37 kW	-0.51 kW
4PM - 6PM	n/a	-0.68 kW	-0.68 kW
6PM - 7PM	n/a	-0.55 kW	-0.55 kW

4.3 Weather Sensitivity of AC Load and Demand Reductions

The load reduction capacity of Power Manager is dependent on weather conditions, as shown in Figure 4-3. The plot shows the estimated average customer impact for each event as a function of daily maximum temperature. There is a distinct correlation between higher temperatures and greater load reduction capacity, with the general trend being higher impacts on hotter days. Cascading impacts similarly trend towards higher impacts during hotter conditions.

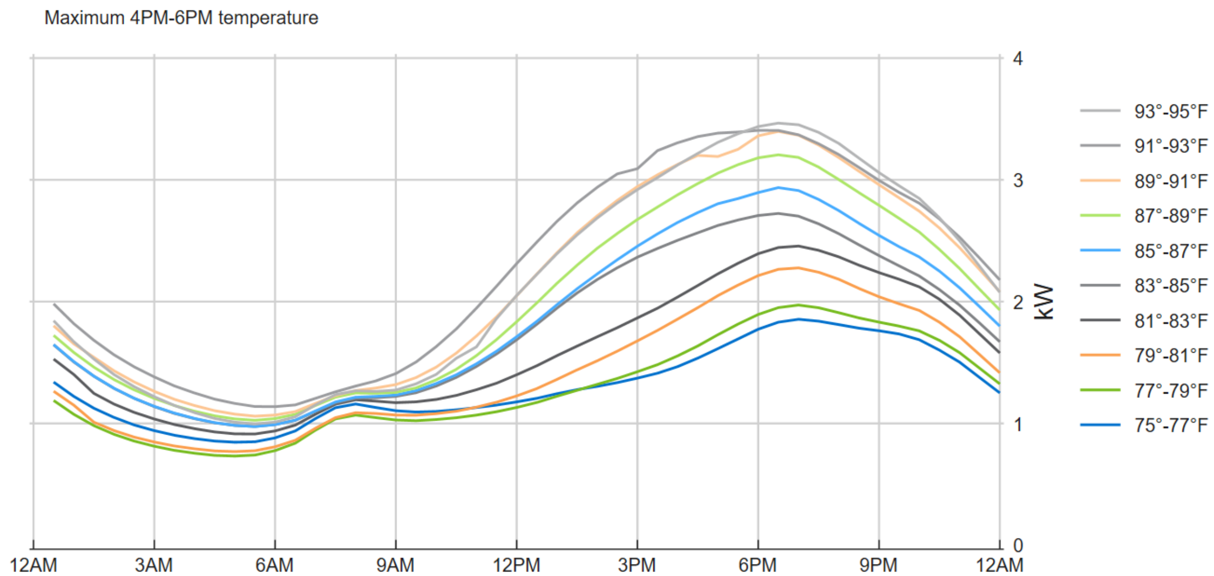
Figure 4-3: Weather Sensitivity of Impacts for Cascading and General Population Events



[11] Impacts for period 2:00PM to 3:18PM; event ended early due to inclement weather.

Both demand reductions and air conditioner loads grow with hotter temperatures. Figure 4-4 shows the weather sensitivity of whole house load for the average customer in Power Manager. All nonevent weekdays where temperatures reached at least 75°F between 4:00PM and 6:00PM were classified into two-degree temperature bins. The plot shows how the loads vary by hour as temperatures grow hotter.

Figure 4-4: Whole-House Loads by Temperature



The key finding is simple: demand reductions grow larger in magnitude when temperatures are hotter and resources are needed most. Because peak loads are driven by central air conditioner use, the magnitude of air conditioner loads available for curtailment grows in parallel with the need for resources. Not only are air conditioner loads higher, but the program performs at its best when it is hotter.

4.4 Key Findings

A few key findings are worth highlighting:

- Demand reductions were 0.73 kW per household for the average general population event.
- The 30-minute emergency shed event produced load impacts of 1.09 kW.
- Load impacts grow as events are called later in the day and closer to the residential system peak.
- Demand reductions grow when temperatures are hotter and resources are needed most.

5 Within-Subjects Results

In addition to the normal and emergency shed events described in Section 4, two events were called in 2019 that could not be estimated using an RCT approach. This first of these events was a jurisdiction-wide emergency shed test event, called to assess the full extent of program capability for demand reduction under emergency conditions. Under this scenario, the full program population is dispatched for the event and no customers are withheld as a control group. The second event, a general population event on September 9, lacked a valid control group due to dispatch programming error. Absent a control group for these events, Nexant employed a within-subjects analysis approach in order to quantify impacts. The analysis approach used is described in detail in Section 3.4. Table 5-1 summarizes impacts for each within-subjects event.

Table 5-1: Within-Subjects per Customer Impacts

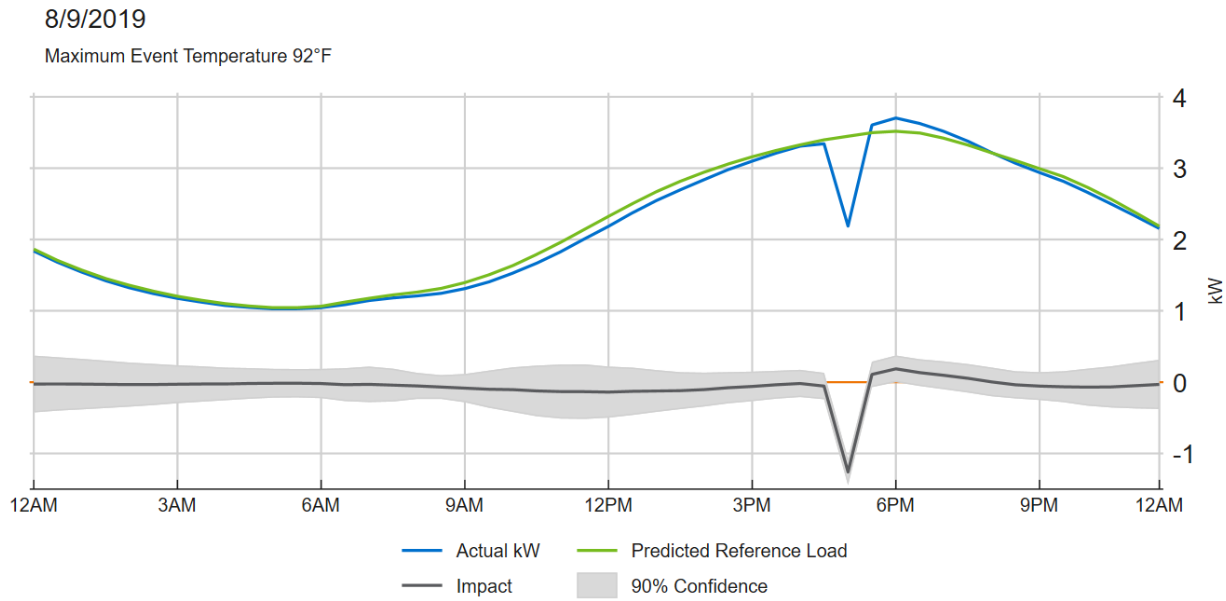
Event Date	Shed Type	Event Period	Reference Load	Impact	90% Confidence		% Impact	90%Confidence		Max Event Temp
					Lower Bound	Upper Bound		Lower Bound	Upper Bound	
8/9/2019	Emergency	4:30PM - 5:00PM	3.45	-1.26	-1.08	-1.45	-36.6%	-31.2%	-41.9%	92.1°F
9/9/2019	Normal	4:00PM - 6:00PM	3.26	-0.69	-0.58	-0.79	-21.1%	-17.9%	-24.3%	90.8°F

5.1 Within-Subjects Event Impacts

For each of these two events, a different set of proxy days was selected and used to generate the baseline loads through the process summarized in Figure 3-3. In this way, baselines were found that closely resembled the load patterns of the treatment groups during non-event hours, and accurately simulate the event period loads absent curtailment, i.e. the counterfactual.

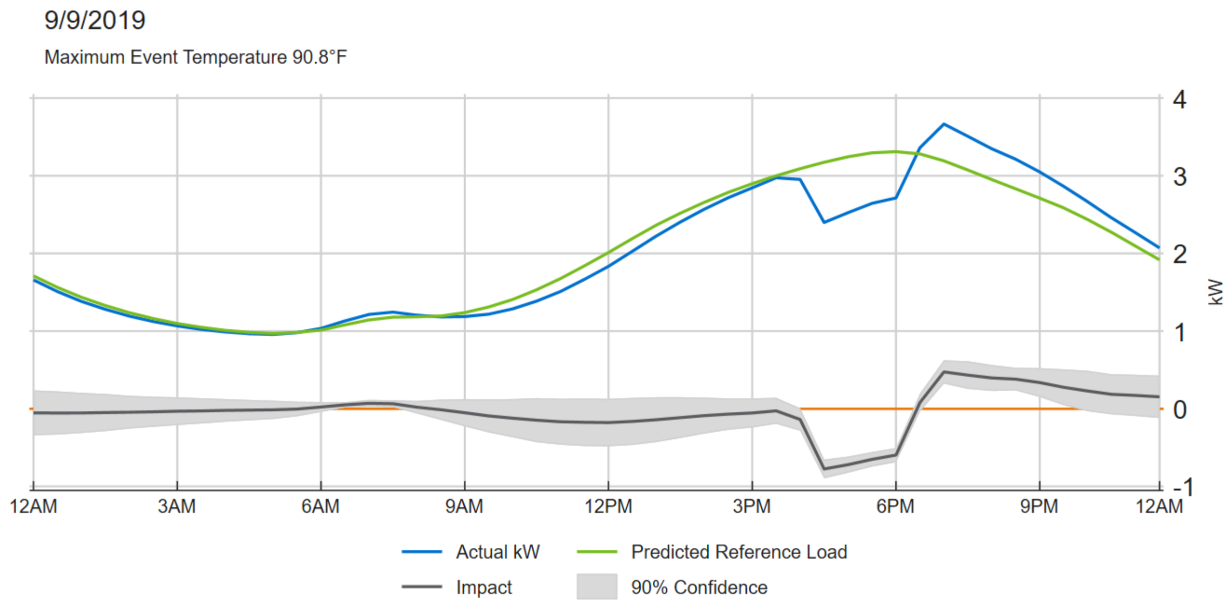
Load impacts for the August 9 and September 9 events are shown in Figure 5-1 and Figure 5-2, respectively. The average per household impact for emergency shed on August 9 was estimated to be 1.26 kW across the event period.

Figure 5-1: Within-Subjects Load Impacts for August 9 Emergency Event



Load impacts for the September 9 general population event were estimated to be 0.69 kW. This impact estimate is consistent with the impacts for the other normal shed events estimated via RCT.

Figure 5-2: Within-Subjects Load Impacts for September 9 Event



5.2 Key Findings

- The within-subjects methodology produced accurate reference loads against which to compare treatment loads, leading to highly reliable impact estimates.
- The normal shed event on September 9 produced impacts of 0.7 kW per household, roughly in line with impacts found for normal shed events via RCT.
- The 30-minute emergency shed event called on August 9 produced impacts of 1.26 kW per household, representing the largest single event impacts of 2019.

6 Demand Reduction Capability

A key objective of the 2019 impact evaluation was to quantify the relationship between demand reductions, temperature and hour of day. This was accomplished by estimating loads under historical weather conditions and applying observed percent load reductions from the 2019 events. The resulting tool, referred to as the time-temperature matrix, allows users to predict the program's load reduction capability under a wide range of temperatures and event conditions.

In Section 6.2, Nexant presents estimated load reduction capability of the program under two similar but distinct scenarios. The key difference between the two scenarios is the use of event period temperatures (i.e. the maximum system temperature observed *during the event period*) vs. maximum daily temperature (i.e. the maximum temperature observed *during the 24-hour event day*). Reasons for offering both scenarios are twofold: first, Duke Energy may select the findings they deem most suitable for regulatory reporting, internal dissemination, and/or other messaging needs, as well as ensure consistency in reported metrics across historical evaluations and/or jurisdictions. Second, by applying both event period temperatures and maximum daily temperatures, Nexant was able to report impacts for a wider range of extreme temperature conditions, supported by data observed during the 2019 program season.

In an ideal program year, a large number of events would be called under a variety of different weather conditions, dispatch windows and cycling strategies so that demand reduction capability could be estimated for a wide range of operating and planning scenarios. In actuality, opportunities for program events can be sporadic, and based on uncertain weather projections, such that they occur infrequently and under fairly similar conditions. In 2019, events were called under a somewhat narrow range of temperature conditions, with maximum temperatures events ranging from 87°F to 93°F. Additionally, no events reached the 100°F target used for estimating program capability. As a result, the ability to predict demand reduction capability across a broader range of conditions – particularly during extremely hot days – was somewhat inhibited.

6.1 Methodology

Figure 6-1 illustrates the weather sensitivity trends of percent load impacts and peak household demand on hot, non-event days. The figure, based on actual 2019 customer load data, shows that Power Manager demand reductions grow on a percentage basis as temperatures increase. At the same time, peak household loads available for curtailment also increase with temperature. The implication is that larger percent reductions are attainable from larger loads, when temperatures are hotter.

Figure 6-1: Weather Sensitivity of Percent Load Impacts and Household Loads

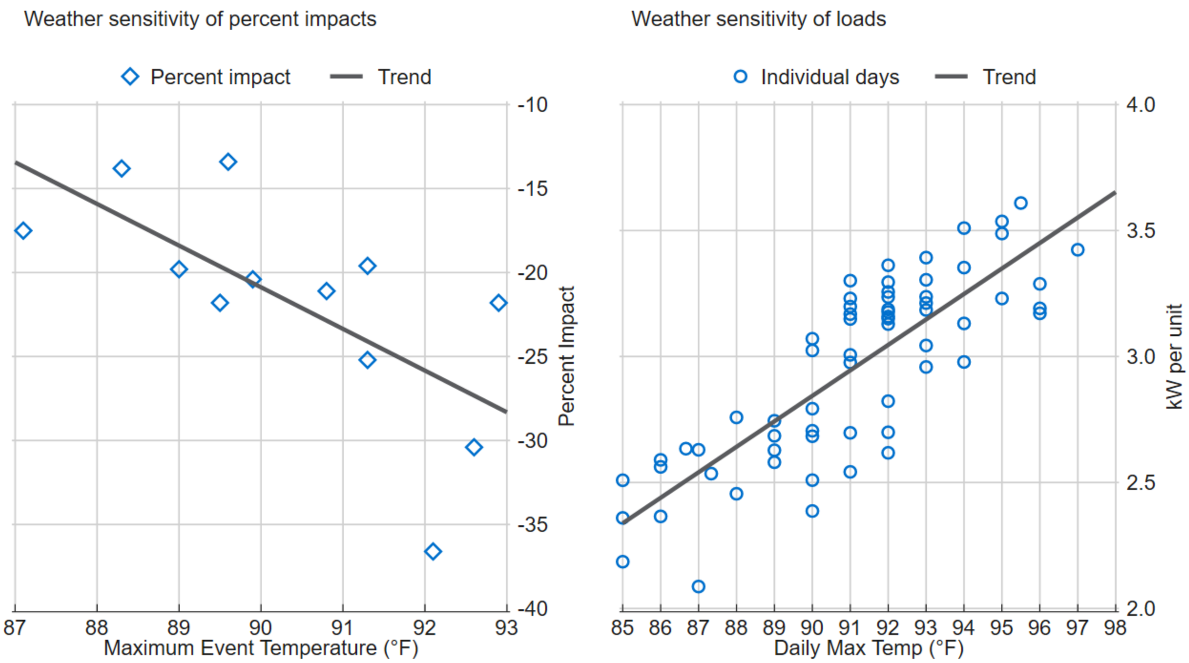
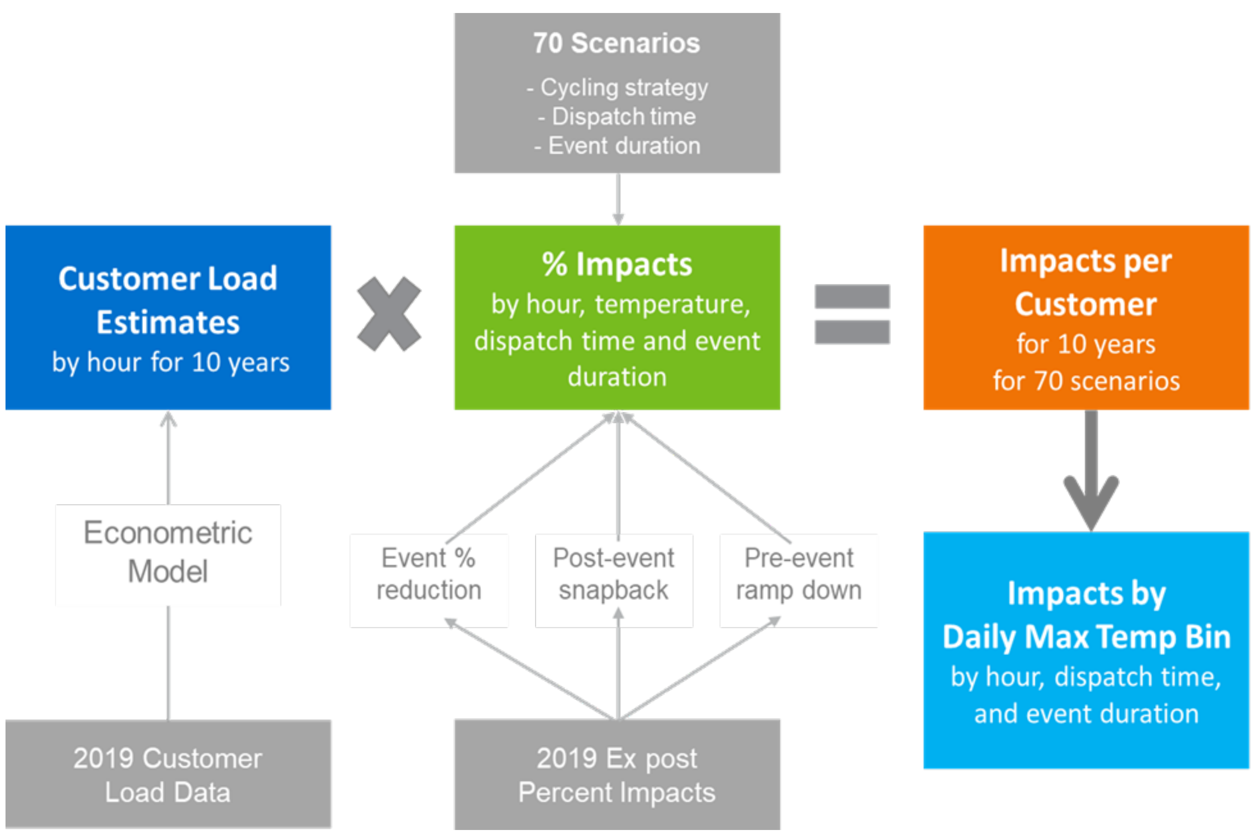


Figure 6-2 summarizes the process used to develop the 2019 time-temperature matrix for estimating demand reduction capability under various scenarios.

Figure 6-2: Time Temperature Matrix Development Process



The process depicted in Figure 6-2 was completed twice to produce two separate versions of the tool using each of the two temperature metrics. The process for each iteration involved the following primary components:

- Estimates of customer loads were developed by applying 2019 AMI data to the same regression models used to estimate impacts. All weekdays with daily average temperatures above 70˚F were included in the models. The 2019 usage patterns were applied to actual weather patterns experienced over the past ten years rather than hypothetical weather patterns.
- Estimates of the percent reductions were based on three distinct econometric models: load control phase-in, percent reductions during the event, and post-event snapback. The models were based on the percent impacts and temperatures experienced both during the event periods and throughout the event days.
- A total of 70 scenarios were developed to reflect various cycling/control strategies, event dispatch times, and event lengths.
- Estimated impacts per customer were produced by combining the estimated household loads, estimated percent reductions, and dispatch scenarios. The process produced estimated hourly impacts for each hot weekday during 2010-2019 under 70 scenarios.
- Multiple days were placed into 2-degree temperature bins and were averaged to produce an expected load reduction profile for each temperature bin.

6.2 Demand Reduction for Emergency Conditions

While Power Manager is typically dispatched for economic or research reasons, its primary function is to deliver demand relief during extreme conditions, when demand is high and capacity is constrained. Extreme temperature conditions can trigger emergency operations, which are designated to deliver larger demand reductions than normal event cycling. During emergency conditions, all program devices are instructed to instantaneously shed loads. While emergency operations are rare and ideally avoided, they represent the full demand reduction capability of Power Manager. A 1-hour emergency event starting at 4:00 PM and with a maximum temperature of 100°F during the event is provided in Figure 6-3. Under these conditions, individual customers are expected to deliver 1.54 kW of demand reduction over a one-hour event window. Because there are approximately 238,000 customers enrolled in Power Manager, the expected aggregate reduction is 365.4 MW.

Figure 6-3: Demand Reduction Capability – 100°F Event Period Temperature

Inputs	
Dispatch Type	Emergency Dispatch
Event Start Time	4 PM
Event Duration	1
Event Period Max Temp	100
# Customers	238,000

Event Window Average Impacts		
Load without DR	4.12	kW per customer
Load with DR	2.58	kW per customer
Impact per Customer	-1.54	kW per customer
Program Impact	-365.4	MW
% Impact	-37.3	%

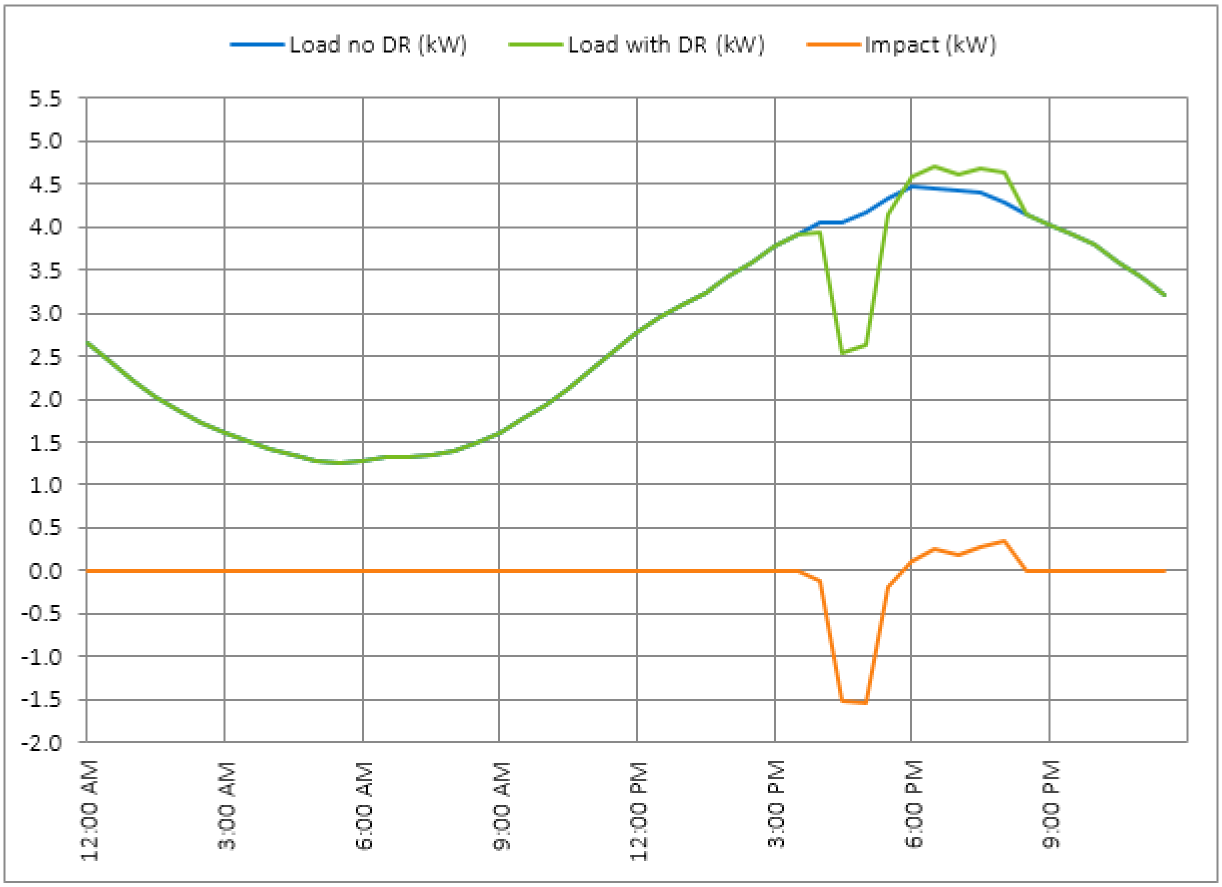


Figure 6-4 presents estimated load reduction capability under similar, but slightly different conditions. The distinction in Figure 6-4 is that impacts are estimated using daily maximum temperatures rather than event period temperatures. Stated another way, the estimates presented in Figure 6-4 assume that a temperature of 100°F was reached at some point during the event day but not necessarily during the event period, while the scenario shown in Figure 6-3 assumes that 100°F was reached during the 1-hour event. While this distinction may seem trivial, the implications for demand impacts are noteworthy. Per customer and aggregate program impacts using a 100°F daily maximum temperature are 1.13 kW and 269 MW, respectively.

Figure 6-4: Demand Reduction Capability – 100°F Daily Maximum Temperature (2019)

Inputs	
Dispatch Type	Emergency Dispatch
Event Start Time	4 PM
Event Duration (hours)	1
Maximum Daily Temperature	100
# Customers	238,000

Event Window Average Impacts		
Load without DR	3.65	kW per customer
Load with DR	2.52	kW per customer
Impact per Customer	-1.13	kW per customer
Program Impact	-269.0	MW
% Impact	-30.9	%

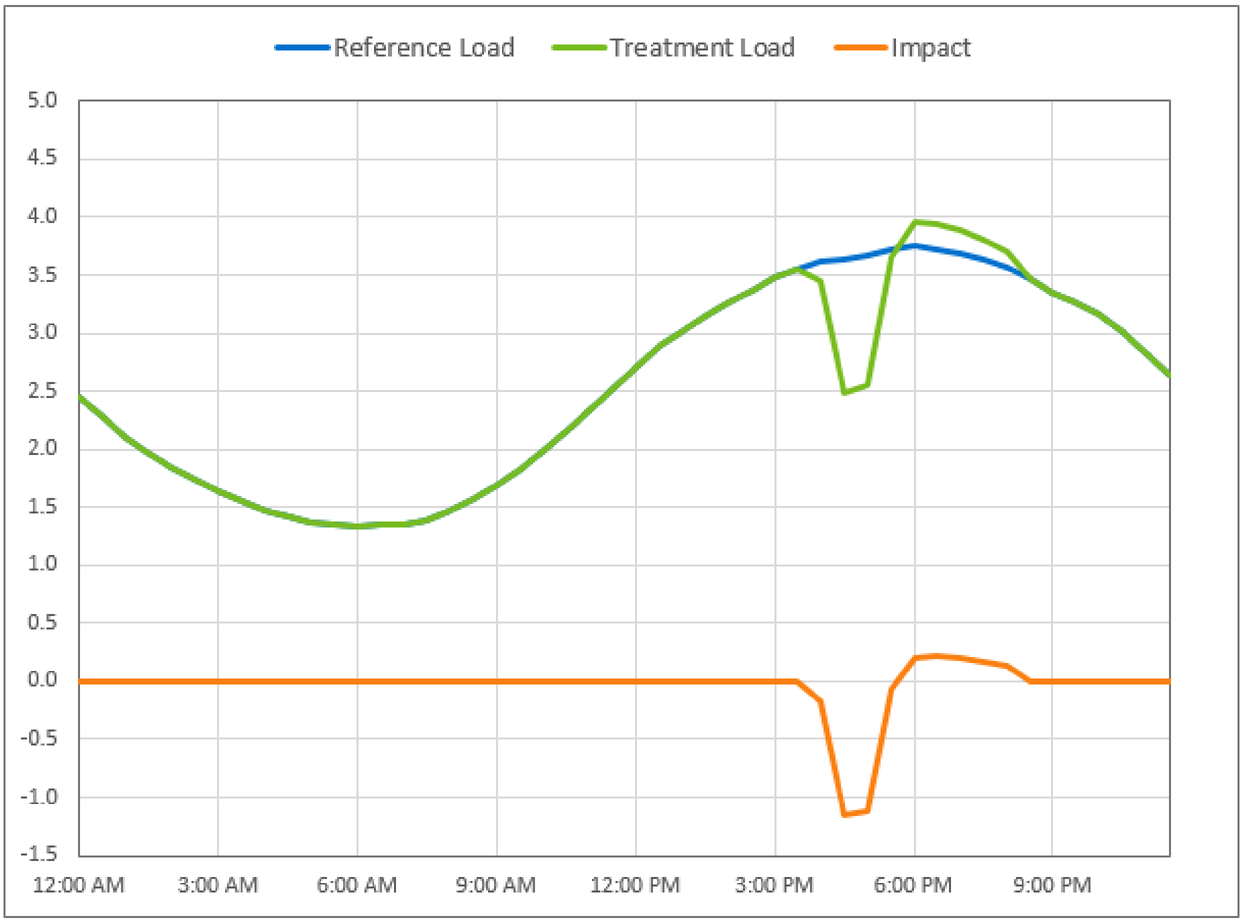


Table 6-1 displays the expected impacts for various event start times and maximum daily temperature conditions, given an emergency event with a one hour duration. The estimates shown are derived from the time-temperature matrix, and are therefore reliant on the empirical data observed during the 2019 program season. As such, the completion of Table 6-1 in its entirety required the use of daily maximum temperatures, rather than event period temperatures, as the conditional input for estimating impacts. Because none of the 2019 events experienced certain of the more extreme temperatures shown in Table 6-1, the time-temperature matrix was limited in its ability to predict loads under these conditions.

Table 6-1: Per Customer Impacts by Daily Maximum Temperature and Event Start Time (2019)

Daily Max Temperature	Event Start Time				
	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM
90°F	-0.56 kW	-0.66 kW	-0.75 kW	-0.80 kW	-0.82 kW
92°F	-0.63 kW	-0.74 kW	-0.82 kW	-0.87 kW	-0.90 kW
94°F	-0.74 kW	-0.86 kW	-0.94 kW	-0.97 kW	-0.98 kW
96°F	-0.77 kW	-0.89 kW	-0.97 kW	-0.99 kW	-1.02 kW
98°F	-0.85 kW	-0.99 kW	-1.09 kW	-1.11 kW	-1.15 kW
100°F	-0.88 kW	1.03 kW	-1.12 kW	-1.13 kW	-1.16 kW
102°F	-0.88 kW	-1.01 kW	-1.12 kW	-1.18 kW	-1.27 kW
104°F	-1.04 kW	-1.25 kW	-1.42 kW	-1.47 kW	-1.56 kW

Impacts increase as temperatures increase and as the event starts later in the day. Impacts increase with a later event start time because reference loads are generally increasing from 1:00 PM to 5:00 PM during the summer. In practice, event day impacts may vary due to unique weather patterns or day characteristics

6.3 Key Findings

Key findings from the development of the time-temperature matrix include:

- While emergency operations are rare and ideally avoided, they represent the full demand reduction capability of Power Manager.
- Power Manager demand reductions grow on a percentage basis as temperatures increase, and with deeper cycling. At the same time, peak household loads available for curtailment also increase with temperature.
- If emergency shed becomes necessary on a day where the maximum temperature during the event is 100°F, Power Manager can deliver 1.54 kW of demand reductions per household during a 1-hour event.
    - If 100°F is reached at some point during the day, but not necessarily during the event dispatch, Power Manager can deliver 1.13 kW of load reduction per household.
- Because there are approximately 238,000 Power Manager customers, the expected aggregate reductions total 365.4 MW under 100°F event period temperatures.
    - Aggregate load reductions are estimated to be 269 MW under 100°F daily maximum temperature conditions.
- The event start time also influences the magnitude of reductions which, generally, are larger during hours when customer loads are highest.

7 Process Evaluation

Process evaluation, particularly when combined with the insight obtained from impact evaluation, informs efforts to continuously improve programs by identifying program strengths and weaknesses, opportunities to improve program operations, program adjustments likely to increase overall effectiveness, and sources of satisfaction or dissatisfaction among participating customers. The primary objectives for the process evaluation component of the evaluation include:

- Assessing the extent to which participants are aware of events, bill credits, and other key program features;
- Understanding the participant experience during events: comfort, occupancy, thermostat adjustments, and strategies employed to mitigate heat;
- Identifying motivations and potential barriers for participation, including expectations, sources of confusion or concern, intention to stay enrolled, and likelihood of recommending the program to others;
- Documenting the operations, recruitment, enrollment, outreach, notification, and curtailment activities associated with program delivery; and
- Identifying program strengths and potential areas for improvement.

7.1 Survey Disposition

Nexant developed a survey for customers participating in the Power Manager program that was deployed immediately following a Power Manager event. In addition to the post-event survey, a nonevent survey was also deployed on a hot, nonevent day. This nonevent day survey was identical to the post-event survey to establish a baseline and facilitate comparison with the results of the event day survey. Both the event and nonevent surveys were administered to Power Manager participants. The survey was administered via phone and web to maximize response rates during the 24 hour window directly following a Power Manager event. The survey addressed the following topics:

- Awareness of the specific event day, including reasons for event day awareness (e.g. increased temperature in home, etc.)
- Levels of comfort, and any actions that increased household comfort during a Power Manager event. Do participants report changing AC settings, using other equipment (including window units, portable units, or ceiling fans) to mitigate heat buildup? Were participants home during the event? Are they usually home during that time period?
- Satisfaction with the Power Manager program and its attributes.
- Expectations and motivations for enrolling. What did participants expect to gain from enrollment? To what extent are they motivated to earn incentive payments versus altruistic motivations such as helping to address electricity shortfalls during periods of high peak demand and/or reducing the environmental effects of energy production?

- Do participants expect to remain enrolled in the program in future years? Would they recommend it to others?

Since event awareness and thermal comfort are primary areas of inquiry for the survey, the nonevent baseline data (from non-event, baseline group surveys) provides the opportunity to net out any propensity for thermal discomfort or belief that a Power Manager event is occurring that would naturally happen on any hot day of the summer. In this way, it is possible to evaluate whether statistically significant differences in event awareness and reports of thermal discomfort exist between customers who actually experience a Power Manager event and customers who do not.

The survey was completed by 74 customers on an event day (the event group) and 71 customers on a hot nonevent day (the nonevent or baseline group). All surveys were conducted on the day of the event or the nonevent. The overall response rate was 4.9%. The survey plan was to survey about 50% of respondents by phone and 50% via the web, but on the event day more people were reached by telephone than expected. The distribution of responses across modes, with response rates, is shown in Table 7-1. All responses in this section summarizing survey results have been weighted to reflect the survey design for 50% of completions by phone and web each. The high temperature on the event day was 92°F, but the system average temperature during the event period was 89°F due to rain in certain parts of the service area, while the maximum and average heat indexes were 97°F and 95°F, respectively.

Table 7-1: Survey Disposition

Total Survey Responses	Survey Responses by Group	Date	Temperature	Phone/ Web Distribution	Response Rate
145 Responses	74 Event Responses	Monday, July 15, 2019	High 92 °F (avg. event temp. 89 °F)	70% Phone	5.9%
				30% Web	3.4%
	71 Baseline Responses			79% Phone	5.4%
				21% Web	4.2%

A majority of households surveyed have two or fewer residents, and 11% of event and 14% of nonevent baseline households have four or more residents. Ninety-five percent of those who responded to a question on home ownership noted that they were homeowners. There was no difference in the age of respondents between the event and nonevent baseline groups; the mean age of respondents is 59. Not including those who did not answer the question, the most commonly reported level of education was a bachelor's degree: 31% of respondents said that they graduated from college. Nearly as many (27%) have some college or an associate's degree and 20% have a graduate or professional degree.

7.2 Program and Event Awareness

The customer surveys were designed with the key objective of evaluating participants' awareness of Power Manager events, but a few questions were also included to gauge participants' general awareness of the program and its key features. Every respondent who was contacted to complete the survey was a Power Manager participant at the time of the survey, and a majority of the respondents, 72%, reported that they are familiar with the Power Manager program.

Every Power Manager participant who was randomly selected to receive the post-event survey (the event group), experienced an actual Power Manager event that day, Monday, July 15. A total of 74 customers completed the post-event survey. A minority, 18%, of event group respondents reported that their homes were uncomfortable that day, while all of them experienced a load control event that afternoon. As a program with no pre-event notification, a decrease in thermal comfort in the home is the key factor for assessing event awareness. In North Carolina, with only 18% of respondents stating that they were uncomfortable on the day that they were surveyed, event awareness by that measure is quite low. However, it could also be that a number of those respondents would say that their home was uncomfortably hot at times on any hot day of the year, regardless of whether or not the Power Manager program had a load control event. To control for this possibility, another randomly selected group of Power Manager participants were also surveyed on Monday, July 15. Unlike the other group of surveyed participants, these customers had been pre-selected at the outset of the season to not be dispatched for load control. A total of 18% of respondents reported that their home was uncomfortable on this day, when they had not actually experienced a Power Manager event that day. There is no difference in the percentage of respondents in the post-event survey and the nonevent survey that stated that their homes were uncomfortable that day, so we have no evidence to support the hypothesis that the Power Manager event caused customers any additional discomfort that they would not have experienced or perceived anyway. The response frequencies are tabulated in Table 7-2.

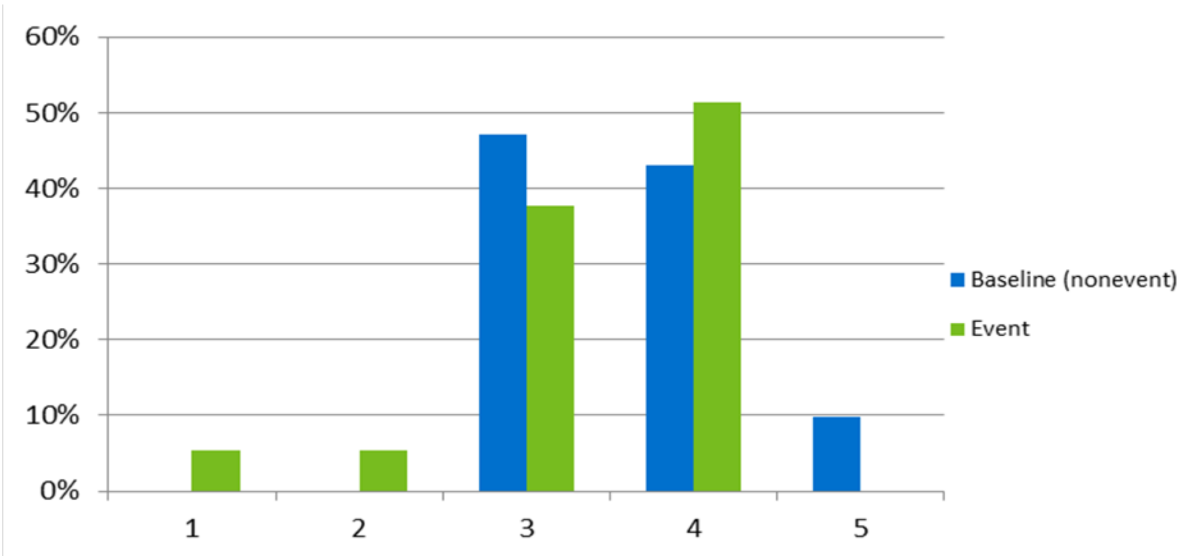
Table 7-2: "Was there any time today when the temperature in your home was uncomfortable?" Response Frequencies Weighted by Mode, $N_t = 72$ and $N_c = 73$

Response	Event	Baseline (Nonevent)
Yes	18%	18%
No	72%	69%
Don't know	10%	13%

Of those relatively few customers (13 event and 11 baseline survey respondents) who reported that they were uncomfortable at some time during the day of the survey, almost half (11 respondents) reported becoming uncomfortable between 3:00 and 5:00 pm. The rest were distributed throughout the day, from 12:00 pm to 6:30 pm. Asked when the period of thermal discomfort in their home ended, there was a shift in responses towards later in the day, with 15 respondents reporting that their homes stopped feeling uncomfortable between 6:00 and 8:00 pm. Five respondents listed times earlier than 6:00 pm, and four respondents said their homes stopped being uncomfortable at 10:00 pm or later.

These customers who reported thermal discomfort were also asked to rate their discomfort using a five point scale, where 1 represents "not at all uncomfortable" and 5 represents "very uncomfortable." Frequencies of the responses are summarized in Figure 7-1; the chi-squared statistical test shows no discernable difference in the distributions of event and baseline survey responses (at the 90% level of confidence). In sum, there is no discernable difference in levels of thermal discomfort between the event group and the baseline group. The survey does not present evidence that Power Manager events led to more customers reporting discomfort in their homes, or to higher levels of discomfort.

Figure 7-1: Please rate your discomfort using a scale of one to five, where one means “not at all uncomfortable” and five means “very uncomfortable.” Response Frequencies Weighted by Mode, N_t = 13 and N_c = 11



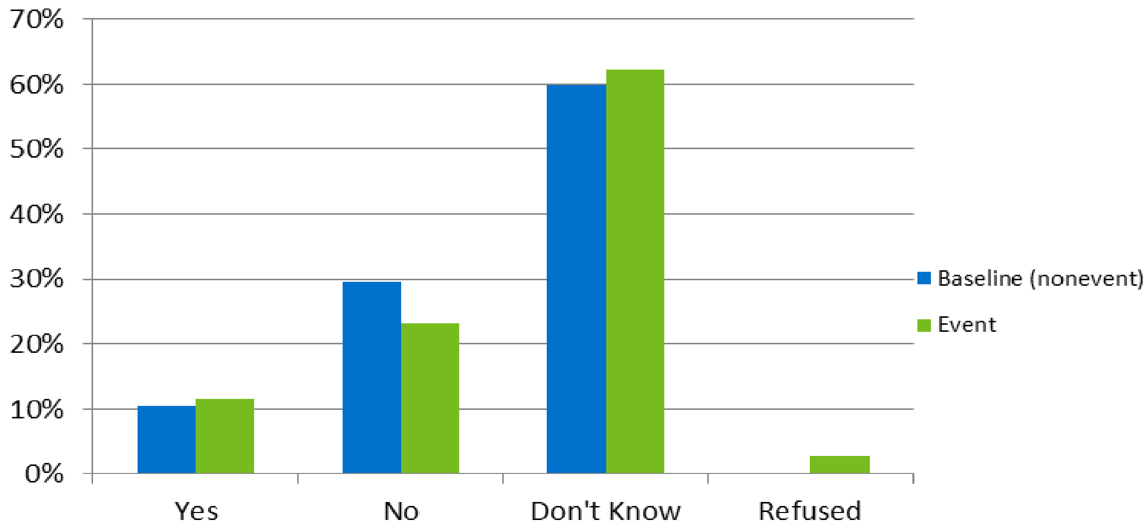
Those respondents who reported that their homes had been uncomfortably hot that day were asked to state in their own words what they think caused the discomfort. The most commonly reported rationale is that the discomfort in their home was due to the weather being hot; 63% of event respondents and 71% of nonevent respondents gave that reason. The second most common reason was that the air conditioner was not on: 10% of baseline and 5% of event respondents said this. Only 16% of event respondents ascribed their thermal discomfort to Duke Energy controlling their air conditioners; no baseline respondents thought that Duke Energy was controlling their air conditioners. Table 7-3 summarizes the responses given to this survey question.

Table 7-3: What do you think caused the temperature to be uncomfortable? Response Frequencies Weighted by Mode, N_t = 13 and N_c = 11

Reason	Event	Baseline (Nonevent)	All
It was a very hot day	63%	71%	67%
Air conditioner doesn't work properly	5%	10%	8%
Duke Energy was controlling air conditioner	16%	0%	8%
Air conditioner unit was not on	15%	0%	7%
Other	0%	19%	10%

All survey respondents were also asked directly whether or not they thought a Power Manager event had been called in the past few days. The most common response was "don't know," where 62% of event customers and 60% of baseline customers stated that they didn't know if there was a Power Manager event in the past few days. The prevalence of "don't know" responses here is not surprising in light of the fact that Duke Energy does not actively notify participants of load control events. Figure 7-2 presents response frequencies for event and nonevent respondents; the differences between event and nonevent responses to this question were not statistically significant. Across all respondents, 61% did not know if there was a Power Manager event recently, 11% thought that there was an event recently, and 27% did not think so.

Figure 7-2: "Do you think a Power Manager event occurred in the past few days?" Response Frequencies Weighted by Mode, N_t = 72 and N_c = 73



The relatively few respondents (10 event and 8 nonevent) who thought there was a Power Manager event recently were asked a few questions about the event(s) that they perceived to have happened. First, when asked on what day they thought the event occurred, 59% of the event customers correctly identified the event day; for comparison, 33% of nonevent customers said there was an event that day.

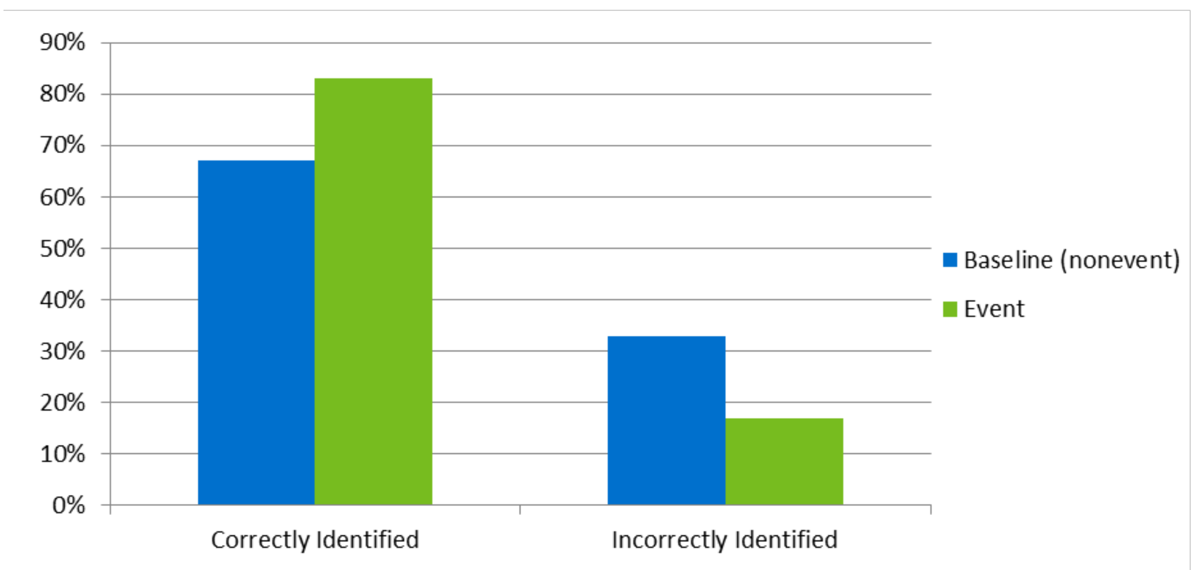
These customers who thought that there had been a Power Manager event recently were also asked to describe how they determined that the event was occurring, and the responses are summarized in Table 7-4. The most common response, given by 33% of respondents, is that they concluded an event was occurring because the temperature inside their home went up. The next most commonly reported rationale that an event occurred was due to it being a hot day outside, with 25% of respondents giving this reason.

Table 7-4: “How did you determine that an event was occurring?” Response Frequencies Weighted by Mode, N_t = 10 and N_c = 8

Reason	Event	Baseline (Nonevent)	All
It got warmer inside - the inside temperature went up	42%	24%	33%
It was a hot day – I knew from the temperature outside	41%	9%	25%
Did not hear the air conditioner running like I knew it should	8%	17%	13%
Some other way	8%	9%	9%
Heard about it on the news	0%	9%	4%
Don't know	0%	33%	16%

Customers were asked whether or not they were home during the event, and forty-eight percent of respondents who experienced an event were home, while 35% of non-event respondents were. These respondents were also asked what time they thought the event occurred, and were offered three response options: 12:00 pm – 2:59 pm, 3:00 pm – 4:59 pm, and 5:00 pm – 7pm. Because the event window (4:00 – 6:00 pm) spanned two time periods, those who had answered that they had thought an event occurred in either of the latter time periods were recognized as having correctly identified the time of the event. Rates of successful identification were calculated and are shown in Figure 7-3.

Figure 7-3: “About what time did you first notice this event?” Response Frequencies Weighted by Mode, N_t = 10 and N_c = 8



7.3 Program Experience

Aside from occasional program communications to program participants, the primary way that Duke Energy customers experience the Power Manager program is during load control events. A majority of survey respondents, 78%, stated that there is normally someone home between the hours of 12:00 pm and 6:00 pm on weekdays. Similarly, large proportions of respondents also reported that they are frequent users of their air conditioning systems. Table 7-5 shows the percentage of respondents who reported that they used their air conditioners every day for four different time periods and day type combinations. Generally, between 74% and 86% of Power Manager survey respondents reported using their air conditioners every day during weekday afternoon and evenings. During the weekend, the rates of customers who use their air conditioners every day increases; between 82% and 92% of customers stated that they run their units during weekend afternoons and evenings. Statistically significant differences in response patterns between the two groups of customers were not observed.

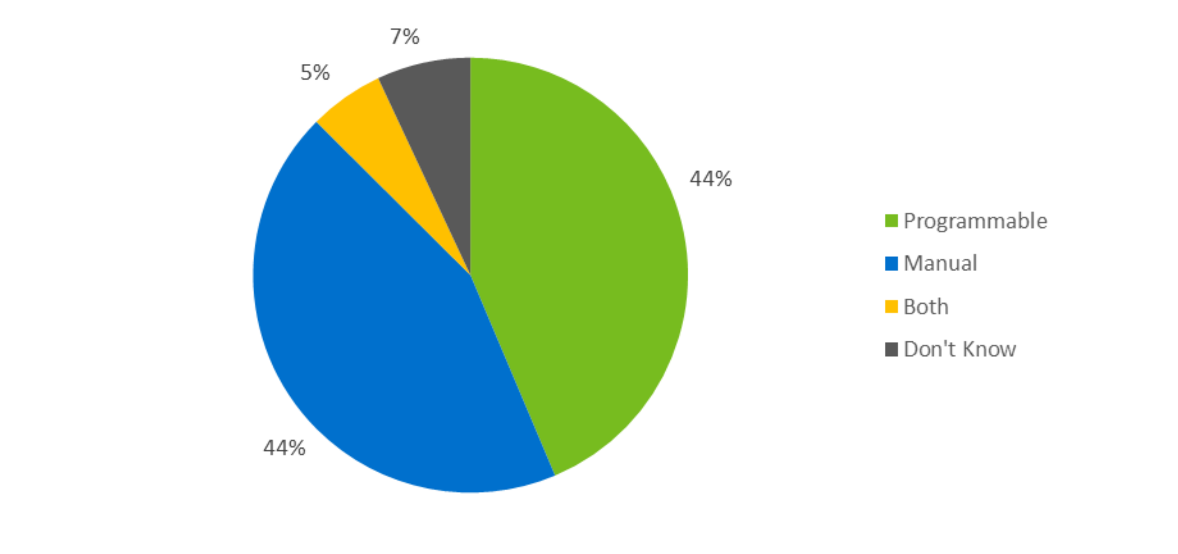
These survey responses confirm that Power Manager participants are in fact largely at home and using their air conditioners during the times that the program is likely to be launched when the need arises to use the program resource. As such, monitoring participant comfort levels is confirmed to be an important evaluation activity so that thermal comfort can be maintained at high enough levels to retain customer participation.

Table 7-5: "How frequently do you or someone else in your household use your air conditioning system?" Response Frequencies Weighted by Mode, N_t = 72 and N_c = 73

Day and Time	% of Event Respondents Responding "every day"	% of Baseline Respondents Responding "every day"
...weekday afternoons (12-6 pm)	74%	83%
...weekend afternoons (12-6 pm)	82%	92%
…weekday evenings (6 pm-12 am)	77%	86%
…weekend evenings (6 pm-12 am)	89%	91%

In addition to occupancy patterns and frequency of air conditioning usage, Power Manager participants' experience with the program is affected by how they operate their air conditioning systems. Survey responses show that there is a mix of both manual and programmable thermostats installed in the homes of Power Manager participants. Figure 7-4 summarizes the types of thermostat(s) that survey respondents reported. Responses show that 44% of customers have a programmable thermostat. Another 44% of respondents said that they have a manual thermostat installed in their home; 5% of the remaining 13% have both a programmable and manual thermostat in their homes.

Figure 7-4: "What type of thermostat(s) do you have?" Response Frequencies Weighted by Mode, N_t = 72 and N_c = 73



Among customers who have programmable thermostats, 42% reported using the programmability feature to allow the thermostat to cool to different temperatures at different times, and a further 47% of customers set their thermostat at a constant temperature. Among customers without programmable thermostats, 54% say that they keep their thermostat set at a constant temperature. This relatively high incidence of using a thermostat set point should increase thermal comfort associated with events. If during the course of an event, the home's internal temperature rises by one or two degrees, when the event is over, the thermostat will reliably detect the higher temperature and automatically cool the home to the desired temperature, without relying on the customer to feel uncomfortable first and manually turn the air conditioning on themselves. These reported air conditioning usage behaviors are supportive of the earlier finding that, on the whole, Power Manager participants are not aware of events when they occur.

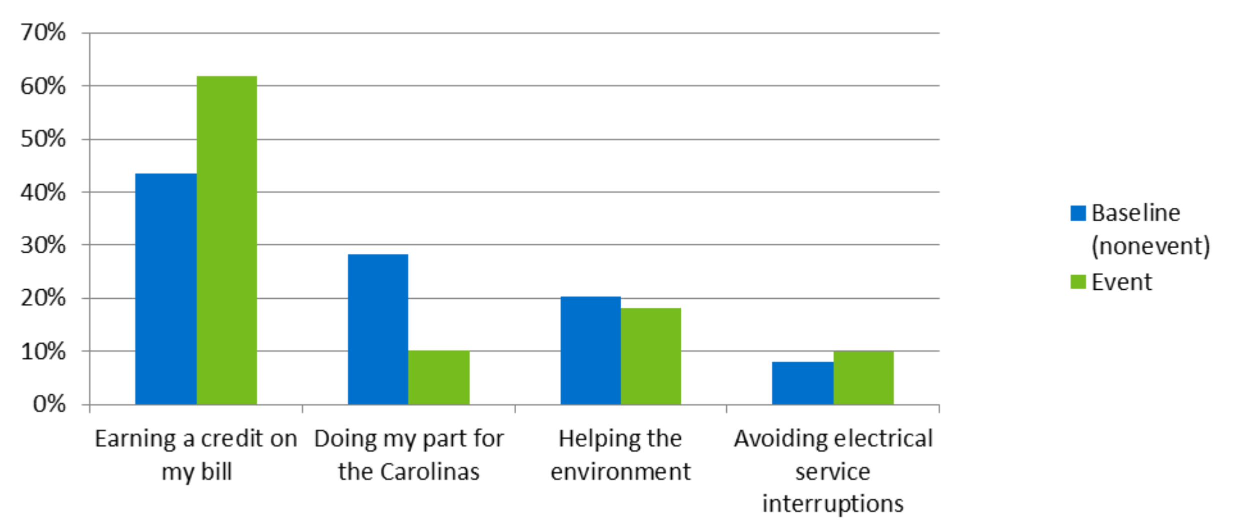
Similarly, Nexant asked customers who reported that they thought there was a Power Manager event recently whether or not they took any actions as a result of the perceived event. Only 5 customers (of 18 who said that they thought there was a Power Manager event) said they did something different in response to the perceived temperature change. The few responses to these questions were unpatterned, and provide further evidence that Power Manager events are not disruptive to participants

7.4 Motivation, Satisfaction, and Potential Barriers to Program Participation

Respondents were provided with a list of possible reasons for enrolling and asked which reason was most important to them. Survey responses reveal that Power Manager participants are motivated to be a part of the program by a diverse set of interests. The most frequently reported motivation is the bill credits, with 52% of respondents citing this as their most important motivator. The second-highest motivator was "doing my part for the Carolinas", capturing 20%

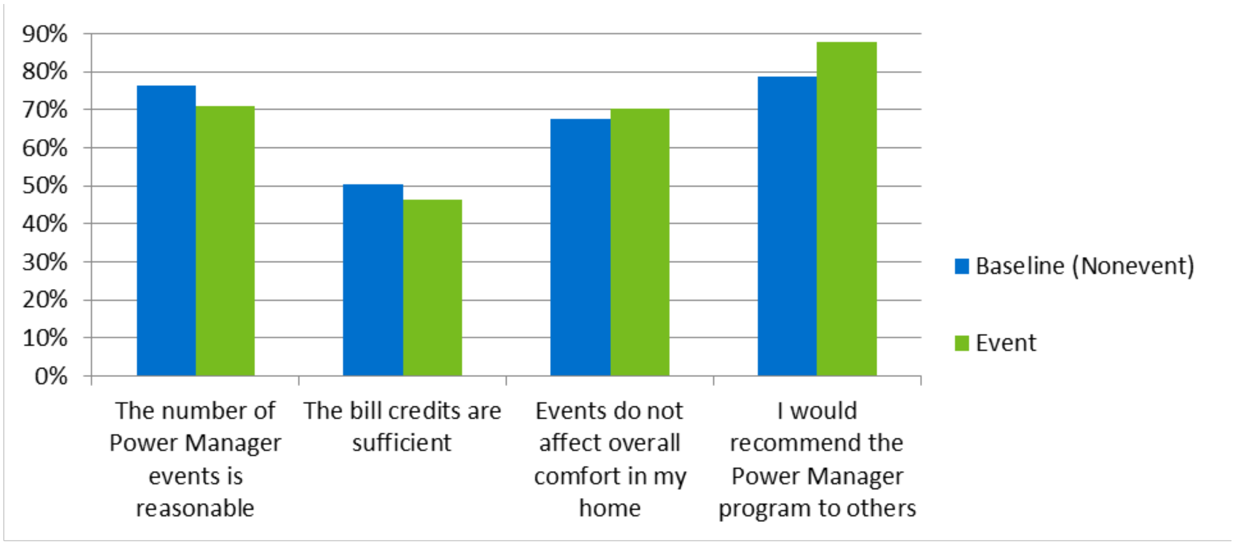
of responses; an additional of 19% of customers stated that their primary motivation was helping the environment. The remaining 9% of customers stated that their primary motivation for enrolling was avoiding electrical service interruptions. Figure 7-5 summarizes the survey responses, with customers who responded "Don't know", or refused to respond, excluded. Differences in response patterns between event and nonevent baseline groups are not statistically significant.

Figure 7-5: "Which of the following reasons was most important to you when enrolling?" Response Frequencies Weighted by Mode, N_t = 63 and N_c = 59



Customers were asked to rate on a scale of 1 to 5, where 1 means "strongly agree" and 5 means "strongly disagree", their agreement with various positive statements about Power Manager. Customers largely agreed with these statements; over 70% of both event and baseline customers agreed that the number of events is reasonable and that they would recommend the program to others. Customers were in slightly less agreement about events not affecting overall comfort in their homes; 70% of event and 68% of event customers agreed with this statement. Only 50% of event customers agreed that the bill credits were sufficient, and less than half of the event customers agreed with this statement. Crucially, 83% of all customer agreed that they would recommend the program to others. The distribution of responses for those who answered each question is shown in Figure 7-6. Differences in response patterns between event and nonevent baseline groups are not statistically significant.

Figure 7-6: "How would you rate the following statements about Power Manager?" Response Frequencies Weighted by Mode, N_t = 72 and N_c = 73



The survey concluded with an opportunity for customers to provide suggestions on how they think the Power Manager program might be improved. Forty-two percent of respondents (61 of 145) offered responses to this question, and of those, 48 offered feedback (13 of the 61 customers stated that they had no suggestions for improving Power Manager). Among those offering suggestions for improvement, there were three common requests. The first, mentioned by 20 of 48 people, reflected a desire for better communication from Duke Energy about the Power Manager program, including increasing awareness of the program, and increased details on bills.

- "Just to make sure that I am more aware of the program."
- "Giving us more information or educating us about the program in the bill statement."

The second, mentioned by 12 people, expressed a desire for notification before or during an event:

- "For Duke Energy to send out and email for whenever an event has occurred."
- "I would like to know when they did it and outlining it on my bill."
- "Text me when you turn off the power. Send a text every month to show me my savings and credits from the program."

The third most common comment, reported by 11 people, was that customers were unsure or unaware of what the Power Manager program specifically entails:

- "I guess getting people more information about the program specifics, including what the power manager installation does."
- "Educate customers better, [so that they] understand what they are signing up for."
- "I kinda forgot it existed, so better information/reminders it exists and what it does."

Nine people expressed a desire for larger bill credits. Additionally, four people stated their desire to see the reach of – or services offered through – the Power Manager program expanded. Some of the comments in these areas include:

- "Giving more credits to people that have it/more incentives to sign up.
- "Increase the power manager credits to what it was when it first started and based on a per device [basis] like the water heater and AC unit."
- "Make it mandatory. There are some people who just want to be ice."

Table 7-6 summarizes categorizations of the free-form responses. Many responses fit into more than one coding category, thus the percentages add up to more than 100%.

Table 7-6: "What suggestions do you have for improving Power Manager?" n=48

Statement	Frequency
Better Communication	42%
Provide Notification of Events Occurring	25%
Unsure/unaware of program details; communicate them	23%
Increase Credits/Incentives	19%
Increase Awareness of Program	19%
Doesn't Impact Me (the customer)	10%
Clarity on Bill	10%
Increase Services/Reach of Program	10%
Unaware of Program	8%
Show Frustration	8%
Express Appreciation	6%
Miscellaneous	6%

Responses were positive when participants were asked to rate the likelihood of staying enrolled in Power Manager, with the large majority of respondents saying that they intend to stay in the program; 87% of all respondents said they are "somewhat likely" or "very likely" to remain enrolled. Responses are tabulated in Figure 7-7. The eight customers who said they were not at all likely to stay enrolled gave varying explanations. Their explanations are shown in Table 7-7.

Figure 7-7: "How likely is it that you will stay enrolled in Power Manager? Would you say…?" Response Frequencies Weighted by Mode, N_t = 72 and N_c = 73

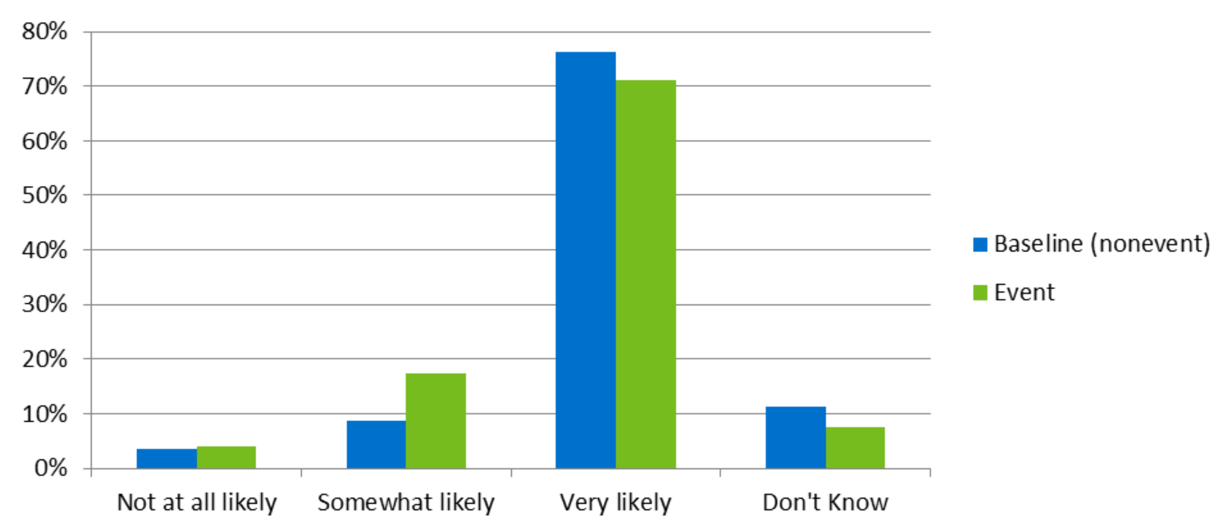


Table 7-7: "Why are you not at all likely to stay enrolled in Power Manager?" N_t = 4 and N_c = 4

Response	Group
If they provided more information on it, and let me know if I'm on it and also understand the terms and conditions of the program.	Nonevent
Doesn't see the benefits in it.	Event
I don't even know I am in it.	Event
Don't know.	Event
Refused.	Nonevent
I don't want them to have power to turn my power off.	Nonevent
Moving, because we are selling the house.	Event
If it lowered her bill it would be fine.	Nonevent

7.5 Interview Findings

Power Manager is a mature demand-side resource that is actively used in the course of operating Duke Energy Carolinas' electric system. The demand savings delivered by Power Manager are made possible through the teamwork of internal and external stakeholders that manage the program's budget and goals, communicate with participants, maintain the Yukon event dispatch software, and interact with the customer at every stage of the program lifecycle, from enrollment, to device installation, to device removal. Three primary stakeholder groups, the Duke Energy program management team, Eaton Power Systems, and Franklin Energy, work together to deliver Power Manager to customers. Nexant interviewed four individuals from these organizations.

Overall, through the course of our conversations, we observe that Power Manager maintains a customer-focused orientation and is currently engaged in a number of initiatives to improve program operations and customer service. The remainder of this section will describe the Power Manager offering in the Carolinas and what Duke Energy's activities are to bring in new program participants and support annual enrollment goals. A description of program operations follows, which is followed in turn by an outline of work that continues after each load control season concludes to ensure Power Manager's continued success. This section concludes with a review of the activities that are planned or currently underway to further improve program operations and participating customer experience.

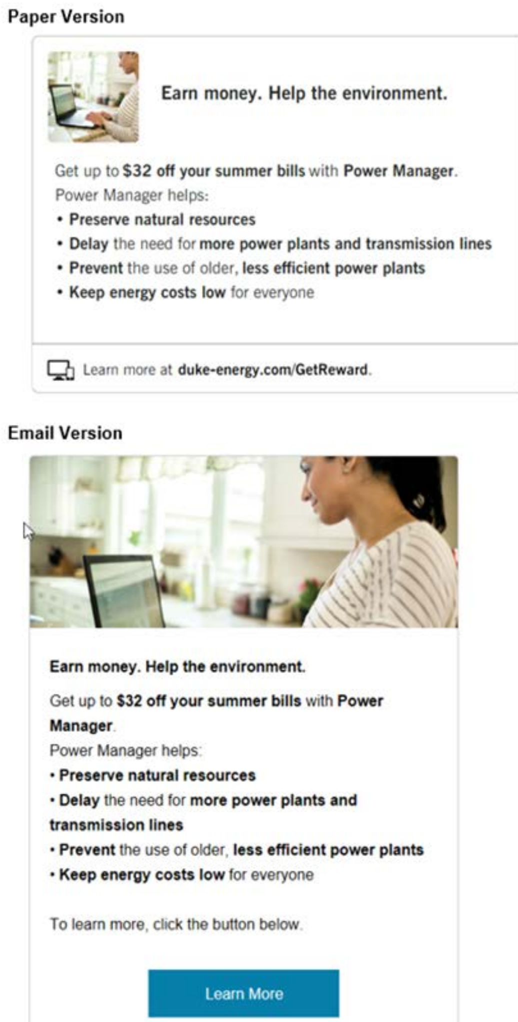
7.5.1 Program Offer and Enrollment Goals

Work to recruit new Duke Energy Carolinas participants into Power Manager takes place year-round. Duke Energy's 2019 enrollment goal for the Carolinas was 15,318 devices. This annual enrollment target is calculated using energy savings goals, and requires a year-round recruitment effort. In 2019, Duke Energy actually enrolled 17,727 devices. In part, this success was due to this year-round recruitment efforts—including increased "pre-season" installations—but also to the increase of recruitment targets for the third-party call center provider, CustomerLink. Though customers are sometimes recruited via other channels, this outbound calling channel is the predominant and most effective recruitment source for the Power Manager program. Additionally, Duke Energy has been providing CustomerLink with customer participation data for other programs. Having the ability to refer to this information during recruitment calls helps CustomerLink staff increase effectiveness of their communications and credibility with potential Power Manager participants.

As an outbound call center, CustomerLink is prepared to address common questions or concerns that Duke Energy customers who are not familiar with the program may have, in addition to describing the basic features of the program, many of which are friendly to the program participants. Outbound callers are ready to speak to the fact that Duke Energy's customer research has shown that the large majority of customers who are home during an event don't notice it, that there are generally only five to seven events each summer, and that events typically end by 6 pm, which is when many customers are just coming home from work. Another participant-friendly aspect of the program is that air conditioning units enrolled in the program are cycled rather than completely curtailed. Power Manager is also not called on weekends or weekday holidays, unless in the rare event of a system emergency. The load control devices used by the program—switches that directly control the air conditioner's compressor—are a proven technology that does no harm to the customer's air conditioner or the home's electric distribution system. In addition, because the device is installed on the compressor, which is typically located outside the home, as opposed to installed on fans or thermostats, the program design does not require a technician to enter the customer's home—preventing any possible problems and subsequent reductions in participant satisfaction.

The large majority of marketing efforts are focused on outbound calling by CustomerLink. However, both the electronic and paper versions of the March 2019 MyHER Home Energy Report featured The Power Manager program. Figure 7-8 depicts the copy present in each version.

Figure 7-8: Power Manager Outreach Material Featured in March 2019 MyHER Reports



The Duke Energy Carolinas program provides $8 credits on participating customers' July thru October bills. With only a modest financial incentive for participation, Duke Energy emphasizes messaging around community and environmental benefits to generate customer interest in the program. Duke Energy has found that these preferences are correlated with older, higher income, and higher education demographics.

Franklin Energy is a third party provider that manages Power Manager customer care and handles participants' inquiries about the programs and requests for customer service, in addition to all fieldwork. Power Manager fieldwork ranges from scheduling and routing load control device installations, training and managing a staff of device installers, responding to any device service calls, and fulfilling customer requests to remove load control devices. Franklin Energy also manages and staffs all quality assurance inspections and fieldwork. In the past, Duke Energy would provide Franklin Energy with a sample of residents to test for device operability problems. However, Duke Energy now uses AMI data to help pinpoint potentially malfunctioning or missing devices and passes a prioritized list of these devices to Franklin Energy. With this new "targeted" system, quality control trips have been reduced by about 60%, while tripling the proportion of devices that are reconnected, doubling installations (due to missing switches), while also significantly increasing replacements. This improvement has allowed for a much higher reconnection rate per quality control trip, while also dramatically reducing the number of necessary trips, as well as the length of time Franklin Energy staff need to be on-site at a participant's residence.

7.5.2 Power Manager Program Operations

In terms of maintaining Power Manager as a reliable system resource for the Duke Energy Carolinas system operators, Eaton Power Systems plays an important role as the provider of the switches and as a resource to assist Duke Energy program staff in maintaining the Yukon software system, managing firmware issues that can arise from time to time, addressing the switches for normal service and evaluation, measurement and verification (EM&V) activities and training Franklin Energy' switch installers. An annual all-hands Spring Training event hosted by Duke Energy brings all the Power Manager program stakeholders together to discuss the upcoming load control season's work.

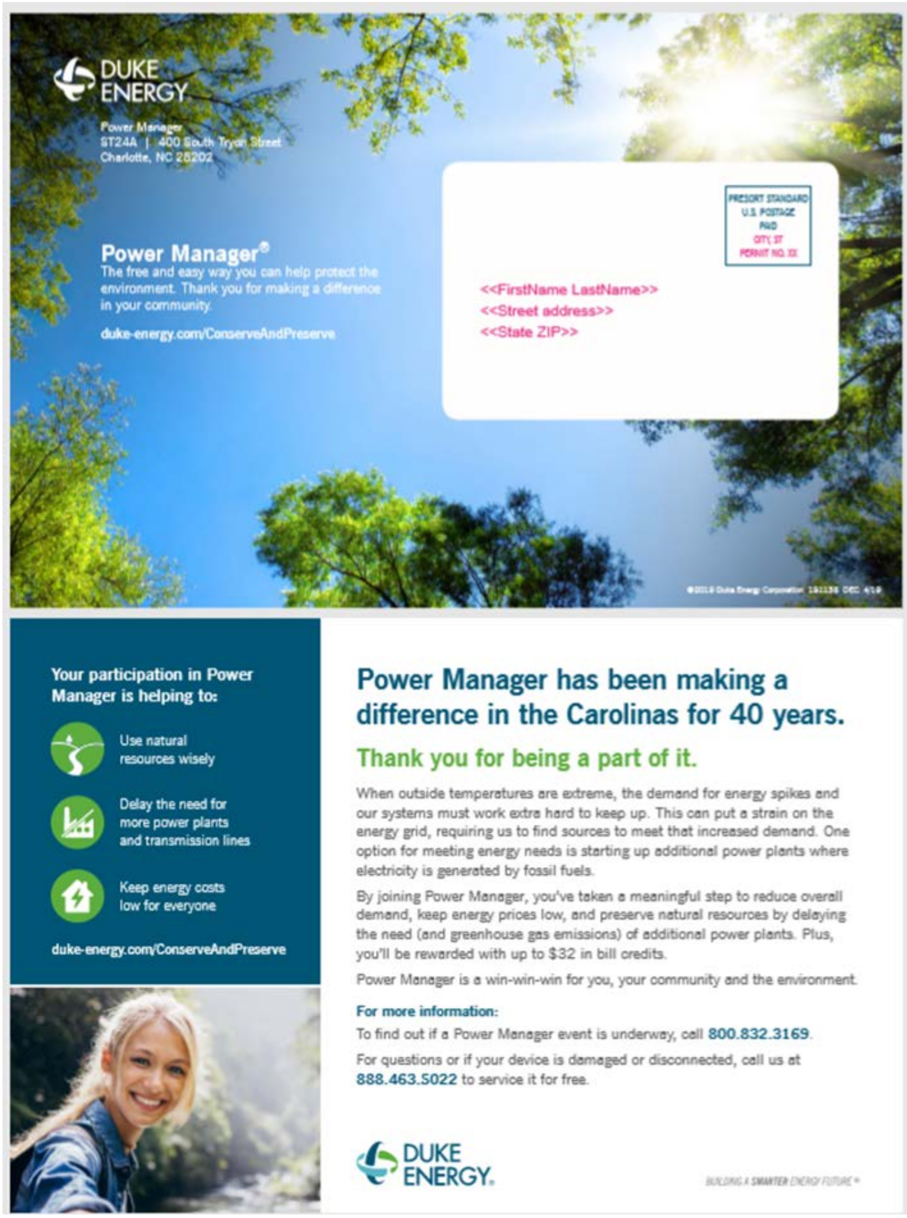
These events were cited by all stakeholders as a crucial aspect of program operations. Not only do these meetings allow for in-depth coverage of upcoming issues of relevance, but they are also critical in maintaining the overall collegiality and professionalism that facilitates free communication amongst the stakeholders that is crucial for the quick resolution of any emergent issues that arise during the program season. In this communicative environment, stakeholders are more keenly aware of each other's responsibilities, knowledge base, and workload, and are thus able to more efficiently troubleshoot and find the appropriate staff for solving any problems. Additionally, weekly meetings between Duke Energy Carolinas and Franklin Energy staff (which Eaton joins once a month), are another strategy that has been built in to head off any problems during the load control season.

Recent program operations improvements have been implemented by Eaton Systems, through the upgrade of their Yukon dispatch software with an "Assets" package. Yukon Assets ties Franklin Energy's program participation data to Duke Energy's customer information and program dispatch capabilities to provide greater flexibility in managing Power Manager events.

The TrueCycle algorithm in Yukon is used for normal Power Manager events. It uses each participants' actual AC usage patterns to achieve the 64% or 50% reduction of each AC unit's runtime during a cycling event. During emergency full-shed events, the cycling algorithm is replaced with a 100% shed.

Before the summer load control season begins, Duke Energy uses seasonal reminder/thank you cards that are sent near the start of the load control season to remind and thank customers for their participation in the program, provide tips for having a comfortable experience with the program, and recognize the benefits of the program in terms of reducing system load and providing environmental benefits. Additionally, the messaging used in 2019 included references to the Power Manager program's 40th anniversary. The 2019 reminder postcard is shown in Figure 7-9.

Figure 7-9: Spring Reminder and Thank-You Postcard



Beyond the monthly credits that are present on customer's bills during load control season, these cards are usually the only communication customers are provided with from the program each year. Duke Energy does not notify Power Manager participants either in advance or during event dispatches. However, Duke Energy maintains a toll-free hotline that program participants may call to get updates on the status of whether or not the program is planning to dispatch an event or whether an event is in progress.

At Duke Energy Carolinas, program managers make the final decision when load control events will be called on a day-of basis, mainly considering local system and weather conditions. Though this is the case, these managers are also in touch with other stakeholders in this system as they work to anticipate days where events are possible. Advance event discussion and preparation makes the day-of event calling process operate smoothly.

Duke Energy's Energy Control Center (ECC) (formerly, the System Operations Center (SOC)), also has access to dispatch Power Manager. The ECC has the responsibility of balancing the supply and demand of electricity on the grid for Duke Energy Carolinas. This requires planning for demand levels that fluctuate throughout the day which must be managed relative to Duke Energy's supply margins. Although Power Manager is rarely used in an emergency full-shed capacity, the ECC uses the cycling option on occasion. Because Power Manager provides a low-cost, reliable and quickly dispatchable asset for this group, it is often used as a "virtual power plant" and contributes to the system's operating reserve margins.

Under normal operations, the Demand Response Operations team includes staff in ECC and Fuel and Systems Optimization in event decision making. However, the Demand Response Operations staff maintains control of the decision to call nonemergency events. Power Manager is viewed as an important resource for the Duke Energy Carolinas system that depends on the participating customers' willingness to remain enrolled. Therefore, all events are called with a view towards whether or not it will be a detriment to the experience of the participants and their continued participation. Considerations taken in this area are the number of events that have already been called during the current summer, during that week, at what hours events are taking place, and at which level the participants' AC units will be cycled.

7.5.3 Program Monitoring and Postseason Program Maintenance

Duke Energy undertakes a number of activities both during the load control season and afterward to ensure that participants are satisfied with their Power Manager program experience and that the program is on track to provide an excellent customer experience going forward.

Franklin Energy, as the third party contractor that manages Power Manager customer contacts, has service level agreements in place with Duke Energy that outline service benchmarks, with both penalties for nonperformance and opportunities for incentives when benchmarks are exceeded. There are specific benchmarks in place to ensure that, during event days in particular, customer calls coming into Franklin Energy are handled quickly, efficiently, and that accurate information is provided to the customers calling in. Additionally, Duke Energy program managers monitor the number of calls coming in to the toll-free notification line, in addition to the number of calls coming into the Franklin Energy call center to detect any emerging issues associated with the program experience. Device removal requests are also tracked for this purpose.

7.5.4 Upcoming Program Changes and Initiatives

Duke Energy is also engaged in initiatives to change the program offering to make it more attractive to customers and to improve program performance. Duke Energy Carolinas is assessing using its website as an additional source of event notification, making it easier for customers to access information about Power Manager events.

As participation saturation becomes an increasingly salient issue for the Power Manager program, the upgrade of the Yukon software that allows for granular management of load control events can help address this issue. Program management is exploring the possibility of putting processes in place to control loads at the regional transmission level. Additionally, Duke Energy Carolinas is transitioning to winter-peaking operational characteristics. With that in mind, Power Manager staff have been preparing for this eventuality and have asked Eaton to begin developing load control switches for water heaters and heat pump strip heating, and work will continue to ensure the program's ability to manage system peaks.

7.6 Key Findings

Key findings from the process evaluation include:

- 145 Power Manager participants were surveyed within 24 hours of the program event that occurred on July 15, which had a high temperature of 92°F and a maximum heat index of 97°F.
- Of the 145 participants that completed the survey, 72 customers experienced the event and 73 customers did not experience the event. This nonevent group survey was used to establish a baseline for comfort, event awareness, and other key metrics.
- A majority of all respondents, 72%, reported that they are familiar with the Power Manager program.
- About 18% of both sets of survey respondents—those who had and those who had not experienced the event—reported that their homes were uncomfortable. There is no increase in customers' thermal discomfort due to Power Manager events.
- 52% of respondents reported that "Earning a credit on my bill" is the primary reason they are participating in Power Manager.
- Overall, 87% of survey respondents state that they are "very" or "somewhat" likely to remain in the program.
- 83% of respondents "strongly" or "somewhat" agreed that they would recommend the Power Manager program to others.
- New load control device installations and quality control reinstallations, reconnections and replacements substantially exceeded goals.
- The Power Manager staff and vendors are customer-focused and undertake a number of activities before, during, and after the load control season to ensure that the program administration and implementation runs smoothly, and that participants are satisfied with their Power Manager program experience.
- Yukon software system has been upgraded with the "Assets" package that provides increased functionality and granularity in calling Power Manager events.
- Effective communication strategies amongst stakeholders is an ongoing strength of the program.

8 2020 Impact Evaluation

Findings from the 2019 impact evaluation indicated that the impacts produced by the events in 2019 were likely affected by one or more issues arising from regional/locational dispatch signals, complexities stemming from the EM&V feeder group assignments, or possibly some other unidentifiable factor(s). Following the 2019 event season, Duke Energy undertook efforts to identify and address the possible issues and requested that Nexant complete a subsequent impact analysis on the 2020 event season. The 2020 analysis did not include a process evaluation component.

8.1 Summary of Results

In general, the magnitude and percent impacts produced by the 2020 events are comparable to those produced by the 2019 events. In 2020, a total of five events were called. Four of the events were emergency full-shed dispatch, while the remaining event was called by the ECC using the 64% cycling option. The four emergency events, all of which lasted less than 30 minutes in duration, averaged impacts of 1.04 kW per device, compared to 1.17 kW per device average impacts for the two emergency events called in 2019. While this shows a 0.13 kW drop in impacts, it is important to note that temperatures observed during the 2020 emergency events were significantly lower than the temperatures observed during the 2019 events, by 5°F on average. As demonstrated through previous evaluations, temperatures leading up to and during the event period are the primary driver of impacts. Events called at identical times for the same duration and population of customers, but under conditions 5°F cooler, will produce notably smaller load impacts compared to a similar event on a 5°F hotter day. This consequence of cooler temperatures appears to be the primary driver of the observed load reduction magnitudes produced in 2020.

Results of the 2020 DEC Power Manager impact analysis are summarized in Table 8-1.

Table 8-1: 2020 Event Impacts

Event Date	Shed Type	Event Period	Reference Load	Impact	90% Confidence		% Impact	90%Confidence		Max Event Temp
					Lower Bound	Upper Bound		Lower Bound	Upper Bound	
6/3/2020	Emergency	3:30PM - 3:45PM	2.93	-0.89	-0.72	-1.06	-30.5%	-24.6%	-36.3%	87.1
6/22/2020	Emergency	4:30PM - 4:45PM	3.14	-1.17	-0.88	-1.46	-37.2%	-27.9%	-46.5%	85.6
8/27/2020	Emergency	4:30PM - 4:45PM	3.30	-1.04	-0.77	-1.32	-31.5%	-23.2%	-39.9%	87.4
9/2/2020	Emergency	4:30PM - 4:57PM	3.47	-1.05	-0.89	-1.22	-30.4%	-25.7%	-35.1%	89.9
9/11/2020	Cycling	4:30PM - 5:12PM	3.02	-0.60	-0.41	-0.80	-20.0%	-13.5%	-26.4%	83.5

Key findings of the 2020 impact analysis are summarized as follows:

- Emergency shed event impacts ranged from 0.89 kW to 1.17 kW.
- The cycling event held on September 11 produced load reduction of 0.60 kW.
  - The magnitude of impacts observed during the September 11 event can be explained by relatively low temperatures observed on that day; the event was called by the Energy Control Center in order to maintain system integrity rather than in response to extreme weather.
- The 2020 event impacts are similar to those in 2019 when controlling for similar dispatch conditions.
- If emergency shed becomes necessary on a day where the event temperature is 100°F, Power Manager can deliver 1.59 kW of demand reductions per household during a one-hour event starting at 4:00PM.
- With an average ratio of 1.2 devices per household, the average demand reduction per device is 1.33 kW.
- Because there are approximately 238,000 Power Manager customers, the expected aggregate reductions total 380 MW under 100°F event period temperatures.

8.2 Methodology

The analysis methodology used to estimate impacts for the 2020 events differed from the analysis approach used in 2019 in a few fundamental ways. First, the 2020 impact analysis relied entirely on a within-subjects analysis framework rather than a RCT. This alternate approach was required in order to accommodate the simplified configuration of the program population, which removed the more complex feeder group assignments, and instead dispatched events at the full program level. Because the within-subjects methodology is described in detail in Section 3.4, it is not rehashed here. Second, the 2020 analysis utilized a small subset of customers from among the program's population who were discovered to have 15-minute interval meter data, rather than 30-minute interval data that is standard in the DEC territory. This group was particularly beneficial for assessing impacts achieved during events having durations that were not multiples of 30 minutes (i.e. events lasting 15 or 45 minutes). These methodological changes were detailed in the Impact Analysis Methodology Memo submitted to Duke Energy on February 2, 2021, and are described in additional detail below.

8.2.1 15-minute vs. 30-minute Interval Data

An assessment of the 2020 data revealed that a small portion of the Power Manager customer population (0.1%) has usage data in 15-minute intervals, rather than 30-minute intervals as expected. The presence of 15-minute interval usage data provides an opportunity to more accurately measure impacts for events that were 15 or 45 minutes in duration. Metered usage data in 30-minute intervals are unable to accurately depict load reductions achieved by dispatches sent for sub-30 minute periods of time because only a fraction of the interval is the true event period. To account for this, Nexant used the subset of customers having 15-minute interval data to inform our analysis based on the full population, resulting in more accurate impact estimates for event periods that are not multiples of 30 minutes. This process involved the following steps:

1) Conduct testing to ensure the sample of customers with 15-minute interval data is statistically similar to the full program population. Customers' load data from the two groups were compared to a set of non-event days to ensure similarity.
2) Use within-subjects methodology to develop impact estimates separately using both 15-minute interval data for the subset of customers with 15-minute data and 30-minute interval data for the general population. As part of this step, data from the customers with 15-minute intervals were collapsed to 30-minute intervals to produce a third set of impacts based on the collapsed data. This enabled two sets of impacts from the same population using both 15-minute and 30-minute data, and allowed for comparison with the general population's impacts based on 30-minute data.
3) Calculate an adjustment factor using the separate sets of impact estimates produced in #2. The adjustment factor was calculated as the ratio of the impacts produced by 15-minute data to the impacts produced by 30-minute data.
4) Apply the adjustment factor to event-level impacts produced by the full population of 30-minute interval data to generate the reported impact estimates for 2020 events.
5) If the event did not run for the full 15 minutes of a 15-minute interval, an additional adjustment factor was applied in order to account for the number of minutes in the interval that the event was dispatched.

8.3 Impact Analysis Findings

The load impact estimates for 2020 events are presented in Table 8-2. Load impacts and confidence intervals for each event are presented as the average per household changes in load during the indicated dispatch window.

Table 8-2: Per Customer Event Impacts

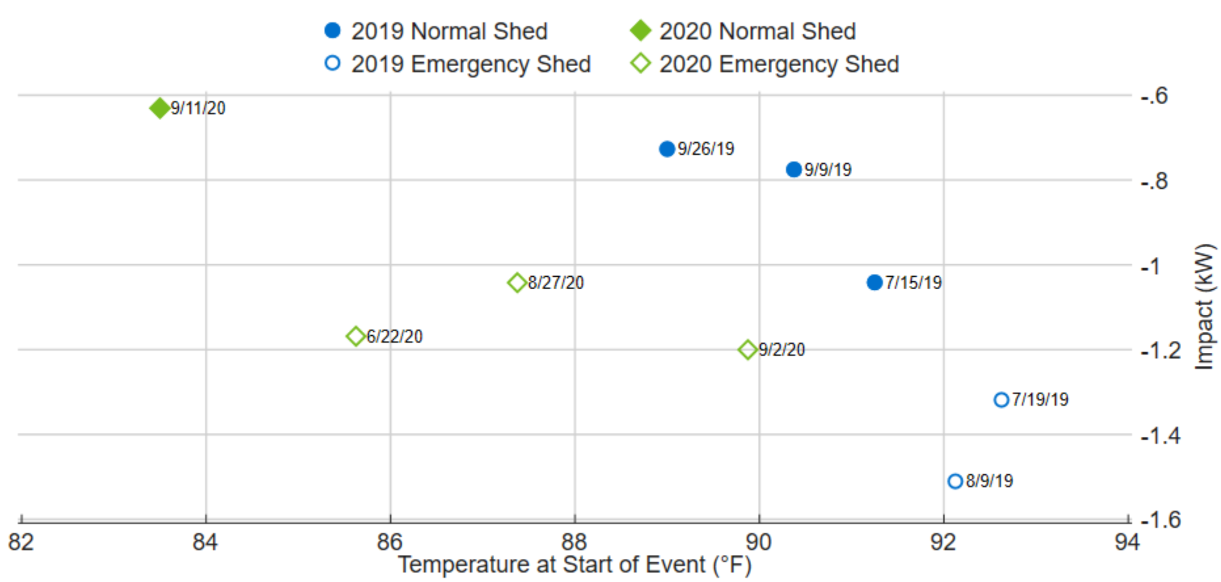
Event Date	Shed Type	Event Period	Reference Load	Impact	90% Confidence		% Impact	90%Confidence		Max Event Temp
					Lower Bound	Upper Bound		Lower Bound	Upper Bound	
6/3/2020	Emergency	3:30PM - 3:45PM	2.93	-0.89	-0.72	-1.06	-30.5%	-24.6%	-36.3%	87.1
6/22/2020	Emergency	4:30PM - 4:45PM	3.14	-1.17	-0.88	-1.46	-37.2%	-27.9%	-46.5%	85.6
8/27/2020	Emergency	4:30PM - 4:45PM	3.30	-1.04	-0.77	-1.32	-31.5%	-23.2%	-39.9%	87.4
9/2/2020	Emergency	4:30PM - 4:57PM	3.47	-1.05	-0.89	-1.22	-30.4%	-25.7%	-35.1%	89.9
9/11/2020	Cycling	4:30PM - 5:12PM	3.02	-0.60	-0.41	-0.80	-20.0%	-13.5%	-26.4%	83.5

Overall load impacts for the average customer ranged between 0.89 kW and 1.17 kW during the four emergency shed events. The lone cycling event, held on September 11, resulted in lower impacts than those for the emergency shed events, with load impacts of 0.60 kW for the average customer. The September 11 cycling event was called by the ECC for the purpose of maintaining system integrity, rather than by Duke Energy in response to extreme temperatures.

8.3.1 Comparison with 2019 Event Impacts

Several factors can affect the magnitude of event impacts, including: the event shed type (i.e. emergency vs. normal dispatch), time-of-day, the duration of the event, day-of-week, month-of-year, and temperature. The structure of the 2020 events, specifically with respect to timing and duration, was different in 2020 compared to 2019. All 2020 Power Manager events began between 3:30 PM and 4:30 PM and were less than one hour in duration. Meanwhile, the 2019 Power Manager events varied by their start times and duration. These differences, combined with cooler temperatures in 2020, led to some challenges in making a valid comparison between the 2019 and 2020 results. In order to draw a meaningful comparison that controls for as many of the differences in event conditions as possible, Nexant isolated the 2019 events that had similar start times to the 2020 events (i.e. dispatch sent between 3:30 PM and 4:30 PM), and then further isolated the impacts of those events to the first 30-minute interval. This enabled a comparison of impacts produced for similar durations and at similar times-of-day between the two years. The comparison of impacts in relation to event start temperature are presented in Figure 8-1.

Figure 8-1: Comparison of 2019 and 2020 Event Impacts



As shown in Figure 8-1, the 2019 events (blue markers) were consistently held on hotter days than the 2020 events. Looking at the emergency shed events (shown as the hollowed markers), temperatures were anywhere between 2°F and 7°F cooler at the start of the 2020 events compared to the emergency events held in 2019. Similarly, the lone cycling event in 2020 was 5°F to 8°F cooler than the normal shed events in 2019. Not surprisingly, the pattern of greater impacts being achieved on hotter days holds between the two years. However, considering the relative magnitude of the impacts observed in 2020 - under inferior temperature conditions - it stands to reason that the 2020 events would have produced equivalent, or higher, impacts as the 2019 events under those hotter weather conditions. These results support the premise that the 2020 impacts are consistent with, and perhaps show improvement over, what was achieved in 2019.

8.4 Demand Reduction Capability

In order to estimate the demand reduction capability, models were developed both for reference loads and event impacts based on a hot, one-hour emergency event starting at 4:00 PM. A 24-hour temperature profile was developed with a temperature of 100°F from 4:00 PM to 5:00 PM, which is also the maximum daily temperature. The analysis assumes that this temperature profile represents the conditions experienced by the average Power Manager customer. Therefore, temperatures from individual weather stations in the Carolinas jurisdiction were weighted based on the regional distribution of the program's population.

Due to lower observed temperatures in 2020 compared to 2019, data from both years were included in the models for reference load and event impacts. Additionally, because no emergency events in 2019 or 2020 exceeded 30 minutes in duration, a ratio was applied to adjust the half-hour impact to a full-hour impact using 2019 events that were at least one hour in duration.

Impacts and loads were modeled using the observed temperature and load data, and then applied to the hot weather temperature profile. A one-hour emergency event starting at 4:00 PM with an event temperature of 100°F is expected to deliver 1.59 kW of demand reduction capability per customer dispatched. Because there are approximately 238,000 customers enrolled in Power Manager, the expected aggregate reduction is 380 MW. In addition, because there is an average of 1.2 devices per household, the average per device load reduction is 1.33 kW.

Table 8-3: Estimated Per Household, Per Device, and Aggregate Impacts

Event	Per Household Impact	Per Device Impact	Aggregate Impact
Emergency Shed 4:00 PM Start 1-hour Duration 100°F Event Temperature	1.59 kW	1.33 kW	379.5 MW

Figure 8-2: Demand Reduction Capability – 100°F Event Period Temperature (2020)

Inputs	
Dispatch Type	Emergency Dispatch
Event Start Time	4 PM
Event Duration	1
Event Period Max Temp	100
# Customers	238,000

Event Window Average Impacts		
Load without DR	4.06	kW per customer
Load with DR	2.47	kW per customer
Impact per Customer	-1.59	kW per customer
Program Impact	-379.5	MW
% Impact	-39.3	%

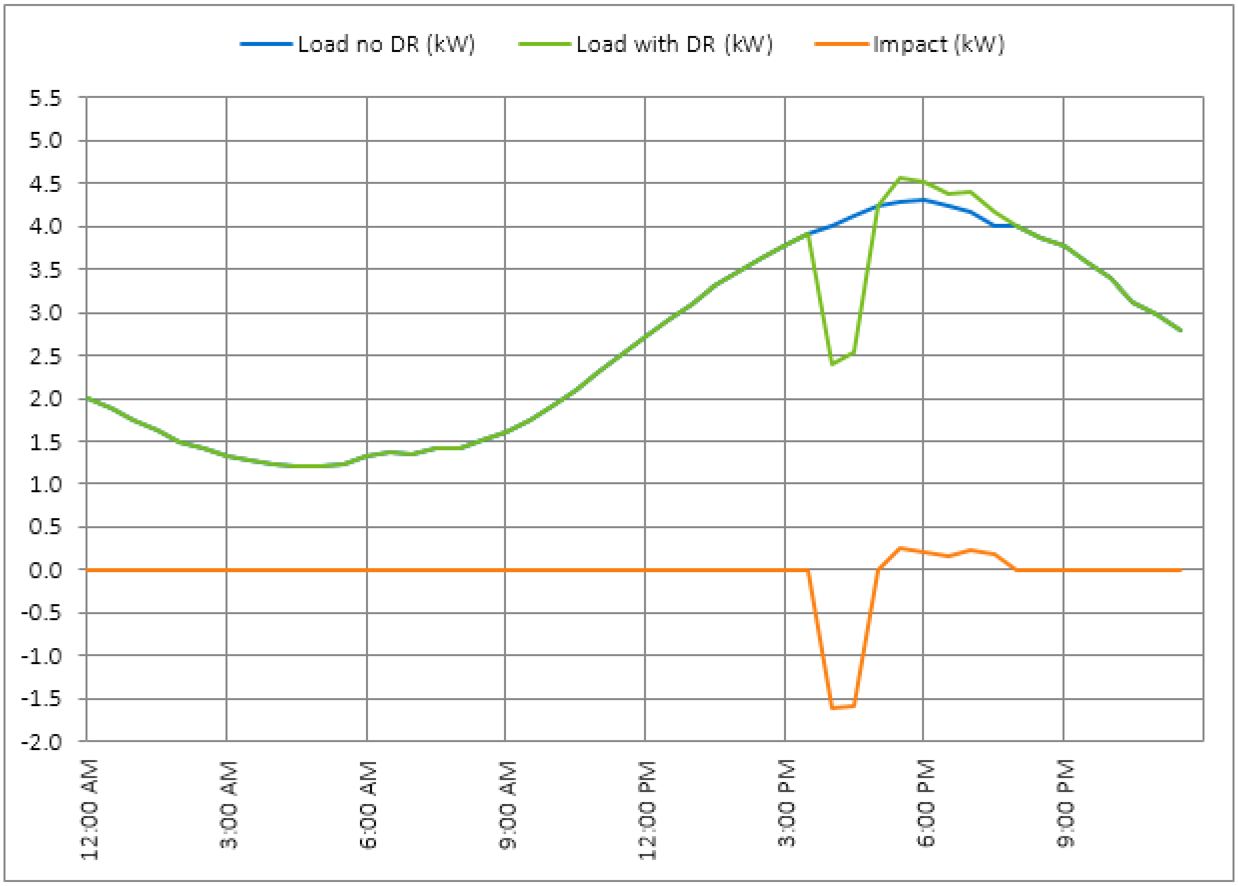


Table 8-3 displays the expected impacts for various event start times and maximum daily temperature conditions, given an emergency event with a one-hour duration. The estimates shown are derived from the time-temperature matrix, and are therefore reliant on the empirical data observed during the 2019 and 2020 program seasons. As such, the completion of Table 6-1 in its entirety requires the use of daily maximum temperatures, rather than event period temperatures, as the conditional input for estimating impacts. Because none of the 2019 or 2020 events experienced certain of the more extreme temperatures shown in Table 6-1, the time-temperature matrix is limited in its ability to predict loads under these conditions.

Table 8-4: Per Customer Impacts by Daily Maximum Temperature and Event Start Time (2020)

Daily Max Temperature	Event Start Time				
	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM
90°F	-0.62 kW	-0.74 kW	-0.85 kW	-0.95 kW	-1.06 kW
92°F	-0.70 kW	-0.84 kW	-0.98 kW	-1.08 kW	-1.19 kW
94°F	-0.78 kW	-0.95 kW	-1.11 kW	-1.22 kW	-1.34 kW
96°F	-0.88 kW	-1.07 kW	-1.24 kW	-1.37 kW	-1.51 kW
98°F	-0.97 kW	-1.19 kW	-1.38 kW	-1.52 kW	-1.68 kW
100°F	-0.98 kW	-1.22 kW	-1.43 kW	-1.59 kW	-1.87 kW
102°F	-1.04 kW	-1.35 kW	-1.65 kW	-1.88 kW	-2.14 kW

Impacts grow as temperatures increase and as the event starts later in the day. Impacts increase with a later event start time because reference loads are generally increasing from 1:00 PM to 5:00 PM during the summer. In practice, impacts may vary due to unique weather patterns or event day characteristics.

9 Conclusions and Recommendations

9.1 Impact Evaluation Conclusions and Recommendations

Conclusion: Overall, the Power Manager program produces significant results in reducing peak load demand for Duke Energy's residential customers. On average, 2019 events achieved greater than 20% load reduction per household for general population events.

> **Recommendation:** Continue to promote the Power Manager program to DEC residential customers who exhibit high peak load consumption. Customers with higher-than-average peak loads remain the best candidates for program participation and have the greatest potential to contribute to demand savings.

Conclusion: Complexities associated with feeder programming and event dispatch design for the M&V events led to a number of unanticipated ramifications with the impact analysis. M&V events designed to assess differences in shed type (i.e. side-by-side dispatches) and time-of-day dispatch (i.e. cascading events) only provided limited value due to the narrow range of event conditions.

> **Recommendation:** In the future, consider a simplified M&V design, whereby only a single control group is assigned and Duke Energy dispatches the Power Manager program as needed, and does not conduct M&V-specific events.

> **Update:** As of the time of this report submission following the 2020 impact analysis, Nexant and Duke have agreed to move to a simplified A/B group study design for subsequent program evaluations. This approach will be detailed in future project documentation.

Conclusion: The time-temperature matrix predicts demand reductions of 1.59 kW per household for a 1-hour event beginning at 4:00PM with an event period temperature of 100°F. However, the time-temperature matrix is limited by a narrow range of empirical data with a maximum observed event period temperature from the past season of 92.9 °F.

> **Recommendation:** Revisit the time-temperature matrix requirements and consider developing a model of program capabilities across a relatively modest band of temperatures, reflecting the current dispatch strategy. For example, reporting estimated impacts under a range of temperatures regularly observed during most event seasons for a 1-hour event starting at 4:00PM.

> **Recommendation:** If Duke Energy is interested in development of a TTM that reflects program capabilities under a broader range of scenarios, Nexant recommends collecting data to inform the TTM based on implementing end-use metering for a small sample of customers, rather than attempting the more complex RCT dispatches similar to the plans from the current evaluations.

9.2 Process Evaluation Conclusions and Recommendations

Conclusion: There were no differences in levels of agreement between event and non-event participants with statements about whether or not an event had occurred recently, about thermal discomfort, or about perceptions of the cause of any discomfort. In short, customers are not able to reliably perceive Power Manager curtailment events.

> **Recommendation:** Continue to prioritize participant comfort and satisfaction during curtailment events.

Conclusion: Eighty-three percent of Power Manager customers are likely to recommend the program to others, and 87% are likely to remain enrolled. There were no differences between event and non-event respondents for either question, nor for any other satisfaction questions. Therefore, Power Manager events do not affect customer satisfaction in either direction.

> **Recommendation:** Continue to prioritize practices that are focused on maximizing customer satisfaction in the design and implementation of the Power Manager program.

Conclusion: Seventy-two percent of all respondents are familiar with the Power Manager program. This represents a decrease of 13% from the previous evaluation of PY 2016. The majority of suggestions (28 of 48; 58%) for improvement from customers spoke to perceived communication gaps from Duke Energy.

> **Recommendation:** Evaluate each jurisdiction's communication strategy: before, during, and after load control seasons, and consider changes. Improved communication can improve customer satisfaction and increase positive word-of-mouth awareness. One possibility is to provide end of season "thank you" postcards, on which customers could be reminded of how much money they saved, or be informed about what the program has accomplished in that load control season and their role in that. For example, "Because of your participation this year, Duke Energy was able to keep expensive fuel-oil source electricity off of the grid on a hot summer day."

> **Recommendation:** Prioritize making Power Manager event notifications available on the program website.

Conclusion: "Targeted" QC protocols, using AMI data to identify switches that may be malfunctioning or missing, have yielded strong results. This allowed Franklin Energy to complete about 60% fewer QC site visits than were budgeted, while achieving a three-fold increase in the proportion of reconnects per site visit, as well as significant increases in replacements. Ultimately, this resulted in decreased costs and more switches being brought back online. The efficiency improvements here allowed for the reallocation of some resources to the recruitment budget, and this, along with increasing CustomerLink's recruitment goals, helped the program exceed enrollment and savings goals for 2019.

> **Recommendation:** Continue to leverage efficiency gains from the improved QC process into recruitment and communication efforts.

Conclusion: The current approach to communications amongst stakeholders has been effective in building professional collegiality and helps to make the program run smoothly, especially when problems arise.

> **Recommendation:** Continue to prioritize inter-organizational communications with "spring trainings", fall meetings (when needed), weekly and monthly calls, and other existing approaches.

Conclusion: As Duke Energy Carolinas transitions to winter-peaking operational conditions, the Power Manager program in the Carolinas will have to adapt to maintain viability. Eaton is currently developing a switch for water heaters.

> **Recommendation:** Continue preparations for this eventuality, as it will not only affect technological needs, but will also require new winter-specific marketing materials for new and existing customers, new guidelines for switch installation (because they will likely be inside homes), and new enrollment and savings goals.

Conclusion: The "Assets" module of the Yukon system offers opportunities to increase granularity of load control events. As customer saturation becomes an increasingly pertinent issue, "Assets" may offer a way to address it.

> **Recommendation:** Evaluate the feasibility and cost of utilizing this capability at different scales, as it offers the ability to localize load control events and thus maximize savings by targeting areas that offer the most savings.

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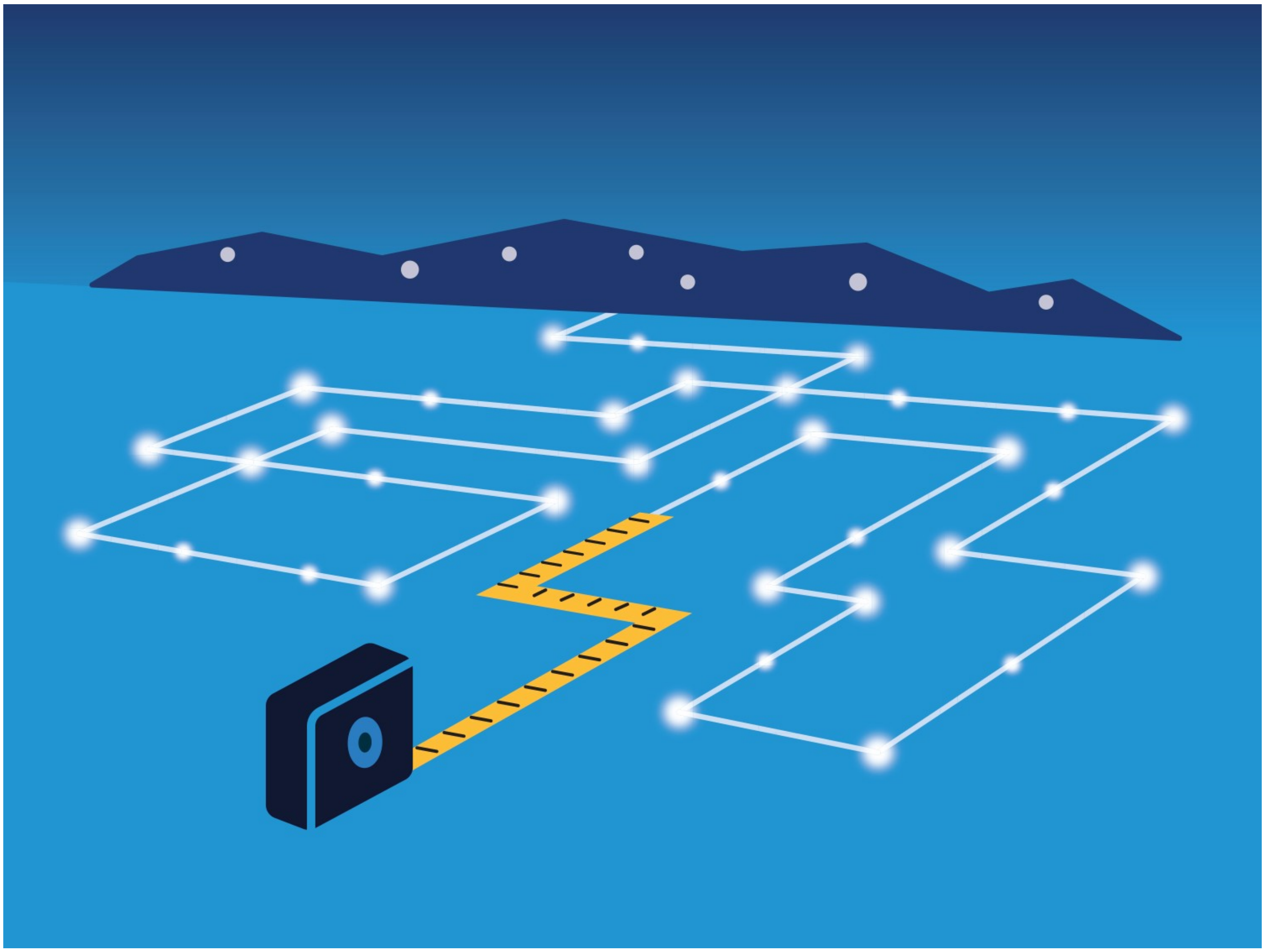


Duke Energy Carolinas & Duke Energy Progress Online Savings Store Program

2021 Evaluation Report – Final

November 30, 2021

Table of Contents

Table of Tables

Table of Figures

Table of Equations

1. Evaluation Summary

This report provides results of an impact and process evaluation of the Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP) Online Savings Store (OSS) Program. The program period under evaluation is January 1, 2019 through March 31, 2021. We refer to this period as the evaluation period throughout the remainder of this report.

1.1 Program Summary

Duke Energy's OSS Program offers a wide range of point-of-sale (POS)-discounted LED lighting and advanced thermostats as well as several other consumer electronics and water-saving measures including advanced power strips, low-flow showerheads, thermostatic shower valves (TSV), dehumidifiers, and air purifiers. Incentivized LED lighting includes a variety of specialty bulb shapes and wattages as well as several types of fixtures, and advanced thermostats include a range of different models at different price points from leading brands. The non-lighting measures reflect an expansion of the OSS Program, which began exclusively distributing energy-efficient lighting in April 2013. Customers can purchase the discounted products online through a designated website operated by Energy Federation Inc. (EFI).

1.2 Evaluation Objectives

This evaluation included process and impact assessments and had several key objectives:

- Assess the program's performance and estimate gross and net annual energy (kWh) and peak summer and winter demand (kW) savings associated with program activity
  - Review program tracking data for completeness and accuracy, and discuss implications of any errors or inconsistencies for program savings estimates
  - Review deemed savings estimates used to track program performance, and provide recommendations for updates to assumptions, where necessary
  - Verify product installation and persistence, and estimate in-service rates (ISRs) by product category based on participant survey responses
  - Develop net-to-gross ratios (NTGRs) based on participant survey responses
  - Estimate ex post gross and net annual energy (kWh) and peak summer and winter demand (kW) savings and realization rates
- Gauge customer preferences as well as current and expected market trends to provide recommendations for how future implementation strategies can maximize customer engagement and minimize free ridership (FR)
- Assess the program's implementation processes and marketing strategies to identify key successes and opportunities for improvement

1.3 High Level Findings

From January 1, 2019 through March 31, 2021, Duke Energy's OSS Program sold 613,990 discounted energy-efficient products to DEC customers and 252,091 to DEP customers, achieving program-tracked ex ante energy savings of 32.1 GWh for DEC and 13.5 GWh for DEP. Table 1 provides a summary of program sales and ex ante energy savings.

Table 1. Online Savings Store Program Performance by Jurisdiction

Product Category	DEC				DEP			
	Units Sold	% of Sales	Ex Ante Gross kWh Savings	% of Savings	Units Sold	% of Sales	Ex Ante Gross kWh Savings	% of Savings
Specialty LED	283,299	46%	9,444,683	29%	125,641	50%	4,212,587	31%
Reflector LED	217,718	35%	10,159,269	32%	80,792	32%	3,778,285	28%
Standard LED	74,703	12%	1,600,138	5%	25,679	10%	550,044	4%
LED Fixture	1,184	<1%	149,207	<1%	794	<1%	107,321	1%
Advanced Thermostat	27,828	5%	10,503,122	33%	15,427	6%	4,728,221	35%
Advanced Power Strip	8,663	1%	159,572	<1%	3,417	1%	62,941	<1%
Showerhead with TSV	387	<1%	82,040	<1%	230	<1%	63,059	<1%
Standalone TSV	197	<1%	10,991	<1%	102	<1%	7,359	<1%
Dehumidifier	10	<1%	1,530	<1%	9	<1%	1,377	<1%
Air Purifier	1	<1%	403	<1%	0	0%	0	0%
Total	**613,990**	**100%**	**32,110,956**	**100%**	**252,091**	**100%**	**13,511,195**	**100%**

Note: Specialty LEDs include globe, decorative, and three-way bulbs; reflector LEDs include both indoor and outdoor bulbs; LED fixtures include portable, direct wire, and photocell products.

1.3.1 Impact Evaluation

The DEC program realized 30.9 GWh in ex post gross energy savings, 6.5 MW in summer peak demand savings, and 4.5 MW in winter peak demand savings during the evaluation period. In the same period, the DEP program achieved 15.4 GWh in ex post gross energy savings, 3.3 MW in summer peak demand savings, and 2.8 MW in winter peak demand savings.

Gross realization rates for the DEC program are 96% for energy savings, 204% for summer peak demand savings, and 287% for winter peak demand savings, while the DEP program saw gross realization rates of 114% for energy savings, 259% for summer peak demand savings and 437% for winter peak demand savings. In both jurisdictions, realization rates are slightly below 100% for LED lighting, which accounts for more than half of ex post gross energy savings. For DEP energy savings, this is more than offset by a 138% realization rate for advanced thermostats, while for DEC energy savings, the advanced thermostat realization rate is also slightly below 100%. For demand savings, advanced thermostats are the primary driver of high overall realization rates, as these products were not assigned ex ante demand savings but account for more than half of ex post gross summer and winter demand savings.

After applying NTGRs established by the current evaluation, the DEC offering achieved 12.6 GWh in ex post net energy savings, 3.3 MW in summer peak demand savings, and 2.6 MW in winter peak demand ex post net savings. The DEP program meanwhile achieved 7.9 GWh in ex post net energy savings, 2.0 MW in summer peak demand savings, and 1.9 MW in winter peak demand ex post net savings.

Table 2 summarizes total ex ante, ex post gross, and ex post net savings for each jurisdiction.

Table 2. Online Savings Store Program Performance by Jurisdiction

Jurisdiction	Metric	Ex Ante	Gross RR	Ex Post Gross	Effective NTGR	Ex Post Net
DEC	Energy Savings (kWh)	32,110,956	96%	30,872,979	0.409	12,631,646
	Summer Peak Demand Savings (kW)	3,179	204%	6,493	0.507	3,293
	Winter Peak Demand Savings (kW)	1,569	287%	4,496	0.578	2,600
DEP	Energy Savings (kWh)	13,511,195	114%	15,359,753	0.513	7,882,578
	Summer Peak Demand Savings (kW)	1,291	259%	3,341	0.589	1,969
	Winter Peak Demand Savings (kW)	644	437%	2,814	0.659	1,854

Note: NTGR values were developed by product category and jurisdiction. While NTGRs do not vary across energy and demand savings, the effective NTGRs (estimated as jurisdiction level ex post net savings divided by ex post gross savings) do as a result of varying contributions of each product category to energy and summer and winter demand savings.

Table 3 provides NTGR results by product category and jurisdiction developed as part of the current evaluation. The evaluation team produced NTGR estimates that account for both FR and participant spillover (PSO). We estimated FR separately for each product category and jurisdiction and developed PSO estimates for the program population overall for each jurisdiction. The NTGR results shown here are applied to ex post gross savings to produce ex post net savings estimates.

Table 3. NTGR Results

Product Category	DEC			DEP		
	FR	PSO	NTGR	FR	PSO	NTGR
LED Lighting	0.777	0.002	0.225	0.695	0.007	0.312
Advanced Thermostats	0.263		0.739	0.257		0.750
Advanced Power Strips	0.031		0.971	0.013		0.994
Showerheads and TSVs	0.125		0.877	0.046		0.961
Dehumidifiers	0.140		0.862	0.105		0.902
Air Purifiers	0.140		0.862	0.105		0.902

1.3.2 Process Evaluation

The evaluation team identified the following high-level process findings based on research conducted as part of the current evaluation:

- Participants are highly satisfied with program-discounted products, key program elements, and the program overall, contributing to an image of a smoothly functioning program that consistently delivers on customer expectations.
- Around half of all participants first learned of the OSS offering from a bill insert or mailing (49% for DEC, 54% for DEP), and approximately one-third found out about the offering on the Duke Energy website (36% for DEC, 31% for DEP).

- Among participants who purchased non-lighting products, many had not been considering a comparable purchase prior to learning of the program's available discounts. This finding was particularly prominent among advanced power strip recipients (73% for DEC, 90% for DEP) and low-flow showerhead and TSV participants (63% for DEC, 79% for DEP) and suggests that other similar products may be especially good candidates for promotion through the program.
- As the market for LED lighting nears transformation, FR continues to rise, reflecting an increase in customer knowledge of and preference for LED bulbs paired with the increased availability and steadily decreasing prices of these products. Most of the remaining program influence (i.e., non-FR) identified by the current evaluation for these products is attributable to the program's role in motivating customers to replace still-working less efficient lighting with LEDs sooner than they otherwise would have.
- Many participants are unsure whether they had received free or reduced shipping, but among those who did, more than 80% considered it highly influential on their decision to purchase program-discounted products, suggesting it may be an especially valuable point of emphasis for future program marketing and an effective tool for encouraging energy-efficient purchases.
- Most advanced thermostat recipients purchased the new thermostat to replace a programmable thermostat (76% for DEC, 62% for DEP), while nearly all the others were replacing manual thermostats (20% for DEC, 38% for DEP). Although many customers reported having previously owned programmable thermostats, virtually all reported they primarily relied on manual adjustments or set the thermostat to a single temperature for entire seasons. Meanwhile, around two-thirds of participants reported they primarily use a programmed schedule and/or self-optimization features on their new thermostat (61% for DEC, 67% for DEP).
- First-year ISRs of less than 80% for advanced thermostats and advanced power strips indicate that substantive portions of participants are not installing their program-discounted products within several months of purchasing. Among respondents who did not have all of their new products installed, most indicated that they had not yet needed or had not yet gotten around to installing.
- Many advanced thermostat participants reported noticeable benefits of their new program-discounted products in terms of increased comfort and reduced electricity bills. Among LED lighting participants, more than half suggested the quality of light in their home had been improved.

1.4 Evaluation Recommendations

Based on the findings of this evaluation, the evaluation team identified the following opportunities for program improvement:

- Although there is a high rate of customer uncertainty regarding whether they received discounted shipping, those who did reported that it influenced their decision to purchase a program-discounted product. Therefore, we recommend that program marketing highlight discounted or free shipping, when available, both in outreach materials and on the program website.
- To support increases to first-year ISR, we recommend that the program continue to include collateral with orders encouraging customers to install their new energy-efficient products. The program could also consider additional outreach to recent participants encouraging them to install their new products, particularly for advanced thermostats. This has the potential to help the program maximize first-year savings.
- Program tracking data should include the necessary product infomation to enable application of appropriate savings assumptions for all product categories, as it did for all products sold during the

current evaluation period with the exception of air purifiers. For air purifiers, future program tracking data should include the product's size (i.e., clean air delivery rate) to ensure the accuracy of savings estimates.

- We recommend the program continue to explore possible expansions of the OSS Program and continue using the offering to promote less common energy-efficient products, some of which have already been introduced to the program (including advanced power strips, faucet aerators, air purifiers, dehumidifiers, or other household appliances). Our evaluation found that participants often purchase these products as a direct result of information made available by the OSS offering, as exhibited by their relatively low FR estimates.

2. Program Description

This section provides an overview of the design, implementation, and performance of the DEC and DEP Online Savings Store Program. The program period under evaluation is January 1, 2019 through March 31, 2021.

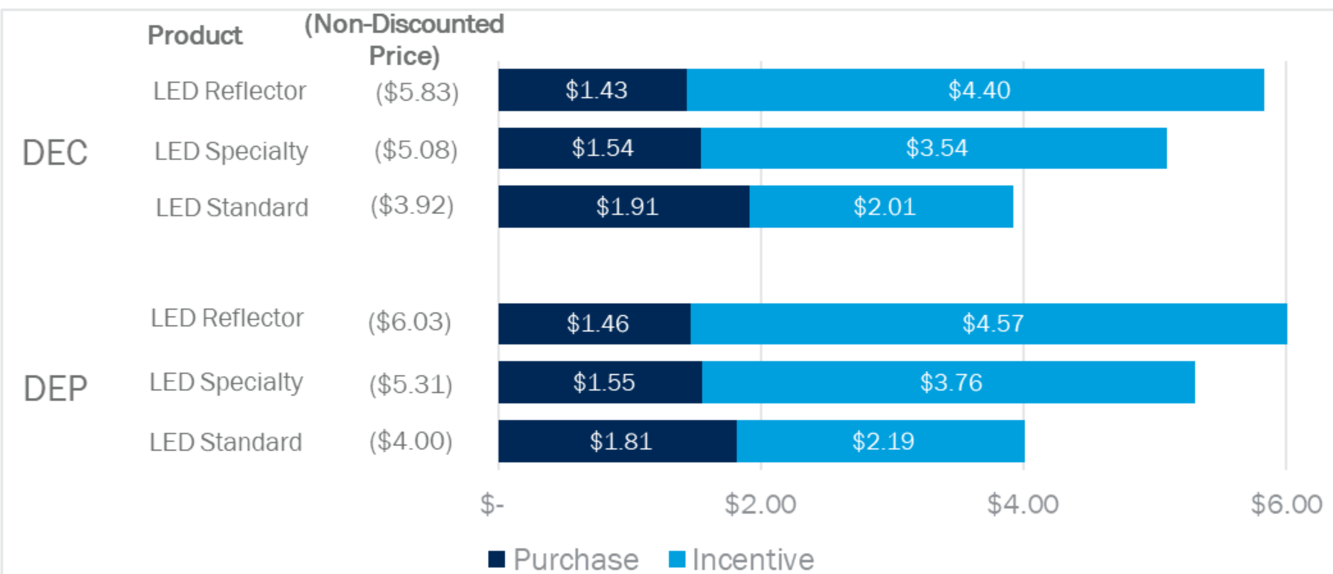
2.1 Program Design

Duke Energy's OSS Program offers a wide range of POS-discounted LED lighting and advanced thermostat products as well as several other consumer electronics and water-saving measures including advanced power strips, low-flow showerheads, TSVs, air purifiers, and dehumidifiers. Incentivized LED lighting includes a variety of specialty bulb shapes and wattages as well as several types of fixtures, and advanced thermostats include a range of different models at varying price points from leading brands.

The non-lighting measures reflect an expansion of the OSS Program, which began exclusively distributing energy-efficient lighting in April 2013. Customers can purchase the discounted products online through a designated website operated by EFI.

Program discounts varied considerably across products and throughout the evaluation period. Among incented LED bulbs for which program tracking data included pricing information,[1] average discounts amounted to more than 50% of non-discounted pricing for each category, with discounts averaging as high as 78% of non-discounted pricing for reflector bulbs. Figure 1 shows average per-unit pricing and incentive amounts for type of LED bulb sold through the program.

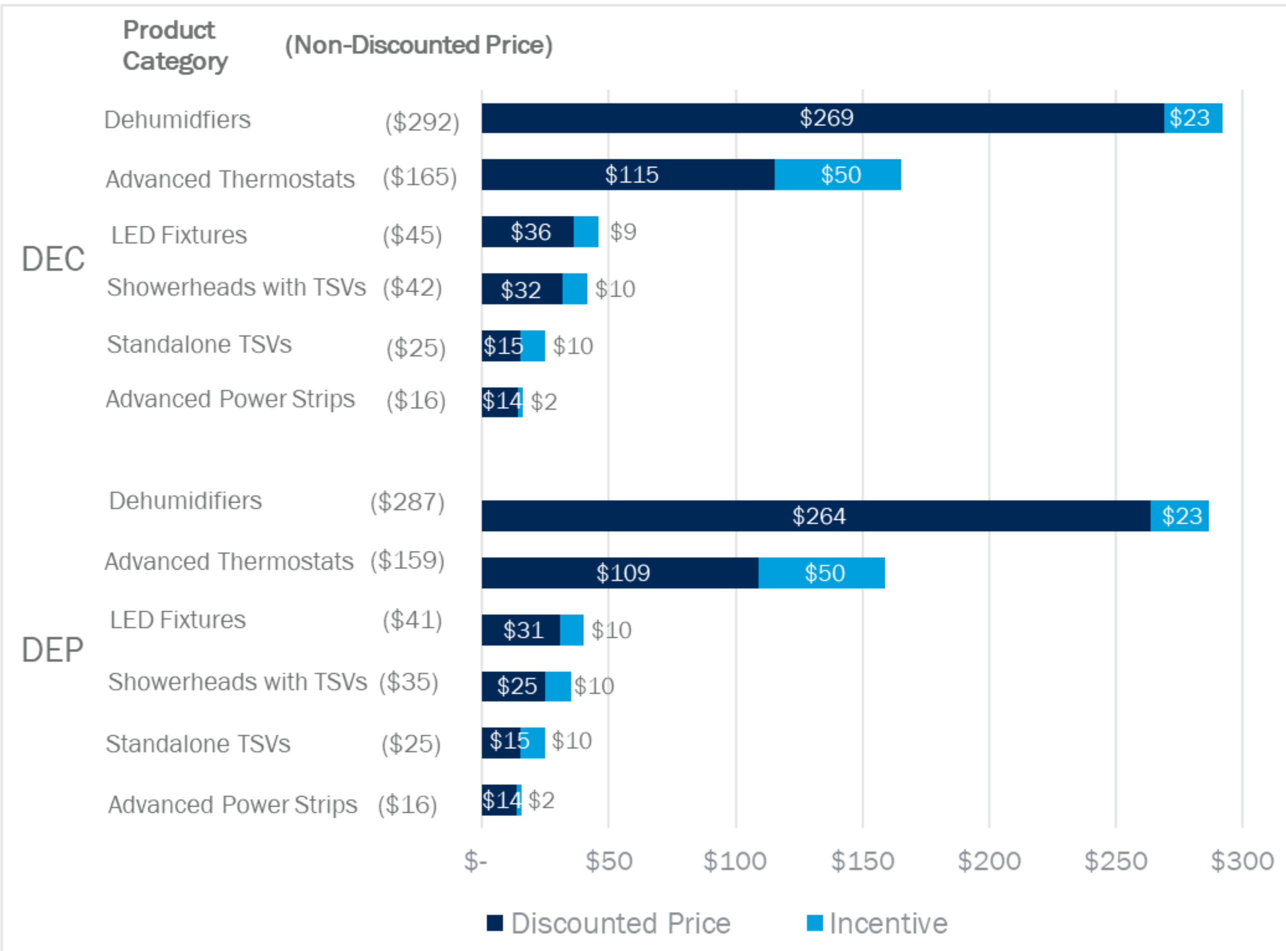
Figure 1. LED Bulb Per-Unit Pricing



[1] Pricing information was unavailable from program tracking data for most purchases made prior to mid-2020.

Figure 2 illustrates the average per-unit costs and program discounts associated with other higher-cost product categories among records for which program tracking data included pricing information. The program typically offered $50 incentives on advanced thermostats, $10 incentives on low-flow showerheads and TSVs, and $2 on advanced power strips. The small number of dehumidifiers sold during the evaluation period were each discounted by $23, amounting to 8% of their non-discounted price. LED fixture discounts ranged from $5 for lower-cost portable fixtures to $10 for photocell fixtures and $12 for direct wire fixtures, averaging $9 to $10 per-unit.

Figure 2. Non-Lighting and LED Fixture Per-Unit Pricing



2.2 Program Implementation

Duke Energy staff manage the OSS Program offerings and are responsible for overseeing program design, marketing, and operations. EFI has implemented the offering on behalf of Duke Energy since the program's inception. EFI is responsible for facilitating customer orders, warehousing products, maintaining inventory, handling order fulfillment and shipping logistics, and managing program invoicing and data tracking.

2.3 Program Performance

From January 1, 2019 through March 31, 2021, Duke Energy's OSS Program sold 613,990 discounted energy-efficient products to DEC customers and 252,091 to DEP customers, achieving ex ante gross energy savings of 32.1 GWh for DEC and 13.5 GWh for DEP. LED lighting dominated the OSS Program sales in both jurisdictions, representing more than 90% of total units sold and more than 50% of ex ante gross energy savings. Non-lighting measures were first distributed by the program in March 2019, shortly before standard LEDs were dropped from the list of available products. Advanced thermostats accounted for 5% of DEC and 6% of DEP sales but for 33% and 35% of savings, respectively. Other non-lighting products accounted for small shares of sales and savings (2% or less).

Table 4 provides a summary of program sales and ex ante energy savings.

Table 4. Online Savings Store Program Performance by Jurisdiction

Product Category	DEC				DEP			
	Units Sold	% of Sales	Ex Ante Gross kWh Savings	% of Savings	Units Sold	% of Sales	Ex Ante Gross kWh Savings	% of Savings
Specialty LED	283,299	46%	9,444,683	29%	125,641	50%	4,212,587	31%
Reflector LED	217,718	35%	10,159,269	32%	80,792	32%	3,778,285	28%
Standard LED	74,703	12%	1,600,138	5%	25,679	10%	550,044	4%
LED Fixture	1,184	<1%	149,207	<1%	794	<1%	107,321	1%
Advanced Thermostat	27,828	5%	10,503,122	33%	15,427	6%	4,728,221	35%
Advanced Power Strip	8,663	1%	159,572	<1%	3,417	1%	62,941	<1%
Showerhead with TSV	387	<1%	82,040	<1%	230	<1%	63,059	<1%
Standalone TSV	197	<1%	10,991	<1%	102	<1%	7,359	<1%
Dehumidifier	10	<1%	1,530	<1%	9	<1%	1,377	<1%
Air Purifier	1	<1%	403	<1%	0	0%	0	0%
Total	**613,990**	**100%**	**32,110,956**	**100%**	**252,091**	**100%**	**13,511,195**	**100%**

Some OSS program participants also purchased non-incented LED lighting products from the OSS website in addition to program-discounted ones. Participants who reached the program's limit of 36 bulbs or fixtures were able to purchase additional LED products at non-discounted prices, amounting to 3,200 units for DEC and 650 units for DEP. These non-discounted OSS purchases are not included in program sales summaries or considered part of program ex ante or ex post gross savings, but are instead evaluated as potential PSO (see discussion in Sections 5.1.2 and 5.2.2).

3. Overview of Evaluation Activities

To answer the evaluation objectives outlined in Section 1.2, Opinion Dynamics performed a range of data collection and analytic activities, including the following:

- Program staff interviews
- Data and deemed savings review
- Participation survey
- Engineering analysis

3.1 Program Staff Interviews

The evaluation team conducted an in-depth qualitative telephone interview with Duke Energy program staff in April 2021 to (1) obtain a full understanding of the OSS Program, including implementation processes, eligibility requirements, and available program-tracked participant information; (2) obtain program staff's perspective on current and past program successes and challenges; and (3) identify program staff's priorities for the process evaluation, including researchable questions.

3.2 Data and Deemed Savings Review

As part of this evaluation, we reviewed program tracking data, assessed its completeness and accuracy, and identified errors or inconsistencies. We discuss our findings and their implications for program-tracked savings in Section 4.2 of this report. We also conducted a detailed review of deemed savings estimates used to track program performance, assumptions behind those values, and sources of those assumptions. We performed manual lookups of product specifications in a small number of cases where the necessary detail was unavailable from the tracking database or where information in the data appeared inconsistent and used those lookups to inform the application of savings assumptions. We delivered a memorandum presenting the findings of this review and recommended updates to per-unit savings, which is included in Appendix B.

3.3 Participant Survey

The evaluation team conducted an online survey with a sample of OSS participants to gauge installation and usage behavior with products purchased through the OSS offering, solicit feedback regarding experiences with the program, and collect information relevant to estimating gross and net savings not available from program tracking data or applicable secondary sources. This included key household characteristics, heating and cooling equipment, and information needed to develop estimates of ISR, FR, and PSO.

Sample Design and Fielding

We designed the survey sample to enable the development of robust ISR and FR estimates by product category for each jurisdiction, where possible. To avoid participant recall issues, we limited the sample frame for the survey to participants who made their purchase no more than twelve months prior to survey fielding.

We stratified the sample by product category and randomly selected up to 650 participants with purchases of each product category to include in the sample. For product categories with fewer than 650 participants who made their purchase within twelve months prior to survey fielding, which included advanced power strips and low-flow showerheads and TSVs, we attempted a census of all participants with available contact information. We excluded standard LEDs, dehumidifiers, and air purifiers given their very limited or non-existent participation during the twelve months preceding survey fielding. We reached out to each sampled participant up to three times via email inviting them to complete the online survey between July 30, 2021 and August 12, 2021.[2]

In total, 298 DEC participants and 172 DEP participants completed the survey. Table 5 summarizes the total count of participants and the number of survey respondents by product category for each jurisdiction.

Table 5. Participant Survey Sample Summary

Product Category	DEC		DEP	
	Participants in Population	Survey Completes	Participants in Population	Survey Completes
Specialty LEDs	3,646	68	1,716	41
Reflector LEDs	2,858	63	1,302	34
Advanced Thermostats	8,237	64	5,160	35
Advanced Power Strips[A]	439	88	205	48
Showerheads and TSVs[A]	73	15	59	14
Total	**15,473**	**298**	**8,491**	**172**

[A] We attempted a census of advanced power strip and low-flow showerhead and TSV participants.

3.4 Engineering Analysis

We estimated annual energy and demand savings for each product sold through the OSS Program by applying the outputs of our deemed savings review (i.e., product category-specific per-unit savings) and ISR analysis to product quantities in the program tracking database.

[2] We also conducted a truncated supplementary fielding effort from August 31, 2021 to September 10, 2021 to collect information from advanced power strip participants necessary for developing estimates of FR.

4. Gross Impact Evaluation

The gross impact evaluation of the DEC and DEP OSS Program consisted of two distinct steps: (1) review of per-unit deemed savings values for incented products; and (2) verification of product installation and continued operation. This section describes the methodologies and results of both steps.

It should be noted that this evaluation did not include a consumption analysis of advanced thermostats given the timing of evaluation activities relative to the measure's introduction to the program. We plan to conduct a consumption analysis as part of the next evaluation, when sufficient post-installation consumption data is available for participants who installed advanced thermostats.

4.1 Methodology

We employed the research methods described in this section to validate program tracking data, review and update deemed savings assumptions, verify product installation and persistence, and calculate ex post gross energy and demand savings for products sold through the DEC and DEP OSS Program.

4.1.1 Data and Deemed Savings Review

We began by reviewing all available program tracking data, assessing its completeness and accuracy, and identifying all available to inform estimation of per-unit savings. To develop per-unit savings, we used several resources. Since neither North Carolina nor South Carolina has a statewide TRM, we relied on the Mid-Atlantic TRM, where possible, and used other TRMs (including the Illinois and Indiana TRMs) and other secondary sources, as needed, for algorithms and assumptions. Where available, our engineering team used inputs from the program tracking data and from our survey of program participants. For more information on the algorithms and inputs used to develop deemed per-unit savings estimates for each product category, see Appendix B.

4.1.2 In-Service Rate

To develop first-year ISR estimates, we relied on responses to the participant survey that asked customers to verify receipt and installation of purchased products. For lighting purchases, most products not installed at the time of the survey are placed in storage and installed in future years, so the ISR analysis used a discounted savings approach to claim savings associated with those future installations. The following sections detail the methods employed to estimate first-year and effective ISRs for both lighting and non-lighting products sold through the DEC and DEP OSS Program.

LED Bulb First-Year ISRs

The evaluation team calculated ISRs for LED bulbs using responses to a series of survey questions that asked respondents to report the number of bulbs they received, the number of bulbs they installed, and the number of bulbs that were installed and then removed. We calculated the received rate as the number of bulbs received divided by the number of bulbs appearing in program tracking data, the installed rate as the number of bulbs installed divided by the number of bulbs received, and the persistence rate as the number of bulbs still installed divided by number of bulbs initially installed. The first-year ISR is a product of the receipt, installation, and persistence rates, as shown in Figure 3.

Figure 3. LED Bulb First-Year ISR Development

Reported	# of bulbs purchased according to program tracking data
%Received	# of bulbs confirmed received by customers / # reported
%Installed	# of bulbs confirmed installed by customers / # received
%Persisting	# of bulbs confirmed remaining installed / # initially installed
First-Year ISR	%Received x %Installed x %Persisting

LED Bulb Future Installations

Research studies across the country have found that residential customers often purchase more LED bulbs than immediately needed and continue to install these bulbs from storage in subsequent years. The two main approaches to claiming savings from these later installations are (1) staggering the savings over time and claiming some in later years, and (2) claiming the savings in the evaluation period the product was sold but discounting savings by a societal or utility discount rate. While the “staggered” approach allows program administrators to more accurately capture the timing of the realized savings, the “discounted savings” approach allows for the simplicity of claiming all costs and benefits during the evaluation period and eliminates the need to keep track of and claim savings from future installations.

The evaluation team used a discounted savings approach to account for savings from future installations. To allocate installations over time, we relied on the installation trajectory recommended by the Uniform Methods Project (UMP) whereby 24% of remaining bulbs are installed in each subsequent year, for a total of five years. For example, if the Year 1 ISR is 80%, an additional 4.8% of bulbs would be installed in Year 2 ([1 – 80%] x 24%; or 20% x 24%) and an additional 3.6% of bulbs would be installed in Year 3 ([1 – 80% - 4.8%] x 24%; 15.2% x 24%).

These future installations are then discounted using Equation 1 to derive the net present value (NPV) of savings associated with future installs of LED bulbs.

Equation 1. Net Present Value Formula for Future LED Bulb Savings

$$NPV = \frac{R_t}{(1+i)^t}$$

Where:

R = Savings
i = Discount rate
t = Number of years in the future that savings take place

Non-Lighting First-Year ISRs

The evaluation team developed ISRs for non-lighting products based on two sets of survey questions asking respondents to confirm the number of products received and to report the number of those products installed at the time of the survey. We calculated the receipt rate as the number of units received by the customer divided by the number appearing in program tracking data and the persistence rate as the number of units installed at the time of the survey divided by the number received. The first-year ISR is a product of the receipt and persistence rates, as shown in Figure 4.

Figure 4. Non-Lighting First-Year ISR Development

Reported	# of units purchased according to program tracking data
%Received	# of units confirmed received by customers / # reported
%Persisting	# of units confirmed currently installed by customers / # received
First-Year ISR	%Received x %Persisting

4.2 Gross Impact Results

This section provides gross energy and demand savings estimates for each product category offered by the DEC and DEP OSS Program and program-level savings, by jurisdiction, during the evaluation period.

4.2.1 Program Tracking Data Review

Opinion Dynamics received two types of program tracking data extracts for each jurisdiction. One type contained product and shipment information while the other contained customer contact information and product pricing. We combined the two sets of data extracts and analyzed the combined dataset for gaps and inconsistencies. As a part of the analysis, we performed the following steps:

- Checked core data fields for missing values
- Checked data for temporal gaps
- Checked key data fields for reasonableness and consistency

In reviewing the data, we found the data fields were clean and fully populated for the most part. Program tracking data included the necessary product specifications to inform TRM-based savings calculations for all product categories with the exception of air purifiers. Incorporating air purifier product size or clean air delivery rates into program tracking data would enable application of appropriate savings assumptions. Contact information and product pricing was included for all recent participation records but was mostly unavailable for purchases made prior to mid-2020. Among records where pricing information was provided, we did not observe any anomalous incentive amounts or total non-discounted pricing.

4.2.2 Per-Unit Deemed Savings

Duke Energy provided per-unit ex ante savings values in the form of spreadsheets containing DSMore outputs for each product category, jurisdiction, and state. Per-unit ex ante savings values are consistent for each product category across jurisdictions and states with the exception of advanced thermostats, low-flow showerheads, and TSVs, which vary by jurisdiction. Savings values were provided as energy, summer peak, and winter peak demand savings across six LED bulb types, three LED fixture types, and five non-lighting product categories.

Ex ante savings for LED lighting products are drawn directly from the most recent prior evaluation of the DEC OSS Program. These values reflect average per-unit ex post savings across the mix of products included in that product category during the prior evaluation period and incorporate ISRs from the prior evaluation. To allow for a better comparison of engineering assumptions, we backed out the prior LED lighting ISRs and developed ex post per-unit values that are also exclusive of ISRs.[3] For non-lighting products, exact parameters and sources used to develop ex ante per-unit savings were not readily available.

[3] The 2018 DEC OSS Program evaluation applied an effective ISR of 87.7% to develop ex-post savings, which were then provided by program staff as ex ante per-unit savings for LED bulbs in the current OSS Program. We therefore divided the ex ante values provided by program staff by 87.7% to produce the ex ante values shown here.

Differences between ex ante and ex post per-unit savings for LED lighting are primarily attributable to shifts in the mix of specific products and LED wattages within each category, with the exception of three-way bulbs, for which ex post savings reflect baseline wattage assumptions assigned based on mid-level lumen output rather than maximum lumen output. The product categories with the largest differences between ex ante and ex post gross per-unit savings are advanced power strips, where ex post savings are more than six times ex ante per-unit savings and advanced thermostats, for which ex ante demand savings were not claimed. In the absence of additional information on the sources of non-lighting ex ante assumptions, the reasons for differences between non-lighting ex ante and ex post per-unit savings estimates remain unknown.

Table 6 and Table 7 provide ex ante and ex post per-unit savings for all products sold through the DEC and DEP OSS Program. Additional detail on parameters and algorithms used to develop per-unit savings are provided in the deemed savings review memorandum included in Appendix B.

Table 6. Comparison of Per-Unit Deemed Savings (Net of ISR) for DEC

Product Category	Energy (kWh)		Summer Demand (kW)		Winter Demand (kW)	
	Ex Ante	Ex Post	Ex Ante	Ex Post	Ex Ante	Ex Post
A-Line LED[A]	24.42	28.62	0.0036	0.0042	0.0017	0.0020
Recessed LED[A]	54.16	54.04	0.0080	0.0080	0.0039	0.0039
Recessed Outdoor LED[A]	47.67	48.85	0.0071	0.0072	0.0034	0.0035
Globe LED[A]	36.61	34.99	0.0054	0.0052	0.0026	0.0025
Decorative LED[A]	35.21	31.76	0.0052	0.0047	0.0025	0.0023
Three-Way LED[A]	83.01	54.19	0.0122	0.0080	0.0059	0.0039
LED Fixture – Direct Wire	39.62	48.37	0.0052	0.0071	0.0043	0.0035
LED Fixture – Portable	20.99	32.85	0.0027	0.0048	0.0023	0.0024
LED Fixture – Photocell	227.91	213.48	0.0000	0.0000	0.0050	0.0072
Advanced Thermostat	377.43	517.19	0.0000	0.1804	0.0000	0.1553
Advanced Power Strip	18.42	112.30	0.0015	0.0100	0.0023	0.0100
Showerhead with TSV	211.99	195.10	0.0683	0.0153	0.0683	0.0306
Standalone TSV	55.79	45.00	0.0180	0.0057	0.0180	0.0114
Dehumidifier	153.02	114.73	0.0347	0.0260	0.0000	0.0000
Air Purifier[B]	403.00	403.00	0.0462	0.0462	0.0462	0.0462

[A] Ex ante per-unit values shown here for LED bulbs have been adjusted to omit ISR, whereas original ex ante values provided by program staff and shown elsewhere in this report have ISRs embedded.

[B] Only one air purifier was sold during the evaluation period and tracking data did not provide sufficient detail to inform the deemed savings review. For the purposes of this evaluation, we set ex post values equal to ex ante values for air purifiers.

Table 7. Comparison of Per-Unit Deemed Savings (Net of ISR) for DEP

Product Category	Energy (kWh)		Summer Demand (kW)		Winter Demand (kW)	
	Ex Ante	Ex Post	Ex Ante	Ex Post	Ex Ante	Ex Post
A-Line LED[A]	24.42	28.81	0.0036	0.0043	0.0017	0.0021
Recessed LED[A]	54.16	54.62	0.0080	0.0081	0.0039	0.0039
Recessed Outdoor LED[A]	47.67	51.03	0.0071	0.0075	0.0034	0.0037
Globe LED[A]	36.61	35.01	0.0054	0.0052	0.0026	0.0025
Decorative LED[A]	35.21	31.70	0.0052	0.0047	0.0025	0.0023
Three-Way LED[A]	83.01	51.48	0.0122	0.0076	0.0059	0.0037
LED Fixture – Direct Wire	39.62	44.26	0.0052	0.0065	0.0043	0.0032
LED Fixture – Portable	20.99	32.95	0.0027	0.0049	0.0023	0.0024
LED Fixture – Photocell	227.91	210.15	0.0000	0.0000	0.0050	0.0071
Advanced Thermostat	306.49	594.55	0.0000	0.1886	0.0000	0.1983
Advanced Power Strip	18.42	112.30	0.0015	0.0100	0.0023	0.0100
Showerhead with TSV	274.17	213.60	0.0874	0.0177	0.0874	0.0355
Standalone TSV	72.15	49.26	0.0230	0.0066	0.0230	0.0132
Dehumidifier	153.02	113.94	0.0347	0.0258	0.0000	0.0000
Air Purifier[B]	403.00	403.00	0.0462	0.0462	0.0462	0.0462

[A] Ex ante per-unit values shown here for LED bulbs have been adjusted to omit ISR, whereas original ex ante values provided by program staff and shown elsewhere in this report have ISRs embedded.

[B] Only one air purifier was sold during the evaluation period, and tracking data did not provide sufficient detail to inform the deemed savings review. For the purposes of this evaluation, we set ex post values equal to ex ante values for air purifiers.

4.2.3 In-Service Rates

Table 8 summarizes survey-based first-year ISRs for LED bulbs. The first-year ISR is a product of the receipt, installation, and persistence rates, as detailed in Section 4.1.2. Analysis results show that participants confirmed receipt of almost all discounted LED purchases (99% of DEC, 98% for DEP) and that once installed, LED bulbs generally remained in place (92% for DEC, 99% for DEP). However, consistent with typical trends for this type of program, not all bulbs are installed within the first year, resulting in installation rates well below 100% (68% for DEC, 74% for DEP) and overall first-year ISRs of 62% for DEC and 72% for DEP.

Table 8. LED Bulb First-Year ISR Development

Rate	DEC (n=131)	DEP (n=75)
% Received	98.7%	98.1%
% Installed	68.0%	74.2%
% Persisting	92.2%	98.6%
First-Year ISR	**61.8%**	**71.7%**

Table 9 provides cumulative installations of LED bulbs by year using the discounted approach discussed above (i.e., incremental installations of 24% of bulbs that remain uninstalled for a total of five additional years). The values shown here are discounted to represent the net present value of installations that occur in each year. The resulting effective ISRs are 86.1% for DEC and 89.7% for DEP.

Table 9. LED Bulb Cumulative Discounted ISR

Year	Cumulative Discounted ISR	
	DEC	DEP
2021 (Year 1)	61.8%	71.7%
2022 (Year 2)	70.5%	78.3%
2023 (Year 3)	76.6%	82.7%
2024 (Year 4)	80.8%	85.9%
2025 (Year 5)	83.9%	88.1%
2026 (Year 6)	86.1%	89,7%
Total	**86.1%**	**89.7%**

Table 10 provides the survey-based values used to calculate first-year ISRs for advanced thermostats, advanced power strips, and low-flow showerheads and TSVs by jurisdiction. First-year ISRs for non-lighting products are calculated by multiplying the percent of the program-tracked quantity confirmed received by the percent of received bulbs confirmed installed at the time of the survey.

Table 10. Non-Lighting First-Year ISR Development

Rate	DEC			DEP		
	Advanced Thermostats (n=64)	Advanced Power Strips (n=84)	Showerheads and TSVs (n=12)	Advanced Thermostats (n=35)	Advanced Power Strips (n=48)	Showerheads and TSVs (n=14)
% Received	97.6%	99.3%	85.7%	100%	100%	100%
% Installed	70.7%	73.9%	100%	71.1%	79.1%	75.0%
First-Year ISR	**69.0%**	**73.4%**	**85.7%**	**71.1%**	**79.1%**	**75.0%**

Table 11 summarizes effective ISR values by product category and jurisdiction. The effective ISR for LED bulbs is reflective of the discounted savings approach detailed earlier in this report, while other values either reflect survey-based estimates of first-year ISR or are deemed at 100% (in cases where products are assumed to be installed or participation levels did not support survey sampling). Relative precision around the point estimates for product categories where sampling error applies range from 8.3% to 14.0% at 90% confidence.

Table 11. Final Effective ISR Summary

Product Category	DEC			DEP		
	ISR	n	Relative Precision	ISR	n	Relative Precision
LED Bulbs	86.1%	131	8.3%	89.7%	75	9.4%
LED Fixtures[A]	100.0%	N/A	N/A	100.0%	N/A	N/A
Advanced Thermostats	69.0%	64	10.7%	71.1%	35	14.0%
Advanced Power Strips[B]	73.4%	84	N/A	79.1%	48	N/A
Showerheads and TSVs[B]	85.7%	12	N/A	75.0%	14	N/A
Dehumidifiers[A]	100.0%	N/A	N/A	100.0%	N/A	N/A
Air Purifiers[A]	100.0%	N/A	N/A	100.0%	N/A	N/A

[A] ISR is assumed to be 100% for dehumidifiers, air purifiers, and LED fixtures.

[B] Because we attempted a census of advanced power strip and low-flow showerhead and TSV participants, the concept of sampling error does not apply for these product categories.

As expected, lighting participants who did not have all of their new LED products installed at the time of the survey (54% of DEC and 52% of DEP respondents) overwhelmingly reported that they had not yet needed them and were waiting for other bulbs to burn out (94% for both DEC and DEP). Most of the remaining 6% reported that the new LEDs had already burnt out, that they did not like the light quality, or that they were the wrong size for the intended socket.

Among surveyed advanced thermostat participants, around one-quarter (27% for DEC, 23% for DEP) had not installed their new thermostat(s) at the time of the survey. The most common reasons included having not yet gotten around to it (62%) and the item being incompatible with their current setup (23%). Just over one-quarter (29% for both DEC and DEP) of participants who purchased advanced power strips had not installed them all at the time of the survey. Most of these respondents similarly indicated that they had not yet needed or not yet gotten around to installing (53%), while another third of respondents indicated that the product was incompatible with their current setup (33%). Among the six respondents who had not installed their program-discounted low-flow showerhead or TSVs (19% of respondents who received these items), two had not gotten around to doing so, two reported they gave the product to a friend or family member, and two said that they did not like the product and therefore uninstalled.

These ISRs, especially for non-lighting products such as advanced thermostats and advanced power strips, indicate that a substantive portion of participants who purchase these products have yet to install or use them for several months after purchasing. Additional outreach or prompts to future participants may help encourage installation of these products and improve first-year ISRs and, subsequently, first-year savings from these products.

4.2.4 Total Ex Post Gross Savings

Table 12, Table 13, and Table 14 present total ex ante and ex post gross energy, summer peak demand, and winter peak demand savings and realization rates, by product category and jurisdiction. The DEC program realized 30.9 GWh in ex post gross energy savings, 6.5 MW in summer peak demand savings, and 4.5 MW in winter peak demand savings during the evaluation period. In the same period, the DEP program achieved 15.4 GWh in ex post gross energy savings, 3.3 MW in summer peak demand savings, and 2.8 MW in winter peak demand savings.

Gross realization rates for the DEC program are 96% for energy savings, 204% for summer peak demand savings, and 287% for winter peak demand savings, while the DEP program saw gross realization rates of 114% for energy savings, 259% for summer peak demand savings and 437%for winter peak demand savings. In both jurisdictions, realization rates are slightly below 100% for LED lighting, which accounts for more than half of ex post gross energy savings. For DEP energy savings, this is more than offset by a 138% realization rate for advanced thermostats, while for DEC energy savings, the advanced thermostat realization rate is also slightly below 100%. For demand savings, advanced thermostats are the primary driver of high overall realization rates, as these products were not assigned ex ante demand savings but account for more than half of ex post gross summer and winter demand savings.

Table 12. Detailed Energy Savings Gross Impacts Results

Product Category	DEC			DEP		
	Ex Ante kWh	Gross RR	Ex Post Gross kWh	Ex Ante kWh	Gross RR	Ex Post Gross kWh
Specialty LED	9,444,683	88%	8,282,108	4,212,587	91%	3,837,885
Reflector LED	10,159,269	98%	9,907,775	3,778,285	103%	3,900,243
Standard LED	1,600,138	115%	1,837,992	550,044	121%	662,946
LED Fixture	149,207	85%	126,444	107,321	86%	92,131
Advanced Thermostat	10,503,122	95%	9,930,731	4,728,221	138%	6,521,379
Advanced Power Strip	159,572	447%	714,075	62,941	482%	303,530
Showerhead with TSV	82,040	79%	64,707	63,059	58%	36,846
Standalone TSV	10,991	69%	7,597	7,359	51%	3,768
Dehumidifier	1,530	75%	1,147	1,377	74%	1,025
Air Purifier	403	100%	403	0	N/A	0
Total	**32,110,956**	**96%**	**30,872,979**	**13,511,195**	**114%**	**15,359,753**

I/A

Table 13. Detailed Summer Peak Demand Savings Gross Impacts Results

Product Category	DEC			DEP		
	Ex Ante kW	Gross RR	Ex Post Gross kW	Ex Ante kW	Gross RR	Ex Post Gross kW
Specialty LED	1,396	88%	1,222	622	91%	566
Reflector LED	1,498	98%	1,462	557	103%	576
Standard LED	239	113%	271	82	119%	98
LED Fixture	2	129%	3	1	130%	2
Advanced Thermostat	0	N/A	3,464	0	N/A	2,069
Advanced Power Strip	13	489%	64	5	527%	27
Showerhead with TSV	26	19%	5	20	15%	3
Standalone TSV	4	27%	1	2	22%	1
Dehumidifier	0	75%	0	0	74%	0
Air Purifier	0	100%	0	0	N/A	0
Total	**3,179**	**204%**	**6,493**	**1,291**	**259%**	**3,341**

Table 14. Detailed Winter Peak Demand Savings Gross Impacts Results

Product Category	DEC			DEP		
	Ex Ante kW	Gross RR	Ex Post Gross kW	Ex Ante kW	Gross RR	Ex Post Gross kW
Specialty LED	674	88%	593	301	91%	275
Reflector LED	727	97%	709	271	103%	279
Standard LED	112	117%	132	39	123%	47
LED Fixture	5	103%	5	3	108%	4
Advanced Thermostat	0	N/A	2,982	0	N/A	2,175
Advanced Power Strip	20	319%	64	8	344%	27
Showerhead with TSV	26	38%	10	20	30%	6
Standalone TSV	4	54%	2	2	43%	1
Dehumidifier	0	N/A	0	0	N/A	0
Air Purifier	0	100%	0	0	N/A	0
Total	**1,569**	**287%**	**4,496**	**644**	**437%**	**2,814**

Table 15 summarizes per-unit ex post gross energy, summer peak demand, and winter peak demand savings by product category and jurisdiction. These values are reflective of deemed per-unit savings presented in Section 4.2.2 adjusted to apply effective ISR values presented in Section 4.2.3.

Table 15. Per-Unit Savings Gross Impact Results

Product Category	DEC			DEP		
	Energy (kWh)	Summer Demand (kW)	Winter Demand (kW)	Energy (kWh)	Summer Demand (kW)	Winter Demand (kW)
A-Line LED	24.60	0.0036	0.0018	25.82	0.0038	0.0018
Recessed LED	46.43	0.0069	0.0033	48.93	0.0072	0.0035
Recessed Outdoor LED	41.98	0.0062	0.0030	45.72	0.0067	0.0033
Globe LED	30.06	0.0044	0.0022	31.37	0.0046	0.0022
Decorative LED	27.28	0.0040	0.0020	28.39	0.0042	0.0020
Three-Way LED	46.53	0.0069	0.0033	46.12	0.0068	0.0033
LED Fixture – Direct Wire	41.46	0.0061	0.0030	39.58	0.0058	0.0028
LED Fixture – Portable	28.13	0.0042	0.0020	29.53	0.0044	0.0021
LED Fixture – Photocell	183.47	0.0000	0.0062	188.03	0.0000	0.0063
Advanced Thermostat	356.86	0.1245	0.1072	422.73	0.1341	0.1410
Advanced Power Strip	82.43	0.0073	0.0073	88.83	0.0079	0.0079
Showerhead with TSV	167.20	0.0131	0.0262	160.20	0.0133	0.0266
Standalone TSV	38.56	0.0049	0.0098	36.95	0.0050	0.0099
Dehumidifier	114.73	0.0260	0.0000	113.94	0.0258	0.0000
Air Purifier [A]	403.00	0.0462	0.0462	N/A	N/A	N/A

[A] Only one air purifier was sold during the evaluation period and tracking data did not provide sufficient detail to inform the deemed savings review. For the purposes of this evaluation, we set ex post values equal to ex ante values for air purifiers.

4.3 References

Illinois Statewide Technical Reference Manual, Version 9.0.

Indiana Technical Reference Manual, Version 2.2, July 28, 2015.

Michigan Evaluation Working Group Showerhead and Faucet Aerator Meter Study Memorandum, June 2013.

Mid-Atlantic Technical Reference Manual, Version 10.0, May 2020.

National Renewable Energy Laboratory (NREL). *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures. Chapter 6: Residential Lighting Protocol.* October, 2017. https://www.nrel.gov/docs/fy17osti/68562.pdf.

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TecMarket Works. *Process and Impact Evaluation of the Residential Energy Efficient Appliance and Devices: Lighting – Specialty Bulbs Program in the Carolina System.* Prepared for Duke Energy Carolinas. November 14, 2014.

Navigant Consulting, Inc. and Apex Analytics, LLC. *EM&V Report for the 2012 Energy Efficient Lighting Program.* Prepared for Duke Energy Progress. July 12, 2013.

National Renewable Energy Laboratory (NREL) Domestic Hot Water Event Generator, 2013.

US Energy Information Administration, 2015 Residential Energy Consumption Survey (RECS), Mid-Atlantic.

5. Net-to-Gross Analysis

This section describes our approach for estimating the net savings for the DEC and DEP OSS Program and presents the resulting NTGRs and net impacts.

5.1 Methodology

The NTGR represents the portion of the gross energy savings associated with a program-supported measure or behavior change that would not have been realized in the absence of the program. In other words, the NTGR represents the share of gross savings that can be considered program-induced or attributed to the program. The NTGR consists of FR and SO and is calculated as (1 – FR + SO).

FR is the proportion of the program-achieved verified gross savings that would have been realized absent the program. There are two types of SO: participant (PSO) and non-participant (NPSO). PSO occurs when participants take additional energy-saving actions that are influenced by program interventions but that did not receive program support. Non-participant SO is the result of energy-saving actions taken by customers who did not participate in the program but were somehow influenced by its existence. The scope of this evaluation included estimation of FR and PSO.[4]

Both FR and PSO components of the NTGR are derived from self-reported information from the participant web survey. The final NTGR is the percentage of gross program savings that can be attributed to the program. The following sections provide a general overview of the methods for developing FR and PSO estimates. Appendix C and Appendix D accompanying this report contain the participant survey instrument and additional detail behind FR algorithms and PSO estimation.

5.1.1 Free Ridership

As part of the participant survey, we asked a series of structured and open-ended questions about the influence of the program on customers' decisions to purchase and install program-discounted products. The survey questions gauged program influence in the following areas:

- Influence on efficiency: whether participants would have purchased comparably energy-efficient products without the program
- Influence on quantity: for relevant measures where participants purchased multiple units, whether participants would have purchased the same quantity without the program
- Influence on timing: whether participants would have delayed their purchase in the absence of the program-discounted products

We developed FR scores by jurisdiction and product category. All respondents who provided valid responses to FR questions were assigned a FR score ranging from 0 (non-free rider) to 1 (full free rider). In addition, we asked customers to provide an open-ended response summarizing how the program influenced their purchase decisions, which we reviewed to identify contradictory responses and adjust FR scores as needed. Appendix D provides additional detail on methods employed to develop FR estimates for both lighting and non-lighting products.

[4] Non-participant SO activities are challenging to quantify and identifying cases where they exist would warrant extensive additional research outside of the scope of this evaluation effort.

5.1.2 Participant Spillover

As a result of positive experience with program-discounted products or information from program marketing, some participants purchase additional energy-efficient products on their own. PSO represents energy savings from such additional energy-saving actions taken by participants (expressed as a percent of total program savings) that were influenced but not directly incentivized by the program. This evaluation quantified PSO savings from two different groups of spillover purchases:

1. **Additional energy-efficient products purchased outside the OSS offering.** The participant survey contained a series of questions designed to gauge the impact of the program on participants' subsequent purchases of energy-efficient products made outside of the OSS offering. Participants who reported a high level of program influence on non-discounted energy-efficient purchases made at other retailers were considered candidates for PSO. In these cases, the survey asked participants to provide additional detail on the non-discounted products they purchased and explain how their experience with the program influenced the purchase. Appendix D provides additional detail on survey-based methods employed to identify and quantify PSO.

2. **Non-discounted energy-efficient purchases made through the OSS offering.** Some OSS Program participants also purchased non-incented LED lighting products from the OSS website in addition to program-discounted ones. Participants who reached the program's limit of 36 bulbs or fixtures were able to purchase additional LED products at non-discounted prices. These non-discounted OSS purchases are not considered part of program gross savings but do represent a source of potential PSO. For these sales, we developed estimates of total ex post gross savings associated with the products and adjusted those savings based on lighting-specific FR estimates established by the current evalution to represent the portion of these sales attributable to the OSS Program.[5]

[5] Note that two survey respondents had additional, non-incented LED purchases through the OSS offering. These two respondents did not report their non-discounted OSS purchases as PSO; as such, there is no double-counting of PSO savings from the two types of spillover measures.

5.2 NTG Results

The evaluation team developed NTGR estimates that account for both FR and PSO. We estimated FR separately for each product category and jurisdiction and developed PSO estimates by jurisdiction. Table 16 summarizes NTGR results by product category and jurisdiction.

Table 16. NTGR Results

Product Category	DEC			DEP		
	FR	PSO	NTGR	FR	PSO	NTGR
LED Lighting	0.777	0.002	0.225	0.695	0.007	0.312
Advanced Thermostats	0.263		0.739	0.257		0.750
Advanced Power Strips	0.031		0.971	0.013		0.994
Low-Flow Showerheads and TSVs	0.125		0.877	0.046		0.961
Dehumidifiers	0.140		0.862	0.105		0.902
Air Purifiers	0.140		0.862	0.105		0.902

5.2.1 Free Ridership

Table 17 below summarizes FR results for each product category, which range from less than 5% for advanced power strips to 70% or more for LED lighting. With the exception of LED lighting, FR is less than 30% for each measure category. Relative precision around the point estimates for product categories where sampling error applies range from 8.0% to 12.9% at 90% confidence. In cases where participation levels were too low to support survey sampling, we apply FR results from other lighting or non-lighting product categories, respectively.

Table 17. FR Results

Product Category	DEC			DEP		
	Respondents	FR	Relative Precision	Respondents	FR	Relative Precision
LED Lighting[A]	76	0.777	8.0%	40	0.695	12.3%
Advanced Thermostats	64	0.263	11.7%	35	0.257	12.9%
Advanced Power Strips[B]	30	0.031	N/A	29	0.013	N/A
Low-Flow Showerhead and TSVs[B]	13	0.125	N/A	14	0.046	N/A
Dehumidifiers[A]	N/A	0.140	N/A	N/A	0.105	N/A
Air Purifiers[A]	N/A	0.140	N/A	N/A	0.105	N/A

[A] Due to limited participation, the survey did not include FR questions for standard LEDs, LED fixtures, dehumidifiers, or air purifiers. FR values for these measures represent the averages of other lighting and non-lighting product categories, respectively.

[B] Because we attempted a census of advanced power strip and low-flow showerhead and TSV participants, the concept of sampling error does not apply for these product categories.

The survey also asked LED lighting participants what they would have expected to purchase in the absence of discounts provided by the OSS offering. More than three-quarters of respondents claimed that without the program discounts they would have bought fewer LED bulbs than they did (78% for DEC, 88% for DEP). However, among these respondents, nearly 80% claimed they still would have purchased LEDs the next time they needed bulbs (78% for DEC, 79% for DEP). This represents a sharp increase from the corresponding results of the prior DEC OSS Program evaluation, where just 53% of respondents indicated they would have purchased LEDs the next time they needed bulbs.

Figure 5 summarizes participant responses regarding how many of the program-discounted bulbs they would have purchased at full price, and Figure 6 provides the type of bulbs they would have expected to buy instead.

Figure 5. Portion of Program LEDs Participants Would Have Purchased Without Program Discount

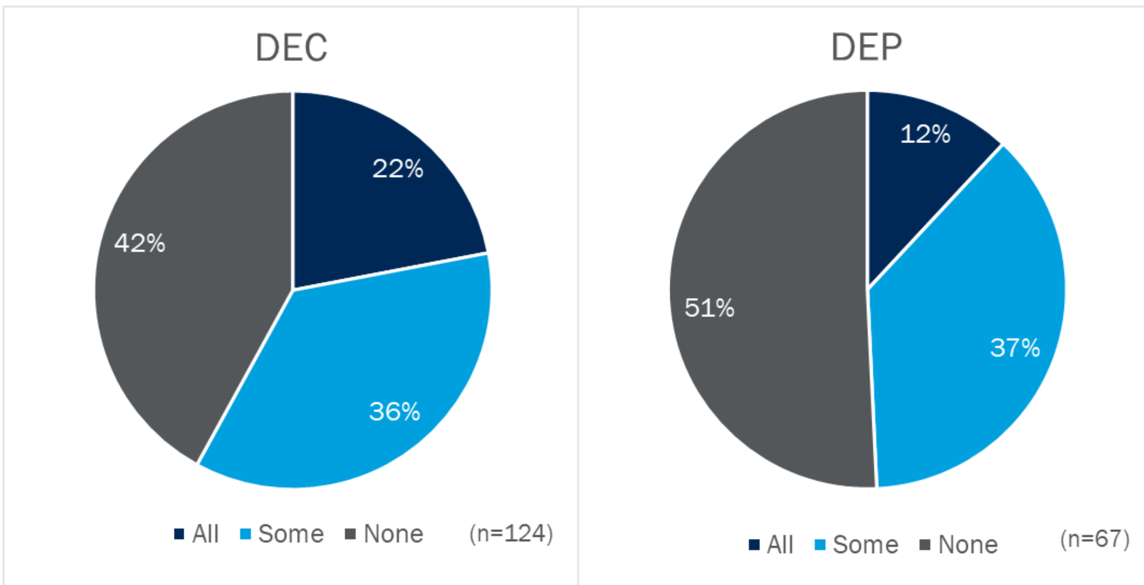
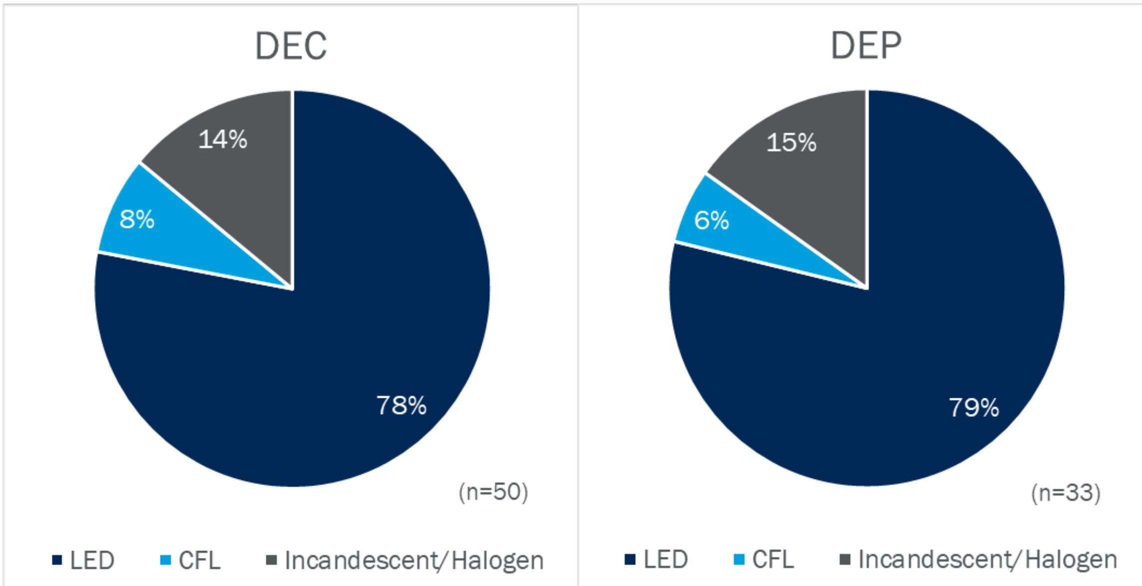


Figure 6. Types of Bulbs Customers Would Have Purchased if Not Buying Program LEDs



The survey also asked non-lighting participants whether they had been looking to purchase a comparable product prior to learning of the available Duke Energy discounts; if they had not previously considered such a purchase, they are assumed to be non-free riders. Sizeable portions of non-lighting participants indicated they had not been planning to purchase a similar product prior to learning about the Duke Energy discounts available, resulting in their being assigned a FR value of 0%. This finding was somewhat more pronounced among low-flow showerhead and TSV participants (62% for DEC, 79% for DEP) and advanced power strip participants (73% for DEC, 90% for DEP) compared to advanced thermostat participants (33% for DEC, 51% for DEP).

5.2.2 Participant Spillover

Two DEC and four DEP survey respondents qualified for PSO by purchasing additional energy-efficient products outside of the OSS since participating in the program and attributing these purchases to their experience with the OSS offering. Table 18 summarizes the products reported as spillover by participants responding to the survey, including the quantity purchased and the associated savings.

Table 18. Survey-Based PSO Savings

Product Type	DEC		DEP	
	Purchase Quantity	kWh	Purchase Quantity	kWh
LED Lighting	5	142.50	1	28.50
Refrigerator			1	51.10
Advanced Power Strip			2	224.60
Low-Flow Showerhead			1	185.50
Low-Flow Faucet Aerator			1	13.28
Total	**5**	**142.50**	**5**	**502.98**

Table 19 outlines the calculation of jurisdiction-level PSO rates based on self-reported qualifying purchases, where total spillover savings associated with purchases made outside of the OSS are divided by total savings associated with participants responding to the survey.

Table 19. Survey-Based PSO Results

Jurisdiction	Spillover Savings from Non-OSS Purchases (kWh)	Total Respondent Savings (Ex Post Gross kWh)[A]	Survey-Based PSO Rate
DEC	142.50	132,371	0.1%
DEP	502.98	79,071	0.6%

[A] Represents total ex post gross savings associated with respondents who provided valid participant survey responses, including those who did not report a spillover purchase.

Table 20 summarizes the calculation of PSO attributable to non-incented LED purchases made on the OSS website, where total program-attributable savings from non-discounted purchases are divided by total program-wide gross savings.[6]

Table 20. Non-Incented OSS Sales PSO Results

Jurisdiction	Spillover Savings from Non-Incented OSS Sales (kWh)	Total Program Savings (Ex Post Gross kWh)	Non-Incented OSS Sales PSO Rate
DEC	22,493.3	30,872,979	0.1%
DEP	6,542.1	15,359,753	<0.1%

The sum of the survey-based PSO rate and PSO rate associated with non-discounted OSS sales is 0.2% for DEC and 0.7% for DEP, as shown in Table 21.

Table 21. Combined PSO Results

Jurisdiction	Survey-Based PSO	Non-Incented OSS Sales PSO	Final PSO
DEC	0.1%	0.1%	0.2%
DEP	0.6%	<0.1%	0.7%

[6] Program-attributable savings from non-discounted OSS purchases reflect ex post gross savings assumptions, including deemed savings updates and ISR application, adjusted to account for program influence by excluding the portion of savings attributable to FR (77.7% for DEC and 69.5% for DEP).

5.3 Net Impact Results

Table 22, Table 23, and Table 24 present the ex post net impacts for energy, summer peak demand, and winter peak demand savings, respectively, that result from applying the evaluation NTGRs to ex post gross savings. The DEC program realized 12.6 GWh in net energy savings, 3.3 MW in net summer peak demand savings, and 2.6 MW in net winter peak demand during the evaluation period. In the same period, the DEP program achieved 7.9 GWh in net energy savings, 2.0 MW in net summer peak demand savings, and 1.9 MW in net winter peak demand.

Table 22. Detailed Energy Savings Net Impact Results

Product Category	DEC			DEP		
	Ex Post Gross kWh Savings	NTGR	Ex Post Net kWh Savings	Ex Post Gross kWh Savings	NTGR	Ex Post Net kWh Savings
Specialty LED	8,282,108	0.225	1,863,474	3,837,885	0.312	1,197,420
Reflector LED	9,907,775		2,229,249	3,900,243		1,216,876
Standard LED	1,837,992		413,548	662,946		206,839
LED Fixture	126,444		28,450	92,131		28,745
Advanced Thermostat	9,930,731	0.739	7,338,810	6,521,379	0.750	4,891,035
Advanced Power Strip	714,075	0.971	693,367	303,530	0.994	301,709
Showerhead with TSV	64,707	0.877	56,748	36,846	0.961	35,409
Standalone TSV	7,597		6,663	3,768		3,621
Dehumidifier	1,147	0.862	989	1,025	0.902	925
Air Purifier	403		347	0	N/A	0
Total	**30,872,979**	**0.409**	**12,631,646**	**15,359,753**	**0.513**	**7,882,578**

Note: Overall NTGRs are estimated as jurisdiction level ex post net savings divided by ex post gross savings.

Table 23. Detailed Summer Peak Demand Savings Net Impacts Results

Product Category	DEC			DEP		
	Ex Post Gross kW Savings	NTGR	Ex Post Net kW Savings	Ex Post Gross kW Savings	NTGR	Ex Post Net kW Savings
Specialty LED	1,222	0.225	275	566	0.311	177
Reflector LED	1,462		329	576		180
Standard LED	271		61	98		31
LED Fixture	3		1	2		1
Advanced Thermostat	3,464	0.739	2,560	2,069	0.749	1,552
Advanced Power Strip	64	0.971	62	27	0.993	27
Showerhead with TSV	5	0.877	4	3	0.960	3
Standalone TSV	1		1	<1		<1
Dehumidifier	<1	0.862	<1	<1	0.901	<1
Air Purifier	<1		<1	0	N/A	0
Total	**6,493**	**0.507**	**3,293**	**3,341**	**0.588**	**1,969**

Note: Overall NTGRs are estimated as jurisdiction level ex post net savings divided by ex post gross savings.

I/A

Table 24. Detailed Winter Peak Demand Savings Net Impacts Results

Product Category	DEC			DEP		
	Ex Post Gross kW Savings	NTGR	Ex Post Net kW Savings	Ex Post Gross kW Savings	NTGR	Ex Post Net kW Savings
Specialty LED	593	0.225	133	275	0.312	86
Reflector LED	709		160	279		87
Standard LED	132		30	47		15
LED Fixture	5		1	4		1
Advanced Thermostat	2,982	0.739	2,204	2,175	0.750	1,631
Advanced Power Strip	64	0.971	62	27	0.994	27
Showerhead with TSV	10	0.877	9	6	0.961	6
Standalone TSV	2		2	1		1
Dehumidifier	0	N/A	0	0	N/A	0
Air Purifier	<1	0.862	<1	0	N/A	0
Total	**4,496**	**0.578**	**2,600**	**2,814**	**0.659**	**1,854**

Note: Overall NTGRs are estimated as jurisdiction level ex post net savings divided by ex post gross savings.

6. Process Evaluation

This section details research questions, evaluation activities, and key findings from the process evaluation of the DEC and DEP OSS Program.

6.1 Research Questions

The evaluation team developed the following process-oriented research questions with input from OSS program staff.

- How effective are program implementation and data-tracking practices?
- How do participants learn about the program?
- Are participants satisfied with their program experience?
- What factors, if any, are preventing customers from installing program-discounted products or prompting their removal?
- How do customers use program-discounted products, and what are the implications for savings attributable to those measures, for advanced thermostats in particular?
- Which measures or customer segments can the program target to maximize its influence and minimize free ridership?
- What role does free or discounted shipping play in motivating customers to purchase program-discounted products?
- What information is currently collected from program participants, and what participant information or eligibility requirements would enable the program to maximize savings for measures where household characteristics are especially relevant?
- What other energy-efficient measures could the program consider offering?
- What are the program's strengths or key successes and in what areas are there potential opportunities for improvement?
- What non-energy impacts, if any, do OSS participants realize as a result of their participation?

6.2 Methodology

The process evaluation relied on the following data collection and analytic activities:

- In-depth interviews with program staff
- Analysis of program tracking data
- Participant survey (n=470)

6.3 Key Findings

The following sections present key findings regarding the evaluation's process-oriented research questions.

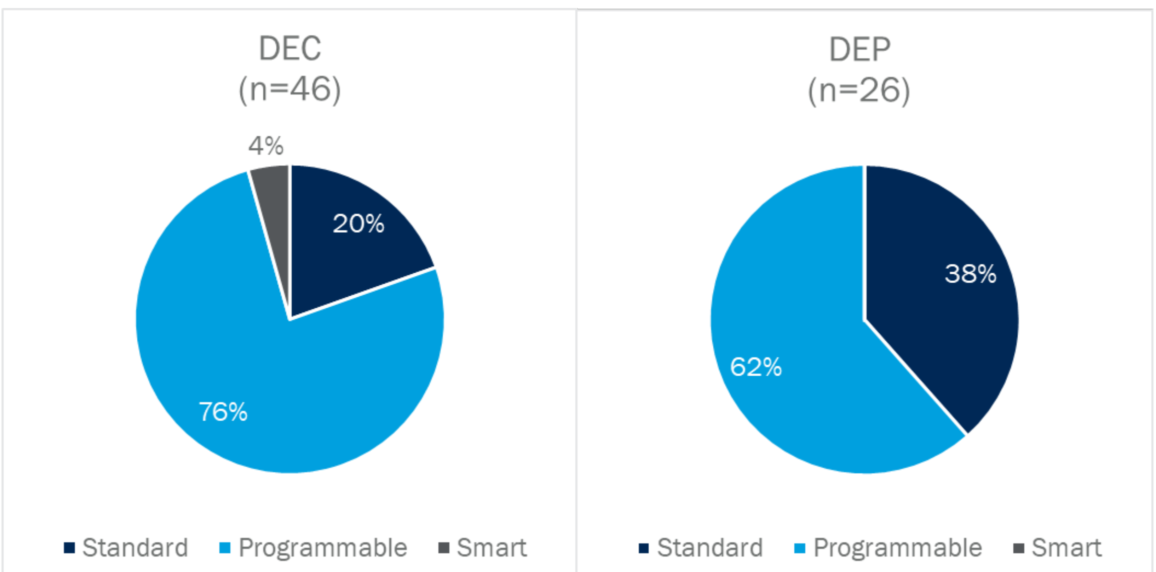
6.3.1 Thermostat Usage Behavior

Two key determinants of savings from advanced thermostats are (1) the type of thermostat participants used prior to the installation of their program-discounted thermostats and (2) how participants used their old thermostats and are using their new ones. The participant survey explored both topics.

Most respondents reported that their new smart thermostats replaced a programmable thermostat (76% for DEC, 62% for DEP), with the rest mostly replacing manual thermostats (20% for DEC, 38% for DEP). A small number of thermostat participants reported they were replacing a previously owned smart thermostat (4% for DEC, 0% for DEP). Ex post per-unit savings do not allow savings for advanced thermostats that replace other advanced thermostats, resulting in a small decrease to per-unit savings for DEC.

Figure 7 summarizes the types of thermostats being replaced by program-discounted advanced thermostats in each jurisdiction.

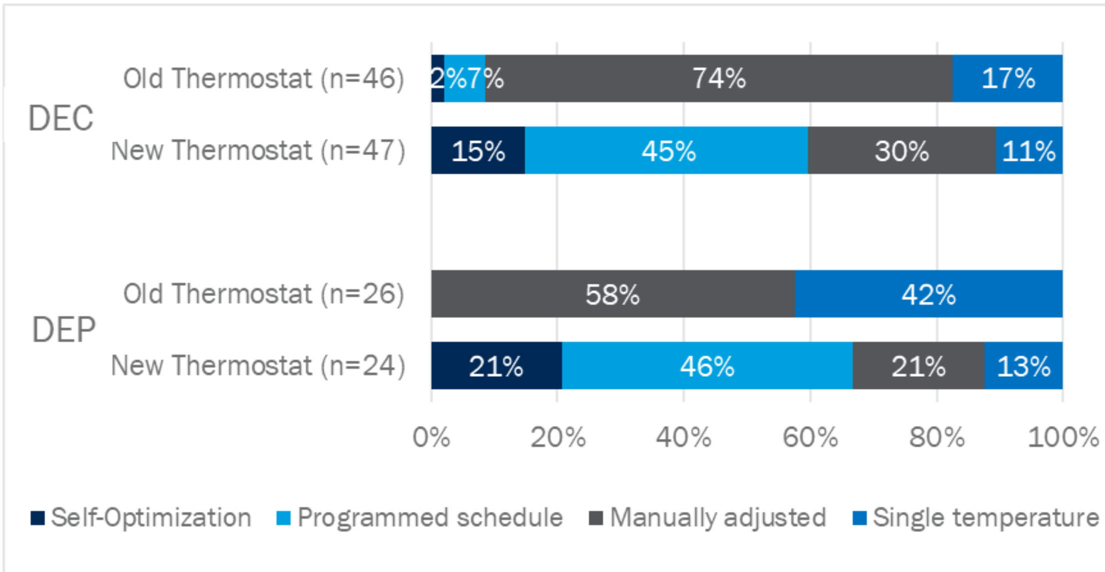
Figure 7. Previous Thermostat Replacement



Thermostat usage patterns are often varied and dependent on a variety of factors, making them challenging to gauge via survey self-report. The participant survey nevertheless explored how customers typically set the temperature on their previous and new thermostats in the summer months to get a sense of how their behavior may have changed. Although the engineering algorithm for advanced thermostats does not explicitly incorporate self-reported usage behaviors, understanding such tendencies can provide important insights into whether application of prior billing analysis results are justified and what savings might be expected from future billing analyses for this program.

Perhaps most notably, few to none of the participants in either jurisdiction typically had a programmed schedule set on their previous thermostat despite most of them having programmable thermostats installed. Conversely, more than half of these respondents claimed that they were either taking advantage of their new advanced thermostat's self-optimization function (15% for DEC, 21% for DEP) or programming their new thermostat on a schedule (45% for DEC, 46% for DEP). Figure 8 illustrates these findings regarding how thermostat participants most typically used their previous and program-discounted thermostats.

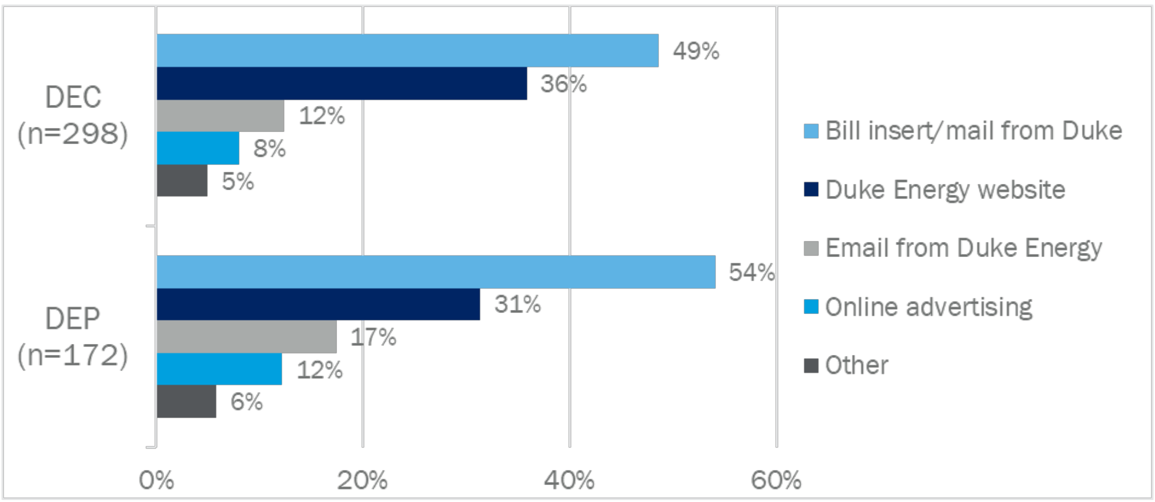
Figure 8. Thermostat Usage Behavior



6.3.2 Program Marketing and Outreach

We asked all participants how they first learned about the Online Savings Store offering. Around half of respondents in each jurisdiction reported they learned about the offering through a bill insert or physical mailing from Duke (49% for DEC, 54% for DEP). The Duke Energy website was the second most common source of program awareness (36% for DEC, 31% for DEP) and emails from Duke were third (12% for DEC, 17% for DEP). Other sources of information reported by participants included family and friends, social media, and hired contractors. Figure 9 summarizes how participants first heard about the OSS offering.

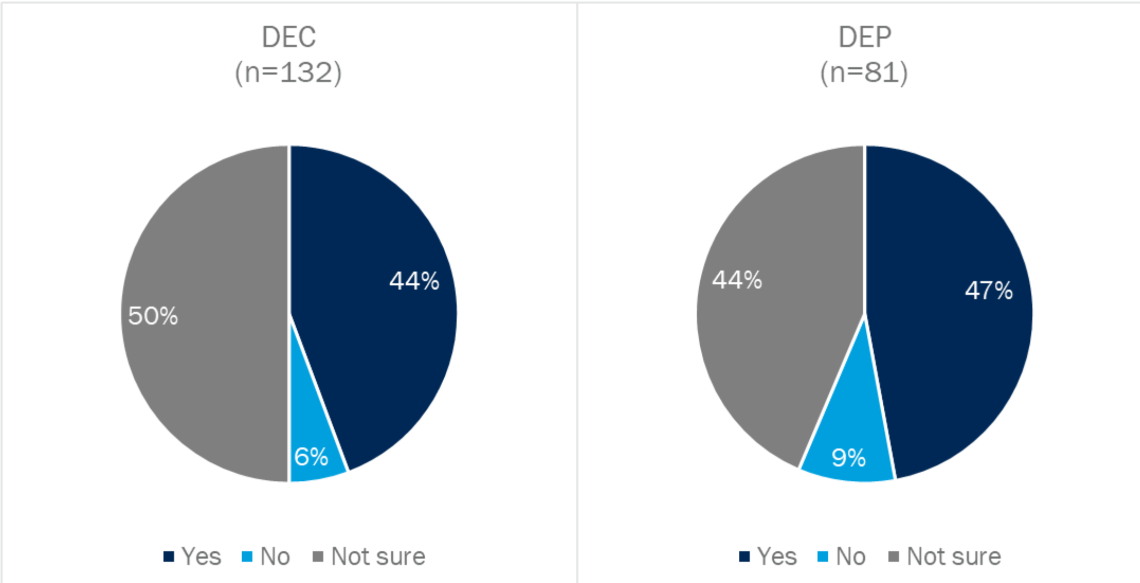
Figure 9. Sources of Awareness



6.3.3 Value of Discounted Shipping

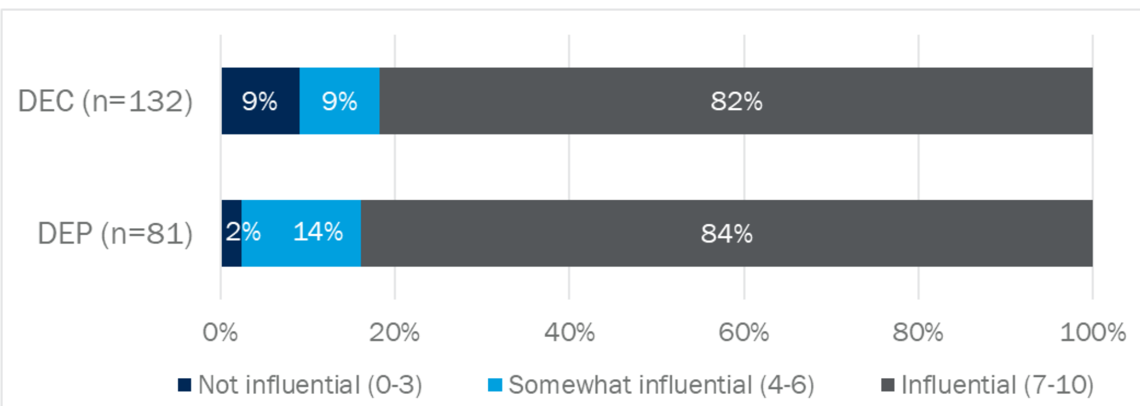
As part of the participant survey, the evaluation sought to gauge the importance of discounted shipping to respondents and better understand the role it plays in motivating customers to purchase program-discounted products. About half of survey respondents reported receiving discounted shipping for the OSS purchase (44% for DEC, 47% for DEP), but about as many indicated they were unsure whether they received free or discounted shipping (50% for DEC, 44% for DEP). Figure 10 illustrates these responses, highlighting a high degree of participant uncertainty as to whether they received free or reduced shipping.

Figure 10. Discounted Shipping Breakdown



Those who did recall receiving free or discounted shipping mostly indicated that it was highly influential in their decision to purchase a product through the program, with more than 80% rating the influence at least 7 on a zero to ten scale (where zero means "Not at all influential" and ten means "Extremely influential"). Figure 11 shows respondents' ratings of how influential discounted shipping was on their decision to make a purchase.

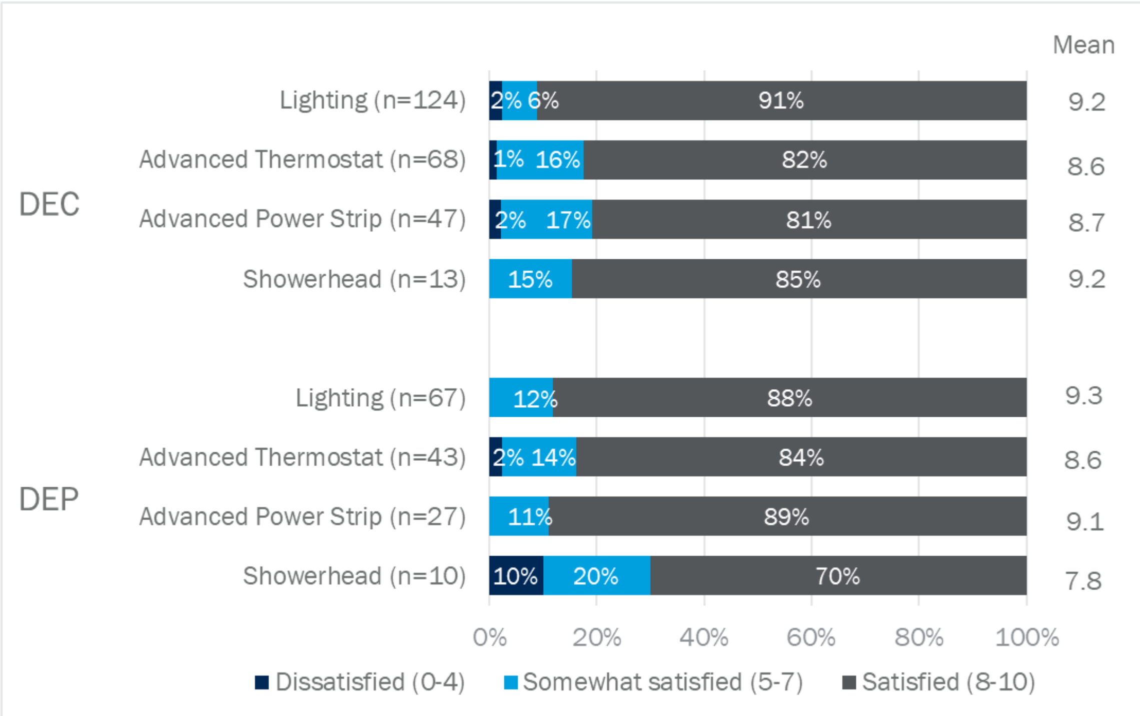
Figure 11. Influence of Shipping Discount



6.3.4 Program Delivery and Participant Satisfaction

Across the board, participants indicated high satisfaction with their discounted products, with average scores of eight or nine for nearly all products in both jurisdictions. The only specific complaints from respondents were two instances of defective advanced power strips and one participant who ordered an LED fixture thinking it was an LED bulb. These findings suggest that the program is effectively targeting high-quality products that customers enjoy using. Figure 12 summarizes participant satisfaction with each type of program-discounted product by jurisdiction.

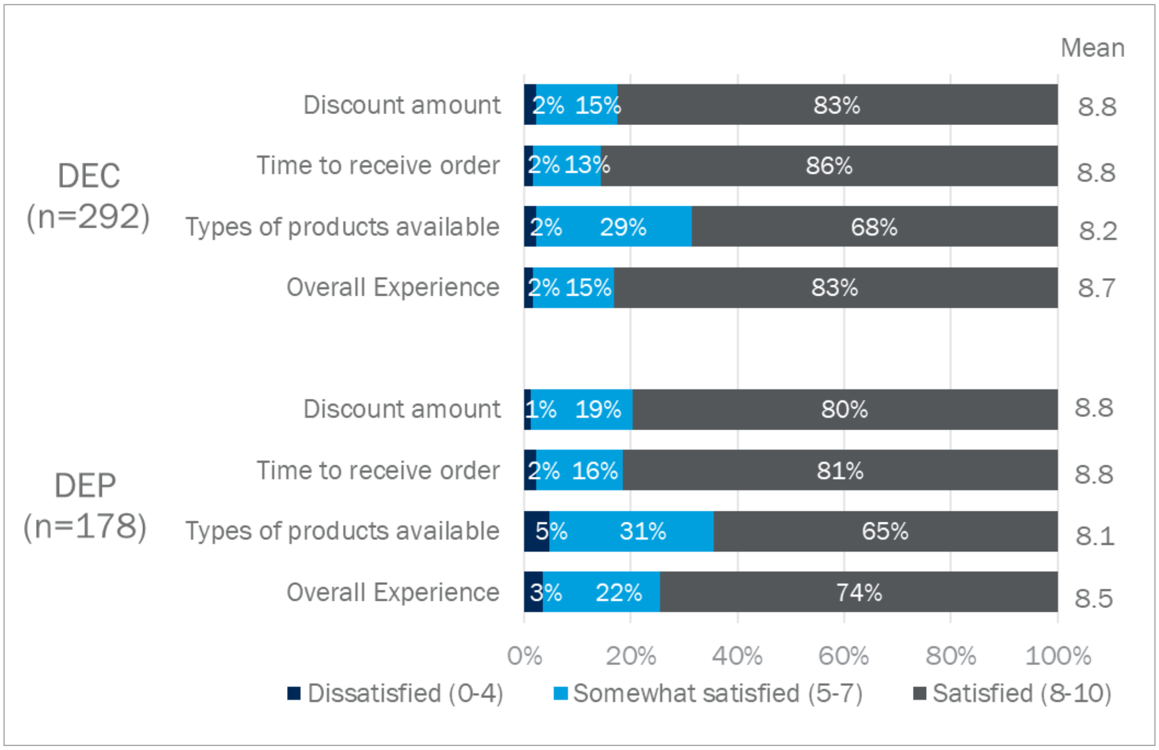
Figure 12. Participant Satisfaction with Program-Discounted Products



Satisfaction with various elements of the program's implementation was also exceptionally high with customers providing mean ratings of between eight and nine out of ten for each aspect of the program and for the program overall. The only suggested improvements offered by participants came from three respondents who indicated the website was difficult to navigate and three who indicated they would have appreciated a larger variety of LED bulbs to choose from. These high satisfaction ratings contribute to an image of a smoothly functioning program that consistently delivers on customer expectations.

Figure 13 provides participant satisfaction ratings associated with key program elements for each jurisdiction.

Figure 13. Participant Satisfaction with Key Program Elements



6.3.5 Non-Energy Impacts

NEIs include a range of occupant health, safety, and economic outcomes that participants may realize beyond the energy and cost savings of energy-efficient upgrades. NEIs can provide significant additional benefits to participants and can be a powerful motivator for program participation.

The participant survey included questions about changes in electricity bills and in different aspects of the home's comfort following program participation, and many participants reported both electric bill and non-energy benefits. Among those who purchased and installed new advanced thermostats, nearly half claimed their winter electricity bills were lower (44% for DEC, 45% for DEP) and at least one-third reported lower electricity bills in the summer (38% for DEC, 33% for DEP). Similarly, at least one-third of advanced thermostat participants reported their home was more comfortable during the winter months since installing the new thermostat (38% for DEC, 33% for DEP), and a similar pattern plays out for summer months with between a quarter and a third of customers reporting higher comfort (37% for DEC, 26% for DEP). Among respondents who purchased LED lighting, a majority reported that the quality of lighting in their homes had improved since installing the new products (55% for DEC, 59% for DEP).

Table 25 summarizes feedback from advanced thermostat and LED lighting participants regarding changes to their home's electricity bills, comfort, and lighting quality since installing program-discounted products.

Table 25. Impacts Reported by Participants

Jurisdiction	Impact	Positive Change	No Change	Negative Change
DEC	**Advanced Thermostat Participants**			
	Electricity bills in summer (n=34)	38% *Bills are lower*	59%	3% *Bills are higher*
	Electricity bills in winter (n=33)	44% *Bills are lower*	52%	4% *Bills are higher*
	Home comfort in summer (n=41)	37% *More comfortable*	61%	2% *Less comfortable*
	Home comfort in winter (n=29)	38% *More comfortable*	62%	0% *Less comfortable*
	LED Lighting Participants			
	Lighting quality (n=116)	55% *Better*	43%	2% *Worse*
DEP	**Advanced Thermostat Participants**			
	Electricity bills in summer (n=15)	33% *Bills are lower*	53%	13% *Bills are higher*
	Electricity bills in winter (n=11)	45% *Bills are lower*	45%	9% *Bills are higher*
	Home comfort in summer (n=23)	26% *More comfortable*	61%	13% *Less comfortable*
	Home comfort in winter (n=15)	33% *More comfortable*	53%	13% *Less comfortable*
	LED Lighting Participants			
	Lighting quality (n=64)	59% *Better*	39%	2% *Worse*

These findings suggest the OSS Program provides value to participants beyond energy savings. Increased home comfort relating to temperature control could be beneficial for customer health and safety. Improved lighting also provides a higher sense of safety in and around the home. Lower energy bills can also help alleviate energy burdens and allow customers to spend their money on essential items, such as food or medicine.

7. Conclusions and Recommendations

This section presents conclusions and recommendations resulting from the process and impact evaluations of the DEC and DEP OSS Program.

7.1 Conclusions

From January 1, 2019 through March 31, 2021, Duke Energy's OSS Program sold 613,990 discounted energy-efficient products to DEC customers and 252,091 to DEP customers, achieving ex ante gross energy savings of 32.1 GWh for DEC and 13.5 GWh for DEP. LED lighting dominated OSS Program sales in both jurisdictions, representing more than 90% of total units sold and more than 50% of ex ante gross energy savings. Non-lighting measures were first distributed by the program in March 2019, shortly before standard LEDs were dropped from the list of available products. Advanced thermostats accounted for 5% of DEC and 6% of DEP sales but for 33% and 35% of savings, respectively. Other non-lighting products accounted for small shares of sales and savings (2% or less). Table 26 provides a summary of program sales and ex ante energy savings.

Table 26. Online Savings Store Program Performance by Jurisdiction

Product Category	DEC				DEP			
	Units Sold	% of Sales	Ex Ante Gross kWh Savings	% of Savings	Units Sold	% of Sales	Ex Ante Gross kWh Savings	% of Savings
Specialty LED	283,299	46%	9,444,683	29%	125,641	50%	4,212,587	31%
Reflector LED	217,718	35%	10,159,269	32%	80,792	32%	3,778,285	28%
Standard LED	74,703	12%	1,600,138	5%	25,679	10%	550,044	4%
LED Fixture	1,184	<1%	149,207	<1%	794	<1%	107,321	1%
Advanced Thermostat	27,828	5%	10,503,122	33%	15,427	6%	4,728,221	35%
Advanced Power Strip	8,663	1%	159,572	<1%	3,417	1%	62,941	<1%
Showerhead with TSV	387	<1%	82,040	<1%	230	<1%	63,059	<1%
Standalone TSV	197	<1%	10,991	<1%	102	<1%	7,359	<1%
Dehumidifier	10	<1%	1,530	<1%	9	<1%	1,377	<1%
Air Purifier	1	<1%	403	<1%	0	0%	0	0%
Total	**613,990**	**100%**	**32,110,956**	**100%**	**252,091**	**100%**	**13,511,195**	**100%**

The DEC program realized 30.9 GWh in ex post gross energy savings, 6.5 MW in summer peak demand savings, and 4.5 MW in winter peak demand savings during the evaluation period. In the same period, the DEP program achieved 15.4 GWh in ex post gross energy savings, 3.3 MW in summer peak demand savings, and 2.8 MW in winter peak demand savings.

Gross realization rates for the DEC program are 96% for energy savings, 204% for summer peak demand savings, and 287% for winter peak demand savings, while the DEP program saw gross realization rates of 114% for energy savings, 259% for summer peak demand savings and 437% for winter peak demand savings. In both jurisdictions, realization rates are slightly below 100% for LED lighting, which accounts for more than half of ex post gross energy savings. For DEP energy savings, this is more than offset by a 138% realization rate for advanced thermostats, while for DEC energy savings, the advanced thermostat realization rate is also slightly below 100%. For demand savings, advanced thermostats are the primary driver of high overall realization rates, as these products were not assigned ex ante demand savings but account for more than half of ex post gross summer and winter demand savings.

After applying NTGRs established by the current evaluation, the DEC offering achieved 12.6 GWh in ex post net energy savings, 3.3 MW in summer peak demand savings, and 2.6 MW in winter peak demand ex post net savings. The DEP program meanwhile achieved 7.9 GWh in ex post net energy savings, 2.0 MW in summer peak demand savings, and 1.9 MW in winter peak demand ex post net savings.

Table 27 summarizes total ex ante, ex post gross, and ex post net savings for each jurisdiction.

Table 27. Online Savings Store Program Performance by Jurisdiction

Jurisdiction	Metric	Ex Ante	Gross RR	Ex Post Gross	NTGR	Ex Post Net
DEC	Energy Savings (kWh)	32,110,956	96%	30,872,979	0.409	12,631,646
	Summer Peak Demand Savings (kW)	3,179	204%	6,493	0.507	3,293
	Winter Peak Demand Savings (kW)	1,569	287%	4,496	0.578	2,600
DEP	Energy Savings (kWh)	13,511,195	114%	15,359,753	0.513	7,882,578
	Summer Peak Demand Savings (kW)	1,291	259%	3,341	0.589	1,969
	Winter Peak Demand Savings (kW)	644	437%	2,814	0.659	1,854

Note: NTGR values were developed by product category and jurisdiction. While NTGRs do not vary across energy and demand savings, the effective NTGRs (estimated as jurisdiction level ex post net savings divided by ex post gross savings) do as a result of varying contributions of each product category to energy and summer and winter demand savings.

Implementation and Data Tracking

Program implementation processes appear to run smoothly and effectively, as evidenced by high levels of customer satisfaction with the products offered and the program overall. In particular, participants expressed high degrees of satisfaction with the size of discounts being offered, the speed with which they received purchased products, and the range of products the program allowed them to choose from.

Program tracking data was generally clean, accurate, fully populated, and included the necessary product specifications to inform TRM-based savings calculations for nearly all products with air purifiers being the notable exception.

Marketing and Outreach

Despite the OSS Program being implemented as an online platform, around half of participants learned about the offering through a bill insert or physical mailing from Duke, suggesting these outreach channels remain an effective method of communicating the program's availability.

Discounted shipping may be an especially valuable point of emphasis for program marketing and an effective tool for encouraging energy-efficient purchases. Many customers expressed uncertainty about whether their order received discounted shipping, but those who did recall receiving it often indicated that it was highly influential in their decision to purchase a product through the program.

Program Influence

The OSS Program provides an easily accessible platform for encouraging customers to consider adopting energy-efficient household items. Participant feedback suggests that many of those who purchased less widely popular measures such as low-flow showerheads or advanced power strips only considered purchasing such a product because of information they received about program offerings. This finding suggests that other less common products that have very recently or not yet been introduced to the program may be especially good candidates for promotion through the program, including faucet aerators, air purifiers, dehumidifiers, or other household appliances.

Conversely, the lighting market appears to be nearing transformation, and limited opportunity remains for program discounts to spur LED purchases that would not have occurred in their absence. Utility programs like this one have helped the lighting market near transformation with many customers indicating LEDs as their preferred product. As the market continues to shift, we expect LEDs will be an increasingly popular and affordable option, further limiting the power of program discounts to motivate LED purchases that would not have otherwise occurred.

Thermostat Usage

Nearly all advanced thermostat participants replaced previously installed programmable or manual thermostats, but the majority of previously installed thermostats were programmable, suggesting there may be limited potential for savings if customers are already conserving energy by way of programmed thermostat schedules. However, almost none of these participants reported primarily relying on a programmed schedule to set the temperature of their home with their previous thermostat. Meanwhile, a majority of respondents indicated that they do use a programmed schedule and/or advanced features of their new thermostat, which offers some support for savings assumptions being applied to these measures as part of the current evaluation.

Installation Behavior

First-year ISRs of less than 80% for advanced thermostats and advanced power strips indicate that substantive portions of participants are not installing their program-discounted products within twelve months of purchasing. Among those with uninstalled products, the vast majority report they have not yet gotten around to or have not yet needed to install their new products. The program may therefore be able to maximize savings by conducting additional outreach or providing materials to participants encouraging them or reminding them to install the new products, as discussed in the following section.

Non-Energy Impacts

In addition to the energy savings achieved by the OSS Program, many customers reported other benefits of their new program-discounted products. More than half of LED lighting participants reported the quality of lighting in their home had been improved and between one-third and half of advanced thermostat participants suggested their homes were more comfortable or their electricity bills were lower since installing their new thermostats.

7.2 Recommendations

Based on the findings of this evaluation, the evaluation team identified the following opportunities for program improvement:

- Although there is a high rate of customer uncertainty regarding whether they received discounted shipping, those who did reported that it influenced their decision to purchase a program-discounted product. Therefore, we recommend that program marketing highlight discounted or free shipping, when available, both in outreach materials and on the program website.
- To support increases to first-year ISR, we recommend that the program continue to include collateral with orders encouraging customers to install their new energy-efficient products. The program could

also consider additional outreach to recent participants encouraging them to install their new products, particularly for advanced thermostats. This has the potential to help the program maximize first-year savings.

- Program tracking data should include the necessary product infomation to enable application of appropriate savings assumptions for all product categories, as it did for all products sold during the current evaluation period with the exception of air purifiers. For air purifiers, future program tracking data should include the product's size (i.e., clean air delivery rate) to ensure the accuracy of savings estimates.
- We recommend the program continue to explore possible expansions of the OSS Program and continue using the offering to promote less common energy-efficient products, some of which have already been introduced to the program (including advanced power strips, faucet aerators, air purifiers, dehumidifiers, or other household appliances). Our evaluation found that participants often purchase these products as a direct result of information made available by the OSS offering, as exhibited by their relatively low FR estimates.

8. Summary Form

Duke Energy Carolinas and Duke Energy Progress Online Savings Store Program

Completed EM&V Fact Sheet

Program Description

Duke Energy's Online Savings Store (OSS) Program offers a wide range of point-of-sale-discounted specialty LED lighting and advanced thermostats as well as several other consumer electronics and water-saving measures including advanced power strips, low-flow showerheads, TSVs, dehumidifiers, and air purifiers. The non-lighting measures reflect an expansion of the OSS Program, which began exclusively distributing energy-efficient lighting in April 2013. Customers can purchase the discounted products online through a designated website operated by Energy Federation Inc. (EFI).

Date	November 30, 2021
Region(s)	Duke Energy Carolinas (DEC) Duke Energy Progress (DEP)
Evaluation Period	January 1, 2019– March 31, 2021
Annual kWh Savings (Ex Post Net)	DEC: 12,632 MWh DEP: 7,883 MWh
Coincident kW Impact (Ex Post Net)	DEC: 3.3 MW (Summer), 2.6 MW (Winter) DEP: 2.0 MW (Summer), 1.9 MW (Winter)
Measure Life	Not Evaluated
Net-to-Gross Ratio	DEC: 0.403 DEP: 0.513
Process Evaluation	Yes
Previous Evaluation(s)	DEC Online Savings Store Program Evaluation. October 4, 2018.

Evaluation Methodology

In support of the **gross impact evaluation**, we first reviewed program tracking data and ex ante per-unit deemed savings values for incented products. We then developed updated per-unit deemed savings based on review of secondary sources and results of a survey fielded with program participants. We also verified product installation and persistence based on participant survey responses. Based on these evaluated ex post per-unit deemed savings values and survey-based ISRs, we calculated ex post gross energy and demand savings for products sold through the DEC and DEP OSS Program.

The **net impact evaluation** relied on responses to the participant survey to quantify free ridership and participant spillover. We estimated free ridership by measure category and jurisdiction and developed jurisdiction-level participant spillover rates. The resulting net-to-gross ratios were multiplied by ex post gross savings to determine net program impacts.

We also conducted a **process evaluation** focused on participant experiences and satisfaction with the program, product usage behaviors, program marketing and outreach, and implications of participant-reported influence of key program elements on their decision to purchase program-discounted energy-efficient products.

9. DSMore Table

The Excel spreadsheet containing measure-level inputs for Duke Energy Analytics is provided below. Per-measure savings values in the spreadsheet are based on the gross and net impact analyses reported above. The evaluation scope did not include updates to measure life assumptions.

[DSMore Table provided as a separate file]

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I/A

Now a part of Resource Innovations

K12 Education Program 2019-2020 Evaluation Report

Submitted to Duke Energy Carolinas and Duke Energy Progress

December 2, 2021

Principal authors:

Jason Hinsey, Senior Consultant

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Contents

List of Figures

List of Tables

Equations

1 Executive Summary

1.1 Program Summary

The Energy Efficiency Education in Schools (K12 Education) Program is a Duke Energy Carolinas and Duke Energy Progress (DEC/DEP) program offering implemented by the National Theatre for Children (NTC). The program provides age-appropriate school performances by NTC's professional actors that teach students about energy and energy conservation in a humorous, engaging, and entertaining format. NTC also provides participating schools with classroom curriculum to coincide with the performance, which includes energy efficiency kit request forms that student families can use to receive free energy efficiency measures to install in their home.

1.2 Evaluation Objectives and Results

This report presents the results and findings of evaluation activities for the DEC/DEP K12 Education Program conducted by Nexant (now a part of Resource Innovations) for the program year of August 2019 through July 2020.

1.2.1 Impact Evaluation

The primary objective of the impact evaluation is to estimate energy and demand savings attributable to the 2019-2020 DEC/DEP K12 Education Program. The 2019-2020 impact evaluation was based on an advanced metering infrastructure (AMI) consumption data analysis using a matched control group made up of non-participants. One of the benefits of using a matched control group in this approach is that it yields net savings estimates, and eliminates the need to address factors such as freeridership and spillover that are typically accounted for in a net-to-gross (NTG) adjustment.

The 2019-2020 EE Education program generated significant energy savings among participating households, but did not show meaningful load demand reductions during the peak periods.

Table 1-1 presents the summarized findings of the 2019-2020 impact evaluation.

Table 1-1: Ex Post Annual Energy and Peak Demand Savings Summary

		2019-2020 Per Houshold Savings	2019-2020 Program Savings
DEC		*Program Population = 20,852*	
	Energy Savings	475 kWh	9,905 MWh
	Summer Demand Impact	-0.081 kW	-1.689 MW
	Winter Demand Impact	0.003 kW	0.062 MW
DEP		*Program Population = 5,348*	
	Energy Savings	475 kWh	2,540 MWh
	Summer Demand Impact	-0.081 kW	-0.433 MW
	Winter Demand Impact	0.003 kW	0.016 MW

*Negative value denotes a load increase

1.2.2 Process Evaluation

The process evaluation assessed opportunities for improving the program's design and delivery in DEC and DEP's service territories. It specifically documented teacher, student, and parent experiences by investigating: 1) teachers' assessments of the NTC performance, quality of curriculum materials, and the kit request form distribution procedure; and 2) student families' responses to the energy efficiency kits and the extent to which the kits effectively motivate families to save energy.

The evaluation team reviewed program documents and web surveys with student families that received a kit (*DEC n*= 300, *DEP n*= 215) and teachers who attended the performance (*DEC n*= 34, *DEP n* = 21). The team also conducted in-depth interviews with utility staff, NTC staff, and eight teachers who completed the web survey.

Overall, the DEC/DEP K12 Education Program performed effectively during the 2019-2020 school year. Key findings from the process evaluation include:

Awareness:

- Both teachers and parents were aware of Duke Energy's sponsorship of the K12 Education Program; 97% of teachers and 88% of parents in DEC, and 95% of teachers and 91% of parents in DEP indicated that they were aware of this fact.
- Teachers in DEC primarily learned about Duke Energy's sponsorship of the program through material provided by NTC about the program, NTC staff or Duke marketing materials. Similarly, teachers in DEP learned about the sponsorship of the program most often through Duke marketing materials and materials provided by the NTC.
- Most parents in both DEC and DEP reported that they learned of Duke's involvement in the program through informational material provided in the kit, followed by educational material provided by NTC and brought home from school by their child.

- Parents are largely unaware of the NTC performances and program related classroom activities with 25% of them in DEC and 18% of them in DEP reporting knowledge of these activities.
- Awareness of digital materials, performances, and the Kilowatt Krush app is inconsistent for teachers.
- Kilowatt Krush app usage by students is increasing, though still relatively low; elementary students are most likely to have used it.
- While 19 of 34 teachers in DEC reported that NTC staff or materials mentioned the Kilowatt Krush app, 7 reported that their students were using it. In DEP more teachers reported that their students were using it than not; 12 of 21 teachers stated that NTC staff or materials mentioned the app, and 9 teachers said that their students were using it.
- In DEC, 275 of 300 student families reported that either the student had not downloaded the Kilowatt Krush app, or that they were not sure if they had or not. In DEP, 194 of 215 families stated that their child had not downloaded the app or they were unsure.

Program Experience and Satisfaction:

- Teacher satisfaction with the performances and interactions with NTC staff was very high with 32 of 34 DEC teachers and 20 of 21 DEP teachers rating the performance a 4 or a 5, or “highly satisfied”.
- Parents reported high levels of satisfaction with the measures provided in the efficiency kits. Measure satisfaction was highest amongst parents who installed LED bulbs; 81% of DEC and 91% of DEP respondents said that they were “highly satisfied” with the measure. Satisfaction measures were lowest with bathroom faucet aerators; 71% of parents in DEC and 74% of parents in DEP reported that they were “highly satisfied” with this measure.

In-Service Rates:

- An average of 3.2 measures from the kit were installed per household in DEC, and an average of 3.4 measures were installed in DEP. Nineteen respondents (6%) in DEC installed all of the items, and 42 respondents (14%) installed none of the items. In DEP, 21 respondents (10%) installed all items and 19 respondents (9%) installed none of the items.
- The lighting measures provided in the kit were installed more often than the water saving measures. When asked why they did not install water saving measures, respondents most frequently reported low water pressure or that the measures didn’t fit or match their fixture. Concerns about lighting measures were minimal and limited to night lights, where most of the respondents who didn’t install the measure reported that they did not need it.
- Large majorities of parents (79% and 81% in DEC and DEP) and children (DEC: 74%, DEP: 67%) changed their behaviors after receiving the kit or seeing the performance. The most commonly changed behavior was turning off lights when not

in the room and was shared amongst parents and children in both territories. Almost as many parents in DEC stated that they changed their thermostat settings as said turned lights off when leaving a room.

1.2.3 Conclusions and Recommendations

Based on evaluation findings, the evaluation team concluded the following and provides several recommendations for program improvement:

Conclusion: The use of AMI meter data as the primary input in the impact analysis was effective in reliably estimating savings attributable to the program.

> **Recommendation:** When proven to be feasible, continue to use an AMI-based consumption analysis approach in future EE Education program evaluations.

Conclusion: Teachers are highly satisfied with NTC performances and materials, although many teachers are unable to effectively utilize the materials within their curriculum due to timing issues. Some teachers additionally reported that they were unaware of the availability of online resources.

> **Recommendation:** Though the amount of online content has increased, it is important to prioritize making teachers aware of the availability of these online resources, including assuring these resources are prominently included in performances, instructional materials, and promotional materials. This may help address any problems stemming from the misalignment of these lessons. Additionally, ensuring that teachers are aware of any online content will be of particular importance in cases of remote learning, when traditional materials cannot be distributed as effectively.

Conclusion: A majority of parents who received energy efficiency kits installed at least one measure. Light bulbs and night lights were much more popular than water saving measures and were widely cited as items that respondents would like to receive more of. Parents primarily indicated that they would prefer to request additional kit items via the internet.

> **Recommendation:** Consider including additional lightbulbs in the efficiency kits, as they are relatively inexpensive and can enhance savings rates.

Conclusion: Large numbers of parents and students adopted energy saving behaviors as a result of tips and materials included in the kit.

> **Recommendation:** Expand behavioral guidance in both student and parent materials to maximize effects of the program. Parents in particular indicated that the primary reason for not finding energy saving tips useful was previous knowledge of those tips, suggesting that more advanced behavioral guidance (e.g. utilizing the scheduling feature of their thermostat to cool or heat the house in off peak periods) may be beneficial.

Conclusion: Teachers at smaller schools noted that reaching the 100 kit request threshold that qualifies for the $250 enrollment bonus is difficult. The program is also highly reliant on engaged teachers to drive performances and distribution of kits/student materials.

> **Recommendation:** Consider adjusting the award structure to encourage more teachers to become “champions” at unenrolled schools and drive more sign-ups. In addition, consider altering the incentive framework for schools that reach 100 kit requests and receive the $250 enrollment bonus to a proportion-based system, using quantity of received kit requests and student enrollment. This will make it easier for smaller schools to receive the enrollment bonus, and thus be more likely to be motivated to join and remain in the program. It is the evaluator’s understanding that an adjustment to the incentive structure was implemented for the 2021-2022 School Year that rewards teachers with $50 that reach 20 kit requests.

Conclusion: It is not clear how many teachers are attending performances, which makes estimating population parameters of evaluation and tracking data for this group difficult.

> **Recommendation:** Evaluate data gathering and tracking protocols to ensure that accurate teacher and student attendance is gathered at each school. This might include teacher sign-in sheets.

2 Introduction and Program Description

2.1 Program Description

2.1.1 Overview

The K12 Education Program is an energy efficiency program sponsored by Duke Energy Carolinas and Duke Energy Progress (DEC/DEP). The program provides free in-school performances by the National Theatre for Children (NTC) that teach elementary, middle, and high school students about energy and conservation concepts in a humorous and engaging format.

In addition to the NTC performance, NTC provides teachers with: 1) student workbooks that reinforce topics taught in the NTC performance, including a take-home form that students and parents can complete to receive an energy efficiency starter kit from Duke Energy; and 2) lesson plans associated with the content in the student workbooks. All workbooks, assignments and activities meet state curriculum requirements. The NTC performers encourage students to have their parents request the kits.

The program can achieve energy savings in two ways:

1. Through the installation of specific energy efficiency measures provided in the kit.
2. By increasing students' and their families' awareness about energy conservation and engaging them to change behaviors to reduce energy consumption.

2.1.2 Energy Efficiency Kit Measures

Table 2-1 lists the kit's contents included in the impact evaluation scope.

Table 2-1: Kit Measures

Measures	Details
9 Watt LED*	2 bulbs
Nightlight	1 LED plug-in nightlight
Showerhead	1 low-flow showerhead
Bathroom Faucet Aerator	1 low-flow faucet aerator
Kitchen Faucet Aerator	1 low-flow kitchen aerator
Water Temperature Gauge Card	1 temperature card indicating water heater temperature
Outlet Insulating Gaskets	8 outlet and 4 light switch gaskets
Behavioral Changes	Informational materials provided in the kit offer energy savings opportunities by changing patterns of energy consumption

*In January 2020 the program transitioned from offering two 9W LEDs to two 5W LEDs.

2.2 Program Implementation

2.2.1 Program Marketing and School Recruitment

Duke Energy sends NTC a list of approved schools in each utility territory, which NTC's communications staff uses to contact schools to schedule NTC performances. These communications include phone calls, emails, and postcards describing the program. An example of one of these postcards distributed to elementary school students can be seen in Figure 2-1. Once a school has agreed to participate, NTC ships curriculum materials to participating schools approximately two weeks prior to the performance date, at the request of the teacher. These teachers are often the contact at the school who organizes the involvement of other teachers.

Figure 2-1: NTC Recruitment Postcard for Elementary Students (K-5)

2.2.2 NTC Performance

NTC has four age-appropriate shows: two for elementary age students (Kindergarten through 2nd grade, and 3rd through 5th grade), one for middle school age students (6th through 8th grade), and one for high school students (9th through 12th grade). Two actors perform in each show, where they use an entertaining, humorous, and interactive format to educate students on four general areas:

- Sources of energy
- How energy is used
- How energy is wasted
- Energy efficiency and conservation

Performers also discuss how DEC and DEP offers students and their families free energy efficiency starter kits, how the items in the kit can save energy in their homes, and will hand out collateral to remind students of these tips, and ways to sign up for the kit.

Due to the emergence of the COVID-19 pandemic, NTC ceased live performances in mid-March, 2020. After about a month of subsequent preparation, NTC was able to provide elementary schools access to an educational video that included topics covered in the live performance. Due to this, the program was not able to meet pre-established kit sign-up goals.

In the performance, the actors explain to students that they must fill out the kit request form to receive their kit. Following the performance, teachers give their students the NTC workbooks that – in addition to educational activities to reinforce the concepts from the NTC performance – include a detachable postage-prepaid postcard kit request form. Students take the form home to their parents or guardians, who complete and mail the form. Parents or guardians may also request a kit via a toll-free telephone number or by signing up at MyEnergyKit.org, the program website administered by Relationship1, with content provided by NTC. The latter mode of sign up was the most popular in 2019-2020. To encourage participation, for every 100 parents to sign up, their childrens' school receives $250, and the six schools whose student's families' request the most kits each semester earn prizes ranging from $1,000-$2,500. In addition, student families who request a kit are entered into a drawing for a $1,000 cash prize.

2.2.3 Kit Distribution

Duke Energy uses two vendors to fulfill kit requests: R1 and AM Conservation. The participant's eligibility is confirmed by the firm R1 who manages and processes kit requests (both paper and online), removes non-Duke customers from the eligibility list, and sends this to Duke Energy, who also cleans this data and verifies the participant's eligibility and contact information. Once this is complete, the cleaned participation list is sent back to R1, as well as AM Conservation. A fulfillment request is then sent to AM Conservation who has 9 business days to ship the kits. Customers are told to expect 4-6 weeks for delivery of their energy kit, though this will generally happen much more quickly.

2.2.4 Energy Kit Eligibility

Student families can only receive a kit once every 36 months, and must be Duke Energy customers. The schools where the performances occur must also be a Duke Energy customer. These eligibility requirements present challenges in finding and motivating new schools, as well as new student families, to participate.

2.2.5 Participation

For the defined evaluation period of August 2019 through July 2020, the program recorded a total of 26,200 kit recipients. Customers in DEC accounted for 20,852 of the total, and the remaining 5,348 kit recipients were in DEP.

2.2.6 Program Changes

In January of 2020, the program changed out the general service LEDs that had historically been part of the kit, to candelabra-style LEDs, due to internal research indicating the former were too close to nearing saturation to legitimize their inclusion.

Duke Energy designed and launched a smart phone app called "Kilowatt Krush" in 2018. This app is geared toward students, and was designed to increase kit signups by 4%, and increase engagement and energy saving behaviors. Due to unanticipated data privacy issues, kit signups via Kilowatt Krush were not available in PY 2018-2019. However, this issue was resolved in 2019-2020, and student families were able to sign up with the app, as the verification codes were sent to the parents' emails so the student or family member could complete the signup process.

Lastly, starting in October 2018, high school performances piloted in other jurisdictions were added to the DEC/DEP program.

2.3 Key Research Objectives

The over-arching project goals will follow the definition of impact evaluation established in the "Model Energy-Efficiency Program Impact Evaluation Guide – A Resource of the National Action Plan for Energy Efficiency," November 2007:

> "Evaluation is the process of determining and documenting the results, benefits, and lessons learned from an energy-efficiency program. Evaluation results can be used in planning future programs and determining the value and potential of a portfolio of energy-efficiency programs in an integrated resource planning process. It can also be used in retrospectively determining the performance (and resulting payments, incentives, or penalties) of contractors and administrators responsible for implementing efficiency programs."

Evaluation has two key objectives:

1) To document and measure the effects of a program and determine whether it met its goals with respect to being a reliable energy resource.
2) To help understand why those effects occurred and identify ways to improve the program.

2.3.1 Impact

As part of evaluation planning, the evaluation team outlined the following activities to assess the impacts of the DEC/DEP K12 Education Program:

- Quantify accurate and supportable energy (kWh) and demand (kW) savings for energy efficient measures implemented in participants' homes;

- If necessary, assess the rate of free riders from the participants' perspective and determine spillover effects;
- Benchmark verified measure-level energy impacts to applicable technical reference manual(s) and similar Duke programs in other jurisdictions.

2.3.2 Process

The process evaluation assessed opportunities for improving the design and delivery of the program in DEC/DEP service territory. It specifically documented teacher, student, and parent experiences by investigating: 1) teachers' assessments of the NTC performance, program materials, and curriculum in terms of quality of content, and ability to engage and motivate students to save energy; and 2) student families' responses to the energy efficiency kits and the extent to which the kits effectively motivate families to save energy.

The evaluation team assessed several elements of the program delivery and customer experience, including:

- **Awareness:**
  - How aware are teachers and student families of DEC/DEP's sponsorship of the program?
  - How did they become aware?
- **Program experience and satisfaction:**
  - How satisfied are teachers with the NTC performance and program curriculum in terms of ease of use, ability to engage, and motivate students to conserve energy at home?
  - How satisfied are student families with the measures in the kit and to what extent do the kits motivate families to save energy?
- **Challenges and opportunities for improvement:**
  - Are there any inefficiencies or challenges associated with program delivery?
  - How engaged are teachers in implementing the curriculum and motivating student families to request program kits?
  - What are teachers' assessments of the NTC performance, program information, and curriculum?
- **Student family characteristics:**
  - What are the demographic characteristics of kit recipients?

2.4 Evaluation Overview

The evaluation team divided its approach into key tasks to meet the outlined goals:

- **Task 1 –** Develop and manage an evaluation work plan to describe the processes that were followed to complete the evaluation tasks outlined in this report;

- **Task 2 –** Verify gross and net energy and peak demand savings resulting from the K12 Education Program through verification activities of a sample of 2019 - 2020 program participants;
- **Task 3 –** Conduct a process review to determine how successfully the program is being delivered to participants and to identify opportunities for improvement.

2.4.1 Impact Evaluation

The impact evaluation utilized a consumption data-based approach using AMI meter data. This methodology differs from the approach used in the previous evaluation, which calculated program savings based on engineering algorithms. While a consumption analysis was attempted as part of the previous evaluation, the evaluation team ultimately determined that it was not feasible at the time. At the time of the previous evaluation, AMI meters had not been fully deployed in DEC and DEP territories and only monthly billed consumption data was available for analysis. Since then, Duke Energy has deployed AMI meters to virtually all of its residential customers in the DEC and DEP territories, which offer more comprehensive usage data. With AMI data now accessible, a consumption analysis offers enhanced analytical capabilities to estimate household-level energy and demand savings.

A consumption analysis allows for accurate measurement of household (or equipment-level) electric usage before and after a program intervention is introduced. Unlike an engineering algorithm, consumption analysis is able to capture behavioral effects of the program, in addition to the effects of the equipment measures installed.

The impact evaluation involved the following steps:

1) Conduct a series of false experiments to test the feasibility of directly estimating energy savings using customers' AMI consumption data.
2) Having verified that consumption analysis is effective, apply a difference-in-differences regression modeling approach to estimate average household-level energy savings at the annual and monthly intervals.
3) Utilizing hourly load data, apply a similar regression modeling approach to estimate summer and winter peak demand impacts.

2.4.2 Process Evaluation

The process evaluation examined and documented:

- Program operations
- Stakeholder satisfaction
- Opportunities to improve the efficiency and effectiveness of program delivery

To satisfy the EM&V objectives for this research effort, the evaluation team reviewed program documents and conducted web surveys with participating student families and teachers who attended the performance. These surveys served both the process and impact evaluation work.

The team also held in-depth interviews (IDI) with utility staff, implementation staff, and teachers. Table 2-2 provides a summary of the evaluation team activities.

Table 2-2: Summary of Process Evaluation Activities

Target Group	Method	Sample Size	Population	Confidence / Precision
Duke Energy program staff	Phone in-depth interview	1	n/a	n/a
Implementation staff: NTC	Phone in-depth interview	1	n/a	n/a
Implementation staff: R1	Phone in-depth interview	1	n/a	n/a
Teachers who attended NTC performance	Web survey	72 (DEC:43, DEP: 29)	unknown	90% ± 9.7%
Participating teacher follow-up interviews	Phone in-depth interview	8	unknown	n/a
Student families who received DEC/DEP kit and are customers of DEC/DEP	Web survey	515 (DEC: 300, DEP: 215)	25,982	90% ± 3.6%

3 Impact Evaluation

3.1 Background

Prior to 2020, impact evaluation was based on an engineering approach, where estimated energy and demand savings were derived using a combination of customer survey responses and measure-specific assumptions that were applied to savings algorithms found in region-specific technical reference manuals.

Energy and demand savings are ideally estimated using empirical household consumption data. A consumption analysis allows for accurate measurement of household (or equipment-level) electric usage before and after a program intervention is introduced. Unlike an engineering algorithm, consumption analysis is able to capture behavioral effects of the program, in addition to the impacts of equipment measures installed.

The 2017-2018 impact evaluation of Duke's Energy Efficiency Education Program attempted a consumption analysis based on customers' monthly billing data. However, due to a range of factors, billing analysis was found to be an ineffective tool for estimating savings. One of the primary contributing factors was the inability of monthly data to detect small program savings of 2% to 3%. As a result, the 2017-2018 analysis applied an engineering approach to calculate estimated savings.

As of mid-2019, Duke Energy had fully deployed advanced meters to virtually all of its residential customers in the DEC territory, as well as to a portion of its customers in the DEP territory. AMI data offer more granular information about customers' electric usage at daily or hourly intervals and enables enhanced analysis methodologies beyond the capability of monthly billed usage data. Specifically, the more robust datasets granted by AMI data result in more precise savings estimates and enables the analysis to better detect small effect sizes. In addition, having hourly AMI load data allows for the estimation of load reduction during the system's summer and winter peak periods.

3.2 Methodology

The 2019-2020 impact evaluation was based on a consumption analysis using AMI consumption data. This approach differs from the engineering approach used in 2017-2018 in a few key aspects:

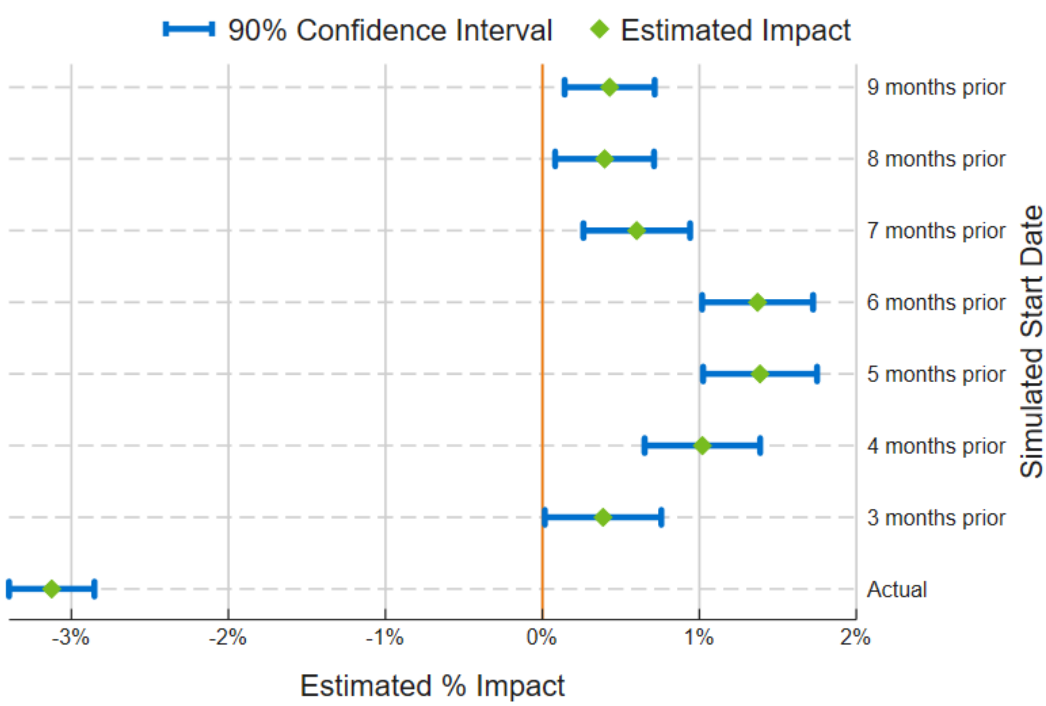
1) As mentioned previously, consumption analysis accounts for the behavioral component of the program by capturing program effects at the whole-house level, rather than at the equipment level. The savings estimates are comprehensive and comprise both the behavioral effects stemming from the educational component of the program, as well as savings derived from the kit equipment.

2) Consumption analysis is unable to disaggregate savings to the measure-level.
3) The savings estimates are not subject to assumptions gathered from a sample of customer surveys and/or taken from secondary sources such as TRMs.

The first step of the impact analysis was to verify the feasibility of an AMI-based consumption analysis approach for estimating energy savings. This involved conducting a series of false experiments where fake enrollment dates were simulated for program participants, and savings were estimated for fake post-treatment periods. The premise of these false experiments is that, because enrollment dates are fictitious and actual post-enrollment data are excluded, the savings are known to be zero.

The results of the false experiments, shown in Figure 3-1, provide assurance that the estimation approach is effective in detecting program effects. Specifically, when customers' enrollment start dates are simulated and fake treatment periods are used, the model correctly estimates near-zero savings when none are expected.

Figure 3-1: Results of False Experiments



We know that the true effects resulting from the false experiments are zero. However, the model estimates slight changes in the range of 0.5% to 1.5%, as indicated by the green markers to the right of the orange line in Figure 3-1. These changes, which we know are not program-related, are presumed to be due to natural increases in consumption over time among participating households that are not netted out by the matched control group. This concept is discussed in further detail in Section 3.6.

Having demonstrated that the consumption analysis modeling approach is effective via the false experiments, the next step of the impact evaluation was to apply the same modeling technique to the actual data in order to estimate annual savings attributable to the program. The model specification used to estimate energy savings is shown below.

Equation 3-1: Energy Savings Model Specification

$$kWh = \beta_0 + \beta_1(month) + \beta_2(partpost) + \varepsilon$$

The key output of the model is β_2, the coefficient on the *partpost* term. This coefficient represents the estimated change in average daily consumption among EE Education participants in the post-enrollment period. Because the modeling approach applies a difference-in-differences methodology, the estimated savings are considered net savings since any changes not related to the program are accounted for by the matched control group.

In addition to estimating annual energy savings, Nexant also assessed savings at the monthly level in order to determine any trends in savings achieved over time. This is often particularly helpful for gauging the savings from equipment measures that are expected to be seasonal or weather-dependent. The model specification used to estimate monthly savings is shown in Equation 3-2.

Equation 3-2: Monthly Energy Savings Model Specification

$$kWh = \beta_0 + \beta_1(moyr) + \beta_2(partpost) + \beta_3(moyr \times partpost) + \varepsilon$$

The monthly model specification includes an independent variable for month-year and interacts it with the *partpost* variable. The individual coefficients determined for each of those interactions, expressed by β_3 *in Equation 3-2,* represent the estimated change in average daily consumption in each month of the post period.

The final step of the impact evaluation was to estimate hourly load impacts during the summer and winter peak periods. This was done by applying a similar difference-in-differences regression modeling approach that was used to estimate energy savings, and based on the same set of customers making up the treatment and control groups. The model specification used to estimate hourly peak load impacts is shown below.

Equation 3-3: Peak Load Demand Impacts Model Specification

$$kW = \beta_0 + \beta_1(post) + \beta_2(partpost) + \varepsilon$$

The demand model controls for unobserved changes in usage over time through the addition of the *post* term. Similar to the energy model, the key output of the model is β_2, the coefficient on the *partpost* term, which represents the estimated change in hourly load among program participants.

3.3 Data Requirements

The impact evaluation utilized five primary data components.

3.3.1 Program Participation

An extract of 2019-2020 EE Education program participants was provided by Duke Energy. The dataset included key customer information and household characteristics, including unique account identifier, jurisdiction (DEC vs. DEP), premise type, heating type, school assignment, and enrollment date (i.e., date kit was sent).

3.3.2 Cross-Program Participation

In addition to EE Education program participation, Duke Energy provided records of customers' participation in other energy efficiency programs offered by Duke Energy during or prior to the 2019-2020 program year. This is important for isolating savings that are directly attributable to the EE Education program, and not due to efficiency measures introduced as part of other programs.

3.3.3 Participating Schools

In addition to a record of participating households, Duke Energy provided a list of schools that participated in the EE Education program during the 2019-2020 school year. The dataset included school identifers (i.e., account number, name, identification number), school characteristics (e.g., public vs. private, grades, number of students, etc), and performance date.

3.3.4 Consumption Data

The primary data input used in the impact analysis is customers' AMI data at either daily or hourly intervals. Data were obtained both for the population of EE Education program participants and for a matched control group made up of MyHER customers. Daily data were applied for the annual energy (kWh) savings analysis while the peak demand impact analysis utilized hourly load data. The data covered the date range from January 2018 through January 2021.

3.3.5 MyHER Customer Data

Nexant used existing customers from Duke Energy's MyHER program to populate the matched control group. The primary reason for using MyHER participants for the control group is the prevalence of the MyHER program among Duke Energy's residential customer population. Normally, the analysis would be restricted to customers who participated in EE Education and no other programs, in order to properly isolate the program's effects. However, because so many EE Education program participants also participate in MyHER, the integrity of the analysis would have been compromised had MyHER customers been excluded. Using MyHER accounts as control customers, and performing the group matching appropriately, assures a net savings result that is directly attributable to participating in the EE Education program.

3.4 Data Cleaning and Validation

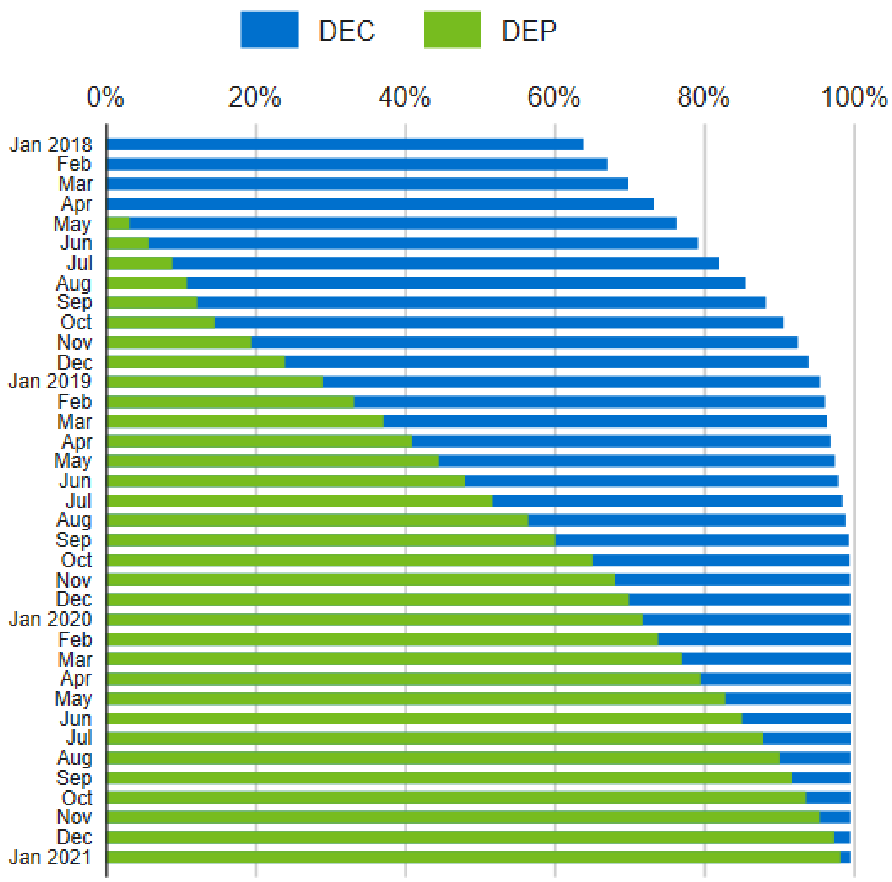
After all raw data sources were compiled and organized, steps were taken to ensure that the refined datasets used in the analysis excluded any spurious, duplicate, and/or unneeded data. The evaluation team applied a rigorous data cleaning process that involved initial, detailed assessments of each data file, followed by a system of checks and filters designed to detect and eliminate any observations not integral to the analysis.

- **Cross-program participants.** The evaluation team removed approximately 7,000 customers from the EE Education participant population who also participated in other Duke Energy efficiency program(s) during the period of consumption data used in the analysis (2018-2021). Removing these accounts ensures that any change in consumption found by the analysis is categorically attributable to the EE Education program, and not due to interventions introduced by other program(s).
- **Accounts with missing or insufficient consumption data.** Customers who did not have at least 12 consecutive months of consumption data prior to the program's enrollment period were removed from the analysis. These customers could not be used in the control group matching process, which was designed to require a complete year of pre-program data in order to establish a stable and representative baseline period.
- **Duplicates and outliers.** Any duplicated data observations were removed. In addition, the evaluation team identified and removed all negative and large outlier usage records. Outliers were defined as usage observations greater than three standard deviations above the mean value.
- **Control group cleaning.** A similar set of checks and filters was applied to the control group (MyHER) datasets.

3.5 Analysis Limitations

The impact evaluation faced a few limitations related to data availability and program design. First, while AMI meters had been deployed to a majority of households in the DEC territory by mid-2018, they were only partially deployed by that point in the DEP territory. Because the consumption analysis requires at least 12 months of pre-enrollment usage data, only households having valid AMI meter data as of August 2018 are able to be included in the analysis.

Figure 3-2: Share of Program Participants with AMI Data, by Month



By August 2018, roughly 85% of participating households in the DEC territory had active AMI meter data, while only 10% of households in DEP had active data. As a result, the set of customers available for analysis is heavily weighted with households from the DEC territory. The most affecting consequence of having such a lopsided analysis population is that savings estimates could not be determined for the DEC and DEP jurisdictions separately. Only 3% of the analyzed program participants came from the DEP jurisdiction, which is too few to produce valid, DEP-specific savings results. For this reason, the evaluation team applied the singular DEC-DEP combined savings results to both jurisdictions uniformly.

A second limitation of the evaluation has to do with forming a dependable baseline against which to measure post-enrollment consumption. Normally, one of the analysis methodologies tested would be an approach known as within-subjects. This approach involves a comparison of weather-normalized consumption prior to enrollment to consumption after enrollment for program participants only (i.e., no control group). In this case, the baseline is defined by the pre-enrollment consumption patterns among program particpants.

There are two specific aspects that compromise the baseline of a within-subjects analysis. First, the post-enrollment period for 2019-2020 program participants contains a substantial period of time affected by the COVID-19 pandemic. The effects of the pandemic have included significant and persistent changes to household occupancy and energy use patterns, particularly resulting from stay-at-home orders, telecommuting, and school closures. These external, non-weather circumstances were introduced during the evaluation period and present significant differences between the pre-enrollment and post-enrollment periods that influence household energy consumption. In other words, even absent the program, consumption still would have differed among participants due to the effects of COVID-19.

Second, households participating in the EE Education program are known to be families with school-aged children and are likely to experience inherent growth in energy usage over time. As family size, household occupancy, and ages of children grow, so does the household's energy needs. This again leads to a natural change in household consumption that is not related to the program.

3.6 Control Group Matching

The first step of the impact analysis is to develop a matched control group consisting of non-participating customers that resemble the participant population in pre-enrollment consumption patterns. To perform the match, each participant is paired with the non-participant whose pattern of electric usage during the 12 months prior to enrollment in the program is most similar. Comparing participants to matched non-participants helps to ensure there are no exogenous differences between the participants and matched control customers that would cause changes in consumption, other than the program's effects.

A difference-in-differences methodology that uses a matched control group has advantages over the within-subjects approach which is applied to program participants only. First, it establishes a reliable baseline for estimating savings attributable to the program. The non-participating customers serve as the baseline for a "no program" alternative. By assuring the control group's consumption is closely similar to that of the program's participants, we are able to assume that their usage in the post-enrollment period represents what would have happened absent the program. The estimated savings attributable to the program, therefore, is calculated as the average difference between the post-treatment consumption among participants and non-participants.

As described earlier, the control group was made up of existing MyHER customers due to the prevalence of the program in the DEC and DEP territories. The MyHER program, which is implemented as a randomized control trial (RCT) program, contains both treatment accounts (those who receive MyHER reports) and control accounts (those who do not receive reports). Furthermore, among the MyHER treatment customers, there are a total of 13 separate cohorts, each with a different release date that defines the time at which customers within that cohort started receiving MyHER reports. Meanwhile, the population of EE Education participants also includes a significant share of MyHER participants from among the 13 treatment cohorts, as well as a number of MyHER control customers and customers who have not participated in MyHER. In order to ensure a well-balanced match, where similarities between treatment and matched control groups are optimized, Nexant performed a segmented match using a number of key characteristics data points, including jurisdiction, premise type, and MyHER cohort.

Households participating in the EE Education program, who are also treatment customers in MyHER, were matched to similar households from among the MyHER control pool in the same cohort. Likewise, EE Education participants who did not participate in MyHER or were MyHER control customers were matched to non-participants from the MyHER control group. This system of targeted matching helps to maximize the homogeneity between groups in ways unobserved through household consumption data.

Groups were matched using monthly consumption data during the 12-month period prior to the start of program enrollment, or the period August 2018 through July 2019. An examination of the matching results indicates that treatment and control groups are highly similar in terms of household consumption during this period.

Figure 3-3: Group Matching Results

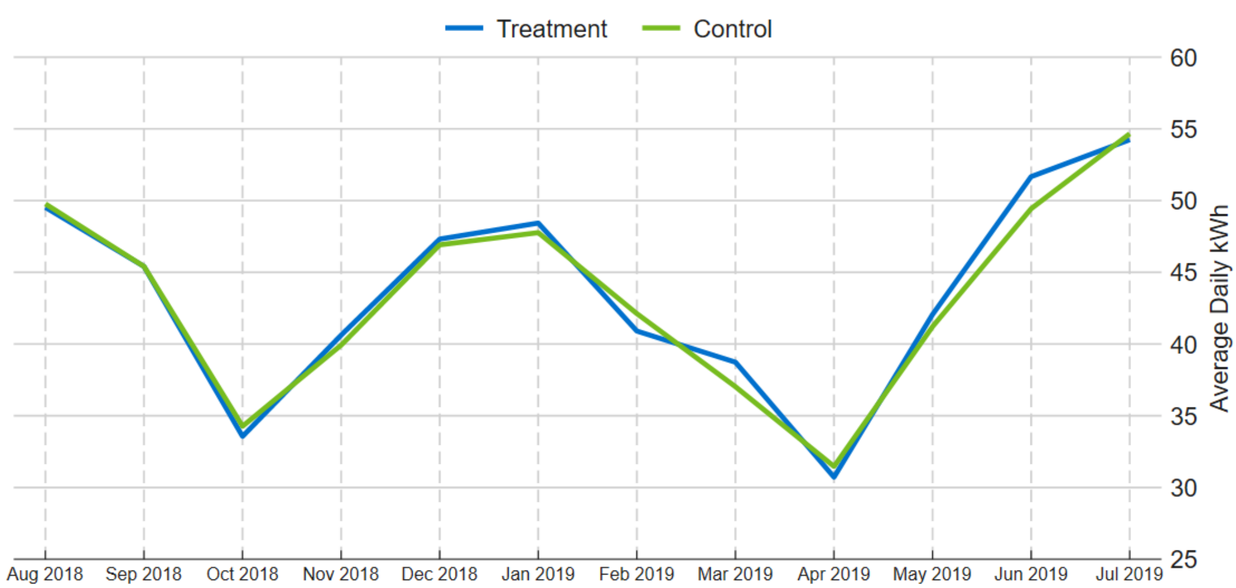


Figure 3-3 shows a strong correlation between groups in terms of pre period consumption patterns; however, three of the months (February, March, and June) show a small disparity between the groups’ usage. These slight inconsistencies are not wholly unexpected given they are matched on monthly consumption values, which can fluctuate within the population.

3.7 Energy Savings Results

Energy savings estimates for the 2019-2020 EE Education program in the DEC and DEP territories are presented in Table 3-1. Results are presented as average daily kWh savings per household. Throughout this section, negative values refer to savings.

Table 3-1: Average Daily Energy Savings Summary

Program	Base kWh	Impact (kWh)	Std. Err.	Lower Bound	Upper Bound	Percent Impact	% Lower Bound	% Upper Bound
EE Education	41.65	-1.30	0.07	-1.42	-1.12	-3.13%	-3.40%	-2.85%

The impact analysis shows that the program generates an average of 1.3 kWh per day per household. This translates to approximately 475 kWh annual savings, or 3.13%. These results are statistically significant at the 90% confidence level.

A monthly regression analysis reveals the trends in savings observed over the extended duration of the post period. The results indicate that program savings occur predominantly during the first six to seven months of the school year (August 2019 through February 2020). The timing of the savings generally coincides with program enrollments (defined by the kit sent dates), where a large portion of the program's participation, roughly 70% of enrollments, occurred during the first half of the school year.

Figure 3-4 presents the estimated monthly percent energy savings profile for the time period August 2019 through December 2020. The trend shown in Figure 3-4 suggests that program effects diminish over time, perhaps due to customer fatigue and/or lack of interest.

Figure 3-4: Monthly Energy Savings Profile, %

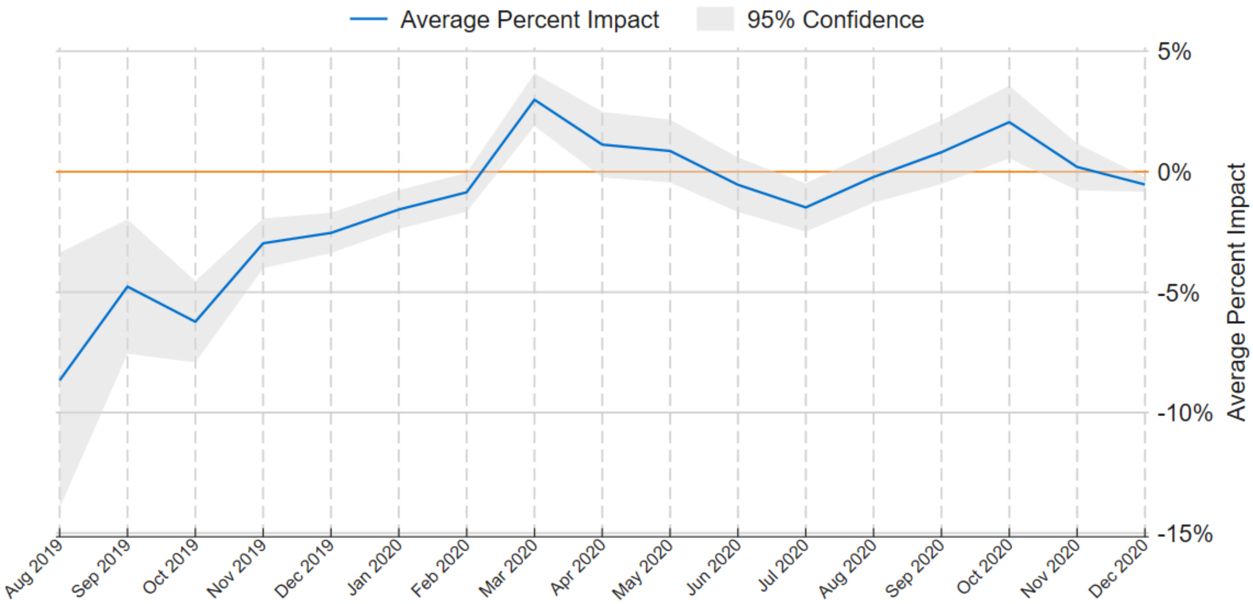


Table 3-2 shows kWh and percent savings by month for the period August 2019 through December 2020. The average percent savings over the first six months of the program year (August 2019 through January 2020) is 4.7%.

Table 3-2: Monthly Energy Savings Results

Month	Impact (kWh)	Lower Bound	Upper Bound	% Impact	% Lower Bound	% Upper Bound
Aug 2019	**-3.58**	-5.71	-1.45	**-8.9%**	-14.1%	-3.6%
Sep 2019	**-2.13**	-3.33	-0.94	**-5.0%**	-7.7%	-2.2%
Oct 2019	**-1.90**	-2.39	-1.41	**-6.6%**	-8.3%	-4.9%
Nov 2019	**-1.22**	-1.62	-0.82	**-3.2%**	-4.3%	-2.2%
Dec 2019	**-1.14**	-1.50	-0.78	**-2.7%**	-3.5%	-1.8%
Jan 2020	**-0.72**	-1.07	-0.37	**-1.7%**	-2.5%	-0.9%
Feb 2020	**-0.42**	-0.76	-0.08	**-1.0%**	-1.9%	-0.2%
Mar 2020	**0.98**	0.61	1.36	**2.9%**	1.8%	4.0%
Apr 2020	**0.31**	-0.12	0.73	**1.0%**	-0.4%	2.4%
May 2020	**0.26**	-0.19	0.72	**0.8%**	-0.5%	2.1%
Jun 2020	**-0.27**	-0.79	0.26	**-0.6%**	-1.7%	0.6%
Jul 2020	**-0.85**	-1.42	-0.28	**-1.5%**	-2.5%	-0.5%
Aug 2020	**-0.09**	-0.63	0.45	**-0.2%**	-1.3%	0.9%
Sep 2020	**0.28**	-0.21	0.77	**0.7%**	-0.6%	2.1%
Oct 2020	**0.58**	0.14	1.02	**2.0%**	0.5%	3.5%
Nov 2020	**0.06**	-0.26	0.39	**0.2%**	-0.8%	1.2%
Dec 2020	**-0.25**	-0.40	-0.10	**-0.5%**	-0.8%	-0.2%

3.8 Demand Impacts Results

A key benefit of AMI meter deployment in the DEC and DEP territories is the availability of hourly load data for residential customers. Accessibility of hourly data enables the analysis to measure changes in load during specific periods of interest, such as when system demand is greatest. These times when system load is greatest, known as peak periods, occur at different times of day during the summer and winter seasons.

Table 3-3: Peak Period Definitions

Season	Peak Period Definition
Summer	July Weekdays 4:00 PM to 5:00 PM
Winter	January Weekdays 7:00 AM to 8:00 AM

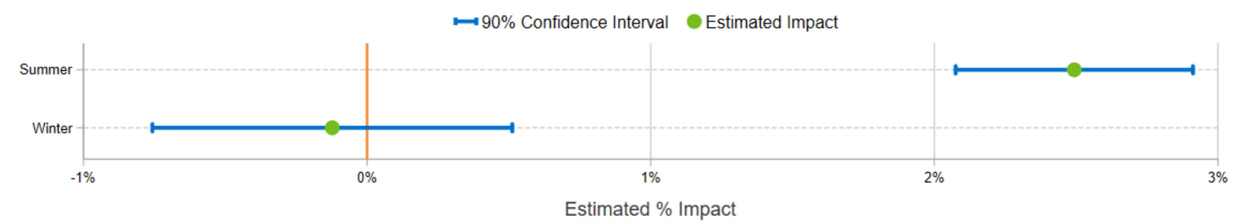
In DEC and DEP territories, summer peak occurs during the one-hour period from 4:00 PM to 5:00 PM on non-holiday weekdays in July. Winter peak occurs between 7:00 AM and 8:00 AM on non-holiday weekdays in January.To estimate the per household load reduction during these defined peak periods, Nexant applied a similar difference-in-differences regression modeling approach based on the same sets of customers used to make up the treatment and control groups for the energy savings analysis.

Results of the demand analysis are shown in Table 3-4 and Figure 3-5.

Table 3-4: Estimated Peak Demand Impacts, by Season

Season	Base kW	Impact (kW)	Std. Err.	Lower Bound	Upper Bound	% Impact	% Lower Bound	% Upper Bound
Summer	3.239	0.081	0.008	0.067	0.094	2.4%	2.1%	2.9%
Winter	2.189	-0.003	0.008	-0.017	-0.011	-0.1%	-0.8%	0.5%

Figure 3-5: Estimated Peak Demand Impacts, by Season



The results show that the EE Education program does not generate notable load reductions during peak periods. The estimated change in load during the summer peak hour is an increase of 0.081 kW, or a 2.4% load growth. The estimated winter peak impact is a load decrease of 0.003 kW, or 0.1% load reduction.

The lack of significant peak load impacts, specifically during the summer season, can be explained by a few possible factors:

- The types of measures included in the efficiency kit are not measures that are typically associated with generating meaningful peak load reduction. Specifically, the water-related measures contained in the kits (low-flow showerheads, faucet aerators, temperature gauge) have very little effect on summertime peak loads.
- The Duke-defined peak periods occur at times when household load is predominantly space heating/cooling. Equipment measures contained in the kit are not designed to reduce space conditioning load.
- The summer peak period occurs in July, generally six to nine months after customers enroll in the program (i.e., view the performance, receive their kits, etc). By the time summer occurs, customer fatigue may have set in and participants may not be as motivated to conserve energy.
- Household loads are likely to be larger during summer months, when children are home from school and energy needs are greater.

3.9 Summary & Key Findings

The 2019-2020 EE Education program generated significant energy savings among participating households, but did not show meaningful load demand reductions during the peak periods. The gains in energy savings shown compared to the previous evaluation were enough to offset the reduced program participation levels in DEC; however, the aggregate program-level savings dropped in DEP due to the decline in participation in 2019-2020.

3.9.1 Summary of Program Savings

The total estimated savings generated by the EE Education Program for the 2019-2020 program year is 9,905 MWh for the DEC jurisdiction and 2,540 MWh for the DEP jurisdiction. The aggregate, program-level load change during summer peak demand period is an increase of 1.69 MW in DEC and 0.43 MW in DEP. The program's winter peak demand impact is a decrease of 0.06 MW in DEP and 0.02 MW in DEP.

Table 3-5: Summary of Program Savings, 2017-2018 vs. 2019-2020

		2017-2018 Engineering Analysis	2017-2018 Program Savings	2019-2020 AMI Data Analysis	2019-2020 Program Savings
DEC		*Program Population = 23,161*		*Program Population = 20,852*	
	Energy Savings	254 kWh	5,884 MWh	475 kWh	9,905 MWh
	Summer Demand Impact	0.031 kW	0.723 MW	-0.081 kW	-1.689 MW
	Winter Demand Impact	0.045 kW	1.036 MW	0.003 kW	0.062 MW
DEP		*Program Population = 9,025*		*Program Population = 5,348*	
	Energy Savings	317 kWh	2,866 MWh	475 kWh	2,540 MWh
	Summer Demand Impact	0.038 kW	0.343 MW	-0.081 kW	-0.433 MW
	Winter Demand Impact	0.059 kW	0.534 MW	0.003 kW	0.016 MW

Table 3-5 provides a summary comparison of the current 2019-2020 AMI-based impact evaluation results to the previous 2017-2018 engineering analysis results. In both jurisdictions, the annual per household energy savings increased significantly from the previous findings. These differences are judged to be primarily due to the differences in the methodologies used to produce them. Specifically, the prior estimates relied on a set of assumptions needed to estimate savings via an engineering approach, while the current estimates utilized empirical measurements. Whereas an engineering approach relies on algorithm input variables that may be estimated or assumed based on secondary sources, an AMI data analysis approach is able to take advantage of requiring only measured and/or observed data. Because there was insufficient AMI data available for the DEP jurisdiction, results of the energy and demand consumption analyses are applied uniformly across both DEC and DEP.

3.9.2 Key Findings

Key findings from the impact evaluation include:

- The program produced significant energy savings. Annual per household energy savings increased by 87% and 50% in the DEC and DEP jurisdictions, respectively, from the 2017-2018 savings estimates.
- The program did not generate any meaningful load demand reductions during summer or winter peak periods.
- The lack of demand impacts may be due to a combination of factors, including the type of measures included in the kit and the timing of observed summer peak periods relative to the start of the program year.

4 Net-to-Gross Methodology and Results

The impacts of the K12 Education Program on energy consumption and demand were measured by comparing the energy consumption and demand of customers who received the kits with that of customers who did not (the matched control group). Naturally occurring energy consumption or demand changes that happen during the period of study are reflected in the energy consumption and demand observed for the control group. The impact of the K12 Education Program is measured as the difference in differences between the treatment and control groups before, during, and after exposure to the program. This difference is net of any naturally occurring changes, so there is no need to perform a net-to-gross adjustment.

5 Process Evaluation

5.1 Summary of Data Collection Activities

The process evaluation is based on telephone interviews with Duke Energy program staff, and implementer staff, and teachers who had attended an NTC performance. The process evaluation is also based on web surveys with teachers who had attended an NTC performance and student families who received a kit during the program evaluation year (Table 5-1).

Table 5-1: Summary of Process Evaluation Data Collection Activities

Target Group	Method	Sample Size	Population	Confidence / Precision
Duke Energy program staff	Phone in-depth interview	1	n/a	n/a
Implementation staff: NTC	Phone in-depth interview	1	n/a	n/a
Implementation staff: R1	Phone in-depth interview	1	n/a	n/a
Teachers who attended NTC performance	Web survey	72 (DEC:43, DEP: 29)	unknown	90% ± 9.7%
Participating teacher follow-up interviews	Phone in-depth interview	8	unknown	n/a
Student families who received efficiency kit and are customers of DEC or DEP	Web survey	515 (DEC: 300, DEP: 215)	25,982	90% ± 3.6%

5.1.1 Teacher Surveys and Follow-Up Interviews

The evaluation team surveyed and interviewed teachers who attended NTC performances to better understand program success and delivery and to gather an educator perspective on what could be improved.

In April and May 2021, the evaluation team contacted a total of 752 teachers who attended NTC performances via email (547 in DEC and 205 in DEP) and ultimately surveyed 55 teachers who saw performances between September 10, 2020 and April 30, 2021. Thirty-four of the 55 teacher respondents taught at schools within DEC's service territory; 11 were elementary school teachers, 14 taught middle school and 9 taught high school. The remaining 21 respondents within DEP's territory were comprised of 6 elementary and 14 middle school teachers, and one high school teacher. We report grade level findings together unless a meaningful difference emerged between school types. Response rates are reported in Table 5-2.

In June 2021 the evaluation team contacted teachers who completed the web survey and indicated interest in being interviewed about their experience. The evaluation team requested their participation in a follow-up in-depth interview (IDI) about their experience with the performance, curriculum materials, and kit request forms. These IDIs allowed the evaluation team to get a deeper understanding of topics uncovered in the web survey and to provide additional details about the teacher's experience with the program. The evaluation team completed interviews with eight of these teachers.

Table 5-2: Survey Response Rates

Survey Group	Population Size	Sample Frame Size	Completed Surveys	Completion Rate	Confidence/ Precision
Teachers	Unknown	752	55	7.3%	n/a
Student Parents	25,982	11,517	515	4.5%	90/4

5.1.2 Survey of Student Families Who Received the DEC/DEP Kit

In April and May 2021 the evaluation team surveyed 515 families who received energy efficiency kits from DEC or DEP between August 2019 and July 2020 (Table 5-2). During that period, DEC and DEP distributed a total of 26,200 kits to families who completed the kit request form their child brought home from school. Through email survey invitations, the evaluation team attempted to contact a random sample of 11,534 households for which program records provided an email address. Ultimately, the data collection effort achieved an 8.8% response rate and a 4.5% completion rate, providing a sample with 90/4 confidence/precision. Comparisons with census data demonstrate that the sample is largely representative of ownership status for the region, with rates in both DEC (70%) and DEP (72%) falling slightly above the regional average of 68%. However, respondents in both DEP and DEC noted higher educational attainment and larger-sized households than typical of the region. Income levels were slightly higher in DEC than what is typical of the region, and slightly lower in DEP.[1]

5.2 Process Evaluation Findings

5.2.1 Awareness of DEC/DEP Sponsorship of the Program

Teachers and student families were largely aware of Duke Energy's sponsorship of the program. Almost all teachers in both DEC and DEP reported they were aware of Duke Energy's sponsorship (DEC = 97%, DEP = 95%). The 33 teachers who knew of DEC's sponsorship most often learned about it through NTC materials (13), NTC staff (12) or DEC marketing materials (12); Table 5-3 provides a full breakdown of teacher awareness. DEP teachers also stated DEP marketing materials (7 of 20 teachers) and NTC materials (7 of 20 teachers) were the most common way of learning about Duke Energy's sponsorship.

[1] Region comparisons come from and average of 2019 American Community Survey (Census) 1-year period estimates data for North Carolina and South Carolina.

Table 5-3: How Teachers Learned of Duke Energy's Sponsorship (Multiple Responses Allowed; DEC n = 33, DEP n = 20)

Source	Number of Teachers	
	DEC	DEP
The National Theatre for Children Materials	13	7
Duke Energy Marketing Materials	12	7
The National Theatre for Children Staff	12	4
Another teacher	5	1
Other	4	4
Duke Energy Staff	1	0
Don't Know	1	0

Awareness of Duke Energy sponsorship among student families was also high, with 88% of DEC parents and 91% of DEP parents stating they knew the kit was sponsored by Duke Energy. Parents indicated they learned about Duke's sponsorship most frequently via information included in or on the kit (DEC: 53%, DEP: 53%). Other common ways that families learned about Duke Energy sponsorship were classroom materials their child brought home (DEC: 51%, DEP: 47%), and communications from their child's teacher or school (DEC: 25%, DEP: 28%).

About one-quarter (26%) of DEC and just under one in five (18%) of DEP student family respondents said they knew about the energy-related classroom activities and NTC performance at their child's school. A majority of the DEC parents who were aware of the performance (60%) said they found out about the NTC activities from their child; a similar proportion (56%) of DEP parents also found out through their child. Of the remaining parents, most stated that they found out about NTC activities from a teacher or school administrator (DEC: 28%, DEP: 33%) or on Duke Energy's website (DEC: 8%, DEP: 8%).

5.2.2 Parent Awareness of DEC/DEP Kit Opportunity

Classroom materials sent home with students were the key source of awareness of kits for families, with about half of student families in both DEC (49%) and DEP (47%) hearing about the opportunity to receive a Duke Energy kit via this medium. Other respondents learned about the kits through various communications from the school (Table 5-4).

Table 5-4: Sources of Parental Awareness of Kits (Multiple Responses Allowed; DEC n = 300, DEP n = 215)

Source of Kit Awareness	Rate (Percent)	
	DEC	DEP
Classroom materials	49%	48%
Email from teacher/school	16%	14%
School newsletter	11%	10%

Source of Kit Awareness	Rate (Percent)	
	DEC	DEP
School website or web portal	8%	10%
Other	5%	8%
Poster at school	1%	1%
Conversations with teacher	1%	1%
After hour event at school	1%	1%
Don't know	7%	8%

5.2.3 Teacher Experience with the Program

NTC Performance

Overall, teachers were largely satisfied with the performance, with 32 of 34 DEC teachers and 20 of 21 DEP teachers surveyed rating their satisfaction as a "4" or "5" on a one-to-five scale. Notably, 71% of DEC teachers and 68% of DEP teachers rated the performance as a "5". When asked about the content of the performances, the response from the majority of teachers was also positive. Interviewed teachers all noted the skill with which the performers engaged the students, by asking them to participate, and generally making the material humorous and accessible to students.

In addition, a large majority of the surveyed teachers (DEC: 82%, DEP: 86%) said the explanation of energy-related concepts was "about right" for most of their students. The remaining teachers in DEC (6) and DEP (3) all stated that the content was slightly too basic for their students. Two of the six DEC teachers and all three remaining teachers in DEP taught middle school. Of the final three DEC teachers, two taught high school and one taught elementary school. Teachers who thought the concepts were too basic for their students commented that the material seemed to be more geared towards younger audiences, and that the middle and high school students weren't as engaged.

Figure 5-1: DEC Age-Appropriateness of NTC Performance (n = 34)

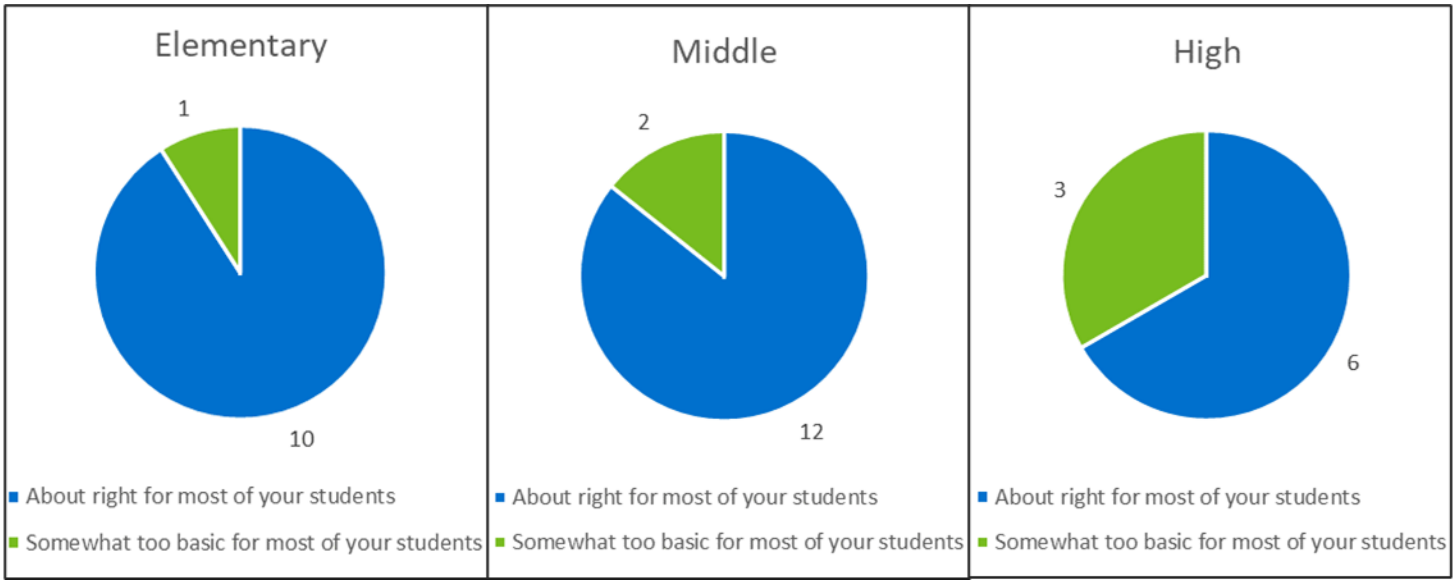
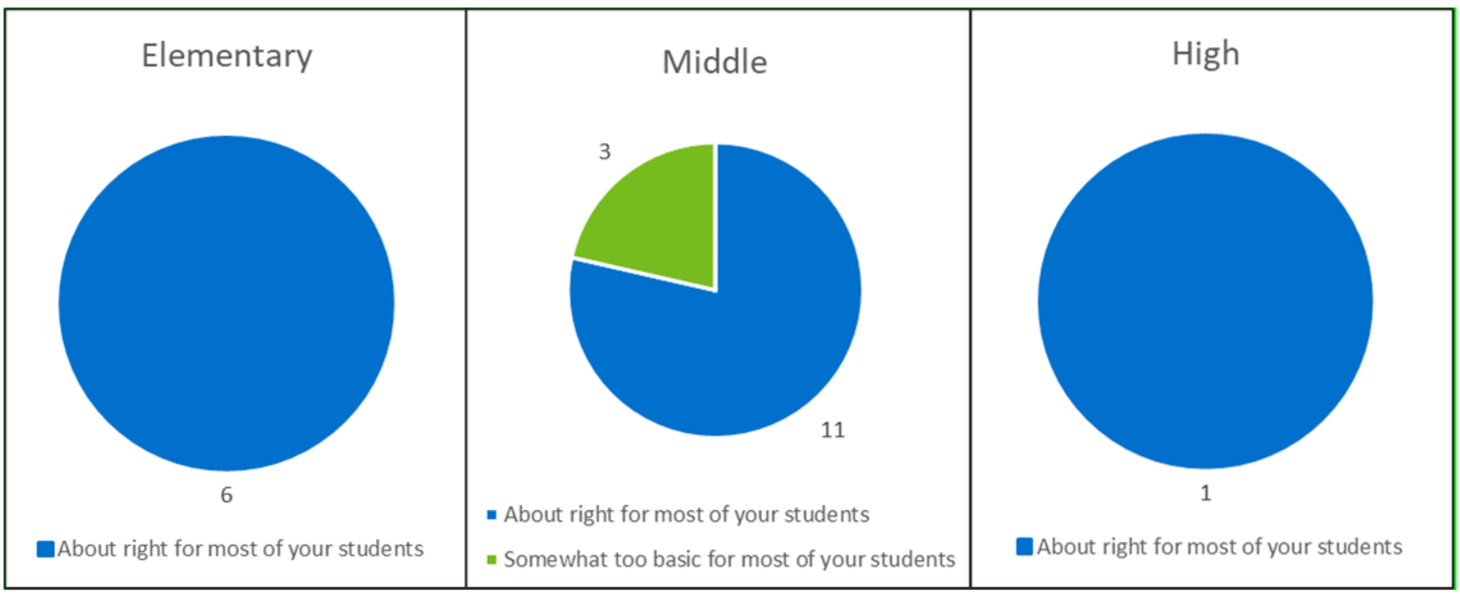


Figure 5-2: DEP Age-Appropriateness of NTC Performance (n = 21)



Regarding age appropriateness, the comments from the interviewed teachers echoed the findings from the online survey. All interviewed teachers said the performance was age appropriate and kept their students' attention, save one teacher that reported the performance for middle school students appeared to be a little juvenile for their age.

The interviewed teachers commented on the quality of the performance, specifically that the performance was engaging, humorous, and informative. When asked how performances might be improved, teachers generally did not offer suggestions, though one urged the performers to be sure they were finishing up the performance in the alloted time.

Curriculum and Instructional Materials

About two-thirds of teachers in both DEC and DEP reported receiving or using the materials, in addition to most reporting that they distributed kit request forms to their students (see Kit Request Forms section below). Sixty-eight percent of surveyed teachers (23 of 34) in DEC reported receiving the curriculum and instructional materials (Figure 5-3), and 62% (13 of 21) of teachers in DEP stated the same (Figure 5-4). Of the eleven remaining teachers in DEC, nine had not received the materials and the final two teachers didn't know if they had received them or not. All eight DEP teachers who reported not using the materials had not received them. All of the 23 DEC teachers who reported receiving the materials used them to some degree, but 10 of these teachers (44%) only used the materials "a little". DEP teachers were split along similar lines, with 46% (6 of 13) teachers stating that they used the materials "a little" and the remainder using the materials a moderate amount.

Teachers who stated that they used the educational material infrequently were asked to describe why; the most common responses were that teachers did not receive the educational material at the right time in the school year. In DEC and DEP, five teachers from each territory stated that the timing of receiving the materials was the main reason for not using materials more. To a lesser degree, teachers commented on the challenges of utilizing the materials effectively within the context of virtual learning; two teachers in DEC and an additional teacher in DEP referenced this as their main challenge to disseminating materials. Both of these response groups highlight that the educational material is regularly not used in conjunction with the presentation and their lessons as intended. It's important to note that while the transition to remote learning was due to external factors, it has exacerbated an existing issue and as such should not be discounted.

Figure 5-3: DEC Teachers Use of Forms and Instructional Materials

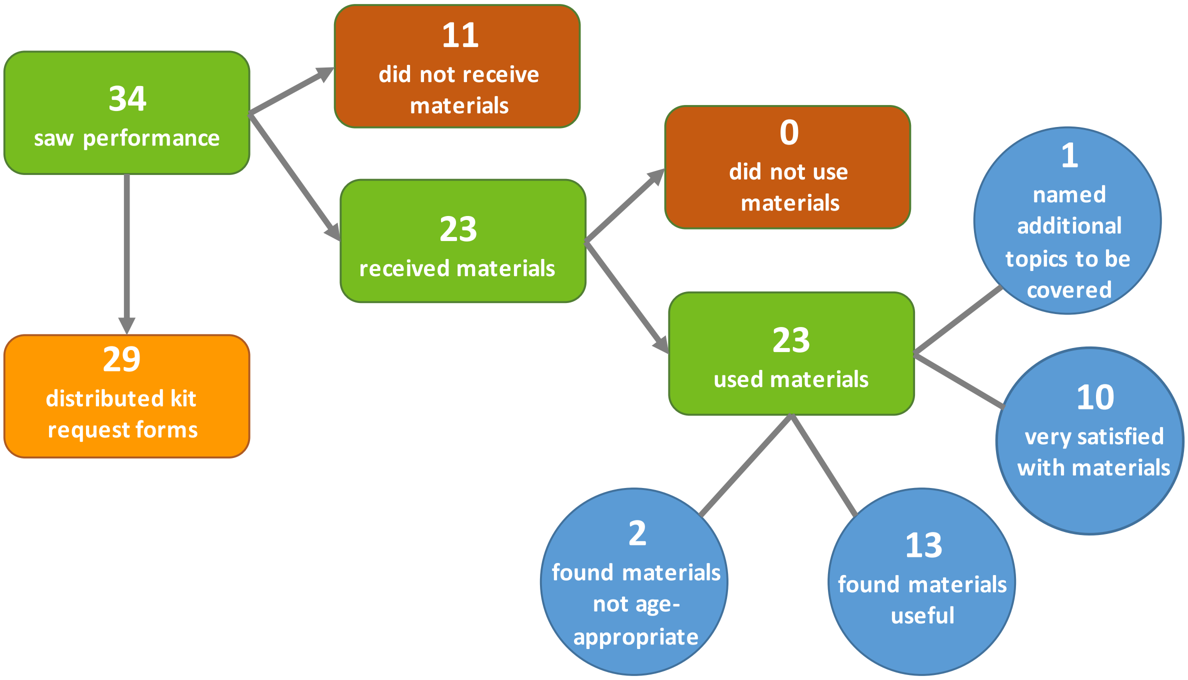
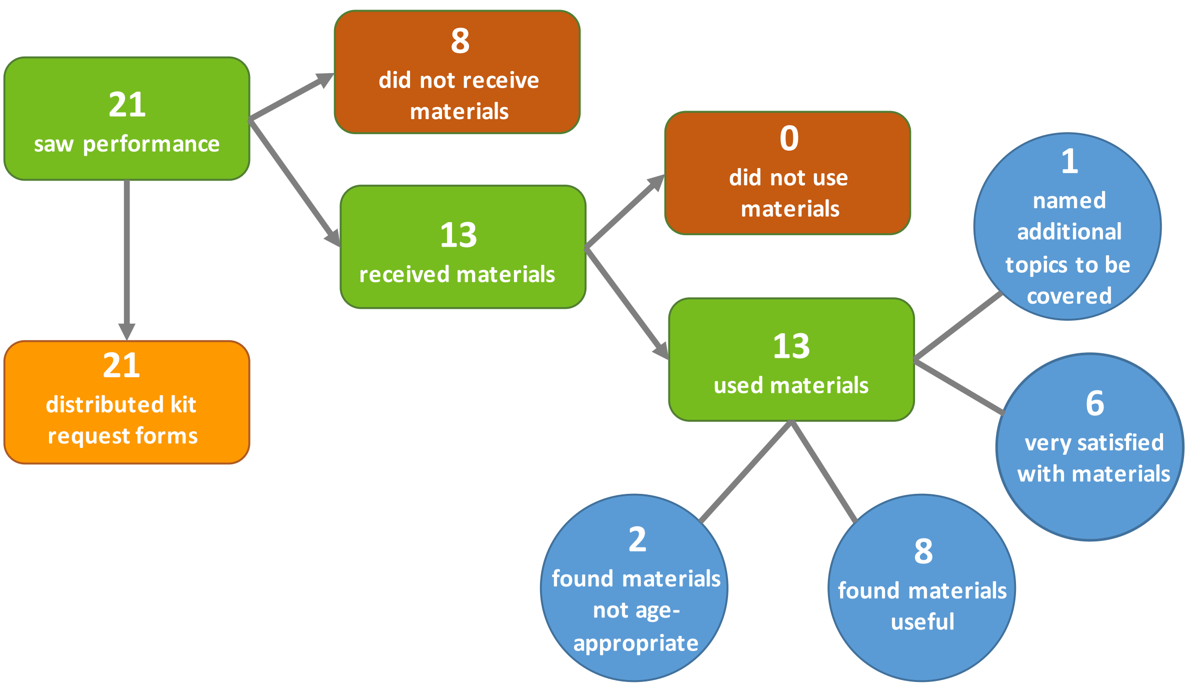


Figure 5-4: DEP Teachers Use of Forms and Instructional Materials



Twenty-three teachers in DEC and 13 teachers in DEP reported use of the instructional materials; they were subsequently surveyed on the materials' usefulness, age-appropriateness, alignment with state science standards, or concepts children had trouble understanding. From their comments, also reflected in interview findings, the following observations emerged:

- Use of materials was minimal to moderate in both territories: Ten teachers in DEC and six in DEP characterized their use as "a little". A further 12 teachers from DEC and and the remaining seven DEP teachers used the materials "moderately." Only one respondent from DEC reported using the materials extensively.
- Materials were useful: When asked to rate the usefulness of the materials, from "1" (not at all useful) to "5" (highly useful), over half of respondents in both DEC (13 of 23) and DEP (8 of 13) rated the usefulness as a "4" or "5". The remaining respondents respondents in DEC and DEP scored the usefulness as a "2" or "3", with the exception of one DEP teacher who did not know how useful the materials were.
- Materials were age-appropriate: Nineteen DEC teachers reported the material was age-appropriate; one high school science teacher reported it was somewhat too basic, and an elementary school science teacher reported that it was somewhat too advanced. In DEP, 11 teachers thought that the materials were age appropriate while two middle school teachers – a math/social studies teacher and a science teacher– thought that the material was too basic.
- Around half of respondents said that the materials aligned with state science standards: Thirteen DEC respondents reported the curriculum "mostly" aligned with state science standards, while eight stated it "somewhat" aligned, and two did not know if the materials aligned. DEP teachers stated that the materials were less in alignment with state standards; four reported that the curriculum "mostly" aligned and eight stated that it "somewhat" aligned, while one did not know if the materials aligned.

The teachers reporting "a little" use explained their rationale for limited use of the material. None of the comments in either survey focused on the quality of the materials per se. Rather, the reason for minimal use was because the materials did not align with their teaching priorities at that time (DEC and DEP, five mentions each) and alternative methods of distributing the workbooks, such as sending the materials home with children to review with their parents (DEC only, two mentions). Additionally, two DEC teachers and one DEP teacher reported that challenges surrounding virtual learning hindered their use of classroom materials. Some interviewed teachers also indicated that they were not aware that digital resources (student workbooks) were available.

The DEP middle school science teacher who thought the materials were too basic also stated that for the workbooks to be more useful, they should have covered "safety". Although they had rated the materials as being about right for their students, a middle school science teacher in DEC also stated that more information on "energy transformation" would enhance the materials. Twenty of twenty-three DEC teachers and eight of thirteen DEP teachers reported being satisfied with the materials (scored a "4" or "5" on a five-point scale), indicating that the material was found to be generally acceptable in the capacity that they were using it.

Kit Request Forms

As Figures Figure 5-3 and Figure 5-4 show, teachers reported sending kit request forms home with children. However, teachers also indicated in interviews that student families predominantly requested kits online.

About 85% of survey teachers in DEC and all of the surveyed teachers in DEP distributed the kit request forms to their students. Of the teachers who distributed the forms, just over half (55%) of DEC teachers distributed the the kit request form separately from the workbook and the remainder distributed workbooks with the kit request form included. Even more DEP teachers distributed the kit request form separately, with 71% of teachers stating that this was how they sent the form to their students, while the remainder distributed forms as a part of the workbook.

Just under half of the teachers in both territories (DEC: 45%, DEP: 48%) reported following up with students to find out whether their household requested a kit. Of those, teachers in DEC estimated between 0% and 90% of families ordered a kit, and teachers in DEP estimated between 0% and 70% of families ordered a kit. This results in an estimated average of 25% of DEP student families and 18% of student families in DEP that requested a kit.[2] Two interviewed teachers expressed a desire to receive more communication after the performance—reminders for them to check in with students about signing up.

Kilowatt Krush App

About half (DEC: 19 of 34, DEP: 12 of 21) teachers reported that either the performers or instructional material had mentioned the Kilowatt Krush app. A majority of DEC teachers (12 of 19) reported that they didn't know if students had downloaded the app, while a quarter of DEP teachers (3 of 12) weren't sure. In both DEC and DEP, all remaining teachers estimated that less than 40% of students had downloaded the app. In addition, some interviewed teachers mentioned that they did not recall seeing or hearing about the app. Observations from parents support the low estimates from teachers; 228 parents (of 300 surveyed) in DEC reported that their children did not download it, while another 47 were not sure. The numbers in DEP were similarly low, 160 out of 215 parents stated that their child had not downloaded the app and an additional 34 parents were unsure. Of the parents who noticed their child using the app, most of those children (DEC: 22 of 25, DEP: 19 of 21) were in elementary school.

5.2.4 Student Family Experience with the Program

Installation and Use Rates

Almost all (DEC: 86%, DEP: 91%) participants used at least one measure in the kit; DEC parents installed an average of 3.2 measures, and DEP parents installed 3.4 measures on average. Table 5-5 details the installation rates of all kit measures for both jurisdictions; most kit recipients in DEC and DEP installed the lighting measures including LEDs (DEC: 98%, DEP: 95%) and nightlights (DEC: 89%, DEP: 87%); far fewer used the insulator gaskets and water

[2] The Evaluation Team calculated the mean of the mid-point values of each teacher's selected range. For example, if one teacher selected 81%-90% and another selected 91%-100%, the mid-points are 85% and 95%, and the mean is 90%.

related measures (ranging from 36% to 51% in DEC and 34% to 60% in DEP). Water related measures were also removed more often than lighting measures, at up to 3 times the rate in both DEC and DEP. Most of the respondents who chose to remove kit measures reported dissatisfaction with the measure performance or stated that the measure was removed due to other circumstances (e.g. purchasing a new sink that had a faucet pre-attached).

Table 5-5: Installation Rates

Measure	DEC (n = 258)	DEP (n = 197)
Showerhead	51%	60%
Kitchen Faucet Aerator	47%	49%
Bathroom Faucet Aerator	47%	48%
Night Light	89%	87%
Energy Efficient Light Bulbs (LEDs)	98%	95%
Insulator Gaskets	36%	34%

The large majority of those installing light bulbs said they installed both bulbs included in the kit (90% in DEC and 88% in DEP). Parents in both DEC and DEP reported that the LEDs typically replaced incandescent lightbulbs (DEC: 44%, DEP: 49%) and CFLs (DEC: 29%, DEP: 20%).

Of those who did not install all items in the kit, around two in five respondents (43% in DEC and 40% in DEP) said they do not plan to install any of the items they had not yet installed. Respondents generally said they would not install the remaining items because the currently installed item is still working, they already had an efficient measure installed, they attempted to install the measure but it didn't fit, or they had not "gotten around to it."

Measure Satisfaction

Nearly all kit recipients reported high satisfaction with the items they installed from their kit in both Duke territories (Figure 5-5 and Figure 5-6). To best gauge the experience with the measures, we asked respondents to rate their satisfaction with all measures they installed, including those they later removed. Respondents explained that any dissatisfaction they had with water measures was due to low water pressure (DEC: 22 customers, DEP: 14 customers) or that the measures did not fit properly (8 customers each in DEC and DEP).

Figure 5-5: DEC Kit Recipient Satisfaction with Installed Measures

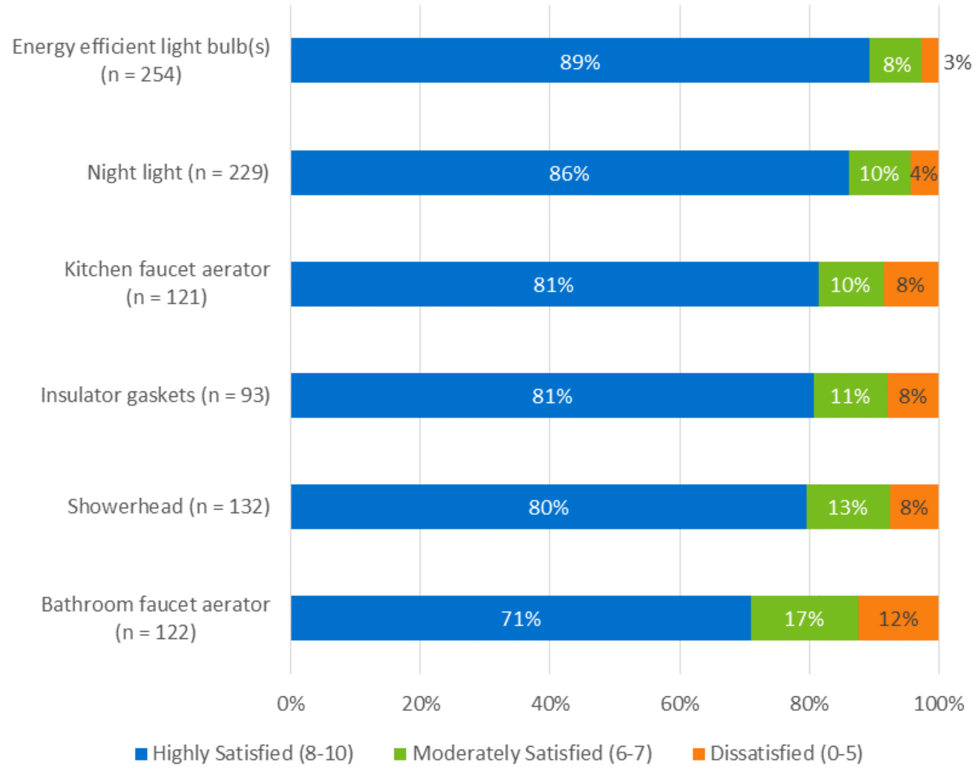
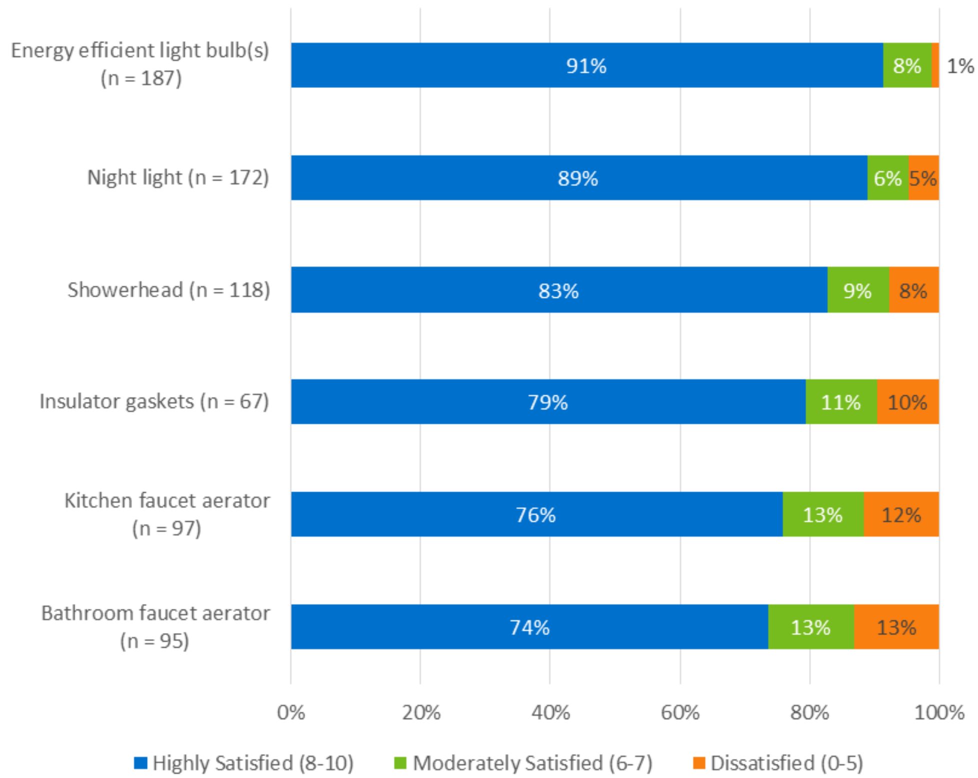


Figure 5-6: DEP Kit Recipient Satisfaction with Installed Measures



Energy Saving Educational Materials in the Kit

The Energy Efficiency Kit includes a Duke Energy-labeled Department of Energy (DOE) Energy Saver Booklet that includes educational information on saving energy at home. Most (DEC: 70%, DEP: 75%) respondents said they read the booklet. Of the kit recepients who read the energy saving booklet, approximately two-thirds in DEC and just over half in DEP found the information to be very helpful.[3] Those not finding the booklet helpful stated they already knew the information presented in the booklet or that information in the booklet could have been presented more concisely.

Additional Energy Saving Actions

Parents and children reported adopting new energy-saving actions since their involvement in the program. About eight in ten parents (DEC: 79%, DEP: 81%) reported taking an energy-saving action and a large majority (74% in DEC and 67% in DEP) reported their child has adopted new energy saving behaviors since receiving their kit. Parents most commonly said that their child now turns off lights when not using a room (DEC: 64%, DEP: 59%) or that they turn off electronic devices when not in use (DEC: 48%, DEP: 42%) (Table 5-6). More than half of respondents (57% in DEC and 50% in DEP) reporting new energy saving behaviors said the Duke Energy sponsored kit and materials were “highly influential” on their adoption of those behaviors.[4]

[3] We asked respondents to rate the helpfulness of the Duke Energy-labeled DOE Energy Saver Booklet on a scale from “0” (“not at all helpful”) to “10” (“very helpful”). In DEC 65% percent of respondents who reported reading the booklet gave a rating of “8” or higher. 23% gave ratings of “6” or “7”, and 11% gave ratings of “0” through “5”. DEP respondents were shifted a bit closer to the middle; 55% of respondents provided ratings of “8” and above, 30% provided ratings of “6” or “7”, and 15% provided ratings of “0” through “5”.

[4] We asked respondents to rate the influence of Duke Energy’s kit and energy saving educational materials on their reported behavior changes, using a scale from “0” (“not at all influential”) to “10” (“extremely influential”). Fifty-seven percent of respondents in DEC (or, 135 out of 235) who reported behavior changes gave a rating of “8” or higher; 50% of respondents in DEP (86 out of 171) gave a rating of “8” or higher

Table 5-6: New Behaviors Adopted by DEC Parents and Children since Receiving Kit (Multiple Responses Allowed; DEC n = 300, DEP n = 215)

New Behaviors Child Has Adopted	DEC		DEP	
	Parents	Children	Parents	Children
Adopted new behaviors since receiving kit	79%	74%	81%	67%
Turn off lights when not in a room	62%	64%	60%	59%
Changing thermostat settings to use less energy	53%	-	53%	-
Turning off electronics when not in use	49%	48%	43%	42%
Using fans instead of air conditioning	35%	-	35%	-
Turning off air conditioning when not home	26%	-	27%	-
Taking shorter showers	23%	21%	29%	18%
Turning off furnace when not home	15%	-	16%	-
Turning water heater thermostat down	10%	-	12%	-
Other reason	2%	3%	1%	3%

Receiving a kit may drive a desire to make additional energy efficiency improvements. Most student families reported a desire to receive more kit measures (98% in DEC, 97% in DEP), specifying interest in LEDs (DEC: 86%, DEP: 83%), nightlights (DEC: 68%, DEP: 67%), showerheads (25% in both DEC and DEP), bathroom and kitchen aerators (17% for both measures in DEC and 15% for both measures in DEP), and gasket insulators (16% in both territories). Parents indicated that they would prefer requesting additional measures via the internet (73% in both DEC and DEP) or pre-paid postcards (DEC: 18%, DEP: 17%).

The kit motivated some respondents to purchase energy efficient equipment or services (Table 5-7). About one-third of customers in DEC (34%) reported purchasing or installing additional energy efficiency measures since receiving their kit, while slightly more than two out of every five customers in DEP (45%) stated that they had purchased or installed additional measures. Efficient light bulbs were the most commonly reported measure, mentioned by 87 respondents in DEC and 76 in DEP.

Fourteen respondents in DEC reported receiving a Duke Energy rebate for their measure, eleven of whom said they received rebates for purchasing LEDs, five for efficient appliances, three for their efficient heating or cooling equipment, one for efficient windows and another customer who received an incentive for purchasing a smart thermostat.

Fifteen respondents in DEP stated that they received a rebate from Duke Energy for their measure. Of those, five received rebates for purchasing LEDs, three for smart thermostats, two each for energy efficient water heaters, efficient heating equipment and products to seal air leaks, and one each for additional insulation and energy efficient appliances. Around half of customers in both territories (DEC: 52 in 103, DEP: 43 in 96) said the Duke Energy schools program was at least partially influential on their decision to purchase and install additional energy saving measures.

Table 5-7: Additional Energy Saving Measures Purchased (Multiple Responses Allowed; DEC n= 103, DEP n = 96)

	DEC Parents			DEP Parents		
	Count of Respondents Reporting Purchases After Receiving the Kit	Count Reporting Duke Rebates for Measure	Count Reporting High Program Influence on Purchase*	Count of Respondents Reporting Purchases After Receiving the Kit	Count Reporting Duke Rebates for Measure	Count Reporting High Program Influence on Purchase*
At least one measure	103	14	52	96	15	43
Bought LEDs and/or CFLs	87	11	45	76	5	33
Bought energy efficient appliances	46	5	19	35	1	17
Sealed air leaks	22	-	8	29	2	12
Added insulation	15	-	3	15	1	7
Bought efficient heating or cooling equipment	15	3	7	12	2	5
Installed an energy efficient water heater	15	-	4	6	2	3
Bought efficient windows	11	1	5	7	-	2
Sealed ducts	6	-	1	5	-	3
Other	4	1	3	7	3	1

*Respondents that rated the influence of the program as “8” or higher on 10-point scale, where “0” was not at all influential and “10” was extremely influential.

5.3 Key Findings

Overall, the DEC/DEP K12 Education Program performed effectively during the 2019-2020 school year. Key findings from the process evaluation include:

Awareness:

- Both teachers and parents were aware of Duke Energy's sponsorship of the K12 Education Program; 97% of teachers and 88% of parents in DEC, and 95% of teachers and 91% of parents in DEP indicated that they were aware of this fact.
- Teachers in DEC primarily learned about Duke Energy's sponsorship of the program through material provided by NTC about the program, NTC staff or Duke marketing materials. Similarly, teachers in DEP learned about the sponsorship of the program most often through Duke marketing materials and materials provided by the NTC.
- Most parents in both DEC and DEP reported that they learned of Duke's involvement in the program through informational material provided in the kit, followed by educational material provided by NTC and brought home from school by their child.
- Parents are largely unaware of the NTC performances and program related classroom activities with 25% of them in DEC and 18% of them in DEP reporting knowledge of these activities.
- Awareness of digital materials, performances, and the Kilowatt Krush app is inconsistent for teachers.
- Kilowatt Krush app usage by students is increasing, though still relatively low; elementary students are most likely to have used it.
- While 19 of 34 teachers in DEC reported that NTC staff or materials mentioned the Kilowatt Krush app, 7 reported that their students were using it. In DEP more teachers reported that their students were using it than not; 12 of 21 teachers stated that NTC staff or materials mentioned the app, and 9 teachers said that their students were using it.
- In DEC, 275 of 300 student families reported that either the student had not downloaded the Kilowatt Krush app, or that they were not sure if they had or not. In DEP, 194 of 215 families stated that their child had not downloaded the app or they were unsure.

Program Experience and Satisfaction:

- Teacher satisfaction with the performances and interactions with NTC staff was very high with 32 of 34 DEC teachers and 20 of 21 DEP teachers rating the performance a 4 or a 5, or "highly satisfied".
- Parents reported high levels of satisfaction with the measures provided in the efficiency kits. Measure satisfaction was highest amongst parents who installed LED bulbs; 81% of DEC and 91% of DEP respondents said that they were "highly

satisfied" with the measure. Satisfaction measures were lowest with bathroom faucet aerators; 71% of parents in DEC and 74% of parents in DEP reported that they were "highly satisfied" with this measure.

In-Service Rates:

- An average of 3.2 measures from the kit were installed per household in DEC, and an average of 3.4 measures were installed in DEP. Nineteen respondents (6%) in DEC installed all of the items, and 42 respondents (14%) installed none of the items. In DEP, 21 respondents (10%) installed all items and 19 respondents (9%) installed none of the items.
- The lighting measures provided in the kit were installed more often than the water saving measures. When asked why they did not install water saving measures, respondents most frequently reported low water pressure or that the measures didn't fit or match their fixture. Concerns about lighting measures were minimal and limited to night lights, where most of the respondents who didn't install the measure reported that they did not need it.
- Large majorities of parents (79% and 81% in DEC and DEP) and children (DEC: 74%, DEP: 67%) changed their behaviors after receiving the kit or seeing the performance. The most commonly changed behavior was turning off lights when not in the room and was shared amongst parents and children in both territories. Almost as many parents in DEC stated that they changed their thermostat settings as said turned lights off when leaving a room.

6 Conclusions and Recommendations

Based on evaluation findings, the evaluation team concluded the following and provides several recommendations for program improvement:

Conclusion: The use of AMI meter data as the primary input in the impact analysis was effective in reliably estimating savings attributable to the program.

> **Recommendation:** When proven to be feasible, continue to use an AMI-based consumption analysis approach in future EE Education program evaluations.

Conclusion: Teachers are highly satisfied with NTC performances and materials, although many teachers are unable to effectively utilize the materials within their curriculum due to timing issues. Some teachers additionally reported that they were unaware of the availability of online resources.

> **Recommendation:** Though the amount of online content has increased, it is important to prioritize making teachers aware of the availability of these online resources, including assuring these resources are prominently included in performances, instructional materials, and promotional materials. This may help address any problems stemming from the misalignment of these lessons. Additionally, ensuring that teachers are aware of any online content will be of particular importance in cases of remote learning, when traditional materials cannot be distributed as effectively.

Conclusion: A majority of parents who received energy efficiency kits installed at least one measure. Light bulbs and night lights were much more popular than water saving measures and were widely cited as items that respondents would like to receive more of. Parents primarily indicated that they would prefer to request additional kit items via the internet.

> **Recommendation:** Consider including additional lightbulbs in the efficiency kits, as they are relatively inexpensive and can enhance savings rates.

Conclusion: Large numbers of parents and students adopted energy saving behaviors as a result of tips and materials included in the kit.

> **Recommendation:** Expand behavioral guidance in both student and parent materials to maximize effects of the program. Parents in particular indicated that the primary reason for not finding energy saving tips useful was previous knowledge of those tips, suggesting that more advanced behavioral guidance (e.g. utilizing the scheduling feature of their thermostat to cool or heat the house in off peak periods) may be beneficial.

Conclusion: Teachers at smaller schools noted that reaching the 100 kit request threshold that qualifies for the $250 enrollment bonus is difficult. The program is also highly reliant on engaged teachers to drive performances and distribution of kits/student materials.

> **Recommendation:** Consider adjusting the award structure to encourage more teachers to become "champions" at unenrolled schools and drive more sign-ups. In addition, consider altering the incentive framework for schools that reach 100 kit requests and receive the $250 enrollment bonus to a proportion-based system, using quantity of received kit requests and student enrollment. This will make it easier for smaller schools to receive the enrollment bonus, and thus be more likely to be motivated to join and remain in the program. It is the evaluator's understanding that an adjustment to the incentive structure was implemented for the 2021-2022 School Year that rewards teachers with $50 that reach 20 kit requests.

Conclusion: It is not clear how many teachers are attending performances, which makes estimating population parameters of evaluation and tracking data for this group difficult.

> **Recommendation:** Evaluate data gathering and tracking protocols to ensure that accurate teacher and student attendance is gathered at each school. This might include teacher sign-in sheets.

Appendix A Summary Forms

DEC Summary Form

Description of program

The K12 Education Program is an energy efficiency program that provides free in-school performances by the National Theatre for Children (NTC) that teach elementary, middle, and high school students about energy and conservation concepts in a humorous and engaging format. NTC provides teachers with: 1) student workbooks that reinforce topics taught in the NTC performance, which include a take-home form that students and parents can complete to receive an energy efficiency starter kit from DEC/DEP and 2) lesson plans associated with the content in the student workbooks.

Date	November 30, 2021
Region(s)	Carolinas
Evaluation Period	August 1, 2019 – July 31, 2020
Annual kWh Savings	9,904,700 kWh
Per Household kWh Savings	475 kWh
Annual Summer kW Savings	-1,689 kW
Annual Winter kW Savings	62 kW
Net-to-Gross Ratio	Not applicable
Process Evaluation	Yes
Previous Evaluation(s)	2015-2016, 2017-2018

Evaluation Methodology

Impact Evaluation Activities

- *AMI consumption data analysis via difference-in-differences regression modeling with matched control group.*

Impact Evaluation Findings

- *The program produced significant energy savings of 475 kWh annually per household. Program-level savings in DEC were 9,900 MWh.*
- *The program did not generate meaningful load reductions during peak periods.*

Process Evaluation Activities

- *300 web surveys with student families and analysis of 6 unique measures.*
- *43 web surveys with teachers from participating schools; 5 in-depth follow up interviews*
- *1 in-depth interview with program staff*
- *1 in-depth interview with NTC implementation staff*
- *1 in-depth interview with R1 implementation staff*

Process Evaluation Findings

- *Teachers are highly satisfied with the performance*
- *Parents largely learning about performances, kits, and materials from their children*
- *Student families are generally satisfied with kit items, although lighting measures are more popular than water measures*
- *The NTC program is successfully influencing families to adopt energy saving behaviors*

DEP Summary Form

Description of program

The K12 Education Program is an energy efficiency program that provides free in-school performances by the National Theatre for Children (NTC) that teach elementary, middle, and high school students about energy and conservation concepts in a humorous and engaging format. NTC provides teachers with: 1) student workbooks that reinforce topics taught in the NTC performance, which include a take-home form that students and parents can complete to receive an energy efficiency starter kit from DEC/DEP and 2) lesson plans associated with the content in the student workbooks.

Date	November 30, 2021
Region(s)	Progress
Evaluation Period	August 1, 2019 – July 31, 2020
Annual kWh Savings	2,540,300 kWh
Per Household kWh Savings	475 kWh
Annual Summer kW Savings	-433 kW
Annual Winter kW Savings	16 kW
Net-to-Gross Ratio	Not applicable
Process Evaluation	Yes
Previous Evaluation(s)	2015-2016, 2017-2018

Evaluation Methodology

Impact Evaluation Activities

- *AMI consumption data analysis via difference-in-differences regression modeling with matched control group.*

Impact Evaluation Findings

- *The program produced significant energy savings of 475 kWh annually per household. Program-level savings in DEP were 2,540 MWh.*
- *The program did not generate meaningful load reductions during peak periods.*

Process Evaluation Activities

- *215 web surveys with student families and analysis of 6 unique measures*
- *29 web surveys with teachers from participating schools; 3 in-depth follow up interviews*
- *1 in-depth interview with program staff*
- *1 in-depth interview with NTC implementation staff*
- *1 in-depth interview with R1 implementation staff*

Process Evaluation Findings

- *Teachers are highly satisfied with the performance*
- *Parents largely learning about performances, kits, and materials from their children*
- *Student families are generally satisfied with kit items, although lighting measures are more popular than water measures*
- *The NTC program is successfully influencing families to adopt energy saving behaviors*

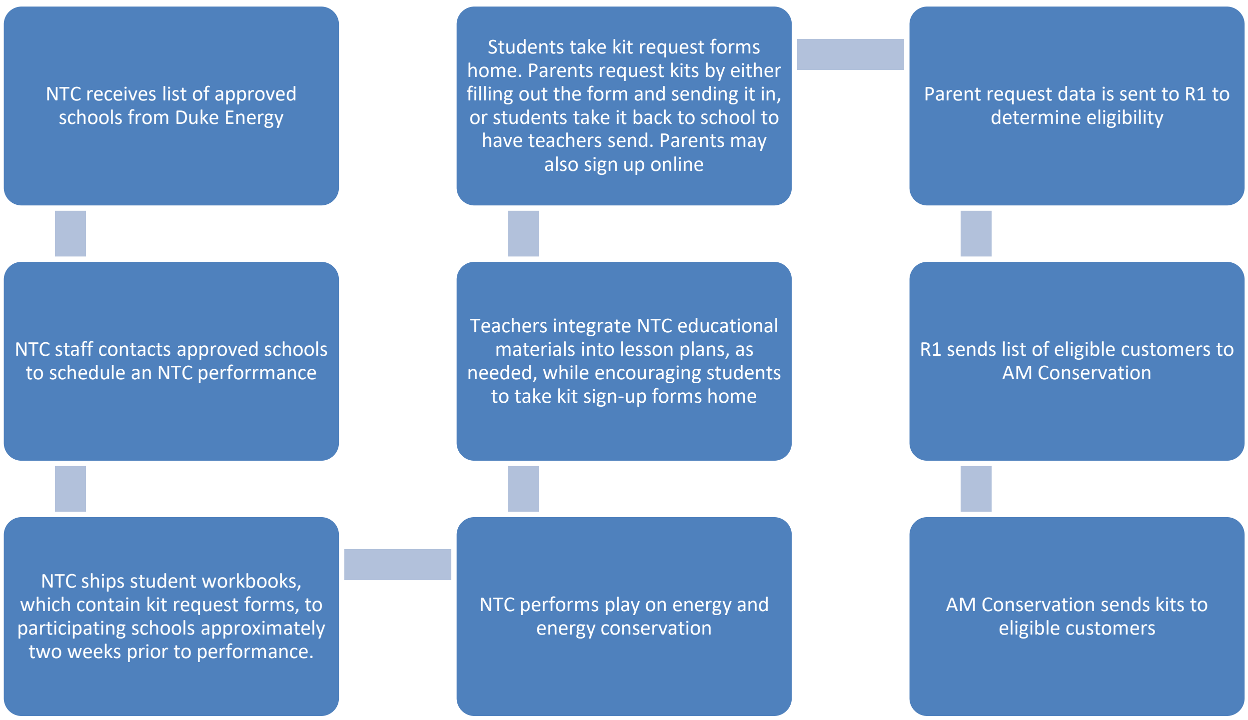
Appendix B Measure Impact Results

Table B-1: DEP and DEP Program Year 2019-2020 per Unit Verified Impacts by Measure – Key Measure Parameters

Measure	Gross Energy Savings (kWh)	Gross Summer Demand (kW)	Gross Winter Demand (kW)	Realization Rate (Energy)	Free Ridership	Spillover	Net to Gross Ratio*	M&V Factor (Energy) (RR x NTG)	Measure Life
Energy Efficiency Kit - DEC	475.21	-0.08075	0.002685	N/A	N/A	N/A	N/A	N/A	N/A
Energy Efficiency Kit - DEP	475.21	-0.08075	0.002685	N/A	N/A	N/A	N/A	N/A	N/A

*The impact analysis approach performed in this evaluation yields a savings estimate that is net of any naturally occurring changes, so there is no need to perform a net-to-gross adjustment

Appendix C Program Process Flow Chart



Appendix D Program Performance Metrics

Figure D-1: DEC Student Family Demographics Reach PPIs

Housing Type

Detached	74%
Attached	18%
Mobile	8%

Ownership Status

Own	69%
Rent	30%
Occupy Rent-free	1%

Number of People in Home

One	4%
Two	19%
Three	22%
Four	33%
Five+	22%

Highest Educational Attainment

Exited before/during High school	2%
High school/Trade school	18%
Some college	32%
Bachelors Degree	25%
Some graduate school	2%
Graduate/Professional Degree	18%
Doctorate	3%

Income

<$35k	31%
$35k to $50k	18%
$50k to $75k	19%
$75k to $150k	22%
$150k+	10%

Figure D-2: DEP Student Family Demographics Reach PPIs

Housing Type

Detached	69%
Attached	17%
Mobile	14%
Other	<1%

Ownership Status

Own	72%
Rent	27%
Occupy Rent-free	1%

Number of People in Home

One	3%
Two	10%
Three	30%
Four	30%
Five+	27%

Highest Educational Attainment

Exited before/during High school	3%
High school/Trade school	21%
Some college	29%
Bachelors Degree	24%
Some graduate school	2%
Graduate/Professional Degree	17%
Doctorate	4%

Income

<$35k	29%
$35k to $50k	17%
$50k to $75k	18%
$75k to $150k	30%
$150k+	6%

Appendix E Instruments

E.1 Program Staff In-Depth Interview Guide

Introduction

Today, we'll be discussing your role in the Energy Efficiency Education Program in the Duke Energy **Carolina and Progress** territories. We would like to learn about your experiences in administering this program in the 2019-2020 school year. Your comments are confidential. If I ask you about areas you don't know about, please feel free to tell me that and we will move on.

Your comments are confidential. If I ask you about areas you don't know about, please feel free to tell me that and we will move on. Also, if you want to refer me to specific documents to answer any of my questions, that's great – I'm happy to look things up if I know where to get the information.

Also, I would like to record this interview for my note-taking purposes. Do I have your permission? Do you have any questions before we start?

Roles and Responsibilities

Q1. Has anything changed regarding your role in Duke Energy's Energy Efficiency Education Program since we last spoke? (Program Manager)

Q2. Has Duke Energy's role changed in terms of program delivery since we last spoke?

Delivery and Operations

Q3. What were your targets for the 2019-2020 school year for the following metrics, and were you successful in meeting them?:

1. Number of schools recruited:
2. Number of students involved:
3. Use of curricula by teachers:
4. Number of kit requests:
5. Savings:
6. Subcontractor SLAs (NTC, R1, AMC):

Q4. Has the delivery process changed since 2018-2019, prior to any forced upon the program by COVID-19? Separately, how did COVID-19 affect program delivery, if at all, in terms of the (ask respondent to describe established protocols as necessary):

1. Recruitment, Marketing, Outreach, Website (request materials):

2. Curriculum and Performance:

3. App (KiloWatt Krush):

4. Kit: contents, request process, delivery schedule (how long):

Q5. Any noteworthy concerns about the age appropriateness of the materials and performances, or has that largely been addressed?

Q6. In what ways, if at all, does the delivery strategy for the high school program differ from the others?

Q7. Can you talk a bit about the development of the high school delivery strategy? What were the priorities, goals, etc.?

Q8. How has the high school program been going generally in NC and SC? Have there been any significant challenges or successes specific to the high school program in 2019-2020? How have these been addressed?

Q9. Are there any changes, beyond those caused by COVID-19, that you have implemented in the 2020-2021 school year? Any planned for 2021-2022?

Q10. Does the operational staff still gather on weekly calls (NTC, R1, Duke Energy)? Are there any other established communication protocols? Any changes there?

Q11. Has anything changed with staffing or management of the program (communications, staff, budget, program goals, data management, subcontractor perfomance, etc.) since we last spoke? If so, how has this affected program delivery or operations? Any problems with any of these?

Wrap Up

Q12. What would you say were the greatest strengths of the program in 2019-2020?

Q13. What would you say were the biggest challenges in administering this program in 2019-2020? Is this specific to he DEC/P jurisdictions? Last time, for DEI, you primarily discussed difficulties with recruitment—both schools and student families.

Q14. Do you have any other thoughts about the program that we didn’t discuss that you think may be important?

Q15. Is there anything in particular you’d like to learn from the program evaluation?

Thank you for your time. Have a great day!

E.2 NTC Staff In-Depth Interview Guide

Introduction

Today, we'll be discussing your role in the Energy Efficiency Education Program in the Duke Energy **Carolina and Progress** territories. We would like to learn about your experiences in administering this program in the 2019-2020 school year. Your comments are confidential. If I ask you about areas you don't know about, please feel free to let me know and we will move on.

Also, I would like to record this interview for my note-taking purposes. Do I have your permission? Do you have any questions before we start?

Roles and Responsibilities

Q1. Can you describe your title, and your role in NTCs work with the Duke Energy Energy Efficiency Education in Schools program?

Q2. Has NTC's role changed in terms of program delivery? Last time we spoke you told me that NTC's role primarily involves designing and distributing classroom materials (including kit request forms), recruiting schools, and designing and executing the performances. Is there anything else?

Delivery and Operations

Q3. Has the delivery process changed since 2018-2019, prior to any forced upon the program? Separately, how did COVID-19 affect program delivery, if at all, in terms of (ask respondent to describe established protocols as necessary):

1. Marketing and outreach (Can you provide recruitment materials?):
2. Curriculum:
3. Performance:
4. Kit request process:

Q4. In what ways, if at all, does the delivery strategy for the high school program differ from the others?

Q5. Can you talk a bit about the development of the high school delivery strategy, including how this applies to materials, performances, etc.?

Q6. Have there been any significant challenges or successes specific to the high school program in 2019-2020? How have these been addressed?

Q7. Do you have copies of the 2019-2020 materials for all three programs that you could send me?

Q8. Are there any changes, beyond those caused by COVID-19, that you have implemented in the 2020-2021 school year? Any planned for 2021-2022?

Q9. Does the operational staff still gather on weekly calls (NTC, R1, Duke Energy)? Are there any other established communication protocols? Any changes there?

Q10. Has anything changed with staffing/management at NTC (communications, content creation, admin, or management staff)? If so, how has this affected program delivery or operations?

Wrap Up

Q11. What would you say were the greatest strengths of the program in 2019-2020?

Q12. What would you say were the biggest challenges in administering this program in 2019-2020? Is this specific to the DEC/P jurisdictions? Last time, for DEI, you discussed a few things: the finite number of schools to work with, the eligibility window for kits, and the existence of non-Duke Energy customers.

Q13. Do you have any other thoughts about the program that we didn't discuss that you think may be important?

Thank you for your time. Have a great day!

E.3 R1 Staff In-Depth Interview Guide

Introduction

Today, we'll be discussing your role in the Energy Efficiency Education Program in the Duke Energy **Carolinas and Progress** territories. We would like to learn about your experiences in administering this program in the 2019-2020 school year. Your comments are confidential. If I ask you about areas you don't know about, please feel free to tell me that and we will move on. Also, I would like to record this interview for my note-taking purposes. Do I have your permission? Do you have any questions before we start?

Roles and Responsibilities

Q1. Has anything changed regarding your position at R1 and your role in Duke Energy's Energy Efficiency Education Program since we last spoke? (VP of IT)

Q2. Has R1's role changed in terms of program delivery? Last time we spoke you told me that R1's role primarily involves maintaining the program website (for kit delivery), maintaining the customer database, and processing paper applications.

Delivery and Operations

Q3. Has anything changed in this delivery process? (Prompts: relationship with AMC, data verification and transfer with Duke Energy, (hand) processing of paper applications)

Q4. Does all the operational staff still gather on weekly calls? Can you briefly describe communication protocols?

Challenges and Successes

Q5. Have you experienced any issues due to the introduction of the high school program?

Q6. Have you experienced any issues due to COVID?

Q7. Were there any other challenges or successes in program delivery from your perspective in the 2019-2020 program year?

Q8. What would you say are the greatest strengths of this program?

Wrap Up

Q9. Do you have any other thoughts about the program that we didn't discuss that you think may be important?

Thank you for your time. Have a great day!

E.4 Teacher Survey

Landing Page Introduction

Thank you for agreeing to take this survey. It starts with a few questions about what grades and subjects you teach, which we need for our analysis of the survey responses. The survey then asks for your feedback on various elements of the program.

Grades and Subjects Taught

Q1. What grade(s) did you teach during the 2019-2020 school year? *Please select all that apply.*

[multiple response]

1. Pre-K – TERMINATE
2. Kindergarten
3. Grade 1
4. Grade 2
5. Grade 3
6. Grade 4
7. Grade 5
8. Grade 6 [SKIP TO Q3]
9. Grade 7 [SKIP TO Q3]
10. Grade 8 [SKIP TO Q3]
11. Grade 9 [SKIP TO Q3)
12. Grade 10 [SKIP TO Q3)
13. Grade 11 [SKIP TO Q3)
14. Grade 12 [SKIP TO Q3)
15. Other, please specify: [Open-ended response] – Collect open end response- then TERMINATE
16. None; I did not teach last year [TERMINATE]

[IF Q1= 1-Kindergarten to 7- Grade 5 AND Q1 <> 8-Grade 6 to 14- Grade 12]

Q2. Are you a home room teacher?

[SINGLE RESPONSE]

1. Yes
2. No [TERMINATE]

[IF Q1= 8-Grade 6 to 14-Grade 12]

Q3. What subjects do you teach? *Please select all that apply.(TEST)*

[MULTIPLE RESPONSE]

1. Math
2. Natural sciences
3. English/language arts
4. Social studies/social sciences/history
5. Music
6. Art
7. Physical education

8. Other – please specify: [OPEN-ENDED RESPONSE]

[IF Q2=1 or Q3<>1 or 2]
Q4. Do you teach any topics on energy (electricity, gas, coal, etc.) generation, transformation, use, or conservation (including, but not limited to, topics/materials provided by the Energy Efficiency for Schools program)?
[SINGLE RESPONSE]
1. Yes
2. No [TERMINATE]

Q5. Have you previously taken a survey (not fielded by NTC) regarding your participation in this program?
[SINGLE RESPONSE]
1. Yes
2. No
98. Don't know

Performance Seen

[IF Q1=2-Kindergarten to 7- Grade 5 AND Q1<> 8-Grade 6 to 14-Grade 12]
Q6. Did you attend The National Theatre for Children performance for elementary school students in [PERFORMANCE_MONTH] of [PERFORMANCE_YEAR]?
1. Yes
2. No [TERMINATE]
98. Don't know/ Can't recall [TERMINATE]

[IF Q6 = 1]
Q7. Did your students see a performance even more specific to their grade level?
1. Yes, they saw the K-2 performance
2. Yes, they saw the performance for grades 3-5
3. No, they saw the K-5 performance
4. Don't know / Can't recall

[IF Q1= 8- Grade 6 to 10- Grade 8]
Q8. Did you see the National Theatre for Children performance for middle school students in [PERFORMANCE_MONTH] of [PERFORMANCE_YEAR]?
1. Yes
2. No [TERMINATE]
98. Don't know/ Can't recall [TERMINATE]

[IF Q1= 11- Grade 9 to 14- Grade 12]
Q9. Did you see the National Theatre for Children performance for high school students in [PERFORMANCE_MONTH] of [PERFORMANCE_YEAR]?
1. Yes
2. No [TERMINATE]
98. Don't know/ Can't recall [TERMINATE]

[TERMINATION SCREEN TEXT: We have determined that you do not meet the qualification criteria for this study. Thank you for your time!]

Awareness of Duke Energy Sponsorship

Q10. Before today, were you aware that Duke Energy sponsored the National Theatre for Children performance(s) in your school?

1. Yes
2. No [SKIP TO Q14]
98. Don't know [SKIP TO Q14]

[If Q10= 1 (YES)]
Q11. How did you learn of Duke Energy's involvement with the National Theatre for Children program? *Please select all that apply.*
[MULTIPLE RESPONSE]

1. Another teacher
2. Duke Energy marketing materials
3. Duke Energy staff
4. National Theatre for Children staff
5. National Theatre for Children materials
6. Other, please describe: [OPEN-ENDED RESPONSE]
98. Don't know

Q12. Are you (one of) the decision-maker(s) regarding the NTC performances at your school?

1. Yes
2. No [SKIP TO Q14]
3. Don't know [SKIP TO Q14]

[IF Q132= 1 (YES)]
Q13. Do you recall how the importance of the program was communicated to you? If so, how was it communicated to you?

1. Yes: [OPEN-ENDED RESPONSE]
2. No

Program Experience and Satisfaction

The next few questions are about the **performance(s)** that National Theatre for Children presented to your school.

Q14. Thinking back to the school performance, would you say that energy related concepts presented in the performance were:
[SINGLE RESPONSE]

1. Far too advanced for most of your students
2. Somewhat too advanced for most of your students
3. About right for most of your students
4. Somewhat too basic for most of your students

5. Far too basic for most of your students
96 Other, please specify: [Open-ended response]
98. Don't know

[IF Q14= 1 or 2]
Q15. What about the performance was too advanced for most of your students?
1. [OPEN-ENDED RESPONSE]

[IF Q14= 4 or 5]
Q16. What about the performance was too basic for most of your students?
1. [OPEN-ENDED RESPONSE]

Q17. Were there any concepts that the performance(s) did not cover that *should have been* covered?
1. Yes
2. No [SKIP TO Q19]
98. Don't know [SKIP TO Q19]

[IF Q17= 1 (YES)]
Q18. What concepts were not covered that *should have been* covered?
1. [OPEN ENDED]

Q19. Please estimate your student's overall engagement level with the National Theatre for Children **performance** on the following scale WHERE 1=NOT AT ALL ENGAGED AND 5=COMPLETELY ENGAGED, with DK; LABEL ONLY THE END POINTS (1 AND 5) – DISPLAY AS HORIZONTAL GRID:

Not at all Engaged				Completely Engaged	Don't Know
1	2	3	4	5	98

Q20. Please rate your overall satisfaction with the National Theatre for Children **performance** on the following scale. [Single response; insert 1-5 scale WHERE 1=NOT AT ALL SATISFIED AND 5=COMPLETELY SATISFIED, with DK; LABEL ONLY THE END POINTS (1 AND 5) – DISPLAY AS HORIZONTAL GRID

Not at all Satisfied				Completely Satisfied	Don't Know
1	2	3	4	5	98

Q21. Please explain why you offered this satisfaction rating.
1. [OPEN ENDED]

The next few questions are about the **curriculum or instructional materials** that you may have received from the National Theatre for Children around the time of the performance.

Q22. Did you receive curriculum or instructional materials, such as student workbooks, related to energy and energy conservation from National Theatre for Children for the Fall 2019-Spring 2020 school year?

1. Yes
2. No [SKIP TO Q36]
98. Don't know [SKIP TO Q36]

[IF Q22= 1 (YES)]
Q23. To what degree did you use the curriculum or instructional materials in teaching your students about energy?
[Single response]

1. Not at all [SKIP TO Q35]
2. A little
3. Moderately
4. A lot
5. Extensively
98. Don't know [SKIP TO Q36]

[IF Q23= 2 (A little)]
Q24. Why did you only use the curriculum or instructional materials "a little" in teaching your students about energy?

1. [OPEN-ENDED RESPONSE]

[IF Q23= 2 through 5]
Q25. Thinking about how the student workbooks explained energy-related concepts, would you say that the material was generally:
[SINGLE RESPONSE]

1. Far too advanced for most of your students
2. Somewhat too advanced for most of your students
3. About right for most of your students
4. Somewhat too basic for most of your students
5. Far too basic for most of your students
96. Other, please specify: [Open-ended response]
98. Don't know
99. Refused

[IF Q23= 2, 3, 4, or 5]
Q26. Please rate how useful the materials were to you in teaching your students about energy. [Single response; insert 1-5 scale WHERE 1=NOT AT ALL USEFUL AND 5=EXTREMELY USEFUL, with DK

Not at all Useful				Extremely Useful	Don't Know
1	2	3	4	5	98

[IF Q23= 2, 3, 4, or 5]
Q27. Please rate the degree to which the topics in the workbook aligned with your state's science standards for the grade(s) you teach.
1. Completely aligned
2. Mostly aligned
3. Somewhat aligned
4. Poorly aligned
5. Not aligned at all
6. N/A – no science standards for my grade(s)
98. Don't know
99. Refused

[IF Q27= 4 or 5]
Q28. Which topic(s) was or were poorly aligned or not aligned at all with your state's science standards? In what way(s)?
1. [OPEN-ENDED RESPONSE]

[IF Q23= 2, 3, 4, or 5]
Q29. Were there any concepts covered in the curriculum or instructional materials that your students had challenges with?
1. Yes
2. No [SKIP TO Q31]
98. Don't know [SKIP TO Q31]
99. Refused [SKIP TO Q31]

[IF Q29= 1 (yes)]
Q30. What concepts did your students have challenges with?
1. [OPEN-ENDED RESPONSE]

[IF Q23= 2, 3, 4, or 5]
Q31. Were there any concepts that the materials did not cover that *should have been* covered?
1. Yes
2. No [SKIP TO Q33]
98. Don't know [SKIP TO Q33]
99. Refused [SKIP TO Q33]

[IF Q31= 1 (YES)]
Q32. What concepts were not covered that *should have been* covered?
1. [OPEN-ENDED RESPONSE]

[IF Q23= 2 through 5]
Q33. Please rate your overall satisfaction with curriculum or instructional materials you received from the National Theatre for Children program using the following scale. [Single response; insert 1-5 scale WHERE 1=NOT AT ALL SATISFIED AND 5=COMPLETELY SATISFIED with DK; LABEL ONLY END POINTS (1 and 5)]

Not at all Satisfied				Completely Satisfied	Don't Know
1	2	3	4	5	98

[IF Q22= 1 (YES)]

Q34. Do you have any additional input regarding the **curriculum or instructional materials** received from the National Theatre for Children that you would like to provide, including other things you liked or think could be improved? This might include things like overall presentation, length, level of detail, messaging, or anything else.

1. [OPEN ENDED]

[IF Q23= 1 (NOT AT ALL)]

Q35. Why did you *not* use the curriculum or instructional materials in teaching your students about energy?

1. [OPEN ENDED]

Interactions with NTC Staff

Q36. Did you have any interactions with anyone from the National Theatre for Children regarding the curriculum or instructional materials?

1. Yes
2. No [SKIP TO Q39]
98. Don't know [SKIP TO Q39]

[IF Q36= 1 (YES)]

Q37. What did those interactions involve?

1. [OPEN-ENDED RESPONSE]

[IF Q36= 1 (YES)]

Q38. Using the scale provided, how satisfied were you with:

a. Your interactions with the National Theatre for Children staff, overall
b. The professionalism and courtesy of the National Theatre for Children staff
c. The National Theatre for Children staff's knowledge about the topics you discussed with them

[Single response; for each item, insert 1-5 scale WHERE 1=NOT AT ALL SATISFIED AND 5=COMPLETELY SATISFIED with; LABEL ONLY THE END POINTS (1 AND 5)]

Not at all Satisfied				Completely Satisfied	Don't Know
1	2	3	4	5	98

Encouragement of Students to Complete Kit Request Form; Use of App

In the student workbooks provided by the National Theatre for Children there is a form that parents can fill out to receive a kit from Duke Energy. The kit contains energy efficient bulbs, low flow showerheads, and a few additional items that students and their parents can install in their home to save energy.

Q39. Did you distribute the kit request form to your students?

1. Yes – I distributed the workbooks, which included the kit request form
2. Yes – I distributed the kit request form separately
3. No [SKIP TO Q44]
98. Don't recall [SKIP TO Q43]

[IF Q39= 1 OR 2 (YES)]
Q40. On average, about what percentage of your students took the kit request form home? Your best estimate is fine.

1. 0% to 10%
2. 11% to 20%
3. 21% to 30%
4. 31% to 40%
5. 41% to 50%
6. 51% to 60%
7. 61% to 70%
8. 71% to 80%
9. 81% to 90%
10. 91% to 100%
98. Don't know

[IF Q39Q39= 1 OR 2 (YES)]
Q41. After students take the kit form home, do you follow up with students later to find out if their parents completed the form or signed up online?

1. Yes
2. No
98. Don't know

[IF Q39= 1 OR 2 (YES)]
Q42. About what percentage of your students either brought the kit form back to you to mail, or reported their parents completed and sent the form to Duke Energy to receive their kit?

1. 0% to 10%
2. 11% to 20%
3. 21% to 30%
4. 31% to 40%
5. 41% to 50%
6. 51% to 60%

7. 61% to 70%
8. 71% to 80%
9. 81% to 90%
10. 91% to 100%
98. Don't know

Q43. About what percentage of student families who had signed up for kits signed up on the website?

1. 0% to 10%
2. 11% to 20%
3. 21% to 30%
4. 31% to 40%
5. 41% to 50%
6. 51% to 60%
7. 61% to 70%
8. 71% to 80%
9. 81% to 90%
10. 91% to 100%
98. Don't know

[IF Q39= 3 (NO)]
Q44. Why didn’t you distribute the kit request forms to your students?

1. [OPEN-ENDED]

Q45. Did the NTC performers or the instructional materials mention the “Kilowatt Krush” app?

1. Yes
2. No [SKIP TO Q48]
98. Don't know [SKIP TO Q48]

[IF Q45= 1 (YES)]
Q46. About what percentage of students would you say downloaded and used the app?

1. 0% to 10%
2. 11% to 20%
3. 21% to 30%
4. 31% to 40%
5. 41% to 50%
6. 51% to 60%
7. 61% to 70%
8. 71% to 80%
9. 81% to 90%
10. 91% to 100%
98. Don't know

Q47. Do you have any suggestions to improve the app or how it was presented to students?
1. Yes; [OPEN ENDED RESPONSE]
2. No

Challenges and Opportunities for Improvement

Q48. Did government or organizational responses to COVID-19 offer any challenges for you regarding your participation in this program, other than those you've already discussed? If so, what were they, and how do you think they might best be addressed moving forward?
1. Yes: [OPEN-ENDED RESPONSE]
2. No
98. Don't know

Q49. Do you have any additional feedback regarding this program or Duke Energy that you would like to provide?
1. Yes; [OPEN ENDED RESPONSE]
2. No

Q50. Would you be willing to participate in an interview, so we might learn more about you and your students' experience with the program?
1. Yes
2. No [SKIP TO CLOSE]
98. Don't know [SKIP TO CLOSE]

[IF Q50= 1 (YES)]
Q51. Thank you for your willingness to be interviewed! We will be in touch with you regarding scheduling.

Thank you for your time completing this survey. Your responses have been recorded. Have a great day!

E.5 Teacher Interview Guide

Awareness, Grades and Subjects Taught, Type of Performance Seen

Q1. What grade(s) and subject(s) do you teach?

Q2. What type of performance did you see? In-person(live) or online(recorded)?

Q3. Do you recall how you heard about the program?

Q4. Do you know how performances are scheduled for your school? Are you involved with this? If so, in what way? [IF NOT ADDRESSED IN Q3]

Q5. Do you have any suggestions regarding recruitment and/or performance scheduling that might improve these processes?

Program Experience and Satisfaction

Q6. What topics were covered in the performance?

Q7. Do you think any of the topics could have been better emphasized or explained? If so, which ones and why?

Q8. Should any topics be removed from the performance? If so, which ones and why?

Q9. What about age appropriateness – was the content appropriate for all ages [ELEMENTARY, MIDDLE, OR HIGH]? If not, what was not age appropriate? How could that be improved?

Q10. Did the performance keep your students' attention? If not, how could the content be improved to keep the students entertained and attentive?

Q11. What did you like the most about the performance?

Is there anything you disliked?

Q12. How did your students respond to the performance?

- *Probes:* What did students say about the performance? Did they like it? What specifically did they like most about it?

Q13. One of the goals of the NTC program is for performers to get students' families to sign up for energy efficiency kits from Duke Energy that contain energy efficient bulbs, low-flow shower heads, and other items that students' families can install in their home to save energy. Did the performers talk about the kits, and/or how to sign up?

- [*If* yes] What did they say?

Q14. How many NTC performances have you seen? [*If they saw multiple NTC performances:*] When did you see that/these performance(s)? How did the latest performance compare to the prior performance(s)?

Q15. On a scale of 1 to 5, where 1 is "not at all interested" and 5 is "very interested", how interested would you be in using virtual or recorded performances in your classroom?

Q16. Do you have any suggestions that might improve the National Theatre for Children performance(s)?

Q17. NTC provides student workbooks that contain educational materials and a form to get an energy saver kit for their home. Have you distributed these workbooks to your students? [THESE NOW ARE AVAILABLE FULLY ELECTRONIC, IF THE TEACHER HAS OPTED OUT OF PRINTED MATERIAL]

- [*If no:*] Why not?
- [*If yes:*] How does the workbook distribution work? Do the students get them in a class?
    - Did you print them yourselves, view it online, or were paper copies delivered?
    - How did you use the workbooks in your classroom?

Q18. Did you get any teacher-facing instructional material from NTC? [*If* yes] What was it? How did you receive it? [*Probe: Left in your box, emailed if in digital form, or in some other way?*] To what extent did you use that material?

- [*If material was not used:*] Why haven't you used the material(s)? What would make you more likely to use them?
- [*If used:*] Using a 1 to 5 scale where 1 means "not at all useful" and 5 means "extremely useful," how useful was the instructional material? Why did you give that rating? What was most/least useful about them?

Q19. Were any other materials handed out by the performers before, during, or after the performance? If so, what was handed out? Did you use these materials in your classroom, or did the students take them home? *[probe about value of these materials]*

Q20. Thinking about the educational materials NTC provided…

- In what ways, if any, did you incorporate the material into your lesson plans? [*IF NOT* MENTIONED] That is, did you extensively use it – such as weaving it into your course work over the year – or did you briefly utilize it in the time surrounding the performance? Please explain how extensively you used the material.

- Was the content age appropriate? Or was it too advanced or too basic? What was too basic/advanced? Is it age appropriate for all ages (ELEMENTARY, MIDDLE, HIGH) How effective is it in teaching kids about energy concepts?

Q21. Do you have any suggestions that might improve the classroom materials received from the National Theatre for Children?

Q22. Did anyone or any of the materials you received emphasize the value of the kits to you? If so, what did they say?

Q23. In the online survey you said you [DID / DID NOT] distribute the kit request form to your students.

- [*IF DISTRIBUTED*] What challenges, if any, did you encounter when trying to distribute the kit forms? Did you have to coordinate with other faculty or staff? If so, can you describe this process and how well the process worked? What can NTC or Duke Energy do to make this process easier for you?
- [*IF NOT DISTRIBUTED*] Why did you not distribute the kit forms? What can NTC or Duke Energy do to make this process easier for you?

Q24. What, if anything, did you say or do to encourage your students to take the kit form and have their parents fill it out? Did you encourage your students to sign up online? If so, what did you say or do in doing so?

Q25. Do you have suggestions that might improve the distribution of the kit forms to students, or the online sign-up process?

Q26. In what ways did the performers or the materials mention the Kilowatt Krush app, if at all? Did your students report using it? Do you have any feedback about the app or how its communicated to participants?

Q27. Thinking about the performance and curriculum as a whole, in what ways, if any, did your students subsequently demonstrate knowledge on the topics presented? [*IF NOT* MENTIONED] What were some of their main takeaways? What is the evidence of their increased knowledge? (test scores, etc.?)

Wrap Up

Q28. Do you have any other thoughts about the program that we didn't discuss that you think may be important?

Thank you for your time. Have a great day!

E.6 Student Parent Survey

Landing Page Introduction

Thank you for agreeing to take this survey. It starts with a few questions about your experience in the program. The survey then asks for your feedback on various elements of the kit you received.

Introduction/Screening

Q1. [IF OUTBOUND CATI] Hi, I'm _______ , calling on behalf of Duke Energy, may I please speak with [CONTACT NAME]? We're returning your call regarding the survey about an energy efficiency educational program that Duke Energy sponsored in your child's school during the **2019-2020 school year.**

We would like to know about your participation in an energy efficiency educational program that Duke Energy sponsored in your child's school during the **2019-2020 school year**. In addition to sponsoring classroom activities, Duke Energy sent a kit containing energy saving items to your home. This kit included light bulbs, a showerhead, and other items that help you save energy in your home. Do you recall receiving this kit?

1. Yes
2. No [IF WEB: TERMINATE] [IF CATI: If no: Can I speak with another adult who may know something about this kit?]
98. Don't know [IF WEB: TERMINATE] [IF CATI: If DK: Can I speak with someone who may know something about this kit?]
99. Refused [TERMINATE]

[IF CATI: INTERVIEWER INSTRUCTIONS: *If no adults are able to speak about the kit, thank and terminate.*]

Q1.1 [IF Q1 = 1]. Were you aware of this program, prior to your child's involvement, due to your work at an elementary, middle, or high school?

1. Yes [→ TERMINATE]
2. No

Program Experience

Q2. Before today, did you know the kit you received was sponsored by Duke Energy?

1. Yes
2. No
98. Don't know
99. Refused

[IF Q2 = 1]

Q3. How did you learn that the kit was sponsored by Duke Energy? *[Select all that apply]*

1. Classroom materials brought home by child
2. My child's teacher/school
3. Information material included in/on the kit
4. Other (specify: ___________)
98. Don't know
99. Refused

Q4. How did you hear about the opportunity to receive the kit from Duke Energy? *[Select all that apply]*

1. Classroom materials brought home by child
2. School newsletter
3. Email from my child's teacher/school
4. School website or school web portal
5. In-person conversations with my child's teacher
6. Saw a poster at my child's school
7. After hours event at my child's school
8. Other (specify: ___________)
98. Don't know
99. Refused

Q4b. How did you request your kit?

1. Program's website (www.myenergykit.org)
2. Sign-up form in the classroom materials my child brought home
3. By calling the toll-free number
4. Via the "Kilowatt Krush" app on my smartphone
98. Don't know
99. Refused

Q4c. Has your child used the "Kilowatt Krush" app on any smartphone in your household?

1. Yes
2. No [SKIP TO Q5]
98. Don't know [SKIP TO Q5]
99. Refused [SKIP TO Q5]

Q4d. About how often would you say that your child uses the "Kilowatt Krush" app?

1. They used it once
2. They used it a few times
3. They use it daily
4. They use it weekly
5. Other: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

Q4e. Have you noticed your child engaging in energy saving behaviors you can attribute to their use of the "Kilowatt Krush" app?

1. Yes [Q4e.1 What energy saving behaviors have you noticed? OPEN-ENDED RESPONSE]
2. No
3. Don't know

Q4f. Do you have any feedback that might help improve the "Kilowatt Krush" app?

1. Yes [Q4f.1 What might improve the app? [OPEN-ENDED RESPONSE 98 Don't Know 99 = Refused]
2. No

98. Don’t know
99. Refused

Q5. Did you read any of the Energy Savers booklet that came in the kit? This is the 44-page booklet with information about how to save energy in the home.

1. Yes
2. No
98. Don't know
99. Refused

[ASK Q6 IF Q5 = 1]

Q6. On a scale from 0 to 10 where 0 is not at all helpful and 10 is very helpful, how helpful was the Energy Savers booklet in identifying ways your household could save energy at home?

0. Not at all helpful
1.
2.
3.
4.
5.
6.
7.
8.
9.
10. Very helpful
98. Don't know
99. Refused

[ASK Q7 IF Q6 < 7]

Q7. What might have made the information more helpful?

[OPEN-ENDED RESPONSE] 98=Don’t Know 99= Refused

Q8. In addition to sending the energy saving kits, Duke Energy sponsored a program about energy and energy efficiency at your child’s school, which included classroom materials and an in-school performance by the National Theatre for Children. Were you aware of this program before today?
[IF CATI: Interviewer: Record ‘yes’ if the respondent reported any awareness of any aspect of the school program]

1. Yes
2. No
98. Don't know
99. Refused

[ASK IF Q8 = 1]

Q9. From who or where did you hear about this program?

[MULTIPLE RESPONSE]

1. From my child/children
2. From a teacher/school administrator
3. On Duke Energy website

4 Other, please specify: Q94.1 From who or where did you hear about this program? [OPEN-ENDED RESPONSE]
98 Don't Know
99. Refused

Assessing Energy Saver Kit Installation

We'd like to ask you about the energy saving items included in your kit.
The kit contained an energy-efficient showerhead, faucet aerators for the bathroom and kitchen, energy efficient light bulbs, a night light, and some insulator gaskets for light switches and electricity outlets.
IF CATI: [*IF NEEDED:* The bathroom and kitchen faucet aerators are small metal pieces that you can screw into a sink faucet to reduce water flow. The insulator gaskets are made of foam and are the size and shape of a light switch or electric outlet.]
IF WEB: (The bathroom and kitchen faucet aerators are small metal pieces that you can screw into a sink faucet to reduce water flow. The insulator gaskets are made of foam and are the size and shape of a light switch or electric outlet.)

Q10. Have you or anyone else installed any of those items in your home, even if they were taken out later?
[IF CATI: Interviewer: Throughout interview, remind respondent as needed to report whether someone else in the home installed or uninstalled any items]

[SINGLE RESPONSE]

1. Yes
2. No [→Q18]
98. Don't know [→ TERMINATE]
99. Refused [→ TERMINATE]

[ASK IF Q10 = 1]
Q11. Which of the items did you install, even if they were taken out later?
[IF CATI: Interviewer: Record each response, then prompt with the list items.]

Item	Response
Q11a Showerhead	1. Yes 2. No 98. DK 99. REF
Q11b Kitchen faucet aerator	1. Yes 2. No 98. DK 99. REF
Q11c Bathroom faucet aerator	1. Yes 2. No 98. DK 99. REF
Q11d Night light	1. Yes 2. No 98. DK 99. REF
Q11e Energy efficient light bulb(s) (LEDs)	1. Yes 2. No 98. DK 99. REF
Q11f Insulator gaskets for light switches and electricity outlets	1. Yes 2. No 98. DK 99. REF

[ASK IF Q11e (ENERGY EFFICIENT LIGHT BULB(S)) = 1 (YES)]
Q12. In addition to the night light, there were two LED light bulbs in the kit. Did you install one or both LED light bulbs in the kit?

[SINGLE RESPONSE]

1. I installed both LEDs
2. I installed only one LED light bulb
98. Don't know
99. Refused

[ASK IF Q11f = 1]
Q13. How many of the light switch and electric outlet gasket insulators from the kit di*d you, or someone else,* install in your home?

[SINGLE RESPONSE]

1. None
2. One
3. Two
4. Three
5. Four
6. Five
7. Six
8. Seven
9. Eight
10. Nine
11. Ten
12. Eleven
13. Twelve
98. Don't know
99. Refused

[ASK IF ANY PART OF Q11 = 1]
Q14. Overall, how satisfied are you with the item[s] you installed? Please use 0 to 10 scales, where 0 is very dissatisfied and 10 is very satisfied. How satisfied are you with...?

DISPLAY IF	Item	Rating
Q11a = 1	Q14a Showerhead	0-10 with 98=DK, 99=REF
Q11b = 1	Q14b Kitchen faucet aerator	0-10 with 98=DK, 99=REF
Q11c = 1	Q14c Bathroom faucet aerator	0-10 with 98=DK, 99=REF
Q11d = 1	Q14d Night light	0-10 with 98=DK, 99=REF
Q11e = 1	Q14e Energy efficient light bulbs (LEDs)	0-10 with 98=DK, 99=REF
Q11f = 1	Q14f Insulator gaskets	0-10 with 98=DK, 99=REF

[ASK IF ANY ITEMS IN Q14a - Q14f < 7]
Q14.1. Can you please explain any dissatisfaction you had with the [DISPLAY ALL ITEMS IN Q14 THAT ARE <7]?

Q14.1a [IF Q14a < 7] Showerhead
Q14.1b [IF Q14b < 7] Kitchen Faucet aerator
Q14.1c [IF Q14c <7] Bathroom faucet aerator
Q14.1d [IF Q14d< 7] Night light
Q14.1e [IF Q14e <7] Energy efficient light bulbs (LEDs)
Q14.1f [IF Q14f < 7] Insulator gaskets
[OPEN END: RECORD VERBATIM]

[ASK IF Q11a OR Q11b OR Q11c OR Q11d OR Q11e OR Q11f = 1]
Q15. Have you since uninstalled any of the items from the kit that you had previously installed?

[SINGLE RESPONSE]

1. Yes

2. No
98. Don't know
99. Refused

[ASK IF Q15 = 1]
Q16. Which of the items did you uninstall?
[IF CATI: Interviewer: Record the response, then prompt with the list items.]

[MULTIPLE RESPONSE]

1. [DISPLAY IF Q11a = 1] Showerhead
2. [DISPLAY IF Q11b = 1] Kitchen faucet aerator
3. [DISPLAY IF Q11c = 1] Bathroom faucet aerator
4. [DISPLAY IF Q11d = 1] Night light
5. [DISPLAY IF Q11e = 1] Energy efficient light bulbs(LEDs)
6. [DISPLAY IF Q11f = 1] Insulator gaskets
98. Don't know
99. Refused

[ASK IF Q16 1-6 OPTIONS WERE SELECTED]
Q17. Why were those items uninstalled? Let's start with…
[IF CATI: *Interviewer: Read each item*]

	Item	Reason
IF Q16 = 1	Q17a Showerhead	Repeat reason options
IF Q16 = 2	Q17b Kitchen faucet aerator	Repeat reason options
IF Q16 = 3	Q17c Bathroom faucet aerator	Repeat reason options
IF Q16 = 4	Q17d Night light	Repeat reason options
IF Q16 = 5	Q17e Energy efficient light bulbs	Repeat reason options
IF Q16 = 6	Q17f Insulator gaskets	Repeat reason options

Response options:

[MULTIPLE RESPONSE]

1. It was broken
2. I didn't like how it worked
3. I didn't like how it looked
4. Other: (specify)
98. Don't Know
99. Refused

[ASK IF Q11a OR Q11b OR Q11c OR Q11d OR Q11e OR Q11f = 2 OR Q10 = 2]
Q18. You said you haven't installed [INPUT ONLY THOSE ITEMS IN Q11 IF Q11a-f = 2] OR [IF Q10=2, RECALL "any of the items"]. Which of those items do you plan to install in the next three months?
[IF CATI: READ LIST - SELECT ALL THAT APPLY].]

[MULTIPLE RESPONSE] [DISPLAY ALL IF = 2]

1 [IF Q10 = 2 OR Q11a = 2] Showerhead
2 [IF Q10 = 2 OR Q11b = 2] Kitchen faucet aerator
3 [IF Q10 = 2 OR Q11c = 2] Bathroom faucet aerator

4 [IF Q10 = 2 OR Q11d = 2] Night light
5 [IF Q10 = 2 OR Q11e = 2] Energy efficient light bulbs(LEDs)
6 [IF Q10 =2 OR Q11f = 2] Insulator gaskets
98. None
99. Refused

[ASK IF ANY 1-6 OPTIONS WERE NOT SELECTED IN Q18 OR OPTION 98 “NONE” WAS SELECTED]

Q19. What’s preventing you from installing those items? Let’s start with….
[IF CATI: *Interviewer: Read items*]

[MULTIPLE RESPONSE]

DISPLAY IF	Item	Reason
SKIP IF Q18=1,98,99	Q19a Showerhead	Use multiple response options below
SKIP IF Q18=2,98,99	Q19b Kitchen faucet aerator	Use multiple response options below
SKIP IF Q18=3,98,99	Q19c Bathroom faucet aerator	Use multiple response options below
SKIP IF Q18=4,98,99	Q19d Night light	Use multiple response options below
SKIP IF Q18=5,98,99	Q19e Energy efficient light bulbs	Use multiple response options below
SKIP IF Q18=6,98,99	Q19f Insulator gaskets	Use multiple response options below

[MULTIPLE RESPONSE OPTIONS FOR Q19]

1. Didn’t know what that was
2. Tried it, didn’t fit
3. Tried it, didn’t work as intended (Please specify: ______________________________)
4. Haven’t gotten around to it
5. Current one is still working
6. Takes too much time to install it/No time/Too busy
7. Too difficult to install it, don’t know how to do it
8. Don’t have the tools I need
9. Don’t have the items any longer (threw away, gave away)
10. [DISPLAY IF Q18.5 was not selected] Already have energy efficient light bulbs
11. [DISPLAY IF Q18.1 was not selected] Already have efficient showerhead
12. [DISPLAY IF Q18.2 was not selected] Already have efficient kitchen faucet aerator
13. [DISPLAY IF Q18.3 was not selected] Already have efficient bathroom faucet aerators

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[IF ANY PART OF Q11 = 1 AND IT’S NOT THE CASE THAT ALL PARTS OF Q16=SELECTED (THAT IS, THEY INSTALLED ANYTHING AND DID NOT UNINSTALL EVERYTHING THEY INSTALLED)]

[SKIP Q20 IF Q10=2]

Q20. Thinking of the items you installed, would you be interested in receiving any more of them from Duke Energy? If so, which ones?
[MULTIPLE RESPONSES]

1. [IF Q11a = 1 AND Q16 <> 1] Yes, I would like another energy-efficient showerhead
2. [IF Q11b = 1 AND Q16 <> 2] Yes, I would like another kitchen faucet aerator
3. [IF Q11c = 1 AND Q16 <> 3] Yes, I would like more bathroom faucet aerators

4. [IF Q11d = 1 AND Q16 <>4] Yes, I would like more night lights
5. [IF Q11e = 1 AND Q16 <> 5 Yes, I would like more energy-efficient light bulbs (LEDs)
6. [IF Q11f = 1 AND Q16 <>6 Yes, I would like more switch/outlet gasket insulators
7. No, I am not interested in receiving any more of the items
98. Don't know
99. Refused

[IF Q20=1-6]

Q21. What would be your preferred way to request these additional items? [MULTIPLE RESPONSES]

1. Internet
2. Telephone
3. Pre-paid postcard
4. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF Q11a (SHOWERHEAD)) = 1 (YES) AND Q16 <>1 (SHOWERHEAD); THAT IS, SHOWERHEAD WAS INSTALLED AND NOT UNINSTALLED]

Q22. On average, what is the typical shower length in your household?

[SINGLE RESPONSE]

1. One minute or less
2. Two to four minutes
3. Five to eight minutes
4. Nine to twelve minutes
5. Thirteen to fifteen minutes
6. Sixteen to twenty minutes
7. Twenty-one to thirty minutes
8. More than thirty minutes
98. Don’t know
99. Refused

[ASK IF Q11a (SHOWERHEAD)) = 1 (YES) AND Q16 <>1 (SHOWERHEAD); THAT IS, SHOWERHEAD WAS INSTALLED AND NOT UNINSTALLED]

Q23. Thinking of the efficient showerhead currently installed in your home…on average, how many showers per day are taken in this shower?

[SINGLE RESPONSE]

1. Fewer than one
2. One
3. Two
4. Three
5. Four
6. Five
7. Six
8. Seven
9. Eight
98. Don't know
99. Refused

I/A

[ASK IF Q11d = 1 AND Q16 <>4 NIGHT LIGHT OPTION WAS NOT SELECTED]

Q24. YOU SAID YOU INSTALLED THE NIGHT LIGHT. Did the night light replace an existing night light?

1. Yes
2. No
98. Don't know
99. Refused

[ASK IF Q24= 1]

Q25. Did the old nightlight have a bulb that you could take out and replace once it burned out?

1. Yes
2. No
98. Don't know
99. Refused

[ASK IF (Q11e = 1 AND Q16 <> 5 (ENERGY EFFICIENT LIGHTS WERE NOT SELECTED)]

Q26. You said you installed at least one of the energy efficient lights. What type of bulb(s) did you replace with the energy efficient lightbulbs?

1. All incandescent [IF CATI: *Interviewer: describe as an old-fashioned light bulb - likely purchased more than two years ago*]
2. All halogen [IF CATI: *Interviewer: describe as bulb that looks like an incandescent, but has a glass tube inside of the bulb*]
3. All CFL [IF CATI: *Interviewer: describe as spiral, or twisty shape bulb that fit into ordinary light fixtures]*
4. All LED [IF CATI: *Interviewer: describe as a new bulb type that uses little electricity and lasts a long time*]
5. Some combination; Please describe: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF (Q11e = 1 AND Q16 <> 5 (ENERGY EFFICIENT LIGHT BULBS NOT SELECTED)]

Q27. In what rooms did you install the energy efficient lightbulbs that were included in the kit? [MULTIPLE RESPONSE] [IF CATI: *Interviewer: If the respondent gives more than two responses, remind them that there were only two bulbs.]*

1. Living room
2. Dining room
3. Bedroom
4. Kitchen
5. Bathroom
6. Den
7. Garage
8. Hallway
9. Basement
10. Outdoors
11. Other area (please specify):_______
12. Don’t Know
13. Refused

Q28. Have you adjusted the temperature of your water heater based on the Hot Water Gauge Card included in your kit?

1. Yes
2. No
3. Don't recall seeing the Hot Water Gauge Card
98. Don't know
99. Refused

[ASK IF Q28 = 1]
Q29. Do you know what the old temperature setting on your hot water heater was? (Numeric answers only, please)

1. Yes (please type in previous temperature setting here)
2. No

[ASK IF Q28 = 1]
Q30. And what was the new temperature setting you set your hot water heater to? (Numeric answers only, please)

[Record response]

98. Don't know

[ASK IF Q28 = 1]
Q31. Is the new water heater temperature setting still in place?

1. Yes
2. No
98. Don't know
99. Refused

[IF Q31 = 2]
Q32. Why did you change the water heater temperature a second time?

[Record response]

Q33. What is the fuel type of your water heater?

1. Electricity
2. Natural Gas
3. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

Q34. How old is your water heater?

1. Less than five years old
2. Five to nine years old
3. Ten to fifteen years old
4. More than fifteen years old
98. Don't know

NTG

[IF ANY PART OF Q11 = 1 AND IT'S NOT THE CASE THAT ALL PARTS OF Q16 =SELECTED (THAT IS, THEY INSTALLED ANYTHING AND DID NOT UNINSTALL EVERYTHING THEY INSTALLED)]

ASK Q35 IF [Q11a = 1 AND Q16<>1]OR [Q11b = 1 AND Q16 <>2] OR [Q11c = 1 AND Q16 <> 3] OR [Q11d = 1 AND Q16 <>4] OR Q11e = 1 AND Q16 <> 5] OR [Q11f = 1 AND Q16 <>6]

Q35. If you had not received the free efficiency items in the kit, how likely is it that you would have purchased and installed any of these same items within the next six months?

0 – Not at all likely	1	2	3	4	5	6	7	8	9	10 – Extremely likely	98 DK	99 RF

Q35_1. [DISPLAY IF Q11a = 1 AND Q16 <>1] Energy-Efficient Showerhead
Q35_2. [DISPLAY IF Q11b = 1 AND Q16 <> 2] Kitchen Faucet Aerator
Q35_3. [DISPLAY IF Q11c = 1 AND Q16 <>3] Bathroom Faucet Aerator
Q35_4. [DISPLAY IF Q11d = 1 AND Q16 <>4] Energy-Efficient Night Light
Q35_5. [DISPLAY IF Q11e = 1 AND Q16 <> 5] Energy-Efficient Light Bulbs (LEDs)
Q35_6. [DISPLAY IF Q11f = 1 AND Q16 <>6] Switch/Outlet Gasket Insulators

[ASK Q36 IF Q35_4 > 4 AND Q12 = 1]

Q36. If you had not received them for free in the kit, how many LED light bulbs would you have purchased?

1. One
2. Two
98. Don't know
99. Refused

[IF (Q11a = 1 AND Q16 <> 1) OR (Q11b = 1 AND Q16 <> 2) OR (Q11c = 1 AND Q16 <> 3)]

Q37. Now, thinking about the water savings items that were provided in the kit - using a scale from 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential" how influential were the following factors on your decision to install the **water saving items (showerhead and faucet aerators)** from the kit? *How influential was…*

1[*97 = Not Applicable 98= Don't Know 99 = Refused* [MATRIX QUESTION: SCALE]

Elements	**Responses**
The fact that the items were free	0-10 scale with DK and REF options
The fact that the items were mailed to your house	0-10 scale with DK and REF options
Information in the kit about how the items would save energy	0-10 scale with DK and REF options
Information that your child brought home from school	0-10 scale with DK and REF options
Other information or advertisements from Duke Energy, including its website	0-10 scale with DK and REF options

[ASK Q38 IF Q11e = 1 AND Q16 <> 5]

Q38. Using a scale from 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential" how influential were the following factors on your decision to install the **lightbulb(s)** from the kit? *How influential was…*

1 *97 = Not Applicable 98= Don't Know 99 = Refused* [MATRIX QUESTION: SCALE]

Elements	**Responses**
The fact that the items were free	0-10 scale with DK and REF options
The fact that the items were mailed to your house	0-10 scale with DK and REF options
Information in the kit about how the items would save energy	0-10 scale with DK and REF options
Information that your child brought home from school	0-10 scale with DK and REF options
Other information or advertisements from Duke Energy, including its website	0-10 scale with DK and REF options

Q39. Since your child learned about energy conservation at school and signed up for your energy kit from Duke Energy, has **your child** adopted any **new behaviors** to help save energy in your home? This would only include new energy saving **behaviors** that your child adopted since receiving the kit.

[MULTIPLE RESPONSE]

1. Not applicable - no new behaviors
2. Turning off lights when not in a room
3. Turning off electronics when not using them
4. Taking shorter showers
5. Other (specify: ____________)
98. Don't know
99. Refused

Q39b. [IF =2 OR 3 OR 4 OR 5] Before receiving the kit, was your child already… [DISPLAY ITEMS SELECTED IN Q39]

Q39b.2 [Display IF Q39 = 2] Turning off lights when not in a room
Q39b.3 [Display IF Q39 = 3] Turning off electronics when not using them
Q39b.4 [Display if Q39 = 4] Taking shorter showers
Q39b.5 [Display IF Q39 = 5 [Insert Q39 "other"]__________)
1. Yes
2. No
98. Don't know
99. Refused

Q40. Since receiving your energy kit from Duke Energy, have **you** adopted or increased any of the following **behaviors** to help save energy in your home?

[MULTIPLE RESPONSE]

1. Not applicable - no new behaviors
2. Turning off lights when not in a room

3. Turning off furnace when not home
4. Turning off air conditioning when not home
5. Changing thermostat settings so heating or cooling system uses less energy
6. Using fans instead of air conditioning
7. Turning off electronics when not using them
8. Taking shorter showers
9. Turning water heat thermostat down
10. Other (specify: ____________)
98. Don't know
99. Refused

Q40b. [IF Q40 = 2-10] Before receiving the kit, were you already…

[DISPLAY ITEMS SELECTED IN Q40- [Question labels: Q40b2 – Q40b10]

1. Yes
2. No
98. Don't know
99. Refused

[ASK Q41 IF Q40b2 OR Q40b3 OR Q40b4 OR Q40b5 OR Q40b6 OR Q40b7 OR Q40b8 OR Q40b9 OR Q40b10 = 2]

Q41. On a scale of 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential," how much influence did Duke Energy's kit and materials on saving energy have on this change of energy using behaviors?

0 – Not at all influential	1	2	3	4	5	6	7	8	9	10 – Extremely influential	98 DK	99 RF

Q42. Since receiving your energy kit from Duke Energy, have you purchased and installed any other **products** or made any improvements to your home to help save energy?

1. Yes
2. No
98. Don't know
99. Refused

[If Q42b= 1] [IF Q42 = 2, 98, 99 SKIP TO Q60]

Q43. What **products** have you purchased and installed to help save energy in your home?

[IF CATI: Do not read list. After each response, ask, "Anything else?"] [MULTIPLE RESPONSE]

1. Energy efficient appliances
2. Efficient heating or cooling equipment
3. Efficient windows
4. Insulation
5. Products to seal air leaks in your home
6. Products to seal ducts
7. LEDs and/or CFLs

8. Energy efficient water heater
9. None – no other actions taken
96. Other, please specify: ____________________
98. Don't know
99. Refused

[ASK IF Q43 <> 9, 98, OR 99]
Q44. Did you get a rebate from Duke Energy for any of those products or services? If so, which ones?

[LOGIC] Item	Response
Q44.1 [IF Q43.1 IS SELECTED] 1. Energy efficient appliances	Yes, No DK REF
Q44.2 [IF Q43.2 IS SELECTED] 2. Efficient heating or cooling equipment	Yes, No DK REF
Q44.3 [IF Q43.3 IS SELECTED] 3. Efficient windows	Yes, No DK REF
Q44.4 [IF Q43.4 IS SELECTED] 4. Additional insulation	Yes, No DK REF
Q44.5 [IF Q43.5 IS SELECTED] 5. Products to seal air leaks in your home	Yes, No DK REF
Q44.6 [IF Q43.6 IS SELECTED] 6. Products to seal ducts	Yes, No DK REF
Q44.7 [IF Q43.7 IS SELECTED] 7. LEDs and/or CFLs	Yes, No DK REF
Q44.8 [IF Q43.8 IS SELECTED] 8. Install an energy efficient water heater	Yes, No DK REF
Q44.96 [IF Q43.96 IS SELECTED] 96 [**Q43 OPEN ENDED RESPONSE]**	Yes, No DK REF

[ASK IF ANY ITEM IN Q43 WAS SELECTED]
Q45. On a scale of 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how much influence did the Duke Energy schools program have on your decision to…

[MATRIX QUESTION: SCALE]

[LOGIC] Item	Response
Q45.1 [IF Q43.1 IS SELECTED] 1. Buy energy efficient appliances	0-10 scale with DK and REF
Q45.2 [IF Q43.2 IS SELECTED] 2. Buy efficient heating or cooling equipment	0-10 scale with DK and REF
Q45.3 [IF Q43.3 IS SELECTED] 3. Buy efficient windows	0-10 scale with DK and REF
Q45.4 [IF Q43.4 IS SELECTED] 4. Buy additional insulation	0-10 scale with DK and REF
Q45.5 [IF Q43.5 IS SELECTED] 5. Seal air leaks in your home	0-10 scale with DK and REF
Q45.6 [IF Q43.6 IS SELECTED] 6. Seal ducts	0-10 scale with DK and REF
Q45.7[IF Q43.7 IS SELECTED] 7. Buy LEDs and/or CFLs	0-10 scale with DK and REF
Q45.8 [IF Q43.8 IS SELECTED] 8. Install an energy efficient water heater	0-10 scale with DK and REF
Q45.96[IF Q43.96 IS SELECTED] **[Q45 open ended response]**	0-10 scale with DK and REF

[ASK IF Q43.1 IS SELECTED AND Q45.1 <> 0, DK, REF]
Q46. What kinds of appliance(s) did you buy?

1*[IF CATI: Do not read list]* [MULTIPLE RESPONSE]

1. Refrigerator
2. Stand-alone Freezer
3. Dishwasher
4. Clothes washer
5. Clothes dryer
6. Oven
7. Microwave
96. Other, please specify: ____________
98. Don’t know
99. Refused

[A*SK Q47* IF Q46 = 1-96] [REPEAT *Q47* FOR EACH ITEM MENTIONED IN Q46]

Q47. Was the [INSERT Q46 RESPONSE] an ENERGY STAR or high-efficiency model?

[SINGLE RESPONSE]

1 Yes
2 No
98. Don't know
99. Refused

[ASK IF Q46 = 5]
Q48. Does the new clothes dryer use natural gas?

1 Yes - it uses natural gas
2 No – does not use natural gas
98. Don’t know
99. Refused

[ASK IF Q43 = 2 AND Q45.2 > 0]
Q49. What type of heating or cooling equipment did you buy?

[Do not read list] [MULTIPLE RESPONSE]

1. Central air conditioner
2. Window/room air conditioner unit
3. Wall air conditioner unit
4. Air source heat pump
5. Geothermal heat pump
6. Boiler
7. Furnace
8. WIFI-enabled thermostat
96. Other, please specify: _______________
98. Don't know
99. Refused

[ASK IF Q49 = 6-7]
Q50. Does the new [INSERT RESPONSE] use natural gas?

1. Yes - it uses natural gas
2. No – does not use natural gas
98. Don’t know
99. Refused

[A*SK* IF Q49 = 1-8, 96] QUESTION LABELS: Q51.1, Q51.2, Q51.3, Q51.4, Q51.5, Q51.6, Q51.7, Q51.96

Q51. Was the heating or cooling equipment an ENERGY STAR or high-efficiency model?

[SINGLE RESPONSE]

1. Yes
2. No
98. Don't know
99. Refused

[REPEAT Q51 FOR EACH ITEM MENTIONED IN Q49, EXCLUDING 49=8 WIFI -enabled thermostat]

[ASK IF Q43 = 3 AND Q45.3 > 0]

Q52. HOW MANY WINDOWS DID YOU INSTALL?

1. [_______________][Numeric Response 1-30
1. Don’t know
99. Refused

[ASK IF Q43 = 4 AND Q45.4 > 0]

Q53. Did you add insulation to your attic, walls, or below the floor?

[IF CATI: Do not read list] [MULTIPLE RESPONSE]

1. Attic
2 Walls
3 Below the floor
98. Don't know
99. Refused

[ASK IF Q53 <> 98-99]
[PROGRAMMER: REPEAT Q54 FOR EACH ITEM MENTIONED IN Q53] Q54.1 = ATTIC Q54.2 = WALLS Q54.3 = BELOW THE FLOOR]

Q54. Approximately what proportion of the [ITEM MENTIONED IN Q53] SPACE DID YOU ADD INSULATION TO? Your best estimate is fine.

1 [RECORD AS %] [NUMERIC RANGE 1 – 100]
98 Don’t know
99. Refused

[ASK IF Q43 = 7 AND Q45.7 > 0]

Q55. How many of LEDs and CFLs did you install in your property?

[IF NEEDED: *Your best estimate is fine]*

1. [NUMERIC RESPONSE 1- 100]
1. Don’t know

99. Refused

[ASK IF Q55 > 50)

Q56. You said that you installed [Q55 RESPONSE] LED and CFL bulbs on your property. Is this the correct number?

1. Yes, this is number of LED and CFL bulbs I installed
2. No, the correct number is: (Numeric answers only, please) _______
98. Don't know
99. Refused

[ASK IF Q43 = 8 IS SELECTED AND Q45.8 > 0]
Q57. Does the new water heater use natural gas?

1Yes - it uses natural gas
2. No – does not use natural gas
98. Don't know
99. Refused

[ASK IF Q43 = 8 IS SELECTED AND Q45.8 > 0]
Q58. Which of the following water heaters did you purchase?

1. A traditional water heater with a large tank that holds the hot water
2. A tankless water heater that provides hot water on demand
3. A solar water heater
4. Other, please specify: _______________
98. Don't know
99. Refused

[ASK IF Q43 = 8 AND Q45.8 > 0]
Q59. Is the new water heater an ENERGY STAR model?

[SINGLE RESPONSE]

1. Yes
2. No
98. Don't know
99. Refused

Demographics

Q60. Which of the following types of housing units would you say best describes your home?

1 Single-family detached house
2 Single-family attached home (such as a townhouse or condo)
3 Duplex, triplex or four-plex
4 Apartment or condominium with 5 units or more
5 Manufactured or mobile home
6 Other ______________
98. Don't know
99. Refused

Q61. How many showers are in your home? Please include both stand-up showers and bathtubs with showerheads.

1. One
2. Two

3. Three
4. Four
5. Five or more
98. Don't know
99. Refused

Q62. How many square feet of living space are there in your residence, including bathrooms, foyers and hallways (exclude garages, unfinished basements, and unheated porches)?

1 Less than 500 square feet
2 500 to under 1,000 square feet
3 1,000 to under 1,500 square feet
4 1,500 to under 2,000 square feet
5 2,000 to under 2,500 square feet
6 2,500 to under 3,000 square feet
7 Greater than 3,000 square feet
98. Don't know
99. Refused

Q63. Do you or members of your household own your home, or do you rent it?

1. Own / buying
2. Rent / lease
3. Occupy rent-free
98. Don't know
99. Refused

Q64. Including yourself, how many people currently live in your home year-round

1 I live by myself
2 Two people
3 Three people
4 Four people
5 Five people
6 Six people
7 Seven people
8 Eight or more people
98. Don't know
99. Refused

Q65. What was your total annual household income for 2020, before taxes?

1 Under $15,000
2 15 to under $25,000
3 25 to under $35,000
4 35 to under $50,000
5 50 to under $75,000
6 75 to under $100,000
7 100 to under $150,000
8 150 to under $200,000
9 $200,000 or more
98. Don't know
99. Prefer not to say

Q66. In what year were you born?

1. [NUMERIC RESPONSE – FIELD WIDTH =4, 1900-2003]
98. Don't know
99. Prefer not to say

Q67. What is the highest level of education achieved among those living in your household?

1 Less than high school
2 Some high school
3 High school graduate or equivalent (such as GED)
4 Trade or technical school
5 Some college (including Associate degree)
6 College degree (Bachelor's degree)
7 Some graduate school
8 Graduate degree, professional degree
9 Doctorate
98 Don't know
99. Prefer not to say

Q68. Lastly, did the COVID-19 pandemic, or government or organizational responses to it, offer any challenges to you regarding your participation in this program? If so, what were these challenges, and how do you think they might best be addressed moving forward?

1 Yes: [OPEN-ENDED RESPONSE]
2 No
98 Don't know

Thank you for your time completing this survey. Your responses have been recorded. Have a great day!

Appendix F Survey Results

F.1 Teacher Survey - DEC

Q1.What grade(s) do you teach?

	# of responses	Percent
PreK-2nd	1	**2%**
PreK-5th	7	**16%**
PreK-8th	1	**2%**
Kindergarten	1	**2%**
K-5th	1	**2%**
K-6th	1	**2%**
1st	1	**2%**
1st-12th	1	**2%**
3rd	1	**2%**
3rd-5th	1	**2%**
4th	3	**7%**
5th & 6th	1	**2%**
6th	6	**14%**
6th-8th	4	**9%**
7th	2	**5%**
7th & 8th	1	**2%**
8th	1	**2%**
9th & 10th	1	**2%**
9th-11th	2	**5%**
9th-12th	3	**7%**
9th, 10th & 12th	1	**2%**
10th-12th	2	**5%**
Total	43	**100%**

Q2. Are you a home room teacher?

Group	Yes	No	Total
Elementary	8	12	20
Percent	**40%**	**60%**	**100%**
Middle	0	14	14
Percent	**0%**	**100%**	**100%**
High	0	9	9
Percent	**0%**	**100%**	**100%**
Total	8	35	43
Percent	**19%**	**81%**	**100%**

Q3. What subject(s) do you teach?

Group	Art, Other	English/ language arts, Other	English/language arts, Social studies/social sciences/history	Natural Sciences	Natural Sciences, Social studies/social sciences/history	Other	Social studies/social sciences/history	Total
Elementary	0	0	2	0	0	0	1	3
Percent	**0%**	**0%**	**66%**	**0%**	**0%**	**0%**	**33%**	**100%**
Middle	1	0	0	8	1	3	1	14
Percent	**7%**	**0%**	**0%**	**57%**	**7%**	**21%**	**7%**	**100%**
High	0	1	0	7	0	1	0	9
Percent	**0%**	**11%**	**0%**	**78%**	**0%**	**11%**	**0%**	**100%**
Total	1	1	2	15	1	4	2	26
Percent	**4%**	**4%**	**8%**	**58%**	**4%**	**15%**	**8%**	**100%**

Q4. Do you teach any topics on energy (electricity, gas, coal, etc.) generation, transformation, use, or conservation (including, but not limited to, topics/materials provided by the Energy Efficiency for Schools Program)?

Group	Yes	No	Total
Elementary	11	0	11
Percent	**100%**	**0%**	**100%**
Middle	5	0	5
Percent	**100%**	**0%**	**100%**
High	2	0	2
Percent	**100**	**0%**	**100%**
Total	18	0	18
Percent	**100%**	**0%**	**100%**

Q5. Have you previously taken a survey (not fielded by the National Theatre for Children) regarding your participation in this program?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	0	10	1	11
Percent	**0%**	**91%**	**9%**	**100%**
Middle	1	9	4	14
Percent	**7%**	**64%**	**29%**	**100%**
High	0	5	4	9
Percent	**0%**	**56%**	**44%**	**100%**
Total	1	24	9	34
Percent	**3%**	**71%**	**26%**	**100%**

Q6. Did you attend The National Theatre for Children performance for elementary school students in [performance_month] of [performance_year]?

	Yes	No	Don't Know	Total
# of responses	8	0	0	8
Percent	**100%**	**0%**	**0%**	**100%**

Q7. Did your students see a performance event more specific to their grade level?

	Yes, they saw the K-2 performance	Yes, they saw the performance for Grades 3-5	No, they saw the K-5 performance	Don't know/ Can't recall	Total
# of responses	3	5	0	0	8
Percent	**37%**	**63%**	**0%**	**0%**	**100%**

Q8. Did you see the National Theatre for Children performance for middle school students in [performance_month] of [performance_year]?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	3	0	0	3
Percent	**100%**	**0%**	**0%**	**100%**
Middle	14	0	0	14
Percent	**100%**	**0%**	**0%**	**100%**
High	0	0	0	0
Percent	**0%**	**0%**	**0%**	**100%**
Total	17	0	0	17
Percent	**100%**	**0%**	**0%**	**100%**

I/A

Q9. Did you see the National Theatre for Children performance for high school students in [performance_month] of [performance_year]?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	1	0	0	1
Percent	**100%**	**0%**	**0%**	**100%**
Middle	0	0	0	0
Percent	**0%**	**0%**	**0%**	**0%**
High	9	0	0	0
Percent	**100%**	**0%**	**0%**	**100%**
Total	17	0	0	17
Percent	**100%**	**0%**	**0%**	**100%**

Q10. Before today, were you aware the Duke Energy sponsored the National Theatre for Children performance(s) in your schoool?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	11	0	0	11
Percent	**100%**	**0%**	**0%**	**100%**
Middle	14	0	0	14
Percent	**100%**	**0%**	**0%**	**0%**
High	8	1	0	9
Percent	**89%**	**11%**	**0%**	**100%**
Total	33	1	0	34
Percent	**97%**	**3%**	**0%**	**100%**

Q11. How did you learn of Duke Energy's involvement with the National Theatre for Children program?

	Elementary	*Percent*	Middle	*Percent*	High	*Percent*	Total	*Percent*
Another teacher	2	**18%**	2	**14%**	0	**0%**	4	**12%**
Another teacher; Duke Energy marketing materials	0	**0%**	1	**7%**	0	**0%**	1	**3%**
Don't know	0	**0%**	1	**7%**	0	**0%**	1	**3%**
Duke Energy marketing materials	3	**27%**	2	**14%**	0	**0%**	5	**15%**
Duke Energy marketing materials; National Theatre for Children materials	1	**9%**	0	**0%**	1	**13%**	2	**6%**
Duke Energy marketing materials; National Theatre for Children staff	0	**0%**	0	**0%**	1	**13%**	1	**3%**
Duke Energy marketing materials; National Theatre for Children staff; National Theatre for Children materials	1	**9%**	0	**0%**	2	**25%**	3	**9%**
Duke Energy staff; National Theatre for Children staff; National Theatre for Children materials	0	**0%**	1	**7%**	0	**0%**	1	**3%**
National Theatre for Children materials	2	**18%**	2	**14%**	0	**0%**	4	**12%**
National Theatre for Children staff	0	**0%**	2	**14%**	2	**25%**	4	**12%**
National Theatre for Children staff; National Theatre for Children materials	0	**0%**	1	**7%**	2	**25%**	3	**9%**
Other	2	**18%**	2	**14%**	0	**0%**	4	**12%**
Total	11	**100%**	14	**100%**	8	**100%**	33	**100%**

Q12. Are you (one of) the decision-maker[s] regarding the NTC performances at your school?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	9	1	1	11
Percent	**82%**	**9%**	**9%**	**100%**
Middle	14	0	0	14
Percent	**100%**	**0%**	**0%**	**0%**
High	8	0	0	8
Percent	**100%**	**0%**	**0%**	**100%**
Total	31	1	1	33
Percent	**94%**	**3%**	**3%**	**100%**

Q13. Do you recall how the importance of the program was communicated to you?

Group	Yes	No	Total
Elementary	5	4	9
Percent	**56%**	**44%**	**100%**
Middle	9	5	14
Percent	**64%**	**36%**	**100%**
High	6	2	8
Percent	**75%**	**25%**	**100%**
Total	20	11	31
Percent	**65%**	**35%**	**100%**

Q14. Thinking back to the school performance, would you say that energy related concepts presented in the performance were:

Group	Far too advanced for most of your students	Somewhat too advanced for most of your students	About right for most of your students	Somewhat too basic for most of your students	Far too basic for most of your students	Other	Don't know	Total
Elementary	0	0	10	1	0	0	0	11
Percent	**0%**	**0%**	**91%**	**9%**	**0%**	**0%**	**0%**	**100%**
Middle	0	0	12	2	0	0	0	14
Percent	**0%**	**0%**	**86%**	**14%**	**0%**	**0%**	**0%**	**100%**
High	0	0	6	3	0	0	0	9
Percent	**0%**	**0%**	**67%**	**33%**	**0%**	**0%**	**0%**	**100%**
Total	0	0	28	6	0	0	0	34
Percent	**0%**	**0%**	**82%**	**18%**	**0%**	**0%**	**0%**	**100%**

Q15. What about the performance was too advanced for most of your students?

Open-ended response type; no tabulation available

Q16. What about the performance was too basic for most of your students?

Open-ended response type; no tabulation available

Q17. Were there any concepts that the performance(s) did not cover that SHOULD HAVE BEEN covered?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	0	10	1	11
Percent	**0%**	**91%**	**9%**	**100%**
Middle	0	10	4	14
Percent	**0%**	**71%**	**29%**	**100%**
High	1	8	0	9
Percent	**11%**	**89%**	**0%**	**100%**
Total	1	28	5	34
Percent	**3%**	**82%**	**15%**	**100%**

Q18. What concepts were not covered that SHOULD HAVE BEEN covered?

Open-ended response type; no tabulation available

Q19. Please estimate your student's overall engagement level with the National Theatre for Children performance on the following scale.

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	1	6	4	0	11
Percent	**0%**	**0%**	**9%**	**55%**	**37%**	**0%**	**100%**
Middle	0	1	1	7	5	0	14
Percent	**0%**	**7%**	**7%**	**50%**	**36%**	**0%**	**100%**
High	0	0	3	4	2	0	9
Percent	**0%**	**0%**	**33%**	**44%**	**22%**	**0%**	**100%**
Total	0	1	5	17	11	0	34
Percent	**0%**	**3%**	**15%**	**50%**	**32%**	**0%**	**100%**

Q20. Please rate your overall satisfaction with the National Theatre for Children performance on the following scale.

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	3	8	0	11
Percent	**0%**	**0%**	**0%**	**27%**	**73%**	**0%**	**100%**
Middle	0	0	1	2	11	0	14
Percent	**0%**	**0%**	**7%**	**14%**	**79%**	**0%**	**100%**
High	0	0	1	4	4	0	9
Percent	**0%**	**0%**	**11%**	**44%**	**44%**	**0%**	**100%**
Total	0	0	2	9	23	0	34
Percent	**0%**	**0%**	**6%**	**26%**	**68%**	**0%**	**100%**

Q21. Please explain why you offered this satisfaction rating

Open-ended response type; no tabulation available

Q22. Did you receive curriculum or instructional materials, such as student workbooks, related to energy and energy conservation from National Theatre for Children for the Fall 2019 - Spring 2020 school year?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	9	1	1	11
Percent	**82%**	**9%**	**9%**	**100%**
Middle	9	4	1	14
Percent	**64%**	**29%**	**7%**	**100%**
High	5	4	0	9
Percent	**56%**	**44%**	**0%**	**100%**
Total	23	9	2	34
Percent	**68%**	**26%**	**6%**	**100%**

Q23. To what degree did you use the curriculum or instructional materials in teaching your students about energy?

Group	Not at all	A little	Moderately	A lot	Extensively	Don't know	Total
Elementary	0	6	3	0	0	0	9
Percent	**0%**	**67%**	**33%**	**0%**	**0%**	**0%**	**100%**
Middle	0	3	6	0	0	0	9
Percent	**0%**	**33%**	**67%**	**0%**	**0%**	**0%**	**100%**
High	0	1	3	1	0	0	5
Percent	**0%**	**20%**	**60%**	**20%**	**0%**	**0%**	**100%**
Total	0	10	12	1	0	0	23
Percent	**0%**	**43%**	**53%**	**3%**	**0%**	**0%**	**100%**

Q24. Why did you only use the workbooks "a little" in teaching your students about energy?

Open-ended response type; no tabulation available

Q25. Thinking about how the student workbooks explained energy related concepts, would you say that the materials were generally:

Group	Far too advanced for most of your students	Somewhat too advanced for most of your students	About right for most of your students	Somewhat too basic for most of your students	Far too basic for most of your students	Other	Don't know	Refused	Total
Elementary	0	1	7	0	0	0	1	0	9
Percent	**0%**	**11%**	**78%**	**0%**	**0%**	**0%**	**11%**	**0%**	**100%**
Middle	0	0	8	0	0	1	0	0	9
Percent	**0%**	**0%**	**89%**	**0%**	**0%**	**11%**	**0%**	**0%**	**100%**
High	0	0	4	1	0	0	0	0	5
Percent	**0%**	**0%**	**80%**	**20%**	**0%**	**0%**	**0%**	**0%**	**100%**
Total	0	1	19	1	0	1	1	0	23
Percent	**0%**	**4%**	**83%**	**4%**	**0%**	**4%**	**4%**	**0%**	**100%**

Q26. Please rate how useful the materials were to you in teaching your students about energy.

Group	1	2	3	4	5	Don't know	Total
Elementary	0	2	4	2	1	0	9
Percent	**0%**	**22%**	**44%**	**22%**	**11%**	**0%**	**100%**
Middle	0	1	1	3	3	1	9
Percent	**0%**	**11%**	**11%**	**33%**	**33%**	**11%**	**100%**
High	0	0	1	2	2	0	5
Percent	**0%**	**0%**	**20%**	**40%**	**40%**	**0%**	**100%**
Total	0	3	6	7	6	1	23
Percent	**0%**	**13%**	**26%**	**30%**	**26%**	**4%**	**100%**

Q27. Please rate the degree to which the topics in the workbook aligned with your state's science standards for the grade(s) you teach.

Group	Completely aligned	Mostly aligned	Somewhat aligned	Poorly aligned	Not at all aligned	N/A - no science standards for my grade(s)	Don't know	Refused	Total
Elementary	0	4	3	0	0	0	2	0	9
Percent	**0%**	**44%**	**33%**	**0%**	**0%**	**0%**	**22%**	**0%**	**100%**
Middle	0	6	3	0	0	0	0	0	9
Percent	**0%**	**67%**	**33%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**
High	0	3	2	0	0	0	0	0	5
Percent	**0%**	**60%**	**40%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**
Total	0	13	8	0	0	0	2	0	23
Percent	**0%**	**57%**	**35%**	**0%**	**0%**	**0%**	**9%**	**0%**	**100%**

Q28. Which topic(s) was or were poorly aligned or not aligned at all with your state's science standards? In what way(s)?

Open-ended response type; no tabulation available

Q29. Were there any concepts covered in the curriculum or instructional materials that your students had challenges with?

Group	Yes	No	Don't Know/ Can't Recall	Refused	Total
Elementary	0	6	3	0	9
Percent	**0%**	**67%**	**33%**	**0%**	**100%**
Middle	1	6	2	0	9
Percent	**11%**	**67%**	**22%**	**0%**	**100%**
High	0	3	2	0	5
Percent	**0%**	**60%**	**40%**	**0%**	**100%**
Total	1	15	7	0	23
Percent	**4%**	**65%**	**30%**	**0%**	**100%**

Q30. What concepts did your students have challenges with?

Open-ended response type; no tabulation available

Q31. Were there any concepts that the materials did not cover that SHOULD HAVE BEEN covered?

Group	Yes	No	Don't Know/ Can't Recall	Refused	Total
Elementary	0	7	2	0	9
Percent	**0%**	**78%**	**22%**	**0%**	**100%**
Middle	1	7	1	0	9
Percent	**11%**	**78%**	**11%**	**0%**	**100%**
High	0	4	1	0	5
Percent	**0%**	**80%**	**20%**	**0%**	**100%**
Total	1	18	4	0	23
Percent	**4%**	**78%**	**17%**	**0%**	**100%**

Q32. What concepts were not covered that SHOULD HAVE BEEN covered?

Open-ended response type; no tabulation available

Q33. Please rate your overall satisfaction with curriculum or instructional materials you received from the National Theatre for Children program using the following scale.

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	2	5	2	0	9
Percent	**0%**	**0%**	**22%**	**56%**	**22%**	**0%**	**100%**
Middle	0	0	1	3	5	0	9
Percent	**0%**	**0%**	**11%**	**33%**	**56%**	**0%**	**100%**
High	0	0	0	2	3	0	5
Percent	**0%**	**0%**	**0%**	**40%**	**60%**	**0%**	**100%**
Total	0	0	3	10	10	0	23
Percent	**0%**	**0%**	**13%**	**43%**	**43%**	**0%**	**100%**

Q34. Do you have any additional input regarding the curriculum or instructional materials received from the National Theatre for Children that you would like to provide, including other things you liked or think could be improved? This might include things like overall presentation, length, level of detail, messaging, or anything else.

Open-ended response type; no tabulation available

Q35. Why did you NOT use the curriculum or instructional materials in teaching your students about energy?

Open-ended response type; no tabulation available

Q36. Did you have any interactions with anyone from the National Theatre for Children regarding the curriculum or instructional materials?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	5	6	0	11
Percent	**45%**	**55%**	**0%**	**100%**
Middle	5	8	1	14
Percent	**36%**	**57%**	**7%**	**100%**
High	4	5	0	9
Percent	**44%**	**56%**	**0%**	**100%**
Total	14	19	1	34
Percent	**41%**	**56%**	**3%**	**100%**

Q37. What did those interactions involve?

Open-ended response type; no tabulation available

Q38. Using the scale provided, how satisfied were you with:

Your interactions with the National Theatre for Children staff, overall

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	2	3	0	5
Percent	**0%**	**0%**	**0%**	**40%**	**60%**	**0%**	**100%**
Middle	0	0	0	0	5	0	5
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
High	0	0	0	0	4	0	4
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Total	0	0	0	2	12	0	14
Percent	**0%**	**0%**	**0%**	**14%**	**86%**	**0%**	**100%**

The professionalism and courtesy of the National Theatre for Children staff

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	1	4	0	5
Percent	**0%**	**0%**	**0%**	**20%**	**80%**	**0%**	**100%**
Middle	0	0	0	0	5	0	5
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
High	0	0	0	0	4	0	4
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Total	0	0	0	1	13	0	14
Percent	**0%**	**0%**	**0%**	**7%**	**93%**	**0%**	**100%**

The National Theatre for Children staff's knowledge about the topics you discussed with them

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	0	5	0	5
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Middle	0	0	0	0	5	0	5
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
High	0	0	0	0	4	0	4
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Total	0	0	0	0	14	0	14
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**

Q39. Did you distribute the kit request form to your students?

Group	Yes - I distributed the workbooks, which included the kit request form	Yes - I distributed the kit request forms separately	No	Don't Recall	Total
Elementary	4	5	1	1	11
Percent	**36%**	**45%**	**9%**	**9%**	**100%**
Middle	5	6	2	1	14
Percent	**36%**	**43%**	**14%**	**7%**	**100%**
High	4	5	0	0	9
Percent	**44%**	**56%**	**0%**	**0%**	**100%**
Total	13	16	3	2	34
Percent	**38%**	**47%**	**9%**	**6%**	**100%**

Q40. On average, about what percentage of your students took the kit request form home?

Group	0% - 10%	11% - 20%	21% - 30%	31% - 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%	Don't know	Total
Elementary	0	0	2	0	1	0	0	0	1	5	0	9
Percent	**0%**	**0%**	**22%**	**0%**	**11%**	**0%**	**0%**	**0%**	**11%**	**56%**	**0%**	**100%**
Middle	2	1	1	0	2	3	0	0	1	1	0	11
Percent	**18%**	**9%**	**9%**	**0%**	**18%**	**27%**	**0%**	**0%**	**9%**	**9%**	**0%**	**100%**
High	0	1	2	3	0	0	0	0	3	0	0	9
Percent	**0%**	**11%**	**22%**	**33%**	**0%**	**0%**	**0%**	**0%**	**33%**	**0%**	**0%**	**100%**
Total	2	2	5	3	3	3	0	0	5	6	0	29
Percent	**7%**	**7%**	**17%**	**10%**	**10%**	**10%**	**0%**	**0%**	**17%**	**21%**	**0%**	**100%**

Q41. After students take the kit form home, do you follow up with students later to find out if their parents completed the form?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	2	5	2	9
Percent	**22%**	**56%**	**22%**	**100%**
Middle	7	3	1	11
Percent	**64%**	**27%**	**9%**	**100%**
High	4	5	0	9
Percent	**44%**	**56%**	**0%**	**100%**
Total	13	13	3	29
Percent	**45%**	**45%**	**10%**	**100%**

Q42. About what percentage of your students either brought the kit form back to you to mail, or reported their parents completed and sent the form to Duke Energy to receive their kit?

Group	0% - 10%	11% - 20%	21% - 30%	31% - 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%	Don't know	Total
Elementary	0	3	2	0	1	0	0	0	0	0	3	9
Percent	**0%**	**33%**	**22%**	**0%**	**11%**	**0%**	**0%**	**0%**	**0%**	**0%**	**33%**	**100%**
Middle	4	1	3	1	0	0	2	0	0	0	0	11
Percent	**36%**	**9%**	**27%**	**9%**	**0%**	**0%**	**18%**	**0%**	**0%**	**0%**	**0%**	**100%**
High	1	3	2	0	0	0	0	0	1	0	2	9
Percent	**11%**	**33%**	**22%**	**0%**	**0%**	**0%**	**0%**	**0%**	**11%**	**0%**	**22%**	**100%**
Total	5	7	7	1	1	0	2	0	1	0	5	29
Percent	**17%**	**24%**	**24%**	**3%**	**3%**	**0%**	**7%**	**0%**	**3%**	**0%**	**17%**	**100%**

Q43. About what percentage of student families who had signed up for kits signed up on the website?

Group	0% - 10%	11% - 20%	21% - 30%	31% - 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%	Don't know	Total
Elementary	0	2	1	0	1	0	0	1	0	0	4	9
Percent	0%	22%	11%	0%	11%	0%	0%	11%	0%	0%	44%	100%
Middle	3	0	2	0	0	1	1	0	0	1	3	11
Percent	27%	0%	18%	0%	0%	9%	9%	0%	0%	9%	27%	100%
High	0	3	1	0	0	0	0	1	0	0	4	9
Percent	0%	33%	11%	0%	0%	0%	0%	11%	0%	0%	44%	100%
Total	3	5	4	0	1	1	1	2	0	1	11	29
Percent	10%	17%	14%	0%	3%	3%	3%	7%	0%	3%	38%	100%

Q44. Why didn't you distribute the kit request forms to your students?

Open-ended response type; no tabulation available

Q45. Did the NTC performers or the instructional materials mention the "Kilowatt Krush" app?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	7	1	3	11
Percent	**64%**	**9%**	**27%**	**100%**
Middle	8	4	2	14
Percent	**57%**	**29%**	**14%**	**100%**
High	4	0	5	9
Percent	**44%**	**0%**	**56%**	**100%**
Total	19	5	10	34
Percent	**56%**	**15%**	**29%**	**100%**

Q46. About what percentage of students would you say downloaded and used the app?

Group	0% - 10%	11% - 20%	21% - 30%	31% - 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%	Don't know	Total
Elementary	0	2	0	0	0	0	0	0	0	0	5	7
Percent	**0%**	**29%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**71%**	**100%**
Middle	3	0	0	1	0	0	0	0	0	0	4	8
Percent	**38%**	**0%**	**0%**	**13%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**100%**
High	0	0	0	1	0	0	0	0	0	0	3	4
Percent	**0%**	**0%**	**0%**	**25%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**75%**	**100%**
Total	3	2	0	2	0	0	0	0	0	0	12	19
Percent	**16%**	**11%**	**0%**	**11%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**63%**	**100%**

Q47. Do you have any suggestions to improve the app or how it was presented to students?

Open-ended response type; no tabulation available

Q48. Did government or organizational responses to COVID-19 offer any challenges for you regarding your participation in this program, other than those you've already discussed? If so, what were they, and how do you think they might best be addressed moving forward?

Open-ended response type; no tabulation available

Q49. Do you have any additional feedback regarding this program or Duke Energy that you would like to provide?

Open-ended response type; no tabulation available

Q50. Would you be willing to participate in an interview, so that we might learn more about you and your students' experience with the program?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	3	4	4	11
Percent	**27%**	**36%**	**36%**	**100%**
Middle	5	9	0	14
Percent	**36%**	**64%**	**0%**	**100%**
High	5	4	0	9
Percent	**56%**	**44%**	**0%**	**100%**
Total	13	17	4	34
Percent	**38%**	**50%**	**12%**	**100%**

F.2 Teacher Survey - DEP

Q1.What grade(s) do you teach?

	# of responses	Percent
PreK & Kindergarten	1	**3%**
PreK-1st	1	**3%**
PreK-2nd	1	**3%**
PreK-3rd	1	**3%**
PreK-5th	2	**7%**
PreK-6th	1	**3%**
PreK-9th	1	**3%**
Kindergarten	2	**7%**
1st-3rd	1	**3%**
2nd	1	**3%**
3rd	2	**7%**
5th	1	**3%**
6th	4	**14%**
6th-12th	1	**3%**
7th	2	**7%**
8th	6	**21%**
9th-11th	1	**3%**
Total	29	**100%**

Q2. Are you a home room teacher?

Group	Yes	No	Total
Elementary	6	8	14
Percent	**43%**	**57%**	**100%**
Middle	1	13	14
Percent	**7%**	**93%**	**100%**
High	0	1	1
Percent	**0%**	**100%**	**100%**
Total	7	22	29
Percent	**24%**	**76%**	**100%**

Q3. What subject(s) do you teach?

Group	Math	Math, Natural Sciences	Math, Other	Math, Social studies/social sciences/history	Natural Sciences	Other	Total
Elementary	0	0	0	0	1	0	1
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Middle	1	2	0	1	8	1	13
Percent	**8%**	**15%**	**0%**	**8%**	**62%**	**8%**	**100%**
High	0	0	1	0	0	0	1
Percent	**0%**	**0%**	**100%**	**0%**	**0%**	**0%**	**100%**
Total	1	2	1	1	9	1	15
Percent	**7%**	**13%**	**7%**	**7%**	**60%**	**7%**	**100%**

Q4. Do you teach any topics on energy (electricity, gas, coal, etc.) generation, transformation, use, or conservation (including, but not limited to, topics/materials provided by the Energy Efficiency for Schools Program)?

Group	Yes	No	Total
Elementary	6	0	6
Percent	**100%**	**0%**	**100%**
Middle	2	0	2
Percent	**100%**	**0%**	**100%**
High	0	0	0
Percent	**0%**	**0%**	**0%**
Total	8	0	8
Percent	**100%**	**0%**	**100%**

Q5. Have you previously taken a survey (not fielded by the National Theatre for Children) regarding your participation in this program?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	0	5	2	7
Percent	**0%**	**71%**	**29%**	**100%**
Middle	0	10	4	14
Percent	**0%**	**71%**	**29%**	**100%**
High	0	1	0	1
Percent	**0%**	**100%**	**0%**	**100%**
Total	0	16	6	22
Percent	**0%**	**73%**	**27%**	**100%**

Q6. Did you attend The National Theatre for Children performance for elementary school students in [performance_month] of [performance_year]?

	Yes	No	Don't Know	Total
# of responses	7	0	0	7
Percent	**100%**	**0%**	**0%**	**100%**

Q7. Did your students see a performance event more specific to their grade level?

	Yes, they saw the K-2 performance	Yes, they saw the performance for Grades 3-5	No, they saw the K-5 performance	Don't know/ Can't recall	Total
# of responses	4	0	1	2	7
Percent	**57%**	**0%**	**14%**	**29%**	**100%**

Q8. Did you see the National Theatre for Children performance for middle school students in [performance_month] of [performance_year]?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	0	0	0	0
Percent	**0%**	**0%**	**0%**	**0%**
Middle	13	0	0	13
Percent	**100%**	**0%**	**0%**	**100%**
High	0	0	0	0
Percent	**0%**	**0%**	**0%**	**0%**
Total	13	0	0	13
Percent	**100%**	**0%**	**0%**	**100%**

Q9. Did you see the National Theatre for Children performance for high school students in [performance_month] of [performance_year]?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	0	0	0	0
Percent	**0%**	**0%**	**0%**	**0%**
Middle	1	0	0	1
Percent	**100%**	**0%**	**0%**	**100%**
High	1	0	0	1
Percent	**100%**	**0%**	**0%**	**100%**
Total	2	0	0	2
Percent	**100%**	**0%**	**0%**	**100%**

Q10. Before today, were you aware the Duke Energy sponsored the National Theatre for Children performance(s) in your schoool?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	5	1	0	6
Percent	**83%**	**17%**	**0%**	**100%**
Middle	14	0	0	14
Percent	**100%**	**0%**	**0%**	**100%**
High	1	0	0	1
Percent	**100%**	**0%**	**0%**	**100%**
Total	20	1	0	21
Percent	**95%**	**5%**	**0%**	**100%**

Q11. How did you learn of Duke Energy's involvement with the National Theatre for Children program?

	Elementary	*Percent*	Middle	*Percent*	High	*Percent*	Total	*Percent*
Another teacher; Duke Energy marketing materials; National Theatre for Children staff	0	**0%**	1	**7%**	0	**0%**	1	**5%**
Duke Energy marketing materials	0	**0%**	5	**36%**	0	**0%**	5	**25%**
Duke Energy marketing materials; National Theatre for Children materials	0	**0%**	1	**7%**	0	**0%**	1	**5%**
National Theatre for Children materials	2	**40%**	4	**29%**	0	**0%**	6	**30%**
National Theatre for Children staff	1	**20%**	2	**14%**	0	**0%**	3	**15%**
Other	2	**40%**	1	**7%**	1	**100%**	4	**20%**
Total	5	**100%**	14	**100%**	1	**100%**	20	**100%**

Q12. Are you (one of) the decision-maker[s] regarding the NTC performances at your school?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	4	1	0	5
Percent	**80%**	**20%**	**0%**	**100%**
Middle	13	1	0	14
Percent	**93%**	**7%**	**0%**	**100%**
High	0	0	1	1
Percent	**0%**	**0%**	**100%**	**100%**
Total	17	2	1	20
Percent	**85%**	**10%**	**5%**	**100%**

Q13. Do you recall how the importance of the program was communicated to you?

Group	Yes	No	Total
Elementary	3	1	4
Percent	**75%**	**25%**	**100%**
Middle	10	3	13
Percent	**77%**	**23%**	**100%**
High	0	0	0
Percent	**0%**	**0%**	**100%**
Total	13	4	17
Percent	**76%**	**24%**	**100%**

Q14. Thinking back to the school performance, would you say that energy related concepts presented in the performance were:

Group	Far too advanced for most of your students	Somewhat too advanced for most of your students	About right for most of your students	Somewhat too basic for most of your students	Far too basic for most of your students	Other	Don't know	Total
Elementary	0	0	6	0	0	0	0	6
Percent	**0%**	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**100%**
Middle	0	0	11	3	0	0	0	14
Percent	**0%**	**0%**	**79%**	**21%**	**0%**	**0%**	**0%**	**100%**
High	0	0	1	0	0	0	0	1
Percent	**0%**	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**100%**
Total	0	0	18	3	0	0	0	21
Percent	**0%**	**0%**	**86%**	**14%**	**0%**	**0%**	**0%**	**100%**

Q15. What about the performance was too advanced for most of your students?

Open-ended response type; no tabulation available

Q16. What about the performance was too basic for most of your students?

Open-ended response type; no tabulation available

Q17. Were there any concepts that the performance(s) did not cover that SHOULD HAVE BEEN covered?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	0	4	2	6
Percent	**0%**	**67%**	**33%**	**100%**
Middle	2	11	1	14
Percent	**14%**	**79%**	**7%**	**100%**
High	1	0	0	1
Percent	**100%**	**0%**	**0%**	**100%**
Total	3	15	3	21
Percent	**14%**	**71%**	**14%**	**100%**

Q18. What concepts were not covered that SHOULD HAVE BEEN covered?

Open-ended response type; no tabulation available

Q19. Please estimate your student's overall engagement level with the National Theatre for Children performance on the following scale.

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	2	4	0	6
Percent	**0%**	**0%**	**0%**	**33%**	**67%**	**0%**	**100%**
Middle	0	1	3	4	6	0	14
Percent	**0%**	**7%**	**21%**	**29%**	**43%**	**0%**	**100%**
High	0	0	0	1	0	0	1
Percent	**0%**	**0%**	**0%**	**100%**	**0%**	**0%**	**100%**
Total	0	1	3	7	10	0	21
Percent	**0%**	**5%**	**14%**	**33%**	**48%**	**0%**	**100%**

Q20. Please rate your overall satisfaction with the National Theatre for Children performance on the following scale.

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	2	4	0	6
Percent	**0%**	**0%**	**0%**	**33%**	**67%**	**0%**	**100%**
Middle	0	0	1	3	10	0	14
Percent	**0%**	**0%**	**7%**	**21%**	**71%**	**0%**	**100%**
High	0	0	0	0	1	0	1
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Total	0	0	1	5	15	0	21
Percent	**0%**	**0%**	**5%**	**24%**	**71%**	**0%**	**100%**

Q21. Please explain why you offered this satisfaction rating

Open-ended response type; no tabulation available

Q22. Did you receive curriculum or instructional materials, such as student workbooks, related to energy and energy conservation from National Theatre for Children for the Fall 2019 - Spring 2020 school year?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	5	1	0	6
Percent	**83%**	**17%**	**0%**	**100%**
Middle	7	7	0	14
Percent	**50%**	**50%**	**0%**	**100%**
High	1	0	0	1
Percent	**100%**	**0%**	**0%**	**100%**
Total	13	8	0	21
Percent	**62%**	**38%**	**0%**	**100%**

Q23. To what degree did you use the curriculum or instructional materials in teaching your students about energy?

Group	Not at all	A little	Moderately	A lot	Extensively	Don't know	Total
Elementary	0	3	2	0	0	0	5
Percent	**0%**	**60%**	**40%**	**0%**	**0%**	**0%**	**100%**
Middle	0	2	5	0	0	0	7
Percent	**0%**	**29%**	**71%**	**0%**	**0%**	**0%**	**100%**
High	0	1	0	0	0	0	1
Percent	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**100%**
Total	0	6	7	0	0	0	13
Percent	**0%**	**46%**	**54%**	**0%**	**0%**	**0%**	**100%**

Q24. Why did you only use the workbooks "a little" in teaching your students about energy?

Open-ended response type; no tabulation available

Q25. Thinking about how the student workbooks explained energy related concepts, would you say that the materials were generally:

Group	Far too advanced for most of your students	Somewhat too advanced for most of your students	About right for most of your students	Somewhat too basic for most of your students	Far too basic for most of your students	Other	Don't know	Refused	Total
Elementary	0	0	5	0	0	0	0	0	5
Percent	**0%**	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**
Middle	0	0	5	2	0	0	0	0	7
Percent	**0%**	**0%**	**71%**	**29%**	**0%**	**0%**	**0%**	**0%**	**100%**
High	0	0	1	0	0	0	0	0	1
Percent	**0%**	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**
Total	0	0	11	2	0	0	0	0	13
Percent	**0%**	**0%**	**85%**	**15%**	**0%**	**0%**	**0%**	**0%**	**100%**

Q26. Please rate how useful the materials were to you in teaching your students about energy.

I/A

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	2	1	2	0	5
Percent	**0%**	**0%**	**40%**	**20%**	**40%**	**0%**	**100%**
Middle	0	1	1	5	0	0	7
Percent	**0%**	**14%**	**14%**	**71%**	**0%**	**0%**	**100%**
High	0	0	0	0	0	1	1
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**	**100%**
Total	0	1	3	6	2	1	13
Percent	**0%**	**8%**	**23%**	**46%**	**15%**	**8%**	**100%**

Q27. Please rate the degree to which the topics in the workbook aligned with your state's science standards for the grade(s) you teach.

Group	Completely aligned	Mostly aligned	Somewhat aligned	Poorly aligned	Not at all aligned	N/A - no science standards for my grade(s)	Don't know	Refused	Total
Elementary	0	1	4	0	0	0	0	0	5
Percent	**0%**	**20%**	**80%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**
Middle	0	3	4	0	0	0	0	0	7
Percent	**0%**	**43%**	**57%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**
High	0	0	0	0	0	0	0	1	1
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**	**100%**
Total	0	4	8	0	0	0	0	1	13
Percent	**0%**	**31%**	**62%**	**0%**	**0%**	**0%**	**0%**	**8%**	**100%**

Q28. Which topic(s) was or were poorly aligned or not aligned at all with your state's science standards? In what way(s)?

Open-ended response type; no tabulation available

Q29. Were there any concepts covered in the curriculum or instructional materials that your students had challenges with?

Group	Yes	No	Don't Know/ Can't Recall	Refused	Total
Elementary	1	4	0	0	5
Percent	**20%**	**80%**	**0%**	**0%**	**100%**
Middle	0	6	1	0	7
Percent	**0%**	**86%**	**14%**	**0%**	**100%**
High	0	0	1	0	1
Percent	**0%**	**0%**	**100%**	**0%**	**100%**
Total	1	10	2	0	13
Percent	**8%**	**77%**	**15%**	**0%**	**100%**

Q30. What concepts did your students have challenges with?

Open-ended response type; no tabulation available

Q31. Were there any concepts that the materials did not cover that SHOULD HAVE BEEN covered?

Group	Yes	No	Don't Know/ Can't Recall	Refused	Total
Elementary	0	5	0	0	5
Percent	**0%**	**100%**	**0%**	**0%**	**100%**
Middle	1	4	2	0	7
Percent	**14%**	**57%**	**29%**	**0%**	**100%**
High	0	0	1	0	1
Percent	**0%**	**0%**	**100%**	**0%**	**100%**
Total	1	9	3	0	13
Percent	**8%**	**69%**	**23%**	**0%**	**100%**

Q32. What concepts were not covered that SHOULD HAVE BEEN covered?

Open-ended response type; no tabulation available

Q33. Please rate your overall satisfaction with curriculum or instructional materials you received from the National Theatre for Children program using the following scale.

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	2	0	3	0	5
Percent	**0%**	**0%**	**40%**	**0%**	**60%**	**0%**	**100%**
Middle	0	0	2	2	3	0	7
Percent	**0%**	**0%**	**29%**	**29%**	**43%**	**0%**	**100%**
High	0	0	0	0	0	1	1
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**	**100%**
Total	0	0	4	2	6	1	13
Percent	**0%**	**0%**	**31%**	**15%**	**46%**	**8%**	**100%**

Q34. Do you have any additional input regarding the <u>curriculum or instructional materials</u> received from the National Theatre for Children that you would like to provide, including other things you liked or think could be improved? This might include things like overall presentation, length, level of detail, messaging, or anything else.

Open-ended response type; no tabulation available

Q35. Why did you NOT use the curriculum or instructional materials in teaching your students about energy?

Open-ended response type; no tabulation available

Q36. Did you have any interactions with anyone from the National Theatre for Children regarding the curriculum or instructional materials?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	2	4	0	6
Percent	**33%**	**67%**	**0%**	**100%**
Middle	1	11	2	14
Percent	**7%**	**79%**	**14%**	**100%**
High	0	0	1	1
Percent	**0%**	**0%**	**100%**	**100%**
Total	3	15	3	21
Percent	**14%**	**71%**	**14%**	**100%**

Q37. What did those interactions involve?

Open-ended response type; no tabulation available

Q38. Using the scale provided, how satisfied were you with:

Your interactions with the National Theatre for Children staff, overall

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	0	2	0	2
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Middle	0	0	0	0	1	0	1
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
High	0	0	0	0	0	0	0
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Total	0	0	0	0	3	0	3
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**

The professionalism and courtesy of the National Theatre for Children staff

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	0	2	0	2
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Middle	0	0	0	0	1	0	1
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
High	0	0	0	0	0	0	0
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Total	0	0	0	0	3	0	3
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**

The National Theatre for Children staff's knowledge about the topics you discussed with them

Group	1	2	3	4	5	Don't know	Total
Elementary	0	0	0	0	2	0	2
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Middle	0	0	0	0	1	0	1
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
High	0	0	0	0	0	0	0
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**
Total	0	0	0	0	3	0	3
Percent	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**100%**

Q39. Did you distribute the kit request form to your students?

Group	Yes - I distributed the workbooks, which included the kit request form	Yes - I distributed the kit request forms separately	No	Don't Recall	Total
Elementary	2	4	0	0	6
Percent	**33%**	**67%**	**0%**	**0%**	**100%**
Middle	3	11	0	0	14
Percent	**21%**	**79%**	**0%**	**0%**	**100%**
High	1	0	0	0	1
Percent	**100%**	**0%**	**0%**	**0%**	**100%**
Total	6	15	0	0	21
Percent	**29%**	**71%**	**0%**	**0%**	**100%**

Q40. On average, about what percentage of your students took the kit request form home?

Group	0% - 10%	11% - 20%	21% - 30%	31% - 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%	Don't know	Total
Elementary	0	1	1	0	0	0	0	1	0	3	0	6
Percent	**0%**	**17%**	**17%**	**0%**	**0%**	**0%**	**0%**	**17%**	**0%**	**50%**	**0%**	**100%**
Middle	0	3	3	0	0	3	0	2	0	3	0	14
Percent	**0%**	**21%**	**21%**	**0%**	**0%**	**21%**	**0%**	**14%**	**0%**	**21%**	**0%**	**100%**
High	0	0	0	0	0	0	0	0	0	0	1	1
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**	**100%**
Total	0	4	4	0	0	3	0	3	0	6	1	21
Percent	**0%**	**19%**	**19%**	**0%**	**0%**	**14%**	**0%**	**14%**	**0%**	**29%**	**5%**	**100%**

Q41. After students take the kit form home, do you follow up with students later to find out if their parents completed the form?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	2	4	0	6
Percent	**33%**	**67%**	**0%**	**100%**
Middle	8	5	1	14
Percent	**57%**	**36%**	**7%**	**100%**
High	0	1	0	1
Percent	**0%**	**100%**	**0%**	**100%**
Total	10	10	1	21
Percent	**48%**	**48%**	**5%**	**100%**

Q42. About what percentage of your students either brought the kit form back to you to mail, or reported their parents completed and sent the form to Duke Energy to receive their kit?

Group	0% - 10%	11% - 20%	21% - 30%	31% - 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%	Don't know	Total
Elementary	2	2	0	1	0	1	0	0	0	0	0	6
Percent	**33%**	**33%**	**0%**	**17%**	**0%**	**17%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**
Middle	6	2	3	1	1	0	0	0	0	0	1	14
Percent	**43%**	**14%**	**21%**	**7%**	**7%**	**0%**	**0%**	**0%**	**0%**	**0%**	**7%**	**100%**
High	0	0	0	0	0	0	0	0	0	0	1	1
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**	**100%**
Total	8	4	3	2	1	1	0	0	0	0	2	21
Percent	**38%**	**19%**	**14%**	**10%**	**5%**	**5%**	**0%**	**0%**	**0%**	**0%**	**10%**	**100%**

Q43. About what percentage of student families who had signed up for kits signed up on the website?

Group	0% - 10%	11% - 20%	21% - 30%	31% - 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%	Don't know	Total
Elementary	1	2	0	0	1	0	0	0	0	1	1	6
Percent	**17%**	**33%**	**0%**	**0%**	**17%**	**0%**	**0%**	**0%**	**0%**	**17%**	**17%**	**100%**
Middle	7	1	2	1	1	0	0	0	0	0	2	14
Percent	**50%**	**7%**	**14%**	**7%**	**7%**	**0%**	**0%**	**0%**	**0%**	**0%**	**14%**	**100%**
High	0	0	0	0	0	0	0	0	0	0	1	1
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**	**100%**
Total	8	3	2	1	2	0	0	0	0	1	4	21
Percent	**38%**	**14%**	**10%**	**5%**	**10%**	**0%**	**0%**	**0%**	**0%**	**5%**	**19%**	**100%**

Q44. Why didn’t you distribute the kit request forms to your students?

Open-ended response type; no tabulation available

Q45. Did the NTC performers or the instructional materials mention the "Kilowatt Krush" app?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	4	0	2	6
Percent	**67%**	**0%**	**33%**	**100%**
Middle	8	3	3	14
Percent	**57%**	**21%**	**21%**	**100%**
High	0	0	1	1
Percent	**0%**	**0%**	**100%**	**100%**
Total	12	3	6	21
Percent	**57%**	**14%**	**29%**	**100%**

Q46. About what percentage of students would you say downloaded and used the app?

Group	0% - 10%	11% - 20%	21% - 30%	31% - 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%	Don't know	Total
Elementary	0	0	1	1	0	0	0	0	0	0	2	4
Percent	**0%**	**0%**	**25%**	**25%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**50%**	**100%**
Middle	3	3	0	1	0	0	0	0	0	0	1	8
Percent	**38%**	**38%**	**0%**	**13%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**13%**	**100%**
High	0	0	0	0	0	0	0	0	0	0	0	0
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Total	3	3	1	2	0	0	0	0	0	0	3	12
Percent	**25%**	**25%**	**8%**	**17%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**25%**	**100%**

Q47. Do you have any suggestions to improve the app or how it was presented to students?

Open-ended response type; no tabulation available

Q48. Did government or organizational responses to COVID-19 offer any challenges for you regarding your participation in this program, other than those you've already discussed? If so, what were they, and how do you think they might best be addressed moving forward?

Open-ended response type; no tabulation available

Q49. Do you have any additional feedback regarding this program or Duke Energy that you would like to provide?

Open-ended response type; no tabulation available

Q50. Would you be willing to participate in an interview, so that we might learn more about you and your students' experience with the program?

Group	Yes	No	Don't Know/ Can't Recall	Total
Elementary	3	2	1	6
Percent	**50%**	**33%**	**17%**	**100%**
Middle	5	7	2	14
Percent	**36%**	**50%**	**14%**	**100%**
High	0	1	0	1
Percent	**0%**	**100%**	**0%**	**100%**
Total	8	10	3	21
Percent	**38%**	**48%**	**14%**	**100%**

F.3 Student Parent Survey - DEC

Q1. This kit included light bulbs, a showerhead, and other items that help you save energy in your home. Do you recall receiving this kit?

	Yes	No	Don't Know	Total
# of responses	300	0	0	300
Percent	**100%**	**0%**	**0%**	**100%**

Q1.1) Were you aware of this program, prior to your child's involvement, due to your work at an elementary, middle or high school?

	Yes	No	Don't Know	Total
# of responses	0	300	0	300
Percent	**0%**	**100%**	**0%**	**100%**

Q2. Before today, did you know the kit you received was sponsored by Duke Energy?

	Yes	No	Don't Know	Total
# of responses	265	29	6	300
Percent	**88%**	**10%**	**2%**	**100%**

Q3. How did you learn that the kit was sponsored by Duke Energy?

	# of responses	Percent
Classroom materials brought home by child	76	**29%**
Classroom materials brought home by child, Information material included in/on the kit	30	**11%**
Classroom materials brought home by child, My child's teacher/school	8	**3%**
Classroom materials brought home by child, My child's teacher/school, Information material included in/on the kit	22	**8%**
Information material included in/on the kit	82	**31%**
My child's teacher/school	26	**10%**
My child's teacher/school, Information material included in/on the kit	7	**3%**
Other	10	**4%**
Don't know	4	**2%**
Refused	0	**0%**
Total	265	**100%**

Q4. How did you hear about the opportunity to receive the kit from Duke Energy?

	# of responses	Percent
After hours event at my child's school	3	**1%**
Classroom materials brought home by child	140	**47%**
Classroom materials brought home by child, After hours event at my child's school	1	**0%**
Classroom materials brought home by child, Email from my child's teacher/school	16	**5%**
Classroom materials brought home by child, Email from my child's teacher/school, Saw a poster at my child's school	1	**0%**
Classroom materials brought home by child, Email from my child's teacher/school, School website or school web portal	4	**1%**
Classroom materials brought home by child, Other	2	**1%**
Classroom materials brought home by child, Saw a poster at my child's school	1	**0%**
Classroom materials brought home by child, School newsletter	11	**4%**
Classroom materials brought home by child, School newsletter, Email from my child's teacher/school	7	**2%**
Classroom materials brought home by child, School newsletter, Email from my child's teacher/school, In-person conversations with my child's teacher	1	**0%**
Classroom materials brought home by child, School newsletter, Email from my child's teacher/school, Saw a poster at my child's school	1	**0%**
Classroom materials brought home by child, School newsletter, Email from my child's teacher/school, School website or school web portal	3	**1%**
Classroom materials brought home by child, School newsletter, Email from my child's teacher/school, School website or school web portal, In-person conversations with my child's teacher	1	**0%**
Classroom materials brought home by child, School newsletter, Saw a poster at my child's school	1	**0%**
Classroom materials brought home by child, School newsletter, School website or school web portal	4	**1%**
Classroom materials brought home by child, School newsletter, School website or school web portal, In-person conversations with my child's teacher	1	**0%**
Classroom materials brought home by child, School website or school web portal	2	**1%**
Email from my child's teacher/school	19	**6%**
Email from my child's teacher/school, Other	1	**0%**
Email from my child's teacher/school, School website or school web portal	5	**2%**
Email from my child's teacher/school, School website or school web portal, Other	1	**0%**
In-person conversations with my child's teacher	3	**1%**
Saw a poster at my child's school	1	**0%**
School newsletter	9	**3%**
School newsletter, Email from my child's teacher/school	3	**1%**

	# of responses	Percent
School newsletter, Email from my child's teacher/school, Other	1	**0%**
School newsletter, Saw a poster at my child's school	1	**0%**
School newsletter, School website or school web portal	1	**0%**
School website or school web portal	12	**4%**
Other	16	**5%**
Don't know	27	**9%**
Refused	0	**0%**
Total	300	**100%**

Q4b. How did you request your kit?

	Program's website	Sign-up form in the classroom materials my child brought home	By calling the toll-free number	Via the "Kilowatt Krush" app on my smartphone	Don't know	Refused	Total
# of responses	197	57	12	4	29	1	300
Percent	**66%**	**19%**	**4%**	**1%**	**10%**	**0.3%**	**100%**

Q4c. Has your child used the "Kilowatt Krush" app on any smartphone in your household?

	Yes	No	Don't Know	Refused	Total
# of responses	25	228	47	0	300
Percent	**8%**	**76%**	**16%**	**0%**	**100%**

Q4d. About how often would you say that your child uses the "Kilowatt Krush" app?

	They used it once	They used it a few times	They use it daily	They use it weekly	Other	Don't know	Refused	Total
# of responses	1	18	1	3	0	2	0	25
Percent	**4%**	**72%**	**4%**	**12%**	**0%**	**8%**	**0%**	**100%**

Q4e. Have you noticed your child engaging in energy saving behaviors you can attribute to their use of the "Kilowatt Krush" app?

	Yes	No	Don't Know	Total
# of responses	14	6	5	25
Percent	**56%**	**24%**	**20%**	**100%**

Q4f. Do you have any feedback that might help improve the "Kilowatt Krush" app?

	Yes	No	Don't Know	Refused	Total
# of responses	0	22	3	0	25
Percent	**0%**	**88%**	**12%**	**0%**	**100%**

Q5. Did you read any of the Energy Savers booklet that came in the kit?

	Yes	No	Don't Know	Refused	Total
# of responses	205	70	25	0	300
Percent	**68%**	**23%**	**8%**	**0%**	**100%**

Q6. On a scale from 0 to 10 where 0 is not at all helpful and 10 is very helpful, how helpful was the Energy Savers booklet in identifying ways your household could save energy at home?

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	0	0	0	3	5	14	25	22	43	17	74	2	0	205
Percent	**0%**	**0%**	**0%**	**1%**	**2%**	**7%**	**12%**	**11%**	**21%**	**8%**	**36%**	**1%**	**0%**	**100%**

Q7. What might have made the information more helpful?

	Provided response	Don't Know	Refused	Total
# of responses	17	30	0	47
Percent	**36%**	**64%**	**0%**	**100%**

Q8. In addition to sending the energy saving kits, Duke Energy sponsored a program about energy and energy efficiency at your child's school, which included classroom materials and in in-school performance by the National Theatre for Children. Were you aware of the program before today?

	Yes	No	Don't Know	Refused	Total
# of responses	78	210	12	0	300
Percent	**26%**	**70%**	**4%**	**0%**	**100%**

Q9. From who or where did you hear about this program?

	From a teacher/school administrator	From my child/children	From my child/children, From a teacher/school administrator	From my child/children, On Duke Energy Website	On Duke Energy Website	Other	Don't know	Refused	Total
# of responses	15	43	10	1	6	2	1	0	78
Percent	**19%**	**55%**	**13%**	**1%**	**8%**	**3%**	**1%**	**0%**	**100%**

Q10. Have you or anyone else installed any of those items in your home, even if they were taken out later?

	Yes	No	Don't Know	Refused	Total
# of responses	258	42	0	0	300
Percent	**86%**	**14%**	**0%**	**0%**	**100%**

Q11. Which of the items did you install, even if they were taken out later?

Q11a. Showerhead

	Yes	No	Don't Know	Refused	Total
# of responses	123	3	0	258	123
Percent	**48%**	**1%**	**0%**	**100%**	**48%**

Q11b. Kitchen faucet aerator

	Yes	No	Don't Know	Refused	Total
# of responses	121	128	9	0	258
Percent	**47%**	**50%**	**3%**	**0%**	**100%**

Q11c. Bathroom faucet aerator

	Yes	No	Don't Know	Refused	Total
# of responses	122	131	5	0	258
Percent	**47%**	**51%**	**2%**	**0%**	**100%**

Q11d. Night light

	Yes	No	Don't Know	Refused	Total
# of responses	229	27	2	0	258
Percent	**89%**	**10%**	**1%**	**0%**	**100%**

Q11e. Energy efficient light bulb(s)

	Yes	No	Don't Know	Refused	Total
# of responses	254	4	0	0	258
Percent	**98%**	**2%**	**0%**	**0%**	**100%**

Q11f. Insulator gaskets for light switches and electricity outlets

	Yes	No	Don't Know	Refused	Total
# of responses	93	145	20	0	258
Percent	**36%**	**56%**	**8%**	**0%**	**100%**

Q12. In addition to the night light, there were two LED light bulbs in the kit. Did you install one or both LED light bulbs in the kit?

	I installed both LEDs	I installed only one LED bulb	Don't Know	Refused	Total
# of responses	231	19	4	0	254
Percent	**91%**	**7%**	**2%**	**0%**	**100%**

Q13. How many of the light switch and electric outlet gasket insulators from the kit did you, or someone else, install in your home?

	None	1	2	3	4	5	6	7	8	9	10	11	12	Don't know	Refused	Total
# of responses	1	13	23	11	6	4	7	0	3	1	0	0	8	16	0	93
Percent	**1%**	**14%**	**25%**	**12%**	**6%**	**4%**	**8%**	**0%**	**3%**	**1%**	**0%**	**0%**	**9%**	**17%**	**0%**	**100%**

Q14. Overall, how satisfied are you with the item[s] you installed? Please use 0 to 10 scales, where 0 is very dissatisfied and 10 is very satisfied. How satisfied are you with...?

Q14a. Showerhead

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	1	1	0	7	8	9	13	13	79	0	0	132
Percent	**1%**	**0%**	**1%**	**1%**	**0%**	**5%**	**6%**	**7%**	**10%**	**10%**	**60%**	**0%**	**0%**	**100%**

Q14b. Kitchen faucet aerator

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	0	2	2	5	5	7	9	11	76	2	1	121
Percent	**1%**	**0%**	**0%**	**2%**	**2%**	**4%**	**4%**	**6%**	**7%**	**9%**	**63%**	**2%**	**1%**	**100%**

Q14c. Bathroom faucet aerator

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	2	1	0	3	6	3	7	13	10	6	70	1	0	122
Percent	**2%**	**1%**	**0%**	**2%**	**5%**	**2%**	**6%**	**11%**	**8%**	**5%**	**57%**	**1%**	**0%**	**100%**

Q14d. Night light

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	0	1	2	6	5	17	20	19	158	0	0	229
Percent	**0%**	**0%**	**0%**	**0%**	**1%**	**3%**	**2%**	**7%**	**9%**	**8%**	**69%**	**0%**	**0%**	**100%**

Q14e. Energy efficient light bulb(s)

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	1	1	1	3	4	16	18	30	178	1	0	254
Percent	**0%**	**0%**	**0%**	**0%**	**0%**	**1%**	**2%**	**6%**	**7%**	**12%**	**70%**	**0%**	**0%**	**100%**

Q14f. Insulator gaskets for light switches and electricity outlets

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	0	1	0	0	0	6	3	7	8	6	57	5	0	93
Percent	**0%**	**1%**	**0%**	**0%**	**0%**	**6%**	**3%**	**8%**	**9%**	**6%**	**61%**	**5%**	**0%**	**100%**

Q14.1 Can you please explain any dissatisfaction you had with the [X item]

Q14.1a) Showerhead

Open-ended response type; no tabulation available

Q14.1b) Kitchen faucet aerator

Open-ended response type; no tabulation available

Q14.1c) Bathroom faucet aerator

Open-ended response type; no tabulation available

Q14.1d) Night light

Open-ended response type; no tabulation available

Q14.1e) Energy efficient light bulb(s)

Open-ended response type; no tabulation available

Q14.1f) Insulator gaskets for light switches and electricity outlets

Open-ended response type; no tabulation available

Q15. Have you since uninstalled any of the items from the kit that you had previously installed?

	Yes	No	Don't Know	Refused	Total
# of responses	39	211	8	0	258
Percent	**15%**	**82%**	**3%**	**0%**	**100%**

Q16. Which of the items did you uninstall?

	# of responses	Percent
Bathroom faucet aerator	5	**13%**
Energy efficient light bulbs	1	**3%**
Kitchen faucet aerator	9	**23%**
Kitchen faucet aerator, Bathroom faucet aerator	2	**5%**
Kitchen faucet aerator, Night light	1	**3%**
Night light	4	**10%**
Showerhead	8	**21%**
Showerhead, Bathroom faucet aerator	1	**3%**
Showerhead, Kitchen faucet aerator	3	**8%**
Showerhead, Kitchen faucet aerator, Bathroom faucet aerator	2	**5%**
Showerhead, Kitchen faucet aerator, Bathroom faucet aerator, Insulator Gaskets	1	**3%**
Don't know	1	**3%**
Refused	1	**3%**
Total	39	**100%**

Q17. Why were those items uninstalled? Let's start with...

Q17a. Showerhead

	It was broken	I didn't like how it looked	I didn't like how it worked	I didn't like how it worked, Other	Other	Don't know	Refused	Total
# of responses	0	1	11	1	2	0	0	15
Percent	**0%**	**7%**	**73%**	**7%**	**13%**	**0%**	**0%**	**100%**

Q17b. Kitchen faucet aerator

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	0	8	2	8	0	0	18
Percent	**0%**	**44%**	**11%**	**44%**	**0%**	**0%**	**100%**

Q17c. Bathroom faucet aerator

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	0	8	1	2	0	0	11
Percent	**0%**	**73%**	**9%**	**18%**	**0%**	**0%**	**100%**

Q17d. Night light

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	1	0	1	3	0	0	5
Percent	**20%**	**0%**	**20%**	**60%**	**0%**	**0%**	**100%**

Q17e. Energy efficient light bulb(s)

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	0	1	0	0	0	0	1
Percent	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**100%**

Q17f. Insulator gaskets for light switches and electricity outlets

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	0	1	0	0	0	0	1
Percent	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**100%**

Q18. You said you haven't installed [X items]. Which of those items did you plan to install in the next three months?

	# of responses	Percent
Bathroom faucet aerator	11	**4%**
Bathroom faucet aerator, Energy efficient light bulbs	1	**0%**
Bathroom faucet aerator, Insulator Gaskets	4	**1%**
Bathroom faucet aerator, Night light	2	**1%**
Bathroom faucet aerator, Night light, Energy efficient light bulbs	1	**0%**
Energy efficient light bulbs	6	**2%**
Insulator Gaskets	25	**9%**
Kitchen faucet aerator	12	**4%**
Kitchen faucet aerator, Bathroom faucet aerator	4	**1%**
Kitchen faucet aerator, Bathroom faucet aerator, Insulator Gaskets	3	**1%**
Kitchen faucet aerator, Bathroom faucet aerator, Night light, Energy efficient light bulbs	1	**0%**
Kitchen faucet aerator, Insulator Gaskets	1	**0%**
Kitchen faucet aerator, Night light, Energy efficient light bulbs	1	**0%**
Night light	8	**3%**
Night light, Energy efficient light bulbs	10	**4%**
Night light, Energy efficient light bulbs, Insulator Gaskets	2	**1%**
Showerhead	14	**5%**
Showerhead, Bathroom faucet aerator	1	**0%**
Showerhead, Energy efficient light bulbs	2	**1%**
Showerhead, Kitchen faucet aerator	1	**0%**
Showerhead, Kitchen faucet aerator, Bathroom faucet aerator	1	**0%**
Showerhead, Kitchen faucet aerator, Bathroom faucet aerator, Energy efficient light bulbs, Insulator Gaskets	1	**0%**

	# of responses	Percent
Showerhead, Kitchen faucet aerator, Bathroom faucet aerator, Night light, Energy efficient light bulbs, Insulator Gaskets	4	**1%**
Showerhead, Kitchen faucet aerator, Night light	2	**1%**
Showerhead, Night light	2	**1%**
Showerhead, Night light, Energy efficient light bulbs	1	**0%**
None	148	**55%**
Don't know	0	**0%**
Refused	1	**0%**
Total	270	**100%**

Q19. What's preventing you from installing them? Let's start with...

Q19a. Showerhead

	# of responses	Percent
Already have efficient showerhead	33	**24%**
Current one is still working	26	**19%**
Current one is still working; Already have efficient showerhead	12	**9%**
Current one is still working; Don't have the items any longer (threw away, gave away)	1	**1%**
Current one is still working; Don't have the items any longer (threw away, gave away); Already have efficient showerhead	1	**1%**
Current one is still working; Other, (please specify:___)	1	**1%**
Current one is still working; Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it; Already have efficient showerhead	1	**1%**
Current one is still working; Too difficult to install it, don't know how to do it; Don't have the tools I need	1	**1%**
Didn't know what that was	3	**2%**
Didn't know what that was; Haven't gotten around to it	1	**1%**
Didn't know what that was; Haven't gotten around to it; Current one is still working	1	**1%**
Didn't know what that was; Other, (please specify:___)	1	**1%**
Didn't know what that was; Too difficult to install it, don't know how to do it	1	**1%**
Don't have the tools I need	1	**1%**
Haven't gotten around to it	11	**8%**
Haven't gotten around to it; Already have efficient showerhead	2	**1%**
Haven't gotten around to it; Current one is still working; Already have efficient showerhead	2	**1%**
Other, (please specify:___)	14	**10%**
Takes too much time to install/No time/Too busy	2	**1%**
Too difficult to install it, don't know how to do it	1	**1%**
Too difficult to install it, don't know how to do it; Don't have the tools I need	1	**1%**
Tried it, didn't fit	11	**8%**
Tried it, didn't fit; Already have efficient showerhead	1	**1%**
Tried it, didn't fit; Current one is still working; Already have efficient showerhead	1	**1%**
Tried it, didn't fit; Current one is still working; Takes too much time to install/No time/Too busy; Already have efficient showerhead	1	**1%**
Tried it, didn't fit; Haven't gotten around to it; Current one is still working; Already have efficient showerhead	1	**1%**
Tried it, didn't work as intended	3	**2%**
Don't know	1	**1%**
Refused	0	**0%**
Total	136	**100%**

Q19b. Kitchen faucet aerator

	# of responses	Percent
Already have efficient kitchen faucet aerator	33	**24%**
Current one is still working	20	**14%**
Current one is still working; Already have efficient kitchen faucet aerator	5	**4%**
Current one is still working; Don't have the items any longer (threw away, gave away); Already have efficient kitchen faucet aerator	1	**1%**
Didn't know what that was	13	**9%**
Didn't know what that was; Already have efficient kitchen faucet aerator	1	**1%**
Didn't know what that was; Current one is still working; Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it	1	**1%**
Didn't know what that was; Haven't gotten around to it	3	**2%**
Didn't know what that was; Haven't gotten around to it; Current one is still working	1	**1%**
Don't have the items any longer (threw away, gave away)	2	**1%**
Don't have the tools I need	1	**1%**
Don't have the tools I need; Other, (please specify:___)	1	**1%**
Haven't gotten around to it	11	**8%**
Haven't gotten around to it; Current one is still working	1	**1%**
Takes too much time to install/No time/Too busy	1	**1%**
Too difficult to install it, don't know how to do it	2	**1%**
Too difficult to install it, don't know how to do it; Don't have the tools I need	2	**1%**
Tried it, didn't fit	20	**14%**
Tried it, didn't fit; Don't have the items any longer (threw away, gave away)	1	**1%**
Tried it, didn't fit; Too difficult to install it, don't know how to do it	1	**1%**
Tried it, didn't work as intended	1	**1%**
Other, (please specify:___)	15	**11%**
Don't know	2	**1%**
Refused	0	**0%**
Total	139	**100%**

Q19c. Bathroom faucet aerator

	# of responses	Percent
Already have efficient bathroom faucet aerators	27	**19%**
Current one is still working	17	**12%**
Current one is still working; Already have efficient bathroom faucet aerators	4	**3%**
Current one is still working; Don't have the items any longer (threw away, gave away); Already have efficient bathroom faucet aerators	1	**1%**
Didn't know what that was	11	**8%**
Didn't know what that was; Haven't gotten around to it	4	**3%**
Didn't know what that was; Haven't gotten around to it; Current one is still working	1	**1%**
Didn't know what that was; Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it; Don't have the tools I need	1	**1%**
Didn't know what that was; Too difficult to install it, don't know how to do it	1	**1%**
Didn't know what that was; Tried it, didn't fit; Haven't gotten around to it; Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it	1	**1%**
Don't have the items any longer (threw away, gave away)	2	**1%**
Don't have the tools I need	2	**1%**
Haven't gotten around to it	20	**14%**
Takes too much time to install/No time/Too busy	1	**1%**
Takes too much time to install/No time/Too busy; Don't have the tools I need	1	**1%**
Too difficult to install it, don't know how to do it	3	**2%**
Too difficult to install it, don't know how to do it; Already have efficient bathroom faucet aerators	1	**1%**
Too difficult to install it, don't know how to do it; Don't have the tools I need	1	**1%**
Tried it, didn't fit	22	**16%**
Tried it, didn't fit; Don't have the items any longer (threw away, gave away)	1	**1%**
Tried it, didn't fit; Other, (please specify:___)	2	**1%**
Tried it, didn't fit; Too difficult to install it, don't know how to do it	1	**1%**
Other, (please specify:___)	9	**6%**
Don't know	5	**4%**
Refused	0	**0%**
Total	139	**100%**

Q19d. Night light

	# of responses	Percent
Current one is still working	6	**17%**
Didn't know what that was	2	**6%**
Haven't gotten around to it	11	**31%**
Haven't gotten around to it; Current one is still working; Too difficult to install it, don't know how to do it	1	**3%**
Haven't gotten around to it; Too difficult to install it, don't know how to do it	1	**3%**
Takes too much time to install/No time/Too busy	1	**3%**
Other, (please specify:___)	7	**20%**
Don't know	5	**14%**
Refused	1	**3%**
Total	35	**100%**

I/A

Q19e. Energy efficient light bulb(s)

	# of responses	Percent
Already have LEDs	2	**13%**
Current one is still working	2	**13%**
Current one is still working; Already have LEDs	1	**6%**
Didn't know what that was	1	**6%**
Haven't gotten around to it	2	**13%**
Takes too much time to install/No time/Too busy	1	**6%**
Tried it, didn't fit	1	**6%**
Other, (please specify:___)	4	**25%**
Don't know	2	**13%**
Refused	0	**0%**
Total	16	**100%**

Q19f. Insulator gaskets

	# of responses	Percent
Current one is still working	15	**10%**
Didn't know what that was	42	**29%**
Didn't know what that was; Haven't gotten around to it	9	**6%**
Didn't know what that was; Haven't gotten around to it; Current one is still working; Too difficult to install it, don't know how to do it	1	**1%**
Didn't know what that was; Other, (please specify:___)	1	**1%**
Didn't know what that was; Too difficult to install it, don't know how to do it	2	**1%**
Don't have the items any longer (threw away, gave away)	2	**1%**
Haven't gotten around to it	33	**22%**
Haven't gotten around to it; Current one is still working	1	**1%**
Haven't gotten around to it; Takes too much time to install/No time/Too busy	1	**1%**
Takes too much time to install/No time/Too busy	2	**1%**
Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it	1	**1%**
Too difficult to install it, don't know how to do it	7	**5%**
Too difficult to install it, don't know how to do it; Don't have the tools I need	1	**1%**
Tried it, didn't fit	6	**4%**
Tried it, didn't work as intended	1	**1%**
Other, (please specify:___)	7	**5%**
Don't know	14	**10%**
Refused	1	**1%**
Total	147	**100%**

Q20. Thinking of the items you installed, would you be interested in receiving any more of them from Duke Energy? If so, which ones?

	# of responses	Percent
Bathroom faucet aerator; Night lights; Energy efficient light bulbs	5	**2%**
Bathroom faucet aerator; Night lights; Energy efficient light bulbs; Insulator Gaskets	1	**0%**
Energy efficient light bulbs	42	**16%**
Energy efficient light bulbs; Insulator Gaskets	8	**3%**
Insulator Gaskets	1	**0%**
Kitchen faucet aerator	1	**0%**
Kitchen faucet aerator; Bathroom faucet aerator; Energy efficient light bulbs	1	**0%**
Kitchen faucet aerator; Bathroom faucet aerator; Night lights; Energy efficient light bulbs	5	**2%**
Kitchen faucet aerator; Night lights	1	**0%**
Kitchen faucet aerator; Night lights; Energy efficient light bulbs	3	**1%**
Night lights	12	**5%**
Night lights; Energy efficient light bulbs	87	**34%**
Night lights; Energy efficient light bulbs; Insulator Gaskets	13	**5%**
Night lights; Insulator Gaskets	3	**1%**
Showerhead	3	**1%**
Showerhead; Bathroom faucet aerator; Energy efficient light bulbs; Insulator Gaskets	1	**0%**
Showerhead; Bathroom faucet aerator; Night lights; Energy efficient light bulbs	2	**1%**
Showerhead; Bathroom faucet aerator; Night lights; Energy efficient light bulbs; Insulator Gaskets	1	**0%**
Showerhead; Energy efficient light bulbs	8	**3%**
Showerhead; Energy efficient light bulbs; Insulator Gaskets	1	**0%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Energy efficient light bulbs	2	**1%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Energy efficient light bulbs; Insulator Gaskets	1	**0%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Night lights	1	**0%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Night lights; Energy efficient light bulbs	12	**5%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Night lights; Energy efficient light bulbs; Insulator Gaskets	7	**3%**
Showerhead; Kitchen faucet aerator; Energy efficient light bulbs	2	**1%**
Showerhead; Kitchen faucet aerator; Night lights; Energy efficient light bulbs	4	**2%**
Showerhead; Night lights	4	**2%**
Showerhead; Night lights; Energy efficient light bulbs	12	**5%**
Showerhead; Night lights; Energy efficient light bulbs; Insulator Gaskets	3	**1%**
No, I am not interested in receiving any more of the items	7	**3%**
Don't know	4	**2%**
Refused	0	**0%**

	# of responses	Percent
Total	258	**100%**

Q21. What would be your preferred way to request these additional items?

	# of responses	Percent
Internet	177	**72%**
Internet; Pre-paid postcard	23	**9%**
Internet; Pre-paid postcard; Other	1	**0%**
Internet; Telephone	6	**2%**
Internet; Telephone; Pre-paid postcard	7	**3%**
Pre-paid postcard	20	**8%**
Pre-paid postcard; Other	1	**0%**
Telephone	5	**2%**
Other	3	**1%**
Don't know	4	**2%**
Refused	0	**0%**
Total	247	**100%**

Q22. On average, what is the typical shower length in your household?

	# of responses	Percent
One minute or less	0	**0%**
Two to four minutes	4	**3%**
Five to eight minutes	44	**38%**
Nine to twelve minutes	24	**21%**
Thirteen to fifteen minutes	24	**21%**
Sixteen to twenty minutes	13	**11%**
Twenty-one to thirty minutes	5	**4%**
More than thirty minutes	2	**2%**
Don't know	1	**1%**
Refused	0	**0%**
Total	117	**100%**

Q23. Thinking of the efficient showerhead currently installed on your home: on average, how many showers per day are taken in this shower?

	Fewer than 1	1	2	3	4	5	6	7	8	Don't know	Refused	Total
# of responses	1	18	47	24	14	7	4	1	1	0	0	117
Percent	**1%**	**15%**	**40%**	**21%**	**12%**	**6%**	**3%**	**1%**	**1%**	**0%**	**0%**	**100%**

Q24. You said you installed the night light. Did the night light replace an existing night light?

	Yes	No	Don't Know	Refused	Total
# of responses	121	103	0	0	224

	Yes	No	Don't Know	Refused	Total
Percent	**54%**	**46%**	**0%**	**0%**	**100%**

Q25. Did the old nightlight have a bulb that you could take out and replace once it burned out?

	Yes	No	Don't Know	Refused	Total
# of responses	74	38	9	0	121
Percent	**61%**	**31%**	**7%**	**0%**	**100%**

Q26. You said you installed at least one of the energy efficient lights. What type of bulb(s) did you replace with the energy efficient lightbulbs?

	All incandescent	All halogen	All CFL	All LED	Some combination	Don't Know	Refused	Total
# of responses	111	15	74	33	4	16	0	253
Percent	**44%**	**6%**	**29%**	**13%**	**2%**	**6%**	**0%**	**100%**

Q27. In what rooms did you install the energy efficient lightbulbs that were included in the kit?

	# of responses	Percent
Bathroom	17	**7%**
Bathroom; Hallway	5	**2%**
Bedroom	25	**10%**
Bedroom; Basement	1	**0%**
Bedroom; Bathroom	12	**5%**
Bedroom; Den	1	**0%**
Bedroom; Garage	1	**0%**
Bedroom; Hallway	2	**1%**
Bedroom; Kitchen	4	**2%**
Den	1	**0%**
Den; Outdoors	1	**0%**
Dining Room	6	**2%**
Dining Room; Bedroom	6	**2%**
Dining Room; Kitchen	2	**1%**
Garage	1	**0%**
Hallway	3	**1%**
Kitchen	5	**2%**
Kitchen; Bathroom	10	**4%**
Kitchen; Den	1	**0%**
Kitchen; Hallway	1	**0%**
Living Room	41	**16%**
Living Room; Bathroom	7	**3%**
Living Room; Bedroom	51	**20%**
Living Room; Den	4	**2%**
Living Room; Dining Room	21	**8%**
Living Room; Hallway	1	**0%**
Living Room; Kitchen	13	**5%**
Living Room; Other area	1	**0%**
Don't know	8	**3%**
Refused	1	**0%**
Total	253	**100%**

Q28. Have you adjusted the temperature of your water heater based on the Hot Water Gauge Card included in your kit?

	Yes	No	Don't recall seeing the Hot Water Gauge Card	Don't Know	Refused	Total
# of responses	45	168	77	9	1	300
Percent	**15%**	**56%**	**26%**	**3%**	**0%**	**100%**

Q29. Do you know what the old temperature setting on your hot water heater was?

	Yes	No	Total
# of responses	12	33	45
Percent	**27%**	**73%**	**100%**

Q30. And what was the new temperature setting you set your hot water heater to?

	Provided response	Don't Know	Total
# of responses	12	33	45
Percent	**27%**	**73%**	**100%**

Q31. Is the new water heater temperature setting still in place?

	Yes	No	Don't Know	Refused	Total
# of responses	35	3	7	0	45
Percent	**78%**	**7%**	**16%**	**0%**	**100%**

Q32. Why did you change the water heater temperature a second time?

No responses given

Q33. What is the fuel type of your water heater?

	Electricity	Natural Gas	Other	Don't Know	Refused	Total
# of responses	181	110	0	8	1	300
Percent	**60%**	**37%**	**0%**	**3%**	**0%**	**100%**

Q34. How old is your water heater?

	Less than 5 years old	5 to 9 years old	10 to 15 years old	More than 15 years old	Don't Know	Refused	Total
# of responses	95	70	45	26	64	0	300
Percent	**32%**	**23%**	**15%**	**9%**	**21%**	**0%**	**100%**

Q35. If you had not received the free efficiency items in the kit, how likely is is that you would have purchased and installed any of these same items within the next six months?

Q35a. Showerhead

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	51	6	6	6	10	10	3	4	1	3	15	2	0	117
Percent	44%	5%	5%	5%	9%	9%	3%	3%	1%	3%	13%	2%	0%	100%

Q35b. Kitchen faucet aerator

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	50	7	5	6	6	8	4	3	2	1	10	1	0	103
Percent	49%	7%	5%	6%	6%	8%	4%	3%	2%	1%	10%	1%	0%	100%

Q35c. Bathroom faucet aerator

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	56	8	6	2	5	7	6	3	4	3	10	1	0	111
Percent	50%	7%	5%	2%	5%	6%	5%	3%	4%	3%	9%	1%	0%	100%

Q35d. Night light

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	84	11	10	9	6	26	10	18	10	7	29	4	0	224
Percent	38%	5%	4%	4%	3%	12%	4%	8%	4%	3%	13%	2%	0%	100%

Q35e. Energy efficient light bulb(s)

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	46	5	4	9	4	21	16	21	22	13	89	3	0	253
Percent	18%	2%	2%	4%	2%	8%	6%	8%	9%	5%	35%	1%	0%	100%

Q35f. Insulator gaskets for light switches and electricity outlets

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	51	8	2	3	2	9	1	5	2	2	6	1	0	92
Percent	55%	9%	2%	3%	2%	10%	1%	5%	2%	2%	7%	1%	0%	100%

Q36. If you had not received them for free in the kit, how many LED light bulbs would you have purchased?

	One	Two	Don't Know	Refused	Total
# of responses	1	53	43	0	97
Percent	**1%**	**55%**	**44%**	**0%**	**100%**

Q37. Now, thinking about the water savings items that were provided in the kit - using a scale from 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how influential were the following factors on your decision to install the water saving items from the kit? How influential was...

Q37a. The fact that the items were free

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	9	1	0	1	2	11	9	9	15	13	98	0	2	0	170
Percent	**5%**	**1%**	**0%**	**1%**	**1%**	**6%**	**5%**	**5%**	**9%**	**8%**	**58%**	**0%**	**1%**	**0%**	**100%**

Q37b. The fact that the items were mailed to your house

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	4	0	1	0	2	9	5	11	15	12	108	0	3	0	170
Percent	**2%**	**0%**	**1%**	**0%**	**1%**	**5%**	**3%**	**6%**	**9%**	**7%**	**64%**	**0%**	**2%**	**0%**	**100%**

Q37c. Information in the kit about how the items would save energy

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	4	1	2	4	2	10	5	9	17	17	98	0	1	0	170
Percent	**2%**	**1%**	**1%**	**2%**	**1%**	**6%**	**3%**	**5%**	**10%**	**10%**	**58%**	**0%**	**1%**	**0%**	**100%**

Q37d. Information that your child brought home from school

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	15	0	3	2	3	10	8	13	19	15	77	3	2	0	170
Percent	**9%**	**0%**	**2%**	**1%**	**2%**	**6%**	**5%**	**8%**	**11%**	**9%**	**45%**	**2%**	**1%**	**0%**	**100%**

Q37e. Other information or advertisements from Duke Energy, including its website

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	14	1	3	4	5	21	8	14	15	13	70	1	1	0	170
Percent	**8%**	**1%**	**2%**	**2%**	**3%**	**12%**	**5%**	**8%**	**9%**	**8%**	**41%**	**1%**	**1%**	**0%**	**100%**

Q38. Using a scale from 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how influential were the following factors in your decision to install the lightbulbs from the kit? How influential was...

Q38a. The fact that the items were free

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	9	1	1	1	5	16	7	11	10	20	172	0	0	0	253
Percent	**4%**	**0%**	**0%**	**0%**	**2%**	**6%**	**3%**	**4%**	**4%**	**8%**	**68%**	**0%**	**0%**	**0%**	**100%**

Q38b. The fact that the items were mailed to your house

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	5	0	1	1	1	16	4	11	17	17	179	0	0	1	253
Percent	**2%**	**0%**	**0%**	**0%**	**0%**	**6%**	**2%**	**4%**	**7%**	**7%**	**71%**	**0%**	**0%**	**0%**	**100%**

Q38c. Information in the kit about how the items would save energy

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	14	0	1	3	6	15	13	21	18	20	141	0	1	0	253
Percent	**6%**	**0%**	**0%**	**1%**	**2%**	**6%**	**5%**	**8%**	**7%**	**8%**	**56%**	**0%**	**0%**	**0%**	**100%**

Q38d. Information that your child brought home from school

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	20	1	1	4	11	20	13	19	25	19	111	5	4	0	253
Percent	**8%**	**0%**	**0%**	**2%**	**4%**	**8%**	**5%**	**8%**	**10%**	**8%**	**44%**	**2%**	**2%**	**0%**	**100%**

Q38e. Other information or advertisements from Duke Energy, including its website

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	26	3	2	5	9	28	19	23	16	19	94	4	4	1	253
Percent	**10%**	**1%**	**1%**	**2%**	**4%**	**11%**	**8%**	**9%**	**6%**	**8%**	**37%**	**2%**	**2%**	**0%**	**100%**

Q39. Since your child learned about energy conservation at school and signed up for your energy kit from Duke Energy, has your child adopted any new behaviors to help save energy in your home? This would only include new energy saving behaviors that your child adopted since receiving the kit.

	# of responses	Percent
Not applicable - no new behaviors	67	**22%**
Taking shorter showers	6	**2%**
Turning off electronics when not using them	13	**4%**
Turning off electronics when not using them; Taking shorter showers	3	**1%**
Turning off lights when not in a room	54	**18%**
Turning off lights when not in a room; Taking shorter showers	11	**4%**
Turning off lights when not in a room; Turning off electronics when not using them	83	**28%**
Turning off lights when not in a room; Turning off electronics when not using them; Other	2	**1%**
Turning off lights when not in a room; Turning off electronics when not using them; Taking shorter showers	42	**14%**
Turning off lights when not in a room; Turning off electronics when not using them; Taking shorter showers; Other	1	**0%**
Other	6	**2%**
Don't know	12	**4%**
Refused	0	**0%**
Total	300	**100%**

Q39b. Before receiving the kit, was your child already...

39b.2) Turning off lights when not in a room

	Yes	No	Don't Know	Refused	Total
# of responses	65	124	4	0	193
Percent	**34%**	**64%**	**2%**	**0%**	**100%**

39b.3) Turning off electronics when not using them

	Yes	No	Don't Know	Refused	Total
# of responses	40	99	5	0	144
Percent	**28%**	**69%**	**3%**	**0%**	**100%**

39b.4) Taking shorter showers

	Yes	No	Don't Know	Refused	Total
# of responses	18	45	0	0	63
Percent	**29%**	**71%**	**0%**	**0%**	**100%**

39b.5) "Other" reasons

	Yes	No	Don't Know	Refused	Total
# of responses	3	4	2	0	9
Percent	**33%**	**44%**	**22%**	**0%**	**100%**

Q40. Since receiving your energy kit from Duke Energy, have you adopted or increased any behaviors to help save energy in your home?

	# of responses	Percent
Changing thermostat settings so heating or cooling system uses less energy	12	**4%**
Changing thermostat settings so heating or cooling system uses less energy; Taking shorter showers	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Taking shorter showers; Turning water heat thermostat down	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	4	**1%**
Changing thermostat settings so heating or cooling system uses less energy; Turning water heat thermostat down	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning Taking shorter showers	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning Turning off electronics when not using them	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Turning water heat thermostat down	1	**0%**
Taking shorter showers	3	**1%**
Turning off air conditioning when not home	3	**1%**
Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy	1	**0%**
Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Turning water heat thermostat down	1	**0%**
Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	1	**0%**
Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Taking shorter showers	2	**1%**
Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	1	**0%**
Turning off electronics when not using them	2	**1%**
Turning off electronics when not using them; Taking shorter showers	1	**0%**
Turning off electronics when not using them; Turning water heat thermostat down	1	**0%**
Turning off furnace when not home	1	**0%**
Turning off furnace when not home; Turning off air conditioning when not home	1	**0%**

I/A

	# of responses	Percent
Turning off lights when not in a room	21	7%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy	10	3%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Taking shorter showers	2	1%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	14	5%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers	5	2%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	1	0%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Turning water heat thermostat down	2	1%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	5	2%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Other	1	0%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Taking shorter showers	1	0%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	15	5%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	12	4%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	3	1%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Turning water heat thermostat down	3	1%
Turning off lights when not in a room; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	3	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers	3	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	5	2%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Other	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	3	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Turning off electronics when not using them	4	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Using fans instead of air conditioning	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Using fans instead of air conditioning; Taking shorter showers	1	0%

I/A

	# of responses	Percent
Turning off lights when not in a room; Turning off air conditioning when not home; Using fans instead of air conditioning; Turning off electronics when not using them	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	2	1%
Turning off lights when not in a room; Turning off electronics when not using them	9	3%
Turning off lights when not in a room; Turning off electronics when not using them; Taking shorter showers	2	1%
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	2	1%
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy	3	1%
Turning off lights when not in a room Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	5	2%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers	2	1%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	2	1%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	6	2%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	4	1%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	8	3%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down; Other	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Turning water heat thermostat down	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Turning off electronics when not using them	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Using fans instead of air conditioning; Turning off electronics when not using them	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Turning off electronics when not using them	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Using fans instead of air conditioning	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	1	0%
Turning off lights when not in a room; Using fans instead of air conditioning	1	0%
Turning off lights when not in a room; Using fans instead of air conditioning; Turning off electronics when not using them	2	1%
Turning off lights when not in a room; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	1	0%

	# of responses	Percent
Turning water heat thermostat down	2	1%
Using fans instead of air conditioning	2	1%
Using fans instead of air conditioning; Turning off electronics when not using them	3	1%
Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	2	1%
Not applicable - no new behaviors	55	18%
Other	3	1%
Don't know	6	2%
Refused	1	0%
Total	300	100%

Q40b. Before receiving the kit, were you already...

40b.2) Turning off lights when not in a room

	Yes	No	Don't Know	Refused	Total
# of responses	137	45	3	0	185
Percent	**74%**	**24%**	**2%**	**0%**	**100%**

40b.3) Turning off furnace when not home

	Yes	No	Don't Know	Refused	Total
# of responses	27	18	1	0	46
Percent	**59%**	**39%**	**2%**	**0%**	**100%**

40b.4) Turning off air conditioning when not home

	Yes	No	Don't Know	Refused	Total
# of responses	45	32	0	0	77
Percent	**58%**	**42%**	**0%**	**0%**	**100%**

40b.5) Changing thermostat settings so heating or cooling system uses less energy

	Yes	No	Don't Know	Refused	Total
# of responses	84	75	1	0	160
Percent	**53%**	**47%**	**1%**	**0%**	**100%**

40b.6) Using fans instead of air conditioning

	Yes	No	Don't Know	Refused	Total
# of responses	66	38	2	0	106
Percent	**62%**	**36%**	**2%**	**0%**	**100%**

40b.7) Turning off electronics when not using them

	Yes	No	Don't Know	Refused	Total
# of responses	83	62	2	0	147
Percent	**56%**	**42%**	**1%**	**0%**	**100%**

40b.8) Taking shorter showers

	Yes	No	Don't Know	Refused	Total
# of responses	20	49	1	0	70
Percent	**29%**	**70%**	**1%**	**0%**	**100%**

40b.9) Turning water heat thermostat down

	Yes	No	Don't Know	Refused	Total
# of responses	9	19	1	0	29
Percent	**31%**	**66%**	**3%**	**0%**	**100%**

40b.10) Other

	Yes	No	Don't Know	Refused	Total
# of responses	5	1	0	0	6
Percent	**83%**	**17%**	**0%**	**0%**	**100%**

Q41. On a scale of 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how much influence did Duke Energy's kit and materials on saving energy have on this change of energy using behaviors?

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	7	4	2	5	7	24	20	28	35	21	79	3	0	235
Percent	**3%**	**2%**	**1%**	**2%**	**3%**	**10%**	**9%**	**12%**	**15%**	**9%**	**34%**	**1%**	**0%**	**100%**

Q42. Since receiving your energy kit from Duke Energy, have you purchased and installed any other products or made any improvements to your home to help save energy?

	Yes	No	Don't Know	Refused	Total
# of responses	103	173	24	0	300
Percent	**34%**	**58%**	**8%**	**0%**	**100%**

Q43. What products have you purchased and installed to help save energy in your home?

	# of responses	Percent
Efficient heating or cooling equipment	1	**1%**
Efficient heating or cooling equipment; Insulation; LEDs and/or CFLs; Energy efficient water heater	1	**1%**
Efficient heating or cooling equipment; LEDs and/or CFLs	1	**1%**
Efficient heating or cooling equipment; Products to seal air leaks in your home; Products to seal ducts; LEDs and/or CFLs	1	**1%**
Efficient windows; Insulation; LEDs and/or CFLs	2	**2%**
Efficient windows; LEDs and/or CFLs	1	**1%**
Efficient windows; Other	1	**1%**
Energy efficient appliances	4	**4%**
Energy efficient appliances; Efficient heating or cooling equipment	1	**1%**
Energy efficient appliances; Efficient heating or cooling equipment; Efficient windows; Insulation; LEDs and/or CFLs; Energy efficient water heater	1	**1%**
Energy efficient appliances; Efficient heating or cooling equipment; Efficient windows LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Efficient heating or cooling equipment; Efficient windows; Products to seal air leaks in your home; LEDs and/or CFLs; Energy efficient water heater	1	**1%**
Energy efficient appliances; Efficient heating or cooling equipment; Insulation; Products to seal air leaks in your home; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Efficient heating or cooling equipment; LEDs and/or CFLs	5	**5%**
Energy efficient appliances; Efficient heating or cooling equipment; Products to seal ducts; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Efficient windows; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Efficient windows; LEDs and/or CFLs; Energy efficient water heater	1	**1%**
Energy efficient appliances; Efficient windows; Products to seal air leaks in your home; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Efficient windows; Products to seal air leaks in your home; LEDs and/or CFLs; Energy efficient water heater	1	**1%**
Energy efficient appliances; Insulation	1	**1%**
Energy efficient appliances; Insulation; LEDs and/or CFLs; Energy efficient water heater	2	**2%**
Energy efficient appliances; Insulation; Products to seal air leaks in your home; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; LEDs and/or CFLs	11	**11%**
Energy efficient appliances; LEDs and/or CFLs; Energy efficient water heater	3	**3%**
Energy efficient appliances; LEDs and/or CFLs; Other	2	**2%**
Energy efficient appliances; Other	1	**1%**
Energy efficient appliances; Products to seal air leaks in your home; LEDs and/or CFLs	3	**3%**

	# of responses	Percent
Energy efficient appliances; Products to seal air leaks in your home; Products to seal ducts; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Products to seal ducts; LEDs and/or CFLs	2	**2%**
Energy efficient water heater	1	**1%**
Insulation	1	**1%**
Insulation; LEDs and/or CFLs	3	**3%**
Insulation; Products to seal air leaks in your home; LEDs and/or CFLs	2	**2%**
LEDs and/or CFLs	26	**25%**
LEDs and/or CFLs; Energy efficient water heater	3	**3%**
Products to seal air leaks in your home	4	**4%**
Products to seal air leaks in your home; LEDs and/or CFLs	4	**4%**
Products to seal air leaks in your home; LEDs and/or CFLs; Other	1	**1%**
Products to seal air leaks in your home; Products to seal ducts; LEDs and/or CFLs	1	**1%**
None - no other actions taken	1	**1%**
Other	2	**2%**
Total	103	**100%**

Q44. Did you get a rebate from Duke Energy for any of those products or services? If so, which ones?

Q44.1) Buy energy efficient appliances

	Yes	No	Don't Know	Refused	Total
# of responses	5	40	1	0	46
Percent	**11%**	**87%**	**2%**	**0%**	**100%**

Q44.2) Buy efficient heating or cooling equipment

	Yes	No	Don't Know	Refused	Total
# of responses	3	12	0	0	15
Percent	**20%**	**80%**	**0%**	**0%**	**100%**

Q44.3) Buy efficient windows

	Yes	No	Don't Know	Refused	Total
# of responses	1	10	0	0	11
Percent	**9%**	**91%**	**0%**	**0%**	**100%**

Q44.4) Buy additional insulation

	Yes	No	Don't Know	Refused	Total
# of responses	0	15	0	0	15
Percent	0%	100%	0%	0%	100%

Q44.5) Products to seal air leaks in your home

	Yes	No	Don't Know	Refused	Total
# of responses	0	20	2	0	22
Percent	0%	91%	9%	0%	100%

Q44.6) Products to seal ducts

	Yes	No	Don't Know	Refused	Total
# of responses	0	6	0	0	6
Percent	0%	100%	0%	0%	100%

Q44.7) Buy LEDs and/or CFLs

	Yes	No	Don't Know	Refused	Total
# of responses	11	69	5	0	85
Percent	13%	81%	6%	0%	100%

Q44.8) Install an energy efficient water heater

	Yes	No	Don't Know	Refused	Total
# of responses	0	13	1	0	14
Percent	0%	93%	7%	0%	100%

Q44.96) "Other" [Q44 open-ended question]

	Yes	No	Don't Know	Refused	Total
# of responses	1	6	0	0	7
Percent	14%	86%	0%	0%	100%

Q45. On a scale of 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how much influence did the Duke Energy schools program have on your decision to...

Q45.1) Buy energy efficient appliances

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	10	0	3	1	0	10	3	0	3	2	14	0	0	46
Percent	22%	0%	7%	2%	0%	22%	7%	0%	7%	4%	30%	0%	0%	100%

Q45.2) Buy efficient heating or cooling equipment

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	7	0	0	0	0	0	0	1	1	0	6	0	0	15
Percent	47%	0%	0%	0%	0%	0%	0%	7%	7%	0%	40%	0%	0%	100%

Q45.3) Buy efficient windows

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	3	1	0	0	0	1	0	1	1	1	3	0	0	11
Percent	27%	9%	0%	0%	0%	9%	0%	9%	9%	9%	27%	0%	0%	100%

Q45.4) Buy additional insulation

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	4	1	2	0	0	3	1	1	2	0	1	0	0	15
Percent	27%	7%	13%	0%	0%	20%	7%	7%	13%	0%	7%	0%	0%	100%

Q45.5) Products to seal air leaks in your home

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	3	0	0	0	0	5	4	2	0	1	7	0	0	22
Percent	14%	0%	0%	0%	0%	23%	18%	9%	0%	5%	32%	0%	0%	100%

Q45.6) Products to seal ducts

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	3	0	0	0	0	2	0	0	0	0	1	0	0	6
Percent	50%	0%	0%	0%	0%	33%	0%	0%	0%	0%	17%	0%	0%	100%

I/A

Q45.7) Buy LEDs and/or CFLs

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	13	2	2	2	1	6	4	10	8	6	31	0	0	85
Percent	**15%**	**2%**	**2%**	**2%**	**1%**	**7%**	**5%**	**12%**	**9%**	**7%**	**36%**	**0%**	**0%**	**100%**

Q45.8)) Install an energy efficient water heater

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	7	0	1	0	0	2	0	0	0	1	3	0	0	14
Percent	**50%**	**0%**	**7%**	**0%**	**0%**	**14%**	**0%**	**0%**	**0%**	**7%**	**21%**	**0%**	**0%**	**100%**

Q45.96) [Q45 open-ended question]

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	2	0	0	0	0	1	0	1	1	1	1	0	0	7
Percent	**29%**	**0%**	**0%**	**0%**	**0%**	**14%**	**0%**	**14%**	**14%**	**14%**	**14%**	**0%**	**0%**	**100%**

Q46. What kinds of appliance(s) did you buy?

	# of responses	Percent
Clothes dryer	1	**3%**
Clothes washer	2	**6%**
Clothes washer; Clothes dryer	1	**3%**
Clothes washer; Clothes dryer; Microwave	1	**3%**
Clothes washer; Clothes dryer; Oven	1	**3%**
Dishwasher	3	**8%**
Dishwasher; Clothes washer; Clothes dryer	1	**3%**
Dishwasher; Clothes washer; Microwave	1	**3%**
Dishwasher; Clothes washer; Oven	1	**3%**
Microwave	1	**3%**
Oven	2	**6%**
Refrigerator	2	**6%**
Refrigerator; Clothes dryer	1	**3%**
Refrigerator; Clothes washer; Clothes dryer; Oven; Microwave	1	**3%**
Refrigerator; Dishwasher; Clothes washer; Clothes dryer; Microwave	1	**3%**
Refrigerator; Dishwasher; Clothes washer; Clothes dryer; Oven; Microwave	7	**19%**
Refrigerator; Dishwasher; Oven	1	**3%**
Refrigerator; Microwave	1	**3%**
Refrigerator; Oven	1	**3%**
Refrigerator; Stand-alone Freezer; Clothes washer; Clothes dryer; Microwave	1	**3%**
Refrigerator; Stand-alone Freezer; Dishwasher; Oven; Microwave	2	**6%**
Stand-alone Freezer; Clothes washer; Clothes dryer	2	**6%**
Other	1	**3%**
Don't know	0	**0%**

	# of responses	Percent
Refused	0	**0%**
Total	36	**100%**

Q47. Was the [Q46 appliance] an ENERGY STAR or high efficiency model?

Q47.1) Refrigerator

	Yes	No	Don't Know	Refused	Total
# of responses	16	0	2	0	18
Percent	**89%**	**0%**	**11%**	**0%**	**100%**

Q47.2) Stand-alone Freezer

	Yes	No	Don't Know	Refused	Total
# of responses	5	0	0	0	5
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q47.3) Dishwasher

	Yes	No	Don't Know	Refused	Total
# of responses	16	0	1	0	17
Percent	**94%**	**0%**	**6%**	**0%**	**100%**

Q47.4) Clothes washer

	Yes	No	Don't Know	Refused	Total
# of responses	19	0	1	0	20
Percent	**95%**	**0%**	**5%**	**0%**	**100%**

Q47.5) Clothes dryer

	Yes	No	Don't Know	Refused	Total
# of responses	17	0	1	0	18
Percent	**94%**	**0%**	**6%**	**0%**	**100%**

Q47.6) Oven

	Yes	No	Don't Know	Refused	Total
# of responses	13	0	3	0	16
Percent	**81%**	**0%**	**19%**	**0%**	**100%**

Q47.7) Microwave

	Yes	No	Don't Know	Refused	Total
# of responses	13	1	2	0	16
Percent	**81%**	**6%**	**13%**	**0%**	**100%**

Q47.96) Other:

	Yes	No	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q48. Does the new clothes dryer use natural gas?

	Yes - it uses natural gas	No - it does not use natural gas	Don't Know	Refused	Total
# of responses	2	15	1	0	18
Percent	**11%**	**83%**	**6%**	**0%**	**100%**

Q49. What type of heating or cooling equipment did you buy?

	# of responses	Percent
Central air conditioner	2	**25%**
Central air conditioner; Air source heat pump; Geothermal heat pump; Furnace; WIFI enabled thermostat	1	**13%**
Central air conditioner; Furnace; WIFI enabled thermostat	1	**13%**
WIFI enabled thermostat	2	**25%**
Window/room air conditioner unit; Other	1	**13%**
Don't know	1	**13%**
Refused	0	**0%**
Total	8	**100%**

Q50. Does the new [Q53 equipment] use natural gas?

Q50.6) Boiler

No responses given

Q50.7) Furnace

	Yes - it uses natural gas	No - it does not use natural gas	Don't Know	Refused	Total
# of responses	0	1	1	0	2
Percent	**0%**	**50%**	**50%**	**0%**	**100%**

Q51. Was the heating or cooling equipment an ENERGY STAR or high-efficiency model?

Q51.1) Central air conditioner

	Yes	No	Don't Know	Refused	Total
# of responses	4	0	0	0	4
Percent	100%	0%	0%	0%	100%

Q51.2) Window/room air conditioner unit

No responses given

Q51.3) Wall air conditioner unit

	Yes	No	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	100%	0%	0%	0%	100%

Q51.4) Air source heat pump

	Yes	No	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	100%	0%	0%	0%	100%

Q51.5) Geothermal heat pump

	Yes	No	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	100%	0%	0%	0%	100%

Q51.6) Boiler

No responses given

Q51.7) Furnace

	Yes	No	Don't Know	Refused	Total
# of responses	2	0	0	0	2
Percent	100%	0%	0%	0%	100%

Q51.96) Other:

	Yes	No	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	100%	0%	0%	0%	100%

Q52. How many windows did you install?

	1	2	3	4	5	6	7	8	9	10	11	Don't know	Refused	Total
# of responses	0	1	1	0	0	1	0	1	1	1	1	1	0	8
Percent	0%	13%	13%	0%	0%	13%	0%	13%	13%	13%	13%	13%	0%	100%

Q53. Did you add insulation to your attic, walls, or below the floor?

	Attic	Attic; Walls; Below the floor	Walls	Below the floor	Don't Know	Refused	Total
# of responses	4	1	3	2	1	0	11
Percent	36%	9%	27%	18%	9%	0%	100%

Q54. Approximately what proportion of the [Q53 location] space did you add insulation?

Q54.1) Attic

	15%	40%	100%	Don't Know	Refused	Total
# of responses	1	1	1	2	0	5
Percent	20%	20%	20%	40%	0%	100%

Q54.2) Walls

	Don't Know	Refused	Total
# of responses	3	0	3
Percent	100%	0%	100%

Q54.3) Below the floor

	100%	Don't Know	Refused	Total
# of responses	1	3	0	4
Percent	25%	75%	0%	100%

Q55. How many LEDs and CFLs did you install in your property?

	3	4	5	6	8	10	11	12	14	15	18	20	25	30	70	Don't know	Refused	Total
# of responses	1	3	7	7	7	15	1	2	1	5	1	6	2	2	1	11	0	72
Percent	**1%**	**4%**	**10%**	**10%**	**10%**	**21%**	**1%**	**3%**	**1%**	**7%**	**1%**	**8%**	**3%**	**3%**	**1%**	**15%**	**0%**	**100%**

Q56. You said that you installed [Q55 response] LED and CFL bulbs on your propert. Is this the correct number?

	Yes, this is the correct number of LED and CFL bulbs I installed	No, the correct number is:	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q57. Does the new water heater use natural gas?

	Yes - it uses natural gas	No - it does not use natural gas	Don't Know	Refused	Total
# of responses	1	5	1	0	7
Percent	**14%**	**71%**	**14%**	**0%**	**100%**

Q58. Which of the following water heaters did you purchase?

	A traditional water heater	A tankless water heater	A solar water heater	Other	Don't know	Refused	Total
# of responses	4	2	0	0	1	0	7
Percent	**57%**	**29%**	**0%**	**0%**	**14%**	**0%**	**100%**

Q59. Is the new water heater an ENERGY STAR model?

	Yes	No	Don't Know	Refused	Total
# of responses	7	0	0	0	7
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q60. Which of the following types of housing units would you say best describes your home? Is it...

	Single-family detached home	Single-family attached home (such as a townhouse or condo)	Duplex, triplex, or quadplex	Apartment or condominium with 5 units or more	Manufactured or mobile home	Other	Don't know	Refused	Total
# of responses	220	16	5	34	23	0	1	1	300
Percent	**73%**	**5%**	**2%**	**11%**	**8%**	**0%**	**0%**	**0%**	**100%**

Q61. How many showers are in your home? Please include both stand-up showers and bathtubs with showerheads.

	1	2	3	4	5 or more	Don't know	Refused	Total
# of responses	70	169	42	14	4	0	1	300
Percent	**23%**	**56%**	**14%**	**5%**	**1%**	**0%**	**0%**	**100%**

Q62. How many square feet of living space are there in your residence, including bathrooms, foyers and hallways (exclude garages, unfinished basements, and unheated porches)?

	Less than 500 sq. ft.	500 to under 1,000 sq. ft.	1,000 to under 1,500 sq. ft.	1,500 to under 2,000 sq. ft.	2,000 to under 2,500 sq. ft.	2,500 to under 3,000 sq. ft.	Greater than 3,000 sq. ft.	Don't know	Refused	Total
# of responses	2	32	75	64	30	39	35	22	1	300
Percent	**1%**	**11%**	**25%**	**21%**	**10%**	**13%**	**12%**	**7%**	**0%**	**100%**

Q63. Do you or members of your household own your home, or do you rent it?

	Own/Buying	Rent/Lease	Occupy Rent-free	Don't know	Refused	Total
# of responses	206	90	2	0	2	300
Percent	**69%**	**30%**	**1%**	**0%**	**1%**	**100%**

Q64. Including yourself, how many people currently live in your home year-round?

	I live by myself	Two people	Three people	Four people	Five people	Six people	Seven people	Eight or more people	Don't know	Refused	Total
# of responses	13	55	66	98	32	24	6	2	0	4	300
Percent	**4%**	**18%**	**22%**	**33%**	**11%**	**8%**	**2%**	**1%**	**0%**	**1%**	**100%**

Q65. What was your total annual household income for 2020, before taxes?

	# of responses	Percent
Under $15,000	16	**5%**
15 to under $25,000	28	**9%**
25 to under $35,000	33	**11%**
35 to under $50,000	45	**15%**
50 to under $75,000	47	**16%**
75 to under $100,000	34	**11%**
100 to under $150,000	22	**7%**

	# of responses	Percent
150 to under $200,000	9	**3%**
$200,000 or more	17	**6%**
Don't know	5	**2%**
Prefer not to say	44	**15%**
Total	300	**100%**
Under $15,000	16	**5%**

Q66. In what year were you born?

	# of responses	Percent
1940	1	**0.3%**
1945	1	**0.3%**
1947	2	**0.7%**
1948	2	**0.7%**
1949	1	**0.3%**
1951	1	**0.3%**
1952	1	**0.3%**
1954	4	**1.3%**
1955	3	**1.0%**
1956	1	**0.3%**
1957	2	**0.7%**
1958	4	**1.3%**
1959	1	**0.3%**
1960	2	**0.7%**
1961	4	**1.3%**
1962	2	**0.7%**
1963	6	**2.0%**
1964	2	**0.7%**
1966	5	**1.7%**
1967	2	**0.7%**
1968	6	**2.0%**
1969	11	**3.7%**
1970	7	**2.3%**
1971	9	**3.0%**
1972	4	**1.3%**
1973	5	**1.7%**
1974	11	**3.7%**
1975	7	**2.3%**
1976	2	**0.7%**
1977	16	**5.3%**
1978	11	**3.7%**
1979	15	**5.0%**
1980	12	**4.0%**
1981	4	**1.3%**
1982	8	**2.7%**
1983	10	**3.3%**
1984	8	**2.7%**
1985	11	**3.7%**
1986	11	**3.7%**
1987	8	**2.7%**
1988	8	**2.7%**

	# of responses	Percent
1989	8	**2.7%**
1990	2	**0.7%**
1991	4	**1.3%**
1992	3	**1.0%**
1993	2	**0.7%**
1994	5	**1.7%**
1996	2	**0.7%**
Don't know	1	**0.3%**
Prefer not to say	42	**14.0%**
Total	300	**100%**

Q67. What is the highest level of education achieved among those living in your household?

	# of responses	Percent
Less than high school	3	**1%**
Some high school	3	**1%**
High school graduate or equivalent	42	**14%**
Trade or technical school	9	**3%**
Some college (including Associate's degree)	94	**31%**
College degree (Bachelor's degree)	73	**24%**
Some graduate school	6	**2%**
Graduate degree, professional degree	51	**17%**
Doctorate	10	**3%**
Don't know	0	**0%**
Prefer not to say	9	**3%**
Total	300	**100%**

Q68. Lastly, did the COVID-19 pandemic, or government or organizational response to it, offer any challenges to you regarding your participation in this program? If so, what challenges, and how do you think they might best be addressed moving forward?

	Yes	No	Don't Know	Refused	Total
# of responses	9	251	40	0	300
Percent	**3%**	**84%**	**13%**	**0%**	**100%**

F.4 Student Parent Survey - DEP

Q1. This kit included light bulbs, a showerhead, and other items that help you save energy in your home. Do you recall receiving this kit?

	Yes	No	Don't Know	Total
# of responses	215	0	0	215
Percent	**100%**	**0%**	**0%**	**100%**

Q1.1) Were you aware of this program, prior to your child's involvement, due to your work at an elementary, middle or high school?

	Yes	No	Don't Know	Total
# of responses	0	215	0	215
Percent	**0%**	**100%**	**0%**	**100%**

Q2. Before today, did you know the kit you received was sponsored by Duke Energy?

	Yes	No	Don't Know	Total
# of responses	195	18	2	215
Percent	**91%**	**8%**	**1%**	**100%**

Q3. How did you learn that the kit was sponsored by Duke Energy?

	# of responses	Percent
Classroom materials brought home by child	40	**21%**
Classroom materials brought home by child; Information material included in/on the kit	27	**14%**
Classroom materials brought home by child; Information material included in/on the kit; Other	2	**1%**
Classroom materials brought home by child; My child's teacher/school	8	**4%**
Classroom materials brought home by child; My child's teacher/school; Information material included in/on the kit	11	**6%**
Information material included in/on the kit	55	**28%**
Information material included in/on the kit; Other	2	**1%**
My child's teacher/school	27	**14%**
My child's teacher/school; Information material included in/on the kit	6	**3%**
My child's teacher/school; Other	1	**1%**
Other	11	**6%**
Don't know	5	**3%**
Refused	0	**0%**
Total	195	**100%**

Q4. How did you hear about the opportunity to receive the kit from Duke Energy?

	# of responses	Percent
After hours event at my child's school	1	**0%**
Classroom materials brought home by child	93	**43%**
Classroom materials brought home by child; Email from my child's teacher/school	10	**5%**
Classroom materials brought home by child; Email from my child's teacher/school; Saw a poster at my child's school	1	**0%**
Classroom materials brought home by child; Email from my child's teacher/school; School website or school web portal	2	**1%**
Classroom materials brought home by child; Other	1	**0%**
Classroom materials brought home by child; Saw a poster at my child's school	1	**0%**
Classroom materials brought home by child; School newsletter	4	**2%**
Classroom materials brought home by child; School newsletter; Email from my child's teacher/school	9	**4%**
Classroom materials brought home by child; School newsletter; Email from my child's teacher/school; School website or school web portal	1	**0%**
Classroom materials brought home by child; School newsletter; Email from my child's teacher/school; School website or school web portal; After hours event at my child's school	1	**0%**
Classroom materials brought home by child; School newsletter; Saw a poster at my child's school	1	**0%**
Classroom materials brought home by child; School newsletter; School website or school web portal	2	**1%**
Classroom materials brought home by child; School newsletter; School website or school web portal; Other	1	**0%**
Classroom materials brought home by child; School website or school web portal	7	**3%**
Classroom materials brought home by child; School website or school web portal; Other	1	**0%**
Classroom materials brought home by child; School website or school web portal; Saw a poster at my child's school	1	**0%**
Email from my child's teacher/school	13	**6%**
Email from my child's teacher/school; In-person conversations with my child's teacher	1	**0%**
Email from my child's teacher/school; School website or school web portal	1	**0%**
In-person conversations with my child's teacher	1	**0%**
School newsletter	8	**4%**
School newsletter; Email from my child's teacher/school	2	**1%**
School newsletter; School website or school web portal	1	**0%**
School website or school web portal	10	**5%**
Other	19	**9%**
Don't know	22	**10%**
Refused	0	**0%**
Total	215	**100%**

Q4b. How did you request your kit?

	Program's website	Sign-up form in the classroom materials my child brought home	By calling the toll-free number	Via the "Kilowatt Krush" app on my smartphone	Don't know	Refused	Total
# of responses	136	49	8	1	21	0	215
Percent	**63%**	**23%**	**4%**	**0%**	**10%**	**0%**	**100%**

Q4c. Has your child used the "Kilowatt Krush" app on any smartphone in your household?

	Yes	No	Don't Know	Refused	Total
# of responses	21	160	34	0	215
Percent	**10%**	**74%**	**16%**	**0%**	**100%**

Q4d. About how often would you say that your child uses the "Kilowatt Krush" app?

	They used it once	They used it a few times	They use it daily	They use it weekly	Other	Don't know	Refused	Total
# of responses	4	12	1	3	1	1	0	22
Percent	**18%**	**55%**	**5%**	**14%**	**5%**	**5%**	**0%**	**100%**

Q4e. Have you noticed your child engaging in energy saving behaviors you can attribute to their use of the "Kilowatt Krush" app?

	Yes	No	Don't Know	Total
# of responses	13	9	0	22
Percent	**59%**	**41%**	**0%**	**100%**

Q4f. Do you have any feedback that might help improve the "Kilowatt Krush" app?

	Yes	No	Don't Know	Refused	Total
# of responses	2	17	3	0	22
Percent	**9%**	**77%**	**14%**	**0%**	**100%**

Q5. Did you read any of the Energy Savers booklet that came in the kit?

	Yes	No	Don't Know	Refused	Total
# of responses	158	41	16	0	215
Percent	**73%**	**19%**	**7%**	**0%**	**100%**

Q6. On a scale from 0 to 10 where 0 is not at all helpful and 10 is very helpful, how helpful was the Energy Savers booklet in identifying ways your household could save energy at home?

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	0	0	3	1	6	14	11	36	27	15	45	0	0	158
Percent	0%	0%	2%	1%	4%	9%	7%	23%	17%	9%	28%	0%	0%	100%

Q7. What might have made the information more helpful?

	Provided response	Don't Know	Refused	Total
# of responses	10	24	1	35
Percent	39%	69%	3%	100%

Q8. In addition to sending the energy saving kits, Duke Energy sponsored a program about energy and energy efficiency at your child's school, which included classroom materials and in in-school performance by the National Theatre for Children. Were you aware of the program before today?

	Yes	No	Don't Know	Refused	Total
# of responses	39	163	13	0	215
Percent	18%	76%	6%	0%	100%

Q9. From who or where did you hear about this program?

	From a teacher/school administrator	From my child/children	From my child/children; From a teacher/school administrator	On Duke Energy Website	Other	Don't know	Refused	Total
# of responses	7	18	9	4	1	0	0	39
Percent	18%	46%	23%	10%	3%	0%	0%	100%

Q10. Have you or anyone else installed any of those items in your home, even if they were taken out later?

	Yes	No	Don't Know	Refused	Total
# of responses	197	18	0	0	215
Percent	92%	8%	0%	0%	100%

Q11. Which of the items did you install, even if they were taken out later?

Q11a. Showerhead

	Yes	No	Don't Know	Refused	Total
# of responses	118	76	2	1	197
Percent	**60%**	**39%**	**1%**	**1%**	**100%**

Q11b. Kitchen faucet aerator

	Yes	No	Don't Know	Refused	Total
# of responses	97	94	5	1	197
Percent	**49%**	**48%**	**3%**	**1%**	**100%**

Q11c. Bathroom faucet aerator

	Yes	No	Don't Know	Refused	Total
# of responses	95	95	6	1	197
Percent	**48%**	**48%**	**3%**	**1%**	**100%**

Q11d. Night light

	Yes	No	Don't Know	Refused	Total
# of responses	172	18	6	1	197
Percent	**87%**	**9%**	**3%**	**1%**	**100%**

Q11e. Energy efficient light bulb(s)

	Yes	No	Don't Know	Refused	Total
# of responses	187	8	2	0	197
Percent	**95%**	**4%**	**1%**	**0%**	**100%**

Q11f. Insulator gaskets for light switches and electricity outlets

	Yes	No	Don't Know	Refused	Total
# of responses	67	116	14	0	197
Percent	**34%**	**59%**	**7%**	**0%**	**100%**

Q12. In addition to the night light, there were two LED light bulbs in the kit. Did you install one or both LED light bulbs in the kit?

	I installed both LEDs	I installed only one LED bulb	Don't Know	Refused	Total
# of responses	165	18	3	1	187
Percent	**88%**	**10%**	**2%**	**1%**	**100%**

Q13. How many of the light switch and electric outlet gasket insulators from the kit did you, or someone else, install in your home?

	None	1	2	3	4	5	6	7	8	9	10	11	12	Don't know	Refused	Total
# of responses	1	6	16	7	10	4	4	1	2	1	1	0	4	10	0	67
Percent	**1%**	**9%**	**24%**	**10%**	**15%**	**6%**	**6%**	**1%**	**3%**	**1%**	**1%**	**0%**	**6%**	**15%**	**0%**	**100%**

Q14. Overall, how satisfied are you with the item[s] you installed? Please use 0 to 10 scales, where 0 is very dissatisfied and 10 is very satisfied. How satisfied are you with...?

Q14a. Showerhead

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	2	1	1	4	3	8	16	15	65	2	0	118
Percent	**1%**	**0%**	**2%**	**1%**	**1%**	**3%**	**3%**	**7%**	**14%**	**13%**	**55%**	**2%**	**0%**	**100%**

Q14b. Kitchen faucet aerator

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	3	0	2	5	2	10	11	6	55	1	1	97
Percent	**1%**	**0%**	**3%**	**0%**	**2%**	**5%**	**2%**	**10%**	**11%**	**6%**	**57%**	**1%**	**1%**	**100%**

Q14c. Bathroom faucet aerator

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	5	0	1	5	3	9	14	8	45	3	1	95
Percent	**1%**	**0%**	**5%**	**0%**	**1%**	**5%**	**3%**	**9%**	**15%**	**8%**	**47%**	**3%**	**1%**	**100%**

Q14d. Night light

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	2	0	2	3	4	7	18	20	114	1	0	172
Percent	**1%**	**0%**	**1%**	**0%**	**1%**	**2%**	**2%**	**4%**	**10%**	**12%**	**66%**	**1%**	**0%**	**100%**

Q14e. Energy efficient light bulb(s)

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	0	0	1	0	0	1	7	7	11	27	132	1	0	187
Percent	0%	0%	1%	0%	0%	1%	4%	4%	6%	14%	71%	1%	0%	100%

Q14f. Insulator gaskets for light switches and electricity outlets

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	0	0	2	0	1	3	3	4	8	9	33	4	0	67
Percent	0%	0%	3%	0%	1%	4%	4%	6%	12%	13%	49%	6%	0%	100%

Q14.1 Can you please explain any dissatisfaction you had with the [X item]

Q14.1a) Showerhead

Open-ended response type; no tabulation available

Q14.1b) Kitchen faucet aerator

Open-ended response type; no tabulation available

Q14.1c) Bathroom faucet aerator

Open-ended response type; no tabulation available

Q14.1d) Night light

Open-ended response type; no tabulation available

Q14.1e) Energy efficient light bulb(s)

Open-ended response type; no tabulation available

Q14.1f) Insulator gaskets for light switches and electricity outlets

Open-ended response type; no tabulation available

Q15. Have you since uninstalled any of the items from the kit that you had previously installed?

	Yes	No	Don't Know	Refused	Total
# of responses	28	160	8	0	196
Percent	14%	82%	4%	0%	100%

I/A

Q16. Which of the items did you uninstall?

	# of responses	Percent
Bathroom faucet aerator	2	**7%**
Bathroom faucet aerator; Night light	1	**3%**
Energy efficient light bulbs	3	**3%**
Insulator Gaskets	1	**10%**
Kitchen faucet aerator	2	**3%**
Kitchen faucet aerator; Bathroom faucet aerator	2	**7%**
Kitchen faucet aerator; Insulator Gaskets	1	**7%**
Night light	2	**3%**
Night light; Energy efficient light bulbs	1	**7%**
Showerhead	8	**3%**
Showerhead; Bathroom faucet aerator	1	**28%**
Showerhead; Energy efficient light bulbs	1	**3%**
Showerhead; Kitchen faucet aerator	1	**3%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator	1	**3%**
Showerhead; Kitchen faucet aerator; Insulator Gaskets	1	**3%**
Don't know	1	**3%**
Refused	0	**0%**
Total	29	**100%**

Q17. Why were those items uninstalled? Let's start with...

Q17a. Showerhead

	It was broken	It was broken; I didn't like how it looked	I didn't like how it worked	I didn't like how it worked; Other	I didn't like how it looked	Other	Don't know	Refused	Total
# of responses	0	1	7	1	0	4	0	0	13
Percent	**0%**	**8%**	**54%**	**8%**	**0%**	**31%**	**0%**	**0%**	**100%**

Q17b. Kitchen faucet aerator

	It was broken	I didn't like how it worked	I didn't like how it worked; Other	I didn't like how it looked	Other	Don't know	Refused	Total
# of responses	0	4	1	0	3	0	0	8
Percent	**0%**	**50%**	**13%**	**0%**	**38%**	**0%**	**0%**	**100%**

Q17c. Bathroom faucet aerator

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	0	5	0	2	0	0	7
Percent	**0%**	**71%**	**0%**	**29%**	**0%**	**0%**	**100%**

Q17d. Night light

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	0	2	1	0	0	0	3
Percent	**0%**	**67%**	**33%**	**0%**	**0%**	**0%**	**100%**

Q17e. Energy efficient light bulb(s)

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	0	1	1	2	0	0	4
Percent	**0%**	**25%**	**25%**	**50%**	**0%**	**0%**	**100%**

Q17f. Insulator gaskets for light switches and electricity outlets

	It was broken	I didn't like how it worked	I didn't like how it looked	Other	Don't Know	Refused	Total
# of responses	0	2	1	0	0	0	3
Percent	**0%**	**67%**	**33%**	**0%**	**0%**	**0%**	**100%**

Q18. You said you haven't installed [X items]. Which of those items did you plan to install in the next three months?

	# of responses	Percent
Bathroom faucet aerator	11	**6%**
Bathroom faucet aerator; Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Bathroom faucet aerator; Insulator Gaskets	3	**2%**
Bathroom faucet aerator; Night light	1	**1%**
Energy efficient light bulbs	4	**2%**
Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Insulator Gaskets	21	**11%**
Kitchen faucet aerator	4	**2%**
Kitchen faucet aerator; Bathroom faucet aerator	5	**3%**
Kitchen faucet aerator; Bathroom faucet aerator; Insulator Gaskets	4	**2%**
Kitchen faucet aerator; Bathroom faucet aerator; Night light	1	**1%**
Kitchen faucet aerator; Bathroom faucet aerator; Night light; Energy efficient light bulbs	1	**1%**
Kitchen faucet aerator; Bathroom faucet aerator; Night light; Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Kitchen faucet aerator; Insulator Gaskets	1	**1%**
Kitchen faucet aerator; Night light	1	**1%**
Night light	5	**3%**
Night light; Energy efficient light bulbs	5	**3%**
Night light; Insulator Gaskets	1	**1%**
Showerhead	14	**8%**
Showerhead; Bathroom faucet aerator	1	**1%**
Showerhead; Bathroom faucet aerator; Insulator Gaskets	1	**1%**
Showerhead; Insulator Gaskets	1	**1%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Insulator Gaskets	1	**1%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Night light; Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Showerhead; Night light; Energy efficient light bulbs	1	**1%**

	# of responses	Percent
Don't know	92	**50%**
Refused	2	**1%**
Total	185	**100%**

Q19. What's preventing you from installing them? Let's start with...

Q19a. Showerhead

	# of responses	Percent
Already have efficient showerhead	20	**27%**
Already have efficient showerhead; Other; (please specify:___)	3	**4%**
Current one is still working	17	**23%**
Current one is still working; Already have efficient showerhead	4	**5%**
Current one is still working; Takes too much time to install/No time/Too busy	1	**1%**
Current one is still working; Too difficult to install it; don't know how to do it	1	**1%**
Didn't know what that was; Haven't gotten around to it	1	**1%**
Don't have the items any longer (threw away; gave away)	2	**3%**
Don't have the tools I need; Don't have the items any longer (threw away; gave away)	1	**1%**
Haven't gotten around to it	6	**8%**
Haven't gotten around to it; Current one is still working	1	**1%**
Haven't gotten around to it; Too difficult to install it; don't know how to do it; Don't have the tools I need	1	**1%**
Takes too much time to install/No time/Too busy	2	**3%**
Too difficult to install it; don't know how to do it	2	**3%**
Tried it; didn't fit	4	**5%**
Tried it; didn't fit; Already have efficient showerhead	1	**1%**
Tried it; didn't fit; Current one is still working	1	**1%**
Tried it; didn't fit; Takes too much time to install/No time/Too busy; Too difficult to install it; don't know how to do it; Don't have the tools I need	1	**1%**
Tried it; didn't work as intended	1	**1%**
Other; (please specify:___)	4	**5%**
Don't know	0	**0%**
Refused	0	**0%**
Total	74	**100%**

Q19b. Kitchen faucet aerator

	# of responses	Percent
Already have efficient kitchen faucet aerator	13	**14%**
Current one is still working	20	**22%**
Current one is still working; Already have efficient kitchen faucet aerator	1	**1%**
Didn't know what that was	3	**3%**
Didn't know what that was; Haven't gotten around to it	2	**2%**
Don't have the items any longer (threw away, gave away)	3	**3%**
Don't know	4	**4%**
Haven't gotten around to it	8	**9%**
Haven't gotten around to it; Current one is still working	1	**1%**
Haven't gotten around to it; Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it; Don't have the tools I need	2	**2%**
Takes too much time to install/No time/Too busy	1	**1%**
Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it	1	**1%**
Too difficult to install it, don't know how to do it	4	**4%**
Too difficult to install it, don't know how to do it; Don't have the tools I need; Already have efficient kitchen faucet aerator	1	**1%**

	# of responses	Percent
Tried it, didn't fit	17	**18%**
Tried it, didn't fit; Already have efficient kitchen faucet aerator	1	**1%**
Tried it, didn't work as intended	1	**1%**
Other, (please specify:___)	9	**10%**
Don't know	0	**0%**
Refused	0	**0%**
Total	92	**100%**

Q19c. Bathroom faucet aerator

	# of responses	Percent
Already have efficient bathroom faucet aerators	10	**12%**
Current one is still working	13	**16%**
Current one is still working; Too difficult to install it; don't know how to do it; Don't have the tools I need	1	**1%**
Didn't know what that was	4	**5%**
Didn't know what that was; Current one is still working; Don't have the items any longer (threw away; gave away)	1	**1%**
Didn't know what that was; Haven't gotten around to it	3	**4%**
Didn't know what that was; Haven't gotten around to it; Takes too much time to install/No time/Too busy; Too difficult to install it; don't know how to do it; Don't have the tools I need	1	**1%**
Didn't know what that was; Too difficult to install it; don't know how to do it	1	**1%**
Don't have the items any longer (threw away; gave away)	3	**4%**
Don't know	7	**9%**
Haven't gotten around to it	6	**7%**
Haven't gotten around to it; Takes too much time to install/No time/Too busy; Too difficult to install it; don't know how to do it; Don't have the tools I need	1	**1%**
Takes too much time to install/No time/Too busy; Too difficult to install it; don't know how to do it	1	**1%**
Too difficult to install it; don't know how to do it	5	**6%**
Too difficult to install it; don't know how to do it; Don't have the tools I need; Already have efficient bathroom faucet aerators	1	**1%**
Tried it; didn't fit	13	**16%**
Tried it; didn't fit; Current one is still working	1	**1%**
Tried it; didn't fit Too difficult to install it; don't know how to do it	1	**1%**
Other; (please specify:___)	8	**10%**
Don't know	0	**0%**
Refused	0	**0%**
Total	81	**100%**

Q19d. Night light

	# of responses	Percent
Current one is still working	1	**6%**
Didn't know what that was	2	**11%**
Didn't know what that was; Haven't gotten around to it	1	**6%**
Haven't gotten around to it	3	**17%**
Tried it, didn't fit	1	**6%**
Other, (please specify:___)	8	**44%**
Don't know	2	**11%**
Refused	0	**0%**
Total	18	**100%**

I/A

Q19e. Energy efficient light bulb(s)

	# of responses	Percent
Already have LEDs	3	**27%**
Current one is still working	2	**18%**
Didn't know what that was; Haven't gotten around to it	1	**9%**
Haven't gotten around to it	2	**18%**
Tried it, didn't fit	2	**18%**
Other, (please specify:___)	0	**0%**
Don't know	0	**0%**
Refused	1	**9%**
Total	11	**100%**

Q19f. Insulator gaskets

	# of responses	Percent
Current one is still working	14	**14%**
Didn't know what that was	21	**22%**
Didn't know what that was; Haven't gotten around to it	1	**1%**
Didn't know what that was; Haven't gotten around to it; Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it; Don't have the tools I need	1	**1%**
Didn't know what that was; Haven't gotten around to it; Too difficult to install it, don't know how to do it	1	**1%**
Don't have the items any longer (threw away, gave away)	4	**4%**
Haven't gotten around to it	15	**15%**
Haven't gotten around to it; Takes too much time to install/No time/Too busy	1	**1%**
Haven't gotten around to it; Takes too much time to install/No time/Too busy; Too difficult to install it, don't know how to do it; Don't have the tools I need	1	**1%**
Takes too much time to install/No time/Too busy	3	**3%**
Too difficult to install it, don't know how to do it	10	**10%**
Tried it, didn't fit	5	**5%**
Tried it, didn't fit; Current one is still working	1	**1%**
Other, (please specify:___)	8	**8%**
Don't know	11	**11%**
Refused	0	**0%**
Total	97	**100%**

Q20. Thinking of the items you installed, would you be interested in receiving any more of them from Duke Energy? If so, which ones?

	# of responses	Percent
Bathroom faucet aerator	2	**1%**
Bathroom faucet aerator; Night lights	1	**1%**
Bathroom faucet aerator; Night lights; Energy efficient light bulbs	5	**3%**
Bathroom faucet aerator; Night lights; Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Energy efficient light bulbs	33	**17%**
Energy efficient light bulbs; Insulator Gaskets	3	**2%**
Insulator Gaskets	2	**1%**
Kitchen faucet aerator; Bathroom faucet aerator; Energy efficient light bulbs	1	**1%**
Kitchen faucet aerator; Bathroom faucet aerator; Night lights; Energy efficient light bulbs	3	**2%**
Kitchen faucet aerator; Bathroom faucet aerator; Night lights; Energy efficient light bulbs; Insulator Gaskets	3	**2%**
Kitchen faucet aerator; Bathroom faucet aerator; Night lights Insulator Gaskets	1	**1%**

	# of responses	Percent
Kitchen faucet aerator; Night lights; Energy efficient light bulbs	5	**3%**
Night lights	9	**5%**
Night lights; Energy efficient light bulbs	51	**26%**
Night lights; Energy efficient light bulbs; Insulator Gaskets	7	**4%**
Night lights; Insulator Gaskets	3	**2%**
Showerhead	2	**1%**
Showerhead; Bathroom faucet aerator; Night lights; Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Showerhead; Energy efficient light bulbs	6	**3%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator	1	**1%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Energy efficient light bulbs	2	**1%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Night lights; Energy efficient light bulbs	10	**5%**
Showerhead; Kitchen faucet aerator; Bathroom faucet aerator; Night lights; Energy efficient light bulbs; Insulator Gaskets	4	**2%**
Showerhead; Kitchen faucet aerator; Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Showerhead; Kitchen faucet aerator; Night lights	1	**1%**
Showerhead; Kitchen faucet aerator; Night lights; Energy efficient light bulbs	2	**1%**
Showerhead; Kitchen faucet aerator; Night lights; Energy efficient light bulbs; Insulator Gaskets	1	**1%**
Showerhead; Night lights	3	**2%**
Showerhead; Night lights; Energy efficient light bulbs	13	**7%**
Showerhead; Night lights; Energy efficient light bulbs; Insulator Gaskets	3	**2%**
No, I am not interested in receiving any more of the items	8	**4%**
Don't know	7	**4%**
Refused	0	**0%**
Total	196	**100%**

Q21. What would be your preferred way to request these additional items?

	# of responses	Percent
Internet	128	**71%**
Internet; Other	1	**1%**
Internet; Pre-paid postcard	22	**12%**
Internet; Pre-paid postcard; Other	1	**1%**
Internet; Telephone	4	**2%**
Internet; Telephone; Pre-paid postcard	2	**1%**
Internet; Telephone; Pre-paid postcard; Other	1	**1%**
Pre-paid postcard	11	**6%**
Telephone	5	**3%**
Telephone; Pre-paid postcard; Other	1	**1%**
Other	2	**1%**
Don't know	2	**1%**
Refused	1	**1%**
Total	181	**100%**

Q22. On average, what is the typical shower length in your household?

	# of responses	Percent
One minute or less	0	**0%**
Two to four minutes	7	**7%**
Five to eight minutes	38	**36%**
Nine to twelve minutes	33	**31%**
Thirteen to fifteen minutes	15	**14%**
Sixteen to twenty minutes	7	**7%**
Twenty-one to thirty minutes	4	**4%**
More than thirty minutes	0	**0%**
Don't know	1	**1%**
Refused	0	**0%**
Total	105	**100%**

Q23. Thinking of the efficient showerhead currently installed on your home: on average, how many showers per day are taken in this shower?

	Fewer than 1	1	2	3	4	5	6	7	8	Don't know	Refused	Total
# of responses	3	13	42	21	11	6	4	3	1	1	0	105
Percent	**3%**	**12%**	**40%**	**20%**	**10%**	**6%**	**4%**	**3%**	**1%**	**1%**	**0%**	**100%**

Q24. You said you installed the night light. Did the night light replace an existing night light?

	Yes	No	Don't Know	Refused	Total
# of responses	92	76	0	0	168
Percent	**55%**	**45%**	**0%**	**0%**	**100%**

Q25. Did the old nightlight have a bulb that you could take out and replace once it burned out?

	Yes	No	Don't Know	Refused	Total
# of responses	64	24	4	0	92
Percent	**70%**	**26%**	**4%**	**0%**	**100%**

Q26. You said you installed at least one of the energy efficient lights. What type of bulb(s) did you replace with the energy efficient lightbulbs?

	All incandescent	All halogen	All CFL	All LED	Some combination	Don't Know	Refused	Total
# of responses	90	14	36	22	3	17	0	182
Percent	**49%**	**8%**	**20%**	**12%**	**2%**	**9%**	**0%**	**100%**

Q27. In what rooms did you install the energy efficient lightbulbs that were included in the kit?

	# of responses	Percent
Bathroom	5	3%
Bathroom; Den	1	1%
Bathroom; Other area	1	1%
Bedroom	24	13%
Bedroom; Bathroom	6	3%
Bedroom; Den	2	1%
Bedroom; Garage	1	1%
Bedroom; Hallway	1	1%
Bedroom; Kitchen	5	3%
Den	4	2%
Dining Room	6	3%
Dining Room; Bedroom	3	2%
Dining Room; Kitchen	3	2%
Garage	1	1%
Hallway	4	2%
Kitchen	7	4%
Kitchen; Bathroom	7	4%
Kitchen; Hallway	1	1%
Living Room	41	23%
Living Room; Basement	1	1%
Living Room; Bathroom	5	3%
Living Room; Bedroom	27	15%
Living Room; Den	1	1%
Living Room; Dining Room	10	5%
Living Room; Hallway	1	1%
Living Room; Kitchen	7	4%
Don't know	7	4%
Refused	0	0%
Total	182	100%

Q28. Have you adjusted the temperature of your water heater based on the Hot Water Gauge Card included in your kit?

	Yes	No	Don't recall seeing the Hot Water Gauge Card	Don't Know	Refused	Total
# of responses	34	122	48	10	1	215
Percent	**16%**	**57%**	**22%**	**5%**	**0%**	**100%**

Q29. Do you know what the old temperature setting on your hot water heater was?

	Yes	No	Total
# of responses	7	27	34
Percent	**21%**	**79%**	**100%**

Q30. And what was the new temperature setting you set your hot water heater to?

	Provided response	Don't Know	Total
# of responses	10	24	34
Percent	**29%**	**71%**	**100%**

Q31. Is the new water heater temperature setting still in place?

	Yes	No	Don't Know	Refused	Total
# of responses	26	3	5	0	34
Percent	**76%**	**9%**	**15%**	**0%**	**100%**

Q32. Why did you change the water heater temperature a second time?

Open-ended response type; no tabulation available

Q33. What is the fuel type of your water heater?

	Electricity	Natural Gas	Other	Don't Know	Refused	Total
# of responses	170	34	2	9	0	215
Percent	**79%**	**16%**	**1%**	**4%**	**0%**	**100%**

Q34. How old is your water heater?

	Less than 5 years old	5 to 9 years old	10 to 15 years old	More than 15 years old	Don't Know	Refused	Total
# of responses	58	62	39	16	40	0	215
Percent	**27%**	**29%**	**18%**	**7%**	**19%**	**0%**	**100%**

Q35. If you had not received the free efficiency items in the kit, how likely is is that you would have purchased and installed any of these same items within the next six months?

Q35a. Showerhead

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	42	7	4	8	7	7	3	4	3	2	15	3	0	105
Percent	40%	7%	4%	8%	7%	7%	3%	4%	3%	2%	14%	3%	0%	100%

Q35b. Kitchen faucet aerator

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	48	5	5	2	4	5	3	1	1	1	12	2	0	89
Percent	54%	6%	6%	2%	4%	6%	3%	1%	1%	1%	13%	2%	0%	100%

Q35c. Bathroom faucet aerator

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	47	5	4	3	4	6	2	2	4	0	9	2	0	88
Percent	53%	6%	5%	3%	5%	7%	2%	2%	5%	0%	10%	2%	0%	100%

Q35d. Night light

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	62	9	6	10	7	23	8	4	9	2	25	3	0	168
Percent	37%	5%	4%	6%	4%	14%	5%	2%	5%	1%	15%	2%	0%	100%

Q35e. Energy efficient light bulb(s)

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	24	3	2	6	7	17	13	14	18	17	56	5	0	182
Percent	13%	2%	1%	3%	4%	9%	7%	8%	10%	9%	31%	3%	0%	100%

Q35f. Insulator gaskets for light switches and electricity outlets

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	34	6	2	4	0	4	3	1	3	0	4	3	0	64
Percent	53%	9%	3%	6%	0%	6%	5%	2%	5%	0%	6%	5%	0%	100%

Q36. If you had not received them for free in the kit, how many LED light bulbs would you have purchased?

	One	Two	Don't Know	Refused	Total
# of responses	3	28	29	0	60
Percent	5%	47%	48%	0%	100%

Q37. Now, thinking about the water savings items that were provided in the kit - using a scale from 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how influential were the following factors on your decision to install the water saving items from the kit? How influential was...

Q37a. The fact that the items were free

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	7	1	0	4	1	7	7	4	14	10	89	1	1	0	146
Percent	5%	1%	0%	3%	1%	5%	5%	3%	10%	7%	61%	1%	1%	0%	100%

Q37b. The fact that the items were mailed to your house

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	5	1	0	2	3	8	3	2	14	12	93	2	1	0	146
Percent	3%	1%	0%	1%	2%	5%	2%	1%	10%	8%	64%	1%	1%	0%	100%

Q37c. Information in the kit about how the items would save energy

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	7	1	0	1	1	12	6	10	17	20	70	0	1	0	146
Percent	5%	1%	0%	1%	1%	8%	4%	7%	12%	14%	48%	0%	1%	0%	100%

Q37d. Information that your child brought home from school

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	14	1	1	2	5	15	10	10	12	12	56	6	2	0	146
Percent	10%	1%	1%	1%	3%	10%	7%	7%	8%	8%	38%	4%	1%	0%	100%

Q37e. Other information or advertisements from Duke Energy, including its website

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	14	2	2	5	7	20	12	16	5	10	42	7	4	0	146
Percent	10%	1%	1%	3%	5%	14%	8%	11%	3%	7%	29%	5%	3%	0%	100%

Q38. Using a scale from 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how influential were the following factors in your decision to install the lightbulbs from the kit? How influential was...

Q38a. The fact that the items were free

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	5	1	1	2	1	9	4	7	17	11	122	1	1	0	182
Percent	**3%**	**1%**	**1%**	**1%**	**1%**	**5%**	**2%**	**4%**	**9%**	**6%**	**67%**	**1%**	**1%**	**0%**	**100%**

Q38b. The fact that the items were mailed to your house

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	3	1	0	3	1	4	6	10	11	16	123	2	2	0	182
Percent	**2%**	**1%**	**0%**	**2%**	**1%**	**2%**	**3%**	**5%**	**6%**	**9%**	**68%**	**1%**	**1%**	**0%**	**100%**

Q38c. Information in the kit about how the items would save energy

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	8	3	1	3	0	16	5	20	18	15	88	0	5	0	182
Percent	**4%**	**2%**	**1%**	**2%**	**0%**	**9%**	**3%**	**11%**	**10%**	**8%**	**48%**	**0%**	**3%**	**0%**	**100%**

Q38d. Information that your child brought home from school

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	14	3	0	5	5	24	12	14	18	12	64	5	6	0	182
Percent	**8%**	**2%**	**0%**	**3%**	**3%**	**13%**	**7%**	**8%**	**10%**	**7%**	**35%**	**3%**	**3%**	**0%**	**100%**

Q38e. Other information or advertisements from Duke Energy, including its website

	0	1	2	3	4	5	6	7	8	9	10	N/A	Don't know	Refused	Total
# of responses	22	4	3	3	15	25	11	16	10	11	48	4	10	0	182
Percent	**12%**	**2%**	**2%**	**2%**	**8%**	**14%**	**6%**	**9%**	**5%**	**6%**	**26%**	**2%**	**5%**	**0%**	**100%**

Q39. Since your child learned about energy conservation at school and signed up for your energy kit from Duke Energy, has your child adopted any new behaviors to help save energy in your home? This would only include new energy saving behaviors that your child adopted since receiving the kit.

	# of responses	Percent
Not applicable - no new behaviors	58	**27%**
Taking shorter showers	4	**2%**
Turning off electronics when not using them	10	**5%**
Turning off electronics when not using them; Taking shorter showers	1	**0%**
Turning off lights when not in a room	40	**19%**
Turning off lights when not in a room; Other	1	**0%**
Turning off lights when not in a room; Taking shorter showers	5	**2%**
Turning off lights when not in a room; Taking shorter showers; Other	1	**0%**
Turning off lights when not in a room; Turning off electronics when not using them	51	**24%**
Turning off lights when not in a room; Turning off electronics when not using them; Other	1	**0%**
Turning off lights when not in a room; Turning off electronics when not using them; Taking shorter showers	26	**12%**
Turning off lights when not in a room; Turning off electronics when not using them; Taking shorter showers; Other	1	**0%**
Other	3	**1%**
Don't know	12	**6%**
Refused	1	**0%**
Total	215	**100%**

Q39b. Before receiving the kit, was your child already...

39b.2) Turning off lights when not in a room

	Yes	No	Don't Know	Refused	Total
# of responses	41	84	1	0	126
Percent	**33%**	**67%**	**79%**	**0%**	**100%**

39b.3) Turning off electronics when not using them

	Yes	No	Don't Know	Refused	Total
# of responses	20	66	3	1	90
Percent	**22%**	**73%**	**3%**	**1%**	**100%**

39b.4) Taking shorter showers

	Yes	No	Don't Know	Refused	Total
# of responses	6	32	0	0	38
Percent	**16%**	**84%**	**0%**	**0%**	**100%**

39b.5) "Other" reasons

	Yes	No	Don't Know	Refused	Total

# of responses	2	4	0	1	7
Percent	**29%**	**57%**	**0%**	**14%**	**100%**

Q40. Since receiving your energy kit from Duke Energy, have you adopted or increased any behaviors to help save energy in your home?

	# of responses	Percent
Changing thermostat settings so heating or cooling system uses less energy	9	**4%**
Changing thermostat settings so heating or cooling system uses less energy; Other	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Taking shorter showers	2	**1%**
Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	2	**1%**
Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Turning water heat thermostat down	1	**0%**
Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	3	**1%**
Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	2	**1%**
Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning water heat thermostat down	1	**0%**
Taking shorter showers	2	**1%**
Taking shorter showers; Turning water heat thermostat down	1	**0%**
Turning off air conditioning when not home	2	**1%**
Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy	2	**1%**
Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	1	**0%**
Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning water heat thermostat down	1	**0%**
Turning off electronics when not using them	2	**1%**
Turning off electronics when not using them; Taking shorter showers	1	**0%**
Turning off furnace when not home; Turning off air conditioning when not home	1	**0%**
Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Turning water heat thermostat down	1	**0%**
Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	1	**0%**
Turning off furnace when not home; Turning off air conditioning when not home; Using fans instead of air conditioning; Turning off electronics when not using them; Other	1	**0%**
Turning off lights when not in a room	9	**4%**
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy	8	**4%**
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Taking shorter showers	4	**2%**
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	9	**4%**
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers	4	**2%**
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Turning water heat thermostat down	1	**0%**
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	2	**1%**
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Taking shorter showers	2	**1%**
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Taking shorter showers; Turning water heat thermostat down	1	**0%**

I/A

	# of responses	Percent
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	7	3%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	5	2%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	2	1%
Turning off lights when not in a room; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Turning water heat thermostat down	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Turning water heat thermostat down	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	5	2%
Turning off lights when not in a room; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Turning off electronics when not using them	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Turning off electronics when not using them; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Turning off electronics when not using them; Turning water heat thermostat down	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Using fans instead of air conditioning; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off air conditioning when not home; Using fans instead of air conditioning; Turning off electronics when not using them	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	2	1%
Turning off lights when not in a room; Turning off air conditioning when not home; Using fans instead of air conditioning; Turning off electronics when not using them; Turning water heat thermostat down	1	0%
Turning off lights when not in a room; Turning off electronics when not using them	1	0%
Turning off lights when not in a room; Turning off electronics when not using them; Taking shorter showers	3	1%
Turning off lights when not in a room; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	1	0%
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Taking shorter showers	1	0%

	# of responses	Percent
Turning off lights when not in a room; Turning off furnace when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Taking shorter showers	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home	2	**1%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy	4	**2%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them	2	**1%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Taking shorter showers	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Turning off electronics when not using them; Turning water heat thermostat down	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning	3	**1%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers; Turning water heat thermostat down	4	**2%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Changing thermostat settings so heating or cooling system uses less energy; Using fans instead of air conditioning; Turning off electronics when not using them; Turning water heat thermostat down	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Turning off air conditioning when not home; Turning off electronics when not using them	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Using fans instead of air conditioning; Turning off electronics when not using them	1	**0%**
Turning off lights when not in a room; Turning off furnace when not home; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	1	**0%**
Turning off lights when not in a room; Turning water heat thermostat down	1	**0%**
Turning off lights when not in a room; Using fans instead of air conditioning	2	**1%**
Turning off lights when not in a room; Using fans instead of air conditioning; Taking shorter showers	1	**0%**
Turning off lights when not in a room; Using fans instead of air conditioning; Turning off electronics when not using them	4	**2%**
Turning off lights when not in a room; Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	3	**1%**
Turning water heat thermostat down	1	**0%**
Using fans instead of air conditioning	4	**2%**
Using fans instead of air conditioning; Turning off electronics when not using them	1	**0%**
Using fans instead of air conditioning; Turning off electronics when not using them; Taking shorter showers	1	**0%**
Not applicable - no new behaviors	38	**18%**
Other	1	**0%**
Don't know	3	**1%**
Refused	0	**0%**
Total	215	**100%**

Q40b. Before receiving the kit, were you already...

40b.2) Turning off lights when not in a room

	Yes	No	Don't Know	Refused	Total

# of responses	101	26	1	0	128
Percent	**79%**	**20%**	**78%**	**0%**	**100%**

40b.3) Turning off furnace when not home

	Yes	No	Don't Know	Refused	Total
# of responses	15	18	1	0	34
Percent	**44%**	**53%**	**3%**	**0%**	**100%**

40b.4) Turning off air conditioning when not home

	Yes	No	Don't Know	Refused	Total
# of responses	31	26	0	1	58
Percent	**53%**	**45%**	**0%**	**2%**	**100%**

40b.5) Changing thermostat settings so heating or cooling system uses less energy

	Yes	No	Don't Know	Refused	Total
# of responses	58	52	4	0	114
Percent	**51%**	**46%**	**4%**	**0%**	**100%**

40b.6) Using fans instead of air conditioning

	Yes	No	Don't Know	Refused	Total
# of responses	48	28	0	0	76
Percent	**63%**	**37%**	**0%**	**0%**	**100%**

40b.7) Turning off electronics when not using them

	Yes	No	Don't Know	Refused	Total
# of responses	49	41	2	0	92
Percent	**53%**	**45%**	**2%**	**0%**	**100%**

40b.8) Taking shorter showers

	Yes	No	Don't Know	Refused	Total
# of responses	20	43	0	0	63
Percent	**32%**	**68%**	**1%**	**0%**	**100%**

40b.9) Turning water heat thermostat down

	Yes	No	Don't Know	Refused	Total
# of responses	5	21	0	0	26
Percent	19%	81%	0%	0%	100%

40b.10) Other

	Yes	No	Don't Know	Refused	Total
# of responses	0	3	0	0	3
Percent	0%	100%	0%	0%	100%

Q41. On a scale of 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how much influence did Duke Energy's kit and materials on saving energy have on this change of energy using behaviors?

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	3	0	1	3	4	23	13	36	23	14	49	2	0	171
Percent	2%	0%	1%	2%	2%	13%	8%	21%	13%	8%	29%	1%	0%	100%

Q42. Since receiving your energy kit from Duke Energy, have you purchased and installed any other products or made any improvements to your home to help save energy?

	Yes	No	Don't Know	Refused	Total
# of responses	96	108	11	0	215
Percent	45%	50%	5%	0%	100%

Q43. What products have you purchased and installed to help save energy in your home?

	# of responses	Percent
Efficient heating or cooling equipment	1	1%
Efficient heating or cooling equipment; Insulation	1	1%
Efficient heating or cooling equipment; LEDs and/or CFLs	2	2%
Efficient heating or cooling equipment; LEDs and/or CFLs; Other	1	1%
Efficient heating or cooling equipment; Products to seal air leaks in your home; LEDs and/or CFLs	1	1%
Efficient windows; Insulation; LEDs and/or CFLs	1	1%
Efficient windows; LEDs and/or CFLs	1	1%
Efficient windows; Products to seal air leaks in your home; LEDs and/or CFLs	3	3%
Energy efficient appliances	1	1%
Energy efficient appliances; Efficient heating or cooling equipment; Insulation; Energy efficient water heater	1	1%

	# of responses	Percent
Energy efficient appliances; Efficient heating or cooling equipment; Insulation; Products to seal air leaks in your home; LEDs and/or CFLs; Energy efficient water heater	1	**1%**
Energy efficient appliances; Efficient heating or cooling equipment; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Efficient heating or cooling equipment; LEDs and/or CFLs; Energy efficient water heater	1	**1%**
Energy efficient appliances; Efficient heating or cooling equipment; Products to seal air leaks in your home	1	**1%**
Energy efficient appliances; Efficient windows; Insulation; Products to seal air leaks in your home; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Efficient windows; Products to seal air leaks in your home; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Energy efficient water heater	1	**1%**
Energy efficient appliances; Insulation; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; Insulation; Products to seal air leaks in your home; Products to seal ducts; LEDs and/or CFLs	1	**1%**
Energy efficient appliances; LEDs and/or CFLs	17	**18%**
Energy efficient appliances; LEDs and/or CFLs; Other	1	**1%**
Energy efficient appliances; Products to seal air leaks in your home	2	**2%**
Energy efficient appliances; Products to seal air leaks in your home; LEDs and/or CFLs	2	**2%**
Energy efficient appliances; Products to seal air leaks in your home; LEDs and/or CFLs; Energy efficient water heater	1	**1%**
Energy efficient appliances; Products to seal air leaks in your home; Products to seal ducts; LEDs and/or CFLs	1	**1%**
Insulation	3	**3%**
Insulation; LEDs and/or CFLs	2	**2%**
Insulation; Products to seal air leaks in your home; LEDs and/or CFLs	1	**1%**
Insulation; Products to seal air leaks in your home; Products to seal ducts; LEDs and/or CFLs	1	**1%**
Insulation; Products to seal ducts; Energy efficient water heater	1	**1%**
LEDs and/or CFLs	23	**24%**
LEDs and/or CFLs; Other	1	**1%**
Products to seal air leaks in your home	2	**2%**
Products to seal air leaks in your home; LEDs and/or CFLs	9	**9%**
Products to seal air leaks in your home; Products to seal ducts; LEDs and/or CFLs	1	**1%**
None - no other actions taken	1	**1%**
Other	5	**5%**
Total	96	**100%**

Q44. Did you get a rebate from Duke Energy for any of those products or services? If so, which ones?

Q44.1) Buy energy efficient appliances

	Yes	No	Don't Know	Refused	Total
# of responses	1	32	2	0	35
Percent	**3%**	**91%**	**6%**	**0%**	**100%**

I/A

Q44.2) Buy efficient heating or cooling equipment

	Yes	No	Don't Know	Refused	Total
# of responses	2	8	1	0	11
Percent	18%	73%	9%	0%	100%

Q44.3) Buy efficient windows

	Yes	No	Don't Know	Refused	Total
# of responses	0	6	1	0	7
Percent	0%	86%	14%	0%	100%

Q44.4) Buy additional insulation

	Yes	No	Don't Know	Refused	Total
# of responses	1	14	0	0	15
Percent	7%	93%	0%	0%	100%

Q44.5) Products to seal air leaks in your home

	Yes	No	Don't Know	Refused	Total
# of responses	2	24	3	0	29
Percent	7%	83%	10%	0%	100%

Q44.6) Products to seal ducts

	Yes	No	Don't Know	Refused	Total
# of responses	0	5	0	0	5
Percent	0%	100%	0%	0%	100%

Q44.7) Buy LEDs and/or CFLs

	Yes	No	Don't Know	Refused	Total
# of responses	5	65	6	0	76
Percent	7%	86%	8%	0%	100%

Q44.8) Install an energy efficient water heater

	Yes	No	Don't Know	Refused	Total
# of responses	2	3	1	0	6
Percent	33%	50%	17%	0%	100%

Q44.96) "Other" [Q44 open-ended question]

	Yes	No	Don't Know	Refused	Total
# of responses	3	4	1	0	8
Percent	38%	50%	13%	0%	100%

Q45. On a scale of 0 to 10, where 0 means "not at all influential" and 10 means "extremely influential", how much influence did the Duke Energy schools program have on your decision to...

Q45.1) Buy energy efficient appliances

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	9	0	1	1	1	3	0	3	4	3	10	0	0	35
Percent	26%	0%	3%	3%	3%	9%	0%	9%	11%	9%	29%	0%	0%	100%

Q45.2) Buy efficient heating or cooling equipment

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	5	0	0	0	0	1	0	0	2	1	2	0	0	11
Percent	45%	0%	0%	0%	0%	9%	0%	0%	18%	9%	18%	0%	0%	100%

Q45.3) Buy efficient windows

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	3	0	0	0	0	1	0	1	0	1	1	0	0	7
Percent	43%	0%	0%	0%	0%	14%	0%	14%	0%	14%	14%	0%	0%	100%

Q45.4) Buy additional insulation

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	4	0	0	0	1	1	2	0	1	2	4	0	0	15
Percent	27%	0%	0%	0%	7%	7%	13%	0%	7%	13%	27%	0%	0%	100%

Q45.5) Products to seal air leaks in your home

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	6	1	0	1	0	3	3	2	1	3	8	1	0	29
Percent	21%	3%	0%	3%	0%	10%	10%	7%	3%	10%	28%	3%	0%	100%

Q45.6) Products to seal ducts

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	0	0	0	0	0	1	0	0	1	1	1	0	0	5
Percent	**20%**	**0%**	**0%**	**0%**	**0%**	**20%**	**0%**	**0%**	**20%**	**20%**	**20%**	**0%**	**0%**	**100%**

Q45.7) Buy LEDs and/or CFLs

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	12	0	0	2	2	10	5	12	8	8	17	0	0	76
Percent	**16%**	**0%**	**0%**	**3%**	**3%**	**13%**	**7%**	**16%**	**11%**	**11%**	**22%**	**0%**	**0%**	**100%**

Q45.8)) Install an energy efficient water heater

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	1	0	0	0	0	1	0	1	0	0	3	0	0	6
Percent	**17%**	**0%**	**0%**	**0%**	**0%**	**17%**	**0%**	**17%**	**0%**	**0%**	**50%**	**0%**	**0%**	**100%**

Q45.96) [Q45 open-ended question]

	0	1	2	3	4	5	6	7	8	9	10	Don't know	Refused	Total
# of responses	3	0	3	0	0	1	0	0	1	0	0	0	0	8
Percent	**38%**	**0%**	**38%**	**0%**	**0%**	**13%**	**0%**	**0%**	**13%**	**0%**	**0%**	**0%**	**0%**	**100%**

Q46. What kinds of appliance(s) did you buy?

	# of responses	Percent
Clothes dryer	1	**4%**
Clothes washer; Clothes dryer	2	**8%**
Clothes washer; Microwave	1	**4%**
Dishwasher	2	**8%**
Dishwasher; Microwave	2	**8%**
Microwave	2	**8%**
Oven	2	**8%**
Refrigerator	3	**12%**
Refrigerator; Clothes washer	1	**4%**
Refrigerator; Clothes washer; Clothes dryer	1	**4%**
Refrigerator; Clothes washer; Clothes dryer; Oven; Microwave	1	**4%**
Refrigerator; Dishwasher; Clothes washer; Clothes dryer; Oven; Microwave	1	**4%**
Refrigerator; Dishwasher; Clothes washer; Oven; Microwave	1	**4%**
Refrigerator; Microwave	1	**4%**
Refrigerator; Stand-alone Freezer; Clothes washer; Clothes dryer; Microwave	1	**4%**
Refrigerator; Stand-alone Freezer; Clothes washer; Clothes dryer; Oven	1	**4%**
Refrigerator; Stand-alone Freezer; Microwave	1	**4%**
Other	2	**8%**
Don't know	0	**0%**
Refused	0	**0%**
Total	26	**100%**

Q47. Was the [Q46 appliance] an ENERGY STAR or high efficiency model?

Q47.1) Refrigerator

	Yes	No	Don't Know	Refused	Total
# of responses	12	0	0	0	12
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q47.2) Stand-alone Freezer

	Yes	No	Don't Know	Refused	Total
# of responses	3	0	0	0	3
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q47.3) Dishwasher

	Yes	No	Don't Know	Refused	Total
# of responses	5	0	1	0	6
Percent	**83%**	**0%**	**17%**	**0%**	**100%**

Q47.4) Clothes washer

	Yes	No	Don't Know	Refused	Total
# of responses	10	0	0	0	10
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q47.5) Clothes dryer

	Yes	No	Don't Know	Refused	Total
# of responses	8	0	0	0	8
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q47.6) Oven

	Yes	No	Don't Know	Refused	Total
# of responses	6	0	0	0	6
Percent	**0%**	**0%**	**0%**	**0%**	**100%**

Q47.7) Microwave

	Yes	No	Don't Know	Refused	Total
# of responses	8	1	2	0	11
Percent	**73%**	**9%**	**18%**	**0%**	**100%**

Q47.96) Other:

	Yes	No	Don't Know	Refused	Total
# of responses	2	0	0	0	2
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q48. Does the new clothes dryer use natural gas?

	Yes - it uses natural gas	No - it does not use natural gas	Don't Know	Refused	Total
# of responses	0	7	1	0	8
Percent	**0%**	**88%**	**13%**	**0%**	**100%**

Q49. What type of heating or cooling equipment did you buy?

	# of responses	Percent
Central air conditioner	1	**17%**
Central air conditioner; Furnace; WIFI enabled thermostat	1	**17%**
Central air conditioner; WIFI enabled thermostat	1	**17%**
Other	1	**17%**
WIFI enabled thermostat	1	**17%**
Window/room air conditioner unit	1	**17%**
Don't know	0	**0%**
Refused	0	**0%**
Total	6	**100%**

Q50. Does the new [Q53 equipment] use natural gas?

Q50.6) Boiler

No responses given

Q50.7) Furnace

	Yes - it uses natural gas	No - it does not use natural gas	Don't Know	Refused	Total
# of responses	0	1	0	0	1
Percent	**0%**	**100%**	**0%**	**0%**	**100%**

Q51. Was the heating or cooling equipment an ENERGY STAR or high-efficiency model?

Q51.1) Central air conditioner

	Yes	No	Don't Know	Refused	Total
# of responses	3	0	0	0	3
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q51.2) Window/room air conditioner unit

	Yes	No	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q51.3) Wall air conditioner unit

No responses given

Q51.4) Air source heat pump

No responses given

Q51.5) Geothermal heat pump

No responses given

Q51.6) Boiler

No responses given

Q51.7) Furnace

	Yes	No	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q51.96) Other:

	Yes	No	Don't Know	Refused	Total
# of responses	1	0	0	0	1
Percent	**100%**	**0%**	**0%**	**0%**	**100%**

Q52. How many windows did you install?

	1	2	3	4	5	6	7	8	9	10	18	Don't know	Refused	Total
# of responses	0	1	1	1	0	0	0	0	0	0	1	0	0	4
Percent	**0%**	**25%**	**25%**	**25%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**25%**	**0%**	**0%**	**100%**

Q53. Did you add insulation to your attic, walls, or below the floor?

	Attic	Walls	Below the floor	Walls; Below the floor	Don't Know	Refused	Total
# of responses	3	0	5	1	2	0	11
Percent	**27%**	**0%**	**45%**	**9%**	**18%**	**0%**	**100%**

Q54. Approximately what proportion of the [Q53 location] space did you add insulation?

Q54.1) Attic

	50%	Don't Know	Refused	Total
# of responses	2	1	0	3
Percent	**67%**	**33%**	**0%**	**100%**

Q54.2) Walls

	50%	Don't Know	Refused	Total
# of responses	1	0	0	2
Percent	**100%**	**0%**	**0%**	**100%**

Q54.3) Below the floor

	10%	35%	50%	75%	Don't Know	Refused	Total
# of responses	1	1	2	1	1	0	6
Percent	**17%**	**17%**	**33%**	**17%**	**17%**	**0%**	**100%**

Q55. How many LEDs and CFLs did you install in your property?

	2	4	5	6	7	8	9	10	11	12	15	16	20	25	30	40	50	Don't know	Refused	Total
# of responses	3	8	7	8	1	5	1	8	1	1	2	1	5	1	4	1	1	6	0	64
Percent	5%	13%	11%	13%	2%	8%	2%	13%	2%	2%	3%	2%	8%	2%	6%	2%	2%	9%	0%	100%

Q56. You said that you installed [Q55 response] LED and CFL bulbs on your propert. Is this the correct number?

No responses given

Q57. Does the new water heater use natural gas?

	Yes - it uses natural gas	No - it does not use natural gas	Don't Know	Refused	Total
# of responses	1	4	0	0	5
Percent	**20%**	**80%**	**0%**	**0%**	**100%**

Q58. Which of the following water heaters did you purchase?

	A traditional water heater	A tankless water heater	A solar water heater	Other	Don't know	Refused	Total
# of responses	4	1	0	0	0	0	5
Percent	**80%**	**20%**	**0%**	**0%**	**0%**	**0%**	**100%**

Q59. Is the new water heater an ENERGY STAR model?

	Yes	No	Don't Know	Refused	Total
# of responses	4	0	1	0	5
Percent	**80%**	**0%**	**20%**	**0%**	**100%**

Q60. Which of the following types of housing units would you say best describes your home? Is it...

	Single-family detached home	Single-family attached home (such as a townhouse or condo)	Duplex, triplex, or quadplex	Apartment or condominium with 5 units or more	Manufactured or mobile home	Other	Don't know	Refused	Total
# of responses	147	13	6	17	29	1	2	0	215
Percent	**68%**	**6%**	**3%**	**8%**	**13%**	**0%**	**1%**	**0%**	**100%**

Q61. How many showers are in your home? Please include both stand-up showers and bathtubs with showerheads.

	1	2	3	4	5 or more	Don't know	Refused	Total
# of responses	41	114	43	9	7	1	0	215
Percent	**19%**	**53%**	**20%**	**4%**	**3%**	**0%**	**0%**	**100%**

Q62. How many square feet of living space are there in your residence, including bathrooms, foyers and hallways (exclude garages, unfinished basements, and unheated porches)?

	Less than 500 sq. ft.	500 to under 1,000 sq. ft.	1,000 to under 1,500 sq. ft.	1,500 to under 2,000 sq. ft.	2,000 to under 2,500 sq. ft.	2,500 to under 3,000 sq. ft.	Greater than 3,000 sq. ft.	Don't know	Refused	Total
# of responses	3	21	52	39	31	21	25	23	0	215
Percent	**1%**	**10%**	**24%**	**18%**	**14%**	**10%**	**12%**	**11%**	**0%**	**100%**

Q63. Do you or members of your household own your home, or do you rent it?

	Own/Buying	Rent/Lease	Occupy Rent-free	Don't know	Refused	Total
# of responses	153	58	2	1	1	215
Percent	**71%**	**27%**	**1%**	**0%**	**0%**	**100%**

Q64. Including yourself, how many people currently live in your home year-round?

	I live by myself	Two people	Three people	Four people	Five people	Six people	Seven people	Eight or more people	Don't know	Refused	Total
# of responses	7	22	64	63	32	17	5	3	0	2	215
Percent	**3%**	**10%**	**30%**	**29%**	**15%**	**8%**	**2%**	**1%**	**0%**	**1%**	**100%**

Q65. What was your total annual household income for 2020, before taxes?

	# of responses	Percent
Under $15,000	10	**5%**
15 to under $25,000	19	**9%**
25 to under $35,000	18	**8%**
35 to under $50,000	28	**13%**
50 to under $75,000	29	**13%**
75 to under $100,000	27	**13%**
100 to under $150,000	23	**11%**
150 to under $200,000	3	**1%**
$200,000 or more	7	**3%**
Don't know	4	**2%**
Prefer not to say	47	**22%**
Total	215	**100%**
Under $15,000	10	**5%**

Q66. In what year were you born?

	# of responses	Percent
1950	1	**0%**
1951	2	**1%**
1956	3	**1%**
1957	2	**1%**
1959	1	**0%**
1960	1	**0%**
1961	2	**1%**
1962	1	**0%**
1963	2	**1%**
1964	2	**1%**
1965	2	**1%**
1966	4	**2%**
1967	1	**0%**
1968	3	**1%**
1969	4	**2%**
1970	5	**2%**
1971	8	**4%**
1972	6	**3%**
1973	5	**2%**
1974	9	**4%**
1975	7	**3%**

	# of responses	Percent
1976	10	**5%**
1977	7	**3%**
1978	8	**4%**
1979	11	**5%**
1980	2	**1%**
1981	10	**5%**
1982	8	**4%**
1983	7	**3%**
1984	11	**5%**
1985	7	**3%**
1986	7	**3%**
1987	4	**2%**
1988	3	**1%**
1989	3	**1%**
1990	2	**1%**
1991	3	**1%**
1992	4	**2%**
1993	1	**0%**
Don't know	3	**1%**
Prefer not to say	33	**15%**
Total	215	**100%**

Q67. What is the highest level of education achieved among those living in your household?

	# of responses	Percent
Less than high school	1	**0%**
Some high school	5	**2%**
High school graduate or equivalent	31	**14%**
Trade or technical school	13	**6%**
Some college (including Associate's degree)	59	**27%**
College degree (Bachelor's degree)	49	**23%**
Some graduate school	4	**2%**
Graduate degree, professional degree	36	**17%**
Doctorate	9	**4%**
Don't know	0	**0%**
Prefer not to say	8	**4%**
Total	215	**100%**

Q68. Lastly, did the COVID-19 pandemic, or government or organizational response to it, offer any challenges to you regarding your participation in this program? If so, what challenges, and how do you think they might best be addressed moving forward?

	Yes	No	Don't Know	Refused	Total
# of responses	7	189	19	0	215
Percent	**3%**	**88%**	**9%**	**0%**	**100%**

EM&V Report for the Duke Energy Small Business Energy Saver Program 2019-2020

Prepared for:

DUKE ENERGY®

Duke Energy Carolinas and Duke Energy Progress

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November 23, 2021

Table of Contents

Contents

List of Tables

List of Figures

1. Evaluation Summary

1.1 Program Summary

The Small Business Energy Saver (SBES) program is a direct install program offered to qualifying commercial customers with an average annual demand of 180 kW or less. Participating customers receive an energy assessment at their facility, and subsequently a set of recommended energy efficient measure retrofits. Customers receive information about the proposed measure installation and project costs including utility incentives of up to 80 percent for lighting and refrigeration, and HVAC measures. Once approved, the direct installation is scheduled and completed with minimal disruption to business operations.

The following measures are currently included in the SBES program:

1. Lighting Measures: LED interior and exterior lighting solutions.
2. Refrigeration Measures: lighting, motors, and controls for refrigeration cases.
3. HVAC Measures: HVAC controls, thermostats, and tune-ups

Lime Energy is the current Implementation Contractor that administers the SBES program in the Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP) jurisdictions. Lime Energy provides integrated energy audits, equipment procurement, and payment services to participating customers. Measure installation is performed by Lime Energy or a subcontractor of Lime Energy.

1.2 Evaluation Objectives and Program Level Findings

This evaluation provides an independent assessment of program impacts and performance for participation that occurred between 1/1/2019 and 6/30/2020. Guidehouse used an engineering-based approach to calculate program impacts, similar to previous evaluation cycles with some differences pertaining to data collection activities. Due to the ongoing COVID-19 pandemic, Guidehouse replaced the previous onsite field study activities with virtual verification to collect information necessary for impact calculations.

Evaluation objectives include the following:

1. Impact Evaluation:
    a. Verify deemed savings estimates through review of measure assumptions and calculations.
    b. Perform virtual verification of measure installations and collect data for use in an engineering analysis.
    c. Estimate the amount of observed energy and peak demand savings (both summer and winter) by measure via engineering analysis.

2. Net-to-Gross Analysis:
    a. Assess the Net-to-Gross ratio by addressing spillover and free-ridership via customer online surveys.

3. Process Evaluation:
    a. Conduct phone interviews with program management and implementation contractor(s) and to collect data for use in process analysis.

b. Administer customer online surveys to collect data for use in process analysis. Evaluate the strengths and weaknesses of current program processes and customer perceptions, with special consideration for effects of the COVID-19 pandemic.

By performing both impact and process components of the EM&V effort, Guidehouse provides Duke Energy with verified energy and demand impacts, as well as a set of recommendations that are intended to aid Duke Energy with improving or maintaining the satisfaction with program delivery while meeting energy and demand reduction targets in a cost-effective manner. Guidehouse found that Duke Energy is successfully delivering the SBES Program to customers, participant satisfaction is generally favorable, and the reported measure installations are relatively accurate.

For the evaluation period covered by this report, there were a total of 1,964 projects comprised of roughly 21,909 measures installed through the program in the DEC jurisdiction and a total of 1,583 projects with roughly 16,853 measures installed through the program in the DEP jurisdiction. The program-level evaluation findings are presented in Table 1-1 and Figure 1-1 for DEC, and Table 1-2 and Figure 1-2 for DEP.

Guidehouse found the realization rate for gross energy savings to be 100 and 101 percent for DEC and DEP, respectively, meaning that total verified gross energy savings were found to be similar to the claimed in the tracking database provided by Duke Energy. Virtual impact assessments found the measure installation rate (ISR) to be 96 percent for both jurisdictions, meaning participants self-reported small differences between the measures indicated in the tracking data and those received or currently operating at their facilities. However, the ISR was offset by the addition of HVAC interactive effects during the engineering analysis, which was the main driver for the final realization rate for energy. The realization rate for DEC and DEP jurisdictions' gross demand savings however were found to both be 99 percent for summer coincident peak demand and 98 percent for winter coincident peak demand. The addition of coincidence factors to demand savings calculations is the main driver of the slightly lowered realization rate.

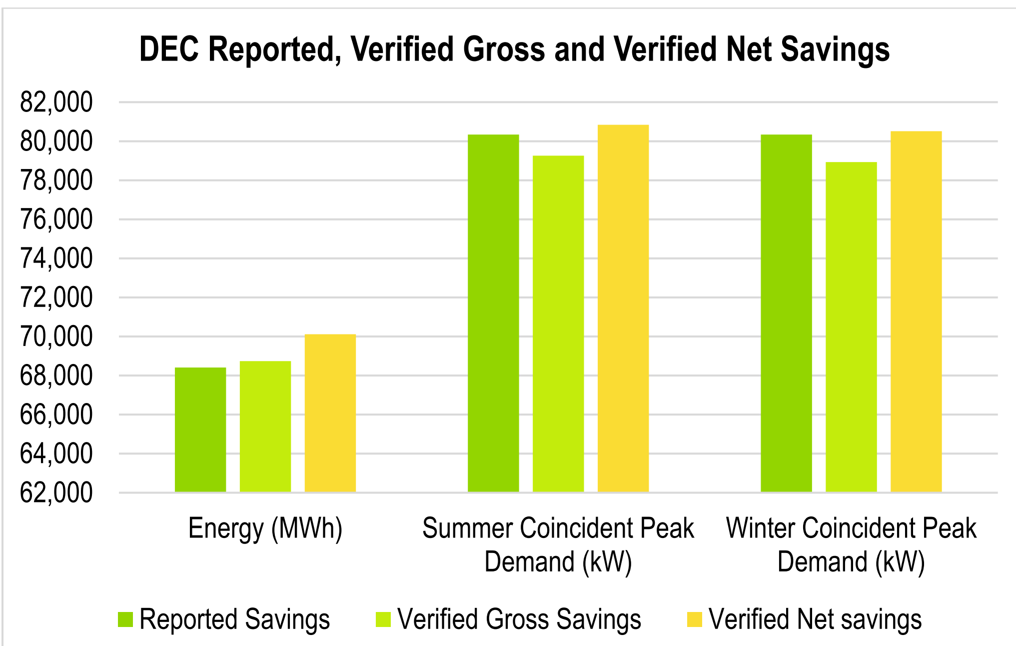
Guidehouse found the net-to-gross (NTG) ratio to be 1.02 for both DEC and DEP jurisdictions, meaning that for every 100 kWh of reported energy savings, 102 kWh can be attributed directly to the program. By multiplying the verified gross energy and demand savings by the NTG ratio, Guidehouse calculated the net energy and demand impacts shown in Table 1-1 for DEC and Table 1-2 for DEP. These findings will be discussed in greater detail throughout this report.

Table 1-1. SBES Reported, Verified Gross and Verified Net Savings - DEC

Parameter	Energy (MWh)	Summer Coincident Peak Demand (kW)	Winter Coincident Peak Demand (kW)
Reported Savings	68,413	80,343	80,343
Realization Rate	100%	99%	98%
Verified Gross Savings	68,738	79,256	78,936
Net-to-Gross	102%	102%	102%
Verified Net savings	70,113	80,841	80,515

Source: Guidehouse analysis, values subject to rounding.

Figure 1-1 Reported, Verified Gross and Net Energy and Demand Savings - DEC



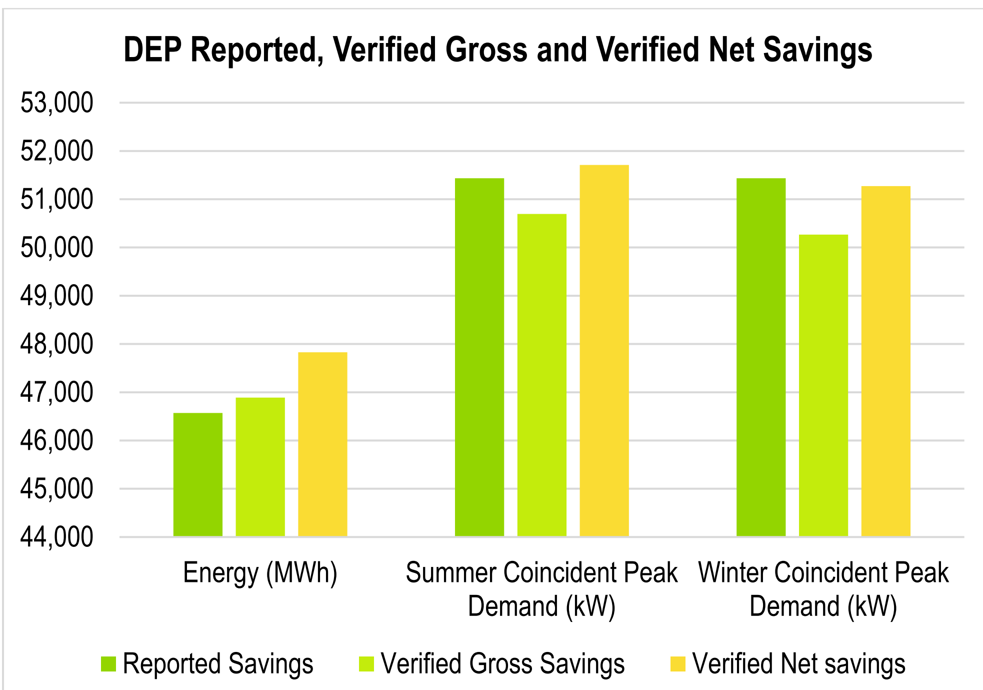
Source: Guidehouse analysis, values subject to rounding.

Table 1-2 SBES Reported, Verified Gross and Verified Net Savings – DEP

Parameter	Energy (MWh)	Summer Coincident Peak Demand (kW)	Winter Coincident Peak Demand (kW)
Reported Savings	46,571	51,433	51,433
Realization Rate	101%	99%	98%
Verified Gross Savings	46,889	50,696	50,267
Net-to-Gross	102%	102%	102%
Verified Net savings	47,827	51,710	51,272

Source: Guidehouse analysis, values subject to rounding.

Figure 1-2 Reported, Verified Gross and Net Energy and Demand Savings – DEP



Source: Guidehouse analysis, values subject to rounding.

1.3 Evaluation Parameters and Sample Period

To accomplish the evaluation objectives, Guidehouse performed a variety of research and analysis activities, including:

- Engineering review of measure savings algorithms
- Virtual verification to assess installed measure quantities and characteristics
- Participant surveys with customers to evaluate satisfaction and decision-making.

Table 1-3 summarizes the evaluated parameters. The targeted sampling confidence and precision was 90 percent ± 10 percent, and the achieved was 90 percent ± 2.5 percent.

Table 1-3. Evaluated Parameters

Evaluated Parameter	Description	Details
In-Service Rates	The percentage of program measures in use as compared to reported	Virtual verification assessments completed by participants
Satisfaction	Customer satisfaction	Process Surveys (Satisfaction with program elements Satisfaction with implementation contractor)
Free Ridership	Fraction of reported savings that would have occurred anyway, even in the absence of the program	NTG surveys
Spillover	Additional, non-reported savings that occurred as a result of participation in the program	NTG surveys

Source: Guidehouse

The evaluation covers program participation from 1/1/2019 and 6/30/2020. Table 1-4 shows the start and end dates of Guidehouse' s sample period for evaluation activities.

Table 1-4. EM&V Sample Period Start and End Dates

Activity	Start Date	End Date
Virtual Verification	2/8/2021	3/05/2021
Process and NTG surveys	2/1/2021	2/26/2021

Source: Guidehouse

1.4 Evaluation Considerations and Recommendations

The evaluation team recommends a few actions for improving the SBES Program, based on insights gained through the evaluation effort. These recommendations are intended to assist Duke Energy with enhancing the program delivery and customer experience, as well as to possibly increase program impacts. Further explanation for each recommendation can be found later in this report.

1. **Consider introducing additional equipment choices in the program.** There were a subset of customers reporting that the program was unable to provide all the energy efficiency equipment they wanted. Duke Energy should consider introducing more equipment choices in the program to include additional outdoor lighting and HVAC measures. This also presents an opportunity for channeling to other Duke Energy programs or education about measures that are not offered through the SBES program.
2. **Increase and improve program communications.** This is the most common challenge or drawback received from participants, indicating that customers were sometimes unclear about the various stages of the program process and did not receive proper communication and guidance from the implementer and/or Duke Energy. Additional education from both Lime Energy and Duke Energy account managers should help customers better understand the program participation process.
3. **Consider using TRM algorithms for HVAC measures.** Lime Energy and Duke Energy developed deemed savings estimates using regional data for HVAC measures. Although the methodology for developing these estimates was accurate, Guidehouse recommends Duke Energy consider using TRM algorithms too and substituting the variables in these algorithms using regional values to estimate savings. This may enhance the transparency of the impact estimates for these measures.
4. **The Program Net-to-Gross Ratio is high**. This indicates that the program is providing a key service to small business customers in helping them manage their energy use.

2. Program Description

2.1 Program Design

The SBES Program is available to qualifying commercial customers with average demand less than 180 kilowatts (kW) demand service. After completing the program application to assess participation eligibility, customers receive a free energy assessment to identify equipment for upgrade. Lime Energy reviews the energy assessment results with the customer, who then chooses which equipment upgrades to perform. Qualified contractors complete the equipment installations at the convenience of the customer.

The SBES Program recognizes that customers with lower savings potential may benefit from a streamlined, one-stop, turnkey delivery model and relatively high incentives to invest in energy efficiency. Additionally, small businesses may lack internal staffing dedicated to energy management and can benefit from energy audits and installations performed by an outside vendor.

The program offers incentives in the form of a discount for the installation of measures, including high-efficiency lighting, refrigeration and HVAC equipment. These incentives increase adoption of efficient technologies beyond what would occur naturally in the market. During the period included in this evaluation, the SBES Program achieved the majority of program savings from lighting measures, which tend to be the most cost-effective and easiest to market to potential participants. The SBES program also achieved program savings from HVAC and refrigeration measures.

The program offers a performance-based incentive up to 80 percent of the total project cost, inclusive of both materials and installation. Multiple factors drive the total project cost, including selection of equipment and unique installation requirements.

2.2 Reported Program Participation and Savings

Duke Energy and the implementation contractor maintain a tracking database that identifies key characteristics of each project, including participant data, installed measures, and estimated energy and peak demand reductions based on assumed (“deemed”) savings values. In addition, this database contains measure level details that are useful for EM&V activities. Table 2-1 provides a summary of the gross reported energy and demand savings and participation for 2019-2020.

Table 2-1. Reported Participation and Gross Savings Summary

Reported Metrics	DEC	DEP
Projects	1,964	1,583
Measures Installed	21,909	16,853
Gross Annual Energy Savings (MWh)	68,413	46,571
Average Quantity of Measures per Project	11	10
Average Gross Savings Per Project (MWh)	34.83	29.41

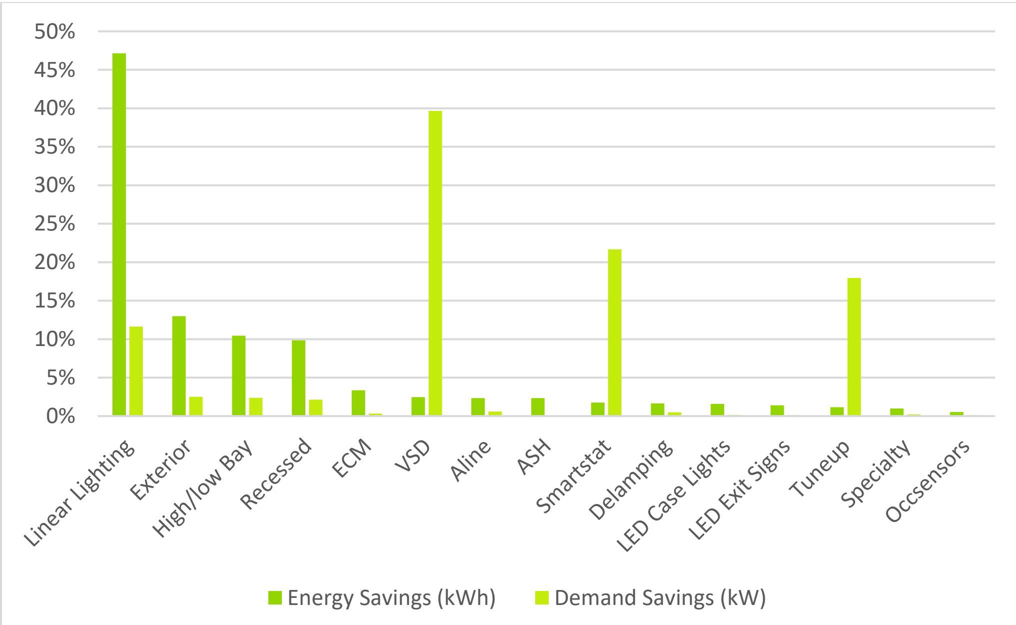
Source: SBES Tracking Database

Duke Energy uses assumptions and algorithms primarily from the New York Technical Resource Manual[1] (TRM) as the basis for energy and demand savings calculations[2] for lighting and refrigeration measures. This TRM is robust, well-established, and follows industry best practices for the measures found in the SBES program. The evaluation team believes the NY TRM is an appropriate basis for estimating savings in the DEC and DEP jurisdictions based on Guidehouse' s assessment of the underlying energy savings assumptions. Lime Energy worked with Duke Energy to develop the HVAC measures' deemed savings using regional data, Guidehouse reviewed the methodology for developing deemed savings estimates for these measures and think the deemed savings values are appropriate and agree with their use.

2.2.1 Program Summary by Measure

Efficient LED linear lighting retrofits were the highest contributor to program energy savings in 2019 -2020, followed by exterior lighting measures and a variety of LED lighting measures for DEC and DEP as seen in Figure 2-1 and Figure 2-2. However, HVAC measures such as VSD, Smart Thermostats and HVAC tune-ups contributed the most to demand savings for both jurisdictions. In addition, refrigeration measures (including EC motors, LED case lighting, and anti-sweat heaters) also contributed to savings. Overall, lighting measures contribute 86 percent of reported program energy savings, refrigeration measures contribute 9 percent and HVAC measures contribute the remaining 5 percent.

Figure 2-1. DEC Reported Gross Energy and Demand Savings by Measure Category



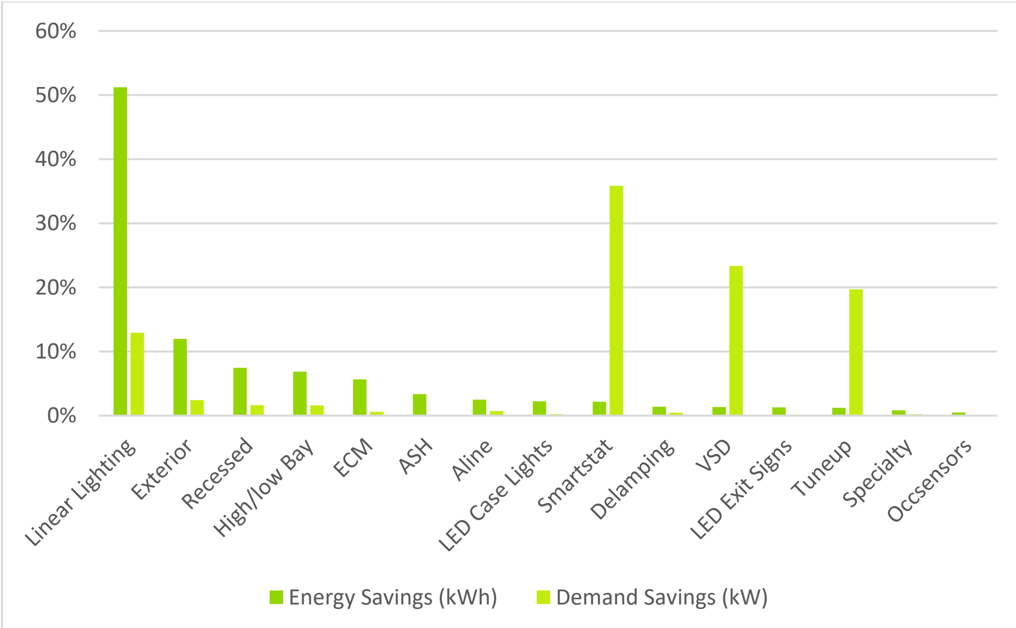
Source: SBES Tracking Database

[1] New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs - Residential, Multi-Family, and Commercial/Industrial, known as the Technical Resource Manual (TRM), Version 7, April 15, 2019

[2] The Pennsylvania Technical Reference Manual, 2016 is used for the anti-sweat heater control measure's algorithms and assumptions

I/A

Figure 2-2. DEP Reported Gross Energy and Demand Savings by Measure Category



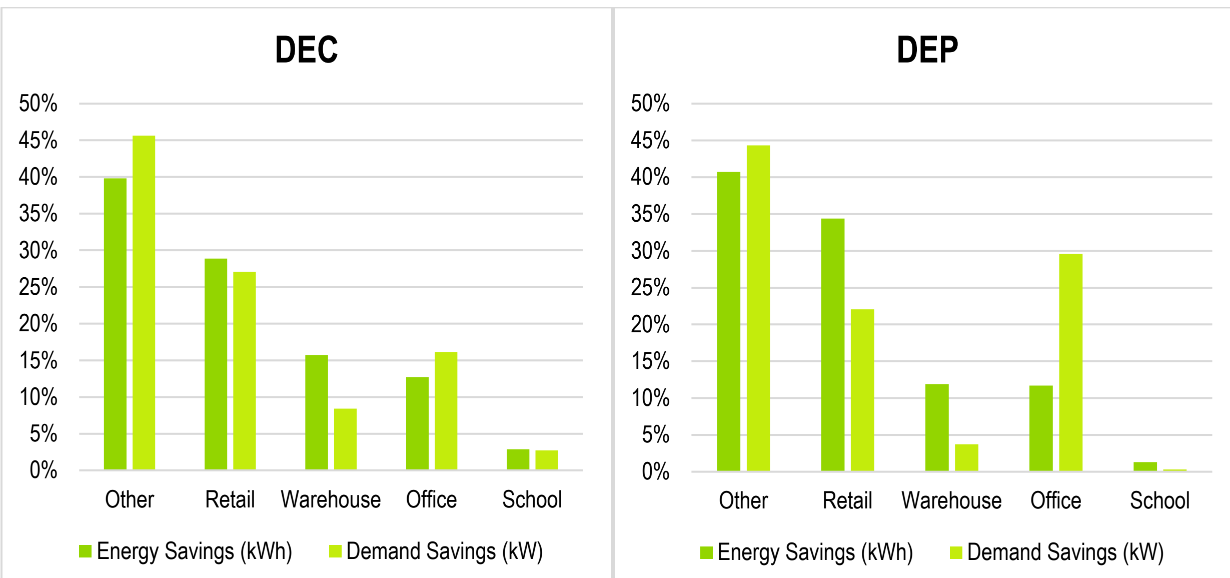
Source: SBES Tracking Database

2.2.2 Savings by Facility Type

Guidehouse reviewed the business type information in the tracking database to understand the participant demographics. The tracking data included SIC codes for each project, resulting in many unique detailed building types. As part of the engineering analysis for this evaluation, Guidehouse used the NEEP Mid-Atlantic TRM[3] to make impact adjustments to account for factors such as HVAC interactive effects and coincidence factors. To accomplish this, Guidehouse mapped the SIC codes from the tracking data to the facility types detailed in the TRM.

These facility types are shown below in Figure 2-3. Note that the largest category is “other”, which indicates either the SIC code was not populated or a suitable TRM facility type was not found. The distribution of facility types is representative of a large variety of small business customers, indicating that the program is successfully recruiting participants across several sectors. The “other”, retail, restaurant and warehouse facilities represent the largest contributors of energy and demand savings in both jurisdictions.

Figure 2-3. Reported Energy Savings by Facility Type



Source: SBES Tracking Database

[3]NEEP TRM (April 2020, v10), https://neep.org/sites/default/files/media-files/trmv10.pdf

3. Impact Evaluation

3.1 Impact Results

Table 3-1 shows the program-level results for gross energy and demand savings for DEC and DEP. The subsequent tables, Table 3-2, Table 3-3, and Table 3-4 show the end use level results for gross energy and demand savings for DEC and DEP. Guidehouse estimates gross realization rates of 100%, 99% and 98% for DEC energy, summer coincident demand, and winter coincident demand, respectively. The gross realization rates for DEP are estimated as 101%, 99% and 98% for energy, summer coincident demand, and winter coincident demand, respectively. The realization rates in these tables have been determined according to the in-service rates calculated based on the findings of the virtual verification survey as well as an engineering/deemed savings review of the algorithms.

Table 3-1 Reported and Verified Program-Level Impacts

Program	Parameter	Energy (kWh)	Summer Coincident Peak Demand (kW)	Winter Coincident Peak Demand (kW)
DEC	Reported Savings	68,413,344	80,343	80,343
	Realization Rate	100.4%	98.6%	98.2%
	Verified Gross Savings	68,737,750	79,256	78,936
DEP	Reported Savings	46,571,185	51,433	51,433
	Realization Rate	100.7%	98.6%	97.7%
	Verified Gross Savings	46,888,802	50,696	50,267

Source: Guidehouse analysis, values subject to rounding

Table 3-2 Reported and Verified Lighting Impacts

Program	Parameter	Energy (kWh)	Summer Coincident Peak Demand (kW)	Winter Coincident Peak Demand (kW)
DEC	Reported Savings	59,789,384	16,221	16,221
	Realization Rate	100.5%	93.3%	91.3%
	Verified Gross Savings	60,113,791	15,134	14,814
DEP	Reported Savings	39,117,872	10,390	10,390
	Realization Rate	100.8%	92.9%	88.8%
	Verified Gross Savings	39,435,490	9,652	9,223

Source: Guidehouse analysis, values subject to rounding

Table 3-3 Reported and Verified HVAC Impacts

Program	Parameter	Energy (kWh)	Summer Coincident Peak Demand (kW)	Winter Coincident Peak Demand (kW)
DEC	Reported Savings	3,666,767	63,700	63,700
	Realization Rate	100.8%	92.9%	88.8%
	Verified Gross Savings	3,666,767	63,700	63,700
DEP	Reported Savings	2,197,861	40,590	40,590
	Realization Rate	100.0%	100.0%	100.0%
	Verified Gross Savings	2,197,861	40,590	40,590

Source: Guidehouse analysis, values subject to rounding

Table 3-4 Reported and Verified Refrigeration Impacts

Program	Parameter	Energy (kWh)	Summer Coincident Peak Demand (kW)	Winter Coincident Peak Demand (kW)
DEC	Reported Savings	4,957,192	422	422
	Realization Rate	100.0%	100.0%	100.0%
	Verified Gross Savings	4,957,192	422	422
DEP	Reported Savings	5,255,451	453	453
	Realization Rate	100.0%	100.0%	100.0%
	Verified Gross Savings	5,255,451	453	453

Source: Guidehouse analysis, values subject to rounding

Table 3-5 below presents the energy, summer peak and winter peak impacts by the different measure categories in the DEC SBES program. Table 3-6 presents the same impacts by measure category for the DEP SBES program.

Table 3-5 Reported and Verified Measure-Level Impacts - DEC

Measure Category	Reported Savings (kWh)	Verified Energy Savings (kWh)	Energy Realization Rate	Reported Savings (kW)	Verified Demand Savings (Summer kW)	Summer Demand Realization Rate	Verified Demand Savings (Winter kW)	Winter Demand Realization Rate
A-Line Lamps	1,605,753	1,697,337	106%	482	580	120%	591	123%
Anti Sweat Heater	1,602,710	1,597,708	100%	38	38	100%	38	100%
De-lamping	1,137,371	1,105,993	97%	390	416	107%	306	79%
ECM	2,302,550	2,302,550	100%	263	263	100%	263	100%
Exterior Lights	8,886,092	8,440,067	95%	2,007	0	0%	1,896	94%
Bay Lights	7,146,435	6,898,134	97%	1,909	2,256	118%	2,256	118%
LED Tubes	32,263,196	32,956,441	102%	9,349	9,471	101%	7,312	78%
LED Case Lighting	1,084,809	1,084,809	100%	121	121	100%	121	100%
LED Exit Signs	955,181	991,480	104%	110	140	128%	140	128%
Occupancy Sensors	356,876	346,393	97%	89	72	80%	72	80%
Recessed Lighting	6,729,790	6,941,007	103%	1,706	1,986	116%	2,024	119%
Smart Thermostat	1,199,650	1,199,650	100%	17,415	17,415	100%	17,415	100%
Specialty Lights	675,811	709,064	105%	178	213	119%	217	122%
Tune-up	786,372	786,372	100%	14,425	14,425	100%	14,425	100%
VSD	1,680,745	1,680,745	100%	31,860	31,860	100%	31,860	100%
Grand Total	**68,413,344**	**68,737,750**	**100%**	**80,343**	**79,256**	**99%**	**78,936**	**98%**

Source: Guidehouse analysis, values subject to rounding

Table 3-6 Reported and Verified Measure-Level Impacts – DEP

Measure Category	Reported Savings (kWh)	Verified Energy Savings (kWh)	Energy Realization Rate	Reported Savings (kW)	Verified Demand Savings (Summer kW)	Summer Demand Realization Rate	Verified Demand Savings (Winter kW)	Winter Demand Realization Rate
A-Line Lamps	1,161,239	1,223,170	105%	372	446	120%	455	122%
Anti Sweat Heater	1,571,502	1,571,502	100%	35	35	100%	35	100%
De-lamping	644,442	577,129	90%	226	221	98%	163	72%
ECM	2,636,283	2,636,283	100%	302	302	100%	302	100%
Exterior Lights	5,579,037	5,156,972	92%	1,237	0	0%	1,139	92%
Bay Lights	3,188,803	3,088,653	97%	815	953	117%	953	117%
LED Tubes	23,850,441	24,499,920	103%	6,650	6,755	102%	5,216	78%
LED Case Lighting	1,047,666	1,047,666	100%	117	117	100%	117	100%
LED Exit Signs	603,599	634,030	105%	69	89	129%	89	129%
Occupancy Sensors	228,693	212,761	93%	57	47	82%	47	82%
Recessed Lighting	3,466,657	3,626,739	105%	845	997	118%	1,016	120%
Smart Thermostat	1,008,250	1,008,250	100%	18,439	18,439	100%	18,439	100%
Specialty Lights	394,961	416,116	105%	119	143	120%	146	122%
Tune-up	563,167	563,167	100%	10,137	10,137	100%	10,137	100%
VSD	626,444	626,444	100%	12,014	12,014	100%	12,014	100%
Grand Total	**46,571,185**	**46,888,802**	**101%**	**51,433**	**50,696**	**99%**	**50,267**	**98%**

Source: Guidehouse analysis, values subject to rounding

The following sections provide more details on the results, the methodology, and findings for the DEC and DEP impact evaluation.

3.2 Impact Evaluation Methodology

Guidehouse conducted an engineering-based analysis using standard savings algorithms to estimate the energy and demand impacts achieved by the program. The analysis was informed by virtual verification to validate measure quantities and characteristics as compared with information in the program tracking data. Additionally, Guidehouse reviewed relevant engineering parameters, such as HVAC interactive effects, and incorporated updates using the NEEP Mid-Atlantic TRM and 2016 Guidehouse logger analysis. The following subsections describe the methodology used for each element of this process, and the results are discussed in detail in Section 3.3.

3.2.1 Deemed Savings Review

Guidehouse conducted a deemed savings review to evaluate the energy and demand impacts reported in the tracking database for each measure type and category. Guidehouse evaluated all program measures and supporting data parameters. During the time period covered by this evaluation cycle, Lime Energy was the implementation contractor.

Guidehouse conducted a detailed review of the tracking data and impact estimates included within the documents provided by Duke Energy. Guidehouse replicated impact estimates using engineering calculations based on algorithms provided by Lime Energy and using measure parameters from the tracking data where available. Guidehouse also calculated preliminary ex post impacts for lighting measures that included basic modifications to include HVAC interactive effects and coincidence factors[4]. Based on these ex post impacts, Guidehouse calculated an "Engineering Review (ER)" verified realization rate which is the ratio of the savings calculated through the deemed savings review and the reported savings. See Section 3.3.1 for more information and findings from the deemed savings review.

3.2.2 Sample Design

The participation data provided by Duke Energy indicated that the vast majority of energy savings are from lighting measures, with a small contribution of energy savings from refrigeration and HVAC measures. Guidehouse analyzed the program tracking data to characterize the trends in equipment and project size. Similar to previous evaluation cycles, Guidehouse stratified the evaluation sample by project size for lighting and grouped together refrigeration and HVAC measures. This allowed for a proper assessment of a range of projects while maximizing the proportion of total program savings that is represented by the evaluation. It should be noted that for calculations and reporting, HVAC and refrigeration measures were separated out of their combined strata.

Guidehouse used a combined sampling approach but considered strata-level characteristics of each jurisdiction. The combined sample design for both jurisdictions can be seen in Table 3-7 below. The original launch of the virtual verification did not produce the adequate amount of responses to fit the sample design, so more projects were needed to be added to the sample.

In addition to working with the Lime Energy database to create the sample population, the file was analyzed to create reported quantity totals for the lighting, HVAC, and refrigeration

[4] HVAC interactive effects in the savings calculations for indoor lighting measures were sourced from the NEEP Mid-Atlantic TRM and were based on building type, with an assumption of AC and non-electric heating to be conservative

measures. This allowed the virtual verification to ask customers to confirm the quantity installed or provide a reason for a different verified quantity value.

Guidehouse targeted a 90/10 sampling confidence and relative precision for virtual verification at the program level. This expected sample size was approximately 107 projects for verification, seen in the tables below. This was based on a coefficient of variation of 0.5 for all strata, found in past field verification activities for this program. Guidehouse received a total of 90 completed impact surveys back from the sample, representing approximately 6,000 measures. The targeted sampling confidence and precision was 90 percent ± 10 percent, and the achieved was 90 percent ± 2.5 percent

Table 3-7 DEC Expected Sampling Summary

Stratum	Population Project Count	Verification Sample Size
Lighting Large	118	15
Lighting Medium	396	20
Lighting Small	1,969	21
HVAC and Refrigeration	1,065	51
Total	**3,548**	**107**

Source: Guidehouse analysis of DEC-DEP program tracking data

3.2.3 Virtual Verification

Guidehouse conducted verification for a sample of program participants to evaluate the consistency of measure characteristics with the program tracking database. Data collection was structured to gather the information necessary to inform the engineering algorithms used to estimate program impacts.

Guidehouse sent email invitations to a sample of participants. The virtual verification link was personalized so each participant only filled in the information relevant to their project. The virtual verification survey was designed to take about 15-20 minutes for a participant to complete while present at their project location. Participants received an incentive of $25-$50 to compensate them for the time required to complete the virtual verification.

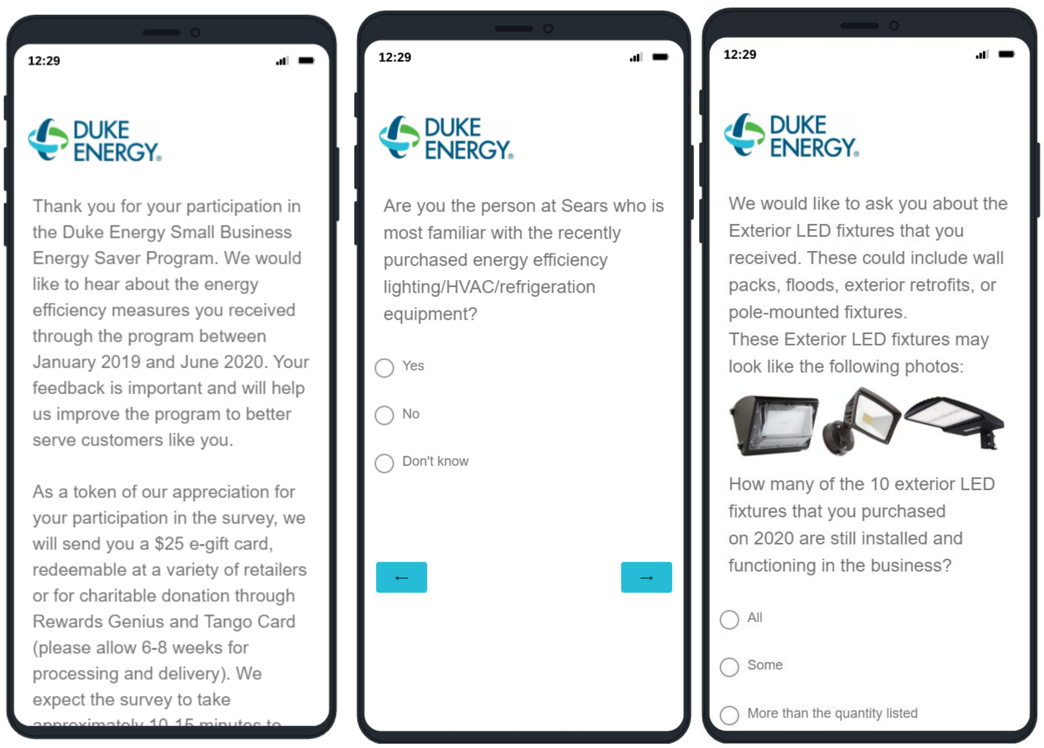
Guidehouse conducted a soft launch of the virtual assessment for a smaller sample of customers to test the process and determine response rates. Early feedback allowed for adjustments to maximize responses. Participants received reminders to complete the assessment. Guidehouse monitored the progress of completes relative to targets and designed a back-up sample to receive invitations when targets were not being met by the initial sample.

Guidehouse used the Qualtrics platform to create the virtual verification interface that participants used to collect key project information. The virtual verification requested photo documentation of certain project characteristics. Customers used a mobile device, such as a smartphone or tablet, to complete the verification process. The virtual verification included general questions about facility features and detailed questions about selected equipment.

Guidehouse asked questions about building HVAC characteristics, operating schedules, measure quantity, lamp/fixture wattage, and efficiency characteristics during the virtual verification. Due to the response rates for these various questions, Guidehouse only used verified measure quantities to update project savings. Guidehouse compared responses associated with heating and cooling system types and hours of operation to the database for consistency checks.

Figure 3-1 shows an example of the Qualtrics virtual verification platform. Participants used their mobile device to access the personalized link and open the interface in a web browser. In the equipment section, participants were prompted to upload pictures of the installed equipment using the camera on their mobile device. Guidehouse used a combination of participant-reported and documentation-based information to inform the verified energy and demand impact calculations.

Figure 3-1 Virtual Verification Platform Example



Source: Guidehouse Virtual Verification Qualtrics Survey

Survey invitations were sent to 2,202 participants between 2/08/2021 and 3/05/2021, with multiple reminders and escalating incentives. This includes all participants who did not receive invites for the process survey. Guidehouse also contacted 150 customers via phone which resulted in 7 additional customers taking the virtual verification survey. Ultimately, 302 participants began the survey, and 90 participants completed the questions in entirety. The 90 completed virtual impact surveys represented almost 6,000 individual measures.

Table 3-8 shows the virtual verification response summary by measure and includes the reported and verified measure quantities.

Table 3-8 Virtual Verification Response Summary by Measure

Measure	Number of Responses by Measure*	Reported Measure Quantity	Verified Measure Quantity
Specialty Lamps	6	56	56
LED Tubes	76	5,127	5,115
Tune-up	9	28	28
Bay Lights	3	91	26
Lighting Controls and Exit Signs	18	116	115
A-Line Lamps	20	167	156
Exterior Lights	14	75	75
Recessed Lights	10	236	233
VSD	3	12	12
De-lamping	1	8	8
Anti-Sweat Heaters	1	5	5
ECM	7	49	49
LED Case Lighting	4	9	9
Total	**172**	**5,979**	**5,887**

Source: Guidehouse Virtual Verification
**Respondents often had multiple measure categories in their projects*

3.3 Impact Evaluation Findings

This section examines findings from the deemed savings review and discusses the main drivers of the savings realization rates. Guidehouse calculates the realization rate as the verified savings divided by the reported savings by measure, which is driven by a combination of the in-service rate, the HVAC interactive effects, and the coincidence factors, described as follows:

1. In-Service Rate (ISR) is the ratio of the verified (i.e., installed) quantity to the reported quantity from the program tracking data.

2. HVAC Interactive Effects are multipliers that reflect effects on space heating and cooling loads caused by a reduction in heat output from efficient lighting. HVAC interactive effects only impact lighting measures. Note that the implementer did not apply HVAC interactive effects for any measures, so this adjustment is equal to the average HVAC interactive effect itself. There are separate adjustments for energy savings and demand savings.

3. Coincidence Factor (CF) represents the portion of installed lighting that is on during the peak utility hours. This affects only demand reductions, not energy savings.

Overall, in-service rates tend to result in minor decreases to the verified energy savings, while HVAC interactive effects result in an increase in savings for lighting measures. Generally, the application of coincidence factor results in decreased demand savings for lighting measures.

3.3.1 Deemed Savings Review

Guidehouse reviewed the program tracking data provided by Duke Energy to assess program activity and the availability of key data fields necessary to support the evaluation. The pre- and post-retrofit measure descriptions summarize the equipment details for each line item in the database, and Guidehouse was able to identify the fields that correspond to ex ante (i.e., reported) energy and demand impacts.

The lighting controls, anti-sweat heater controls, LED case lighting, and refrigeration ECM motor measures were initially lacking information in the Lime Energy tracking data. Lime Energy then provided additional documentation to assist in the review of the program tracking data. Guidehouse used this to confirm that the Lime Energy lighting and refrigeration measure savings in the tracking data align with the algorithms from the New York and Pennsylvania Technical Reference Manuals, as in prior evaluations of this program.

Lime Energy also provided their HVAC measure deemed savings table and provided some background on how those values were developed.

3.3.1.1 Anti-Sweat Heater Controls

Lime Energy calculated the anti-sweat heater controls measure savings using the algorithms from the Pennsylvania TRM.

Refrigerator/Cooler

$$\mathrm{D}kWh_{per\ unit} = \frac{kW_{coolerbase}}{DoorFt} \times (8{,}760 \times CHA_{off}) \times \left(1 + \frac{R_h}{COP_{cool}}\right)$$

$$\Delta kW_{peak\ per\ unit} = \frac{kW_{coolerbase}}{DoorFt} \times CHP_{off} \times \left(1 + \frac{R_h}{COP_{cool}}\right) \times DF$$

Freezer

$$\mathrm{D}kWh_{per\ unit} = \frac{kW_{freezerbase}}{DoorFt} \times (8{,}760 \times FHA_{off}) \times \left(1 + \frac{R_h}{COP_{freeze}}\right)$$

$$\Delta kW_{peak\ per\ unit} = \frac{kW_{freezerbase}}{DoorFt} \times FHP_{off} \times \left(\frac{R_h}{COP_{freeze}}\right) \times DF$$

where:

N	= Number of doors or case length in linear feet having ASH controls installed
R_h	= Residual heat fraction; estimated percentage of the heat produced by the heaters that remains in the freezer or cooler case and must be removed by the refrigeration unit
$Unit$	= Refrigeration unit

8,760	= Hours in a year
$kW_{cooler\ base}$	= Per door power consumption of cooler case ASHs without controls
CHP_{off}	= Percent of time cooler case ASH with controls will be off during the peak period
CHA_{off}	= Percent of time cooler case ASH with controls will be off annually
DF_{cool}	= Demand diversity factor of cooler, accounting for the fact that not all anti-sweat heaters in all buildings in the population are operating at the same time.
COP_{cool}	= Coefficient of performance of cooler
$kW_{freezerbase}$	= Per door power consumption of freezer case ASHs without controls
FHP_{off}	= Percent of time freezer case ASH with controls will be off during the peak period
FHA_{off}	= Percent of time freezer case ASH with controls will be off annually
DF_{freeze}	= Demand diversity factor of freezer, accounting for the fact that not all anti-sweat heaters in all buildings in the population are operating at the same time.
COP_{freeze}	= Coefficient of performance of freezer

3.3.1.2 Electronically Commutated Motors

Lime Energy calculated the electronically commutated motor for Walk-In/Reach-In units measure savings using the algorithms from the New York TRM.

Annual Electric Energy Savings

$$\Delta kWh = \Delta kWh_{EFan} + \Delta kWh_{RH}$$

$$\Delta kWh_{EFan} = units \times \left(\frac{A_{EFan} \times V_{EFan} \times \sqrt{Phase_{EFan}}}{1{,}000}\right) \times F_{PA} \times F_{EFan} \times hrs_{EFan}$$

$$\Delta kWh_{RH} = \Delta kWh_{EFan} \times Comp_{Eff} \times 0.284$$

Summer Peak Coincident Demand Savings

$$\Delta kW = \Delta kW_{EFan} + \Delta kW_{RH}$$

$$\Delta kW_{EFan} = units \times \left(\frac{A_{EFan} \times V_{EFan} \times \sqrt{Phase_{EFan}}}{1{,}000}\right) \times F_{PA} \times F_{EFan} \times CF$$

$$\Delta kW_{RH} = \Delta kW_{EFan} \times Comp_{Eff} \times 0.284$$

where:

ΔkWh	= Annual electric energy savings
ΔkW	= Peak coincident demand electric savings
$\Delta therms$	= Annual gas energy savings
ΔkWh_{EFan}	= Annual electric savings due to evaporator fan motor replacement
ΔkWh_{RH}	= Annual electric savings due to reduced heat from evaporator fan motor replacement
ΔkW_{EFan}	= Summer Peak Coincident Demand Savings due to evaporator fan motor replacement
ΔkW_{RH}	= Summer Peak Coincident Demand Savings due to reduced heat from evaporator fan motor replacement
units	= Number of measures installed under the program
A_{EFan}	= Nameplate amperage of existing evaporator fan motor
V_{EFan}	= Nameplate voltage of existing evaporator fan motor
$Phase_{EFan}$	= Phase of existing evaporator fan
1,000	= Conversion factor, one kW equals 1,000 W
F_{PA}	= Power factor
F_{EFan}	= Reduction of load by replacing evaporator fan motor
hrs_{EFan}	= Evaporator fan annual operating hours
$Comp_{Eff}$	= Efficiency of the cooler/freezer compressor (kW/Ton)
0.284	= Conversion factor from kW to Tons of refrigeration (Tons/kW)
CF	= Coincidence factor

3.3.1.3 Refrigerated LED Case Lighting

Lime Energy calculated the refrigerated LED case lighting measure savings using the algorithms from the New York TRM.

Annual Electric Energy Savings

$$\Delta kWh = \left(\frac{(W \times units)_{baseline} - (W \times units)_{ee}}{1{,}000}\right) \times hrs \times (1 + (Comp_{eff} \times 0.284))$$

Summer Peak Coincident Demand Savings

$$\Delta kW = \left(\frac{(W \times units)_{baseline} - (W \times units)_{ee}}{1{,}000}\right) \times CF \times (1 + (Comp_{Eff} \times 0.284))$$

where:

ΔkWh	= Annual electricity energy savings
ΔkW	= Peak coincident demand electric savings
Δtherms	= Annual gas energy savings
units	= Number of measures installed under the program
W	= Rated wattage of lamp or fixture (Watts)
baseline	= Baseline condition or measure
ee	= Energy efficient condition or measure
1,000	= Conversion factor, one kW equals 1,000 Watts
hrs	= Lighting operating hours
CF	= Coincidence factor
$Comp_{Eff}$	= Efficiency of the cooler/freezer compressor (kW/Ton)
0.284	= Conversion factor from kW to Tons of refrigeration (Tons/kW)

3.3.1.4 HVAC Measures Deemed Savings

Lime Energy worked with Duke Energy to determine the deemed savings for the HVAC measures: fan motor VSDs, HVAC tune-ups, and smart thermostats. For VSDs, Lime Energy provided engineering algorithm(s) used to calculate the energy savings values to support the determination of deemed savings values. For smart thermostats and HVAC tune-ups, deemed savings values were provided to Lime Energy. Lime Energy's regional adjustment methodology for smart thermostats and HVAC tune-ups used 5 years of cooling degree day comparisons with a base temperature of 60 degrees Fahrenheit. There was no adjustment for the VSD measure since VSDs have very little weather dependence.

Since Lime Energy worked with Duke Energy to develop the HVAC measures' deemed savings using regional data, we think the deemed savings values are appropriate and agree with their use.

3.3.1.5 Lighting Controls

Lime Energy also shared the following algorithm used to calculate the lighting control measure energy savings:

$$kWh = \left[kW_{before} * Qty_{before} * \left(Hours * (1 - ReductionFactor)\right)\right] - \left[kW_{after} * Qty_{after} * \left(Hours * (1 - ReductionFactor)\right)\right]$$

The ReductionFactor variable Lime Energy used is equal to 0.3. Guidehouse was unable to replicate the lighting control savings since baseline wattage data was not provided.

3.3.1.6 Lighting Measures

As outlined in previous EM&V reports and in following the best practices for commercial lighting impact verification, Table 3-9 shows the algorithms used by Guidehouse to calculate the savings for the lighting measures. These algorithms are similar to those commonly found in technical reference manuals for commercial lighting measures and match the methodology outlined in the New York TRM. Lime Energy followed similar algorithms to calculate lighting measure savings but did not include HVAC interactive effects or coincidence factors (for demand savings only). A discussion on each impact parameter is included after the table.

Table 3-9 Engineering Algorithms for Lighting Measures

Measure	Energy Savings Algorithm	Coincident Peak Demand Savings Algorithm
Lighting Measures	$kWh = ISR * \frac{(W_b * Qty_b) - (W_{ee} * Qty_{ee})}{1000} * HOU * IF\_Energy$	$kW = ISR * \frac{(W_b * Qty_b) - (W_{ee} * Qty_{ee})}{1000} * CF * IF\_Demand$
ISR = in-service rate*		
Qty_b = baseline quantity of equipment		
Qty_ee = efficient quantity of equipment		
HOU = operating hours		
Watts_b = baseline watts		
Watts_ee = efficient watts		
CF = coincidence factor		
IF_Energy = heating, ventilating, and air conditioning (HVAC) interaction factor for energy savings calculations		
IF_Demand = interaction factor for demand savings calculations		

**Guidehouse did not apply an ISR to the preliminary ex post impacts. ISRs were applied based on findings from evaluation activities. Source: Guidehouse analysis*

Baseline and Efficient Wattage

Based on the measure descriptions in the tracking database, estimates for baseline and efficient wattage appeared to be reasonable and are likely accurate records of project equipment and specifications. The virtual verification survey supported the wattage information provided in the tracking database, as a small subset of respondents provided wattage information.

HVAC Interactive Effects for Energy and Demand

The HVAC interactive effects represent additional HVAC impacts due to changes in heating and cooling load for lighting measures located in conditioned spaces. The tracking databases did not apply HVAC interactive effects for any lighting measures, which resulted in adjustments to the energy and demand savings during Guidehouse' s engineering review. The HVAC Interactive effects by building type as presented in Table 3-6 were applied from the NEEP Mid-Atlantic TRM to the verified savings as calculated from the engineering review.

Coincidence Factor (CF)

The tracking database included a single demand savings field for lighting measures, which does not incorporate a coincidence factor. Guidehouse interpreted the demand impacts in the tracking data as non-coincident impacts, and the evaluation incorporated summer and winter coincidence factors to calculate kW impacts for reporting purposes. Table 3-7 and Table 3-8 present the summer and winter peak coincident factors that were used in the calculation of the verified demand savings stemming from the engineering review.

3.3.2 HVAC Interactive Effects

HVAC interactive effects are the lighting-HVAC interaction factors that represent the reduced space cooling requirements due to the reduction of waste heat rejected by efficient lighting. Because of this, HVAC interactive effects are not applicable to exterior lighting measures. The evaluation team applied HVAC interactive effects to both the energy and demand savings calculations for the interior lighting measures. The HVAC interactive effects shown in Table 3-10 are sourced from Appendix E (Commercial & Industrial Lighting Waste Heat Factors) in the NEEP Mid-Atlantic TRM and are based on building type[5]. Note that the implementor did not apply HVAC interactive effects for any of the lighting measures claimed in the program year. The HVAC interactive effects adjustment is between 1.00 and 1.10 for energy and 1.00 and 1.44 for demand.

Table 3-10 HVAC Interactive Effects Multipliers from the NEEP Mid-Atlantic TRM

Building Type	WHFe	WHFd
Office	1.10	1.36
Retail	1.06	1.27
School	1.10	1.44
Warehouse	1.02	1.23
Other	1.08	1.35

Source: NEEP Mid-Atlantic TRM

HVAC interactive effects and coincidence factors are the main reason for discrepancy between the reported and verified savings in interior lighting measures. The addition of HVAC interactive effects to the energy savings calculations resulted in an increase of savings. The addition of the HVAC interactive effects to the demand savings resulted in an increase in demand savings.

3.3.3 Coincidence Factors

To develop summer and winter coincidence factors for the lighting measures, Guidehouse used findings from the lighting logger measurements conducted during the 2016 DEC-DEP evaluation. Coincidence factors account for the fact that not all lights are on for the duration of the peak demand period. Coincidence factors range from 0.0 and 1.0, based on measure type, and are detailed in Table 3-11 below. The implementer did not apply coincidence factors to the demand savings for lighting measures. LED exit signs that are on all day receive a summer and winter coincidence factor on 1.0, while exterior lights receive a summer coincidence factor of 0.0 and winter coincidence factor of 1.0.

Lighting controls have a separate set of coincidence factors based on building type, similar to the HVAC interactive effects. There coincidence values come from the NEEP Mid-Atlantic TRM Appendix E (Commercial & Industrial Lighting Waste Heat Factors) and can be found in Table 3-12.

[5] NEEP TRM (April 2020, v10), https://neep.org/sites/default/files/media-files/trmv10.pdf . The HVAC interactive effects (or waste heat factors) used are for Maryland buildings with AC and non-electric heat.

Table 3-11 Summer and Winter Coincidence Factors for Lighting Measures from DEC-DEP 2016 Logger Analysis

Measure	Summer Coincidence Factor	Winter Coincidence Factor
LED Exit Sign	1	1
A Line Lamp	0.914	0.931
Recessed Light	0.914	0.931
Specialty Light	0.914	0.931
LED Tube	0.802	0.619
High/low Bay	1	1
Delamping	0.902	0.664
Exterior Light	0	1

Source: DEC-DEP 2016 logger data analysis.

Table 3-12 Coincidence Factors for Lighting Controls from the NEEP Mid-Atlantic TRM

Building Type	Coincidence Factor
Office	0.70
Retail	0.83
School	0.35
Warehouse	0.80
Other	0.62

Source: NEEP Mid-Atlantic TRM

3.3.4 Engineering Review (ER) Realization Rate

During the engineering review process, Guidehouse used the HVAC interactive effects as well as summer and winter peak coincident factors to adjust the deemed impacts.

On average the addition of HVAC interactive effects resulted in an increase of 5% in energy savings and 25% in demand savings. The addition of coincident peak demand factors resulted in an average decrease of 20% in summer peak demand savings and 25% in winter peak demand savings.

Table 3-13 and Table 3-14 show the realization rates stemming from the engineering review for energy, summer peak and winter peak demand savings for each stratum.

Table 3-13 DEC Engineering Review (ER) Realization Rate

Stratum	Energy Realization Rate	Summer Peak Demand Realization Rate	Winter Peak Demand Realization Rate
Lighting Large	105%	97%	98%
Lighting Medium	106%	96%	97%
Lighting Small	106%	101%	93%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**105%**	**100%**	**99%**

Source: Guidehouse Engineering Review

Table 3-14 DEP Engineering Review (ER) Realization Rate

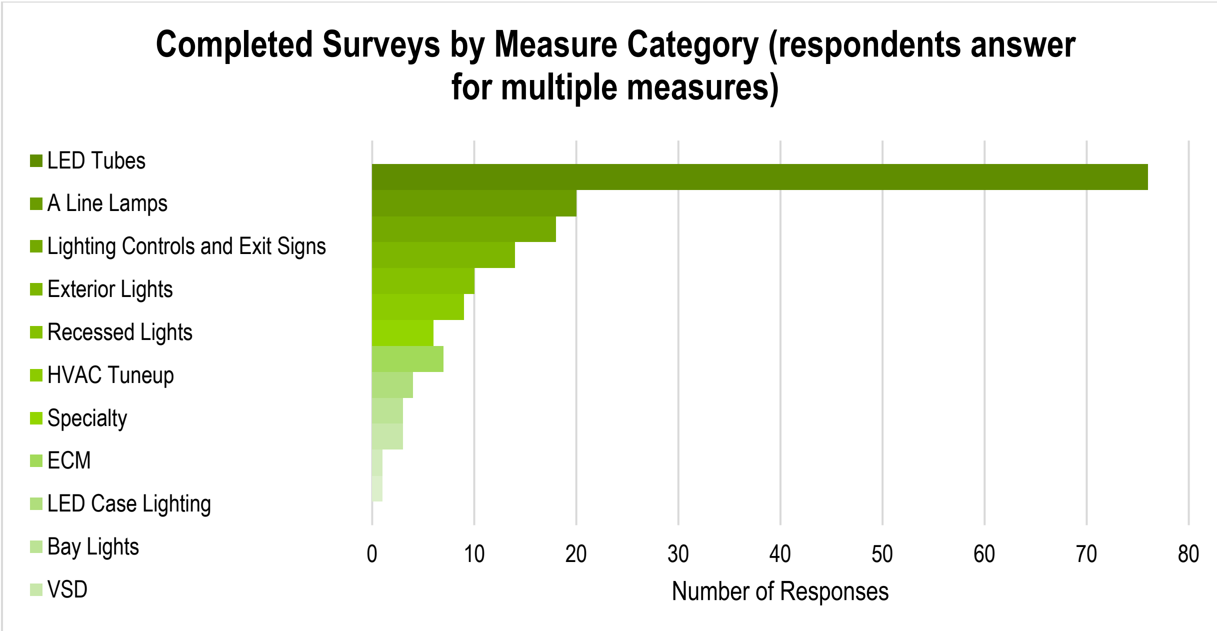
Stratum	Energy Realization Rate	Summer Peak Demand Realization Rate	Winter Peak Demand Realization Rate
Lighting Large	104%	88%	108%
Lighting Medium	106%	96%	99%
Lighting Small	107%	104%	87%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**105%**	**99%**	**99%**

Source: Guidehouse Engineering Review

3.3.5 In-Service Rates (ISR)

Guidehouse analyzed the responses to the virtual verification survey to identify the verified quantities of equipment installed. Guidehouse calculated the ISR as a ratio between the findings from the virtual verification and the quantities reported in the program-tracking databases. As seen in Figure 3-2, Guidehouse received responses to questions representing the majority of program measure categories.

Figure 3-2 Survey Responses by Measure Category



Source: Guidehouse Virtual Verification

Table 3-15 shows the reported and verified quantities by stratum as collected from the virtual verification survey. Although the number of completed virtual assessments was slightly lower than Guidehouse' s target, this did not impact the precision goals of the evaluation. This is because in-service rates (ISR) at the site level were still extremely high within the sample group, with a 96% realization rate ISR from the survey alone. A table of ISR by stratum can be seen below in Table 3-16.

Table 3-15 Response Summary by Stratum

Stratum	Sample Size	Sample Reported Quantity	Sample Verified Quantity
Lighting Large	3	1,039	965
Lighting Medium	9	2,549	2,546
Lighting Small	53	2,288	2,273
HVAC	14	40	40
Refrigeration	11	63	63
Total	**90**	**5,979**	**5,887**

Source: Guidehouse Virtual Verification

Table 3-16 Verification Energy Realization Rate ISR

Stratum	ISR
Lighting Large	85%
Lighting Medium	100%
Lighting Small	100%
HVAC	100%
Refrigeration	100%
Total	**96%**

Source: Guidehouse Virtual Verification

As shown in Table 3-17 below, the ISR for each measure varied from 29% to 100%. The high/low bay lights measure had the lowest ISR of 29% while the rest of the measures had ISR between 93% and 100%. 11 out of the 13 measure categories had an ISR between 99% and 100%.

Table 3-17 Virtual Verification In-Service Rates Findings

Measure	ISR
Specialty Lamps	100%
LED Tubes	100%
Tune-up	100%
Bay Lights	29%
Lighting Controls and Exit Signs	99%
A-Line Lamps	93%
Exterior Lights	100%
Recessed Lights	99%
VSD	100%
De-lamping	100%
Anti-Sweat Heaters	100%
ECM	100%
LED Case Lighting	100%

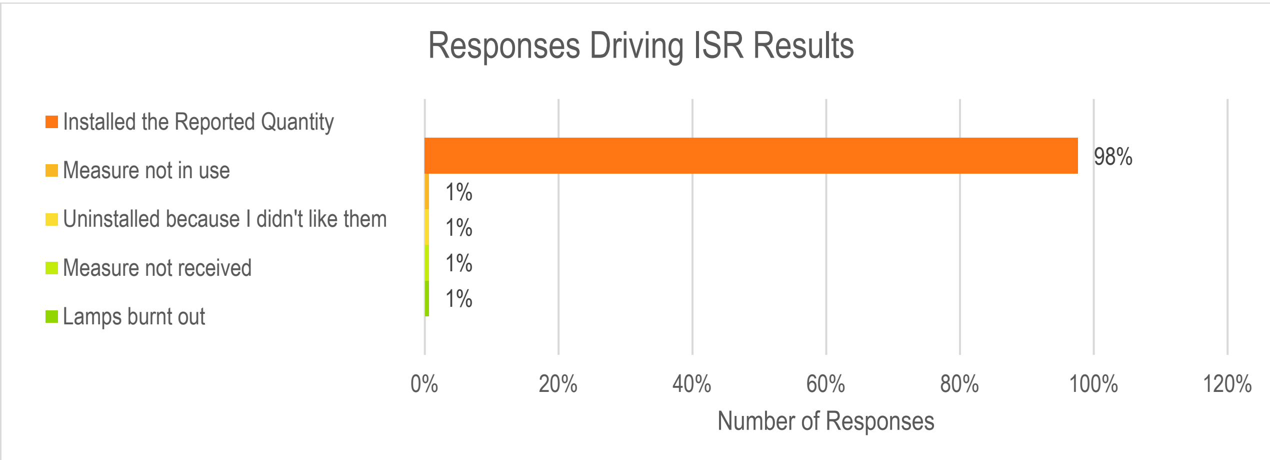
Source: Guidehouse Virtual Verification

**90 virtual verification surveys were completed, with respondents answering questions about multiple measures*

The majority of respondents (98%) reported that they installed the quantity of their measure that was reported in the program tracking data, as shown in Figure 3-3. Four percent of the respondents said that the quantities reported in the program tracking data for their measure were either no longer installed or were never installed. One percent of respondents said the measure is no longer in use, with no further explanation. One percent of respondents said they uninstalled the measure because they didn't like it. One percent said they never received the measure and the last 1% said their lamps burnt out, so they are no longer installed.

Overall, the ISR values are high and indicate the program is accurately tracking installed measures. Additionally, even though the ISRs decreased for some measures, overall energy savings increased through the application of HVAC interactive effects that were added in during the engineering review. The lighting large strata was the only strata that saw an overall decrease in energy savings due to the ISR.

Figure 3-3 Responses Driving ISR Results



Source: Guidehouse Virtual Verification

3.1 Verified Realization Rates based on ISR and ER

This section presents the overall realization rates based on verified gross savings, separated out by jurisdiction. This process includes merging the realization rates calculated based on the engineering review and in-service rates from the virtual verification assessments.

Table 3-18 presents the overall realization rates for DEC, and Table 3-20 presents the DEP overall realization rates. Table 3-19 and Table 3-21 present the realization rates by end use for DEC and DEP respectively. As mentioned in earlier sections, the virtual verification assessments were used to determine in-service rates (ISRs) for each category. Guidehouse calculated separate impacts using an engineering review (ER) process that included applying algorithms from the New York and Pennsylvania TRMs and measure characteristics from the program tracking data. The total realization rates were obtained using both the verified quantity from the surveyed customers and the engineering review calculations. The ER energy realization rate was 105% for DEC and DEP and the ISRs was 96%.

These realization rates were impacted by the interactive effects in the engineering review calculations. For both programs, these interactive effects increased the verified savings above the reported savings, and the ISR from the virtual verification decreased the verified savings slightly to bring both realization rates to their final values of 100% and 101%. Figure 3-4 and Figure 3-5 show how each calculation method impacted the realization rate for each stratum, as well as the jurisdictions' overall realization rate.

Table 3-18 Energy Installation Rate by Strata – DEC

Stratum	ER	ISR	Total Energy Realization Rate
Lighting Large	105%	85%	89%
Lighting Medium	106%	100%	106%
Lighting Small	106%	100%	106%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**105%**	**96%**	**100%**

Source: Guidehouse analysis, values subject to rounding.

Table 3-19 Energy Installation Rate by End Use – DEC

End Use	ER	ISR	Total Energy Realization Rate
Lighting Large	106%	96%	101%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**105%**	**96%**	**100%**

Source: Guidehouse analysis, values subject to rounding.

Table 3-20. Energy Realization Rate by Strata – DEP

Stratum	ER	ISR	Total Energy Realization Rate
Lighting Large	104%	85%	89%
Lighting Medium	106%	100%	106%
Lighting Small	107%	100%	107%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**105%**	**96%**	**101%**

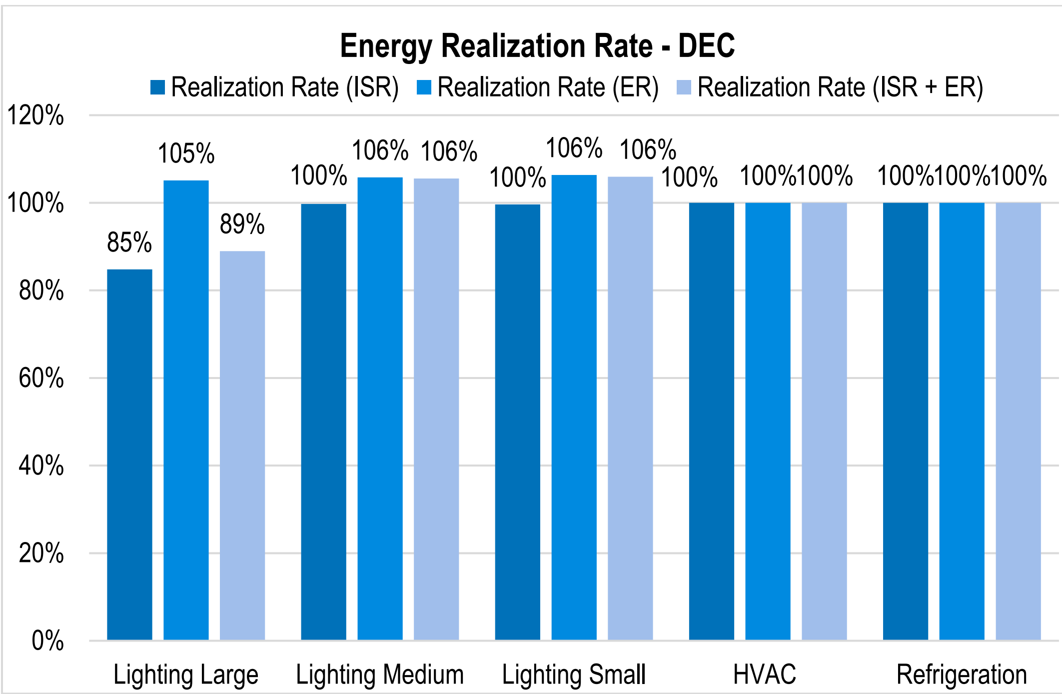
Source: Guidehouse analysis, values subject to rounding.

Table 3-21 Energy Installation Rate by End Use – DEP

End Use	ER	ISR	Total Energy Realization Rate
Lighting	106%	96%	101%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**105%**	**96%**	**101%**

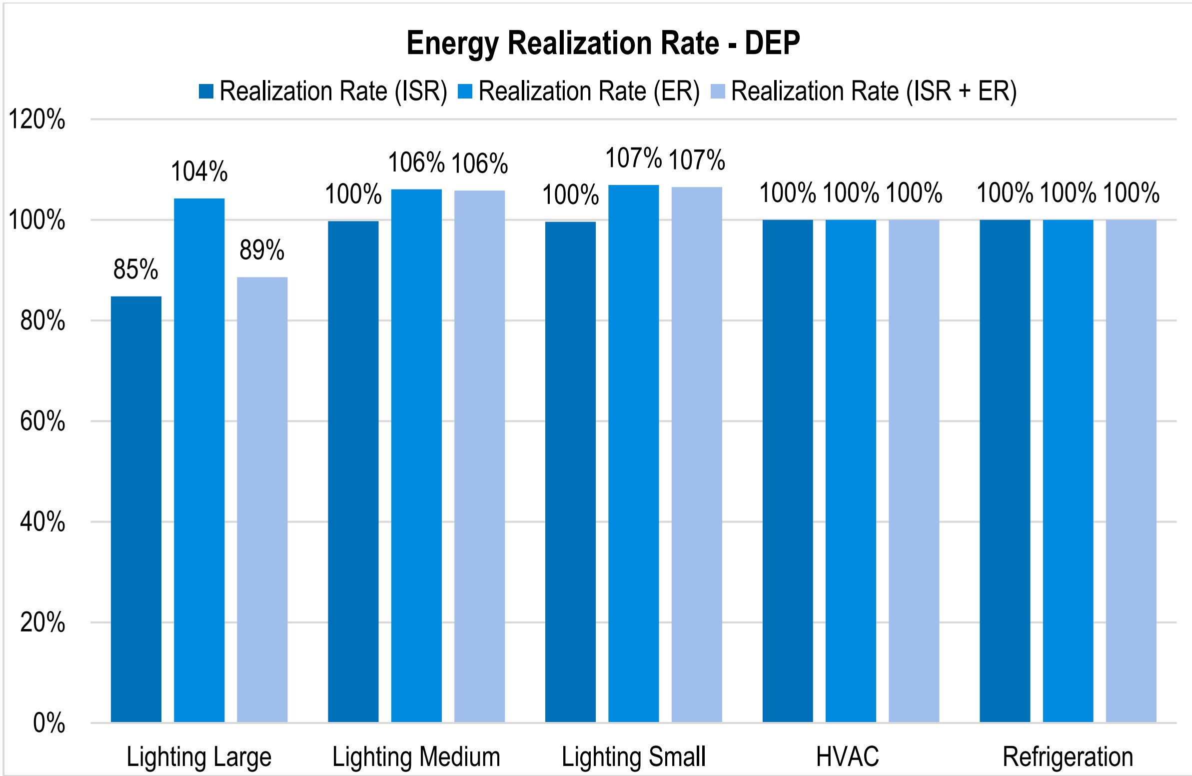
Source: Guidehouse analysis, values subject to rounding.

Figure 3-4 Comparison of Energy Savings Realization Rates by Strata - DEC



Source: Guidehouse analysis, values subject to rounding.

Figure 3-5 Comparison of Energy Savings Realization Rates by Strata – DEP



Source: Guidehouse analysis, values subject to rounding.

The summer and winter peak overall realization rates are shown in the tables below, broken out by jurisdiction. The in-service rates for DEC and DEP demand savings were relatively high at 99% for both summer and winter. The ER realization rates for summer and winter peak are impacted by the HVAC interactive effects and coincidence factors (summer and winter).The total realization rate combines these two verification savings methods. Table 3-22 to Table 3-29 below lay out the jurisdictions' realization rates by season, strata and end use.

For the DEC jurisdiction, the overall summer demand realization rate is 99%. This is because the interactive effects and summer coincidence factors increased or held the realization rate close to 100% while the verified quantities significantly reduced the Lighting Large realization rate, so the factors balanced each other out in the final realization rate. The jurisdiction's overall winter demand realization rate was slightly lower at 98% due to a stronger impact on the Lighting Small strata in addition to the summer realization rate's reasoning, resulting in an overall winter peak realization rate of 98%. Figure 3-6 and Figure 3-8 show how each calculation method impacted the summer and winter realization rate for each of DEC's stratum, respectively.

The DEP jurisdiction has an overall summer demand realization rate of 99% because the interactive effects, summer coincidence factors, and verified quantities once again balanced one another out. The 99% comes from those interactive effects and coincidence factors having a slightly higher influence on the realization rates than the verified quantities. The jurisdiction's overall winter demand realization rate was 98% because the winter demand coincidence factors decreased the Lighting strata's realization rates, producing a slightly lower overall winter peak realization rate. Figure 3-7 and Figure 3-9 show how the calculation methods impacted DEP's summer and winter realization rate for each stratum, respectively.

Table 3-22 Summer Peak Demand Realization Rates by Strata – DEC

Stratum	ER	ISR	Total Summer Demand Realization Rate (ER +ISR)
Lighting Large	97%	83%	80%
Lighting Medium	96%	100%	96%
Lighting Small	101%	100%	101%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**100%**	**99%**	**99%**

Source: Guidehouse analysis, values subject to rounding.

Table 3-23 Summer Peak Demand Realization Rates by End Use – DEC

Stratum	ER	ISR	Total Summer Demand Realization Rate (ER +ISR)
Lighting	98%	96%	93%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**100%**	**99%**	**99%**

Source: Guidehouse analysis, values subject to rounding.

Table 3-24 Summer Peak Demand Realization Rates by Strata - DEP

Stratum	ER	ISR	Total Winter Demand Realization Rate (ER +ISR)
Lighting Large	88%	83%	73%
Lighting Medium	96%	100%	96%
Lighting Small	104%	100%	104%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**99%**	**99%**	**99%**

Source: Guidehouse analysis, values subject to rounding.

Table 3-25 Summer Peak Demand Realization Rates by End Use – DEP

End Use	ER	ISR	Total Summer Demand Realization Rate (ER +ISR)
Lighting	97%	96%	93%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**99%**	**99%**	**99%**

Source: Guidehouse analysis, values subject to rounding.

Table 3-26 Winter Peak Demand Realization Rates by Strata – DEC

Stratum	ER	ISR	Total Winter Demand Realization Rate (ER +ISR)
Lighting Large	98%	83%	81%
Lighting Medium	97%	100%	97%
Lighting Small	93%	100%	93%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**99%**	**99%**	**98%**

Source: Guidehouse analysis, values subject to rounding.

Table 3-27 Winter Peak Demand Realization Rates by End Use – DEC

End Use	ER	ISR	Total Winter Demand Realization Rate (ER +ISR)
Lighting	96%	96%	91%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**99%**	**99%**	**98%**

Source: Guidehouse analysis, values subject to rounding

Table 3-28 Winter Peak Demand Realization Rates by Strata – DEP

Stratum	ER	ISR	Total Winter Demand Realization Rate (ER +ISR)
Lighting Large	94%	83%	79%
Lighting Medium	95%	100%	95%
Lighting Small	91%	100%	90%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**99%**	**99%**	**98%**

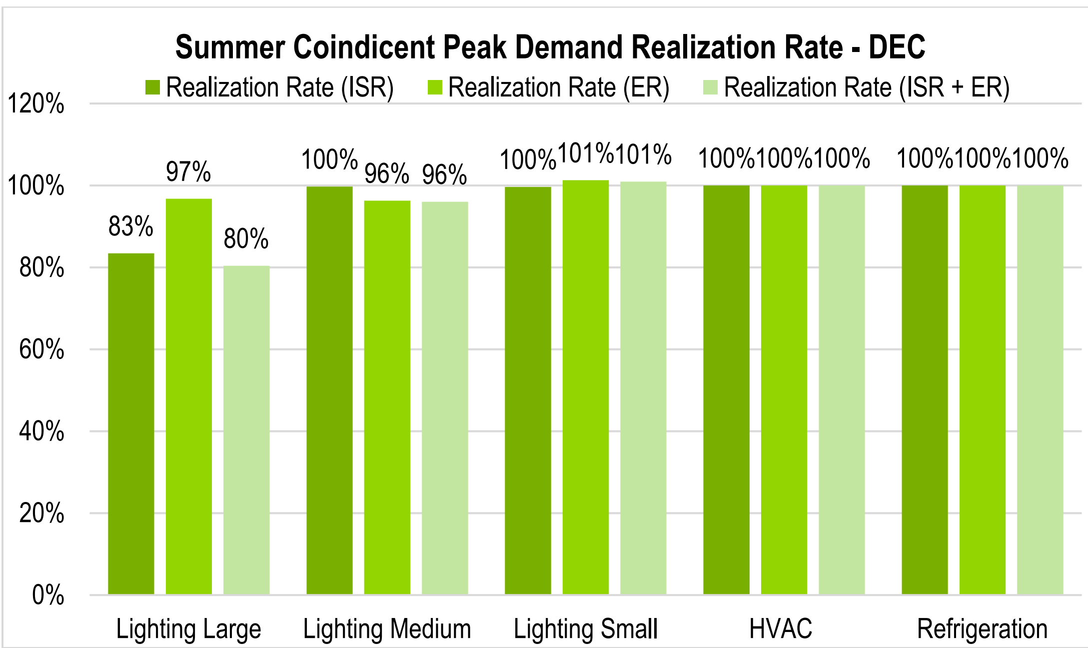
Source: Guidehouse analysis, values subject to rounding.

Table 3-29 Winter Peak Demand Realization Rates by End Use – DEP

End Use	ER	ISR	Total Winter Demand Realization Rate (ER +ISR)
Lighting	93%	96%	89%
HVAC	100%	100%	100%
Refrigeration	100%	100%	100%
Total	**99%**	**99%**	**98%**

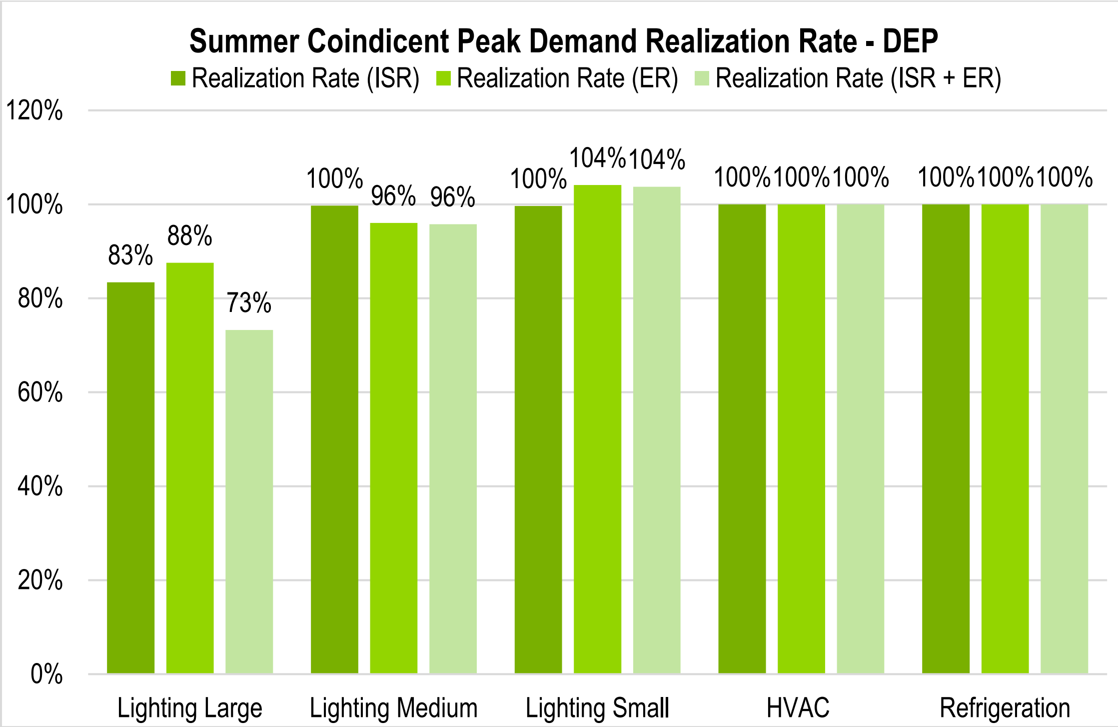
Source: Guidehouse analysis, values subject to rounding

Figure 3-6 Comparison of Summer Peak Demand Savings Realization Rates by Strata - DEC



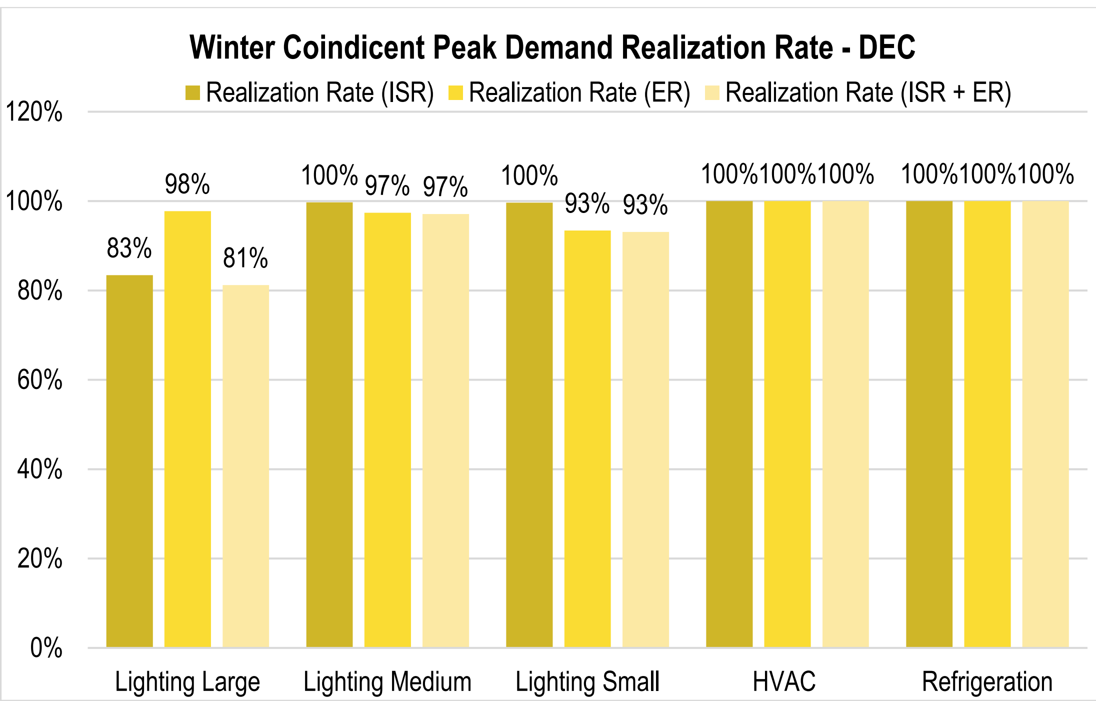
Source: Guidehouse analysis, values subject to rounding.

Figure 3-7 Comparison of Summer Peak Demand Savings Realization Rates by Strata – DEP



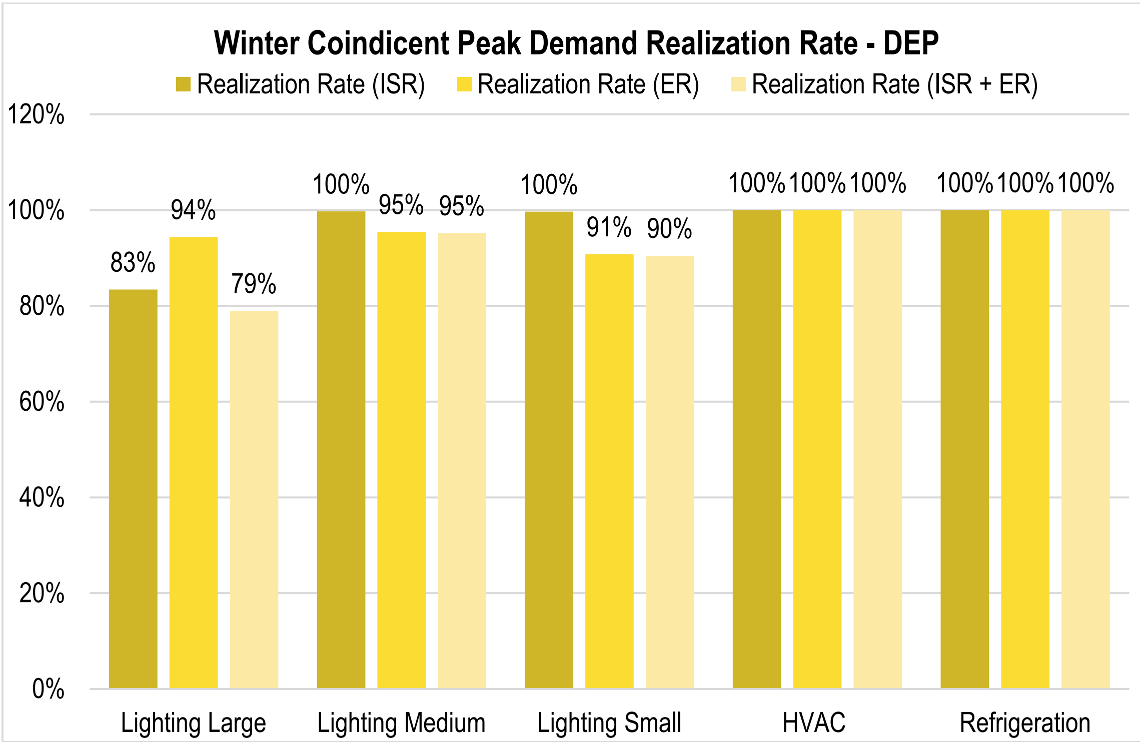
Source: Guidehouse analysis, values subject to rounding.

Figure 3-8 Comparison of Winter Peak Demand Savings Realization Rates by Strata - DEC



Source: Guidehouse analysis, values subject to rounding.

Figure 3-9 Comparison of Winter Peak Demand Savings Realization Rates by Strata – DEP



Source: Guidehouse analysis, values subject to rounding.

4. Process Evaluation

The purpose of the process evaluation is to understand, document and provide feedback on the program implementation components and customer experience.

4.1 Process Methodology

The evaluation team conducted in-depth interviews with SBES Program staff and implementation contractor (IC) staff as well as conducting customer participant surveys, as noted previously. The process findings summarized in this document are based on the results of:

- Participant surveys with 97 program participants.
- Program review, including interviews with the Duke Energy Program Manager and the IC staff; and a review of the program documentation.

Due to the COVID-19 pandemic, Guidehouse performed both the impact and process evaluation activities using online survey platforms, rather than prior evaluations where onsite field verification was used for the impact assessment. To accomplish the virtual assessments, Guidehouse randomly divided the population of participants into separate groups to receive invitations for process and impact-related surveys, such that participants would not be inundated with multiple requests. Email addresses were also not available for all participants. The response status of all process survey participants is outlined in Table 4-1.

Table 4-1. Response Status – Process Survey

Status	Number of Responses
Email Failed	325
Email Hard Bounce	11
Email Not Sent	35
Email Opened	1
Email Sent	536
Email Soft Bounce	15
Survey Finished	97
Survey Partially Finished	25
Survey Started	300
Total	**1,345**

Source: Guidehouse

4.2 Participant Survey

Guidehouse designed the surveys to ask specific questions about the program measure categories. The measure families as a part of this evaluation period are lighting, HVAC, and refrigeration. Participants received an email invitation to complete an online survey that was designed to collect detailed information about program experience and satisfaction. The survey was 15-20 minutes long and participants received an incentive of $10-$40 based on the timing of participation.

The survey effort successfully completed surveys with 97 customers to assess:

- Participation experience and satisfaction
- Participant channel and awareness
- Feedback about program components
- Program improvements
- Program benefits and challenges
- Satisfaction associated with implementation contractors
- Free-ridership, Inside and Outside Spillover

4.3 Program Review

The evaluation team designed the program review task to understand changes and updates to the program design, implementation and energy and demand savings assumptions. Guidehouse reviewed program literature and Duke Energy's website, interviewed the Duke Energy program team, and had several conversations with Lime Energy regarding the energy and demand savings included in the program tracking database. The key program characteristics include the following:

- **Program Design** – The SBES program is designed to offer high incentives (up to 80 percent of the total cost of the project) on efficient equipment to reduce energy use and peak demand. It specifically targets small business customers that are difficult to reach and often do not pursue energy efficiency on their own.
- **Program Implementation** – A third-party contractor, Lime Energy administers the SBES program on Duke Energy's behalf. The IC handles all aspects of the program, including customer recruitment, facility assessments, equipment installation (through independent installers contracted by the IC), and payment and incentive processing. The IC reports energy and peak demand reduction estimates to Duke Energy. The IC has continued to refine their processes to ensure that savings estimates are reasonable and customer complaints are handled in a timely manner.
- **Incentive Model** – The IC offers potential participants a recommended package of energy efficiency measures along with equipment pricing and installation costs. The incentive is proportional to estimated energy savings and can be as high as 80 percent of the total cost of the project.
- **Savings Estimates** – Energy and peak demand savings are estimated on a per-measure basis, considering existing equipment, proposed equipment, and operational characteristics unique to each customer.

4.4 Participant Survey Findings

The following sections detail the process findings from all relevant sources of program information, including interviews with Duke Energy and IC staff and the results of the customer surveys, organized by topic. The feedback received indicates that the SBES Program serves Duke Energy's customers well and represents an important component of Duke Energy's portfolio of business energy efficiency programs. Key findings are as follows:

- A majority of SBES participants were satisfied with the program. On a scale of 0 to 10, where 0 indicates “not satisfied at all” and 10 indicates “extremely satisfied”:
    - 82 percent of respondents indicated 8-10 for satisfaction with overall program experience.
    - 90 percent of respondents indicated 8-10 for satisfaction with Lime Energy
- Sixty-six percent of respondents stated that equipment offered through the program allowed them to upgrade all of the equipment they wanted at the time.
- Eighty-two percent of respondents mentioned that they are extremely likely to participate in this program or a similar Duke Energy program again.
- Sixty-three percent of respondents mentioned that that their attitude towards Duke Energy is more positive after participating in the program.
- Over Fifty percent of respondents stated that they had recommended the program to other businesses. On average, respondents recommended the program to an average of three other businesses.

The following sections details the process findings and addresses the following topics:

1. Overall customer experience.
2. Implementation contractor.
3. Program challenges.
4. Program benefits.
5. Suggested improvements.

4.4.1 Customer Experience

Customers reported very high satisfaction with their overall program experience as shown in Figure 4-1. Only four percent of the participants rated their overall satisfaction as less than 5, and 82% rated their satisfaction as an 8, 9, or 10.

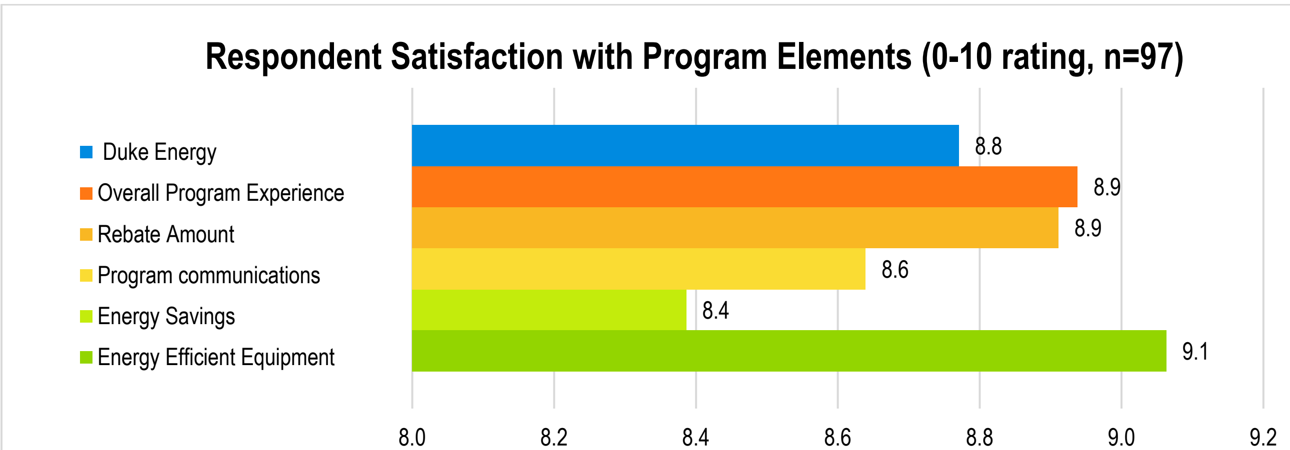
Guidehouse identified some correlations with overall program satisfaction that provide insight into drivers of high satisfaction:

- Customers with overall high program satisfaction were more satisfied on average with every program element, but the difference was particularly noticeable on two program elements:
    - **The energy savings resulting from the new equipment**: highly satisfied customers gave an average rating of 9.4 vs 4.9 among less satisfied customers. Five respondents mentioned that they have not seen any significant savings from the new equipment which is why they provided a lower rating.
    - **Program communications**: highly satisfied customers gave an average rating of 9.4 vs 5.7 among less satisfied customers. Three respondents mentioned that there could be clearer communication between their internal team and Duke Energy.

Around **63%** respondents mentioned that their attitude towards Duke Energy is more positive after participating in the program. These findings indicate both high program satisfaction and an opportunity to continue to market energy efficiency programs to previous participants to achieve deeper savings.

Participation in the SBES program generally served to improve customers' satisfaction with Duke Energy overall.

Figure 4-1. Program Satisfaction (n=97)



Source: Guidehouse analysis

4.4.2 Implementation Contractor

As mentioned in the previous section, customers are highly satisfied with the services provided by the implementation contractor, Lime Energy and that high satisfaction translates to high overall program satisfaction.

Nearly all (97%) said that the proposal was clear about the scope of work to be performed, and 99% of customers said that the proposal was clear about their share of project costs.

A large majority (89%) of customers said they knew who to contact if they had any questions or concerns about their project or any aspect of the program.

Respondents report high level of satisfaction with all different aspects of project implementation from the first assessment of energy efficiency at the project site to post installation clean-up as shown in Figure 4-2. 90% of respondents rated their satisfaction with different aspects of the project implementation at an 8 or higher, on a scale of 0 to 10.

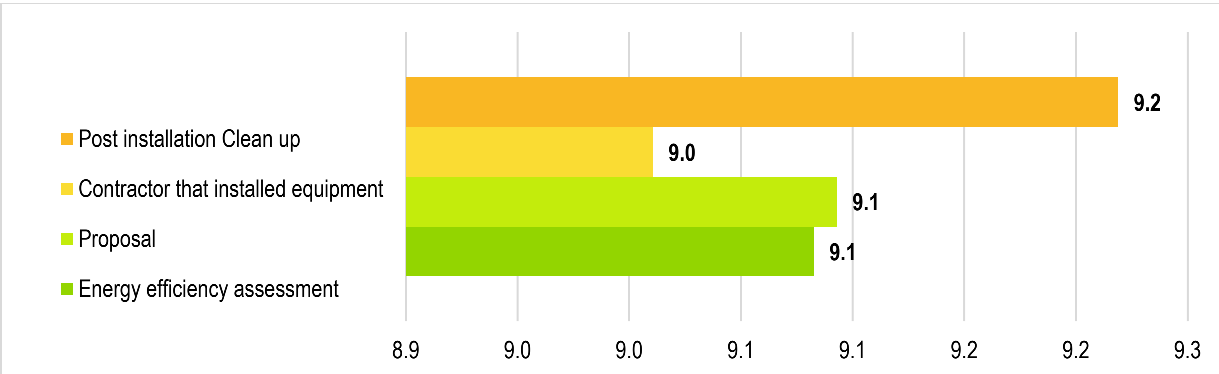
Some verbatim responses from the respondents supporting the high satisfaction:

"The program was excellent and allowed me to afford
the upgrade of lighting in my store. It has cut my monthly bill by every bit of the projection I was given. I am very thankful. Thank you!"

"They worked very well during COVID19 restrictions"

"It was fantastic. I recommended this service to a friend who is also a business owner and he did it as well and was equally thrilled."

Figure 4-2. Implementer and Contractor Satisfaction (n=97)



Source: Guidehouse analysis

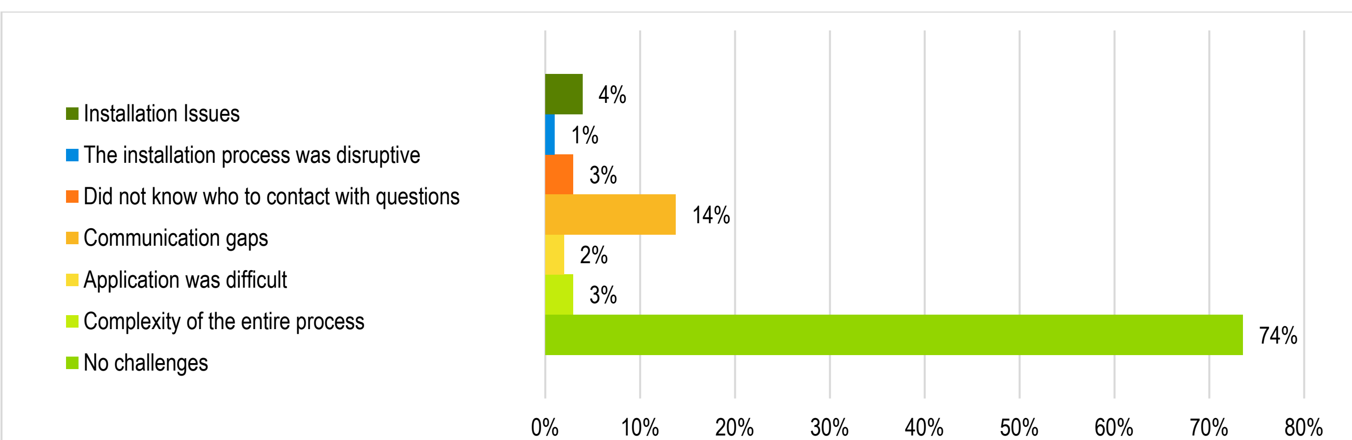
Customers are highly satisfied with the energy efficiency assessment conducted by Lime Energy as well as the proposal prepared by Lime Energy, with 90% rating their satisfaction as an 8 or higher for both program elements.

A similar percentage of customers, 89% rated their satisfaction with the inspection as an 8 or higher with the post installtion cleanup conducted by Lime Energy. Only one customer rated this aspect less than 5 out of 10.

4.4.3 Program Challenges

As seen in Figure 4-3, almost 74% of respondents did not experience any challenges with different program components. Fourteen respondents mentioned that there were communication gaps between Duke Energy, the implementation team and their internal team. Four respondents mentioned that installations of measures was not correct or incomplete. Five respondents mentioned that the application was difficult, and the process was too complex. Only one respondent mentioned that that the installation process was disruptive to their work.

Figure 4-3:Program Challenges/Drawbacks, (n=97)



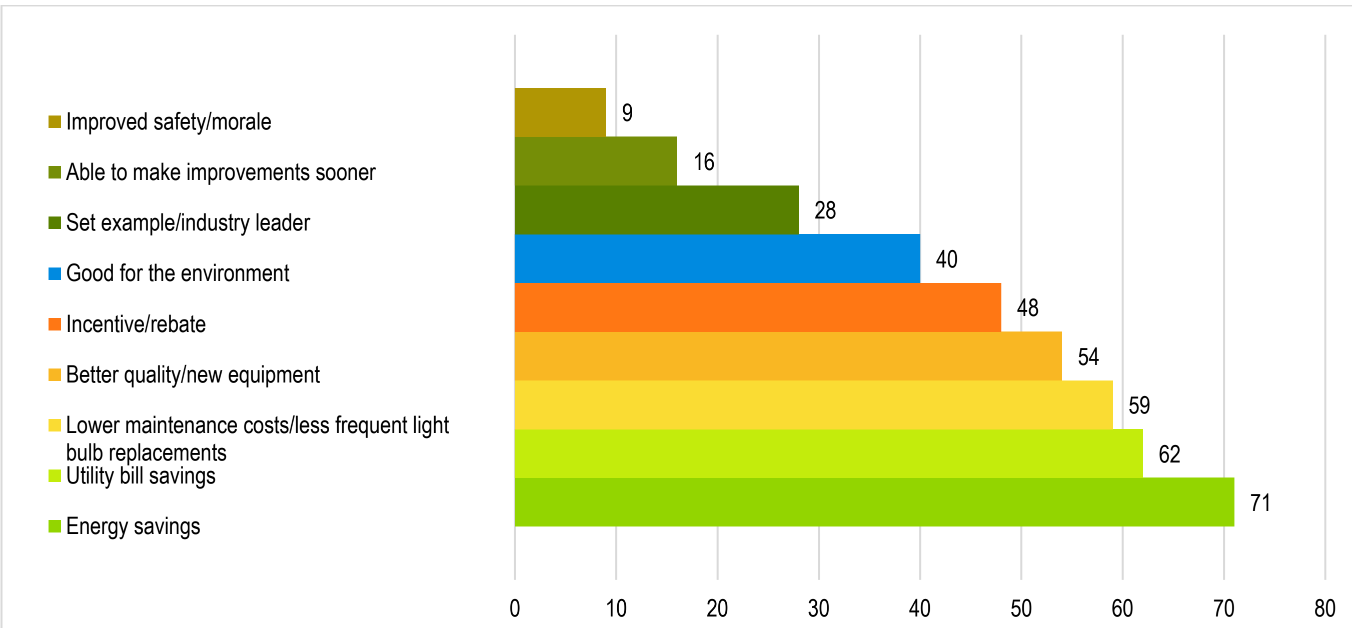
Source: Guidehouse analysis

4.4.4 Program Benefits

As shown in Figure 4-4, a majority of customers identified the energy savings and associated utility bill savings as the top benefit of participating in the SBES program. Better quality equipment and lower maintenance hassle were also significant benefits to many customers. Another important survey finding was that 66 percent of customers stated that the equipment offered through the program allowed them to upgrade all of the equipment they wanted at the time of the project, rather than piecing together the upgrades in multiple phases.

Majority of respondents (82%) mentioned that they are extremely likely to participate in this program or a similar Duke Energy program again.

Figure 4-4:Program Benefits, (n=97)

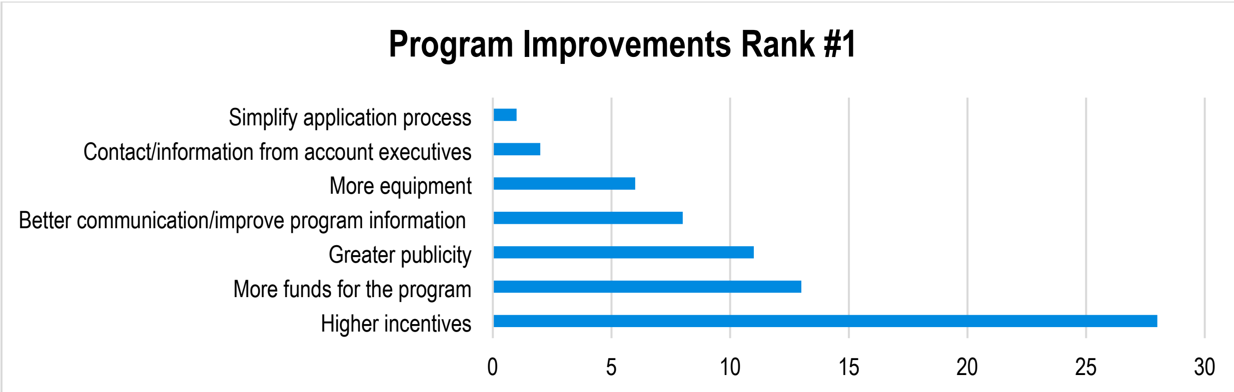


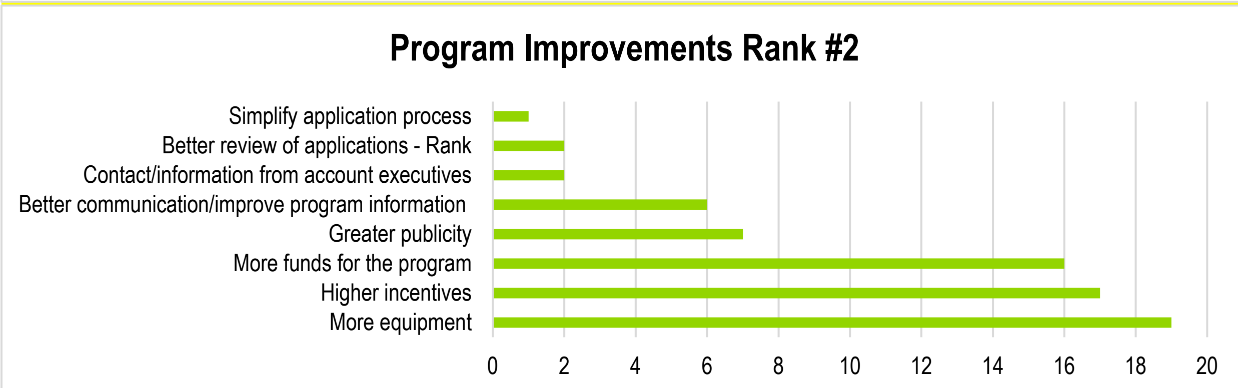
Source: Guidehouse analysis

4.4.5 Suggested Improvements

Overall program satisfaction is very high, but some customers had minor complaints or identified drawbacks of the program. Guidehouse asked respondents to rank the top 3 program improvements they would like to see in future programs. The two charts in Figure 4-5 show the different program improvements and how they were ranked by the respondents. As expected, higher incentive was ranked as the #1 program improvement requested by the majority of the respondents. More choice of equipment/measures and more funds for the program was the second and third highest ranked improvement requested by majority of the respondents.

Figure 4-5:Program Improvements





Source: Guidehouse analysis

5. Net-to-Gross Analysis

The impact analysis described in the preceding sections addresses *gross program savings*, based on program records, modified by an engineering review and virtual verification of measure installations. *Net savings* incorporate the influence of free ridership (savings that would have occurred even in the absence of the program) and spillover (additional savings influenced by the program, but not captured in program records) and are commonly expressed as a NTG ratio applied to the verified gross savings values.

Table 5-1 shows the results of Guidehouse' s NTG analysis. In aggregate, the NTG results are very similar to findings from the prior evaluation.

Table 5-1. 2019-2020 Net-to-Gross Results

	Lighting	Refrigeration	HVAC	Lighting, HVAC & Refrigeration
Estimated Free Ridership	0.06	0.14	0.01	0.06
Estimated Spillover	0.08	0.08	0.06	0.07
Estimated NTG	**1.02**	**0.94**	**1.05**	**1.02**

Source: Guidehouse analysis, totals subject to rounding.

This report provides definitions, methods, and further detail on the analysis and findings of the net savings assessment. The discussion is divided into the following three sections:

- Defining free ridership, spillover, and net-to-gross (NTG) ratio
- Methods for estimating free ridership and spillover
- Results for free ridership, spillover, and NTG ratio

5.1 Defining Free Ridership, Spillover, and Net-to-Gross Ratio

The methodology for assessing the energy savings attributable to a program is based on a NTG ratio. The NTG ratio has two main components: free ridership and spillover.

Free ridership is the share of the gross savings that is due to actions participants would have taken even in the absence of the program (i.e., actions that the program did not induce). This is meant to account for naturally occurring adoption of energy efficient technology. The SBES program covers a range of energy efficient lighting and refrigeration measures and is designed to move the overall market for energy efficiency forward. However, it is likely that some participants would have wanted to install, for various reasons, some high efficiency equipment (possibly a subset of those installed under the SBES Program), even if they had not participated in the program or been influenced by the program in any way.

Spillover captures program savings that go beyond the measures installed through the program. Spillover adds to a program's measured savings by incorporating indirect (i.e., non-incentivized) savings and effects that the program has had on the market above and beyond the directly incentivized or directly induced program measures.

Total spillover is a combination of non-reported actions to be taken at the project site itself (*within-facility spillover*) and at other sites (*outside-facility spillover*). Each type of spillover is meant to capture a different aspect of the energy savings caused by the program, but not included in program records.

The **overall NTG ratio** accounts for both the net savings at participating projects and spillover savings that result from the program but are not included in the program's accounting of energy savings. When the NTG ratio is multiplied by the estimated gross program savings, the result is an estimate of energy savings that are attributable to the program (i.e., savings that would not have occurred without the program).

The basic equation is shown in Equation 1.

Equation 1. Net-to-Gross Ratio

$$NTG = 1 - \text{Free Ridership} + \text{Spillover}$$

The underlying concept inherent in the application of the NTG formula is that *only* savings caused by the program should be included in the final net program savings estimate but that this estimate should include *all* savings caused by the program.

5.2 Methods for Estimating Free Ridership and Spillover

5.2.1 Estimating Free Ridership

Data to assess free ridership were gathered through the self-report method—a series of survey questions asked of SBES participants. Free ridership was asked in both direct questions, which aimed at obtaining respondent estimates of the appropriate free ridership rate that should be applied to them, and in supporting or influencing questions, which could be used to verify whether the direct responses are consistent with participants' views of the program's influence.

Respondents were asked three categories of program-influence questions:

- **Likelihood:** to estimate the likelihood that they would have incorporated lighting measures "of the same high level of efficiency," if not for the assistance of the SBES Program. In cases where respondents indicated that they might have incorporated some, but not all, of the measures, they were asked to estimate the share of measures that would have been incorporated anyway at high efficiency. This flexibility in how respondents could conceptualize and convey their views on free ridership allowed respondents to give their most informed response, thus improving the accuracy of the free-ridership estimates.
- **Prior planning:** to further estimate the probability that a participant would have implemented the measures without the program. Participants were asked the extent to which they had considered installing the same level of energy-efficient lighting prior to participating in the program. The general approach holds that if customers were not definitively planning to install all of the efficiency lighting prior to participation, then the program can reasonably be credited with at least a portion of the energy savings resulting from the high-efficiency lighting. Strong free ridership is reflected by those participants who indicated they had already allocated funds for the purchase and selected the lighting and an installer.

- **Program importance:** to clarify the role that program components (e.g., information, incentives) played in decision-making, and to provide supporting information on free ridership. Responses to these questions were analyzed for each respondent, not just in aggregate, and were used to identify whether the direct responses on free ridership were consistent with how each respondent rated the “influence” of the program.

Free-ridership scores were calculated for each of these categories[6] and then averaged and divided by 100 to convert the scores into a free-ridership percentage. Next, a timing multiplier was applied to the average of the three scores to reflect the fact that respondents indicating that their energy efficiency actions would not have occurred until far into the future may be overestimating their level of free ridership. Participants were asked, without the program, when they would have installed the equipment. Respondents who indicated that they would not have installed the lighting for at least two years were not considered free riders and had a timing multiplier of 0. If they would have installed at the same time as they did, they had a timing multiplier of 1; within one year, 0.67; and between one and two years, 0.33. Participants were also asked when they learned about the financial incentive; if they learned about it after the equipment was installed, then they had a free ridership ratio of 1.

5.2.2 Estimating Spillover

The basic method for assessing participant spillover (both within-facility and outside-facility) was an approach that asked a set of questions to determine the following:

- **Whether spillover exists at all.** These were yes/no questions that asked, for example, whether the respondent incorporated energy efficiency measures or designs that were not recorded in program records. Questions related to extra measures installed at the project site (within-facility spillover) and to measures installed in non-program projects (outside-facility spillover) within the service territory.
- **The share of those savings that could be attributed to the influence of the program.** Participants were asked if they could estimate the energy savings from these additional extra measures to be less than, similar to, or more than the energy savings from the SBES program equipment.

[6] Scores were calculated by the following formulas:

» Likelihood: The likelihood score is 0 for those that “definitely would NOT have installed the same energy efficient measure” and 1 for those that “definitely WOULD have installed the same energy efficient measure.” For those that “MAY HAVE installed the same energy efficient measure,” the likelihood score is their answer to the following question: “On a scale of 0 to 10 where 0 is DEFINITELY WOULD NOT have installed and 10 is DEFINITELY WOULD have installed the same energy efficient measure, can you tell me the likelihood that you would have installed the same energy efficient measure?” If more than one measure was installed in the project, then this score was also multiplied by the respondent’s answer to what share they would have done.

» Prior planning: If participants stated they had considered installing the measure prior to program participation, then the prior planning score is the average of their answers to the following two questions: “On a scale of 0 to 10, where 0 means you ‘Had not yet planned for equipment and installation’ and 10 means you ‘Had identified and selected specific equipment and the contractor to install it’, please tell me how far along your plans were” and “On a scale of 0 to 10, where 0 means ‘Had not yet budgeted or considered payment’ and 10 means ‘Already had sufficient funds budgeted and approved for purchase’, please tell me how far along your budget had been planned and approved.”

» Program importance: This score was calculated by taking the maximum importance on a 0 to 10 scale of the four program importance questions and subtracting from 10 (i.e., the higher the program importance, the lower the influence on free ridership).

- **Program importance.** Estimates were derived from a question asking the program importance, on a 0 to 10 scale. Participants were also asked how the program influenced their decisions to incorporate additional energy efficiency measures.

If respondents said no, they did not install additional measures, they received a zero score for spillover. If they said yes, then the individual's spillover was estimated as the self-reported savings as a share of project savings, multiplied by the program-influence score. Then, a 50 percent discount was applied to reflect uncertainty in the self-reported savings and divided by 10 to convert the score to a spillover percentage.

5.2.3 Combining Results across Respondents

The evaluation team determined free ridership and spillover estimates for each of the following:

- Individual respondents, by evaluating the responses to the relevant questions and applying the rules-based approach discussed above
- Measure categories:
    - For free ridership: by taking the average of each respondent's score within each category, weighted by the respondent's share of savings within the measure category
    - For spillover: by taking the sum of the individual spillover results (in kWh) for each measure category and dividing by the category's total program savings in the sample
- The program as a whole, by combining measure-level results:
    - For free ridership: measure category results were subsequently weighted by each category's share of total program savings
    - For spillover: similarly, measure category results were subsequently weighted by each category's share of total program savings

5.3 Results for Free Ridership, Spillover, and Net-to-Gross

This section presents the results of the attribution analysis for the SBES Program. Specifically, results are presented for free ridership and spillover (within-facility and outside-facility), which are used collectively to calculate an NTG ratio.

5.3.1 Review of Data Collection Efforts for Attribution Analysis

Guidehouse conducted 96[7] surveys with SBES participants to estimate free ridership, spillover, and NTG ratios. Table 5-2 shows the number of completions, by measure group.

Table 5-2. Participant Survey Completes by Project Type

Measure Category	Surveys
Lighting	64
Refrigeration	16
HVAC	16
Total	**96**

Source: Guidehouse analysis

5.3.2 Free-Ridership Results

Guidehouse asked participants a series of questions regarding the likelihood, scope, and timing of the investments in energy-efficient lighting if the respondent had not participated in the program. The purpose of the surveys was to elicit explicit estimates of free ridership and perspectives on the influence of the program. Guidehouse estimates free-ridership for the SBES Program at six percent of program-reported savings.

Guidehouse developed the free ridership estimate presented above based on responses to a variety of questions that related to survey respondents' intentions prior to participating in the program and to the influence of the program itself. Below are summaries by scoring component.

Prior Planning: Fifty out of 96 respondents indicated they had **prior plans to install energy efficient** equipment at their facilities before participating in the program. However, only 12 of the 50 respondents indicated their plans were **well-developed** (7 or higher on a scale of 0 to 10) in terms of identifying equipment for installation and 9 out of 28 respondents had budgeted for installing the equipment.

Program Importance: Respondents provided an average rating of 9 out of 10 for how important the financial incentive offered through the SBES program was in **influencing their decision** to upgrade their equipment.

Likelihood: Respondents were asked in the absence of the program, if they would have had at least some of the work done (in terms of both quantity of measures and the efficiency of measures installed). Five respondents indicated they would have installed about **32%** of the same energy efficiency equipment in the absence of the program.

Timing: Without the program, 29 respondents said that they would have installed the measures at the **same time or within 1-2 years, and the remainder would have delayed longer**.

[7]The survey was combined with process and NTG sections. One respondent did not complete the NTG section of the combined survey.

5.3.3 Spillover Results

The SBES Program influenced approximately five percent of participants to install additional energy efficiency measures on-site and influenced two percent of participants to install additional measures at other locations. Based on the survey findings, the evaluation team estimates the overall program spillover to be seven percent of program-reported savings. Participants reported a variety of spillover measures installed, including lighting (most common) and HVAC.

5.3.3.1 Inside Spillover

Table 5-3 shows the inside (within facility) spillover by measure type. The inside spillover for the program was estimated at **six** percent.

Program Importance: 32 out of 96 respondents indicated the program influenced them to install additional measures or change their behavior to be more energy efficient.

Qualified for Spillover: 19 out of the 32 respondents qualified for inside spillover based on information provided.

Spillover Savings Measures: Most respondents indicated retrofits to LED lights but a select few upgraded HVAC equipment like ductless mini split heat pumps and packaged HVAC units due to the program's influence. Their main rationale for not applying for an incentive was lack of awareness of incentives through the program or the measures not qualifying for an incentive through the program.

Table 5-3. Inside Spillover by Measure Type

Measure Family	Inside Spillover
Lighting	5.5%
Refrigeration	7.9%
HVAC	6.0%
Total	**5.7%**

Source: Guidehouse analysis, totals subject to rounding

5.3.3.2 Outside Spillover

Table 5-4 shows the outside (outside facility) spillover by measure type. The outside spillover for the program was estimated at two percent.

Program Importance: Only ten out of 97 respondents indicated the program influenced them to install additional measures or change their behavior to be more energy efficient, but the resulting impacts were relatively small.

Qualified for Spillover: Only five out of the ten respondents qualified for outside spillover based on information provided**.**

Spillover Savings Measures: All respondents contributing to spillover indicated retrofits to LEDs due to the program's influence. Their main rationale for not applying for an incentive was lack of awareness of incentives through the program or the measures not qualifying for an incentive through the program.

Table 5-4. Outside Spillover by Measure Type

Measure Family	Outside Spillover
Lighting	2.3%
Refrigeration	0.0%
HVAC	0.0%
Total	**2.0%**

Source: Guidehouse analysis, totals subject to rounding

5.3.3.3 Total Spillover

Total spillover is the sum of inside and outside spillover. Adding the result of 5.4% for inside spillover and 2.0% for outside spillover, Guidehouse found a total spillover of 7.4%.

5.3.4 Net-to-Gross Ratio

As stated above, the NTG ratio is defined as follows in Equation 2 below.

Equation 2. Net-to-Gross Ratio

$$NTG = 1 - \text{free ridership} + \text{spillover}$$

Using the overall free ridership value of two percent and the overall spillover value of nine percent, the NTG ratio is 1 – 0.06 + 0.07 = 1.02[8]. The estimated NTG ratio of 1.02 implies that for every 100 megawatt-hours (MWh) of realized savings recorded in SBES records, 102 MWh is attributable to the program. Table 5-5 shows the final NTG results.

Table 5-5. SBES Free Ridership, Spillover, and NTG Ratio

	Free Ridership	Spillover	NTG Ratio
SBES Program Total	0.06	0.07	1.02

Source: Guidehouse analysis, totals subject to rounding.

Table 5-6 and Table 5-7 shows the verified net savings after applying the impact realization rate as well as the NTG ratio for energy and demand savings DEC and DEP respectively.

[8] The total is subject to rounding. The weighted average calculation of the overall NTG value is causing the rounding error.

Table 5-6. DEC SBES Reported, Verified Gross and Verified Net Savings

Parameter	Energy (MWh)	Summer Coincident Peak Demand (kW)	Winter Coincident Peak Demand (kW)
Reported Savings	68,413	80,343	80,343
Realization Rate	100%	99%	98%
Verified Gross Savings	68,738	79,256	78,936
Net-to-Gross	102%	102%	102%
Verified Net savings	70,113	80,841	80,515

Source: Guidehouse analysis, totals subject to rounding.

Table 5-7. DEP SBES Reported, Verified Gross and Verified Net Savings

Parameter	Energy (MWh)	Summer Coincident Peak Demand (kW)	Winter Coincident Peak Demand (kW)
Reported Savings	46,571	51,433	51,433
Realization Rate	101%	99%	98%
Verified Gross Savings	46,889	50,696	50,267
Net-to-Gross	102%	102%	102%
Verified Net savings	47,827	51,710	51,272

Source: Guidehouse analysis, totals subject to rounding.

6. Conclusions and Recommendations

Guidehouse' s findings suggest that Duke Energy's SBES program is being delivered and tracked effectively in the DEC and DEP jurisdictions. Customer satisfaction is generally high, and the program measure installations appear to be tracked appropriately. Guidehouse presents the following list of recommendations to help improve program delivery and impacts:

1. **Consider introducing additional equipment choices in the program.** A subset of customers reported that the program was unable to provide all the energy efficiency equipment they wanted. Duke Energy should consider introducing more equipment choices in the program to include outdoor lighting and HVAC measures. This also presents an opportunity for channeling to other Duke Energy programs or education about measures that are not offered through the SBES program.
2. **Increase and improve program communications.** This is the most common challenge or drawback received from participants, indicating that customers were sometimes unclear about the various stages of the program process and did not receive proper communication and guidance from the implementer and/or Duke Energy. Additional education from both Lime Energy and Duke Energy account managers should help customers better understand the program participation process.
3. **Consider using TRM algorithms for HVAC measures.** Lime Energy and Duke Energy developed deemed savings estimates using regional data for HVAC measures. Although the methodology for developing these estimates was accurate, Guidehouse recommends Duke Energy consider using TRM algorithms too and substituting the variables in these algorithms using regional values to estimate savings. This may enhance the transparency of the impact estimates for these measures.
4. **The Program Net-to-Gross Ratio is high**. This indicates that the program is providing a key service to small business customers in helping them manage their energy use.

7. Summary Form

Small Business Energy Saver

Completed EMV Fact Sheet

Description of program

Duke Energy's Small Business Energy Saver Program provides energy efficient equipment to eligible small business customer at up to an 80 percent discount. The program is delivered through an implementation contractor that coordinates all aspects of the program, from the initial audit, ordering equipment, coordinating installation, and invoicing.
The program consists of lighting, HVAC, and refrigeration measures.

- **Lighting measures:** LED lamps and fixtures, LED exit signs, occupancy sensors.
- **Refrigeration measures:** LED case lighting, EC motor upgrades, anti-sweat heater controls,
- **HVAC Measures:** HVAC controls, thermostats, and tune-ups

Evaluation Methodology

The evaluation team used engineering analysis and virtual impact assessments as the primary basis for estimating program impacts. Additionally, online surveys were conducted with participants to assess customer satisfaction and determine a net-to-gross ratio.

Impact Evaluation Details

- **Virtual verification surveys were completed by 90 participants.** Guidehouse designed the virtual impact assessment survey tool to collect data about project and measure characteristics for comparison to tracking records and for engineering analysis.
- **In-Service rates (ISRs) varied by equipment type.** The evaluation team found ISRs ranging from 0.29 to 1.00 depending on the equipment type.
- **Participants achieved an average of 35 MWh and 29 MWh of energy savings per year for DEC and DEO respectively.** The program is accurately characterizing energy and demand impacts.

Date	July 07, 2021
Region(s)	Duke Energy Progress Duke Energy Carolinas
Evaluation Period	DEC 1/1/2019 – 6/30/2020 DEP 1/1/2019 – 6/30/2020
Annual net MWh Savings	DEC 70,113 MWh DEP 47,827 MWh
Per Participant net MWh Savings	DEC 34.83 MWh DEP 29.41 MWh
Coincident MW Impact	DEC 79.25MW DEP 50.69 MW
Net-to-Gross Ratio	1.02
Previous Evaluation(s)	2016, 2015, 2014, 2013

8. Measure Level Inputs for Duke Energy Analytics

The SBES program estimates deemed savings on a per-fixture basis that takes into account specific operational characteristics. This approach differs from a more traditional prescriptive approach that applies deemed parameters by measure type and building type.

For the lighting measures, the EM&V team applied HVAC interactive effects and coincident factors in the analysis that differed from those used by the IC; the values used are shown in Table 8-1, Table 8-2 and Table 8-3. Note that for this evaluation the EM&V team applied the coincidence factors for both summer and winter peak demand reductions by lamp type from the logger data analysis completed in 2016. For lighting controls, these values were taken from the NEEP Mid-Atlantic TRM, v10[9].

Table 8-1 HVAC Interactive Effects Multipliers from the NEEP Mid-Atlantic TRM

Building Type	WHFe	WHFd
Office	1.10	1.36
Retail	1.06	1.27
School	1.10	1.44
Warehouse	1.02	1.23
Other	1.08	1.35

Source: NEEP Mid-Atlantic TRM, V10

Table 8-2 Summer and Winter Coincidence Factors for Lighting Measures from DEC-DEP 2016 Logger Analysis

Measure	Summer Coincidence Factor	Winter Coincidence Factor
LED Exit Sign	1	1
A Line Lamp	0.914	0.931
Recessed Light	0.914	0.931
Specialty Light	0.914	0.931
LED Tube	0.802	0.619
High/low Bay	1	1
Delamping	0.902	0.664
Exterior Light	0	1

Source: DEC-DEP 2016 logger data analysis.

[9]NEEP TRM (April 2020, v10), https://neep.org/sites/default/files/media-files/trmv10.pdf

Table 8-3 Coincidence Factors for Lighting Controls from the NEEP Mid-Atlantic TRM

Building Type	Coincidence Factor
Office	0.70
Retail	0.83
School	0.35
Warehouse	0.80
Other	0.62

Source: NEEP Mid-Atlantic TRM, V10

Additionally, the Duke Energy DSMore table is embedded below for reference.

DSMore table - DEC DEP SBES - 11 22 21.x

Appendix A. Process and NTG Survey Guide

DEC/DEP Small Business Energy Saver (SBES) Program
Commercial & Industrial (C&I)

Introduction and Confirmation

Guidehouse is evaluating Duke Energy's Small Business Energy Saver program, and our records show your business participated in this program during this past one or two years. This survey will help Duke Energy better understand the experience and impacts this program had on your business . Your responses are completely confidential.

Landing Page

Thank you for your willingness to complete this survey! Before you get started, just a few notes:

- This survey will ask about your experience with Duke Energy's Small Business Energy Saver program and the different type of energy efficiency equipment installed in your business.
- We are offering a $10 e-gift card for completing the survey. This gift card will be emailed to you within two weeks of completing the survey.

S1. Thanks in advance for your time. Our records indicate your business received **[INSERT SAMPLE_MEASURE_FAMILY]** from the Small Business Energy Saver program on [INSERT INSTALLDATE) , at **[INSERT SAMPLE_CUSTOMER_ADDR1, "in" SAMPLE_CUSTOMER_CITY]**. Is this correct?

Yes	1 **[SKIP TO S3]**
No	2 **[CONTINUE]**
Don't know	3 **[CONTINUE]**

S1a. Is there anyone available who might know about your company's participation in the program and the energy efficiency **[INSERT SAMPLE_MEASURE_FAMILY]** done at **[INSERT SAMPLE_CUSTOMER_ADDR1, "in" SAMPLE_CUSTOMER_CITY]**?

Yes	1 **[CONTINUE]**
No	2 **[THANK AND TERMINATE]**

S2. Can you provide an email address for that person?

Yes, Please enter email address	1 **[GO BACK TO S1]**
No	2 **[THANK AND TERMINATE]**
Don't know	3 **[THANK AND TERMINATE]**

[FOR TERMINATIONS]: These are all the questions we have for you. Thank you for your time.

S3. Our records show that you had the following energy efficiency improvements installed AT THIS SITE:
[INSERT SAMPLE_MEASURE(S)]. Is this correct?

Yes 1 **[GO TO S4]**

No 2 **[GO TO S3a]**

Don't know 3 **[THANK AND TERMINATE]**

S3a. Was any other energy efficiency equipment installed at this site?

Yes 1 **[GO TO S3b]**

No 2 **[THANK AND TERMINATE]**

Don't know 3 **[THANK AND TERMINATE]**

[FOR TERMINATIONS. These are all the questions we have for you. Thank you for your time.

S3b. Please tell me what energy efficiency equipment was installed at your facility through the DUKE ENERGY program

____**[OPEN END]**

For the purposes of this survey, the questions will focus on just the **[INSERT MEASURE_FAMILY] which you had installed and not the other measures, and we will just refer to them as "energy efficient equipment."**

S4. How did you learn about the Small Business Energy Saver program? (LIST OPTIONS; ACCEPT MULTIPLE RESPONSES.)

Contacted by my DUKE ENERGY account representative or other DUKE ENERGY staff 1

I contacted my DUKE ENERGY account representative to find out about possible programs 2

Contacted by a LIME ENERGY representative 3

Contacted by a trade ally, vendor, or contractor 4

Energy efficiency conference or workshop 5

Advertising by vendor or contactor 6

Word of mouth through a business colleague 7

Word of mouth through a family, friend, or neighbor 8

Through a trade organization or professional organization/association 9
Mailer or other print materials sent by the program 10
At a trade show 11
Participation in other DUKE ENERGY programs 12
Internet research/DUKE ENERGY website 13
Social media/online ad 14
Duke Energy call center 15
Email/e-newsletter from Duke Energy 16
Print material/flyer dropped off at my business 17
Other (Please specify) 18
Don't know 19

S5. Prior to participating in the Small Business Energy Saver program, what concerns did you have about participation, if any?

Cost of project 1
Access to financing/loan for project 2
Disruption to business during installation 3
Quality/performance of new equipment 4
Other (Please specify) 5
Don't know 6

Contractor and Proposal Module

The next few questions will be about your experiences with the program implementer, Lime Energy, and the equipment installer.

CP1. On a scale of 0 to 10, with 0 being "Not at all satisfied" and 10 being "Extremely satisfied", how satisfied would you say you are with …? [MATRIX STYLE QUESTION]

Items	Not at all satisfied (0)	1	2	3	4	5	6	7	8	9	Completely satisfied (10)	Don't know
CP1a. The energy efficiency assessment conducted by Lime Energy at your business site												
CP1b. The proposal prepared for you by Lime Energy												

CP2. Was the proposal clear about the scope of work to be performed?

Yes 1 **[SKIP TO CP3]**

No 2

Don't know ....3 **[SKIP TO CP3]**

CP2a. Why not?

____**[OPEN END]**

CP3. Was the proposal clear about your share of the project's final cost?

Yes 1

No 2

Don't know 3

CP4. If you had any questions or concerns about any aspect of your project or the DUKE ENERGY program, did you know who to contact?

Yes 1

No 2

Don't know 3

CP5. On a scale of 0 to 10, with 0 being "Not at all satisfied" and 10 being "Extremely satisfied", how satisfied would you say you are with …? [MATRIX STYLE QUESTION]

Items	Not at all satisfied (0)	1	2	3	4	5	6	7	8	9	Completely satisfied (10)	Don't know
CP5a. The contractor that installed the equipment												
CP5b. The post-installation cleanup												

CP6. Do you have any comments to share, good or bad, about the installation contractor or the post-installation cleanup?
____ **[OPEN END]**

Net to Gross Module

Next are questions relating to your decision to purchase <u>energy efficient</u> equipment for this site.

Free Ridership/Prior Plans

P1. Prior to participating in the program, <u>had you considered installing</u> energy efficient **[INSERT SAMPLE_MEASURE_FAMILY]**?

Yes 1

No .... 2 **[SKIP TO RC1]**

Don't know 3

P1a. Please describe any plans that you had to install the efficient **[INSERT SAMPLE_MEASURE_FAMILY]** prior to participating in the program.
____ **[OPEN END]**

P2a. Again, please think about <u>before</u> your involvement with the program. On a scale of 0 to 10, where 0 means you "Had not yet planned for equipment and installation" and 10 means you “Had identified and selected specific equipment and the contractor to install it”, please tell me how far along your plans were.

Had not yet planned for equipment and installation										Identified and selected specific equipment and the contractor to install it	Don’t know
0	1	2	3	4	5	6	7	8	9	10	98

P2b. Still thinking about your plans prior to program participation, on a scale of 0 to 10, where 0 means “Had not yet budgeted or considered payment” and 10 means "Already had sufficient funds budgeted and approved for purchase”, please tell me how far along your budget had been planned and approved?

Had not yet budgeted or considered payment										Already had sufficient funds budgeted and approved for purchase
0	1	2	3	4	5	6	7	8	9	10

Role of Contractor

RC1. Did Lime Energy help you with your choice of the energy efficient **[INSERT SAMPLE_MEASURE_FAMILY]** equipment installed?

Yes 1

No.. 2 **[SKIP TO IC1]**

Don’t know .... 3**[SKIP TO IC1]**

RC1a. On a scale of 0 to 10, where 0 is “Not at all important” and 10 is “Extremely important,” how important was the recommendation from Lime Energy in your decision to install the energy efficient **[INSERT SAMPLE_MEASURE_FAMILY]**?

Not at all important										Extremely important	Don’t know
0	1	2	3	4	5	6	7	8	9	10	98

Importance: Categories

IC1. Please tell me in your own words how the program influenced your decision to install the energy-efficient **[INSERT SAMPLE_MEASURE_FAMILY]**?
____**[OPEN END]**

Now I want to ask you a few questions about the importance of two different elements of the program to your decision to install the new equipment. Both questions ask you to rate the importance using a 0 to 10 scale where 0 means "Not at all important" and 10 means "Extremely important".

IC2. How important was the program's financial incentive or project discount in your decision to install the energy efficient **[INSERT SAMPLE_MEASURE_FAMILY]**?

Not at all important										Extremely important	Don't know
0	1	2	3	4	5	6	7	8	9	10	98

IC3. How important were the program's advertising and information resources (including the energy efficiency assessment itself) in your decision to install the energy efficient **[INSERT SAMPLE_MEASURE_FAMILY]**?

Not at all important										Extremely important	Don't know
0	1	2	3	4	5	6	7	8	9	10	98

Likelihood

[IF SAMPLE_MEASURE_FAMILY = "Lighting" THEN ASK L1, ELSE SKIP TO L2.]

L1. Given everything you've just said about the program, what is the likelihood that you **would have installed the same energy-efficient lighting** (in the same quantity and the same level of efficiency) without the program and its financial and technical assistance.

Definitely would NOT have installed the same energy efficient lighting 1

MAY HAVE installed the same energy efficient lighting, even without the program 2

Definitely WOULD have installed the same energy efficient lighting anyway 3

Don't know 4

[IF L1 = 2, 3, or 4, CONTINUE. OTHERWISE, SKIP TO IO1.]

L1a. As best you can, please estimate the percent of the Lighting you think you would have installed at the same high level of efficiency had the program not been available. (USE "998" FOR DON'T KNOW.)

___ % **[RECORD 0-100 OR 998 FOR DON'T KNOW]**

[IF SAMPLE_MEASURE_FAMILY = "Refrigeration" THEN ASK L2, OTHERWISE, SKIP TO IO1.]

L2. Given everything you've just said about the program, on a scale of 0 to 10 where 0 is definitely would not have installed and 10 is definitely would have installed, what is the likelihood that you would have installed the same energy-efficient **[INSERT SAMPLE_MEASURE_FAMILY]** equipment had the program not been available?

__________ **[RECORD 0-10 OR 98 FOR DON'T KNOW]**

[IF SAMPLE_MEASURE_FAMILY = "HVAC and Refrigeration" THEN ASK L3, OTHERWISE, SKIP TO IO1.]

L3. Given everything you've just said about the program, on a scale of 0 to 10 where 0 is definitely would not have installed and 10 is definitely would have installed, what is the likelihood that you would have installed the same energy-efficient **[INSERT SAMPLE_MEASURE_FAMILY]** equipment had the program not been available?

__________ **[RECORD 0-10 OR 98 FOR DON'T KNOW]**

Importance: Overall

IO1. Given everything you've just told me about the program, please tell me how important the program was in your decision to install the energy efficient **[INSERT SAMPLE_MEASURE_FAMILY] equipment**? Please use a 0 to 10 scale where 0 is "Not at all important" and 10 is "Extremely important".

Not at all important										Extremely important	Don't know
0	1	2	3	4	5	6	7	8	9	10	98

Timing

T1. Without the program, when would you have installed the efficient **[INSERT SAMPLE_MEASURE_FAMILY]**? Would it have been…(READ LIST)?

At the same time as you did 1

Within 1 year of the time you did 2

Between 1 and 2 years 3

Sometime after 2 years 4

Would have never installed without the program 5

Spillover (Inside Spillover)

Now we have a few questions concerning any **non-incentivized equipment** you may have also installed at this location.

IS1. Did your experience with the program in any way influence you to incorporate additional energy efficiency equipment where you did not receive a program incentive at this site?

Yes 1 **[CONTINUE]**

No 2 **[SKIP TO OS1]**

Don't know 3 **[SKIP TO OS1]**

IS2. Please briefly describe how the program has influenced your decisions to incorporate additional energy efficiency equipment that were not part of a program incentive.
____**[OPEN END]**

IS3. On a scale of 0 to 10, where 0 is "Not at all important" and 10 is "Extremely important", how important was your participation in the program in your decision to install additional energy efficiency equipment?

Not at all important										Extremely important	Don't know
0	1	2	3	4	5	6	7	8	9	10	98

[IF IS3 >5, CONTINUE, ELSE SKIP TO OS1]

IS4. What type of energy-efficient equipment did you install without program incentives, and what were the approximate quantities and project costs? Estimates are fine.

	Energy-Efficient Equipment Types	Equipment Characteristics	
	(Please describe the equipment as specifically as possible.) (1)	Quantity (1)	Project Cost ($) (2)

I/A

Equipment Type 1 (1)			
Equipment Type 2 (if applicable) (2)			
Equipment Type 3 (if applicable) (3)			
Equipment Type 4 (if applicable) (4)			

IS5. Now, please think only about the additional energy efficiency equipment not installed through the program (which received no incentives). Would you estimate the energy savings from these additional non-incentivized equipment to be less than, similar to, or more than the energy savings from the SBES program equipment?

Less than the SBES project 1

Similar to the savings from the SBES project 2

More than the SBES project 3

Don't know 4

IS6. Why didn't you apply for a program incentive for the additional energy efficiency equipment?

____**[OPEN END]**

Outside Spillover

This next set of questions asks about any **non-incentivized energy efficiency equipment** you may have installed at **other** locations within the Duke Energy service territory.

I/A

OS1. Did your experience with the program in any way influence you to incorporate energy efficiency equipment at other facilities that did not receive program rebates yet are also served by DUKE ENERGY? Do not include projects that participated in any DUKE ENERGY program.

Yes 1

No 2

Don't know 3

[IF OS1 = 1, CONTINUE, OTHERWISE, SKIP TO BB1.]

OS1a. About how many other facilities were influenced that did not participate in the program? (USE 98 FOR DON'T KNOW.)

___

INSERT NUMBER OF FACILITIES **[RECORD 1-100]**

OS2. Please briefly describe how the program has influenced your decisions to incorporate additional high-efficiency equipment at other facilities that did not participate in the program.

____ **[OPEN END]**

OS3. On a scale of 0 to 10, where 0 is "Not at all important" and 10 is "Extremely important," how important was your participation in the program in your decision to install additional energy efficiency equipment at other facilities

Not at all important										Extremely important	Don't know
0	1	2	3	4	5	6	7	8	9	10	98

[IF OS3 > 5, CONTINUE. OTHERWISE, SKIP TO BB1]

OS4. What type of energy-efficient equipment did you install without program incentives, and what were the approximate quantities and project costs? Estimates are fine.

	Energy-Efficient Equipment Types	Equipment Characteristics

I/A

	(Please describe the equipment as specifically as possible.) (1)	Quantity (1)	Project Cost ($) (2)
Equipment Type 1 (1)			
Equipment Type 2 (if applicable) (2)			
Equipment Type 3 (if applicable) (3)			
Equipment Type 4 (if applicable) (4)			

OS5. On average, would you estimate the energy savings from these other non-program facilities to be less than, similar to or more than the energy savings from the energy efficiency equipment installed through the program?

Less than the SBES project 1

Similar to savings from the SBES project 2

More than the SBES project 3

Don't know ..4

OS6. Why didn't you apply for a program incentive for the additional energy efficiency equipment?

____[OPEN END]

Benefits and Barriers

Before wrapping up, we have a few more questions related to participation and satisfaction.

BB1. Did you experience any problems, delays or difficulties with the program, and if so what were they? (OPEN ENDED – CODED IN ANALYSIS)

The process took too long 1

Too many delays between steps in the process 2

The process was too complex 3

The application materials were difficult to understand 4

Lack of coordination and communication among program staff 5

Did not know who to contact with questions 6

The program staff was not responsive/unable to get needed information or status updates 7

The program staff was not knowledgeable 8

The incentives were less than I expected 9

I do not like the equipment installed 10

I was not given a choice on the specific equipment installed 11

The installation process was disruptive 12

Things were damaged during the installation 13

The post-installation clean-up took too long 14

The equipment failed/required repairs/did not work well 15

The equipment installed was sized incorrectly 16

Energy savings were not as significant as expected 17

I don't know where to buy replacement bulbs 18

Other (Please specify) 19

Don't know 20

No problems experienced **[EXCLUSIVE]** 22

[Ask if BB1<> 21]
BB1a. How easy or difficult was it to resolve the problem(s) that you experienced? Please rate on a scale of 0 to 10 in which 0 means very difficult and 10 means very easy.

Very difficult (0)	1	2	3	4	5	6	7	8	9	Very easy (10)	Don't know	Problems were not resolved

BB2. If you could change anything about the <u>entire program process</u>, from the audit to signoff to payment, what would you change?
____**[OPEN END]**

BB3. On a scale of 0 to 10, with 0 being "Not at all satisfied" and 10 being "Extremely satisfied", how satisfied would you say you are with …? **[MATRIX STYLE QUESTION; RANDOMIZE a-e]**

Items	Not at all satisfied (0)	1	2	3	4	5	6	7	8	9	Completely satisfied (10)	Don't know
BB3a. The energy efficiency equipment installed through the program												
BB3b. The energy savings resulting from the new equipment												
BB3c. **[If lighting]** The quality of the light produced by the new light fixtures/bulbs												
BB3d. Program communications												
BB3e. The amount of the rebate												
BB3f. The overall program experience												
BB3g. Duke Energy												

[IF ANY RESPONSE TO BB3a-g < 5, CONTINUE. OTHERWISE, SKIP TO BB4]
BB3h. Why did you rate [BB3a-BB3g] as you did?
____**[OPEN END]**

BB4. How did participation in the Small Business Energy Saver program affect your attitude toward Duke Energy? Relative to before the program, is your attitude toward Duke Energy?
....Much more positive 1
Somewhat more positive 2

About the same 3

Somewhat more negative, or 4

Much more negative 5

Other (Please specify) 6

Don't know 7

BB5. On a scale of 0 to 10, with 0 being "Not at all likely and 10 being "Extremely likely", given the chance, how likely would you be to participate in this or a similar program again?

Not at all likely										Extremely likely	Don't know
0	1	2	3	4	5	6	7	8	9	10	98

[IF BB4 < 7, ASK BB5a. OTHERWISE, SKIP TO BB6]

BB5a. What—if anything—would persuade you to definitely participate in the program again? ____ **[OPEN END]**

BB7. Have you recommended the program to other businesses?
Yes; how many? [ENTER NUMBER] 1

No 2

Don't know 3

BB8. What do you see as the main benefits to participating in the Small Business Energy Saver program? (OPEN ENDED – CODED IN ANALYSIS)
Energy savings 1

Utility bill savings 2

Lower maintenance costs/less frequent light bulb replacements 3

Better quality/new equipment 4

Incentive/rebate 5

Good for the environment 6

Improved safety/morale 7

Set example/industry leader 8

Able to make improvements sooner 9

Other (Please specify) 10

Don't know 11

Feedback and Recommendations

FR1. Do you have any suggestions on how the Small Business Energy Saver program could be improved? (RANK IN ORDER BY IMPORTANCE FOR YOUR ORGANIZATION) (OPEN ENDED – CODED IN ANALYSIS.)

Higher incentives 1

More equipment 2

Greater publicity 3

Better communication/improve program information 4

Contact/information from account executives 5

Longer time period to complete project 6

Better review of applications 7

Simplify application process 8

Electronic applications 9

More funds for the program 10

Other (Please specify) 11

No recommendations **[EXCLUSIVE]** 12

Don't know 13

FR2. Did the equipment offered through the program allow you to upgrade all of the energy efficiency equipment you wanted at the time?

Yes 1 **[SKIP TO FG1]**

No 2

Don't know 3 **[SKIP TO FG1]**

[IF FR2 < 7, ASK FR2a. OTHERWISE, SKIP TO BB6]

FR2a. What other energy efficiency equipment did you want to upgrade?

____**[OPEN END]**

Firmographics

Finally, I'd like to ask you a few general questions about your company, specifically the facility at **[INSERT SAMPLE_CUSTOMER_ADDR1, "in" SAMPLE_CUSTOMER_CITY]**.

FG1. Does your organization own or lease the space located at **[INSERT SAMPLE_CUSTOMER_ADDR1, "in" SAMPLE_CUSTOMER_CITY]**?

Own 1

Lease 2

Own part and lease part 3

Don't know 4

FG2. Who in your company makes decisions about how energy is managed at this facility?

I DO (describe role) **[OPEN END]**...... 14

Proprietor/Owner 1

President/CEO 2

Facilities Manager 3

Building/Store Manager 4

Energy Manager 5

Facilities Management/Maintenance Position 6

Chief Financial Officer 7

Other Financial/Administrative Position 8

Sales Staff 9

Lessor 10

Other (Please specify) 11

Don't know 12

FG3. What is the principal activity or type of business that is conducted at this location? This may not be the main activity of your organization, but should be the main activity that occurs at this location. For example, is it an office, a warehouse, a store?

Office 1

Retail (non-food) 2

School 3

Grocery Store 4

Convenience Store 5

Restaurant 6

Health Care/Hospital 7

Hotel or Motel 8

Warehouse 9

Personal Service	10
Community Service/Church/Temple/Municipality	11
Industrial Electronic & Machinery	12
Other Industrial	13
Agricultural	14
Condo Association/Apartment Management	15
Other (Please specify)	16
Don't know	17

FG 4. Please enter your preferred email address so that we can send you your $10 e-gift card through TangoCard Rewards Genius. You can select from a variety of retailers or donate your incentive to charity. Please allow 4-6 weeks to receive the incentive email.

- ○ Email address: (1) ____
- ○ No thanks - I do not wish to receive the e-gift card incentive (2)

Closing

Those are all of the questions we have for you. Your responses are very important to Duke Energy and will help as we design future energy efficiency programs. Thank you for participating in this survey!

2020 EM&V Interim Report for the EnergyWise Business Program

February 5, 2021

Prepared for:

Duke Energy Carolinas and Duke Energy Progress

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Table of Contents

Evaluation Summary

Guidehouse conducted an impact evaluation to estimate energy impacts contributed by participants that received the thermostat between January 2018 and February 2019, using monthly energy consumption data. This report contains only the results of the energy impact analysis. Upon completion of the Summer 2021 DR season, Guidehouse will estimate demand response impacts on event days, using participant and non-participant advanced metering infrastructure (AMI) interval data.

Table 1 summarizes the estimated annual energy impacts for participants who installed a thermostat. Guidehouse found that on average, DEC participants saved 1,026 kWh per thermostat and DEP participants saved 423 kWh per thermostat.

Table 1: Per Device and Program Total Energy Impacts

Energy Provider	Devices	Impact per Device (kWh / Device)	Program Impact (MWh)	Margin of Error (90% CI)
DEC	5,304	1,026	5,440	±1,488
DEP	2,653	423	1,122	±724

Source: Guidehouse analysis. Values subject to rounding.

The EnergyWise® Business (“EnergyWise Business”) program in the Duke Energy Progress (DEP) and Duke Energy Carolinas (DEC) territories, provides small and medium business customers that consume an average of at least 1,000 kWh per month and have one or more central air conditioning or heat pump units at their facility, with an opportunity to earn bill credits by allowing DEP and DEC to periodically cycle their HVAC equipment during conservation periods (i.e. curtailment or demand response – DR – events).

In the summer, participating devices may be controlled by DEP and DEC from May through September for up to four hours per event. Events typically occur between 1pm and 7pm on non-holiday weekdays. During the curtailment events, the HVAC compressors are typically cycled in 30-minute intervals for the duration of the event. Participants may opt out of up to two events per season. Additional opt-outs may result in the forfeiture of the annual bill credit. Participants who have electric heat pumps with electric resistance auxiliary heat strips can also participate in the winter DR season for an additional $25 bill credit. For the winter 2020/2021 season, events are expected to occur in the morning from 6:30am to 8:30am, around the peak demand hour of 7-8am.

Participants may elect to have curtailment dispatched via thermostat or switch. Participants equipped with the thermostat (the majority) can access the EnergyWise Business portal using a smartphone, tablet, or computer. The portal allows users to monitor and modify their facility HVAC runtimes, change the temperature setpoints, and program customized cooling and heating schedules. The purpose of the portal is to facilitate the adoption of energy efficiency behaviors by participants, specifically the practice of adjusting HVAC setpoints to reduce space heating and cooling energy consumption. The portal includes tips to help participants optimize energy use, including tutorials and preset features for energy efficiency, away times, and vacations.

Evaluation Methods

Guidehouse's impact evaluation approach for this report focuses on energy impacts. Demand impacts will be established after the summer 2021 DR season.

Energy Efficiency Impact Evaluation Approach

Guidehouse assessed the suitability of using a matched comparison group (MCG) to estimate savings, but concluded that such an approach was unsuitable for this evaluation due to evidence of divergent energy consumption behavior after the time period used to select the MCG. As a result, Guidehouse proceeded by using a within-subjects regression approach, using participants only.

Guidehouse estimated annual per participant savings by applying a regression analysis to participant consumption data observed in the period from March 1, 2019 through February 29, 2020 (the "Post-Install Period"). Only participants that enrolled in the period from January 1, 2018 through February 28, 2019 (the "Install Period" or the evaluation sample period) were included in the estimation data. Program impacts were calculated by multiplying estimated annual per participant impacts by the number of participants that enrolled during the Install Period. The impacts per thermostat were calculated by dividing the per participant results by the average number of thermostats at each participant site.

Findings and Conclusions

The principal EM&V findings and conclusions regarding the estimated energy impacts are as follows:

- **Participants are estimated to have reduced an average of 1,026 kWh per device in DEC and 423 kWh per device in DEP for the post-installation period.** The post-installation period was March 2019 through February 2020, and applies to the evaluation sample of participants who enrolled between January 2018 through February 2019. More savings were realized in summer months compared with winter, which reflects the fact that only some participants use electric heating (approximately 20%). Guidehouse has developed hypotheses for the difference in savings between DEC and DEP participants, which may be used to guide future evaluation and program implementation.

- **Guidehouse concluded that selecting a suitable non-participant comparison group was not possible with the data available for estimating energy impacts.** Guidehouse observed evidence of differing evolution of consumption patterns between participants and selected matches from the pre- to post-installation periods, which suggests that the consumption behavior of selected matches may not evolve in similar ways as participants as would be assumed when using a comparison group. This result suggests that an MCG comprised of non-participants is unsuitable for estimating energy efficiency impacts for small and medium-sized businesses in this program.

Based on the impact findings above, Guidehouse recommends that Duke Energy consider the following recommendations:

- **Consider customer targeting or outreach activities to increase energy savings.** Targeting more customers with electric heat could increase winter energy savings. Guidehouse understands that future program data will have more accurate tracking of HVAC equipment types, which would facilitate such targeting efforts. Duke Energy may wish to consider increasing outreach encouraging participants to adopt more energy efficient setpoints. Although program technicians assist participants with initial thermostat setup, it is unclear how the settings persist over time. Following up with participants to encourage them to optimize these settings may increase the amount of energy savings achieved in the program.

- **Consider using future process evaluations to better understand differences in savings estimated in DEP and DEC service territories.** Consistent with the findings of the prior evaluation conducted by another evaluator, Guidehouse estimated that average savings per participant were lower for DEP participants than for DEC participants. Participants interviews or surveys may be used to better understand the factors that cause DEP participants to exhibit lower savings. For example, surveying DEC and DEP participants may show differences in willingness to use temperature setbacks or capability of reducing HVAC consumption based on business operation considerations.

1. Introduction

The EnergyWise® Business ("EnergyWise Business") program in the Duke Energy Progress (DEP) and Duke Energy Carolinas (DEC) territories, provides small and medium business customers that consume an average of at least 1,000 kWh per month and have one or more central air conditioning or heat pump units at their facility, with an opportunity to earn bill credits by allowing DEP and DEC to periodically cycle their HVAC equipment during conservation periods (i.e. curtailment or demand response events).

Upon enrollment, eligible participants select to receive either a "smart" Wi-Fi communicating thermostat[1] capable of remote set-point adjustment, or a switch device to allow DEP and DEC to cycle the participant's HVAC during DR events. The switch device may be either Wi-Fi connected or cellular. Participants may select one of three options for participating:

- 30% Cycling - Participants receive an annual bill credit of $50 per device controlled for the summer season.
- 50% Cycling - Participants receive an annual bill credit of $85 per device controlled for the summer season.
- 75% Cycling - Participants receive an annual bill credit of $135 per device controlled for the summer season.

In the summer, participating devices may be controlled by DEP and DEC from May through September, for up to four hours per event. Events typically occur between 1pm and 7pm on non-holiday weekdays. During the curtailment events, the HVAC compressors are cycled in 30-minute intervals for the duration of the event. Participants may opt out of up to two events per season Additional opt-outs may result in the forfeiture of the annual bill credit. Participants with electric heat pumps or electric resistance heating can also participate in the winter DR season for an additional $25 bill credit. For the winter 2020/2021 season, events are expected to occur in the morning from 6:30am to 8:30am, around the peak demand hour of 7-8am.

Participants with the thermostat can access the EnergyWise Business portal using a smartphone, tablet, or computer. The portal allows users to monitor and modify their facility HVAC runtimes, change the temperature setpoints, and program customized cooling and heating schedules. The purpose of the portal is to facilitate the adoption of energy efficiency behaviors by participants, specifically the practice of adjusting HVAC setpoints to reduce space heating and cooling energy consumption. The portal includes tips to help participants optimize energy use, including tutorials and preset features for energy efficiency, away times, and vacations.

[1] Note that this is not an "adaptive" thermostat.

1.1 Objectives of the Evaluation

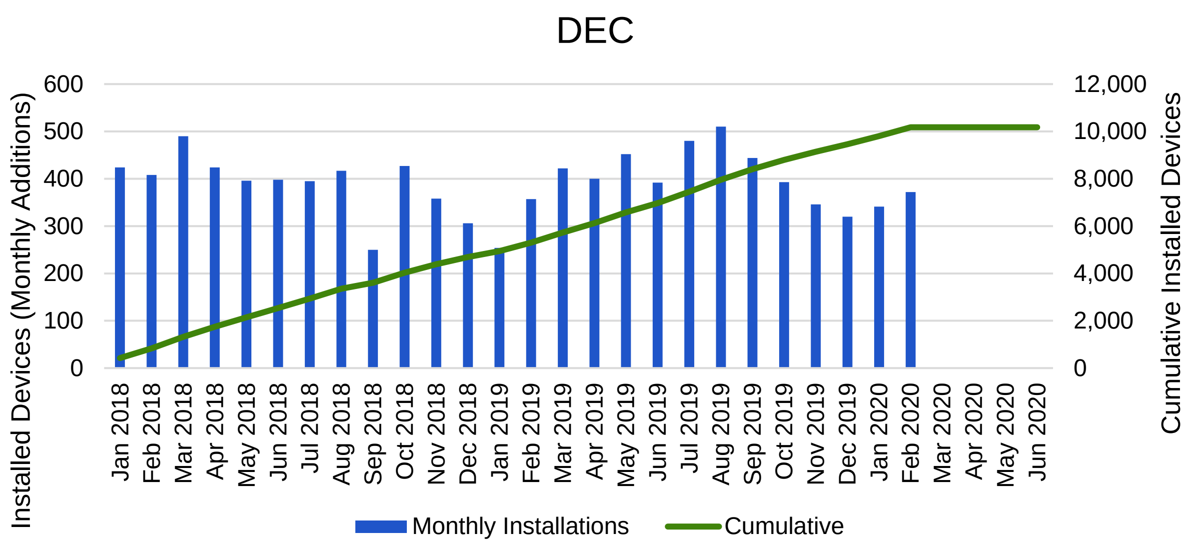
The key objectives for the impact analysis conducted as part of this evaluation, as identified in Guidehouse's evaluation plan, include:

- **Energy Efficiency Impacts:** estimate the annual energy efficiency impacts for participants who have a thermostat and enrolled in the program between January 2018 and February 2019.

1.2 Reported Program Participation

Figure 1-1 and Figure 1-2 illustrate installations between January 2018 and February 2020 for DEC and DEP, to show trends in participation over time outside of the evaluation sample period. In this time period, Duke Energy installed 10,176 and 5,188 devices in DEC and DEP territories respectively. From this population, the energy impacts in the report include a sample of participants who enrolled between January 2018 and February 2019, to allow sufficient post-installation consumption data to accrue for analysis.

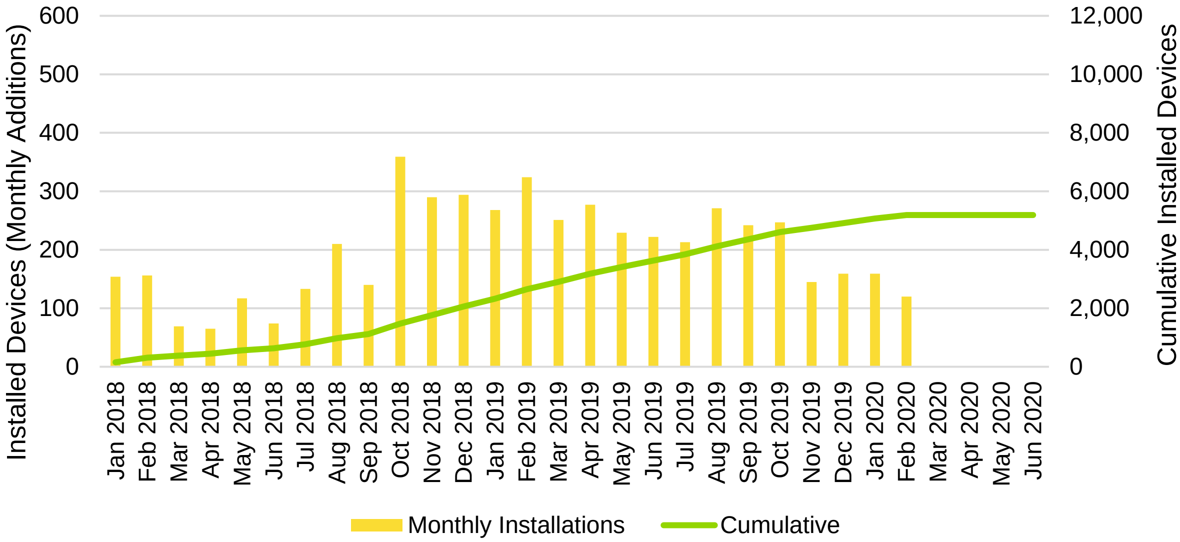
Figure 1-1: Installations between January 2018 and February 2020 – DEC



Source: Guidehouse analysis

I/A

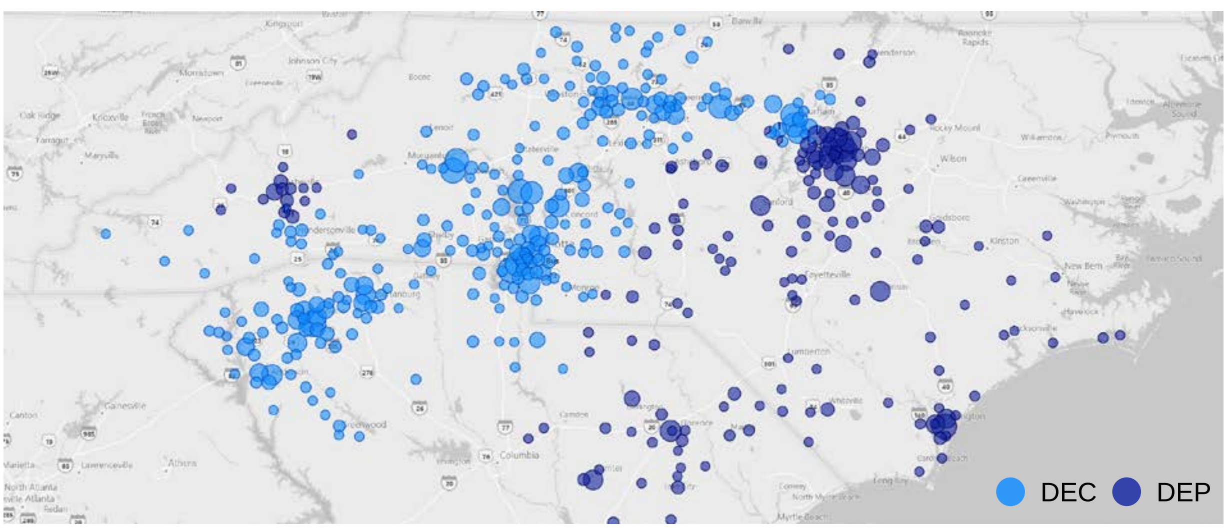
Figure 1-2: Installations between January 2018 and February 2020 – DEP



Source: Guidehouse analysis

Figure 1-3 shows the geographic distribution of participants. Most installations occurred around cities including Charlotte and Raleigh, although participation was achieved throughout the service territories.

Figure 1-3. Geographic Distribution of Participants



Source: Guidehouse Analysis
Size of Circle is Proportional to the Number of Installations

2. Evaluation Methods

This chapter of the evaluation report provides a description of the approaches used to conduct the evaluation. Additional technical details related to the impact approaches may be found in Appendix A.

2.1 Energy Efficiency Impact Methodology

Guidehouse estimated thermostat energy savings impacts using a within-subjects regression analysis applied to participant monthly consumption data, weather data, and data flags identifying the period after which each participant's thermostat was installed. This analysis also controlled for participation in other Duke Energy programs during the same time period, effectively netting out the impacts from other energy efficiency programs such as the Small Business Energy Saver.

A "within-subjects" regression approach is one which includes only participants and implicitly uses observed participant consumption prior to program enrollment to develop an estimate of participant baseline consumption in the program period and the estimated impact of the program on participant consumption in the post-installation period. A detailed description of the regression model specification is included in Appendix A.2.

Guidehouse also performed an experimental analysis comparing participant consumption patterns with those of a large pool of non-participants in pre-program period to select an MCG (non-participants with consumption patterns very similar to those of participants). As discussed below in Section 2.1.3, and in greater detail in Appendix A, Guidehouse's exploratory analysis identified that such an approach appears to be inappropriate for an evaluation of energy efficiency impacts for the small to medium businesses in this program.

2.1.1 Data Sources

For the energy efficiency evaluation, Guidehouse used the following data provided by Duke Energy:

- Monthly consumption data, for DEC and DEP participants and non-participants:
    - DEC: Calendarized monthly billing data for the period of January 2016 through February 2020 for 5,850 participants and 97,571 eligible non-participants[2]
    - DEP: Calendarized monthly billing data for the period of March 2017 through February 2020 for 2,898 participants and 66,899 non-participants. DEP billing consumption data was not available prior to March 2017.
- Customer cross-sectional data, including -

[2] Non-participant data were used only in exploratory analysis. All impacts reported in this evaluation are estimated based only on participant consumption data.

   - Standard Industry Classification (SIC) Code
   - HVAC equipment type (participants only)
   - HVAC system capacity in tons of refrigeration (participants only)
   - Program device type – switch or thermostat (participants only)
   - Participant enrollment and drop-out dates

- List of participants that participated in other DEP or DEC EE programs, including measures and installation dates.

Guidehouse collected hourly dry-bulb temperature data for the period of January 2016 through February 2020 from twelve weather stations across the Carolinas and developed a weighted average hourly time series for the analysis based on the number of participants closest to each station. This single time series was then used in subsequent modeling to estimate energy efficiency impacts. The stations and corresponding weights are listed in Table 2-1.

Table 2-1. Weather Stations and Weighting Used for Analysis

Weather Station	Weight
Raleigh-Durham Airport	27.4%
Charlotte/Douglas Airport	22.3%
Piedmont Triad Airport	9.1%
Hickory Regional Airport	8.6%
Greenville Downtown Airport	8.3%
Florence Regional Airport	7.0%
Greenville-Spartanburg Airport	4.8%
Asheville Regional Airport	4.1%
Occonee County Airport	3.4%
Anderson Regional Airport	3.1%
Wilmington International Airport	1.7%
Craven County Airport	0.2%

Source; Guidehouse Analysis

2.1.2 Analysis Period, Participant Sample, and Data Cleaning

Guidehouse has divided the participant consumption data into three different periods for analysis:

- **Pre-Install Period (January – December 2017):** the year prior to thermostats being installed for all participants in the estimation sample. No participant included in the analysis had enrolled in the program during this period.

- **Install Period (January 2018 – February 2019):** the year during which participants in the estimation sample installed thermostats. All participants included in the analysis enrolled in the program during this period.

- **Post-Install Period (March 2019 – February 2020):** the year during which all participants in the estimation sample have a thermostat installed. All participants included in the analysis had enrolled in the program prior to this period.

Guidehouse performed data cleaning on the provided monthly consumption data, including checking for:

- Very large consumption (>2,500 kWh per day in a month)

- Negative consumption

- At least 8 months of data in the pre- and post-install periods. This requirement was chosen to balance data completeness while maximizing the number of participants that could be included in analysis, and is consistent with other Guidehouse evaluations.

Table 2-2 summarizes the number of participant accounts that were able to be included in the analysis after the data cleaning process.

Table 2-2. Summary of Accounts Included in Data Cleaning Process

Description	Accounts (DEC)	Accounts (DEP)
All accounts that installed thermostats between January 2018 and February 2019	3,080	1,519
Accounts with any billing data	3,033	1,498
Accounts in the sample after cleaning (i.e. had at least 8 months of billing data in both the pre- and post-periods)*	1,929	1,019
Remaining accounts after removing customers that changed consumption from pre- to post-period by more than 100%**	1,893	1,008

Source: Guidehouse Analysis
** Essentially all (>99%) accounts dropped in data cleaning were due to a lack of sufficient data in either the pre- or post-period.*
*** Guidehouse investigated trimming the sample of customers that exhibited very large changes in energy usage to mitigate potential bias, as discussed in Appendix A.1.*

2.1.3 Assessment of a Matched Comparison Group

Guidehouse assessed the suitability of estimating impacts using a lagged dependent variable (LDV) approach[3] supported by an MCG developed from eligible non-participants. In this process, each participant is assigned a “match.” This is the non-participant whose pre-installation period consumption most closely resembles the given participant. In general, this approach is also commonly referred to as quasi-experimental design and is generally the preferred evaluation method in absence of true experimental design (e.g. a randomized control trial, or RCT).

The purpose of selecting an MCG is to find a group of customers for whom energy usage patterns would be expected to follow a parallel trend over time to that of the participants in absence of the program treatment. The treatment in this case is the installation of a thermostat.

The key assumption of selecting an MCG is that the relative difference between participant and MCG consumption is consistent over time in absence of the treatment, conditional on the independent variables included in the regression equation. In the residential sector, this assumption is generally regarded as unproblematic due to the homogenous nature of residential consumption patterns. However, the heterogeneity of small businesses means that the key assumption that underlies this approach may be too restrictive and not reflect the realities of small business. In other words, two businesses that exhibit similar usage patterns in the period in which they are matched may not evolve in similar ways over time. This may be due to differences in business types or to administrative details related to the data themselves. For example, if the electricity account holder is a landlord, the business may change entirely between the pre-program and the program period without any indication.

To assess the suitability of an MCG approach for this evaluation, Guidehouse selected matches for both DEC and DEP participants. Each participant was assigned the non-participant from the same SIC division[4] that had the most similar monthly consumption pattern during the pre-installation period. Guidehouse’s exploratory analysis found that participant and comparison group consumption patterns outside of the pre-program matching period diverged materially from each other in a manner inconsistent with what might typically be expected of the program treatment.

Specifically, when using an MCG, savings estimates changed substantially in response to the incremental removal of participants and matches from the estimation set. Conversely, estimated savings using participants only (a within-subjects approach) were robust to the same sub-setting – the regression parameter values were insensitive to the sample used. This result suggests the presence of some non-program effect impacting the relative difference between participant and match consumption over time. Absent any observable data to control for this effect, it will result in omitted variable bias in the model, and inaccurate estimates of savings.

Therefore, Guidehouse concluded that an MCG was not appropriate for this analysis using the data available. Guidehouse proceeded with the analysis using a within-subject approach which considers participants only and compares consumption before and after installation of the

[3] The LDV approach is a special case of the difference-in-differences approach.

[4] Standard industry classification division denotes the broad industry category the small business belongs to. See https://www.naics.com/sic-codes-counts-division/.

thermostat. For a more detailed description of the methods used for selecting and assessing the suitability of a matched control group, see Appendix A.1

2.1.4 Estimating Ex-Post Impacts

Guidehouse employed a within-subject regression analysis to estimate impacts. This approach uses a model that implicitly compares the energy consumption of participants before and after installation of the program thermostat. This type of model is also known as a “pre-post” model. The model estimated for this analysis controls for the effects of weather (cooling and heating degree days), month of year, and participation in other DEP or DEC EE programs (such as Small Business Energy Saver). The treatment effect was modeled to be weather-dependent, on both cooling and heating degree days – savings, that is, are assumed to be a function of temperature.

In this model, any changes in consumption over time that are not explicitly controlled for by the independent variables are attributed to the treatment. As described in Section 2.1.3, Guidehouse employs within-subject models only in the absence of true experimental design (e.g., an RCT) and when matched controls are either not available or inappropriate.

The regression model provides ex-post (i.e., historical) impact estimates for the post-installation period described in Section 2.1.2, March 2019 through February 2020. These are obtained by applying the estimated treatment parameters to the observed weather in this period. For additional details regarding the regression model used for this analysis, see Appendix A.2.

3. Impact Findings

This chapter provides a detailed summary of the impact findings, and is divided into three sections:

- **Energy Efficiency Impacts.** This section summarizes the estimated energy efficiency impacts.
- **Differences in Savings between DEC and DEP.** This section discusses the differences in estimated savings for the two service territories.
- **Net-to-Gross.** This section describes the assumptions informing the net-to-gross ratio applied in this evaluation.

3.1 Energy Efficiency Impacts

Table 3-1 shows the ex-post energy efficiency impacts for the period from March 2019 through February 2020 for those participants who enrolled between January 2018 and February 2019. The program achieved an estimated 5,440 MWh and 1,122 MWh of savings for DEC and DEP participants respectively over the post-install period.

Table 3-1. Ex-Post EE Impacts – Program Total Mar 2019 through Feb 2020

Energy Provider	Devices	Program Impact (MWh)	Margin of Error (90% CI)	Relative Precision (+/-)
DEC	5,304	5,440	±1,488	±27%
DEP	2,653	1,122	±724	±65%

Source: Guidehouse analysis of DEC and DEP data, values subject to rounding.

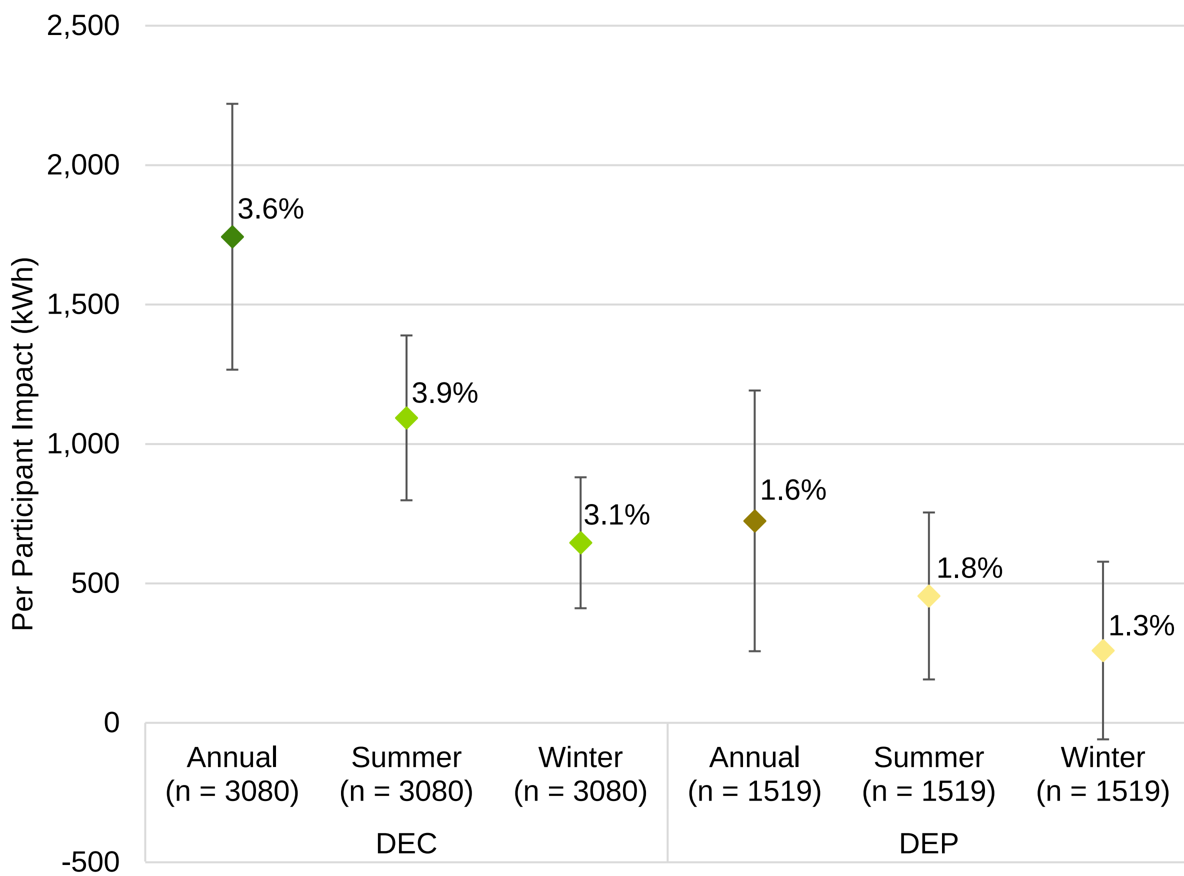
Figure 3-1 and Table 3-2 show per participant EE savings in each season of the post-install period. Overall, the program delivered 1,743 kWh (DEC) and 724 kWh (DEP) of energy savings per participant over the entire post-install period. This amounts to about 3.9% of facility consumption in DEC and 1.8% in DEP. Statistically significant savings were estimated in both summer and winter seasons, but more savings accrued in the summer – 1,094 kWh (DEC) and 455 kWh (DEP) per participant. The higher savings during the summer months is consistent with Guidehouse's analysis of program tracking data that indicates that approximately 20% of participants have heat pumps installed.

Table 3-2. Ex-Post EE Impacts – per Participant by Season

Energy Provider	Season	Impact (kWh / Participant)	Margin of Error (90% CI)	Savings (% Facility)
DEC	Summer	1,094	±296	3.9%
	Winter	646	±235	3.1%
	Annual	**1,743**	**±477**	**3.6%**
DEP	Summer	455	±299	1.8%
	Winter	259	±319	1.3%
	Annual	**724**	**±468**	**1.6%**

* Summer (May – Oct) and Winter (Nov – Apr) may not add up exactly to Annual impacts due to rounding and the fact that they are estimated separately from annual impacts.
Source: Guidehouse analysis of DEC and DEP data, values subject to rounding.

Figure 3-1. Ex-Post EE Impacts – Per Participant by Season



**percentages indicate savings as a percent of total facility consumption, and bars indicate margin of error.*
Source: Guidehouse analysis of DEC and DEP data.

Similarly, Table 3-3 and Figure 3-2 show per device energy savings in each season of the post-install period. Overall, the program delivered 1,026 kWh (DEC) and 423 kWh (DEP) of energy savings per device over the entire post-install period. Savings were observed for both summer and winter seasons, but more savings accrued in the summer – 644 kWh (DEC) and 266 kWh (DEP) per device.

Table 3-3. Ex-Post EE Impacts – per Device by Season

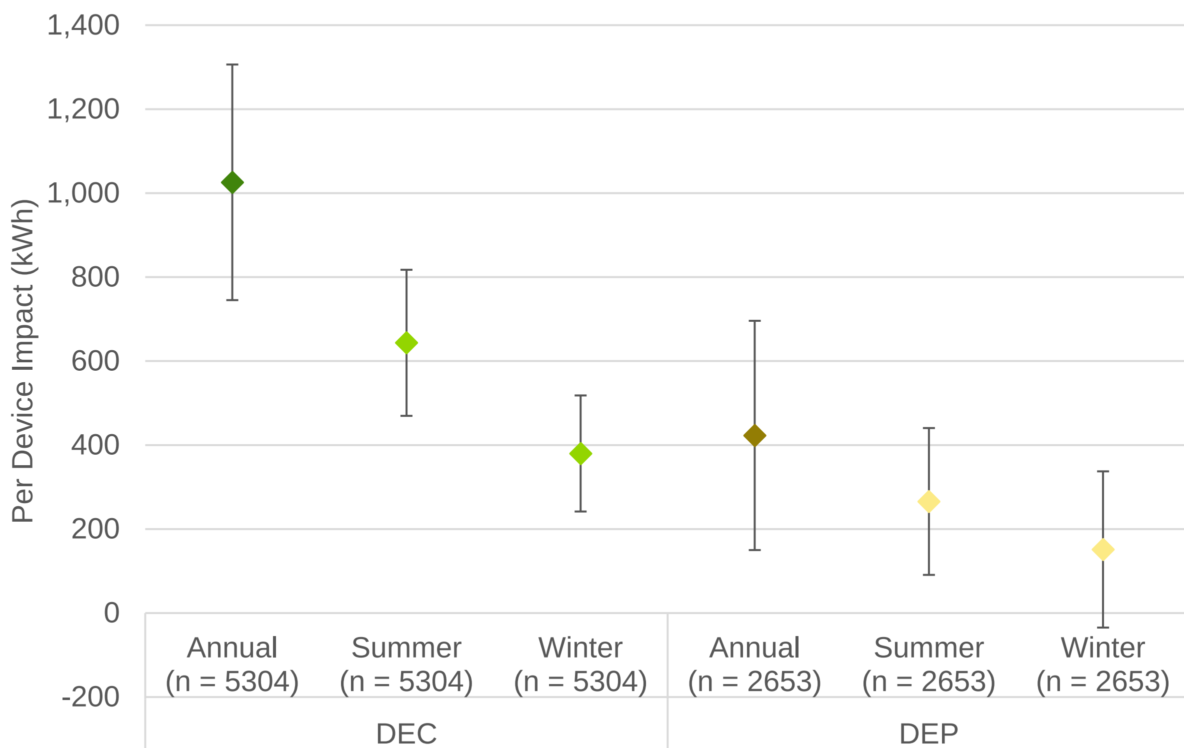
Energy Provider	Season	Impact (kWh / Device**)	Margin of Error (90% CI)
DEC	Summer	644	±174
	Winter	380	±138
	Annual	1,026	±281
DEP	Summer	266	±175
	Winter	152	±186
	Annual	423	±273

* Summer (May – Oct) and Winter (Nov – Apr) may not add up exactly to Annual impacts due to rounding and the fact that they are estimated separately from annual impacts.

*** Per device impacts are based on an average of 1.71 devices per participant (DEC) and 1.75 devices per participant (DEP).*

Source: Guidehouse analysis of DEC and DEP data, values subject to rounding.

Figure 3-2. Ex-Post EE Impacts – Per Device by Season



**Bars indicate margin of error.*
Source: Guidehouse analysis of DEC and DEP data.

3.2 Differences in Savings between DEC and DEP

Guidehouse estimated materially higher savings for DEC participants (1,026 kWh / device) than DEP participants (423 kWh / device). This difference (603 kWh / device) is consistent with the findings of the prior evaluation completed by another evaluator, which found DEC impacts to be 503 kWh higher per device in DEC than DEP. Guidehouse has developed and explored several hypotheses that may explain the difference in achieved savings:

- **Different Participant Setpoint Behavior**: Duke Energy provided Guidehouse with thermostat setpoint schedule data for participants,[5] which provided some insight into how participants in DEC and DEP use the setback features of their thermostats. Setbacks are defined as the temperature setpoint programmed by a participant when a building is likely to be unoccupied, and more aggressive setbacks generally lead to energy savings. Guidehouse found that a greater percentage of DEC participants use setbacks for both heating and cooling seasons as compared to DEP participants. About 60% of DEC participants used heating setbacks as compared to about 40% of DEP participants, and about 40% of DEC participants used cooling setbacks as compared to

[5] Available setpoint schedule data was primarily for participants who installed a device after February 2019 and spanned the period of March 2019 through January 2020. Nevertheless, the data provided some insight into differing behavior among DEP and DEC participants.

about 30% for DEP. These differences between unoccupied and occupied setpoints suggest that DEC participants are more likely to exhibit energy efficient behavior than DEP participants, supporting Guidehouse's finding of greater kWh savings for DEC. This analysis is discussed in further detail in Appendix A.3. Further investigation of participant behavior before and after installation of the smart thermostat may provide additional insight into this phenomenon.

- **Use of Air Conditioning (AC) in Response to Temperature**: Higher AC usage for DEC participants for a given increase in temperature suggests a higher potential for savings. Guidehouse's regression modeling indicates for each incremental cooling degree day experienced, DEC participants increase their electricity demand by more than DEP participants. This modeling result indicates that when DEC and DEP participants are exposed to the same temperature, DEC participants on average use more electricity, suggesting that DEC participants tend to use their AC units more than DEP participants. The total cooling load over the summer season may still be higher for DEP customers, as it is generally warmer in DEP territory.

- **Differences in AC Size**: Larger AC units also suggests a higher potential for energy savings. Guidehouse found that the average size of AC units for DEC thermostats (4.3 tons, average over all thermostats) was slightly higher than DEP thermostats (4 tons, average over all thermostats). Depending on the efficiency of installed equipment, this difference may indicate differences in energy consumption between DEC and DEP participants.

- **Different Participant Business Types**: Differences in business types or operations between the territories may lead to variation in the flexibility to achieve energy savings. Based on SIC code, Guidehouse found that DEC participants include a larger share of Manufacturing and Retail participants, while DEP participants include a larger share of Finance and Services participants. In the manufacturing sector, DEC participants exhibited higher consumption (339 kWh / day) than DEP participants (152 kWh / day). While this difference does not completely account for the differences in savings achieved, it does illustrate that businesses have different consumption patterns and therefore may have a different capability of reducing HVAC usage via the thermostat.

These hypotheses can be used to direct future efforts in evaluation and program design. Potential activities to investigate these hypotheses include:

- **AC Size and Usage**: Further investigate available thermostat telemetry data and any additional available HVAC equipment characteristics (i.e. capacity, SEER/EER) that can be collected for DEC and DEP participants and directly compare the runtime and energy consumption of connected equipment on hot weather days. Alternatively, AMI data for summer 2021 (to be collected for the DR evaluation) may be used to compare whole facility energy consumption directly on hot weather days. In the future, existing thermostat type and temperature setpoints could be collected at the time of installation of the new device, to enable future investigation.

- **Participant Business Types and Behavior:** Future evaluations could include, for example, participant surveys to assess business capacity for saving energy (e.g., ability to curtail AC use during business hours) and willingness and ability to save energy via the thermostat (e.g., preferences for setpoints before and after installing the device). Participant surveys can also be used to understand how customers in each territory are engaging with the online portal.

3.3 Net-to-Gross

Evaluations of demand-side management programs typically estimate both net and gross savings, and often present a net-to-gross (NTG) ratio based on the evaluated percentage of energy reductions that may be ascribed either to free ridership (which decreases the NTG ratio) or to program spillover (which increases the NTG ratio).

Free ridership is typically defined as the percentage of savings that would have occurred absent the presence of the program. Spillover is typically defined as incremental savings actions undertaken by a program's participants not directly incented by the program.

All savings presented in this report should be considered net.

3.3.1 Energy Efficiency Impacts

The energy efficiency impacts of this program are net of any free ridership. This is because most of the key program elements that drive savings are not available in the consumer market. Furthermore, the program is designed primarily as a demand response program and it is unlikely that energy impacts driven by free ridership occur because participants enroll in demand response.

A participant is considered a free rider when it can be demonstrated that even absent the program the participant would have purchased the efficient equipment and adopted the efficient behavior promoted by that program.

In the case of this program, the energy efficiency equipment being deployed requires educated action on the part of the participant to achieve energy savings. This action requires information feedback provided by program-specific tools. Simply purchasing a Wi-Fi enabled thermostat would not yield any savings. Savings are delivered by the participants taking appropriate and impactful actions that the education, information feedback via the portal, and program-specific thermostat pre-sets empower them to do. It is the combined effect of these elements, packaged in a single offering, that results in the savings estimated in this evaluation.

Key program elements that customers could not acquire in the open market, elements that are essential for achieving the energy efficiency savings include:

- **Multi-Source Information.** Although some Wi-Fi-enabled thermostats for commercial enterprises allow the user to observe thermostat run-times (real-time and historical) the EnergyWise Business online portal allows users to observe things like thermostat run-times and set-points alongside consumption values. This more clearly identifies potential bill savings to participants than commercially available products.

  The portal doesn't just display HVAC usage and run-time characteristics, but combines both sets of information to deliver customized participant business-specific benchmarking, identifying for the participant (at portal login) periods of high usage and opportunities for bill savings.

- **Education and Tech Support.** When participants enroll, the thermostat is installed *and set up* by industry professionals in consultation with the key business decision-maker. This means that initial thermostat settings for all businesses will be calibrated to deliver savings without impinging on the core business. Additionally, the installer ensures that the participant can access all portal and thermostat functionality while they are on site. The program therefore delivers both a nearly universal adoption of initial energy saving settings and ensures that the business owner understands and can access and use the tools provided.

  In addition to the significant assistance provided at enrollment and installation, Duke Energy maintains a call center for participant technical support, specially trained for supporting this program, the thermostat and portal.

- **Maintenance and Energy-Saving Prompts.** In addition to the standard battery of energy efficiency tips and maintenance prompts, a key feature of the Duke Energy portal not otherwise available in the consumer market is its automated analysis of equipment condition – for example monitoring the relationship between run-time and temperature – and alerting the user when monitored metrics suggest maintenance could deliver cost-effective bill savings. This targeted advice effectively provides users with a customized maintenance schedule and reminders and is a program-specific feature, rather than a thermostat capability that could be obtained through the consumer market.

These elements are all major factors that drive savings and are all specific to the programmatic context of the technology deployed. Given that these elements are available only through participation in the program, Guidehouse believes the energy savings found in this evaluation are net savings.

4. Findings, Conclusions, and Recommendations

The principal EM&V findings and conclusions regarding the estimated energy impacts are as follows:

- **Participants are estimated to have reduced an average of 1,026 kWh per device in DEC and 423 kWh per device in DEP for the period of March 2019 through February 2020.** More savings were realized in summer months compared with winter, which reflects the fact that only some participants use electric heating. Guidehouse has developed hypotheses for the difference in savings between DEC and DEP participants, which may be used to guide future evaluation and program implementation.

- **Guidehouse concluded that selecting a suitable non-participant comparison group was not possible with the data available for estimating energy impacts.** Guidehouse observed evidence of differing evolution of consumption patterns between participants and selected matches from the pre- to post-installation periods, which suggests that the consumption behavior of selected matches may not evolve in similar ways as participants as would be assumed when using a comparison group. This result suggests that an MCG comprised of non-participants is unsuitable for estimating energy efficiency impacts for small and medium-sized businesses in this program.

Based on the impact findings above, Guidehouse recommends that Duke Energy consider the following recommendations:

- **Consider customer targeting or outreach activities to increase energy savings.** Targeting more customers with electric heat could increase winter energy savings. Guidehouse understands that future program data will have more accurate tracking of HVAC equipment types, which would facilitate such targeting efforts. Duke Energy may wish to consider increasing outreach encouraging participants to adopt more energy efficient setpoints. Although program technicians assist participants with initial thermostat setup, it is unclear how the settings persist over time. Following up with participants to encourage them to optimize these settings may increase the amount of energy savings achieved in the program.

- **Consider using future process evaluations to better understand differences in savings estimated in DEP and DEC service territories.** Consistent with the findings of the prior evaluation conducted by another evaluator, Guidehouse estimated that average savings per participant were lower for DEP participants than for DEC participants. Participant interviews or surveys may be used to better understand the factors that cause DEP participants to exhibit lower savings. For example, surveying DEC and DEP participants may show differences in willingness to use temperature setbacks or capability of reducing HVAC consumption based on business operation considerations.

5. Summary Form

EnergyWise Business

2019-2020

Completed EMV Fact Sheet

Description of Program

EnergyWise Business is a commercial HVAC load control program that targets small and medium businesses. At the time of enrollment participants are provided either with a thermostat or a load switch, with most customers having a thermostat. Participants must have a password-protected wireless network in order to qualify for a thermostat.

Participants may elect to be controlled using one of three cycling strategies: 30%, 50%, or 75%. Incentive for participation increases commensurate with the increased aggressiveness of the cycling strategy selected.

Impact Evaluation Methods

Guidehouse estimated energy impacts via a regression analysis of monthly consumption data for the estimation period of March 2019 through February 2020, for participants who installed a thermostat between January 2018 and February 2019.

Impact Evaluation Details

- **The program generated 5,440 MWh (DEC) and 1,122 MWh (DEP) of savings from March 2019 through February 2020.**

- **Participants are estimated to have reduced an average of 1,026 kWh / device (DEC) and 423 kWh / device (DEP) for the period of March 2019 through February 2020.** More savings were realized in summer months compared with winter, which reflects the fact that only some participants use electric heating. Guidehouse has developed hypotheses for the difference in savings between DEC and DEP participants, which may be used to guide future evaluation and program implementation.

Date:	2021-01-22
Region:	DEC and DEP
Evaluation Period	EE: 2019 – 2020
DR Event Program Impact (MW)	
EE Program Impact (MWh)	
Program total for participants with thermostats (Mar 2019 – Feb 2020	DEC: 5,440 MWh DEP: 1,122 MWh
Net-to-Gross Ratio	1

6. Program Impacts for Duke Energy Analytics

DSMore table -
DEC-DEP SBDR Therm

Appendix A. Detailed Energy Efficiency Impact Methodology

This appendix includes a more detailed description of Guidehouse's methodology for estimating energy efficiency impacts and ruling out the suitability of an MCG, resulting in a within-subject regression analysis.

A.1 Assessment of Matched Comparison Group

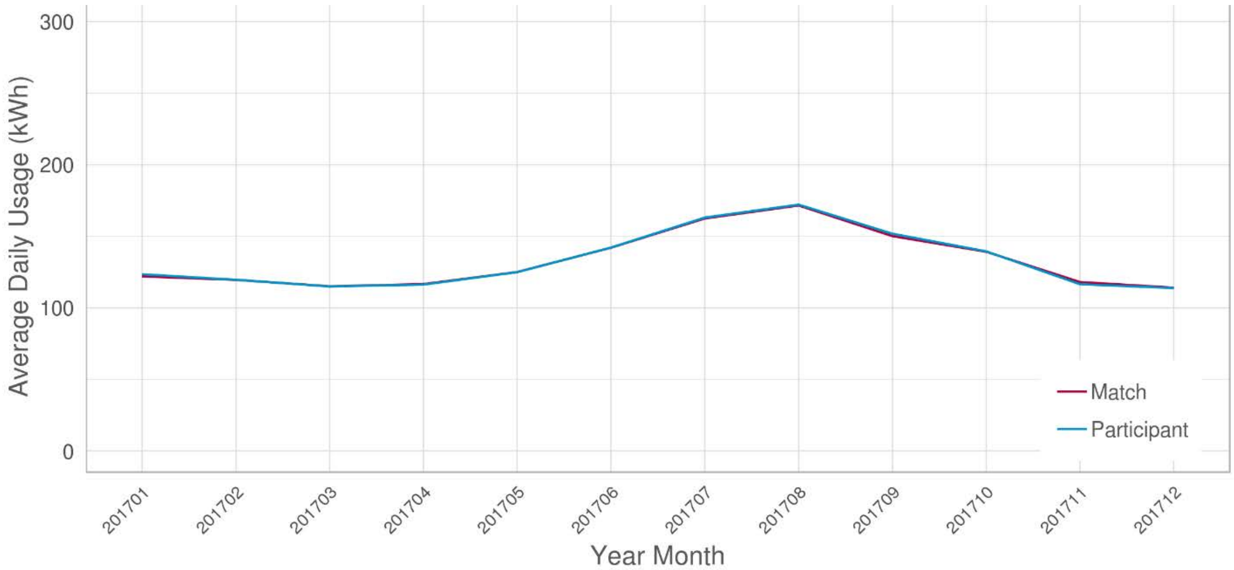
In absence of true experimental design (e.g., a randomized control trial), using an MCG is generally the preferred evaluation method for estimating energy savings for a program like EnergyWise Business. An MCG generally allows evaluators to control for unobserved trends in energy use that are unrelated to the installation of the program thermostat but consistent in effect across both participants and non-participants such as changes in energy use associated with macroeconomic factors. This approach is also commonly referred to as quasi-experimental and reduces the likelihood of specification bias.[6] Within-subject models that do not use a comparison group tend to be much more sensitive to model specification than models with a comparison group, which rely more heavily on contemporaneous observations of non-participant consumption to estimate participant baseline consumption.

Guidehouse developed an MCG where each participant was assigned a "match", which is the non-participant within the same SIC division (first two digits of the SIC Code) that has the most similar consumption patterns in the matching period (e.g., January to December 2017).[7] Figure A-1 and Figure A-2 compare average daily usage by month during the matching period between participants and matches for DEC and DEP, respectively. In general, the selected matches for both DEC and DEP, on average, exhibited similar behavior in the matching period, before any participants have installed the thermostat. DEP participants and matches showed large differences in the matching period. The underlying assumption of using an MCG is that the relative difference between participant and MCG consumption is consistent over time in absence of the treatment, conditional on the independent variables included in the regression equation, such that subsequent differences after installation of the thermostat can be attributed to energy savings.

[6] An LDV approach using an MCG, conditional on the assumption that the two groups' consumption will (absent the treatment) trend in a similar fashion, will tend to be less sensitive to what variables are included (or left out) of the model specification.

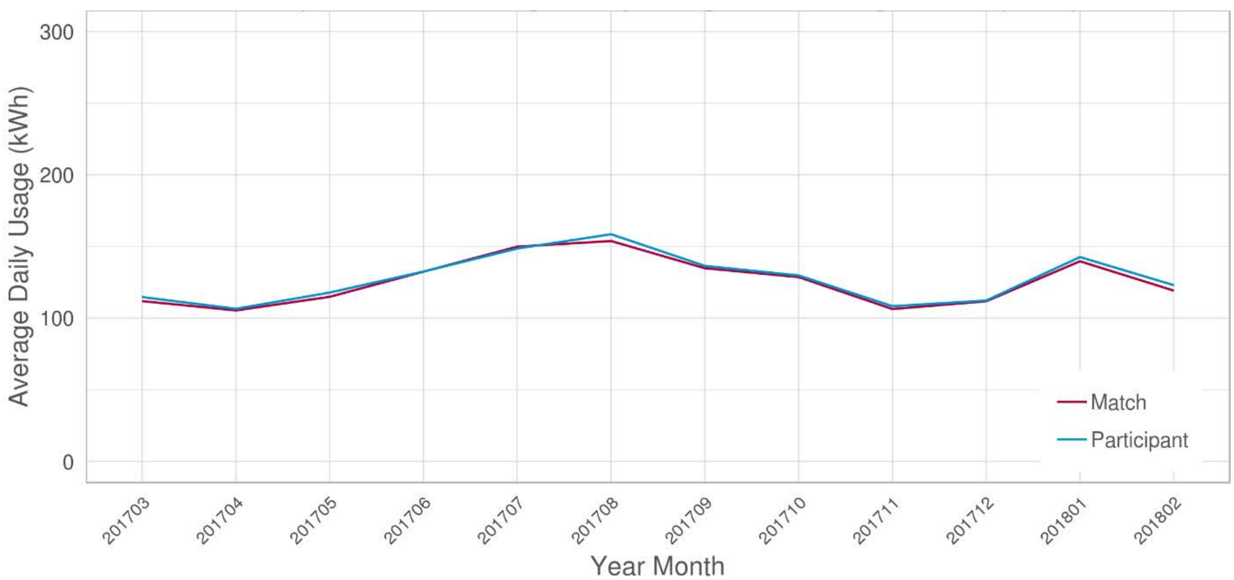
[7] For a small number of DEP customers who installed in January or February of 2018, data was only available for March 2017 onwards. Therefore, for DEP customers who installed in January 2018, the matching period was defined as March through December 2017. For DEP customers who installed in February 2018, the matching period was defined as March 2017 through January 2018. For all other DEP customers, the matching period was defined as March 2017 through February 2018.

Figure A-1. Comparison of Average Daily Usage – Matching Period (DEC)



Source: Guidehouse analysis of DEC and DEP data

Figure A-2. Comparison of Average Daily Usage – Matching Period (DEP)



Source: Guidehouse analysis of DEC and DEP data

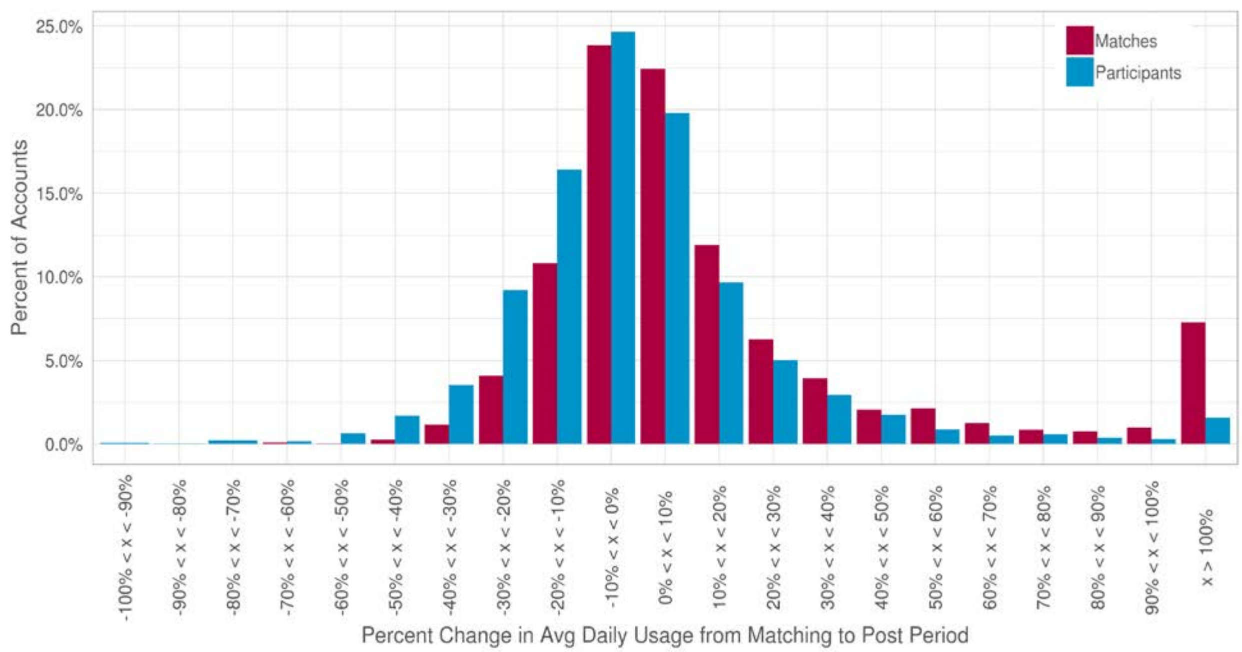
However, Guidehouse observed some large differences in the post-installation period, particularly for DEC participants and corresponding matches where changes in winter consumption would be unexpected as a result of installing a thermostat. As a result, Guidehouse further investigated match quality. Guidehouse observed that many participants changed their consumption significantly between the pre- and post-installation period (2017 to 2019). This phenomenon may be expected for small businesses, where changes in operations or tenancy may occur. However, these swings in usage may bias impacts if they either:

- Are not experienced similarly by participants and matches, e.g., if matches exhibit large swings in usage that participants do not;

- Are asymmetric, e.g., if swings are more likely to be increases than decreases, then large swing upwards will not 'cancel out' with large swings downward.

Figure A-3 shows the distribution of such changes for both participants and matches. In the middle of the distribution, (i.e. changes in consumption of ±10%), some differences are expected since the participants have installed a thermostat. However, higher levels of change such as increasing consumption by +100% are unexpected and not plausibly related to the installation of a thermostat. The selected matches showed a much higher proportion of customers that increased consumption by more than 100%, which suggests that the selected matches may have evolved differently over time, despite exhibiting similar consumption in the pre-installation (i.e., matching) period.

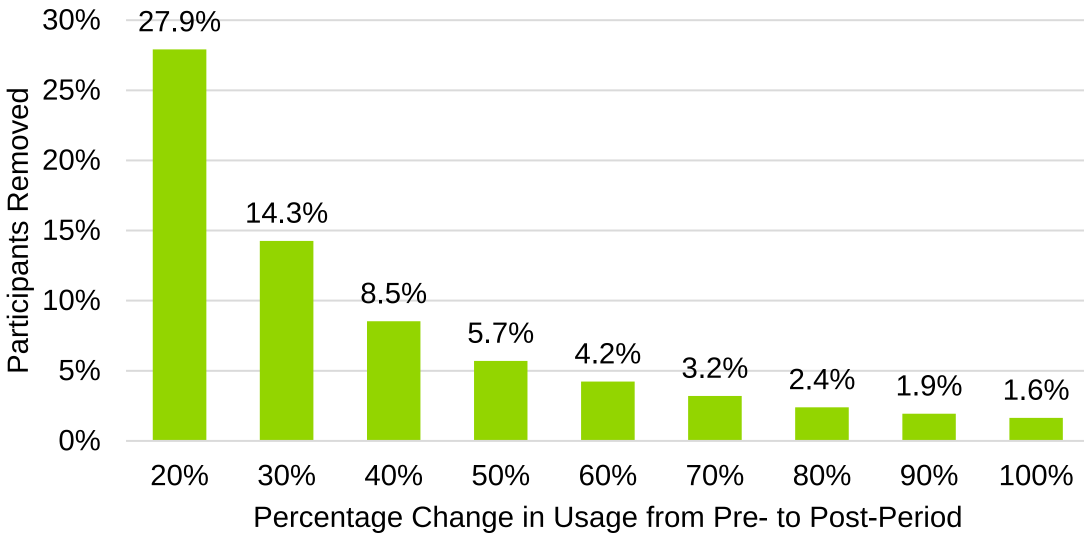
Figure A-3. Distribution of Change in Average Usage, Participants vs Matches



Source: Guidehouse analysis of DEC and DEP data

To test the sensitivity of savings estimates, Guidehouse investigated "trimming" the participant sample to remove customers that exhibited changes in average consumption larger than a certain percentage. Figure A-4 shows the percent of participants (for DEC and DEP combined) that would be removed at different thresholds, from ±20% to no trimming of the sample. For example, if the condition is set that customers whose consumption either doubles or falls to zero (±100% change) should be removed, 1.6% of customers must be "trimmed" from the estimation set.

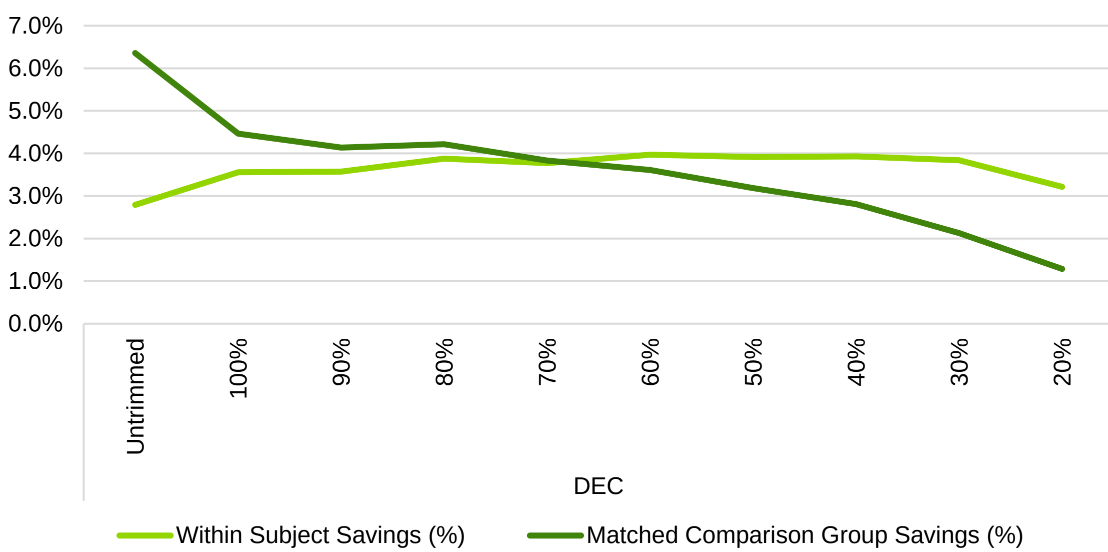
Figure A-4. Comparison of Average Daily Usage – Post Period



Source: Guidehouse analysis of DEC and DEP data

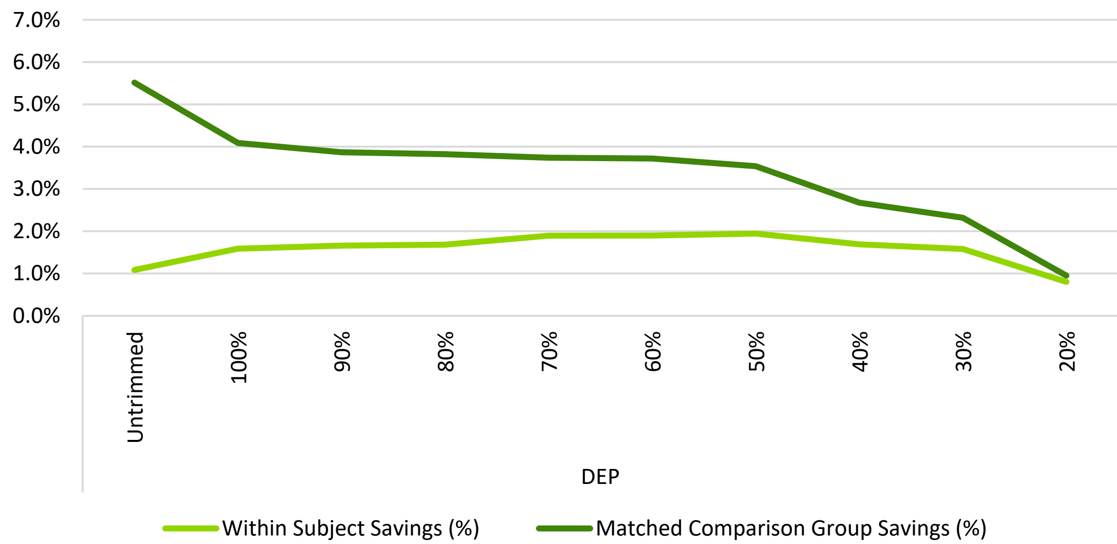
Guidehouse then explored the sensitivity of estimated savings at each level of trim, with the selected MCG and using the within-subjects approach. Guidehouse found that the savings estimates generated using an MCG varied substantially between different trim levels. In contrast, savings estimates estimated without an MCG were much less sensitive, as shown in Figure A-5 and Figure A-6. For both DEC and DEP, aside from the untrimmed and ±20% thresholds, savings estimates are relatively consistent as shown by the flatter profile of the within-subjects' lines.

Figure A-5. Comparison of Percent Savings Estimates at Different Trim Thresholds - DEC



Source: Guidehouse analysis of DEC and DEP data.

Figure A-6. Comparison of Percent Savings Estimates at Different Trim Thresholds - DEP



Source: Guidehouse analysis of DEC and DEP data.

The sensitivity of estimated savings to trim when using the selected MCG suggests that trimming the sample affects the group of participants differently than the selected matches, and therefore suggests that the selected matches may have evolved differently in terms of energy consumption behavior than participants for reasons unrelated to the EnergyWise for Business program.

Based on this investigation, Guidehouse concluded that an LDV approach with MCG is inappropriate for evaluating the impacts of energy efficiency for small businesses in the DEP and DEC territories.[8] Additionally, Guidehouse imposed a restriction on participants for the sample to have a change in average consumption of less than 100% between the pre- and post-installation periods. Guidehouse selected this threshold for the following reasons:

- this threshold removes approximately 2% of participants that could be considered outliers who increased their consumption by more than double their 2017 amount;
- the resulting sample of participants exhibits changes in usage that are more symmetric (i.e. between -100% and 100% of 2017 consumption); and
- estimated savings results were not sensitive to further trim levels.

Guidehouse proceeded with the analysis using a within-subject approach which considers participants only and compares consumption before and after installation of the thermostat.

[8] This finding should be understood to be specific to this program and set of jurisdictions, and caution should be used in generalizing this result to other jurisdictions, or even to other programs within this same jurisdiction.

A.2 Regression Model Specification

DEC and DEP participants were modeled separately. Equation A-1 shows the within-subjects model regression equation used for both models. These models estimate participant average daily usage in a given bill period as a function of month of year, cooling and heating degree days, and participation in Duke Energy's other energy efficiency programs. Only participant data is included in the models for the period from January 2016 through February 2020 (for DEC) and March 2017 through February 2020 (for DEP).

Equation A-1. Within-Subjects Regression Model

$$ADU_{it} = \alpha_i + \sum_J \beta_{1j} Month_{jt} + \beta_2 CDD_{it} + \beta_3 spline_1 HDD_{it} + \beta_4 spline_2 HDD_{it} + \beta_5 CrossPart_{it}$$
$$+ \beta_6 Treatment_i \cdot CDD_{it} + \beta_7 Treatment_i \cdot spline_1 HDD_{it} + \beta_8 Treatment_i \cdot spline_2 HDD_{it} + \varepsilon_{it}$$

Where,

i = The subscript identifying the customer.

t = The subscript identifying the month of sample.

α_i = The customer-specific fixed effect.

ADU_{it} = Average daily consumption of kWh by customer *i* in month of sample *t*.

$Month_{jt}$ = A set of binary variables taking a value of 1 when *j* = *t* and 0 otherwise; *j* indexes months 1-12.

CDD_{it} = average cooling degree days (base 65°F) in month of sample *t*.

$spline_1 HDD_{it}$, $spline_2 HDD_{it}$ = a set of variables acting as a temperature spline for the average heating degree days (base 65°F) in month t experienced by customer I, with a spline knot of 19. As illustrated in Figure A-7, the spline models temperature dependent consumption with a different relationship at lower temperatures below the spline knot. The higher temperature component of the spline accounts for increased electricity usage at very cold temperatures, where auxiliary heating may be used for heat pumps.

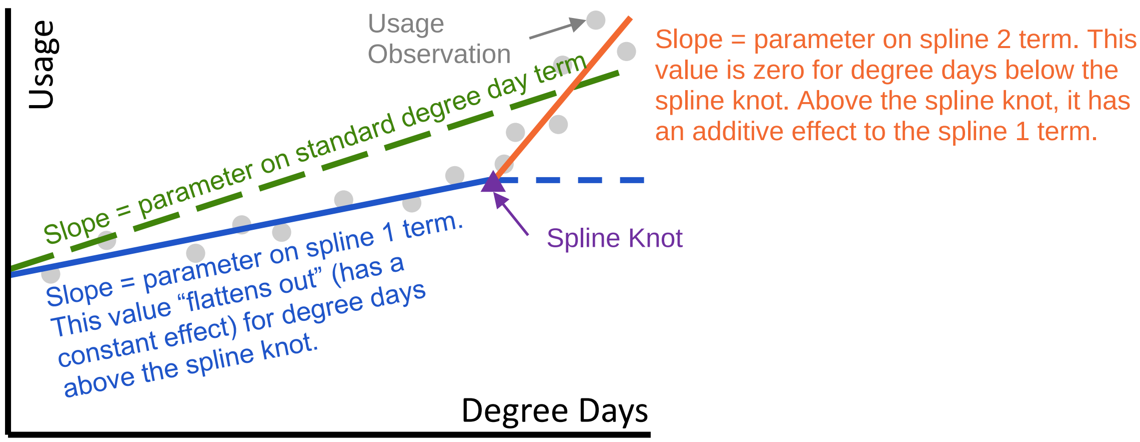
$CrossPart_{it}$ = A dummy variable equal to 1 if customer *i* participated in a related small business energy efficiency program (e.g. Small Business Energy Saver, etc.) during, or in any of the months prior to, month of sample *t*; and 0 otherwise.

$Treatment_{it}$ = A dummy variable equal to 1 if customer *i* installed their smart thermostat during, or in any of the months prior to the month of sample *t*; 0 otherwise.

ε_{it} = The error for customer *i* during month of sample *t*. Standard errors are estimated from model residuals and are cluster-robust to account for any heteroskedasticity or serial correlation at the business level.

β = Parameter estimates. These values are the estimated relationship between demand and the variable for which the beta represents. β_7, β_8 are used to estimate average daily energy savings due to the program.

Figure A-7. Illustration of a Temperature Spline



A.3 Participant Setpoint Analysis

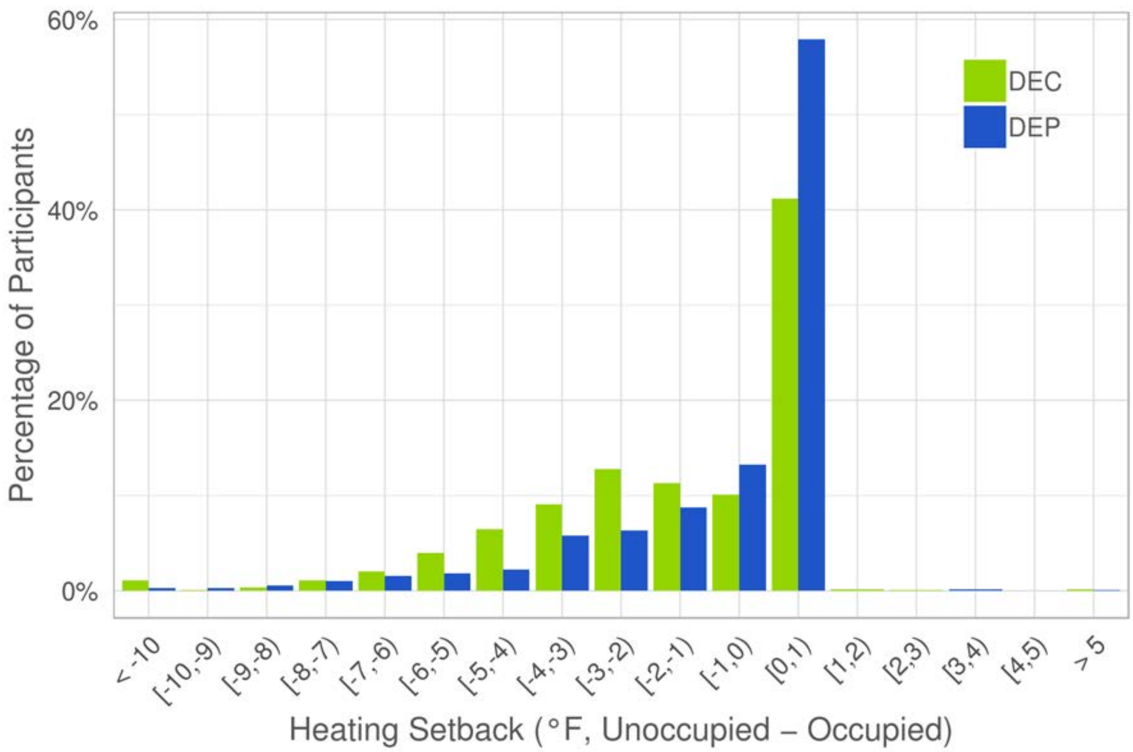
Guidehouse performed analysis of available thermostat setpoint telemetry data for participants in the program, to provide insight into the differences in estimated energy savings between DEP and DEC participants. Duke Energy provided a set of thermostat telemetry data for participants in both DEC and DEP territories. The data contained a log of participant thermostat setpoint schedules spanning the time period of March 2019 through January 2020, where entries appear every time a schedule is created. Customers can create a setpoint schedule in different ways: by day of week, by weekday and weekend, or by occupied and unoccupied. 95% of participants chose to set an unoccupied vs occupied schedule. Only 15% chose to set a daily schedule (10% of customers chose to use both types of schedules at different times). No DEP participants used a daily setpoint schedule, i.e. they only used an occupied vs unoccupied schedule.

The data contained schedules for participants who installed a device between January 2019 through February 2020; however, there was little overlap with the evaluation sample of those who installed between January 2018 and February 2020, as 98% of devices in the available data were installed after February 2019. Nevertheless, the data still provides insight into DEP and DEC participants, so Guidehouse analyzed the data to discover any trends that may explain differences in observed energy savings.

Since no DEP participants used a daily schedule, Guidehouse focused on comparing unoccupied and occupied setpoints to understand the extent to which customers in each territory use temperature setbacks, or a more energy efficient setpoint, when their business is unoccupied. In the summer, a setback corresponds to a higher setpoint, while in the winter a setback corresponds to a lower setpoint. A larger setback indicates more energy efficient behavior.

Figure A-8 compares the distribution of observed heating setbacks between DEC and DEP participants. Almost 60% of DEP participants with telemetry data do not appear to use any heating setback, compared with about 40% of DEC participants (indicated by the tall bars on the right of the distribution). Furthermore, setbacks for DEC participants are generally more aggressive than DEP, as indicated by the higher green bars for various setback levels. This suggests that DEC participants are exhibiting more efficient behavior on average than DEP participants during the heating season.

Figure A-8. Distribution of Observed Heating Setbacks

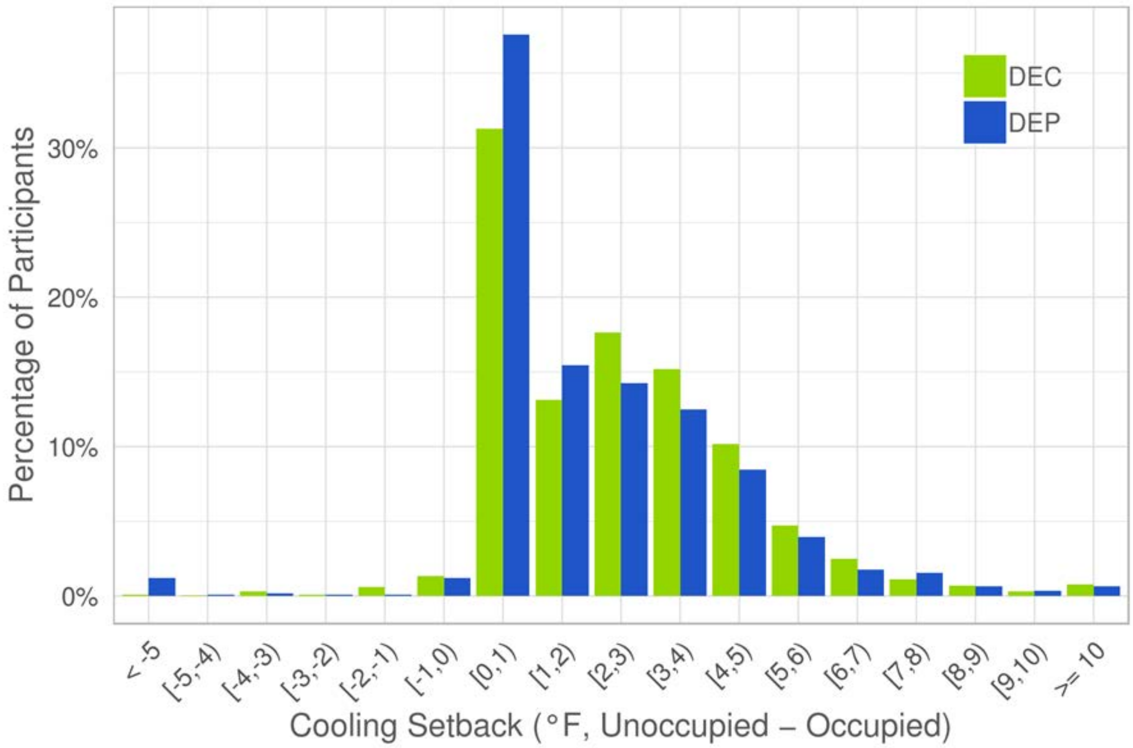


Source: Guidehouse Analysis

Similarly, Figure A-9 compares the distribution of observed cooling setbacks between DEC and DEP participants. Almost 40% of DEP participants with telemetry data do not appear to use any cooling setback, compared with about 30% of DEC participants. Furthermore, setbacks for DEC participants are generally more aggressive than DEP, as indicated by the higher green bars for various setback levels. This suggests that DEC participants are exhibiting more efficient behavior on average than DEP participants for the cooling season.

I/A

Figure A-9. Distribution of Observed Cooling Setbacks



Source: Guidehouse Analysis

Across both heating and cooling, occupied and unoccupied setpoints suggest that DEC participants exhibit more energy efficient behavior on average than DEP participants. Almost 60% of DEP participants do not use any heating setback, and almost 40% do not use a cooling setback. Comparatively for DEC participants, ~40% do not use a heating setback and ~30% do not use a cooling setback.

The differences in setback behavior may explain some of the differences in the estimated kWh savings between DEP and DEC. Note that this analysis was based on a more recent sample of participants than those used for estimating kWh savings. Nevertheless, the data provided some insight into differing behavior among DEP and DEC participants. Guidehouse also did not have data on behavior prior to installation of the thermostat; however, since a large portion of participants appear to not use any setback, we may assume that these customers did not use one before installing the new thermostat either.

Listebarger Exhibit 1, page 1
Supplemental

DSM/EE Cost Recovery Rider 14
Docket Number E-7 Sub 1265
Exhibit Summary of Rider EE Exhibits and Factors

Residential Billing Factor for Rider 14 True-up (EMF) Components

Line				Revised
1	Year 2018 EE/DSM True-Up (EMF) Revenue Requirement	Listebarger Exhibit 2 pg 1, Line 15		(106,780)
2	Year 2019 EE/DSM True-Up (EMF) Revenue Requirement	Listebarger Exhibit 2 pg 2, Line 15		932,709
3	Year 2020 EE/DSM True-Up (EMF) Revenue Requirement	Listebarger Exhibit 2 pg 3, Line 15		958,673
4	Year 2021 EE/DSM True-Up (EMF) Revenue Requirement	Listebarger Exhibit 2 pg 4, Line 15		(22,334,861)
5	Total True-up (EMF) Revenue Requirement	Sum Lines 1-4	$	(20,550,259)
6	Projected NC Residential Sales (kWh) for rate period	Listebarger Exhibit 6, Line 1		22,809,393,337
7	*EE/DSM Revenue Requirement EMF Residential Rider EE (cents per kWh)*	Line 5 / Line 6 * 100		**(0.0901)**

Residential Billing Factor for Rider 14 Prospective Components

Line				
8	Vintage 2020 Total EE/DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 3, Line 15		2,568,275
9	Vintage 2021 Total EE/DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 4, Line 15		3,959,003
10	Vintage 2022 Total EE/DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 5, Line 1		6,791,458
11	Vintage 2023 Total EE/DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 6, Line 11		84,567,117
12	Total Prospective Revenue Requirement	Sum Lines 8-11	$	97,885,853
13	Projected NC Residential Sales (kWh) for rate period	Listebarger Exhibit 6, Line 1		22,809,393,337
14	*EE/DSM Revenue Requirement Prospective Residential Rider EE (cents per kWh)*	Line 12 / Line 13 * 100		**0.4291**
	<u>Total Revenue Requirements in Rider 14 from Residential Customers</u>			
15	Total True-up (EMF) Revenue Requirement	Line 5	$	(20,550,259)
16	Total Prospective Revenue Requirement	Line 12		97,885,853
17	***Total EE/DSM Revenue Requirement for Residential Rider EE***	Line 15 + Line 16	**$**	**77,335,594**
18	***Total EE/DSM Revenue Requirement for Residential Rider EE (cents per kWh)***	Line 7 + Line 14		**0.3390**

Non-Residential Billing Factors for Rider 14 True-up (EMF) Components

Line				
19	*Vintage Year 2018 EE True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 1, Line 25	$	(342,180)
20	*Projected Year 2018 EE Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 4		15,445,061,521
21	*EE Revenue Requirement Year 2018 EMF Non-Residential Rider EE (cents per kWh)*	Line 19 / Line 20 * 100		**(0.0022)**
22	*Vintage Year 2018 DSM True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 1, Line 35	$	(62,531)
23	*Projected Year 2018 DSM Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 5		16,537,337,560
24	*DSM Revenue Requirement Year 2018 EMF Non-Residential Rider EE (cents per kWh)*	Line 22 / Line 23 * 100		**(0.0004)**
25	*Vintage Year 2019 EE True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 2, Line 25	$	1,039,022
26	*Projected Year 2019 EE Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 6		15,395,466,337
27	*EE Revenue Requirement Year 2019 EMF Non-Residential Rider EE (cents per kWh)*	Line 25 / Line 26 * 100		**0.0067**
28	*Vintage Year 2019 DSM True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 2, Line 35	$	56,978
29	*Projected Year 2019 DSM Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 7		16,570,566,722
30	*DSM Revenue Requirement Year 2019 EMF Non-Residential Rider EE (cents per kWh)*	Line 28 / Line 29 * 100		**0.0003**
31	*Vintage Year 2020 EE True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 3, Line 25	$	7,416
32	*Projected Year 2020 EE Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 8		14,831,584,100
33	*EE Revenue Requirement Year 2020 EMF Non-Residential Rider EE (cents per kWh)*	Line 31 / Line 32 * 100		**0.0001**
34	*Vintage Year 2020 DSM True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 3, Line 35	$	(209)
35	*Projected Year 2020 DSM Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 9		16,609,571,340
36	*DSM Revenue Requirement Year 2020 EMF Non-Residential Rider EE (cents per kWh)*	Line 34 / Line 35 * 100		-
37	*Vintage Year 2021 EE True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 4, Line 25	$	(12,407,806)
38	*Projected Year 2021 EE Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 10		14,903,909,177
39	*EE Revenue Requirement Year 2021 EMF Non-Residential Rider EE (cents per kWh)*	Line 37 / Line 38 * 100		**(0.0833)**
40	*Vintage Year 2021 DSM True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 4, Line 35	$	(2,882,278)
41	*Projected Year 2021 DSM Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 11		16,646,430,078
42	*DSM Revenue Requirement Year 2021 EMF Non-Residential Rider EE (cents per kWh)*	Line 40 / Line 41 * 100		**(0.0173)**

Listebarger Exhibit 1, page 2
Supplemental

Non-Residential Billing Factors for Rider 14 Prospective Components

43	Vintage Year 2020 EE Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 3, Line 25	$	3,845,961
44	Projected Vintage 2020 EE Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 8		14,831,584,100
45	*EE Revenue Requirement Vintage 2020 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 43 / Line 44 * 100		**0.0259**
46	Vintage Year 2021 EE Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 4, Line 25	$	10,003,040
47	Projected Vintage 2021 EE Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 10		14,903,909,177
48	*EE Revenue Requirement Vintage 2021 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 46 / Line 47 * 100		**0.0671**
49	Vintage Year 2022 EE Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 5, Line 4	$	15,132,477
50	Projected Vintage 2022 EE Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 12		15,209,154,609
51	*EE Revenue Requirement Vintage 2022 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 49 / Line 50 * 100		**0.0995**
52	Vintage Year 2023 EE Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 6, Line 18	$	65,748,787
53	Projected Vintage 2023 EE Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 14		15,209,154,609
54	*EE Revenue Requirement Vintage 2023 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 52 / Line 53 * 100		**0.4323**
55	Vintage Year 2023 DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 6, Line 25	$	16,406,881
56	Projected Vintage 2023 DSM Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 15		16,907,663,645
57	*DSM Revenue Requirement Vintage 2023 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 55 / Line 56 * 100		**0.0970**
	Total EMF Rate			**(0.0961)**
	Total Prospective Rate			**0.7218**

Total Revenue Requirements in Rider 14 from Non-Residential Customers

56	Vintage Year 2018 EE True-up (EMF) Revenue Requirement	Line 19	(342,180)
57	Vintage Year 2018 DSM True-up (EMF) Revenue Requirement	Line 22	(62,531)
58	Vintage Year 2019 EE True-up (EMF) Revenue Requirement	Line 25	1,039,022
59	Vintage Year 2019 DSM True-up (EMF) Revenue Requirement	Line 28	56,978
60	Vintage Year 2020 EE True-up (EMF) Revenue Requirement	Line 31	7,416
61	Vintage Year 2020 DSM True-up (EMF) Revenue Requirement	Line 34	(209)
62	Vintage Year 2021 EE True-up (EMF) Revenue Requirement	Line 37	(12,407,806)
63	Vintage Year 2021 DSM True-up (EMF) Revenue Requirement	Line 40	(2,882,278)
64	Vintage Year 2020 EE Prospective Amounts Revenue Requirement	Line 43	3,845,961
65	Vintage Year 2021 EE Prospective Amounts Revenue Requirement	Line 46	10,003,040
66	Vintage Year 2022 EE Prospective Amounts Revenue Requirement	Line 49	15,132,477
67	Vintage Year 2023 EE Prospective Amounts Revenue Requirement	Line 52	65,748,787
68	Vintage Year 2023 DSM Prospective Amounts Revenue Requirement	Line 55	16,406,881
	Total Non-Residential Revenue Requirement in Rider 14	Sum (Lines 56-68)	**96,545,559**

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
True Up of Year 1, 2 and 3 Lost Revenues for Vintage Year 2018

RESIDENTIAL
Energy Efficiency Programs

Line		Reference	E-7 Sub 1130 Rider 9 Year 1 Estimate	E-7 Sub 1164 Year 2018 Yr 2 LR Estimate	E-7 Sub 1192 Rider 11 True up	E-7 Sub 1192 Year 2018 Year 3 Estimate	E-7 Sub 1230 Rider 12 True Up	E-7 Sub 1230 Year 2018 Yr 4 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1265 Rider 14 True up	Year 2018
1	Residential EE Program Cost	Evans Exhibit 1 pg. 1, Line 9 * NC Alloc. Factor	41,623,609		14,606,717		$ (0)		$ -	$ -	$ 56,230,326
2	Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 1, Line 9 * NC Alloc. Factor	5,511,264		4,154,068		140,649		(22,279)	157,616	9,941,319
3	Return on overcollection of Residential EE Program Costs	Listebarger Exhibit 3 pg 1			244,540		1,024,850		750,744	(5,288)	2,014,846
4	Total EE Program Cost and Incentive Components	Line 1 + Line 2 + Line 3	47,134,873		19,005,325		1,165,498		728,465	152,329	68,186,490
5	Residential DSM Program Cost	Evans Exhibit 1 pg. 1, Line 10 + Line 26 * NC Alloc. Factor	9,903,130		(124,235)		0		-	-	9,778,895
6	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 1, Line 10 + Line 26 * NC Alloc. Factor	2,569,925		17,215		(5,581)		(289)	573	2,581,843
7	Return on undercollection of Residential DSM Program Costs	Listebarger Exhibit 3 pg 2			(28,626)		(40,884)		(21,193)	68	(90,634)
8	Total DSM Program Cost and Incentive Components	Line 5 + Line 6 + Line 7	12,473,055		(135,646)		(46,465)		(21,481)	641	12,270,105
9	Total EE/DSM Program Cost and Incentive Components	Line 4 + Line 8	59,607,928		18,869,679		1,119,034		706,984	152,970	80,456,594
10	Revenue-related taxes and regulatory fees factor **	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	1.001302	
11	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 9 * Line 10	59,691,498		18,895,191		1,120,491		707,904	153,169	80,568,253
12	Residential Net Lost Revenues	Evans Exhibit 2 pg 1-6	19,612,717	6,294,025	894,901	9,715,212	1,534,156	-	2,310,499	(86,953)	40,274,557
13	Total Residential EE/DSM Revenue Requirement	Line 11 + Line 12	79,304,216	6,294,025	19,790,092	9,715,212	2,654,647	-	3,018,403	66,216	120,842,811
14	Total Collected for Vintage Year 2018 (through estimated Rider 13)	Listebarge Exhibit 4, Line 1									120,949,591
15	**Total Residential EE/DSM Revenue Requirement**	Line 13 - Line 14									$ (106,780)
											See Listebarger Exhibit A for rate
			2,573,528		17,238	-	(5,588)	-			

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	E-7 Sub 1130 Rider 9 Year 1 Estimate	E-7 Sub 1164 Year 2018 Yr 2 LR Estimate	E-7 Sub 1192 Rider 11 True up	E-7 Sub 1192 Year 2018 Year 3 Estimate	E-7 Sub 1230 Rider 12 True Up	E-7 Sub 1230 Year 2018 Yr 4 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1265 Rider 14 True up	Year 2018
16	Non- Residential EE Program Cost	Evans Exhibit 1 pg. 1, Line 23 * NC Alloc. Factor	40,592,949		(3,317,005)		0		-	-	37,275,944
17	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 1, Line 23 * NC Alloc. Factor	11,623,199		2,818,045		(25,396)		(10,579)	-	14,405,269
18	Return on undercollection of Non-residential EE Program Costs	Listebarger Exhibit 3 page 3			461,049		592,305		407,815	27,855	1,489,024
19	Total EE Program Cost and Incentive Components	Line 16 + Line 17 + Line 18	52,216,148		(37,911)		566,910		397,236	27,855	53,170,237
20	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	1.001302	
21	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 19 * Line 20	52,289,355		(37,962)		567,648		397,753	27,891	53,244,685
22	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg 1-6	5,167,253	8,746,000	2,933,863	9,507,185	(1,090,744)	2,182,027	(2,020,437)	(47,064)	25,378,082
23	Total Non-Residential EE Revenue Requirement	Line 21 + Line 22	57,456,608	8,746,000	2,895,901	9,507,185	(523,097)	2,182,027	(1,622,684)	(19,173)	78,622,767
24	Total Collected for Vintage Year 2018 (through estimated Rider 13)	Listebarger Exhibit 4 Line 7									78,964,947
25	Non-Residential EE Revenue Requirement	Line 23 - Line 24									(342,180)
26	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 4									15,445,061,521
27	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 25/Line 26*100									**(0.0022)**

DSM Programs

Line		Reference	E-7 Sub 1130 Rider 9 Year 1 Estimate		E-7 Sub 1192 Rider 11 True up		E-7 Sub 1230 Rider 12 True Up		E-7 Sub 1249 Rider 13 True up	E-7 Sub 1265 Rider 14 True up	Year 2018
28	Non-Residential DSM Program Cost	Evans Exhibit 1, pg. 1 Line 10 + Line 26 * NC Alloc. Factor	11,959,889		651,281		(0)		-	-	12,611,170
29	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1, pg. 1 Line 10 + Line 26 * NC Alloc. Factor	3,103,667		232,789		(7,197)		(372)	739	3,329,626
30	Return on undercollection of Non-residential DSM Program Costs	Listebarger Exhibit 3 page 4	-		37,743		76,651		54,598	11,654	180,645
31	Total Non-Residential DSM Program Cost and Incentive Components	Line 28 + Line 29 + Line 30	15,063,556		921,813		69,454		54,225	12,393	16,121,441
32	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	1.001302	
33	Total Non-Residential DSM Revenue Requirement	Line 31 * Line 32	15,084,675		923,059		69,544		54,296	12,409	16,143,983
34	Total Collected for Vintage Year 2018 (through estimated Rider 13)	Listebarger Exhibit 4 Line 12									16,206,515
35	Non-Residential EE Revenue Requirement True-up Amount	Line 33 - Line 34									(62,531)
36	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6, Line 5									16,537,337,560
37	**NC Non-Residential DSM billing factor**	Line 35/Line 36*100									**(0.0004)**

** Actual regulatory fee rate in effect in year of collection. May differ from original filed estimates.

Listebarger Exhibit 2, page 2
Supplemental

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Year 4 Lost Revenue and True Up of Year 1 and Year 2 for Vintage Year 2019

RESIDENTIAL
Energy Efficiency Programs

Line		Reference	E-7 Sub 1164 Rider 10 Year 1 Estimate	E-7 Sub 1192 Year 2019 Yr 2 LR Estimate	E-7 Sub 1230 Rider 12 True up	E-7 Sub 1230 Year 2019 Yr 3 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1249 Year 2020 Yr 4 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2019
1	Residential EE Program Cost	Evans Exhibit 1 pg. 2, Line 9 * NC Alloc. Factor	$ 41,002,874		$ 13,243,503		$ (0)		$ 0	$ 54,246,377
2	Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 2, Line 9 * NC Alloc. Factor	3,801,819		3,296,056		(124,962)		90,385	7,063,299
3	Return on undercollection of Residential EE Program Costs	Listebarger Exhibit 3 pg 5			55,738		750,744		511,698	1,318,179
4	Total EE Program Cost and Incentive Components	Line 1 + Line 2 + Line 3	44,804,694		16,595,296		625,782		602,083	62,627,855
5	Residential DSM Program Cost	Evans Exhibit 1 pg. 2, Line 10 + Line 26 * NC Alloc. Factor	10,577,352		(308,751)		(0)		(0)	10,268,601
6	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 2, Line 10 + Line 26 * NC Alloc. Factor	2,773,086		541,821		0		26,383	3,341,290
7	Return on undercollection of Residential DSM Program Costs	Listebarger Exhibit 3 pg 6			(6,600)		(21,193)		6,578	(21,215)
8	Total DSM Program Cost and Incentive Components	Line 5 + Line 6 + Line 7	13,350,438		226,469		(21,193)		32,961	13,588,676
9	Total EE/DSM Program Cost and Incentive Components	Line 4 + Line 8	58,155,132		16,821,766		604,589		635,045	76,216,531
10	Revenue-related taxes and regulatory fees factor **	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	
11	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 9 * Line 10	58,236,665		16,844,509		605,376		635,871	76,322,421
12	Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	18,783,204	5,519,302	6,704,043	5,292,331	(1,623,869)	2,233,068	236,622	37,144,701
13	Total Residential EE/DSM Revenue Requirement	Line 11 + Line 12	77,019,869	5,519,302	23,548,552	5,292,331	(1,018,493)	2,233,068	872,493	113,467,122
14	Total Collected for Vintage Year 2019 (through estimated Rider 13)	Listebarger Exhibit 4, Line 2								112,534,414
15	**Total Residential EE/DSM Revenue Requirement**	Line 13 - Line 14								$ 932,709

Note: No prospective Year 4 lost revenue is included in this exhibit because the rate case test period was extended for residential customers.

See Listebarger Exhibit A for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	E-7 Sub 1164 Rider 10 Year 1 Estimate	E-7 Sub 1192 Year 2019 Yr 2 LR Estimate	E-7 Sub 1230 Rider 12 True up	E-7 Sub 1230 Year 2019 Yr 3 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1249 Year 2020 Yr 4 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2019
16	Non- Residential EE Program Cost	Evans Exhibit 1 pg. 2, Line 23 * NC Alloc. Factor	41,671,833		(8,698,625)		-		0	32,973,208
17	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 2, Line 23 * NC Alloc. Factor	8,464,629		1,873,850		759,937		(0)	11,098,417
18	Return on undercollection of Non-residential EE Program Costs	Listebarger Exhibit 3 page 7			(553,659)		(275,034)		(181,099)	(1,009,792)
19	Total EE Program Cost and Incentive Components	Line 16 + Line 17 + Line 18	50,136,462		(7,378,434)		484,904		(181,099)	43,061,833
20	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	
21	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 19 * Line 20	50,206,753		(7,388,410)		485,535		(181,335)	43,122,544
22	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	5,590,446	9,219,870	452,216	10,794,655	(8,183,962)	2,074,187	874,289	20,821,700
23	Total Non-Residential EE Revenue Requirement	Line 21 + Line 22	55,797,199	9,219,870	(6,936,194)	10,794,655	(7,698,427)	2,074,187	692,954	63,944,244
24	Total Collected for Vintage Year 2019 (through estimated Rider 13)	Listebarger Exhibit 4 Line 8								62,905,222
25	Non-Residential EE Revenue Requirement	Line 23 - Line 24								1,039,022
26	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 6								15,395,466,337
27	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 25/Line 26*100								**0.0067**

Note: Only non-residential customer lost revenues earned after the rate case test period have been included.

DSM Programs

Line		Reference	E-7 Sub 1164 Rider 10 Year 1 Estimate		E-7 Sub 1230 Rider 12 True up		E-7 Sub 1249 Rider 13 True up		E-7 Sub 1265 Rider 14 True up	Year 2019
28	Non-Residential DSM Program Cost	Evans Exhibit 1 pg. 2, Line 10 + Line 26 * NC Alloc. Factor	12,538,168		(462,163)		-		(0)	12,076,005
29	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 2, Line 10 + Line 26 * NC Alloc. Factor	3,287,157		611,215		-		31,027	3,929,399
30	Return on undercollection of Non-residential DSM Program Costs	Listebarger Exhibit 3 page 8	-		(9,744)		7,619		1,582	(542)
31	Total Non-Residential DSM Program Cost and Incentive Components	Line 28 + Line 29 + Line 30	15,825,325		139,308		7,619		32,609	16,004,862
32	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	
33	Total Non-Residential DSM Revenue Requirement	Line 31 * Line 32	15,847,512		139,497		7,629		32,651	16,027,289
34	Total Collected for Vintage Year 2019 (through estimated Rider 13)	Listebarger Exhibit 4 Line 13								15,970,311
35	Non-Residential EE Revenue Requirement True-up Amount	Line 33 - Line 34								56,978
36	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6, Line 7								16,570,566,722
37	**NC Non-Residential DSM billing factor**	Line 35/Line 36*100								**0.0003**

** Actual regulatory fee rate in effect in year of collection. May differ from original filed estimates.

Listebarger Exhibit 2, page 3
Supplemental

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Year 3 Lost Revenue and True Up of Year 1 for Vintage Year 2020

RESIDENTIAL
Energy Efficiency Programs

Line		Reference	Year 2020 Yr 4 LR Estimate	E-7 Sub 1192 Rider 11 Year 1 Estimate	E-7 Sub 1230 Year 2020 Yr 2 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1249 Year 2020 Yr 3 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2020
1	Residential EE Program Cost	Evans Exhibit 1 pg. 3, Line 9 * NC Alloc. Factor		$ 33,551,578		$ 4,000,501		$ -	$ 37,552,079
2	Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 3, Line 9 * NC Alloc. Factor		3,173,534		1,218,929		90,910	4,483,373
3	Return on undercollection of Residential EE Program Costs	Listebarger Exhibit 3 pg 9				147,060		453,648	600,708
4	Total EE Program Cost and Incentive Components	Line 1 + Line 2 + Line 3		36,725,112		5,366,490		544,558	42,636,160
5	Residential DSM Program Cost	Evans Exhibit 1 pg. 3, Line 10 + Line 26 * NC Alloc. Factor		12,243,392		(2,355,317)		-	9,888,075
6	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 3, Line 10 + Line 26 * NC Alloc. Factor		3,189,876		7,301		14,471	3,211,648
7	Return on overcollection of Residential DSM Program Costs	Listebarger Exhibit 3 pg 10				(62,603)		(158,389)	(220,992)
8	Total DSM Program Cost and Incentive Components	Line 5 + Line 6 + Line 7		15,433,268		(2,410,619)		(143,918)	12,878,731
9	Total EE/DSM Program Cost and Incentive Components	Line 4 + Line 8		52,158,380		2,955,871		400,640	55,514,892
10	Revenue-related taxes and regulatory fees factor **	Listebarger Exhibit 2, pg. 7		1.001402		1.001302		1.001302	
11	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 9 * Line 10		52,231,506		2,959,720		401,162	55,592,388
12	Residential Net Lost Revenues	Evans Exhibit 2 pg. 1-6	$ 2,568,275	14,667,095	4,495,479	6,588,261	5,386,818	609,516	31,747,169
13	Total Residential EE/DSM Revenue Requirement	Line 11 + Line 12	2,568,275	66,898,602	4,495,479	9,547,981	5,386,818	1,010,678	87,339,557
14	Total Collected for Vintage Year 2020 (through estimated Rider 13)	Listebarger Exhibit 4, Line 3							86,380,883
15	**Total Residential EE/DSM Revenue Requirement**	Line13 - Line 14	$ 2,568,275						$ 958,673

See Listebarger Exhibit A for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	Year 2020 Yr 4 LR Estimate	E-7 Sub 1192 Rider 11 Year 1 Estimate	E-7 Sub 1230 Year 2020 Yr 2 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1249 Year 2020 Yr 3 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2020
16	Non- Residential EE Program Cost	Evans Exhibit 1 pg. 3, Line 23 * NC Alloc. Factor		37,708,077		(15,681,234)		-	22,026,843
17	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 3, Line 23 * NC Alloc. Factor		10,010,194		(2,909,256)		98,425	7,199,363
18	Return on overcollection of Non-residential EE Program Costs	Listebarger Exhibit 3 page 11				(324,916)		(586,906)	(911,822)
19	Total EE Program Cost and Incentive Components	Line 16 + Line 17 + Line 18		47,718,271		(18,915,406)		(488,481)	28,314,384
20	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7		1.001402		1.001302		1.001302	
21	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 19 * Line 20		47,785,172		(18,940,034)		(489,117)	28,356,021
22	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg. 1 - 6	3,845,961	5,183,193	9,376,721	(4,169,004)	6,802,676	1,081,898	18,275,484
23	Total Non-Residential EE Revenue Requirement	Line 21 + Line 22	3,845,961	52,968,365	9,376,721	(23,109,038)	6,802,676	592,781	46,631,505
24	Total Collected for Vintage Year 2020 (through estimated Rider 13)	Listebarger Exhibit 4 Line 9							46,624,089
25	Non-Residential EE Revenue Requirement	Line 23 - Line 24	3,845,961						7,416
26	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 8	14,831,584,100						14,831,584,100
27	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 25/Line 26*100	**0.0259**						**0.0001**

DSM Programs

Line		Reference	E-7 Sub 1192 Rider 11 Year 1 Estimate		E-7 Sub 1249 Rider 13 True up		E-7 Sub 1265 Rider 14 True up	Year 2020
28	Non-Residential DSM Program Cost	Evans Exhibit 1 pg. 3, Line 10 + Line 26 * NC Alloc. Factor	15,789,462		(3,918,078)		-	11,871,383
29	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 3, Line 10 + Line 26 * NC Alloc. Factor	4,113,764		(275,311)		17,373	3,855,826
30	Return on overcollection of Non-residential DSM Program Costs	Listebarger Exhibit 3 page 12	-		(63,113)		28,202	(34,911)
31	Total Non-Residential DSM Program Cost and Incentive Components	Line 28 + Line 29 + Line 30	19,903,226		(4,256,502)		45,575	15,692,299
32	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001302		1.001302	
33	Total Non-Residential DSM Revenue Requirement	Line 31 * Line 32	19,931,130		(4,262,044)		45,634	15,714,720
34	Total Collected for Vintage Year 2020 (through estimated Rider 13)	Listebarger Exhibit 4 Line 14						15,714,929
35	Non-Residential EE Revenue Requirement True-up Amount	Line 33- Line 34						(209)
36	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6 Line 9						16,609,571,340
37	**NC Non-Residential DSM billing factor**	Line 35/Line 36*100						-

** Actual regulatory fee rate in effect in year of collection. May differ from original filed estimates.

Listebarger Exhibit 2, page 4
Supplemental

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Year 3 Lost Revenue and True Up of Year 1 for Vintage Year 2021

RESIDENTIAL
Energy Efficiency Programs

Line		Reference	Year 2021 Yr 3 LR Estimate	E-7 Sub 1230 Rider 12 Year 1 Estimate	E-7 Sub 1249 Year 2021 Yr 2 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2021
1	Residential EE Program Cost	Evans Exhibit 1 pg. 4, Line 9 * NC Alloc. Factor		$ 37,155,471		$ (10,923,999)	$ 26,231,472
2	Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 4, Line 9 * NC Alloc. Factor		2,774,995		(244,088)	2,530,907
3	Return on undercollection of Residential EE Program Costs	Listebarger Exhibit 3 pg 13				(427,153)	(427,153)
4	Total EE Program Cost and Incentive Components	Line 1 + Line 2 + Line 3		39,930,466		(11,595,240)	28,335,226
5	Residential DSM Program Cost	Evans Exhibit 1 pg. 4, Line 10 + Line 26 * NC Alloc. Factor		13,699,485		(2,210,071)	11,489,414
6	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 4, Line 10 + Line 26 * NC Alloc. Factor		3,521,313		(751,140)	2,770,173
7	Return on overcollection of Residential DSM Program Costs	Listebarger Exhibit 3 pg 14				(105,961)	(105,961)
8	Total DSM Program Cost and Incentive Components	Line 5 + Line 6 + Line 7		17,220,797		(3,067,171)	14,153,626
9	Total EE/DSM Program Cost and Incentive Components	Line 4 + Line 8		57,151,264		(14,662,411)	42,488,852
10	Revenue-related taxes and regulatory fees factor **	Listebarger Exhibit 2, pg. 7		1.001302		1.001302	
11	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 9 * Line 10		57,225,674		(14,681,502)	42,544,173
12	Residential Net Lost Revenues	Evans Exhibit 2 pg. 1-6	$ 3,959,003	25,205,298	6,249,665	(8,091,427)	23,363,537
13	Total Residential EE/DSM Revenue Requirement	Line 11 + Line 12	3,959,003	82,430,974	6,249,665	(22,772,928)	65,907,710
14	Total Collected for Vintage Year 2021 (through estimated Rider 13)	Listebarger Exhibit 4, Line 4					88,242,571
15	**Total Residential EE/DSM Revenue Requirement**	Line13 - Line 14	$ 3,959,003				$ (22,334,861)

See Listebarger Exhibit A for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	Year 2021 Yr 3 LR Estimate	E-7 Sub 1230 Rider 12 Year 1 Estimate	E-7 Sub 1249 Year 2021 Yr 2 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2021
16	Non- Residential EE Program Cost	Evans Exhibit 1 pg. 4, Line 23 * NC Alloc. Factor		38,264,959		(8,510,352)	29,754,607
17	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 4, Line 23 * NC Alloc. Factor		8,888,527		(1,494,004)	7,394,523
18	Return on overcollection of Non-residential EE Program Costs	Listebarger Exhibit 3 page 15				(580,644)	(580,644)
19	Total EE Program Cost and Incentive Components	Line 16 + Line 17 + Line 18		47,153,486		(10,585,000)	36,568,486
20	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7		1.001302		1.001302	
21	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 19 * Line 20		47,214,880		(10,598,782)	36,616,098
22	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg. 1-6	10,003,040	6,360,715	13,494,665	(4,819,745)	15,035,634
23	Total Non-Residential EE Revenue Requirement	Line 21 + Line 22	10,003,040	53,575,595	13,494,665	(15,418,527)	51,651,733
24	Total Collected for Vintage Year 2021 (through estimated Rider 13)	Listebarger Exhibit 4 Line 10					64,059,539
25	Non-Residential EE Revenue Requirement	Line 23 - Line 24	10,003,040				(12,407,806)
26	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 10	14,903,909,177				14,903,909,177
27	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 25/Line 26*100	**0.0671**				**(0.0833)**

DSM Programs

Line		Reference	E-7 Sub 1230 Rider 12 Year 1 Estimate		E-7 Sub 1265 Rider 14 True up	Year 2021
28	Non-Residential DSM Program Cost	Evans Exhibit 1 pg. 4, Line 10 + Line 26 * NC Alloc. Factor	16,110,767		(3,154,656)	12,956,111
29	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 4, Line 10 + Line 26 * NC Alloc. Factor	4,141,109		(1,017,305)	3,123,804
30	Return on overcollection of Non-residential DSM Program Costs	Listebarger Exhibit 3 page 16	-		(77,597)	(77,597)
31	Total Non-Residential DSM Program Cost and Incentive Components	Line 28 + Line 29 + Line 30	20,251,876		(4,249,558)	16,002,318
32	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001302		1.001302	
33	Total Non-Residential DSM Revenue Requirement	Line 31 * Line 32	20,278,244		(4,255,091)	16,023,153
34	Total Collected for Vintage Year 2020 (through estimated Rider 13)	Listebarger Exhibit 4 Line 15				18,905,431
35	Non-Residential EE Revenue Requirement True-up Amount	Line 33- Line 34				(2,882,278)
36	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6 Line 11				16,646,430,078
37	**NC Non-Residential DSM billing factor**	Line 35/Line 36*100				**(0.0173)**

** Actual regulatory fee rate in effect in year of collection. May differ from original filed estimates.

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Year 2 Lost Revenues for Vintage Year 2022

RESIDENTIAL

Line		Reference	2022
1	Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	6,791,458
2	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 1	$ 22,809,393,337
3	**NC Residential EE Billing Factor (Cents/kWh)**	Line 1/Line 2*100	**0.0298**

NON-RESIDENTIAL
Energy Efficiency Programs

		Reference	2022
4	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	15,132,477
5	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6, Line 12	15,209,154,609
6	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 4/Line 5*100	**0.0995**

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Program Costs, Earned Incentive and Lost Revenues for Vintage Year 2023

RESIDENTIAL

Line		Reference	2023
1	Residential EE Program Cost	Evans Exhibit 1, pg. 5, Line 10 * NC Alloc. Factor	$ 43,514,258
2	Residential EE Earned Utility Incentive	Evans Exhibit 1, pg. 5, Line 10	5,293,270
3	Total EE Program Cost and Incentive Components	Line 1 + Line 2	48,807,528
4	Residential DSM Program Cost	Evans Exhibit 1 pg. 5, Line 11 + Line 26 * NC Alloc. Factor	12,159,515
5	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 5, Line 11 + Line 26 * NC Alloc. Factor	2,371,105
6	Total DSM Program Cost and Incentive Components	Line 4 + Line 5	14,530,620
7	Total EE/DSM Program Cost and Incentive Components	Line 3 + Line 6	63,338,148
8	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001302
9	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 7 * Line 8	63,420,614
10	Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	21,146,502
11	**Total Residential EE Revenue Requirement**	**Line 9 + Line 10**	**$ 84,567,117**

See Listebarger Exhibit 1 for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	2023
12	Non- Residential EE Program Cost	Evans Exhibit 1, pg. 5, Line 24 * NC Alloc. Factor	$ 45,838,354
13	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1, pg. 5, Line 24	12,167,415
14	Total EE Program Cost and Incentive Components	Line 12 + Line 13	58,005,769
15	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001302
16	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 14 * Line 15	58,081,293
17	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	7,667,494
18	Total Non-Residential EE Revenue Requirement	Line 16 + Line 17	$ 65,748,787
19	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 14	15,209,154,609
20	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 18/Line 19*100	**0.4323**

DSM Programs

Line		Reference	2023
21	Non-Residential DSM Program Cost	Evans Exhibit 1 pg. 5, Line 11 + Line 26 * NC Alloc. Factor	$ 13,711,755
22	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 5, Line 11 + Line 26 * NC Alloc. Factor	2,673,792
23	Total Non-Residential DSM Program Cost and Incentive Components	Line 21 + Line 22	16,385,547
24	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001302
25	Total Non-Residential DSM Revenue Requirement	Line 23 * Line 24	16,406,881
26	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6, Line 15	16,907,663,645
27	**NC Non-Residential DSM billing factor**	Line 25/Line 26*100	**0.0970**

Listebarger Exhibit 2, page 7
Supplemental

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Gross Receipts Tax Years 2018 through estimated 2022

	Year		Actual GRT Rate In Effect
Rider 9	2018		1.001402
Rider 10	2019		1.001402
	2020	Jan - June	1.001402
	2020	July - Dec	1.001302
Rider 11	2020	Weighted Average	1.001352
Rider 12	2021		1.001302
Rider 13	2022		1.001302
Rider 14	2023		1.001302

Note: the current rate is used as the estimate for 2022 and 2023. This will be subject to true-up based on actual rates in effect.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential EE Programs Vintage 2018

NC Residential EE		Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 1, Line 4			see calc. at right		
Beginning Balance		77,331,818		56,230,324	96,550,755			(54,997)
2021	January		72.7130507%	-	162,555	1.6199%	(2,633)	(2,633)
2021	February		72.7130507%	-	311,915	1.6199%	(5,053)	(5,053)
2021	March		72.7130507%	-	304,265	1.6199%	(4,929)	(4,929)
2021	April		72.7130507%	-	241,514	1.6199%	(3,912)	(3,912)
2021	May		72.7130507%	-	196,271	1.6199%	(3,179)	(3,179)
2021	June		72.7130507%	-	270,416	1.6199%	(4,381)	(4,381)
2021	July		72.7130507%	-	327,081	1.6199%	(5,298)	(5,298)
2021	August		72.7130507%	-	337,132	1.6199%	(5,461)	(5,461)
2021	September		72.7130507%	-	324,456	1.6199%	(5,256)	(5,256)
2021	October		72.7130507%	-	225,806	1.6199%	(3,658)	(3,658)
2021	November		72.7130507%	-	207,102	1.6199%	(3,355)	(3,355)
2021	December		72.7130507%	-	597,245	1.6199%	(9,675)	(9,675)
		77,331,818		56,230,324	100,056,516		(56,790)	(111,787)

Program Costs to be Recovered in Rider 12	(54,997)
Revenues to be Collected in Rider 12	3,395,034
% Revenue related to Program Costs	1.6199%

NC Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		(54,997)			(12,842)	(42,155)					
2021	January	(57,630)	0.233503	(615)	(13,457)	(44,173)	0.005469	(236)	(236)	0.766497	(308)
2021	February	(62,683)	0.233503	(1,180)	(14,637)	(48,046)	0.005469	(252)	(488)	0.766497	(637)
2021	March	(67,612)	0.233503	(1,151)	(15,788)	(51,824)	0.005469	(273)	(761)	0.766497	(993)
2021	April	(71,524)	0.233503	(914)	(16,701)	(54,823)	0.005469	(292)	(1,053)	0.766497	(1,374)
2021	May	(74,703)	0.233503	(742)	(17,443)	(57,260)	0.005469	(307)	(1,359)	0.766497	(1,774)
2021	June	(79,084)	0.233503	(1,023)	(18,466)	(60,618)	0.005469	(322)	(1,682)	0.766497	(2,194)
2021	July	(84,382)	0.233503	(1,237)	(19,704)	(64,679)	0.005469	(343)	(2,024)	0.766497	(2,641)
2021	August	(89,844)	0.233503	(1,275)	(20,979)	(68,865)	0.005469	(365)	(2,390)	0.766497	(3,118)
2021	September	(95,100)	0.233503	(1,227)	(22,206)	(72,894)	0.005469	(388)	(2,777)	0.766497	(3,623)
2021	October	(98,757)	0.233503	(854)	(23,060)	(75,697)	0.005469	(406)	(3,184)	0.766497	(4,154)
2021	November	(102,112)	0.233503	(783)	(23,844)	(78,269)	0.005469	(421)	(3,605)	0.766497	(4,703)
2021	December	(111,787)	0.233503	(2,259)	(26,103)	(85,685)	0.005469	(448)	(4,053)	0.766497	(5,288)
	Checks			(13,261)	(13,261)	(26,103)		(4,053)			(5,288)

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balances have been added in row 32. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance. Formula was also corrected for cell I33 as the original formula was pulling a blank cell.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2018

NC Residential DSM		Residential DSM Program Costs Incurred	NC Allocation %	NC Allocated DSM Program Costs	NC Residential Revenue Collected	NC Residential DSM Program Collection %	DSM Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 1, Line 9			see calc. at right		
Beginning Balance		30,409,405		9,778,896	12,353,771		(9,778,182)	713
2021	January		32.1574721%	-	(35,889)	0.0951%	34	34
2021	February		32.1574721%	-	(68,864)	0.0951%	65	65
2021	March		32.1574721%	-	(67,175)	0.0951%	64	64
2021	April		32.1574721%	-	(53,321)	0.0951%	51	51
2021	May		32.1574721%	-	(43,333)	0.0951%	41	41
2021	June		32.1574721%	-	(59,702)	0.0951%	57	57
2021	July		32.1574721%	-	(72,213)	0.0951%	69	69
2021	August		32.1574721%	-	(74,432)	0.0951%	71	71
2021	September		32.1574721%	-	(71,633)	0.0951%	68	68
2021	October		32.1574721%	-	(49,853)	0.0951%	47	47
2021	November		32.1574721%	-	(45,724)	0.0951%	43	43
2021	December		32.1574721%	-	(44,915)	0.0951%	43	43
		30,409,405		9,778,896	11,666,717		(9,777,529)	1,366

Program Costs to be Recovered in Rider 12	713
Revenues to be Collected in Rider 12	(749,324)
% Revenue related to Program Costs	0.0951%

NC Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		713			166	546					
2021	January	747	0.233503	8	174	572	0.005469	3	3	0.766497	4
2021	February	812	0.233503	15	190	623	0.005469	3	6	0.766497	8
2021	March	876	0.233503	15	205	671	0.005469	4	10	0.766497	13
2021	April	927	0.233503	12	216	710	0.005469	4	14	0.766497	18
2021	May	968	0.233503	10	226	742	0.005469	4	18	0.766497	23
2021	June	1,025	0.233503	13	239	785	0.005469	4	22	0.766497	28
2021	July	1,093	0.233503	16	255	838	0.005469	4	26	0.766497	34
2021	August	1,164	0.233503	17	272	892	0.005469	5	31	0.766497	40
2021	September	1,232	0.233503	16	288	945	0.005469	5	36	0.766497	47
2021	October	1,280	0.233503	11	299	981	0.005469	5	41	0.766497	54
2021	November	1,323	0.233503	10	309	1,014	0.005469	5	47	0.766497	61
2021	December	1,366	0.233503	10	319	1,047	0.005469	6	52	0.766497	68
	Checks			153	153	319		52			68

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balances have been added in row 32. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance. Formula was also corrected for cell I33 as the original formula was pulling a blank cell.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Non- Residential EE Programs Vintage 2018

NC Non- Residential EE		Non-Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	NC Residential Revenue Collected	NC Non-Residential EE Program Collection %	Non-Residential EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5. pg 1, Line 4			See calc. at right		
Beginning Balance		51,264,448		37,275,944	64,192,958		20,546,481	1,342,401
2021	January		72.7130507%	-	376,128	96.0330337%	(361,207)	(361,206)
2021	February		72.7130507%	-	139,345	96.0330337%	(133,817)	(133,817)
2021	March		72.7130507%	-	104,126	96.0330337%	(99,995)	(99,995)
2021	April		72.7130507%	-	102,159	96.0330337%	(98,106)	(98,106)
2021	May		72.7130507%	-	94,315	96.0330337%	(90,573)	(90,573)
2021	June		72.7130507%	-	118,155	96.0330337%	(113,468)	(113,468)
2021	July		72.7130507%	-	135,313	96.0330337%	(129,945)	(129,945)
2021	August		72.7130507%	-	131,110	96.0330337%	(125,908)	(125,908)
2021	September		72.7130507%	-	143,390	96.0330337%	(137,702)	(137,702)
2021	October		72.7130507%	-	114,526	96.0330337%	(109,983)	(109,983)
2021	November		72.7130507%	-	99,907	96.0330337%	(95,944)	(95,944)
2021	December		72.7130507%	-	154,161	96.0330337%	(148,046)	(148,046)
		51,264,448		37,275,944	65,905,594		18,901,785	(302,294)

Program Costs to be Recovered in Rider 12	1,342,401
Revenues to be Collected in Rider 12	1,397,854
% Revenue to be assigned to Program Costs	96.03%

NC Non-Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		1,342,401			313,455	1,028,946					
2021	January	981,195	0.233503	(84,343)	229,112	752,083	0.005469	4,870	4,870	0.766497	6,354
2021	February	847,377	0.233503	(31,247)	197,865	649,512	0.005469	3,833	8,703	0.766497	11,354
2021	March	747,382	0.233503	(23,349)	174,516	572,866	0.005469	3,343	12,046	0.766497	15,715
2021	April	649,276	0.233503	(22,908)	151,608	497,668	0.005469	2,927	14,973	0.766497	19,535
2021	May	558,703	0.233503	(21,149)	130,459	428,244	0.005469	2,532	17,505	0.766497	22,838
2021	June	445,234	0.233503	(26,495)	103,964	341,271	0.005469	2,104	19,610	0.766497	25,583
2021	July	315,289	0.233503	(30,343)	73,621	241,668	0.005469	1,594	21,204	0.766497	27,663
2021	August	189,381	0.233503	(29,400)	44,221	145,160	0.005469	1,058	22,262	0.766497	29,043
2021	September	51,679	0.233503	(32,154)	12,067	39,611	0.005469	505	22,767	0.766497	29,702
2021	October	(58,304)	0.233503	(25,681)	(13,614)	(44,690)	0.005469	(14)	22,753	0.766497	29,684
2021	November	(154,248)	0.233503	(22,403)	(36,017)	(118,231)	0.005469	(446)	22,307	0.766497	29,103
2021	December	(302,294)	0.233503	(34,569)	(70,587)	(231,707)	0.005469	(957)	21,350	0.766497	27,855
	Checks			(384,041)	(384,041)	(70,587)		21,350			27,855

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balances have been added in row 34. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance. Formula was also corrected for cell I33 as the original formula was pulling a blank cell.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation -Non - Residential DSM Programs Vintage 2018

NC Non- Residential DSM		Total System NC DSM Program Costs Incurred	NC Non- Residential DSM Allocation %	NC Allocated DSM Non- Residential Program Costs	NC Non-Residential DSM Revenue Collected	NC Non- Residential DSM Program Collection %	Non-Residential DSM Program Costs Revenue Collected	(Over)/Under Collection
			See Listebarger Exhibit 5 pg. 1, Line 10					
Beginning Balance		30,409,405	41.4712829%	12,611,170	1,218,346		(12,466,415)	144,755
2021	January	-	41.4712829%	-	33,936	-59.5662739%	20,214	(20,214)
2021	February	-	41.4712829%	-	(10,867)	-59.5662739%	(6,473)	6,473
2021	March	-	41.4712829%	-	(17,268)	-59.5662739%	(10,286)	10,286
2021	April	-	41.4712829%	-	(16,980)	-59.5662739%	(10,115)	10,115
2021	May	-	41.4712829%	-	(15,445)	-59.5662739%	(9,200)	9,200
2021	June	-	41.4712829%	-	(19,453)	-59.5662739%	(11,587)	11,587
2021	July	-	41.4712829%	-	(22,697)	-59.5662739%	(13,520)	13,520
2021	August	-	41.4712829%	-	(22,169)	-59.5662739%	(13,205)	13,205
2021	September	-	41.4712829%	-	(23,209)	-59.5662739%	(13,825)	13,825
2021	October	-	41.4712829%	-	(17,763)	-59.5662739%	(10,580)	10,580
2021	November	-	41.4712829%	-	(18,286)	-59.5662739%	(10,892)	10,892
2021	December	-	41.4712829%	-	(17,874)	-59.5662739%	(10,647)	10,647
		30,409,405		12,611,170	1,050,271		(12,566,531)	244,871

Program Costs to be Recovered in Rider 12	144,755
Revenues to be Collected in Rider 12	(243,015)
% Revenue to be assigned to Program Costs	-59.57%

NC Non-Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		144,755			33,801	110,954					
2021	January	124,541	0.233503	(4,720)	29,081	95,460	0.005469	564	564	0.766497	736
2021	February	131,014	0.233503	1,512	30,592	100,422	0.005469	536	1,100	0.766497	1,435
2021	March	141,300	0.233503	2,402	32,994	108,306	0.005469	571	1,671	0.766497	2,180
2021	April	151,414	0.233503	2,362	35,356	116,059	0.005469	614	2,284	0.766497	2,980
2021	May	160,614	0.233503	2,148	37,504	123,110	0.005469	654	2,938	0.766497	3,834
2021	June	172,201	0.233503	2,706	40,210	131,992	0.005469	698	3,636	0.766497	4,744
2021	July	185,721	0.233503	3,157	43,366	142,355	0.005469	750	4,386	0.766497	5,723
2021	August	198,926	0.233503	3,083	46,450	152,476	0.005469	806	5,193	0.766497	6,774
2021	September	212,751	0.233503	3,228	49,678	163,073	0.005469	863	6,055	0.766497	7,900
2021	October	223,332	0.233503	2,471	52,149	171,183	0.005469	914	6,969	0.766497	9,093
2021	November	234,224	0.233503	2,543	54,692	179,532	0.005469	959	7,929	0.766497	10,344
2021	December	244,871	0.233503	2,486	57,178	187,693	0.005469	1,004	8,933	0.766497	11,654
	Checks			23,377	23,377	57,178		8,933			11,654

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balances have been added in row 29. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance. Formula was also corrected for cell I33 as the original formula was pulling a blank cell.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential EE Programs Vintage 2019

NC Residential EE		Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 2, Line 4			see calc. at right		
Beginning Balance		74,218,205		54,246,377	63,652,577		(39,726,803)	14,519,574
2021	January		73.0903918%	-	1,381,718	50.2421%	(694,204)	(694,204)
2021	February		73.0903918%	-	2,651,280	50.2421%	(1,332,058)	(1,332,058)
2021	March		73.0903918%	-	2,586,255	50.2421%	(1,299,389)	(1,299,389)
2021	April		73.0903918%	-	2,052,872	50.2421%	(1,031,406)	(1,031,406)
2021	May		73.0903918%	-	1,668,307	50.2421%	(838,192)	(838,192)
2021	June		73.0903918%	-	2,298,538	50.2421%	(1,154,834)	(1,154,834)
2021	July		73.0903918%	-	2,780,192	50.2421%	(1,396,827)	(1,396,827)
2021	August		73.0903918%	-	2,865,623	50.2421%	(1,439,749)	(1,439,749)
2021	September		73.0903918%	-	2,757,880	50.2421%	(1,385,617)	(1,385,617)
2021	October		73.0903918%	-	1,919,352	50.2421%	(964,323)	(964,323)
2021	November		73.0903918%	-	1,760,369	50.2421%	(884,446)	(884,446)
2021	December		73.0903918%	-	4,187,905	50.2421%	(2,104,091)	(2,104,091)
		74,218,205		54,246,377	92,562,868		(54,251,938)	(5,561)

Program Costs to be Recovered in Rider 12	14,519,574
Revenues to be Collected in Rider 12	28,899,221
% Revenue related to Program Costs	50.2421%

NC Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		14,519,574			3,390,364	11,129,210					
2021	January	13,825,370	0.233503	(162,099)	3,228,265	10,597,105	0.005469	59,413	59,413	0.766497	77,512
2021	February	12,493,311	0.233503	(311,040)	2,917,226	9,576,086	0.005469	55,165	114,578	0.766497	149,483
2021	March	11,193,923	0.233503	(303,411)	2,613,815	8,580,108	0.005469	49,650	164,228	0.766497	214,257
2021	April	10,162,517	0.233503	(240,836)	2,372,978	7,789,539	0.005469	44,764	208,992	0.766497	272,658
2021	May	9,324,325	0.233503	(195,720)	2,177,258	7,147,067	0.005469	40,845	249,837	0.766497	325,947
2021	June	8,169,491	0.233503	(269,657)	1,907,601	6,261,890	0.005469	36,668	286,505	0.766497	373,785
2021	July	6,772,664	0.233503	(326,163)	1,581,437	5,191,227	0.005469	31,320	317,825	0.766497	414,646
2021	August	5,332,915	0.233503	(336,186)	1,245,252	4,087,664	0.005469	25,374	343,199	0.766497	447,750
2021	September	3,947,299	0.233503	(323,546)	921,706	3,025,593	0.005469	19,452	362,651	0.766497	473,127
2021	October	2,982,976	0.233503	(225,172)	696,534	2,286,442	0.005469	14,526	377,177	0.766497	492,079
2021	November	2,098,530	0.233503	(206,521)	490,013	1,608,517	0.005469	10,651	387,828	0.766497	505,975
2021	December	(5,561)	0.233503	(491,312)	(1,299)	(4,263)	0.005469	4,387	392,215	0.766497	511,698
	Checks			(3,391,663)	(3,391,663)	(1,299)		392,215			511,698

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Error found in cell D13. The link was pulling 2018 rate. Update had no impact on calculation.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2019

NC Residential DSM		Total System NC DSM Program Costs Incurred	NC Allocation %	NC Allocated DSM Program Costs	NC Residential Revenue Collected	NC Residential DSM Program Collection %	DSM Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 2, Line 9			see calc. at right		
Beginning Balance		30,097,219		10,268,600	13,367,259		(10,090,987)	177,614
2021	January		34.1181040%		10,556	77.7199%	(8,204)	(8,204)
2021	February		34.1181040%	-	20,254	77.7199%	(15,742)	(15,742)
2021	March		34.1181040%	-	19,757	77.7199%	(15,355)	(15,355)
2021	April		34.1181040%	-	15,683	77.7199%	(12,189)	(12,189)
2021	May		34.1181040%	-	12,745	77.7199%	(9,905)	(9,905)
2021	June		34.1181040%	-	17,559	77.7199%	(13,647)	(13,647)
2021	July		34.1181040%	-	21,239	77.7199%	(16,507)	(16,507)
2021	August		34.1181040%	-	21,892	77.7199%	(17,014)	(17,014)
2021	September		34.1181040%	-	21,069	77.7199%	(16,374)	(16,374)
2021	October		34.1181040%	-	14,663	77.7199%	(11,396)	(11,396)
2021	November		34.1181040%	-	13,448	77.7199%	(10,452)	(10,452)
2021	December		34.1181040%	-	(31,620)	77.7199%	24,575	24,575
		30,097,219		10,268,600	13,524,504		(10,213,197)	55,403

Program Costs to be Recovered in Rider 12	177,614
Revenues to be Collected in Rider 12	228,531
% Revenue related to Program Costs	77.7199%

NC Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		177,614			41,473	136,140					
2021	January	169,410	0.233503	(1,916)	39,558	129,852	0.005469	727	727	0.766497	949
2021	February	153,668	0.233503	(3,676)	35,882	117,786	0.005469	677	1,405	0.766497	1,832
2021	March	138,313	0.233503	(3,586)	32,296	106,016	0.005469	612	2,017	0.766497	2,631
2021	April	126,124	0.233503	(2,846)	29,450	96,674	0.005469	554	2,571	0.766497	3,354
2021	May	116,219	0.233503	(2,313)	27,137	89,081	0.005469	508	3,079	0.766497	4,017
2021	June	102,572	0.233503	(3,187)	23,951	78,621	0.005469	459	3,537	0.766497	4,615
2021	July	86,065	0.233503	(3,854)	20,096	65,968	0.005469	395	3,933	0.766497	5,131
2021	August	69,051	0.233503	(3,973)	16,124	52,927	0.005469	325	4,258	0.766497	5,555
2021	September	52,676	0.233503	(3,823)	12,300	40,376	0.005469	255	4,513	0.766497	5,888
2021	October	41,280	0.233503	(2,661)	9,639	31,641	0.005469	197	4,710	0.766497	6,145
2021	November	30,828	0.233503	(2,441)	7,199	23,630	0.005469	151	4,861	0.766497	6,342
2021	December	55,403	0.233503	5,738	12,937	42,466	0.005469	181	5,042	0.766497	6,578
	Checks			(28,537)	(28,537)	12,937		5,042			6,578

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balance has been added in cell C32. Cell E33 was pulling the wrong cell so formula has been updated, the cumulative deferred income tax was therefore impacted as well.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Non- Residential EE Programs Vintage 2019

NC Non- Residential EE		Non-Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Performance Incentives	Lost Revenues	Total Costs	NC Residential Revenue Collected	NC Non-Residential EE Program Collection %	Non-Residential EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5. pg 2, Line 4						100% used due to overcollection		
Beginning Balance		45,112,919		32,973,209	10,338,479	14,874,342	58,186,030	61,095,561		(61,095,561)	(2,909,531)
2021	January		73.0903918%		63,328	495,613	558,941	286,260	100.00%	(286,260)	272,682
2021	February		73.0903918%		63,328	495,613	558,941	529,758	100.00%	(529,758)	29,183
2021	March		73.0903918%		63,328	495,613	558,941	539,266	100.00%	(539,266)	19,676
2021	April		73.0903918%		63,328	495,613	558,941	532,898	100.00%	(532,898)	26,043
2021	May		73.0903918%		63,328	495,613	558,941	495,950	100.00%	(495,950)	62,992
2021	June		73.0903918%		63,328	495,613	558,941	616,582	100.00%	(616,582)	(57,640)
2021	July		73.0903918%		63,328	495,613	558,941	708,170	100.00%	(708,170)	(149,229)
2021	August		73.0903918%		63,328	495,613	558,941	684,592	100.00%	(684,592)	(125,650)
2021	September		73.0903918%		63,328	495,613	558,941	747,597	100.00%	(747,597)	(188,656)
2021	October		73.0903918%		63,328	495,613	558,941	601,473	100.00%	(601,473)	(42,531)
2021	November		73.0903918%		63,328	495,613	558,941	522,512	100.00%	(522,512)	36,429
2021	December		73.0903918%		63,328	495,613	558,941	655,807	100.00%	(655,807)	(96,866)
		45,112,919		32,973,209	11,098,417	20,821,700	64,893,326	68,016,425		(68,016,425)	(3,123,099)

Since Rider 13 was overcollected, interest has continued to be calculated on the entire balance. Lost revenues earned in 2021 were applied to the outstanding balance and all revenues collected in 2021 were also applied to the outstanding balance.

NC Non-Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		(2,909,531)			(679,384)	(2,230,146)					
2021	January	(2,636,849)	0.233503	63,672	(615,712)	(2,021,137)	0.005469	(11,626)	(11,626)	0.766497	(15,167)
2021	February	(2,607,666)	0.233503	6,814	(608,898)	(1,998,768)	0.005469	(10,993)	(22,618)	0.766497	(29,509)
2021	March	(2,587,990)	0.233503	4,594	(604,303)	(1,983,687)	0.005469	(10,890)	(33,509)	0.766497	(43,717)
2021	April	(2,561,947)	0.233503	6,081	(598,222)	(1,963,725)	0.005469	(10,795)	(44,303)	0.766497	(57,800)
2021	May	(2,498,955)	0.233503	14,709	(583,514)	(1,915,442)	0.005469	(10,608)	(54,911)	0.766497	(71,639)
2021	June	(2,556,596)	0.233503	(13,459)	(596,973)	(1,959,623)	0.005469	(10,597)	(65,508)	0.766497	(85,464)
2021	July	(2,705,825)	0.233503	(34,845)	(631,818)	(2,074,007)	0.005469	(11,030)	(76,538)	0.766497	(99,854)
2021	August	(2,831,475)	0.233503	(29,340)	(661,158)	(2,170,317)	0.005469	(11,606)	(88,145)	0.766497	(114,997)
2021	September	(3,020,131)	0.233503	(44,052)	(705,210)	(2,314,921)	0.005469	(12,265)	(100,410)	0.766497	(130,998)
2021	October	(3,062,663)	0.233503	(9,931)	(715,141)	(2,347,522)	0.005469	(12,750)	(113,160)	0.766497	(147,632)
2021	November	(3,026,233)	0.233503	8,506	(706,635)	(2,319,599)	0.005469	(12,763)	(125,922)	0.766497	(164,283)
2021	December	(3,123,099)	0.233503	(22,618)	(729,253)	(2,393,846)	0.005469	(12,889)	(138,812)	0.766497	(181,099)
	Checks			(49,869)	(49,869)	(729,253)		(138,812)			(181,099)

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balances have been added in row 34. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation -Non - Residential DSM Programs Vintage 2019

NC Non- Residential DSM		Total System NC DSM Program Costs Incurred	NC Non- Residential DSM Allocation %	NC Allocated DSM Non-Residential Program Costs	NC Non-Residential DSM Revenue Collected	NC Non-Residential DSM Program Collection %	Non-Residential DSM Program Costs Revenue Collected	(Over)/Under Collection
			See Listebarger Exhibit 5 pg. 2, Line 10					
Beginning Balance		30,097,219		12,076,004	15,942,519		(12,035,182)	40,822
2021	January	-	40.1233224%	-	2,569	13.0447472%	(335)	(335)
2021	February	-	40.1233224%	-	21,868	13.0447472%	(2,853)	(2,853)
2021	March	-	40.1233224%	-	23,522	13.0447472%	(3,068)	(3,068)
2021	April	-	40.1233224%	-	23,121	13.0447472%	(3,016)	(3,016)
2021	May	-	40.1233224%	-	21,046	13.0447472%	(2,745)	(2,745)
2021	June	-	40.1233224%	-	26,538	13.0447472%	(3,462)	(3,462)
2021	July	-	40.1233224%	-	30,892	13.0447472%	(4,030)	(4,030)
2021	August	-	40.1233224%	-	30,170	13.0447472%	(3,936)	(3,936)
2021	September	-	40.1233224%	-	31,654	13.0447472%	(4,129)	(4,129)
2021	October	-	40.1233224%	-	24,152	13.0447472%	(3,151)	(3,151)
2021	November	-	40.1233224%	-	24,992	13.0447472%	(3,260)	(3,260)
2021	December	-	40.1233224%	-	28,089	13.0447472%	(3,664)	(3,664)
		30,097,219		12,076,004	16,231,132		(12,072,831)	3,173

Program Costs to be Recovered in Ride	40,822
Revenues to be Collected in Rider 12	312,940
% Revenue related to Program Costs	13.0447%

NC Non-Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		40,822			9,532	31,290					
2021	January	40,487	0.233503	(78)	9,454	31,033	0.005469	170	170	0.766497	222
2021	February	37,634	0.233503	(666)	8,788	28,847	0.005469	164	334	0.766497	436
2021	March	34,566	0.233503	(716)	8,071	26,495	0.005469	151	486	0.766497	633
2021	April	31,550	0.233503	(704)	7,367	24,183	0.005469	139	624	0.766497	814
2021	May	28,805	0.233503	(641)	6,726	22,079	0.005469	127	751	0.766497	979
2021	June	25,343	0.233503	(808)	5,918	19,425	0.005469	113	864	0.766497	1,127
2021	July	21,313	0.233503	(941)	4,977	16,336	0.005469	98	962	0.766497	1,255
2021	August	17,377	0.233503	(919)	4,058	13,320	0.005469	81	1,043	0.766497	1,361
2021	September	13,248	0.233503	(964)	3,094	10,155	0.005469	64	1,107	0.766497	1,444
2021	October	10,098	0.233503	(736)	2,358	7,740	0.005469	49	1,156	0.766497	1,508
2021	November	6,838	0.233503	(761)	1,597	5,241	0.005469	35	1,192	0.766497	1,555
2021	December	3,173	0.233503	(856)	741	2,432	0.005469	21	1,213	0.766497	1,582
	Checks			(8,791)	(8,791)	741		1,213			1,582

Note 1: Amounts represent all revenue actually collected through 2020.
Note 2: Cells in Blue: Beginning Balances have been added in row 29. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential EE Programs Vintage 2020

NC Residential EE		Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 3, Line 4			see calc. at right		
Beginning Balance		51,310,734		37,570,373	51,645,101	59.3631972%	(30,658,183)	6,912,190
2021	January		73.2212736%			0.0000%		
2021	February		73.2212736%			0.0000%		
2021	March		73.2212736%			0.0000%		
2021	April		73.2212736%			0.0000%		
2021	May		73.2212736%			0.0000%		
2021	June		73.2212736%			0.0000%		
2021	July		73.2212736%			0.0000%		
2021	August		73.2212736%			0.0000%		
2021	September		73.2212736%			0.0000%		
2021	October		73.2212736%			0.0000%		
2021	November		73.2212736%			0.0000%		
2021	December		73.2212736%			0.0000%		
		51,310,734		37,570,373	51,645,101			6,912,190

Note: All revenues collected in Rider 12 were to collect Y2 of lost revenue. Therefore, no revenue received in 2021 would offset the under collected balance of program costs and a return would still be earned.

NC Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		6,912,190			1,614,017	5,298,173					
2021	January	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	28,977	0.766497	37,804
2021	February	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	57,953	0.766497	75,608
2021	March	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	86,930	0.766497	113,412
2021	April	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	115,907	0.766497	151,216
2021	May	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	144,883	0.766497	189,020
2021	June	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	173,860	0.766497	226,824
2021	July	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	202,837	0.766497	264,628
2021	August	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	231,813	0.766497	302,432
2021	September	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	260,790	0.766497	340,236
2021	October	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	289,766	0.766497	378,040
2021	November	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	318,743	0.766497	415,844
2021	December	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	347,720	0.766497	453,648
	Checks			-	-	1,614,017		347,720			453,648

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balances have been added in row 32. Cell E33 has been updated as the January cell had a bad cell reference. Adding the beginning balance for Net Deferred After Tax Balance changed the Monthly A/T Return on Deferral amount for January.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2020

NC Residential DSM		Total System NC DSM Program Costs Incurred	NC Allocation %	NC Allocated DSM Program Costs	Program Incentives	Total Costs	NC Residential Revenue Collected	NC Residential DSM Program Collection %	DSM Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 3, Line 9					100% used due to overcollection		
Beginning Balance - Source		29,327,255		9,888,075	3,194,120	13,082,195	15,504,312		(15,504,312)	(2,422,117)
2021	January		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	February		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	March		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	April		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	May		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	June		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	July		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	August		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	September		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	October		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	November		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	December		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
		29,327,255		9,888,075	3,211,648	13,099,723	15,504,312		(15,504,312)	(2,404,589)

Since Rider 13 was overcollected, interest has continued to be calculated on the entire balance.

NC Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		(2,422,117)			(565,572)	(1,856,545)					
2021	January	(2,420,656)	0.233503	341	(565,231)	(1,855,426)	0.005469	(10,151)	(10,151)	0.766497	(13,243)
2021	February	(2,419,196)	0.233503	341	(564,889)	(1,854,306)	0.005469	(10,145)	(20,295)	0.766497	(26,478)
2021	March	(2,417,735)	0.233503	341	(564,548)	(1,853,187)	0.005469	(10,138)	(30,434)	0.766497	(39,705)
2021	April	(2,416,274)	0.233503	341	(564,207)	(1,852,067)	0.005469	(10,132)	(40,566)	0.766497	(52,924)
2021	May	(2,414,814)	0.233503	341	(563,866)	(1,850,948)	0.005469	(10,126)	(50,692)	0.766497	(66,135)
2021	June	(2,413,353)	0.233503	341	(563,525)	(1,849,828)	0.005469	(10,120)	(60,812)	0.766497	(79,338)
2021	July	(2,411,892)	0.233503	341	(563,184)	(1,848,708)	0.005469	(10,114)	(70,926)	0.766497	(92,533)
2021	August	(2,410,432)	0.233503	341	(562,843)	(1,847,589)	0.005469	(10,108)	(81,034)	0.766497	(105,720)
2021	September	(2,408,971)	0.233503	341	(562,502)	(1,846,469)	0.005469	(10,102)	(91,136)	0.766497	(118,899)
2021	October	(2,407,511)	0.233503	341	(562,161)	(1,845,350)	0.005469	(10,096)	(101,232)	0.766497	(132,070)
2021	November	(2,406,050)	0.233503	341	(561,820)	(1,844,230)	0.005469	(10,089)	(111,321)	0.766497	(145,234)
2021	December	(2,404,589)	0.233503	341	(561,479)	(1,843,110)	0.005469	(10,083)	(121,404)	0.766497	(158,389)
	Checks			4,093	4,093	(561,479)		(121,404)			(158,389)

Note 1: Amounts represent all revenue actually collected through 2021.

Note 2: Cells in Blue: Beginning Balances have been added in row 32. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Non- Residential EE Programs Vintage 2020

NC Non- Residential EE		Non-Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Performance Incentives	Lost Revenues	Total Costs	NC Residential Revenue Collected	NC Non-Residential EE Program Collection %	Non-Residential EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5. pg 3, Line 4						100% used due to overcollection		
Beginning Balance		30,082,572		22,026,843	7,142,705	3,839,208	33,008,756	44,023,239		(44,023,239)	(11,014,483)
2021	January		73.2212736%		4,721	1,203,023	1,207,744	1,383,560	100.00%	(1,383,560)	(175,816)
2021	February		73.2212736%		4,721	1,203,023	1,207,744	790,679	100.00%	(790,679)	417,065
2021	March		73.2212736%		4,721	1,203,023	1,207,744	696,234	100.00%	(696,234)	511,510
2021	April		73.2212736%		4,721	1,203,023	1,207,744	687,469	100.00%	(687,469)	520,275
2021	May		73.2212736%		4,721	1,203,023	1,207,744	628,499	100.00%	(628,499)	579,246
2021	June		73.2212736%		4,721	1,203,023	1,207,744	788,734	100.00%	(788,734)	419,010
2021	July		73.2212736%		4,721	1,203,023	1,207,744	906,904	100.00%	(906,904)	300,841
2021	August		73.2212736%		4,721	1,203,023	1,207,744	869,438	100.00%	(869,438)	338,306
2021	September		73.2212736%		4,721	1,203,023	1,207,744	959,762	100.00%	(959,762)	247,983
2021	October		73.2212736%		4,721	1,203,023	1,207,744	764,101	100.00%	(764,101)	443,643
2021	November		73.2212736%		4,721	1,203,023	1,207,744	668,944	100.00%	(668,944)	538,800
2021	December		73.2212736%		4,721	1,203,023	1,207,744	821,567	100.00%	(821,567)	386,178
		30,082,572		22,026,843	7,199,363	18,275,484	47,501,689	53,989,132		(53,989,132)	(6,487,442)

No program cost allocation is needed since Rider 13 was overcollected, in total and interest due was calculated on the entire vintage. Lost revenues earned in 2021 were applied to the outstanding balance and all revenues collected in 2021 were also applied to the outstanding balance.

Therefore, 100% of all revenues offset the overcollected balance.

NC Non-Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		(11,014,483)			(2,571,915)	(8,442,568)					
2021	January	(11,190,299)	0.233503	(41,054)	(2,612,968)	(8,577,331)	0.005469	(46,542)	(46,542)	0.766497	(60,721)
2021	February	(10,773,234)	0.233503	97,386	(2,515,582)	(8,257,652)	0.005469	(46,037)	(92,579)	0.766497	(120,782)
2021	March	(10,261,724)	0.233503	119,439	(2,396,143)	(7,865,581)	0.005469	(44,090)	(136,670)	0.766497	(178,304)
2021	April	(9,741,449)	0.233503	121,486	(2,274,658)	(7,466,791)	0.005469	(41,928)	(178,597)	0.766497	(233,005)
2021	May	(9,162,203)	0.233503	135,256	(2,139,402)	(7,022,801)	0.005469	(39,623)	(218,220)	0.766497	(284,698)
2021	June	(8,743,193)	0.233503	97,840	(2,041,562)	(6,701,631)	0.005469	(37,531)	(255,751)	0.766497	(333,662)
2021	July	(8,442,352)	0.233503	70,247	(1,971,315)	(6,471,038)	0.005469	(36,022)	(291,773)	0.766497	(380,658)
2021	August	(8,104,046)	0.233503	78,995	(1,892,319)	(6,211,727)	0.005469	(34,682)	(326,455)	0.766497	(425,905)
2021	September	(7,856,064)	0.233503	57,905	(1,834,414)	(6,021,649)	0.005469	(33,453)	(359,908)	0.766497	(469,550)
2021	October	(7,412,420)	0.233503	103,592	(1,730,822)	(5,681,598)	0.005469	(32,004)	(391,912)	0.766497	(511,303)
2021	November	(6,873,620)	0.233503	125,811	(1,605,011)	(5,268,609)	0.005469	(29,944)	(421,856)	0.766497	(550,369)
2021	December	(6,487,442)	0.233503	90,174	(1,514,837)	(4,972,605)	0.005469	(28,006)	(449,862)	0.766497	(586,906)
	Checks			1,057,078	1,057,078	(1,514,837)		(449,862)			(586,906)

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balances have been added in row 34. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation -Non - Residential DSM Programs Vintage 2020

NC Non- Residential DSM		Total System NC DSM Program Costs Incurred	NC Non- Residential DSM Allocation %	NC Allocated DSM Non-Residential Program Costs	Program Incentives	Total Costs	NC Non-Residential DSM Revenue Collected	NC Non-Residential DSM Program Collection %	Non-Residential DSM Program Costs Revenue Collected	(Over)/Under Collection
			See Listebarger Exhibit 5 pg. 3, Line 10					100% used due to overcollection		
Beginning Balance		29,327,255		11,871,383	3,860,688	15,732,071	17,715,486		(17,715,486)	(1,983,414)
2021	January		40.4790117%	-	(405)	(405)	-	100.0000000%	-	(405)
2021	February		40.4790117%	-	(405)	(405)	74,520	100.0000000%	(74,520)	(74,925)
2021	March		40.4790117%	-	(405)	(405)	671	100.0000000%	(671)	(1,077)
2021	April		40.4790117%	-	(405)	(405)	8	100.0000000%	(8)	(413)
2021	May		40.4790117%	-	(405)	(405)	1	100.0000000%	(1)	(407)
2021	June		40.4790117%	-	(405)	(405)	71	100.0000000%	(71)	(477)
2021	July		40.4790117%	-	(405)	(405)	12	100.0000000%	(12)	(418)
2021	August		40.4790117%	-	(405)	(405)	(52)	100.0000000%	52	(353)
2021	September		40.4790117%	-	(405)	(405)	626	100.0000000%	(626)	(1,031)
2021	October		40.4790117%	-	(405)	(405)	(626)	100.0000000%	626	221
2021	November		40.4790117%	-	(405)	(405)	635	100.0000000%	(635)	(1,040)
2021	December		40.4790117%	-	(405)	(405)	(39,231)	100.0000000%	39,231	38,826
		29,327,255		11,871,383	3,855,826	15,727,210	17,752,122		(17,752,122)	(2,024,912)

No program cost allocation is needed since Rider 13 was overcollected, in total and interest due was calculated on the entire vintage. Lost revenues earned in 2021 were applied to the outstanding balance and all revenues collected in 2021 were also applied to the outstanding balance.

Therefore, 100% of all revenues offset the overcollected balance.

NC Non-Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		(1,983,414)			(463,133)	(1,520,281)					
2021	January	(405)	0.233503	(95)	(463,228)	462,823	0.005469	(2,892)	(2,892)	0.766497	(3,773)
2021	February	(75,331)	0.233503	(17,495)	(480,723)	405,393	0.005469	2,374	(518)	0.766497	(675)
2021	March	(76,407)	0.233503	(251)	(480,974)	404,567	0.005469	2,215	1,697	0.766497	2,214
2021	April	(76,820)	0.233503	(96)	(481,071)	404,251	0.005469	2,212	3,909	0.766497	5,100
2021	May	(77,226)	0.233503	(95)	(481,166)	403,939	0.005469	2,210	6,119	0.766497	7,983
2021	June	(77,703)	0.233503	(111)	(481,277)	403,574	0.005469	2,208	8,327	0.766497	10,864
2021	July	(78,120)	0.233503	(98)	(481,375)	403,254	0.005469	2,206	10,534	0.766497	13,743
2021	August	(78,473)	0.233503	(82)	(481,457)	402,984	0.005469	2,205	12,739	0.766497	16,619
2021	September	(79,505)	0.233503	(241)	(481,698)	402,193	0.005469	2,202	14,940	0.766497	19,492
2021	October	(79,284)	0.233503	52	(481,646)	402,363	0.005469	2,200	17,141	0.766497	22,362
2021	November	(80,324)	0.233503	(243)	(481,889)	401,565	0.005469	2,198	19,339	0.766497	25,230
2021	December	(41,498)	0.233503	9,066	(472,823)	431,325	0.005469	2,278	21,617	0.766497	28,202
	Checks			(9,690)	(9,690)	(472,823)		21,617			28,202

Note 1: Amounts represent all revenue actually collected through 2021.
Note 2: Cells in Blue: Beginning Balances have been added in row 29. The Cumulative (Over)/Under Recovery in column C had a reference error, this has been corrected. The cumulative deferred income tax column has been updated so the calculation includes the beginning balance.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential EE Programs Vintage 2021

NC Residential EE		Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Incentives	Lost Revenues	Total Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 4, Line 4						100% used due to overcollection		
2021	January	1,806,147	73.5233682%	1,327,940	130,020	1,182,754	2,640,715	3,115,990	100.0000%	(3,115,990)	(475,275)
2021	February	2,431,280	73.5233682%	1,787,559	175,022	1,592,122	3,554,703	5,979,051	100.0000%	(5,979,051)	(2,424,347)
2021	March	2,954,841	73.5233682%	2,172,499	212,712	1,934,976	4,320,187	5,832,411	100.0000%	(5,832,411)	(1,512,224)
2021	April	3,242,259	73.5233682%	2,383,818	233,403	2,123,191	4,740,411	4,629,547	100.0000%	(4,629,547)	110,864
2021	May	2,488,632	73.5233682%	1,829,726	179,151	1,629,679	3,638,555	3,762,293	100.0000%	(3,762,293)	(123,738)
2021	June	3,246,602	73.5233682%	2,387,011	233,715	2,126,035	4,746,762	5,183,564	100.0000%	(5,183,564)	(436,802)
2021	July	2,364,378	73.5233682%	1,738,370	170,206	1,548,311	3,456,888	6,269,768	100.0000%	(6,269,768)	(2,812,880)
2021	August	2,363,589	73.5233682%	1,737,790	170,149	1,547,794	3,455,733	6,462,428	100.0000%	(6,462,428)	(3,006,694)
2021	September	3,922,710	73.5233682%	2,884,109	282,387	2,568,784	5,735,279	6,219,451	100.0000%	(6,219,451)	(484,172)
2021	October	3,464,959	73.5233682%	2,547,554	249,434	2,269,026	5,066,014	4,328,439	100.0000%	(4,328,439)	737,575
2021	November	2,674,604	73.5233682%	1,966,459	192,538	1,751,463	3,910,460	3,969,908	100.0000%	(3,969,908)	(59,448)
2021	December	4,717,732	73.5233682%	3,468,635	339,618	3,089,403	6,897,657	8,995,007	100.0000%	(8,995,007)	(2,097,350)
		35,677,735		26,231,472	2,568,356	23,363,537	52,163,365	64,747,858		(64,747,858)	(12,584,493)

Vintage is overcollected. Interest is calculated on all components.

100% of all revenues offset the overcollected balance.

NC Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	(475,275)	0.233503	(110,978)	(110,978)	(364,297)	0.005469	(996)	(996)	0.766497	(1,300)
2021	February	(2,899,623)	0.233503	(566,092)	(677,071)	(2,222,552)	0.005469	(7,074)	(8,070)	0.766497	(10,529)
2021	March	(4,411,847)	0.233503	(353,109)	(1,030,180)	(3,381,667)	0.005469	(15,325)	(23,395)	0.766497	(30,523)
2021	April	(4,300,983)	0.233503	25,887	(1,004,292)	(3,296,690)	0.005469	(18,263)	(41,658)	0.766497	(54,349)
2021	May	(4,424,721)	0.233503	(28,893)	(1,033,186)	(3,391,535)	0.005469	(18,290)	(59,948)	0.766497	(78,210)
2021	June	(4,861,523)	0.233503	(101,995)	(1,135,180)	(3,726,343)	0.005469	(19,464)	(79,412)	0.766497	(103,604)
2021	July	(7,674,403)	0.233503	(656,816)	(1,791,996)	(5,882,407)	0.005469	(26,276)	(105,688)	0.766497	(137,884)
2021	August	(10,681,098)	0.233503	(702,072)	(2,494,068)	(8,187,029)	0.005469	(38,474)	(144,162)	0.766497	(188,079)
2021	September	(11,165,270)	0.233503	(113,056)	(2,607,124)	(8,558,146)	0.005469	(45,791)	(189,953)	0.766497	(247,820)
2021	October	(10,427,695)	0.233503	172,226	(2,434,898)	(7,992,797)	0.005469	(45,260)	(235,213)	0.766497	(306,868)
2021	November	(10,487,143)	0.233503	(13,881)	(2,448,779)	(8,038,364)	0.005469	(43,839)	(279,052)	0.766497	(364,061)
2021	December	(12,584,493)	0.233503	(489,737)	(2,938,517)	(9,645,976)	0.005469	(48,359)	(327,411)	0.766497	(427,153)
	Checks			(2,938,517)	(2,938,517)	(2,938,517)		(327,411)			(427,153)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2021

NC Residential DSM		Total System NC DSM Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Incentives	Total Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 4, Line 9							
2021	January	1,625,830	34.9475492%	568,188	137,912	706,100	824,386	100.0000%	(824,386)	(118,286)
2021	February	1,861,375	34.9475492%	650,505	157,892	808,397	1,581,856	100.0000%	(1,581,856)	(773,459)
2021	March	1,932,178	34.9475492%	675,249	163,898	839,147	1,543,060	100.0000%	(1,543,060)	(703,913)
2021	April	2,879,839	34.9475492%	1,006,433	244,284	1,250,717	1,224,823	100.0000%	(1,224,823)	25,895
2021	May	1,640,354	34.9475492%	573,264	139,144	712,408	995,376	100.0000%	(995,376)	(282,969)
2021	June	2,019,985	34.9475492%	705,935	171,346	877,282	1,371,397	100.0000%	(1,371,397)	(494,115)
2021	July	4,168,637	34.9475492%	1,456,836	353,607	1,810,443	1,658,770	100.0000%	(1,658,770)	151,673
2021	August	3,898,456	34.9475492%	1,362,415	330,689	1,693,104	1,709,741	100.0000%	(1,709,741)	(16,638)
2021	September	3,925,636	34.9475492%	1,371,914	332,994	1,704,908	1,645,458	100.0000%	(1,645,458)	59,450
2021	October	4,516,753	34.9475492%	1,578,494	383,136	1,961,631	1,145,160	100.0000%	(1,145,160)	816,471
2021	November	1,763,142	34.9475492%	616,175	149,560	765,735	1,050,304	100.0000%	(1,050,304)	(284,570)
2021	December	2,643,978	34.9475492%	924,006	224,277	1,148,283	2,494,717	100.0000%	(2,494,717)	(1,346,434)
		32,876,164		11,489,414	2,788,739	14,278,153	17,245,048		(17,245,048)	(2,966,895)

Vintage is overcollected. Interest is calculated on all components.

100% of all revenues offset the overcollected balance.

NC Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	(118,286)	0.233503	(27,620)	(27,620)	(90,666)	0.005469	(248)	(248)	0.766497	(323)
2021	February	(891,745)	0.233503	(180,605)	(208,225)	(683,520)	0.005469	(2,117)	(2,365)	0.766497	(3,085)
2021	March	(1,595,658)	0.233503	(164,366)	(372,591)	(1,223,067)	0.005469	(5,214)	(7,579)	0.766497	(9,888)
2021	April	(1,569,764)	0.233503	6,046	(366,545)	(1,203,219)	0.005469	(6,635)	(14,214)	0.766497	(18,544)
2021	May	(1,852,732)	0.233503	(66,074)	(432,619)	(1,420,114)	0.005469	(7,174)	(21,387)	0.766497	(27,903)
2021	June	(2,346,848)	0.233503	(115,377)	(547,996)	(1,798,852)	0.005469	(8,803)	(30,190)	0.766497	(39,387)
2021	July	(2,195,174)	0.233503	35,416	(512,580)	(1,682,594)	0.005469	(9,520)	(39,710)	0.766497	(51,807)
2021	August	(2,211,812)	0.233503	(3,885)	(516,465)	(1,695,347)	0.005469	(9,237)	(48,948)	0.766497	(63,859)
2021	September	(2,152,362)	0.233503	13,882	(502,583)	(1,649,779)	0.005469	(9,148)	(58,095)	0.766497	(75,793)
2021	October	(1,335,891)	0.233503	190,648	(311,934)	(1,023,956)	0.005469	(7,312)	(65,407)	0.766497	(85,332)
2021	November	(1,620,460)	0.233503	(66,448)	(378,382)	(1,242,078)	0.005469	(6,197)	(71,603)	0.766497	(93,416)
2021	December	(2,966,895)	0.233503	(314,396)	(692,779)	(2,274,116)	0.005469	(9,615)	(81,219)	0.766497	(105,961)
	Checks			(692,779)	(692,779)	(692,779)		(81,219)			(105,961)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A
Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Non- Residential EE Programs Vintage 2021

NC Non- Residential EE		Non-Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Incentives	Lost Revenues	Total Costs	NC Residential Revenue Collected	NC Non-Residential EE Program Collection %	Non-Residential EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5. pg 4, Line 4						See calc. at right		
2021	January	2,630,148	73.5233682%	1,933,773	483,719	977,177	3,394,669	1,020,322	100.0000000%	(1,020,322)	913,451
2021	February	2,758,573	73.5233682%	2,028,196	507,338	1,024,890	3,560,424	3,694,780	100.0000000%	(3,694,780)	(1,666,585)
2021	March	2,414,424	73.5233682%	1,775,166	444,044	897,029	3,116,239	4,002,820	100.0000000%	(4,002,820)	(2,227,655)
2021	April	3,989,941	73.5233682%	2,933,539	733,803	1,482,379	5,149,721	3,951,018	100.0000000%	(3,951,018)	(1,017,479)
2021	May	3,182,053	73.5233682%	2,339,552	585,221	1,182,225	4,106,999	3,605,136	100.0000000%	(3,605,136)	(1,265,584)
2021	June	2,591,922	73.5233682%	1,905,668	476,689	962,975	3,345,332	4,538,733	100.0000000%	(4,538,733)	(2,633,065)
2021	July	2,744,693	73.5233682%	2,017,991	504,785	1,019,733	3,542,509	5,193,948	100.0000000%	(5,193,948)	(3,175,957)
2021	August	4,013,209	73.5233682%	2,950,647	738,082	1,491,024	5,179,753	5,011,049	100.0000000%	(5,011,049)	(2,060,403)
2021	September	3,195,742	73.5233682%	2,349,617	587,739	1,187,311	4,124,668	5,474,795	100.0000000%	(5,474,795)	(3,125,178)
2021	October	4,489,722	73.5233682%	3,300,995	825,719	1,668,063	5,794,777	4,414,912	100.0000000%	(4,414,912)	(1,113,917)
2021	November	4,420,521	73.5233682%	3,250,116	812,992	1,642,353	5,705,460	3,822,764	100.0000000%	(3,822,764)	(572,648)
2021	December	4,038,645	73.5233682%	2,969,348	742,760	1,500,474	5,212,582	5,834,596	100.0000000%	(5,834,596)	(2,865,248)
		40,469,592		29,754,607	7,442,891	15,035,634	52,233,133	50,564,874		(50,564,874)	(20,810,267)

Vintage is overcollected. Interest is calculated on all components.

100% of all revenues offset the overcollected balance.

NC Non-Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	913,451	0.233503	213,294	213,294	700,158	0.005469	1,915	1,915	0.766497	2,498
2021	February	(753,133)	0.233503	(389,153)	(175,859)	(577,274)	0.005469	336	2,251	0.766497	2,936
2021	March	(2,980,788)	0.233503	(520,164)	(696,023)	(2,284,765)	0.005469	(7,827)	(5,576)	0.766497	(7,274)
2021	April	(3,998,267)	0.233503	(237,584)	(933,607)	(3,064,660)	0.005469	(14,628)	(20,204)	0.766497	(26,359)
2021	May	(5,263,851)	0.233503	(295,518)	(1,229,125)	(4,034,726)	0.005469	(19,414)	(39,618)	0.766497	(51,687)
2021	June	(7,896,916)	0.233503	(614,829)	(1,843,954)	(6,052,963)	0.005469	(27,586)	(67,204)	0.766497	(87,677)
2021	July	(11,072,874)	0.233503	(741,596)	(2,585,549)	(8,487,324)	0.005469	(39,762)	(106,966)	0.766497	(139,551)
2021	August	(13,133,276)	0.233503	(481,110)	(3,066,659)	(10,066,617)	0.005469	(50,737)	(157,703)	0.766497	(205,745)
2021	September	(16,258,454)	0.233503	(729,738)	(3,796,398)	(12,462,056)	0.005469	(61,607)	(219,310)	0.766497	(286,119)
2021	October	(17,372,371)	0.233503	(260,103)	(4,056,501)	(13,315,870)	0.005469	(70,492)	(289,802)	0.766497	(378,086)
2021	November	(17,945,019)	0.233503	(133,715)	(4,190,216)	(13,754,803)	0.005469	(74,027)	(363,829)	0.766497	(474,664)
2021	December	(20,810,267)	0.233503	(669,044)	(4,859,260)	(15,951,007)	0.005469	(81,233)	(445,062)	0.766497	(580,644)
	Checks			(4,859,260)	(4,859,260)	(4,859,260)		(445,062)			(580,644)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation -Non - Residential DSM Programs Vintage 2021

NC Non- Residential DSM		Total System NC DSM Program Costs Incurred	NC Non-Residential DSM Allocation %	NC Allocated DSM Non-Residential Program Costs	Program Incentives	Total Costs	NC Non-Residential DSM Revenue Collected	NC Non-Residential DSM Program Collection %	Non-Residential DSM Program Costs Revenue Collected	(Over)/Under Collection
			See Listebarger Exhibit 5 pg. 4, Line 10							
2021	January	1,625,830	39.4088278%	640,721	155,517	796,238	368,590	100.0000000%	(368,590)	427,648
2021	February	1,861,375	39.4088278%	733,546	178,048	911,594	1,384,272	100.0000000%	(1,384,272)	(472,678)
2021	March	1,932,178	39.4088278%	761,449	184,821	946,269	1,493,559	100.0000000%	(1,493,559)	(547,289)
2021	April	2,879,839	39.4088278%	1,134,911	275,468	1,410,379	1,483,929	100.0000000%	(1,483,929)	(73,550)
2021	May	1,640,354	39.4088278%	646,444	156,907	803,351	1,328,086	100.0000000%	(1,328,086)	(524,735)
2021	June	2,019,985	39.4088278%	796,052	193,220	989,272	1,695,925	100.0000000%	(1,695,925)	(706,652)
2021	July	4,168,637	39.4088278%	1,642,811	398,747	2,041,558	1,976,636	100.0000000%	(1,976,636)	64,922
2021	August	3,898,456	39.4088278%	1,536,336	372,903	1,909,239	1,909,853	100.0000000%	(1,909,853)	(614)
2021	September	3,925,636	39.4088278%	1,547,047	375,503	1,922,550	2,013,862	100.0000000%	(2,013,862)	(91,312)
2021	October	4,516,753	39.4088278%	1,779,999	432,046	2,212,045	1,539,896	100.0000000%	(1,539,896)	672,149
2021	November	1,763,142	39.4088278%	694,834	168,652	863,486	1,592,001	100.0000000%	(1,592,001)	(728,515)
2021	December	2,643,978	39.4088278%	1,041,961	252,907	1,294,868	2,118,822	100.0000000%	(2,118,822)	(823,954)
		32,876,164		12,956,111	3,144,740	16,100,851	18,905,431		(18,905,431)	(2,804,580)

Vintage is overcollected. Interest is calculated on all components.

100% of all revenues offset the overcollected balance.

NC Non-Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	427,648	0.233503	99,857	99,857	327,791	0.005469	896	896	0.766497	1,169
2021	February	(45,030)	0.233503	(110,372)	(10,515)	(34,515)	0.005469	802	1,698	0.766497	2,216
2021	March	(592,319)	0.233503	(127,794)	(138,308)	(454,011)	0.005469	(1,336)	362	0.766497	473
2021	April	(665,869)	0.233503	(17,174)	(155,482)	(510,387)	0.005469	(2,637)	(2,275)	0.766497	(2,968)
2021	May	(1,190,604)	0.233503	(122,527)	(278,010)	(912,594)	0.005469	(3,891)	(6,166)	0.766497	(8,044)
2021	June	(1,897,257)	0.233503	(165,005)	(443,015)	(1,454,241)	0.005469	(6,472)	(12,638)	0.766497	(16,488)
2021	July	(1,832,335)	0.233503	15,159	(427,856)	(1,404,479)	0.005469	(7,817)	(20,456)	0.766497	(26,687)
2021	August	(1,832,948)	0.233503	(143)	(427,999)	(1,404,949)	0.005469	(7,683)	(28,138)	0.766497	(36,710)
2021	September	(1,924,260)	0.233503	(21,322)	(449,320)	(1,474,939)	0.005469	(7,875)	(36,014)	0.766497	(46,985)
2021	October	(1,252,110)	0.233503	156,949	(292,372)	(959,739)	0.005469	(6,658)	(42,672)	0.766497	(55,671)
2021	November	(1,980,626)	0.233503	(170,111)	(462,482)	(1,518,144)	0.005469	(6,776)	(49,448)	0.766497	(64,511)
2021	December	(2,804,580)	0.233503	(192,396)	(654,878)	(2,149,702)	0.005469	(10,030)	(59,478)	0.766497	(77,597)
	Checks			(654,878)	(654,878)	(654,878)		(59,478)			(77,597)

Note 1: Amounts represent all revenue actually collected through 2021.

Listebarger Exhibit 4
Supplemental

Duke Energy Carolinas, LLC
DSM/EE Actual Revenues Collected from Years 2018-2021 (By Vintage)
and Estimated 2022 Collections from Rider 13 (by Vintage)
Docket Number E-7 Sub 1265
For Vintage Year 2018-2022 Estimate and True Up Calculations

Line		Vintage	Actual 2018 Rider 9	Actual 2019 Rider 10	Actual 2020 Rider 11	Actual 2021 Rider 12	Estimated 2022 Rider 13 [1]	Total
	Residential							
	EE/DSM							
1		Year 2018	83,631,851	6,302,019	25,272,676	2,818,706	2,924,339	120,949,591
2		Year 2019		77,019,837	5,261,547	29,067,535	1,185,495	112,534,414
3		Year 2020			67,149,413	4,559,292	14,672,178	86,380,883
4		Year 2021				81,992,905	6,249,665	88,242,571
5		Year 2022					79,361,507	79,361,507
6	**Total Residential**		$ 83,631,851	$ 83,321,856	$ 97,683,636	$ 118,438,439	$ 104,393,183	$ 487,468,965
	Non-Residential							
	EE							
7		Year 2018	51,998,801	12,546,122	12,194,157	1,712,636	513,230	78,964,947
8		Year 2019		52,862,599	8,232,962	6,920,864	(5,111,203)	62,905,222
9		Year 2020			44,023,239	9,965,893	(7,365,043)	46,624,089
10		Year 2021				50,564,874	13,494,665	64,059,539
11		Year 2022					68,099,841	68,099,841
	DSM							
12		Year 2018	14,074,924	777,733	1,176,922	(168,075)	345,011	16,206,515
13		Year 2019		15,674,069	268,450	288,613	(260,821)	15,970,311
14		Year 2020			17,715,486	36,636	(2,037,192)	15,714,929
15		Year 2021				18,905,431		18,905,431
16		Year 2022					18,683,620	18,683,620
17	**Total Non-Residential**		$ 66,073,725	$ 81,860,522	$ 83,611,216	$ 88,226,872	$ 86,362,108	$ 406,134,443
18	**Total Revenue**		**$ 149,705,576**	**$ 165,182,379**	**$ 181,294,852**	**$ 206,665,311**	**$ 190,755,292**	**$ 893,603,408**

[1] Rider 13 estimates are based on Order issued in Docket No. E-7 Sub 1249 dated 9/10/2021.

Listebarger Exhibit 5, page 1
Supplemental

Duke Energy Carolinas, LLC
Vintage Year 2018 Allocation Factors for the Period January 1, 2018 - December 31, 2018
Docket Number E-7 Sub 1265
Allocation Factors

Line			MWH		
	New Mechanism Sales Allocator at Generator				
1	NC Retail MWH Sales Allocation	Company Records	58,534,269		
2	SC Retail MWH Sales Allocation	Company Records	21,966,093		
3	Total Retail	Line 1 + Line 2	80,500,362		
	Allocation 1 to state based on kWh sales				
4	NC Retail	Line 1 / Line 3	**72.7130507%**		
	Demand Allocators		**NC**	**SC**	**Total**
5	Residential	Company Records	5,078,308	1,617,566	6,695,874
6	Non Residential	Company Records	6,549,145	2,546,981	9,096,126
7	Total	Line 5 + Line 6	11,627,453	4,164,547	15,792,000
	Allocation 2 to state based on peak demand				
8	NC Retail	Line 7, NC / Line 7 Total	**73.6287551%**		
	Allocation 3 NC res vs non-res Peak Demand to retail system peak				
9	NC Residential	Line 5 NC/ Line 7 Total	**32.1574721%**		
10	NC Non-residential	Line 6 NC/ Line 7 Total	**41.4712829%**		

Duke Energy Carolinas, LLC
Vintage Year 2019 Allocation Factors for the Period January 1, 2019 - December 31, 2019
Docket Number E-7 Sub 1265
Allocation Factors

Line	New Mechanism Sales Allocator at Generator		MWH		
1	NC Retail MWH Sales Allocation	Company Records	62,147,533		
2	SC Retail MWH Sales Allocation	Company Records	22,880,788		
3	Total Retail	Line 1 + Line 2	85,028,321		
	Allocation 1 to state based on kWh sales				
4	NC Retail	Line 1 / Line 3	**73.0903918%**		
	Demand Allocators		**NC**	**SC**	**Total**
5	Residential	Company Records	5,420,002	1,681,673	7,101,675
6	Non Residential	Company Records	6,373,991	2,410,334	8,784,325
7	Total	Line 5 + Line 6	11,793,993	4,092,007	15,886,000
	Allocation 2 to state based on peak demand				
8	NC Retail	Line 7, NC / Line 7 Total	**74.2414264%**		
	Allocation 3 NC res vs non-res Peak Demand to retail system peak				
9	NC Residential	Line 5 NC/ Line 7 Total	**34.1181040%**		
10	NC Non-residential	Line 6 NC/ Line 7 Total	**40.1233224%**		

Listebarger Exhibit 5, page 3
Supplemental

Duke Energy Carolinas, LLC
Vintage Year 2020 Allocation Factors for the Period January 1, 2020 - December 31, 2020
Docket Number E-7 Sub 1265
Allocation Factors

Line	New Mechanism Sales Allocator at Generator		MWH
1	NC Retail MWH Sales Allocation	Company Records	61,250,523
2	SC Retail MWH Sales Allocation	Company Records	22,400,744
3	Total Retail	Line 1 + Line 2	83,651,267
	Allocation 1 to state based on kWh sales		
4	NC Retail	Line 1 / Line 3	**73.2212736%**

Line	Demand Allocators		NC	SC	Total
5	Residential	Company Records	5,410,460	1,632,146	7,042,606
6	Non Residential	Company Records	6,495,667	2,508,727	9,004,394
7	Total	Line 5 + Line 6	11,906,127	4,140,873	16,047,000
	Allocation 2 to state based on peak demand				
8	NC Retail	Line 7, NC / Line 7 Total	**74.1953449%**		
	Allocation 3 NC res vs non-res Peak Demand to retail system peak				
9	NC Residential	Line 5 NC/ Line 7 Total	**33.7163333%**		
10	NC Non-residential	Line 6 NC/ Line 7 Total	**40.4790117%**		

Duke Energy Carolinas, LLC
Vintage Year 2021 Allocation Factors for the Period January 1, 2021 - December 31, 2023
Docket Number E-7 Sub 1265
Allocation Factors

Line			MWH		
	New Mechanism Sales Allocator at Generator				
1	NC Retail MWH Sales Allocation	Company Records	59,254,276		
2	SC Retail MWH Sales Allocation	Company Records	21,338,163		
3	Total Retail	Line 1 + Line 2	80,592,439		
	Allocation 1 to state based on kWh sales				
4	NC Retail	Line 1 / Line 3	**73.5233682%**		
	Demand Allocators		**NC**	**SC**	**Total**
5	Residential	Company Records	5,482,921	1,710,195	7,193,116
6	Non Residential	Company Records	6,182,851	2,313,033	8,495,884
7	Total	Line 5 + Line 6	11,665,772	4,023,228	15,689,000
	Allocation 2 to state based on peak demand				
8	NC Retail	Line 7, NC / Line 7 Total	**74.3563771%**		
	Allocation 3 NC res vs non-res Peak Demand to retail system peak				
9	NC Residential	Line 5 NC/ Line 7 Total	**34.9475492%**		
10	NC Non-residential	Line 6 NC/ Line 7 Total	**39.4088278%**		

Listebarger Exhibit 6
Supplemental

Duke Energy Carolinas, LLC
DSM/EE Cost Recovery Rider 14
Docket Number E-7 Sub 1265
Forecasted 2023 kWh Sales for Rate Period for Vintage Years 2018-2023

Line	Fall 2021 Sales Forecast - kWhs	Forecasted 2023 sales		
	North Carolina Retail:			
1	Residential	**22,809,393,337**		
2	Non-Residential	**35,294,575,316**		
3	Total Retail	**58,103,968,653**		
	NC Opt Out Sales	**Total Usage**	**Opt-Outs**	**Net Usage**
	Vintage 2018 Actual Opt Out			
4	EE	35,294,575,316	19,849,513,795	15,445,061,521
5	DSM	35,294,575,316	18,757,237,757	16,537,337,560
	Vintage 2019 Actual Opt Out			
6	EE	35,294,575,316	19,899,108,979	15,395,466,337
7	DSM	35,294,575,316	18,724,008,595	16,570,566,722
	Vintage 2020 Estimated Opt Out			
8	EE	35,294,575,316	20,462,991,216	14,831,584,100
9	DSM	35,294,575,316	18,685,003,977	16,609,571,340
	Vintage 2021 Estimated Opt Out			
10	EE	35,294,575,316	20,390,666,139	14,903,909,177
11	DSM	35,294,575,316	18,648,145,239	16,646,430,078
	Vintage 2022 Estimated Opt Out			
12	EE	35,294,575,316	20,085,420,707	15,209,154,609
13	DSM	35,294,575,316	18,386,911,672	16,907,663,645
	Vintage 2023 Estimated Opt Out			
14	EE	35,294,575,316	20,085,420,707	15,209,154,609
15	DSM	35,294,575,316	18,386,911,672	16,907,663,645

I/A

Listebarger Exhibit 1, page 1

DSM/EE Cost Recovery Rider 14
Docket Number E-7 Sub 1265
Exhibit Summary of Rider EE Exhibits and Factors

Residential Billing Factor for Rider 14 True-up (EMF) Components

Line				
1	Year 2018 EE/DSM True-Up (EMF) Revenue Requirement	Listebarger Exhibit 2 pg 1, Line 15		(86,005)
2	Year 2019 EE/DSM True-Up (EMF) Revenue Requirement	Listebarger Exhibit 2 pg 2, Line 15		932,065
3	Year 2020 EE/DSM True-Up (EMF) Revenue Requirement	Listebarger Exhibit 2 pg 3, Line 15		899,910
4	Year 2021 EE/DSM True-Up (EMF) Revenue Requirement	Listebarger Exhibit 2 pg 4, Line 15		(22,334,861)
5	Total True-up (EMF) Revenue Requirement	Sum Lines 1-4	$	(20,588,890)
6	Projected NC Residential Sales (kWh) for rate period	Listebarger Exhibit 6, Line 1		22,809,393,337
7	*EE/DSM Revenue Requirement EMF Residential Rider EE (cents per kWh)*	Line 5 / Line 6 * 100		**(0.0903)**

Residential Billing Factor for Rider 14 Prospective Components

8	Vintage 2020 Total EE/DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 3, Line 15		2,568,275
9	Vintage 2021 Total EE/DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 4, Line 15		3,959,003
10	Vintage 2022 Total EE/DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 5, Line 1		6,791,458
11	Vintage 2023 Total EE/DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 6, Line 11		84,567,117
12	Total Prospective Revenue Requirement	Sum Lines 8-11	$	97,885,853
13	Projected NC Residential Sales (kWh) for rate period	Listebarger Exhibit 6, Line 1		22,809,393,337
14	*EE/DSM Revenue Requirement Prospective Residential Rider EE (cents per kWh)*	Line 12 / Line 13 * 100		**0.4291**
	Total Revenue Requirements in Rider 14 from Residential Customers			
15	Total True-up (EMF) Revenue Requirement	Line 5	$	(20,588,890)
16	Total Prospective Revenue Requirement	Line 12		97,885,853
17	***Total EE/DSM Revenue Requirement for Residential Rider EE***	Line 15 + Line 16	**$**	**77,296,962**
18	***Total EE/DSM Revenue Requirement for Residential Rider EE (cents per kWh)***	Line 7 + Line 14		**0.3388**

Non-Residential Billing Factors for Rider 14 True-up (EMF) Components

19	*Vintage Year 2018 EE True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 1, Line 25	$	(320,101)
20	*Projected Year 2018 EE Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 4		15,445,061,521
21	*EE Revenue Requirement Year 2018 EMF Non-Residential Rider EE (cents per kWh)*	Line 19 / Line 20 * 100		**(0.0021)**
22	*Vintage Year 2018 DSM True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 1, Line 35	$	(33,726)
23	*Projected Year 2018 DSM Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 5		16,537,337,560
24	*DSM Revenue Requirement Year 2018 EMF Non-Residential Rider EE (cents per kWh)*	Line 22 / Line 23 * 100		**(0.0002)**
25	*Vintage Year 2019 EE True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 2, Line 25	$	991,169
26	*Projected Year 2019 EE Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 6		15,395,466,337
27	*EE Revenue Requirement Year 2019 EMF Non-Residential Rider EE (cents per kWh)*	Line 25 / Line 26 * 100		**0.0064**
28	*Vintage Year 2019 DSM True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 2, Line 35	$	57,650
29	*Projected Year 2019 DSM Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 7		16,570,566,722
30	*DSM Revenue Requirement Year 2019 EMF Non-Residential Rider EE (cents per kWh)*	Line 28 / Line 29 * 100		**0.0003**
31	*Vintage Year 2020 EE True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 3, Line 25	$	(173,740)
32	*Projected Year 2020 EE Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 8		14,831,584,100
33	*EE Revenue Requirement Year 2020 EMF Non-Residential Rider EE (cents per kWh)*	Line 31 / Line 32 * 100		**(0.0012)**
34	*Vintage Year 2020 DSM True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 3, Line 35	$	(32,830)
35	*Projected Year 2020 DSM Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 9		16,609,571,340
36	*DSM Revenue Requirement Year 2020 EMF Non-Residential Rider EE (cents per kWh)*	Line 34 / Line 35 * 100		**(0.0002)**
37	*Vintage Year 2021 EE True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 4, Line 25	$	(12,407,806)
38	*Projected Year 2021 EE Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 10		14,903,909,177
39	*EE Revenue Requirement Year 2021 EMF Non-Residential Rider EE (cents per kWh)*	Line 37 / Line 38 * 100		**(0.0833)**
40	*Vintage Year 2021 DSM True-up (EMF) Revenue Requirement*	Listebarger Exhibit 2 pg 4, Line 35	$	(2,882,278)
41	*Projected Year 2021 DSM Participants NC Non-Residential Sales (kwh) for rate period*	Listebarger Exhibit 6, Line 11		16,646,430,078
42	*DSM Revenue Requirement Year 2021 EMF Non-Residential Rider EE (cents per kWh)*	Line 40 / Line 41 * 100		**(0.0173)**

Listebarger Exhibit 1, page 2

Non-Residential Billing Factors for Rider 14 Prospective Components

43	Vintage Year 2020 EE Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 3, Line 25	$	3,845,961
44	Projected Vintage 2020 EE Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 8		14,831,584,100
45	*EE Revenue Requirement Vintage 2020 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 43 / Line 44 * 100		**0.0259**
46	Vintage Year 2021 EE Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 4, Line 25	$	10,003,040
47	Projected Vintage 2021 EE Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 10		14,903,909,177
48	*EE Revenue Requirement Vintage 2021 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 46 / Line 47 * 100		**0.0671**
49	Vintage Year 2022 EE Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 5, Line 4	$	15,132,477
50	Projected Vintage 2022 EE Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 12		15,209,154,609
51	*EE Revenue Requirement Vintage 2022 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 49 / Line 50 * 100		**0.0995**
52	Vintage Year 2023 EE Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 6, Line 18	$	65,748,787
53	Projected Vintage 2023 EE Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 14		15,209,154,609
54	*EE Revenue Requirement Vintage 2023 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 52 / Line 53 * 100		**0.4323**
55	Vintage Year 2023 DSM Prospective Amounts Revenue Requirement	Listebarger Exhibit 2 pg 6, Line 25	$	16,406,881
56	Projected Vintage 2023 DSM Participants NC Non-Residential Sales (kwh) for rate period	Listebarger Exhibit 6, Line 15		16,907,663,645
57	*DSM Revenue Requirement Vintage 2023 Prospective Component for Non-Residential Rider EE (cents per kWh)*	Line 55 / Line 56 * 100		**0.0970**
	Total EMF Rate			**(0.0976)**
	Total Prospective Rate			**0.7218**

Total Revenue Requirements in Rider 14 from Non-Residential Customers

56	Vintage Year 2018 EE True-up (EMF) Revenue Requirement	Line 19	(320,101)
57	Vintage Year 2018 DSM True-up (EMF) Revenue Requirement	Line 22	(33,726)
58	Vintage Year 2019 EE True-up (EMF) Revenue Requirement	Line 25	991,169
59	Vintage Year 2019 DSM True-up (EMF) Revenue Requirement	Line 28	57,650
60	Vintage Year 2020 EE True-up (EMF) Revenue Requirement	Line 31	(173,740)
61	Vintage Year 2020 DSM True-up (EMF) Revenue Requirement	Line 34	(32,830)
62	Vintage Year 2021 EE True-up (EMF) Revenue Requirement	Line 37	(12,407,806)
63	Vintage Year 2021 DSM True-up (EMF) Revenue Requirement	Line 40	(2,882,278)
64	Vintage Year 2020 EE Prospective Amounts Revenue Requirement	Line 43	3,845,961
65	Vintage Year 2021 EE Prospective Amounts Revenue Requirement	Line 46	10,003,040
66	Vintage Year 2022 EE Prospective Amounts Revenue Requirement	Line 49	15,132,477
67	Vintage Year 2023 EE Prospective Amounts Revenue Requirement	Line 52	65,748,787
68	Vintage Year 2023 DSM Prospective Amounts Revenue Requirement	Line 55	16,406,881
	Total Non-Residential Revenue Requirement in Rider 14	Sum (Lines 56-68)	**96,335,484**

I/A

Listebarger Exhibit 2, page 1

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
True Up of Year 1, 2 and 3 Lost Revenues for Vintage Year 2018

RESIDENTIAL
Energy Efficiency Programs

Line		Reference	E-7 Sub 1130 Rider 9 Year 1 Estimate	E-7 Sub 1164 Year 2018 Yr 2 LR Estimate	E-7 Sub 1192 Rider 11 True up	E-7 Sub 1192 Year 2018 Year 3 Estimate	E-7 Sub 1230 Rider 12 True Up	E-7 Sub 1230 Year 2018 Yr 4 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1265 Rider 14 True up	Year 2018
1	Residential EE Program Cost	Evans Exhibit 1 pg. 1, Line 9 * NC Alloc. Factor	41,623,609		14,606,717		$ (0)		$ -	$ -	$ 56,230,326
2	Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 1, Line 9 * NC Alloc. Factor	5,511,264		4,154,068		140,649		(22,279)	157,616	9,941,319
3	Return on overcollection of Residential EE Program Costs	Listebarger Exhibit 3 pg 1			244,540		1,024,850		750,744	(2,580)	2,017,553
4	Total EE Program Cost and Incentive Components	Line 1 + Line 2 + Line 3	47,134,873		19,005,325		1,165,498		728,465	155,036	68,189,197
5	Residential DSM Program Cost	Evans Exhibit 1 pg. 1, Line 10 * NC Alloc. Factor	9,903,130		(124,235)		0		-	-	9,778,895
6	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 1, Line 10 * NC Alloc. Factor	2,569,925		17,215		(5,581)		(289)	573	2,581,843
7	Return on undercollection of Residential DSM Program Costs	Listebarger Exhibit 3 pg 2			(28,626)		(40,884)		(21,193)	18,109	(72,593)
8	Total DSM Program Cost and Incentive Components	Line 5 + Line 6 + Line 7	12,473,055		(135,646)		(46,465)		(21,481)	18,682	12,288,145
9	Total EE/DSM Program Cost and Incentive Components	Line 4 + Line 8	59,607,928		18,869,679		1,119,034		706,984	173,718	80,477,343
10	Revenue-related taxes and regulatory fees factor **	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	1.001302	
11	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 9 * Line 10	59,691,498		18,895,191		1,120,491		707,904	173,944	80,589,028
12	Residential Net Lost Revenues	Evans Exhibit 2 pg 1-6	19,612,717	6,294,025	894,901	9,715,212	1,534,156	-	2,310,499	(86,953)	40,274,557
13	Total Residential EE/DSM Revenue Requirement	Line 11 + Line 12	79,304,216	6,294,025	19,790,092	9,715,212	2,654,647	-	3,018,403	86,992	120,863,586
14	Total Collected for Vintage Year 2018 (through estimated Rider 13)	Listebarge Exhibit 4, Line 1									120,949,591
15	**Total Residential EE/DSM Revenue Requirement**	Line 13 - Line 14									$ (86,005)

See Listebarger Exhibit A for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	E-7 Sub 1130 Rider 9 Year 1 Estimate	E-7 Sub 1164 Year 2018 Yr 2 LR Estimate	E-7 Sub 1192 Rider 11 True up	E-7 Sub 1192 Year 2018 Year 3 Estimate	E-7 Sub 1230 Rider 12 True Up	E-7 Sub 1230 Year 2018 Yr 4 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1265 Rider 14 True up	Year 2018
16	Non- Residential EE Program Cost	Evans Exhibit 1 pg. 1, Line 23 * NC Alloc. Factor	40,592,949		(3,317,005)		0		-	-	37,275,944
17	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 1, Line 23 * NC Alloc. Factor	11,623,199		2,818,045		(25,396)		(10,579)	-	14,405,269
18	Return on undercollection of Non-residential EE Program Costs	Listebarger Exhibit 3 page 3			461,049		592,305		407,815	49,904	1,511,074
19	Total EE Program Cost and Incentive Components	Line 16 + Line 17 + Line 18	52,216,148		(37,911)		566,910		397,236	49,904	53,192,287
20	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	1.001302	
21	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 19 * Line 20	52,289,355		(37,962)		567,648		397,753	49,969	53,266,763
22	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg 1-6	5,167,253	8,746,000	2,933,863	9,507,185	(1,090,744)	2,182,027	(2,020,437)	(47,064)	25,378,082
23	Total Non-Residential EE Revenue Requirement	Line 21 + Line 22	57,456,608	8,746,000	2,895,901	9,507,185	(523,097)	2,182,027	(1,622,684)	2,905	78,644,845
24	Total Collected for Vintage Year 2018 (through estimated Rider 13)	Listebarger Exhibit 4 Line 7									78,964,947
25	Non-Residential EE Revenue Requirement	Line 23 - Line 24									(320,101)
26	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 4									15,445,061,521
27	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 25/Line 26*100									**(0.0021)**

DSM Programs

Line		Reference	E-7 Sub 1130 Rider 9 Year 1 Estimate		E-7 Sub 1192 Rider 11 True up		E-7 Sub 1230 Rider 12 True Up		E-7 Sub 1249 Rider 13 True up	E-7 Sub 1265 Rider 14 True up	Year 2018
28	Non-Residential DSM Program Cost	Evans Exhibit 1, pg. 1 Line 10 + Line 26 * NC Alloc. Factor	11,959,889		651,281		(0)		-	-	12,611,170
29	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1, pg. 1 Line 10 + Line 26 * NC Alloc. Factor	3,103,667		232,789		(7,197)		(372)	739	3,329,626
30	Return on undercollection of Non-residential DSM Program Costs	Listebarger Exhibit 3 page 4	-		37,743		76,651		54,598	40,422	209,414
31	Total Non-Residential DSM Program Cost and Incentive Components	Line 28 + Line 29 + Line 30	15,063,556		921,813		69,454		54,225	41,161	16,150,209
32	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	1.001302	
33	Total Non-Residential DSM Revenue Requirement	Line 31 * Line 32	15,084,675		923,059		69,544		54,296	41,215	16,172,789
34	Total Collected for Vintage Year 2018 (through estimated Rider 13)	Listebarger Exhibit 4 Line 12									16,206,515
35	Non-Residential EE Revenue Requirement True-up Amount	Line 33 - Line 34									(33,726)
36	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6, Line 5									16,537,337,560
37	**NC Non-Residential DSM billing factor**	Line 35/Line 36*100									**(0.0002)**

** Actual regulatory fee rate in effect in year of collection. May differ from original filed estimates.

Listebarger Exhibit 2, page 2

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Year 4 Lost Revenue and True Up of Year 1 and Year 2 for Vintage Year 2019

RESIDENTIAL
Energy Efficiency Programs

Line		Reference	E-7 Sub 1164 Rider 10 Year 1 Estimate	E-7 Sub 1192 Year 2019 Yr 2 LR Estimate	E-7 Sub 1230 Rider 12 True up	E-7 Sub 1230 Year 2019 Yr 3 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1249 Year 2020 Yr 4 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2019
1	Residential EE Program Cost	Evans Exhibit 1 pg. 2, Line 9 * NC Alloc. Factor	$ 41,002,874		$ 13,243,503		$ (0)		$ 0	$ 54,246,377
2	Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 2, Line 9 * NC Alloc. Factor	3,801,819		3,296,056		(124,962)		90,385	7,063,299
3	Return on undercollection of Residential EE Program Costs	Listebarger Exhibit 3 pg 5			55,738		750,744		511,698	1,318,179
4	Total EE Program Cost and Incentive Components	Line 1 + Line 2 + Line 3	44,804,694		16,595,296		625,782		602,083	62,627,855
5	Residential DSM Program Cost	Evans Exhibit 1 pg. 2, Line 10 + Line 26 * NC Alloc. Factor	10,577,352		(308,751)		(0)		(0)	10,268,601
6	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 2, Line 10 + Line 26 * NC Alloc. Factor	2,773,086		541,821		0		26,383	3,341,290
7	Return on undercollection of Residential DSM Program Costs	Listebarger Exhibit 3 pg 6			(6,600)		(21,193)		5,935	(21,858)
8	Total DSM Program Cost and Incentive Components	Line 5 + Line 6 + Line 7	13,350,438		226,469		(21,193)		32,318	13,588,033
9	Total EE/DSM Program Cost and Incentive Components	Line 4 + Line 8	58,155,132		16,821,766		604,589		634,402	76,215,888
10	Revenue-related taxes and regulatory fees factor **	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	
11	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 9 * Line 10	58,236,665		16,844,509		605,376		635,228	76,321,778
12	Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	18,783,204	5,519,302	6,704,043	5,292,331	(1,623,869)	2,233,068	236,622	37,144,701
13	Total Residential EE/DSM Revenue Requirement	Line 11 + Line 12	77,019,869	5,519,302	23,548,552	5,292,331	(1,018,493)	2,233,068	871,850	113,466,479
14	Total Collected for Vintage Year 2019 (through estimated Rider 13)	Listebarger Exhibit 4, Line 2								112,534,414
15	**Total Residential EE/DSM Revenue Requirement**	Line 13 - Line 14								$ 932,065

Note: No prospective Year 4 lost revenue is included in this exhibit because the rate case test period was extended for residential customers.

See Listebarger Exhibit A for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	E-7 Sub 1164 Rider 10 Year 1 Estimate	E-7 Sub 1192 Year 2019 Yr 2 LR Estimate	E-7 Sub 1230 Rider 12 True up	E-7 Sub 1230 Year 2019 Yr 3 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1249 Year 2020 Yr 4 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2019
16	Non- Residential EE Program Cost	Evans Exhibit 1 pg. 2, Line 23 * NC Alloc. Factor	41,671,833		(8,698,625)		-		0	32,973,208
17	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 2, Line 23 * NC Alloc. Factor	8,464,629		1,873,850		759,937		(0)	11,098,417
18	Return on undercollection of Non-residential EE Program Costs	Listebarger Exhibit 3 page 7			(553,659)		(275,034)		(228,890)	(1,057,583)
19	Total EE Program Cost and Incentive Components	Line 16 + Line 17 + Line 18	50,136,462		(7,378,434)		484,904		(228,890)	43,014,042
20	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	
21	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 19 * Line 20	50,206,753		(7,388,410)		485,535		(229,188)	43,074,691
22	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	5,590,446	9,219,870	452,216	10,794,655	(8,183,962)	2,074,187	874,289	20,821,700
23	Total Non-Residential EE Revenue Requirement	Line 21 + Line 22	55,797,199	9,219,870	(6,936,194)	10,794,655	(7,698,427)	2,074,187	645,101	63,896,391
24	Total Collected for Vintage Year 2019 (through estimated Rider 13)	Listebarger Exhibit 4 Line 8								62,905,222
25	Non-Residential EE Revenue Requirement	Line 23 - Line 24								991,169
26	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 6								15,395,466,337
27	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 25/Line 26*100								**0.0064**

Note: Only non-residential customer lost revenues earned after the rate case test period have been included.

DSM Programs

Line		Reference	E-7 Sub 1164 Rider 10 Year 1 Estimate		E-7 Sub 1230 Rider 12 True up		E-7 Sub 1249 Rider 13 True up		E-7 Sub 1265 Rider 14 True up	Year 2019
28	Non-Residential DSM Program Cost	Evans Exhibit 1 pg. 2, Line 10 + Line 26 * NC Alloc. Factor	12,538,168		(462,163)		-		(0)	12,076,005
29	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 2, Line 10 + Line 26 * NC Alloc. Factor	3,287,157		611,215		-		31,027	3,929,399
30	Return on undercollection of Non-residential DSM Program Costs	Listebarger Exhibit 3 page 8	-		(9,744)		7,619		2,253	128
31	Total Non-Residential DSM Program Cost and Incentive Components	Line 28 + Line 29 + Line 30	15,825,325		139,308		7,619		33,279	16,005,532
32	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001352		1.001302		1.001302	
33	Total Non-Residential DSM Revenue Requirement	Line 31 * Line 32	15,847,512		139,497		7,629		33,323	16,027,961
34	Total Collected for Vintage Year 2019 (through estimated Rider 13)	Listebarger Exhibit 4 Line 13								15,970,311
35	Non-Residential EE Revenue Requirement True-up Amount	Line 33 - Line 34								57,650
36	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6, Line 7								16,570,566,722
37	**NC Non-Residential DSM billing factor**	Line 35/Line 36*100								**0.0003**

** Actual regulatory fee rate in effect in year of collection. May differ from original filed estimates.

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Year 3 Lost Revenue and True Up of Year 1 for Vintage Year 2020

RESIDENTIAL
Energy Efficiency Programs

Line		Reference	Year 2020 Yr 4 LR Estimate	E-7 Sub 1192 Rider 11 Year 1 Estimate	E-7 Sub 1230 Year 2020 Yr 2 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1249 Year 2020 Yr 3 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2020
1	Residential EE Program Cost	Evans Exhibit 1 pg. 3, Line 9 * NC Alloc. Factor		$ 33,551,578		$ 4,000,501		$ -	$ 37,552,079
2	Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 3, Line 9 * NC Alloc. Factor		3,173,534		1,218,929		90,910	4,483,373
3	Return on undercollection of Residential EE Program Costs	Listebarger Exhibit 3 pg 13				147,060		434,746	581,806
4	Total EE Program Cost and Incentive Components	Line 1 + Line 2 + Line 3		36,725,112		5,366,490		525,656	42,617,258
5	Residential DSM Program Cost	Evans Exhibit 1 pg. 3, Line 10 + Line 26 * NC Alloc. Factor		12,243,392		(2,355,317)		-	9,888,075
6	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 3, Line 10 + Line 26 * NC Alloc. Factor		3,189,876		7,301		14,471	3,211,648
7	Return on overcollection of Residential DSM Program Costs	Listebarger Exhibit 3 pg 10				(62,603)		(198,174)	(260,777)
8	Total DSM Program Cost and Incentive Components	Line 5 + Line 6 + Line 7		15,433,268		(2,410,619)		(183,703)	12,838,946
9	Total EE/DSM Program Cost and Incentive Components	Line 4 + Line 8		52,158,380		2,955,871		341,953	55,456,205
10	Revenue-related taxes and regulatory fees factor **	Listebarger Exhibit 2, pg. 7		1.001402		1.001302		1.001302	
11	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 9 * Line 10		52,231,506		2,959,720		342,398	55,533,624
12	Residential Net Lost Revenues	Evans Exhibit 2 pg. 1-6	$ 2,568,275	14,667,095	4,495,479	6,588,261	5,386,818	609,516	31,747,169
13	Total Residential EE/DSM Revenue Requirement	Line 11 + Line 12	2,568,275	66,898,602	4,495,479	9,547,981	5,386,818	951,915	87,280,793
14	Total Collected for Vintage Year 2020 (through estimated Rider 13)	Listebarger Exhibit 4, Line 3							86,380,883
15	**Total Residential EE/DSM Revenue Requirement**	Line13 - Line 14	$ 2,568,275						$ 899,910

See Listebarger Exhibit A for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	Year 2020 Yr 4 LR Estimate	E-7 Sub 1192 Rider 11 Year 1 Estimate	E-7 Sub 1230 Year 2020 Yr 2 LR Estimate	E-7 Sub 1249 Rider 13 True up	E-7 Sub 1249 Year 2020 Yr 3 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2020
16	Non- Residential EE Program Cost	Evans Exhibit 1 pg. 3, Line 23 * NC Alloc. Factor		37,708,077		(15,681,234)		-	22,026,843
17	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 3, Line 23 * NC Alloc. Factor		10,010,194		(2,909,256)		98,425	7,199,363
18	Return on overcollection of Non-residential EE Program Costs	Listebarger Exhibit 3 page 11				(324,916)		(767,827)	(1,092,743)
19	Total EE Program Cost and Incentive Components	Line 16 + Line 17 + Line 18		47,718,271		(18,915,406)		(669,402)	28,133,463
20	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7		1.001402		1.001302		1.001302	
21	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 19 * Line 20		47,785,172		(18,940,034)		(670,274)	28,174,865
22	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg. 1 - 6	3,845,961	5,183,193	9,376,721	(4,169,004)	6,802,676	1,081,898	18,275,484
23	Total Non-Residential EE Revenue Requirement	Line 21 + Line 22	3,845,961	52,968,365	9,376,721	(23,109,038)	6,802,676	411,625	46,450,349
24	Total Collected for Vintage Year 2020 (through estimated Rider 13)	Listebarger Exhibit 4 Line 9							46,624,089
25	Non-Residential EE Revenue Requirement	Line 23 - Line 24	3,845,961						(173,740)
26	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 8	14,831,584,100						14,831,584,100
27	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 25/Line 26*100	**0.0259**						**(0.0012)**

DSM Programs

Line		Reference	E-7 Sub 1192 Rider 11 Year 1 Estimate		E-7 Sub 1249 Rider 13 True up		E-7 Sub 1265 Rider 14 True up	Year 2020
28	Non-Residential DSM Program Cost	Evans Exhibit 1 pg. 3, Line 10 + Line 26 * NC Alloc. Factor	15,789,462		(3,918,078)		-	11,871,383
29	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 3, Line 10 + Line 26 * NC Alloc. Factor	4,113,764		(275,311)		17,373	3,855,826
30	Return on overcollection of Non-residential DSM Program Costs	Listebarger Exhibit 3 page 12	-		(63,113)		(4,377)	(67,490)
31	Total Non-Residential DSM Program Cost and Incentive Components	Line 28 + Line 29 + Line 30	19,903,226		(4,256,502)		12,996	15,659,720
32	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001402		1.001302		1.001302	
33	Total Non-Residential DSM Revenue Requirement	Line 31 * Line 32	19,931,130		(4,262,044)		13,013	15,682,099
34	Total Collected for Vintage Year 2020 (through estimated Rider 13)	Listebarger Exhibit 4 Line 14						15,714,929
35	Non-Residential EE Revenue Requirement True-up Amount	Line 33- Line 34						(32,830)
36	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6 Line 9						16,609,571,340
37	**NC Non-Residential DSM billing factor**	Line 35/Line 36*100						**(0.0002)**

** Actual regulatory fee rate in effect in year of collection. May differ from original filed estimates.

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Year 3 Lost Revenue and True Up of Year 1 for Vintage Year 2021

RESIDENTIAL
Energy Efficiency Programs

Line		Reference	Year 2021 Yr 3 LR Estimate	E-7 Sub 1230 Rider 12 Year 1 Estimate	E-7 Sub 1249 Year 2021 Yr 2 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2021
1	Residential EE Program Cost	Evans Exhibit 1 pg. 4, Line 9 * NC Alloc. Factor		$ 37,155,471		$ (10,923,999)	$ 26,231,472
2	Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 4, Line 9 * NC Alloc. Factor		2,774,995		(244,088)	2,530,907
3	Return on undercollection of Residential EE Program Costs	Listebarger Exhibit 3 pg 13				(427,153)	(427,153)
4	Total EE Program Cost and Incentive Components	Line 1 + Line 2 + Line 3		39,930,466		(11,595,240)	28,335,226
5	Residential DSM Program Cost	Evans Exhibit 1 pg. 4, Line 10 + Line 26 * NC Alloc. Factor		13,699,485		(2,210,071)	11,489,414
6	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 4, Line 10 + Line 26 * NC Alloc. Factor		3,521,313		(751,140)	2,770,173
7	Return on overcollection of Residential DSM Program Costs	Listebarger Exhibit 3 pg 14				(105,961)	(105,961)
8	Total DSM Program Cost and Incentive Components	Line 5 + Line 6 + Line 7		17,220,797		(3,067,171)	14,153,626
9	Total EE/DSM Program Cost and Incentive Components	Line 4 + Line 8		57,151,264		(14,662,411)	42,488,852
10	Revenue-related taxes and regulatory fees factor **	Listebarger Exhibit 2, pg. 7		1.001302		1.001302	
11	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 9 * Line 10		57,225,674		(14,681,502)	42,544,173
12	Residential Net Lost Revenues	Evans Exhibit 2 pg. 1-6	$ 3,959,003	25,205,298	6,249,665	(8,091,427)	23,363,537
13	Total Residential EE/DSM Revenue Requirement	Line 11 + Line 12	3,959,003	82,430,974	6,249,665	(22,772,928)	65,907,710
14	Total Collected for Vintage Year 2021 (through estimated Rider 13)	Listebarger Exhibit 4, Line 4					88,242,571
15	**Total Residential EE/DSM Revenue Requirement**	Line13 - Line 14	$ 3,959,003				$ (22,334,861)

See Listebarger Exhibit A for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	Year 2021 Yr 3 LR Estimate	E-7 Sub 1230 Rider 12 Year 1 Estimate	E-7 Sub 1249 Year 2021 Yr 2 LR Estimate	E-7 Sub 1265 Rider 14 True up	Year 2021
16	Non- Residential EE Program Cost	Evans Exhibit 1 pg. 4, Line 23 * NC Alloc. Factor		38,264,959		(8,510,352)	29,754,607
17	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1 pg. 4, Line 23 * NC Alloc. Factor		8,888,527		(1,494,004)	7,394,523
18	Return on overcollection of Non-residential EE Program Costs	Listebarger Exhibit 3 page 15				(580,644)	(580,644)
19	Total EE Program Cost and Incentive Components	Line 16 + Line 17 + Line 18		47,153,486		(10,585,000)	36,568,486
20	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7		1.001302		1.001302	
21	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 19 * Line 20		47,214,880		(10,598,782)	36,616,098
22	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg. 1-6	10,003,040	6,360,715	13,494,665	(4,819,745)	15,035,634
23	Total Non-Residential EE Revenue Requirement	Line 21 + Line 22	10,003,040	53,575,595	13,494,665	(15,418,527)	51,651,733
24	Total Collected for Vintage Year 2021 (through estimated Rider 13)	Listebarger Exhibit 4 Line 10					64,059,539
25	Non-Residential EE Revenue Requirement	Line 23 - Line 24	10,003,040				(12,407,806)
26	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 10	14,903,909,177				14,903,909,177
27	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 25/Line 26*100	**0.0671**				**(0.0833)**

DSM Programs

Line		Reference	E-7 Sub 1230 Rider 12 Year 1 Estimate		E-7 Sub 1265 Rider 14 True up	Year 2021
28	Non-Residential DSM Program Cost	Evans Exhibit 1 pg. 4, Line 10 + Line 26 * NC Alloc. Factor	16,110,767		(3,154,656)	12,956,111
29	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 4, Line 10 + Line 26 * NC Alloc. Factor	4,141,109		(1,017,305)	3,123,804
30	Return on overcollection of Non-residential DSM Program Costs	Listebarger Exhibit 3 page 16	-		(77,597)	(77,597)
31	Total Non-Residential DSM Program Cost and Incentive Components	Line 28 + Line 29 + Line 30	20,251,876		(4,249,558)	16,002,318
32	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001302		1.001302	
33	Total Non-Residential DSM Revenue Requirement	Line 31 * Line 32	20,278,244		(4,255,091)	16,023,153
34	Total Collected for Vintage Year 2020 (through estimated Rider 13)	Listebarger Exhibit 4 Line 15				18,905,431
35	Non-Residential EE Revenue Requirement True-up Amount	Line 33- Line 34				(2,882,278)
36	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6 Line 11				16,646,430,078
37	**NC Non-Residential DSM billing factor**	Line 35/Line 36*100				**(0.0173)**

** Actual regulatory fee rate in effect in year of collection. May differ from original filed estimates.

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Year 2 Lost Revenues for Vintage Year 2022

RESIDENTIAL

Line		Reference	2022
1	Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	6,791,458
2	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 1	$ 22,809,393,337
3	**NC Residential EE Billing Factor (Cents/kWh)**	Line 1/Line 2*100	**0.0298**

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	2022
4	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	15,132,477
5	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6, Line 12	15,209,154,609
6	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 4/Line 5*100	**0.0995**

Listebarger Exhibit 2, page 6

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Program Costs, Earned Incentive and Lost Revenues for Vintage Year 2023

RESIDENTIAL

Line		Reference	2023
1	Residential EE Program Cost	Evans Exhibit 1, pg. 5, Line 10 * NC Alloc. Factor	$ 43,514,258
2	Residential EE Earned Utility Incentive	Evans Exhibit 1, pg. 5, Line 10	5,293,270
3	Total EE Program Cost and Incentive Components	Line 1 + Line 2	48,807,528
4	Residential DSM Program Cost	Evans Exhibit 1 pg. 5, Line 11	12,159,515
5	Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 5, Line 11	2,371,105
6	Total DSM Program Cost and Incentive Components	Line 4 + Line 5	14,530,620
7	Total EE/DSM Program Cost and Incentive Components	Line 3 + Line 6	63,338,148
8	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001302
9	Total EE/DSM Program Cost and Incentive Revenue Requirement	Line 7 * Line 8	63,420,614
10	Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	21,146,502
11	**Total Residential EE Revenue Requirement**	**Line 9 + Line 10**	**$ 84,567,117**
			See Listebarger Exhibit 1 for rate

NON-RESIDENTIAL
Energy Efficiency Programs

Line		Reference	2023
12	Non- Residential EE Program Cost	Evans Exhibit 1, pg. 5, Line 24 * NC Alloc. Factor	$ 45,838,354
13	Non-Residential EE Earned Utility Incentive	Evans Exhibit 1, pg. 6, Line 24	12,167,415
14	Total EE Program Cost and Incentive Components	Line 12 + Line 13	58,005,769
15	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001302
16	Total Non-Residential EE Program Cost and Incentive Revenue Requirements	Line 14 * Line 15	58,081,293
17	Non-Residential Net Lost Revenues	Evans Exhibit 2 pg 1 - 6	7,667,494
18	Total Non-Residential EE Revenue Requirement	Line 16 + Line 17	$ 65,748,787
19	Projected NC Residential Sales (kWh)	Listebarger Exhibit 6, Line 14	15,209,154,609
20	**NC Non-Residential EE billing factor (Cents/kWh)**	Line 18/Line 19*100	**0.4323**

DSM Programs

Line		Reference	2023
21	Non-Residential DSM Program Cost	Evans Exhibit 1 pg. 6, Line 10 + Line 26 * NC Alloc. Factor	$ 13,711,755
22	Non-Residential DSM Earned Utility Incentive	Evans Exhibit 1 pg. 6, Line 10 + Line 26 * NC Alloc. Factor	2,673,792
23	Total Non-Residential DSM Program Cost and Incentive Components	Line 21 + Line 22	16,385,547
24	Revenue-related taxes and regulatory fees factor	Listebarger Exhibit 2, pg. 7	1.001302
25	Total Non-Residential DSM Revenue Requirement	Line 23 * Line 24	16,406,881
26	Projected NC Non-Residential Sales (kWh)	Listebarger Exhibit 6, Line 15	16,907,663,645
27	**NC Non-Residential DSM billing factor**	Line 25/Line 26*100	**0.0970**

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Gross Receipts Tax Years 2018 through estimated 2022

	Year		Actual GRT Rate In Effect
Rider 9	2018		1.001402
Rider 10	2019		1.001402
	2020	Jan - June	1.001402
	2020	July - Dec	1.001302
Rider 11	2020	Weighted Average	1.001352
Rider 12	2021		1.001302
Rider 13	2022		1.001302
Rider 14	2033		1.001302

Note: the current rate is used as the estimate for 2022 and 2023. This will be subject to true-up based on actual rates in effect.

I/A

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1249
Estimated Return Calculation - Residential EE Programs Vintage 2018

NC Residential EE		Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 2, Line 4			see calc. at right		
Beginning Balance		77,331,818		56,230,324	96,550,755			(54,997)
2021	January		72.7130507%	-	162,555	-1.6199%	2,633	2,633
2021	February		72.7130507%	-	311,915	-1.6199%	5,053	5,053
2021	March		72.7130507%	-	304,265	-1.6199%	4,929	4,929
2021	April		72.7130507%	-	241,514	-1.6199%	3,912	3,912
2021	May		72.7130507%	-	196,271	-1.6199%	3,179	3,179
2021	June		72.7130507%	-	270,416	-1.6199%	4,381	4,381
2021	July		72.7130507%	-	327,081	-1.6199%	5,298	5,298
2021	August		72.7130507%	-	337,132	-1.6199%	5,461	5,461
2021	September		72.7130507%	-	324,456	-1.6199%	5,256	5,256
2021	October		72.7130507%	-	225,806	-1.6199%	3,658	3,658
2021	November		72.7130507%	-	207,102	-1.6199%	3,355	3,355
2021	December		72.7130507%	-	597,245	-1.6199%	9,675	9,675
		77,331,818		56,230,324	100,056,516		56,790	1,794

Program Costs to be Recovered in Rider 11	(54,997)
Revenues to be Collected in Rider 11	3,395,034
% Revenue related to Program Costs	-1.6199%

NC Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2020 - 12/2020				6.56%			0.766497	
2021	January	(52,364)	0.233503	615	615	(52,978)	0.005469	(145)	(145)	0.766497	(189)
2021	February	(47,311)	0.233503	1,180	615	(47,926)	0.005469	(276)	(421)	0.766497	(549)
2021	March	(42,382)	0.233503	1,151	1,766	(44,148)	0.005469	(252)	(673)	0.766497	(877)
2021	April	(38,470)	0.233503	914	1,528	(39,998)	0.005469	(230)	(903)	0.766497	(1,178)
2021	May	(35,290)	0.233503	742	2,508	(37,798)	0.005469	(213)	(1,115)	0.766497	(1,455)
2021	June	(30,910)	0.233503	1,023	2,551	(33,461)	0.005469	(195)	(1,310)	0.766497	(1,709)
2021	July	(25,611)	0.233503	1,237	3,745	(29,357)	0.005469	(172)	(1,482)	0.766497	(1,934)
2021	August	(20,150)	0.233503	1,275	3,827	(23,976)	0.005469	(146)	(1,628)	0.766497	(2,124)
2021	September	(14,894)	0.233503	1,227	4,973	(19,867)	0.005469	(120)	(1,748)	0.766497	(2,280)
2021	October	(11,236)	0.233503	854	4,681	(15,917)	0.005469	(98)	(1,846)	0.766497	(2,408)
2021	November	(7,881)	0.233503	783	5,756	(13,637)	0.005469	(81)	(1,926)	0.766497	(2,513)
2021	December	1,794	0.233503	2,259	6,940	(5,146)	0.005469	(51)	(1,978)	0.766497	(2,580)
								(1,978)			(2,580)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2018

NC Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.272869	
Beginning Balance		(91)			(5,458)	6,170					
2021	January	25,567	72.7131%	18,657	13,199	12,368	0.005469	51	51	0.272869	186
2021	February	77,239	72.7131%	37,572	50,771	26,468	0.005469	106	157	0.272869	575
2021	March	127,577	72.7131%	36,603	87,374	40,203	0.005469	182	339	0.272869	1,243
2021	April	166,979	72.7131%	28,650	116,024	50,955	0.005469	249	588	0.272869	2,157
2021	May	198,494	72.7131%	22,916	138,940	59,554	0.005469	302	891	0.272869	3,264
2021	June	242,933	72.7131%	32,313	171,253	71,680	0.005469	359	1,250	0.272869	4,579
2021	July	297,248	72.7131%	39,494	210,747	86,501	0.005469	433	1,682	0.272869	6,165
2021	August	353,315	72.7131%	40,768	251,515	101,800	0.005469	515	2,197	0.272869	8,052
2021	September	407,173	72.7131%	39,161	290,676	116,496	0.005469	597	2,794	0.272869	10,239
2021	October	443,836	72.7131%	26,659	317,335	126,501	0.005469	664	3,459	0.272869	12,675
2021	November	477,240	72.7131%	24,289	341,624	135,616	0.005469	717	4,175	0.272869	15,301
2021	December	510,005	72.7131%	23,824	365,449	144,556	0.005469	766	4,941	0.272869	18,109
								4,941			18,109

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2018

Interest Calculation

2018 - Rider 11	Month	NC Program Costs Incurred	Revenue Collected	Overcollected Balance	PPI	Revenue Collected	Undercollected Balance	**Total Cumulative Over/Under Collected**
	January	577,730	496,812	80,919	217,020	132,319	84,701	165,620
	February	492,253	976,135	(483,881)	217,020	259,980	(42,960)	(361,221)
	March	560,931	718,111	(157,180)	217,020	191,259	25,761	(492,640)
	April	580,847	723,243	(142,396)	217,020	192,626	24,394	(610,642)
	May	458,541	632,349	(173,807)	217,020	168,417	48,603	(735,846)
	June	981,302	901,517	79,786	217,020	240,107	(23,086)	(679,147)
	July	1,134,268	1,034,845	99,423	217,020	275,617	(58,596)	(638,320)
	August	1,151,622	952,221	199,402	217,020	253,611	(36,591)	(475,509)
	September	1,295,899	1,022,050	273,849	217,020	272,209	(55,189)	(256,849)
	October	1,127,691	722,072	405,619	217,020	192,314	24,706	173,477
	November	528,490	667,394	(138,904)	217,020	177,751	39,269	73,842
	December	889,322	1,555,855	(666,533)	217,020	414,381	(197,360)	(790,051)
YTD Balance		9,778,896	10,402,600	(623,705)	2,604,245	2,770,592	(166,347)	(790,051)

DSM Program Costs	9,778,895	0.79
DSM PPI & GRT	2,604,245	0.21
Total Revenue Requirement	12,383,141	

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2018

Interest Calculation

2019 - Rider 12	Month	NC Program Costs Incurred	Revenue Collected	Undercollected Balance	PPI	Revenue Collected	Undercollected Balance	**Total Cumulative Over/Under Collected**
Beginning Balance		9,778,896	10,402,600	(623,705)	2,604,245	2,770,592	(166,347)	(790,051)
	January			-			-	(790,051)
	February			-			-	(790,051)
	March			-			-	(790,051)
	April			-			-	(790,051)
	May			-			-	(790,051)
	June			-			-	(790,051)
	July			-			-	(790,051)
	August			-			-	(790,051)
	September			-			-	(790,051)
	October			-			-	(790,051)
	November			-			-	(790,051)
	December			-			-	(790,051)
YTD Balance		9,778,896	10,402,600	(623,705)	2,604,245	2,770,592	(166,347)	(790,051)

Note: Year 2 of all residential vintages goes toward the collection of Year 2 lost revenues. Therefore, no revenues offset the overcollection of Program costs or PPI. Interest continued to accrue on beginning balance.

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2018

Interest Calculation

2020 - Rider 13	Month	NC Program Costs Incurred	Revenue Collected	Undercollected Balance	PPI	Revenue Collected	Undercollected Balance	**Total Cumulative Over/Under Collected**
Beginning Balance		9,778,896	10,402,600	(623,705)	2,604,245	2,770,592	(166,347)	(790,051)
	January		(23,068)	(600,636)		(6,152)	(160,194)	(760,831)
	February		(56,262)	(544,374)		(15,006)	(145,189)	(689,563)
	March		(48,859)	(495,515)		(13,031)	(132,158)	(627,673)
	April		(41,587)	(453,928)		(11,092)	(121,066)	(574,994)
	May		(38,349)	(415,579)		(10,228)	(110,838)	(526,417)
	June		(49,065)	(366,514)		(13,086)	(97,752)	(464,266)
	July		(65,763)	(300,750)		(17,540)	(80,212)	(380,963)
	August		(68,628)	(232,122)		(18,304)	(61,909)	(294,031)
	September		(56,896)	(175,226)		(15,175)	(46,734)	(221,960)
	October		(38,900)	(136,326)		(10,375)	(36,359)	(172,685)
	November		(40,266)	(96,059)		(10,739)	(25,620)	(121,679)
	December		(95,988)	(72)		(25,601)	(19)	(91)
YTD Balance		-	(623,633)			(166,328)		
Cumulative Ending Balance		9,778,896	9,778,968	(72)	2,604,245	2,604,265	(19)	(91)

Revenue Requirement:		
Program Costs	(623,705)	0.79
PPI	(166,347)	0.21
Total	(790,051)	
Revenue Given back	(818,586)	
Less Interest given back	(28,626)	
Total	(789,960)	
Check Point	(789,960)	
Difference	-	

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2018

Interest Calculation

2021 - Rider 14	Month	NC Program Costs Incurred	Revenue Collected	Undercollected Balance	PPI	Revenue Collected	Undercollected Balance	**Total Cumulative Over/Under Collected**
Beginning Balance		9,778,896	9,778,968	(72)	2,604,245	2,604,265	(19)	(91)
	January		(25,639)	25,567		(6,838)	6,819	32,386
	February		(51,672)	77,239		(13,781)	20,600	97,839
	March		(50,338)	127,577		(13,426)	34,026	161,603
	April		(39,401)	166,979		(10,509)	44,535	211,513
	May		(31,516)	198,494		(8,405)	52,940	251,434
	June		(44,439)	242,933		(11,852)	64,792	307,725
	July		(54,315)	297,248		(14,486)	79,278	376,527
	August		(56,067)	353,315		(14,953)	94,232	447,547
	September		(53,858)	407,173		(14,364)	108,596	515,769
	October		(36,663)	443,836		(9,778)	118,375	562,211
	November		(33,403)	477,240		(8,909)	127,283	604,523
	December		(32,765)	510,005		(8,739)	136,022	646,027
YTD Balance		-	(510,077)			(136,041)		
Cumulative Ending Balance		9,778,896	9,268,891	510,005	2,604,245	2,468,223	136,022	646,027

Revenue Requirement:		
Program Costs	(72)	0.79
PPI	(19)	0.21
Total	(91)	
Revenue Given back	(687,055)	
Less Interest given back	(40,937)	
Total	(646,118)	
Check Point	(646,118)	
Difference	-	

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Non- Residential EE Programs Vintage 2018

NC Non- Residential EE		Non-Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	NC Residential Revenue Collected	NC Non-Residential EE Program Collection %	Non-Residential EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5. pg 1, Line 4			See calc. at right		
Beginning Balance		51,264,448		37,275,944	64,192,958		20,546,481	1,342,401
2021	January		72.7130507%	-	376,128	96.0330337%	(361,207)	(361,206)
2021	February		72.7130507%	-	139,345	96.0330337%	(133,817)	(133,817)
2021	March		72.7130507%	-	104,126	96.0330337%	(99,995)	(99,995)
2021	April		72.7130507%	-	102,159	96.0330337%	(98,106)	(98,106)
2021	May		72.7130507%	-	94,315	96.0330337%	(90,573)	(90,573)
2021	June		72.7130507%	-	118,155	96.0330337%	(113,468)	(113,468)
2021	July		72.7130507%	-	135,313	96.0330337%	(129,945)	(129,945)
2021	August		72.7130507%	-	131,110	96.0330337%	(125,908)	(125,908)
2021	September		72.7130507%	-	143,390	96.0330337%	(137,702)	(137,702)
2021	October		72.7130507%	-	114,526	96.0330337%	(109,983)	(109,983)
2021	November		72.7130507%	-	99,907	96.0330337%	(95,944)	(95,944)
2021	December		72.7130507%	-	154,161	96.0330337%	(148,046)	(148,046)
		51,264,448		37,275,944	65,905,594		18,901,785	(302,294)

Program Costs to be Recovered in Rider 12	1,342,401
Revenues to be Collected in Rider 12	1,397,854
% Revenue to be assigned to Program Costs	96.03%

NC Non-Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	981,195	0.233503	(84,342.73)	(84,343)	1,065,538	0.005469	2,914	2,914	0.766497	3,801
2021	February	847,377	0.233503	(31,246.78)	(115,590)	962,967	0.005469	5,547	8,461	0.766497	11,038
2021	March	747,382	0.233503	(23,349.22)	(138,939)	886,321	0.005469	5,057	13,518	0.766497	17,636
2021	April	649,276	0.233503	(22,908.11)	(161,847)	811,123	0.005469	4,642	18,160	0.766497	23,692
2021	May	558,703	0.233503	(21,149.13)	(182,996)	741,698	0.005469	4,246	22,406	0.766497	29,232
2021	June	445,234	0.233503	(26,495.13)	(209,491)	654,726	0.005469	3,819	26,225	0.766497	34,214
2021	July	315,289	0.233503	(30,342.59)	(239,834)	555,123	0.005469	3,308	29,533	0.766497	38,530
2021	August	189,381	0.233503	(29,400.01)	(269,234)	458,614	0.005469	2,772	32,305	0.766497	42,147
2021	September	51,679	0.233503	(32,153.87)	(301,388)	353,066	0.005469	2,220	34,525	0.766497	45,043
2021	October	(58,304)	0.233503	(25,681.28)	(327,069)	268,765	0.005469	1,700	36,225	0.766497	47,261
2021	November	(154,248)	0.233503	(22,403.25)	(349,472)	195,224	0.005469	1,269	37,494	0.766497	48,916
2021	December	(302,294)	0.233503	(34,569.12)	(384,041)	81,747	0.005469	757	38,252	0.766497	49,904
								38,252			49,904

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation -Non - Residential DSM Programs Vintage 2018

NC Non- Residential DSM		Total System NC DSM Program Costs Incurred	NC Non- Residential DSM Allocation %	NC Allocated DSM Non- Residential Program Costs	NC Non-Residential DSM Revenue Collected	NC Non- Residential DSM Program Collection %	Non-Residential DSM Program Costs Revenue Collected	(Over)/Under Collection
			See Listebarger Exhibit 5 pg. 1, Line 10					
Beginning Balance		30,409,405	41.4712829%	12,611,170	1,218,346		(12,466,415)	144,755
2021	January	25,567	41.4712829%	10,603	33,936	-59.5662739%	20,214	30,817
2021	February	77,239	41.4712829%	32,032	(10,867)	-59.5662739%	(6,473)	25,559
2021	March	127,577	41.4712829%	52,908	(17,268)	-59.5662739%	(10,286)	42,622
2021	April	166,979	41.4712829%	69,248	(16,980)	-59.5662739%	(10,115)	59,134
2021	May	198,494	41.4712829%	82,318	(15,445)	-59.5662739%	(9,200)	73,118
2021	June	242,933	41.4712829%	100,748	(19,453)	-59.5662739%	(11,587)	89,160
2021	July	297,248	41.4712829%	123,273	(22,697)	-59.5662739%	(13,520)	109,753
2021	August	353,315	41.4712829%	146,524	(22,169)	-59.5662739%	(13,205)	133,319
2021	September	407,173	41.4712829%	168,860	(23,209)	-59.5662739%	(13,825)	155,035
2021	October	443,836	41.4712829%	184,065	(17,763)	-59.5662739%	(10,580)	173,484
2021	November	477,240	41.4712829%	197,917	(18,286)	-59.5662739%	(10,892)	187,025
2021	December	510,005	41.4712829%	211,505	(17,874)	-59.5662739%	(10,647)	200,858
		33,737,012		13,991,172	1,050,271		(12,566,531)	1,424,640

Program Costs to be Recovered in Rider 12	144,755
Revenues to be Collected in Rider 12	(243,015)
% Revenue to be assigned to Program Costs	-59.57%

NC Non-Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	175,572	0.233503	7,196	7,196	168,376	0.005469	460	460	0.766497	601
2021	February	201,131	0.233503	5,968	13,164	187,967	0.005469	974	1,435	0.766497	1,872
2021	March	243,753	0.233503	9,952	23,116	220,637	0.005469	1,117	2,552	0.766497	3,330
2021	April	302,887	0.233503	13,808	36,924	265,963	0.005469	1,331	3,883	0.766497	5,066
2021	May	376,005	0.233503	17,073	53,998	322,008	0.005469	1,608	5,491	0.766497	7,163
2021	June	465,165	0.233503	20,819	74,817	390,349	0.005469	1,948	7,439	0.766497	9,705
2021	July	574,918	0.233503	25,628	100,444	474,474	0.005469	2,365	9,804	0.766497	12,790
2021	August	708,238	0.233503	31,130	131,575	576,663	0.005469	2,874	12,678	0.766497	16,540
2021	September	863,273	0.233503	36,201	167,776	695,497	0.005469	3,479	16,157	0.766497	21,079
2021	October	1,036,757	0.233503	40,509	208,285	828,472	0.005469	4,167	20,324	0.766497	26,516
2021	November	1,223,782	0.233503	43,671	251,956	971,826	0.005469	4,923	25,247	0.766497	32,939
2021	December	1,424,640	0.233503	46,901	298,857	1,125,783	0.005469	5,736	30,984	0.766497	40,422
								30,984			40,422

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential EE Programs Vintage 2019

NC Residential EE		Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 2, Line 4			see calc. at right		
Beginning Balance		74,218,205		54,246,377	63,652,577		(39,726,803)	14,519,574
2021	January		73.0903918%	-	1,381,718	50.2421%	(694,204)	(694,204)
2021	February		72.7130507%	-	2,651,280	50.2421%	(1,332,058)	(1,332,058)
2021	March		72.7130507%	-	2,586,255	50.2421%	(1,299,389)	(1,299,389)
2021	April		72.7130507%	-	2,052,872	50.2421%	(1,031,406)	(1,031,406)
2021	May		72.7130507%	-	1,668,307	50.2421%	(838,192)	(838,192)
2021	June		72.7130507%	-	2,298,538	50.2421%	(1,154,834)	(1,154,834)
2021	July		72.7130507%	-	2,780,192	50.2421%	(1,396,827)	(1,396,827)
2021	August		72.7130507%	-	2,865,623	50.2421%	(1,439,749)	(1,439,749)
2021	September		72.7130507%	-	2,757,880	50.2421%	(1,385,617)	(1,385,617)
2021	October		72.7130507%	-	1,919,352	50.2421%	(964,323)	(964,323)
2021	November		72.7130507%	-	1,760,369	50.2421%	(884,446)	(884,446)
2021	December		72.7130507%	-	4,187,905	50.2421%	(2,104,091)	(2,104,091)
		74,218,205		54,246,377	92,562,868		(54,251,938)	(5,561)

Program Costs to be Recovered in Rider 12	14,519,574
Revenues to be Collected in Rider 12	28,899,221
% Revenue related to Program Costs	50.2421%

NC Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
Beginning Balance		14,519,574			3,390,364	11,129,210					
2021	January	13,825,370	0.233503	(162,099)	3,228,265	10,597,105	0.005469	59,413	59,413	0.766497	77,512
2021	February	12,493,311	0.233503	(311,040)	2,917,226	9,576,086	0.005469	55,165	114,578	0.766497	149,483
2021	March	11,193,923	0.233503	(303,411)	2,613,815	8,580,108	0.005469	49,650	164,228	0.766497	214,257
2021	April	10,162,517	0.233503	(240,836)	2,372,978	7,789,539	0.005469	44,764	208,992	0.766497	272,658
2021	May	9,324,325	0.233503	(195,720)	2,177,258	7,147,067	0.005469	40,845	249,837	0.766497	325,947
2021	June	8,169,491	0.233503	(269,657)	1,907,601	6,261,890	0.005469	36,668	286,505	0.766497	373,785
2021	July	6,772,664	0.233503	(326,163)	1,581,437	5,191,227	0.005469	31,320	317,825	0.766497	414,646
2021	August	5,332,915	0.233503	(336,186)	1,245,252	4,087,664	0.005469	25,374	343,199	0.766497	447,750
2021	September	3,947,299	0.233503	(323,546)	921,706	3,025,593	0.005469	19,452	362,651	0.766497	473,127
2021	October	2,982,976	0.233503	(225,172)	696,534	2,286,442	0.005469	14,526	377,177	0.766497	492,079
2021	November	2,098,530	0.233503	(206,521)	490,013	1,608,517	0.005469	10,651	387,828	0.766497	505,975
2021	December	(5,561)	0.233503	(491,312)	(1,299)	(4,263)	0.005469	4,387	392,215	0.766497	511,698
								392,215			511,698

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2019

NC Residential DSM		Total System NC DSM Program Costs Incurred	NC Allocation %	NC Allocated DSM Program Costs	NC Residential Revenue Collected	NC Residential DSM Program Collection %	DSM Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 2, Line 9			see calc. at right		
Beginning Balance		30,097,219		10,268,600	13,367,259		(10,090,987)	177,614
2021	January		34.1181040%		10,556	77.7199%	(8,204)	(8,204)
2021	February		34.1181040%	-	20,254	77.7199%	(15,742)	(15,742)
2021	March		34.1181040%	-	19,757	77.7199%	(15,355)	(15,355)
2021	April		34.1181040%	-	15,683	77.7199%	(12,189)	(12,189)
2021	May		34.1181040%	-	12,745	77.7199%	(9,905)	(9,905)
2021	June		34.1181040%	-	17,559	77.7199%	(13,647)	(13,647)
2021	July		34.1181040%	-	21,239	77.7199%	(16,507)	(16,507)
2021	August		34.1181040%	-	21,892	77.7199%	(17,014)	(17,014)
2021	September		34.1181040%	-	21,069	77.7199%	(16,374)	(16,374)
2021	October		34.1181040%	-	14,663	77.7199%	(11,396)	(11,396)
2021	November		34.1181040%	-	13,448	77.7199%	(10,452)	(10,452)
2021	December		34.1181040%	-	(31,620)	77.7199%	24,575	24,575
		30,097,219		10,268,600	13,524,504		(10,213,197)	55,403

Program Costs to be Recovered in Rider 12	177,614
Revenues to be Collected in Rider 12	228,531
% Revenue related to Program Costs	77.7199%

NC Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	169,410	0.233503	41,473	41,473	127,937	0.005469	350	350	0.766497	456
2021	February	153,668	0.233503	(3,676)	37,798	115,871	0.005469	667	1,017	0.766497	1,326
2021	March	138,313	0.233503	(3,586)	34,212	104,101	0.005469	602	1,618	0.766497	2,111
2021	April	126,124	0.233503	(2,846)	31,366	94,758	0.005469	544	2,162	0.766497	2,820
2021	May	116,219	0.233503	(2,313)	29,053	87,166	0.005469	497	2,659	0.766497	3,470
2021	June	102,572	0.233503	(3,187)	25,866	76,705	0.005469	448	3,108	0.766497	4,054
2021	July	86,065	0.233503	(3,854)	22,012	64,053	0.005469	385	3,492	0.766497	4,556
2021	August	69,051	0.233503	(3,973)	18,039	51,011	0.005469	315	3,807	0.766497	4,967
2021	September	52,676	0.233503	(3,823)	14,216	38,460	0.005469	245	4,052	0.766497	5,286
2021	October	41,280	0.233503	(2,661)	11,555	29,726	0.005469	186	4,238	0.766497	5,529
2021	November	30,828	0.233503	(2,441)	9,114	21,714	0.005469	141	4,379	0.766497	5,713
2021	December	55,403	0.233503	5,738	14,852	40,551	0.005469	170	4,549	0.766497	5,935
								4,549			5,935

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Non- Residential EE Programs Vintage 2019

NC Non- Residential EE		Non-Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Performance Incentives	Lost Revenues	Total Costs	NC Residential Revenue Collected	NC Non-Residential EE Program Collection %	Non-Residential EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5. pg 3, Line 4						100% used due to overcollection		
Beginning Balance		45,112,919		32,973,209	10,338,479	14,874,342	58,186,030	61,095,561		(61,095,561)	(2,909,531)
2021	January		73.0903918%		63,328	495,613	558,941	286,260	100.00%	(286,260)	272,682
2021	February		73.0903918%		63,328	495,613	558,941	529,758	100.00%	(529,758)	29,183
2021	March		73.0903918%		63,328	495,613	558,941	539,266	100.00%	(539,266)	19,676
2021	April		73.0903918%		63,328	495,613	558,941	532,898	100.00%	(532,898)	26,043
2021	May		73.0903918%		63,328	495,613	558,941	495,950	100.00%	(495,950)	62,992
2021	June		73.0903918%		63,328	495,613	558,941	616,582	100.00%	(616,582)	(57,640)
2021	July		73.0903918%		63,328	495,613	558,941	708,170	100.00%	(708,170)	(149,229)
2021	August		73.0903918%		63,328	495,613	558,941	684,592	100.00%	(684,592)	(125,650)
2021	September		73.0903918%		63,328	495,613	558,941	747,597	100.00%	(747,597)	(188,656)
2021	October		73.0903918%		63,328	495,613	558,941	601,473	100.00%	(601,473)	(42,531)
2021	November		73.0903918%		63,328	495,613	558,941	522,512	100.00%	(522,512)	36,429
2021	December		73.0903918%		63,328	495,613	558,941	655,807	100.00%	(655,807)	(96,866)
		45,112,919		32,973,209	11,098,417	20,821,700	64,893,326	68,016,425		(68,016,425)	(3,123,099)

Since Rider 13 was overcollected, interest has continued to be calculated on the entire balance. Lost revenues earned in 2021 were applied to the outstanding balance and all revenues collected in 2021 were also applied to the outstanding balance.

NC Non-Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	(2,636,849)	0.233503	63,672	63,672	(2,700,521)	0.005469	(7,385)	(7,385)	0.766497	(9,634)
2021	February	(2,607,666)	0.233503	6,814	70,486	(2,678,152)	0.005469	(14,708)	(22,093)	0.766497	(28,824)
2021	March	(2,587,990)	0.233503	4,594	75,081	(2,663,071)	0.005469	(14,606)	(36,699)	0.766497	(47,879)
2021	April	(2,561,947)	0.233503	6,081	81,162	(2,643,109)	0.005469	(14,510)	(51,210)	0.766497	(66,810)
2021	May	(2,498,955)	0.233503	14,709	95,871	(2,594,826)	0.005469	(14,324)	(65,533)	0.766497	(85,497)
2021	June	(2,556,596)	0.233503	(13,459)	82,411	(2,639,007)	0.005469	(14,312)	(79,846)	0.766497	(104,169)
2021	July	(2,705,825)	0.233503	(34,845)	47,566	(2,753,391)	0.005469	(14,746)	(94,592)	0.766497	(123,408)
2021	August	(2,831,475)	0.233503	(29,340)	18,226	(2,849,701)	0.005469	(15,322)	(109,914)	0.766497	(143,397)
2021	September	(3,020,131)	0.233503	(44,052)	(25,826)	(2,994,305)	0.005469	(15,981)	(125,895)	0.766497	(164,247)
2021	October	(3,062,663)	0.233503	(9,931)	(35,757)	(3,026,906)	0.005469	(16,466)	(142,360)	0.766497	(185,728)
2021	November	(3,026,233)	0.233503	8,506	(27,250)	(2,998,983)	0.005469	(16,478)	(158,838)	0.766497	(207,226)
2021	December	(3,123,099)	0.233503	(22,618)	(49,869)	(3,073,230)	0.005469	(16,605)	(175,443)	0.766497	(228,890)
								$\boxed{(175,443)}$			$\boxed{(228,890)}$

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation -Non - Residential DSM Programs Vintage 2019

NC Non- Residential DSM		Total System NC DSM Program Costs Incurred	NC Non- Residential DSM Allocation %	NC Allocated DSM Non- Residential Program Costs	NC Non-Residential DSM Revenue Collected	NC Non- Residential DSM Program Collection %	Non-Residential DSM Program Costs Revenue Collected	(Over)/Under Collection
			See Listebarger Exhibit 5 pg. 2, Line 10					
Beginning Balance		30,097,219		12,076,004	15,942,519		(12,035,182)	40,822
2021	January	-	40.1233224%	-	2,569	13.0447472%	(335)	(335)
2021	February	-	40.1233224%	-	21,868	13.0447472%	(2,853)	(2,853)
2021	March	-	40.1233224%	-	23,522	13.0447472%	(3,068)	(3,068)
2021	April	-	40.1233224%	-	23,121	13.0447472%	(3,016)	(3,016)
2021	May	-	40.1233224%	-	21,046	13.0447472%	(2,745)	(2,745)
2021	June	-	40.1233224%	-	26,538	13.0447472%	(3,462)	(3,462)
2021	July	-	40.1233224%	-	30,892	13.0447472%	(4,030)	(4,030)
2021	August	-	40.1233224%	-	30,170	13.0447472%	(3,936)	(3,936)
2021	September	-	40.1233224%	-	31,654	13.0447472%	(4,129)	(4,129)
2021	October	-	40.1233224%	-	24,152	13.0447472%	(3,151)	(3,151)
2021	November	-	40.1233224%	-	24,992	13.0447472%	(3,260)	(3,260)
2021	December	-	40.1233224%	-	28,089	13.0447472%	(3,664)	(3,664)
		30,097,219		12,076,004	16,231,132		(12,072,831)	3,173

Program Costs to be Recovered in Ride	40,822
Revenues to be Collected in Rider 12	312,940
% Revenue related to Program Costs	13.0447%

NC Non-Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	40,487	0.233503	(78)	(78)	40,565	0.005469	111	111	0.766497	145
2021	February	37,634	0.233503	(666)	(744)	38,379	0.005469	216	327	0.766497	426
2021	March	34,566	0.233503	(716)	(1,461)	36,027	0.005469	203	530	0.766497	692
2021	April	31,550	0.233503	(704)	(2,165)	33,715	0.005469	191	721	0.766497	941
2021	May	28,805	0.233503	(641)	(2,806)	31,611	0.005469	179	900	0.766497	1,174
2021	June	25,343	0.233503	(808)	(3,614)	28,957	0.005469	166	1,065	0.766497	1,390
2021	July	21,313	0.233503	(941)	(4,555)	25,868	0.005469	150	1,215	0.766497	1,585
2021	August	17,377	0.233503	(919)	(5,474)	22,852	0.005469	133	1,348	0.766497	1,759
2021	September	13,248	0.233503	(964)	(6,439)	19,687	0.005469	116	1,465	0.766497	1,911
2021	October	10,098	0.233503	(736)	(7,174)	17,272	0.005469	101	1,566	0.766497	2,043
2021	November	6,838	0.233503	(761)	(7,936)	14,773	0.005469	88	1,653	0.766497	2,157
2021	December	3,173	0.233503	(856)	(8,791)	11,964	0.005469	73	1,727	0.766497	2,253
								1,727			2,253

Note 1: Amounts represent all revenue actually collected through 2020.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential EE Programs Vintage 2020

NC Residential EE		Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 3, Line 4			see calc. at right		
Beginning Balance		51,310,734		37,570,373	51,645,101	59.3631972%	(30,658,183)	6,912,190
2021	January		73.2212736%			0.0000%		
2021	February		73.2212736%			0.0000%		
2021	March		73.2212736%			0.0000%		
2021	April		73.2212736%			0.0000%		
2021	May		73.2212736%			0.0000%		
2021	June		73.2212736%			0.0000%		
2021	July		73.2212736%			0.0000%		
2021	August		73.2212736%			0.0000%		
2021	September		73.2212736%			0.0000%		
2021	October		73.2212736%			0.0000%		
2021	November		73.2212736%			0.0000%		
2021	December		73.2212736%			0.0000%		
		51,310,734		37,570,373	51,645,101			6,912,190

Note: All revenues collected in Rider 12 were to collect Y2 of lost revenue. Therefore, no revenue received in 2021 would offset the under collected balance of program costs and a return would still be earned.

NC Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	6,912,190	0.233503	1,614,017	1,614,017	5,298,173	0.005469	14,488	14,488	0.766497	18,902
2021	February	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	43,465	0.766497	56,706
2021	March	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	72,442	0.766497	94,510
2021	April	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	101,418	0.766497	132,314
2021	May	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	130,395	0.766497	170,118
2021	June	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	159,372	0.766497	207,922
2021	July	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	188,348	0.766497	245,726
2021	August	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	217,325	0.766497	283,530
2021	September	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	246,302	0.766497	321,334
2021	October	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	275,278	0.766497	359,138
2021	November	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	304,255	0.766497	396,942
2021	December	6,912,190	0.233503	-	1,614,017	5,298,173	0.005469	28,977	333,231	0.766497	434,746
								$\boxed{333,231}$			$\boxed{434,746}$

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2020

NC Residential DSM		Total System NC DSM Program Costs Incurred	NC Allocation %	NC Allocated DSM Program Costs	Program Incentives	Total Costs	NC Residential Revenue Collected	NC Residential DSM Program Collection %	DSM Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 4, Line 9					100% used due to overcollection		
Beginning Balance - Source		29,327,255		9,888,075	3,194,120	13,082,195	15,504,312		(15,504,312)	(2,422,117)
2021	January		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	February		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	March		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	April		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	May		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	June		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	July		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	August		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	September		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	October		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	November		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
2021	December		33.7163333%	-	1,461	1,461		100.0000%	-	1,461
		29,327,255		9,888,075	3,211,648	13,099,723	15,504,312		(15,504,312)	(2,404,589)

Since Rider 13 was overcollected, interest has continued to be calculated on the entire balance.

NC Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	(2,420,656)	0.233503	341	341	(2,420,997)	0.005469	(6,620)	(6,620)	0.766497	(8,637)
2021	February	(2,419,196)	0.233503	341	682	(2,419,878)	0.005469	(13,238)	(19,858)	0.766497	(25,908)
2021	March	(2,417,735)	0.233503	341	1,023	(2,418,758)	0.005469	(13,232)	(33,090)	0.766497	(43,170)
2021	April	(2,416,274)	0.233503	341	1,364	(2,417,639)	0.005469	(13,226)	(46,315)	0.766497	(60,425)
2021	May	(2,414,814)	0.233503	341	1,705	(2,416,519)	0.005469	(13,219)	(59,535)	0.766497	(77,671)
2021	June	(2,413,353)	0.233503	341	2,046	(2,415,400)	0.005469	(13,213)	(72,748)	0.766497	(94,910)
2021	July	(2,411,892)	0.233503	341	2,387	(2,414,280)	0.005469	(13,207)	(85,955)	0.766497	(112,141)
2021	August	(2,410,432)	0.233503	341	2,729	(2,413,160)	0.005469	(13,201)	(99,156)	0.766497	(129,363)
2021	September	(2,408,971)	0.233503	341	3,070	(2,412,041)	0.005469	(13,195)	(112,351)	0.766497	(146,578)
2021	October	(2,407,511)	0.233503	341	3,411	(2,410,921)	0.005469	(13,189)	(125,540)	0.766497	(163,784)
2021	November	(2,406,050)	0.233503	341	3,752	(2,409,802)	0.005469	(13,183)	(138,723)	0.766497	(180,983)
2021	December	(2,404,589)	0.233503	341	4,093	(2,408,682)	0.005469	(13,177)	(151,899)	0.766497	(198,174)
								(151,899)			(198,174)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A **Duke Energy Carolinas, LLC**
Docket Number E-7 Sub 1265
Estimated Return Calculation - Non- Residential EE Programs Vintage 2020

NC Non- Residential EE		Non-Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Performance Incentives	Lost Revenues	Total Costs	NC Residential Revenue Collected	NC Non-Residential EE Program Collection %	Non-Residential EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5. pg 3, Line 4						100% used due to overcollection		
Beginning Balance		30,082,572		22,026,843	7,142,705	3,839,208	33,008,756	44,023,239		(44,023,239)	(11,014,483)
2021	January		73.2212736%		4,721	1,203,023	1,207,744	1,383,560	100.00%	(1,383,560)	(175,816)
2021	February		73.2212736%		4,721	1,203,023	1,207,744	790,679	100.00%	(790,679)	417,065
2021	March		73.2212736%		4,721	1,203,023	1,207,744	696,234	100.00%	(696,234)	511,510
2021	April		73.2212736%		4,721	1,203,023	1,207,744	687,469	100.00%	(687,469)	520,275
2021	May		73.2212736%		4,721	1,203,023	1,207,744	628,499	100.00%	(628,499)	579,246
2021	June		73.2212736%		4,721	1,203,023	1,207,744	788,734	100.00%	(788,734)	419,010
2021	July		73.2212736%		4,721	1,203,023	1,207,744	906,904	100.00%	(906,904)	300,841
2021	August		73.2212736%		4,721	1,203,023	1,207,744	869,438	100.00%	(869,438)	338,306
2021	September		73.2212736%		4,721	1,203,023	1,207,744	959,762	100.00%	(959,762)	247,983
2021	October		73.2212736%		4,721	1,203,023	1,207,744	764,101	100.00%	(764,101)	443,643
2021	November		73.2212736%		4,721	1,203,023	1,207,744	668,944	100.00%	(668,944)	538,800
2021	December		73.2212736%		4,721	1,203,023	1,207,744	821,567	100.00%	(821,567)	386,178
		30,082,572		22,026,843	7,199,363	18,275,484	47,501,689	53,989,132		(53,989,132)	(6,487,442)

No program cost allocation is needed since Rider 13 was overcollected, in total and interest due was calculated on the entire vintage. Lost revenues earned in 2021 were applied to the outstanding balance and all revenues collected in 2021 were also applied to the outstanding balance.

Therefore, 100% of all revenues offset the overcollected balance.

NC Non-Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	(11,190,299)	0.233503	(41,054)	(41,054)	(11,149,246)	0.005469	(30,489)	(30,489)	0.766497	(39,777)
2021	February	(10,773,234)	0.233503	97,386	56,332	(10,829,566)	0.005469	(60,103)	(90,592)	0.766497	(118,189)
2021	March	(10,261,724)	0.233503	119,439	175,772	(10,437,495)	0.005469	(58,157)	(148,748)	0.766497	(194,062)
2021	April	(9,741,449)	0.233503	121,486	297,257	(10,038,706)	0.005469	(55,994)	(204,742)	0.766497	(267,114)
2021	May	(9,162,203)	0.233503	135,256	432,513	(9,594,716)	0.005469	(53,689)	(258,432)	0.766497	(337,159)
2021	June	(8,743,193)	0.233503	97,840	530,353	(9,273,546)	0.005469	(51,597)	(310,029)	0.766497	(404,475)
2021	July	(8,442,352)	0.233503	70,247	600,600	(9,042,953)	0.005469	(50,088)	(360,117)	0.766497	(469,821)
2021	August	(8,104,046)	0.233503	78,995	679,596	(8,783,642)	0.005469	(48,748)	(408,865)	0.766497	(533,420)
2021	September	(7,856,064)	0.233503	57,905	737,500	(8,593,564)	0.005469	(47,520)	(456,385)	0.766497	(595,416)
2021	October	(7,412,420)	0.233503	103,592	841,093	(8,253,513)	0.005469	(46,070)	(502,454)	0.766497	(655,520)
2021	November	(6,873,620)	0.233503	125,811	966,904	(7,840,524)	0.005469	(44,011)	(546,465)	0.766497	(712,938)
2021	December	(6,487,442)	0.233503	90,174	1,057,078	(7,544,520)	0.005469	(42,072)	(588,537)	0.766497	(767,827)
								$\boxed{(588,537)}$			$\boxed{(767,827)}$

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation -Non - Residential DSM Programs Vintage 2020

NC Non- Residential DSM		Total System NC DSM Program Costs Incurred	NC Non- Residential DSM Allocation %	NC Allocated DSM Non-Residential Program Costs	Program Incentives	Total Costs	NC Non-Residential DSM Revenue Collected	NC Non-Residential DSM Program Collection %	Non-Residential DSM Program Costs Revenue Collected	(Over)/Under Collection
			See Listebarger Exhibit 5 pg. 4, Line 10					100% used due to overcollection		
Beginning Balance		29,327,255		11,871,383	3,860,688	15,732,071	17,715,486		(17,715,486)	(1,983,414)
2021	January		40.4790117%	-	(405)	(405)	-	100.0000000%	-	(405)
2021	February		40.4790117%	-	(405)	(405)	74,520	100.0000000%	(74,520)	(74,925)
2021	March		40.4790117%	-	(405)	(405)	671	100.0000000%	(671)	(1,077)
2021	April		40.4790117%	-	(405)	(405)	8	100.0000000%	(8)	(413)
2021	May		40.4790117%	-	(405)	(405)	1	100.0000000%	(1)	(407)
2021	June		40.4790117%	-	(405)	(405)	71	100.0000000%	(71)	(477)
2021	July		40.4790117%	-	(405)	(405)	12	100.0000000%	(12)	(418)
2021	August		40.4790117%	-	(405)	(405)	(52)	100.0000000%	52	(353)
2021	September		40.4790117%	-	(405)	(405)	626	100.0000000%	(626)	(1,031)
2021	October		40.4790117%	-	(405)	(405)	(626)	100.0000000%	626	221
2021	November		40.4790117%	-	(405)	(405)	635	100.0000000%	(635)	(1,040)
2021	December		40.4790117%	-	(405)	(405)	(39,231)	100.0000000%	39,231	38,826
		29,327,255		-	3,855,826	15,727,210	17,752,122		(17,752,122)	(2,024,912)

No program cost allocation is needed since Rider 13 was overcollected, in total and interest due was calculated on the entire vintage. Lost revenues earned in 2021 were applied to the outstanding balance and all revenues collected in 2021 were also applied to the outstanding balance.

Therefore, 100% of all revenues offset the overcollected balance.

NC Non-Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	(405)	0.233503	(95)	(95)	(311)	0.005469	(1)	(1)	0.766497	(1)
2021	February	(75,331)	0.233503	(17,495)	(17,590)	(57,741)	0.005469	(159)	(160)	0.766497	(208)
2021	March	(76,407)	0.233503	(251)	(17,841)	(58,566)	0.005469	(318)	(478)	0.766497	(623)
2021	April	(76,820)	0.233503	(96)	(17,938)	(58,882)	0.005469	(321)	(799)	0.766497	(1,042)
2021	May	(77,226)	0.233503	(95)	(18,033)	(59,194)	0.005469	(323)	(1,122)	0.766497	(1,463)
2021	June	(77,703)	0.233503	(111)	(18,144)	(59,559)	0.005469	(325)	(1,446)	0.766497	(1,887)
2021	July	(78,120)	0.233503	(98)	(18,241)	(59,879)	0.005469	(327)	(1,773)	0.766497	(2,313)
2021	August	(78,473)	0.233503	(82)	(18,324)	(60,150)	0.005469	(328)	(2,101)	0.766497	(2,741)
2021	September	(79,505)	0.233503	(241)	(18,565)	(60,940)	0.005469	(331)	(2,432)	0.766497	(3,173)
2021	October	(79,284)	0.233503	52	(18,513)	(60,771)	0.005469	(333)	(2,765)	0.766497	(3,608)
2021	November	(80,324)	0.233503	(243)	(18,756)	(61,568)	0.005469	(335)	(3,100)	0.766497	(4,044)
2021	December	(41,498)	0.233503	9,066	(9,690)	(31,808)	0.005469	(255)	(3,355)	0.766497	(4,377)
								(3,355)			(4,377)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential EE Programs Vintage 2021

NC Residential EE		Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Incentives	Lost Revenues	Total Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 4, Line 4						100% used due to overcollection		
2021	January	1,806,147	73.5233682%	1,327,940	130,020	1,182,754	2,640,715	3,115,990	100.0000%	(3,115,990)	(475,275)
2021	February	2,431,280	73.5233682%	1,787,559	175,022	1,592,122	3,554,703	5,979,051	100.0000%	(5,979,051)	(2,424,347)
2021	March	2,954,841	73.5233682%	2,172,499	212,712	1,934,976	4,320,187	5,832,411	100.0000%	(5,832,411)	(1,512,224)
2021	April	3,242,259	73.5233682%	2,383,818	233,403	2,123,191	4,740,411	4,629,547	100.0000%	(4,629,547)	110,864
2021	May	2,488,632	73.5233682%	1,829,726	179,151	1,629,679	3,638,555	3,762,293	100.0000%	(3,762,293)	(123,738)
2021	June	3,246,602	73.5233682%	2,387,011	233,715	2,126,035	4,746,762	5,183,564	100.0000%	(5,183,564)	(436,802)
2021	July	2,364,378	73.5233682%	1,738,370	170,206	1,548,311	3,456,888	6,269,768	100.0000%	(6,269,768)	(2,812,880)
2021	August	2,363,589	73.5233682%	1,737,790	170,149	1,547,794	3,455,733	6,462,428	100.0000%	(6,462,428)	(3,006,694)
2021	September	3,922,710	73.5233682%	2,884,109	282,387	2,568,784	5,735,279	6,219,451	100.0000%	(6,219,451)	(484,172)
2021	October	3,464,959	73.5233682%	2,547,554	249,434	2,269,026	5,066,014	4,328,439	100.0000%	(4,328,439)	737,575
2021	November	2,674,604	73.5233682%	1,966,459	192,538	1,751,463	3,910,460	3,969,908	100.0000%	(3,969,908)	(59,448)
2021	December	4,717,732	73.5233682%	3,468,635	339,618	3,089,403	6,897,657	8,995,007	100.0000%	(8,995,007)	(2,097,350)
		35,677,735		26,231,472	2,568,356	23,363,537	52,163,365	64,747,858		(64,747,858)	(12,584,493)

Vintage is overcollected. Interest is calculated on all components.

100% of all revenues offset the overcollected balance.

NC Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	(475,275)	0.233503	(110,978)	(110,978)	(364,297)	0.005469	(996)	(996)	0.766497	(1,300)
2021	February	(2,899,623)	0.233503	(566,092)	(677,071)	(2,222,552)	0.005469	(7,074)	(8,070)	0.766497	(10,529)
2021	March	(4,411,847)	0.233503	(353,109)	(1,030,180)	(3,381,667)	0.005469	(15,325)	(23,395)	0.766497	(30,523)
2021	April	(4,300,983)	0.233503	25,887	(1,004,292)	(3,296,690)	0.005469	(18,263)	(41,658)	0.766497	(54,349)
2021	May	(4,424,721)	0.233503	(28,893)	(1,033,186)	(3,391,535)	0.005469	(18,290)	(59,948)	0.766497	(78,210)
2021	June	(4,861,523)	0.233503	(101,995)	(1,135,180)	(3,726,343)	0.005469	(19,464)	(79,412)	0.766497	(103,604)
2021	July	(7,674,403)	0.233503	(656,816)	(1,791,996)	(5,882,407)	0.005469	(26,276)	(105,688)	0.766497	(137,884)
2021	August	(10,681,098)	0.233503	(702,072)	(2,494,068)	(8,187,029)	0.005469	(38,474)	(144,162)	0.766497	(188,079)
2021	September	(11,165,270)	0.233503	(113,056)	(2,607,124)	(8,558,146)	0.005469	(45,791)	(189,953)	0.766497	(247,820)
2021	October	(10,427,695)	0.233503	172,226	(2,434,898)	(7,992,797)	0.005469	(45,260)	(235,213)	0.766497	(306,868)
2021	November	(10,487,143)	0.233503	(13,881)	(2,448,779)	(8,038,364)	0.005469	(43,839)	(279,052)	0.766497	(364,061)
2021	December	(12,584,493)	0.233503	(489,737)	(2,938,517)	(9,645,976)	0.005469	(48,359)	(327,411)	0.766497	(427,153)
								(327,411)			(427,153)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Residential DSM Programs Vintage 2021

NC Residential DSM		Total System NC DSM Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Incentives	Total Costs	NC Residential Revenue Collected	NC Residential EE Program Collection %	EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5 pg. 4, Line 9							
2021	January	1,625,830	34.9475492%	568,188	137,912	706,100	824,386	100.0000%	(824,386)	(118,286)
2021	February	1,861,375	34.9475492%	650,505	157,892	808,397	1,581,856	100.0000%	(1,581,856)	(773,459)
2021	March	1,932,178	34.9475492%	675,249	163,898	839,147	1,543,060	100.0000%	(1,543,060)	(703,913)
2021	April	2,879,839	34.9475492%	1,006,433	244,284	1,250,717	1,224,823	100.0000%	(1,224,823)	25,895
2021	May	1,640,354	34.9475492%	573,264	139,144	712,408	995,376	100.0000%	(995,376)	(282,969)
2021	June	2,019,985	34.9475492%	705,935	171,346	877,282	1,371,397	100.0000%	(1,371,397)	(494,115)
2021	July	4,168,637	34.9475492%	1,456,836	353,607	1,810,443	1,658,770	100.0000%	(1,658,770)	151,673
2021	August	3,898,456	34.9475492%	1,362,415	330,689	1,693,104	1,709,741	100.0000%	(1,709,741)	(16,638)
2021	September	3,925,636	34.9475492%	1,371,914	332,994	1,704,908	1,645,458	100.0000%	(1,645,458)	59,450
2021	October	4,516,753	34.9475492%	1,578,494	383,136	1,961,631	1,145,160	100.0000%	(1,145,160)	816,471
2021	November	1,763,142	34.9475492%	616,175	149,560	765,735	1,050,304	100.0000%	(1,050,304)	(284,570)
2021	December	2,643,978	34.9475492%	924,006	224,277	1,148,283	2,494,717	100.0000%	(2,494,717)	(1,346,434)
		32,876,164		11,489,414	2,788,739	14,278,153	17,245,048		(17,245,048)	(2,966,895)

Vintage is overcollected. Interest is calculated on all components.

100% of all revenues offset the overcollected balance.

NC Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	(118,286)	0.233503	(27,620)	(27,620)	(90,666)	0.005469	(248)	(248)	0.766497	(323)
2021	February	(891,745)	0.233503	(180,605)	(208,225)	(683,520)	0.005469	(2,117)	(2,365)	0.766497	(3,085)
2021	March	(1,595,658)	0.233503	(164,366)	(372,591)	(1,223,067)	0.005469	(5,214)	(7,579)	0.766497	(9,888)
2021	April	(1,569,764)	0.233503	6,046	(366,545)	(1,203,219)	0.005469	(6,635)	(14,214)	0.766497	(18,544)
2021	May	(1,852,732)	0.233503	(66,074)	(432,619)	(1,420,114)	0.005469	(7,174)	(21,387)	0.766497	(27,903)
2021	June	(2,346,848)	0.233503	(115,377)	(547,996)	(1,798,852)	0.005469	(8,803)	(30,190)	0.766497	(39,387)
2021	July	(2,195,174)	0.233503	35,416	(512,580)	(1,682,594)	0.005469	(9,520)	(39,710)	0.766497	(51,807)
2021	August	(2,211,812)	0.233503	(3,885)	(516,465)	(1,695,347)	0.005469	(9,237)	(48,948)	0.766497	(63,859)
2021	September	(2,152,362)	0.233503	13,882	(502,583)	(1,649,779)	0.005469	(9,148)	(58,095)	0.766497	(75,793)
2021	October	(1,335,891)	0.233503	190,648	(311,934)	(1,023,956)	0.005469	(7,312)	(65,407)	0.766497	(85,332)
2021	November	(1,620,460)	0.233503	(66,448)	(378,382)	(1,242,078)	0.005469	(6,197)	(71,603)	0.766497	(93,416)
2021	December	(2,966,895)	0.233503	(314,396)	(692,779)	(2,274,116)	0.005469	(9,615)	(81,219)	0.766497	(105,961)
								(81,219)			(105,961)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC
Docket Number E-7 Sub 1265
Estimated Return Calculation - Non- Residential EE Programs Vintage 2020

NC Non- Residential EE		Non-Residential EE Program Costs Incurred	NC Allocation %	NC Allocated EE Program Costs	Program Incentives	Lost Revenues	Total Costs	NC Residential Revenue Collected	NC Non-Residential EE Program Collection %	Non-Residential EE Program Costs Revenue Collected	(Over)/Under Collection
			Listebarger Exhibit 5. pg 4, Line 4						See calc. at right		
2021	January	2,630,148	73.5233682%	1,933,773	483,719	977,177	3,394,669	1,020,322	100.0000000%	(1,020,322)	913,451
2021	February	2,758,573	73.5233682%	2,028,196	507,338	1,024,890	3,560,424	3,694,780	100.0000000%	(3,694,780)	(1,666,585)
2021	March	2,414,424	73.5233682%	1,775,166	444,044	897,029	3,116,239	4,002,820	100.0000000%	(4,002,820)	(2,227,655)
2021	April	3,989,941	73.5233682%	2,933,539	733,803	1,482,379	5,149,721	3,951,018	100.0000000%	(3,951,018)	(1,017,479)
2021	May	3,182,053	73.5233682%	2,339,552	585,221	1,182,225	4,106,999	3,605,136	100.0000000%	(3,605,136)	(1,265,584)
2021	June	2,591,922	73.5233682%	1,905,668	476,689	962,975	3,345,332	4,538,733	100.0000000%	(4,538,733)	(2,633,065)
2021	July	2,744,693	73.5233682%	2,017,991	504,785	1,019,733	3,542,509	5,193,948	100.0000000%	(5,193,948)	(3,175,957)
2021	August	4,013,209	73.5233682%	2,950,647	738,082	1,491,024	5,179,753	5,011,049	100.0000000%	(5,011,049)	(2,060,403)
2021	September	3,195,742	73.5233682%	2,349,617	587,739	1,187,311	4,124,668	5,474,795	100.0000000%	(5,474,795)	(3,125,178)
2021	October	4,489,722	73.5233682%	3,300,995	825,719	1,668,063	5,794,777	4,414,912	100.0000000%	(4,414,912)	(1,113,917)
2021	November	4,420,521	73.5233682%	3,250,116	812,992	1,642,353	5,705,460	3,822,764	100.0000000%	(3,822,764)	(572,648)
2021	December	4,038,645	73.5233682%	2,969,348	742,760	1,500,474	5,212,582	5,834,596	100.0000000%	(5,834,596)	(2,865,248)
		40,469,592		29,754,607	7,442,891	15,035,634	52,233,133	50,564,874		(50,564,874)	(20,810,267)

Vintage is overcollected. Interest is calculated on all components.

100% of all revenues offset the overcollected balance.

NC Non-Residential EE		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	913,451	0.233503	213,294	213,294	700,158	0.005469	1,915	1,915	0.766497	2,498
2021	February	(753,133)	0.233503	(389,153)	(175,859)	(577,274)	0.005469	336	2,251	0.766497	2,936
2021	March	(2,980,788)	0.233503	(520,164)	(696,023)	(2,284,765)	0.005469	(7,827)	(5,576)	0.766497	(7,274)
2021	April	(3,998,267)	0.233503	(237,584)	(933,607)	(3,064,660)	0.005469	(14,628)	(20,204)	0.766497	(26,359)
2021	May	(5,263,851)	0.233503	(295,518)	(1,229,125)	(4,034,726)	0.005469	(19,414)	(39,618)	0.766497	(51,687)
2021	June	(7,896,916)	0.233503	(614,829)	(1,843,954)	(6,052,963)	0.005469	(27,586)	(67,204)	0.766497	(87,677)
2021	July	(11,072,874)	0.233503	(741,596)	(2,585,549)	(8,487,324)	0.005469	(39,762)	(106,966)	0.766497	(139,551)
2021	August	(13,133,276)	0.233503	(481,110)	(3,066,659)	(10,066,617)	0.005469	(50,737)	(157,703)	0.766497	(205,745)
2021	September	(16,258,454)	0.233503	(729,738)	(3,796,398)	(12,462,056)	0.005469	(61,607)	(219,310)	0.766497	(286,119)
2021	October	(17,372,371)	0.233503	(260,103)	(4,056,501)	(13,315,870)	0.005469	(70,492)	(289,802)	0.766497	(378,086)
2021	November	(17,945,019)	0.233503	(133,715)	(4,190,216)	(13,754,803)	0.005469	(74,027)	(363,829)	0.766497	(474,664)
2021	December	(20,810,267)	0.233503	(669,044)	(4,859,260)	(15,951,007)	0.005469	(81,233)	(445,062)	0.766497	(580,644)
								(445,062)			(580,644)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Duke Energy Carolinas, LLC

Docket Number E-7 Sub 1265

Estimated Return Calculation -Non - Residential DSM Programs Vintage 2021

NC Non- Residential DSM		Total System NC DSM Program Costs Incurred	NC Non-Residential DSM Allocation %	NC Allocated DSM Non-Residential Program Costs	Program Incentives	Total Costs	NC Non-Residential DSM Revenue Collected	NC Non-Residential DSM Program Collection %	Non-Residential DSM Program Costs Revenue Collected	(Over)/Under Collection
			See Listebarger Exhibit 5 pg. 4, Line 10							
2021	January	1,625,830	39.4088278%	640,721	155,517	796,238	368,590	100.0000000%	(368,590)	427,648
2021	February	1,861,375	39.4088278%	733,546	178,048	911,594	1,384,272	100.0000000%	(1,384,272)	(472,678)
2021	March	1,932,178	39.4088278%	761,449	184,821	946,269	1,493,559	100.0000000%	(1,493,559)	(547,289)
2021	April	2,879,839	39.4088278%	1,134,911	275,468	1,410,379	1,483,929	100.0000000%	(1,483,929)	(73,550)
2021	May	1,640,354	39.4088278%	646,444	156,907	803,351	1,328,086	100.0000000%	(1,328,086)	(524,735)
2021	June	2,019,985	39.4088278%	796,052	193,220	989,272	1,695,925	100.0000000%	(1,695,925)	(706,652)
2021	July	4,168,637	39.4088278%	1,642,811	398,747	2,041,558	1,976,636	100.0000000%	(1,976,636)	64,922
2021	August	3,898,456	39.4088278%	1,536,336	372,903	1,909,239	1,909,853	100.0000000%	(1,909,853)	(614)
2021	September	3,925,636	39.4088278%	1,547,047	375,503	1,922,550	2,013,862	100.0000000%	(2,013,862)	(91,312)
2021	October	4,516,753	39.4088278%	1,779,999	432,046	2,212,045	1,539,896	100.0000000%	(1,539,896)	672,149
2021	November	1,763,142	39.4088278%	694,834	168,652	863,486	1,592,001	100.0000000%	(1,592,001)	(728,515)
2021	December	2,643,978	39.4088278%	1,041,961	252,907	1,294,868	2,118,822	100.0000000%	(2,118,822)	(823,954)
		32,876,164		12,956,111	3,144,740	16,100,851	18,905,431		(18,905,431)	(2,804,580)

Vintage is overcollected. Interest is calculated on all components.

100% of all revenues offset the overcollected balance.

NC Non-Residential DSM		Cumulative (Over)/Under Recovery	Current Income Tax Rate	Monthly Deferred Income Tax	Cumulative Deferred Income Tax	Net Deferred After Tax Balance	Monthly Return	Monthly A/T Return on Deferral	YTD After Tax Interest	Gross up of Return to Pretax Rate	Gross up of Return to Pretax
			1/2021 - 12/2021				6.56%			0.766497	
2021	January	427,648	0.233503	99,857	99,857	327,791	0.005469	896	896	0.766497	1,169
2021	February	(45,030)	0.233503	(110,372)	(10,515)	(34,515)	0.005469	802	1,698	0.766497	2,216
2021	March	(592,319)	0.233503	(127,794)	(138,308)	(454,011)	0.005469	(1,336)	362	0.766497	473
2021	April	(665,869)	0.233503	(17,174)	(155,482)	(510,387)	0.005469	(2,637)	(2,275)	0.766497	(2,968)
2021	May	(1,190,604)	0.233503	(122,527)	(278,010)	(912,594)	0.005469	(3,891)	(6,166)	0.766497	(8,044)
2021	June	(1,897,257)	0.233503	(165,005)	(443,015)	(1,454,241)	0.005469	(6,472)	(12,638)	0.766497	(16,488)
2021	July	(1,832,335)	0.233503	15,159	(427,856)	(1,404,479)	0.005469	(7,817)	(20,456)	0.766497	(26,687)
2021	August	(1,832,948)	0.233503	(143)	(427,999)	(1,404,949)	0.005469	(7,683)	(28,138)	0.766497	(36,710)
2021	September	(1,924,260)	0.233503	(21,322)	(449,320)	(1,474,939)	0.005469	(7,875)	(36,014)	0.766497	(46,985)
2021	October	(1,252,110)	0.233503	156,949	(292,372)	(959,739)	0.005469	(6,658)	(42,672)	0.766497	(55,671)
2021	November	(1,980,626)	0.233503	(170,111)	(462,482)	(1,518,144)	0.005469	(6,776)	(49,448)	0.766497	(64,511)
2021	December	(2,804,580)	0.233503	(192,396)	(654,878)	(2,149,702)	0.005469	(10,030)	(59,478)	0.766497	(77,597)
								(59,478)			(77,597)

Note 1: Amounts represent all revenue actually collected through 2021.

I/A

Listebarger Exhibit 4

Duke Energy Carolinas, LLC
DSM/EE Actual Revenues Collected from Years 2018-2021 (By Vintage)
and Estimated 2022 Collections from Rider 13 (by Vintage)
Docket Number E-7 Sub 1265
For Vintage Year 2018-2022 Estimate and True Up Calculations

Line		Vintage	Actual 2018 Rider 9	Actual 2019 Rider 10	Actual 2020 Rider 11	Actual 2021 Rider 12	Estimated 2022 Rider 13 [1]	Total
	Residential							
	EE/DSM							
1		Year 2018	83,631,851	6,302,019	25,272,676	2,818,706	2,924,339	120,949,591
2		Year 2019		77,019,837	5,261,547	29,067,535	1,185,495	112,534,414
3		Year 2020			67,149,413	4,559,292	14,672,178	86,380,883
4		Year 2021				81,992,905	6,249,665	88,242,571
5		Year 2022					79,361,507	79,361,507
6	**Total Residential**		$ 83,631,851	$ 83,321,856	$ 97,683,636	$ 118,438,439	$ 104,393,183	$ 487,468,965
	Non-Residential							
	EE							
7		Year 2018	51,998,801	12,546,122	12,194,157	1,712,636	513,230	78,964,947
8		Year 2019		52,862,599	8,232,962	6,920,864	(5,111,203)	62,905,222
9		Year 2020			44,023,239	9,965,893	(7,365,043)	46,624,089
10		Year 2021				50,564,874	13,494,665	64,059,539
11		Year 2022					68,099,841	68,099,841
	DSM							
12		Year 2018	14,074,924	777,733	1,176,922	(168,075)	345,011	16,206,515
13		Year 2019		15,674,069	268,450	288,613	(260,821)	15,970,311
14		Year 2020			17,715,486	36,636	(2,037,192)	15,714,929
15		Year 2021				18,905,431		18,905,431
16		Year 2022					18,683,620	18,683,620
17	**Total Non-Residential**		$ 66,073,725	$ 81,860,522	$ 83,611,216	$ 88,226,872	$ 86,362,108	$ 406,134,443
18	**Total Revenue**		**$ 149,705,576**	**$ 165,182,379**	**$ 181,294,852**	**$ 206,665,311**	**$ 190,755,292**	**$ 893,603,408**

[1] Rider 13 estimates are based on Order issued in Docket No. E-7 Sub 1249 dated 9/10/2021.

Duke Energy Carolinas, LLC
Vintage Year 2018 Allocation Factors for the Period January 1, 2018 - December 31, 2018
Docket Number E-7 Sub 1265
Allocation Factors

Line	New Mechanism Sales Allocator at Generator		MWH		
1	NC Retail MWH Sales Allocation	Company Records	58,534,269		
2	SC Retail MWH Sales Allocation	Company Records	21,966,093		
3	Total Retail	Line 1 + Line 2	80,500,362		
	Allocation 1 to state based on kWh sales				
4	NC Retail	Line 1 / Line 3	**72.7130507%**		
	Demand Allocators		**NC**	**SC**	**Total**
5	Residential	Company Records	5,078,308	1,617,566	6,695,874
6	Non Residential	Company Records	6,549,145	2,546,981	9,096,126
7	Total	Line 5 + Line 6	11,627,453	4,164,547	15,792,000
	Allocation 2 to state based on peak demand				
8	NC Retail	Line 7, NC / Line 7 Total	**73.6287551%**		
	Allocation 3 NC res vs non-res Peak Demand to retail system peak				
9	NC Residential	Line 5 NC/ Line 7 Total	**32.1574721%**		
10	NC Non-residential	Line 6 NC/ Line 7 Total	**41.4712829%**		

Listebarger Exhibit 5, page 2

Duke Energy Carolinas, LLC
Vintage Year 2019 Allocation Factors for the Period January 1, 2019 - December 31, 2019
Docket Number E-7 Sub 1265
Allocation Factors

Line			MWH		
	New Mechanism Sales Allocator at Generator				
1	NC Retail MWH Sales Allocation	Company Records	62,147,533		
2	SC Retail MWH Sales Allocation	Company Records	22,880,788		
3	Total Retail	Line 1 + Line 2	85,028,321		
	Allocation 1 to state based on kWh sales				
4	NC Retail	Line 1 / Line 3	**73.0903918%**		
	Demand Allocators		**NC**	**SC**	**Total**
5	Residential	Company Records	5,420,002	1,681,673	7,101,675
6	Non Residential	Company Records	6,373,991	2,410,334	8,784,325
7	Total	Line 5 + Line 6	11,793,993	4,092,007	15,886,000
	Allocation 2 to state based on peak demand				
8	NC Retail	Line 7, NC / Line 7 Total	**74.2414264%**		
	Allocation 3 NC res vs non-res Peak Demand to retail system peak				
9	NC Residential	Line 5 NC/ Line 7 Total	**34.1181040%**		
10	NC Non-residential	Line 6 NC/ Line 7 Total	**40.1233224%**		

Duke Energy Carolinas, LLC
Vintage Year 2020 Allocation Factors for the Period January 1, 2020 - December 31, 2020
Docket Number E-7 Sub 1265
Allocation Factors

Line	**New Mechanism Sales Allocator at Generator**		**MWH**
1	NC Retail MWH Sales Allocation	Company Records	61,250,523
2	SC Retail MWH Sales Allocation	Company Records	22,400,744
3	Total Retail	Line 1 + Line 2	83,651,267
	Allocation 1 to state based on kWh sales		
4	NC Retail	Line 1 / Line 3	**73.2212736%**

Line	**Demand Allocators**		**NC**	**SC**	**Total**
5	Residential	Company Records	5,410,460	1,632,146	7,042,606
6	Non Residential	Company Records	6,495,667	2,508,727	9,004,394
7	Total	Line 5 + Line 6	11,906,127	4,140,873	16,047,000
	Allocation 2 to state based on peak demand				
8	NC Retail	Line 7, NC / Line 7 Total	**74.1953449%**		
	Allocation 3 NC res vs non-res Peak Demand to retail system peak				
9	NC Residential	Line 5 NC/ Line 7 Total	**33.7163333%**		
10	NC Non-residential	Line 6 NC/ Line 7 Total	**40.4790117%**		

Duke Energy Carolinas, LLC
Vintage Year 2021 Allocation Factors for the Period January 1, 2021 - December 31, 2023
Docket Number E-7 Sub 1265
Allocation Factors

Line	New Mechanism Sales Allocator at Generator		MWH		
1	NC Retail MWH Sales Allocation	Company Records	59,254,276		
2	SC Retail MWH Sales Allocation	Company Records	21,338,163		
3	Total Retail	Line 1 + Line 2	80,592,439		
	Allocation 1 to state based on kWh sales				
4	NC Retail	Line 1 / Line 3	**73.5233682%**		
	Demand Allocators		**NC**	**SC**	**Total**
5	Residential	Company Records	5,482,921	1,710,195	7,193,116
6	Non Residential	Company Records	6,182,851	2,313,033	8,495,884
7	Total	Line 5 + Line 6	11,665,772	4,023,228	15,689,000
	Allocation 2 to state based on peak demand				
8	NC Retail	Line 7, NC / Line 7 Total	**74.3563771%**		
	Allocation 3 NC res vs non-res Peak Demand to retail system peak				
9	NC Residential	Line 5 NC/ Line 7 Total	**34.9475492%**		
10	NC Non-residential	Line 6 NC/ Line 7 Total	**39.4088278%**		

Listebarger Exhibit 6

Duke Energy Carolinas, LLC
DSM/EE Cost Recovery Rider 14
Docket Number E-7 Sub 1265
Forecasted 2023 kWh Sales for Rate Period for Vintage Years 2018-2023

Line	Fall 2021 Sales Forecast - kWhs	Forecasted 2023 sales
	North Carolina Retail:	
1	Residential	**22,809,393,337**
2	Non-Residential	**35,294,575,316**
3	Total Retail	**58,103,968,653**

	NC Opt Out Sales	Total Usage	Opt-Outs	Net Usage
	Vintage 2018 Actual Opt Out			
4	EE	35,294,575,316	19,849,513,795	15,445,061,521
5	DSM	35,294,575,316	18,757,237,757	16,537,337,560
	Vintage 2019 Actual Opt Out			
6	EE	35,294,575,316	19,899,108,979	15,395,466,337
7	DSM	35,294,575,316	18,724,008,595	16,570,566,722
	Vintage 2020 Estimated Opt Out			
8	EE	35,294,575,316	20,462,991,216	14,831,584,100
9	DSM	35,294,575,316	18,685,003,977	16,609,571,340
	Vintage 2021 Estimated Opt Out			
10	EE	35,294,575,316	20,390,666,139	14,903,909,177
11	DSM	35,294,575,316	18,648,145,239	16,646,430,078
	Vintage 2022 Estimated Opt Out			
12	EE	35,294,575,316	20,085,420,707	15,209,154,609
13	DSM	35,294,575,316	18,386,911,672	16,907,663,645
	Vintage 2023 Estimated Opt Out			
14	EE	35,294,575,316	20,085,420,707	15,209,154,609
15	DSM	35,294,575,316	18,386,911,672	16,907,663,645

RIDER EE (NC)
ENERGY EFFICIENCY RIDER

APPLICABILITY (North Carolina Only)

Service supplied under the Company's rate schedules is subject to approved adjustments for new energy efficiency and demand-side management programs approved by the North Carolina Utilities Commission (NCUC). The Rider Adjustments are not included in the Rate Schedules of the Company and therefore, must be applied to the bill as calculated under the applicable rate.

As of January 1, 2023, cost recovery under Rider EE consists of the four-year term program, years 2014-2017, as well as rates under the continuation of that program for years 2018-2023 as outlined below. This Rider applies to service supplied under all rate schedules, except rate schedules OL, FL, PL, GL and NL for program years 2017-2022.

GENERAL PROVISIONS

This Rider will recover the cost of new energy efficiency and demand-side management programs beginning January 1, 2014, using the method approved by the NCUC as set forth in Docket No. E-7, Sub 1032, Order dated October 29, 2013, and as revised by Docket No. E-7, Sub 1130, Order dated August 23, 2017, and Docket No. E-7, Sub 1032, Order dated October 20, 2020.

TRUE-UP PROVISIONS

Rider amounts will initially be determined based on estimated kW and kWh impacts related to expected customer participation in the programs, and will be trued-up as actual customer participation and actual kW and kWh impacts are verified. If a customer participates in any vintage of programs, the customer is subject to the true-ups as discussed in this section for any vintage of programs in which the customer participated.

RIDER EE OPT OUT PROVISION FOR QUALIFYING NON-RESIDENTIAL CUSTOMERS

The Rider EE increment applicable to energy efficiency programs and/or demand-side management programs will not be applied to the energy charge of the applicable rate schedule for customers qualified to opt out of the programs where:

a. The customer has notified the Company that it has implemented, or has plans for implementing, alternative energy efficiency measures in accordance with quantifiable goals.
b. Electric service to the customer must be provided under:
   1. An electric service agreement where the establishment is classified as a "manufacturing industry" by the Standard Industrial Classification Manual published by the United States Government and where more than 50% of the electric energy consumption of such establishment is used for its manufacturing processes. Additionally, all other agreements billed to the same entity associated with the manufacturing industry located on the same or contiguous properties are also eligible to opt out.
   2. An electric service agreement for general service as provided for under the Company's rate schedules where the customer's annual energy use is 1,000,000 kilowatt hours or more. Additionally, all other agreements billed to the same entity with lesser annual usage located on the same or contiguous properties are also eligible to opt out.

The following additional provisions apply for qualifying customers who elect to opt out:

For customers who elect to opt out of energy efficiency programs, the following provisions also apply:

- Qualifying customers may opt out of the Company's energy efficiency programs each calendar year only during the annual two-month enrollment period between November 1 and December 31 immediately prior to a new Rider EE becoming effective on January 1. (Qualifying new customers have sixty days after beginning service to optout.)
- Customers may not opt out of individual energy efficiency programs offered by the Company. The choice to opt out applies to the Company's entire portfolio of energy efficiency programs.
- If a customer participates in any vintage of energy efficiency programs, the customer, irrespective of future opt out decisions, remains obligated to pay the remaining portion of the lost revenues for each vintage of energy efficiency programs in which the customer participated.

RIDER EE (NC)
ENERGY EFFICIENCY RIDER

- Customers who elect to opt out during the two-month annual enrollment period immediately prior to the new Rider EE becoming effective may elect to opt in to the Company's energy efficiency programs during the first 5 business days of March each calendar year. Customers making this election will be back-billed retroactively to the effective date of the new Rider EE.

For customers who elect to opt out of demand-side management programs, the following provisions also apply:

- Qualifying customers may opt out of the Company's demand-side management program during the enrollment period between November 1 and December 31 immediately prior to a new Rider EE becoming effective on January 1 of the applicable year. (Qualifying new customers have sixty days after beginning service to opt out.)
- If a customer elects to participate in a demand-side management program, the customer may not subsequently choose to opt out of demand-side management programs for three years.
- Customers who elect to opt out during the two-month annual enrollment period immediately prior to the new Rider EE becoming effective may elect to opt in to the Company's demand-side management program during the first 5 business days of March each calendar year. Customers making this election will be back-billed to the effective date of the new Rider EE.

Any qualifying non-residential customer that has not participated in an energy efficiency or demand-side management program may opt out during any enrollment period, and has no further responsibility to pay Rider EE amounts associated with the customer's opt out election for energy efficiency and/or demand-side management programs.

ENERGY EFFICIENCY RIDER ADJUSTMENTS (EEA) FOR ALL PROGRAM YEARS

The Rider EE amounts applicable to the residential and nonresidential rate schedules for the period January 1, 2023 through December 31, 2023 including utility assessments are as follows:

Residential	
Vintage 2018[1], 2019[1], 2020[1], 2021[1]	(0.0903) ¢ per kWh
Vintage 2020[2], 2021[2], 2022[2], 2023[2]	0.4291 ¢ per kWh
Total Residential Rate	0.3388 ¢ per kWh
Nonresidential	
Vintage 2018[3]	
Energy Efficiency	(0.0021) ¢ per kWh
Demand Side Management	(0.0002) ¢ per kWh
Vintage 2019[3]	
Energy Efficiency	0.0064 ¢ per kWh
Demand Side Management	0.0003 ¢ per kWh
Vintage 2020[3]	
Energy Efficiency	0.0247 ¢ per kWh
Demand Side Management	(0.0002) ¢ per kWh
Vintage 2021[3]	
Energy Efficiency	(0.0162) ¢ per kWh
Demand Side Management	(0.0173) ¢ per kWh
Vintage 2022[3]	
Energy Efficiency	0.0995 ¢ per kWh
Demand Side Management	0.0000 ¢ per kWh

RIDER EE (NC)
ENERGY EFFICIENCY RIDER

Vintage 2023[3]	
Energy Efficiency	0.4323 ¢ per kWh
Demand Side Management	0.0970 ¢ per kWh
Total Nonresidential Rate	0.6242 ¢ per kWh

[1] Includes the true-up of program costs, shared savings and lost revenues from Vintages 2018, 2019, 2020 and 2021

[2] Includes prospective component of Vintages 2020, 2021, 2022 and 2023

[3] Not Applicable to Rate Schedules OL, FL, PL, GL and NL

Each factor listed under Nonresidential is applicable to nonresidential customers who are not eligible to opt out and to eligible customers who have not opted out. If a nonresidential customer has opted out of a Vintage(s), then the applicable energy efficiency and/or demand-side management charge(s) shown above for the Vintage(s) during which the customer has opted out will not apply to the bill.

RIDER EE (NC)
ENERGY EFFICIENCY RIDER

APPLICABILITY (North Carolina Only)

Service supplied under the Company's rate schedules is subject to approved adjustments for new energy efficiency and demand-side management programs approved by the North Carolina Utilities Commission (NCUC). The Rider Adjustments are not included in the Rate Schedules of the Company and therefore, must be applied to the bill as calculated under the applicable rate.

As of January 1, ~~2022~~2023, cost recovery under Rider EE consists of the four-year term program, years 2014-2017, as well as rates under the continuation of that program for years 2018-~~2022~~2023 as outlined below. This Rider applies to service supplied under all rate schedules, except rate schedules OL, FL, PL, GL and NL for program years 2017-2022.

GENERAL PROVISIONS

This Rider will recover the cost of new energy efficiency and demand-side management programs beginning January 1, 2014, using the method approved by the NCUC as set forth in Docket No. E-7, Sub 1032, Order dated October 29, 2013, and as revised by Docket No. E-7, Sub 1130, Order dated August 23, 2017, and Docket No. E-7, Sub 1032, Order dated October 20, 2020.

TRUE-UP PROVISIONS

Rider amounts will initially be determined based on estimated kW and kWh impacts related to expected customer participation in the programs, and will be trued-up as actual customer participation and actual kW and kWh impacts are verified. If a customer participates in any vintage of programs, the customer is subject to the true-ups as discussed in this section for any vintage of programs in which the customer participated.

RIDER EE OPT OUT PROVISION FOR QUALIFYING NON-RESIDENTIAL CUSTOMERS

The Rider EE increment applicable to energy efficiency programs and/or demand-side management programs will not be applied to the energy charge of the applicable rate schedule for customers qualified to opt out of the programs where:

a. The customer has notified the Company that it has implemented, or has plans for implementing, alternative energy efficiency measures in accordance with quantifiable goals.
b. Electric service to the customer must be provided under:
    1. An electric service agreement where the establishment is classified as a "manufacturing industry" by the Standard Industrial Classification Manual published by the United States Government and where more than 50% of the electric energy consumption of such establishment is used for its manufacturing processes. Additionally, all other agreements billed to the same entity associated with the manufacturing industry located on the same or contiguous properties are also eligible to opt out.
    2. An electric service agreement for general service as provided for under the Company's rate schedules where the customer's annual energy use is 1,000,000 kilowatt hours or more. Additionally, all other agreements billed to the same entity with lesser annual usage located on the same or contiguous properties are also eligible to opt out.

The following additional provisions apply for qualifying customers who elect to opt out:

For customers who elect to opt out of energy efficiency programs, the following provisions also apply:

- Qualifying customers may opt out of the Company's energy efficiency programs each calendar year only during the annual two-month enrollment period between November 1 and December 31 immediately prior to a new Rider EE becoming effective on January 1. (Qualifying new customers have sixty days after beginning service to optout.)
- Customers may not opt out of individual energy efficiency programs offered by the Company. The choice to opt out applies to the Company's entire portfolio of energy efficiency programs.
- If a customer participates in any vintage of energy efficiency programs, the customer, irrespective of future opt out decisions, remains obligated to pay the remaining portion of the lost revenues for each vintage of energy efficiency programs in which the customer participated.

RIDER EE (NC)
ENERGY EFFICIENCY RIDER

- Customers who elect to opt out during the two-month annual enrollment period immediately prior to the new Rider EE becoming effective may elect to opt in to the Company's energy efficiency programs during the first 5 business days of March each calendar year. Customers making this election will be back-billed retroactively to the effective date of the new Rider EE.

For customers who elect to opt out of demand-side management programs, the following provisions also apply:

- Qualifying customers may opt out of the Company's demand-side management program during the enrollment period between November 1 and December 31 immediately prior to a new Rider EE becoming effective on January 1 of the applicable year. (Qualifying new customers have sixty days after beginning service to opt out.)
- If a customer elects to participate in a demand-side management program, the customer may not subsequently choose to opt out of demand-side management programs for three years.
- Customers who elect to opt out during the two-month annual enrollment period immediately prior to the new Rider EE becoming effective may elect to opt in to the Company's demand-side management program during the first 5 business days of March each calendar year. Customers making this election will be back-billed to the effective date of the new Rider EE.

Any qualifying non-residential customer that has not participated in an energy efficiency or demand-side management program may opt out during any enrollment period, and has no further responsibility to pay Rider EE amounts associated with the customer's opt out election for energy efficiency and/or demand-side management programs.

ENERGY EFFICIENCY RIDER ADJUSTMENTS (EEA) FOR ALL PROGRAM YEARS

The Rider EE amounts applicable to the residential and nonresidential rate schedules for the period January 1, 202~~2~~3 through December 31, 202~~2~~3 including utility assessments are as follows:

Residential

Vintage ~~2017~~2018[1], ~~2018~~2019[1], ~~2019~~2020[1], ~~2020~~2021[1]	~~0.0516~~(0.0903) ¢ per kWh
Vintage ~~2019~~2020[2], ~~2020~~2021[2], ~~2021~~2022[2], ~~2022~~2023[2]	0.~~4255~~4291 ¢ per kWh
Total Residential Rate	0.~~4771~~3388 ¢ per kWh

Nonresidential

Vintage ~~2017~~2018[3]	
Energy Efficiency	~~0.0157~~(0.0021) ¢ per kWh
Demand Side Management	~~0.0000~~(0.0002) ¢ per kWh
Vintage ~~2018~~2019[3]	
Energy Efficiency	0.~~0030~~0064 ¢ per kWh
Demand Side Management	0.~~0019~~0003 ¢ per kWh
Vintage ~~2019~~2020[3]	
Energy Efficiency	~~(0.0300)~~ 0.0247 ¢ per kWh
Demand Side Management	(0.~~0015~~0002) ¢ per kWh
Vintage ~~2020~~2021[3]	
Energy Efficiency	(0.~~0445~~0162) ¢ per kWh
Demand Side Management	(0.~~0113~~0173) ¢ per kWh
Vintage ~~2021~~2022[3]	
Energy Efficiency	0.~~0813~~0995 ¢ per kWh
Demand Side Management	0.0000 ¢ per kWh

RIDER EE (NC)

ENERGY EFFICIENCY RIDER

Vintage ~~2022~~2023[3]	
Energy Efficiency	0.~~4102~~4323 ¢ per kWh
Demand Side Management	0.~~1038~~0970 ¢ per kWh
Total Nonresidential Rate	0.~~5286~~6242 ¢ per kWh

[1] Includes the true-up of program costs, shared savings and lost revenues from Vintages ~~2017~~2018, ~~2018~~2019, ~~2019~~2020 and ~~2020~~2021

[2] Includes prospective component of Vintages ~~2019~~2020, ~~2020~~2021, ~~2021~~2022 and ~~2022~~2023

[3] Not Applicable to Rate Schedules OL, FL, PL, GL and NL

Each factor listed under Nonresidential is applicable to nonresidential customers who are not eligible to opt out and to eligible customers who have not opted out. If a nonresidential customer has opted out of a Vintage(s), then the applicable energy efficiency and/or demand-side management charge(s) shown above for the Vintage(s) during which the customer has opted out will not apply to the bill.

I/A

Forest Bradley-Wright

4532 Bancroft Dr. New Orleans, LA 70122
(504) 208-7597; forest@forestwright.com

PROFESSIONAL EXPERIENCE

Energy Efficiency Director: Southern Alliance for Clean Energy, Knoxville, TN **April 2018 – Present**

- Regulatory filings, testimony, strategy, and stakeholder management on integrated resource planning, energy efficiency program design, cost recovery and related matters throughout the Southeast.

Senior Policy Director: Alliance for Affordable Energy, New Orleans, LA **February 2017 – April 2018**

- Regulatory filings, strategy, and stakeholder management on integrated resource planning and energy efficiency rulemaking, power plant proposals and related matters at the city and state level.

Consultant: Utility Regulation and Energy Policy **December 2014 – February 2017**

- Technical and strategic guidance on clean energy policy and utility regulation for Opower, Gulf States Renewable Energy Industries Association, the Alliance, and Mississippi PSC candidate Brent Bailey.

Candidate: Louisiana Public Service Commission **July - December 2014**

- Won the open primary and secured 49.15% of the vote in the general election against a highly favored, well-funded incumbent.
- Raised nearly $500,000 in campaign contributions while publicly pledging not to accept money from monopoly companies regulated by the PSC.
- Campaign focused on ethical leadership, reducing bills, energy efficiency, the rights of customers to generate solar energy, and government transparency.

Utility Policy Director: Alliance for Affordable Energy, New Orleans, LA **October 2005 – June 2014**

- Directed successful policy efforts for energy efficiency, renewable energy, and integrated resource planning at the Louisiana PSC and New Orleans City Council, spurring every major Louisiana utility investment in clean energy over the past decade.
- Reviewed and filed intervenor comments, met with commissioners, utilities, and technical consultants, assembled and managed relationships with a broad coalition of stakeholders, worked with media, and served as the organization's public face.
- Launched and managed energy efficiency and solar workforce training programs, public education campaigns, and direct service projects to improve energy performance in over 100 homes following the city's rebuild post-Katrina.

Owner and Director: EcoPark LLC (d.b.a. The Building Block), New Orleans, LA **February 2008 – Present**

Created an innovative co-location business center to serve as a catalyst for moving green commerce and social entrepreneurship to the mainstream.

- Developed the business concept and plan, brought initial funding to the project, hired staff, established brand identity, and secured tenants.

Sustainable Development Team Facilitator: Shell International, New Orleans, LA **May 2001 – June 2004**

- Worked to facilitate a paradigm shift within corporate management's core business practices toward social and environmental issue management.
- Engaged a diverse team of professionals across the company to identify energy and resource inefficiencies and methods to reduce carbon emissions from venting and flaring in oil and natural gas exploration and production.
- Analyzed ways to incorporate sustainability accounting into each stage of new venture development for major drilling projects.

EDUCATION

Tulane University

- **Master of Arts in Latin American Studies, 2011**
  Concentration in environmental law, business, and international development
- **Bachelor of Arts with Honors in Latin American Studies, 2001**

EXPERT WITNESS TESTIMONY

Forest Bradley-Wright, Direct Testimony on Behalf of Southern Alliance for Clean Energy, North Carolina Justice Center, and North Carolina Housing Coalition. Application of Duke Energy Progress, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. §62-133.9 and Commission Rule R8-69; Docket No. E-2, Sub 1273. September 9th, 2021.

Forest Bradley-Wright, Direct Testimony on Behalf of Southern Alliance for Clean Energy, North Carolina Justice Center, and North Carolina Housing Coalition. Application of Duke Energy Carolinas, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. §62-133.9 and Commission Rule R8-69; Docket No. E-7, Sub 1249. May 10th, 2021.

Forest Bradley-Wright, Direct Testimony on Behalf of Southern Alliance for Clean Energy, North Carolina Justice Center, and North Carolina Housing Coalition. Application of Duke Energy Progress, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. §62-133.9 and Commission Rule R8-69; Docket No. E-2, Sub 1252. August 26th, 2020.

Forest Bradley-Wright, Direct Testimony on Behalf of Southern Alliance for Clean Energy, North Carolina Justice Center, and North Carolina Housing Coalition. Application of Duke Energy Carolinas, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. §62-133.9 and Commission Rule R8-69; Docket No. E-7, Sub 1230. May 22nd, 2020.

Forest Bradley-Wright, Direct Testimony on Behalf of Southern Alliance for Clean Energy, North Carolina Justice Center, and North Carolina Housing Coalition. Application of Duke Energy Progress, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. §62-133.9 and Commission Rule R8-69; Docket No. E-2, Sub 1206. August 19th, 2019.

Forest Bradley-Wright, Direct Testimony on Behalf of Southern Alliance for Clean Energy and League of United Latin American Citizens. Docket Nos. 20190015-EG, 20190016-EG, 20190018-EG, 20190019-EG, 20190020-EG, 20190021-EG- Commission Review of Numeric Conservation Goals for Florida Power & Light, Gulf Power Company, Duke Energy Florida, Orlando Utilities Commission, Jacksonville Electric Authority, Tampa Electric Company. June 10th, 2019.

Forest Bradley-Wright, Direct Testimony on Behalf of Southern Alliance for Clean Energy and North Carolina Justice Center, Application of Duke Energy Carolinas, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C.G.S. §62-133.9 and Commission Rule R8-69; Docket No. E-7, Sub 1192. May 20th, 2019.

Forest Bradley-Wright, Direct Testimony on Behalf of Southern Alliance for Clean Energy, Georgia Power Company's Application for the Certification, Decertification, and Amended Demand Side Management Plan, Docket No. 42311. April 25th, 2019.

OTHER REGULATORY FILINGS

Forest Bradley-Wright, Comments on Behalf of Southern Alliance for Clean Energy, Re: Mississippi Power Company's Notice of IRP Cycle Pursuant to Commission Rule 29 – MPSC Docket 2019-UA-231. March 22nd, 2021

Forest Bradley-Wright, Comments on Behalf of Southern Alliance for Clean Energy, Re: Proposed amendment of Rule 25-17.0021 F.A.C., Goals for Electric Utilities – FPSC Docket No. 20200181. February 15th, 2021

Forest Bradley-Wright and George Cavros, Comments on Behalf of Southern Alliance for Clean Energy, Re: Entergy Mississippi, LLC Notice of IRP Cycle Pursuant to Commission Rule 29 – MPSC Docket 2019-UA-232. July 17th, 2020

I/A
Forest Bradley-Wright, Comments on Behalf of Southern Alliance for Clean Energy, Re: Mississippi Power Company's Notice of IRP Cycle Pursuant to Commission Rule 29 – MPSC Docket 2019-UA-231. March 24th, 2020

Forest Bradley-Wright, Comments on Behalf of Southern Alliance for Clean Energy, Order Establishing Docket to Investigate the Development and Implementation of an Integrated Resource Planning Rule – MPSC Docket 2018-AD-64. February 15th, 2019

Forest Bradley-Wright and Daniel Brookeshire, Comments on Behalf of North Carolina Sustainable Energy Association and Southern Alliance for Clean Energy, Duke Energy Progress, LLC's Proposed Non-Profit Low-Income Weatherization Pay for Performance Pilot, Docket No. E-2, Sub 1187. November 9th, 2018

Forest Bradley-Wright, Comments on Behalf of Southern Alliance for Clean Energy, Order Establishing Docket to Investigate the Development and Implementation of an Integrated Resource Planning Rule – MPSC Docket 2018-AD-64. August 1st, 2018

Forest Bradley-Wright and Logan Burke, Comments on Behalf of Alliance for Affordable Energy, Rulemaking to Study the Possible Development of Financial Incentives for the Promotion of Energy Efficiency by Jurisdictional Electric and Natural Gas Utilities, Louisiana Public Service Commission Docket R-31106. June 20th, 2017

Forest Bradley-Wright and Logan Burke, Comments on Behalf of Alliance for Affordable Energy, Rulemaking to Establish Integrated Resource Planning Components and Reporting Requirements for Entergy New Orleans, Docket No. UD-17-01. May 25th, 2017

Forest Bradley-Wright and Logan Burke, Comments on Behalf of Alliance for Affordable Energy, Rulemaking to Study the Possible Development of Financial Incentives for the Promotion of Energy Efficiency by Jurisdictional Electric and Natural Gas Utilities, Louisiana Public Service Commission Docket R-31106. March 7th, 2017

Forest Bradley-Wright and Jeff Cantin, Post Hearing Brief on Behalf of Gulf States Renewable Energy Industries Association, Petition for a Certificate of Convenience and Necessity for Alabama Power, Docket No. 32382. August 19th, 2015

PUBLICATIONS

Forest Bradley-Wright and Heather Pohnan, Fourths Annual Energy Efficiency in the Southeast Report, Southern Alliance for Clean Energy. February 14th, 2022

Forest Bradley-Wright and Heather Pohnan, Third Annual Energy Efficiency in the Southeast Report, Southern Alliance for Clean Energy. January 26th, 2021

Forest Bradley-Wright and Heather Pohnan, Energy Efficiency in the Southeast 2019 Annual Report, Southern Alliance for Clean Energy. January 21st, 2020

Forest Bradley-Wright and Heather Pohnan, Energy Efficiency in the Southeast 2018 Annual Report, Southern Alliance for Clean Energy. December 12th, 2018

SACE et al.
Docket No. E-7, Sub 1265
2022 DSM/EE Rider
SACE Data Request No. 1
Item No. 1-5

DUKE ENERGY CAROLINAS, LLC

Request:

For each program in DEC's DSM/EE portfolio, please provide:

a. UCT and TRC cost-effectiveness test scores with corresponding total costs and benefits for 2017, 2018, 2019, and 2020, including:

   i. A detailed explanation of the inputs and calculation methods used for UCT and TRC

   ii. An illustrative example showing how the calculations are done using a common efficient HVAC measure.

b. The projected cost effectiveness scores for each program in the 2021 and 2022 forecasts;
c. The measures and programs offered in 2018, 2019, and 2020 that were removed because there were deemed no longer cost effective for 2021 and 2022;
d. Measures and programs that have UCT and/or TRC cost effectiveness score between 0.85 and 0.99 that were not included in DEC's 2021 and 2022 portfolios along with their respective cost effectiveness scores and projected kW and kWh savings impact that would have been expected if they had been included.

Follow-up Response (May 12, 2022):

Yes, 2021 data provided in response to data request 1-5 was for actuals, not forecasts.

Please refer to file "SACE DR1-5 a, b follow-up.xlsx" for response to parts a and b. File includes projected cost-effectiveness scores for 2023.

SACE%20DR%201-5
%20a,%20b%20follov

Initial Response:

Please refer to "SACE DR1-5 a, b.xlsx" for response to parts a and b. Refer to "SACE DR 1-5 c, d.doc" for response to parts c and d.

I/A

SACE et al.
Docket No. E-7, Sub 1265
2022 DSM/EE Rider
SACE Data Request No. 1
Item No. 1-5
Page 2 of 2

SACE%20DR%201-5 %20a,%20b.xlsx

SACE%20DR%201-5 %20c,%20d.docx

Person responding: Steven A. LoConte, Senior Program Performance Analyst

I/A

SACE DR1-5

1-5. For each program in DEC's DSM/EE portfolio, please provide:

a. UCT and TRC cost-effectiveness test scores with corresponding total costs and benefits for 2017, 2018, 2019, 2020 and 2021, including:

i. A detailed explanation of the inputs and calculation methods used for UCT and TRC

ii. An illustrative example showing how the calculations are done using a common efficient HVAC measure.

b. The projected cost effectiveness scores for each program in the 2022 and 2023 forecasts;

Note: Due to the availability of actual participant costs, calculations of historical TRC prior to 2018 are unavailable.

Note: Minor variances in Total Portfolio NPV of AC and Program Costs due to rounding

2017	NPV of AC	Program Cost	UCT
Appliance Recycling Program	-	5,307	0.00
Energy Efficiency Education	3,597,724	2,077,611	1.73
Energy Efficient Appliances and Devices	105,352,687	30,340,728	3.47
HVAC Energy Efficiency	7,287,263	7,403,327	0.98
Income Qualified Energy Efficiency and Weatherization Assistance	3,185,867	5,505,992	0.58
Multi-Family Energy Efficiency	13,539,656	3,168,422	4.27
Energy Assessments	6,602,773	2,909,098	2.27
My Home Energy Report	21,728,369	13,812,250	1.57
Residential New Construction	-	-	0.00
PowerManager	61,074,105	14,021,500	4.36
Non Residential Smart Saver Custom Technical Assessments	10,272,302	2,139,875	4.80
Non Residential Smart Saver Custom	34,693,083	7,304,838	4.75
Energy Management Information Services	-	-	
Non Residential Smart Saver Energy Efficient Food Service Products	959,251	306,488	3.13
Non Residential Smart Saver Energy Efficient HVAC Products	2,958,336	1,560,769	1.90
Non Residential Smart Saver Energy Efficient Lighting Products	240,054,511	66,689,770	3.60
Non Residential Energy Efficient Pumps and Drives Products	3,070,044	528,937	5.80
Non Residential Energy Efficient ITEE	523	61,215	0.01
Non Residential Energy Efficient Process Equipment Products	530,295	162,413	3.27
Non Residential Smart Saver Performance Incentive	8,958	320,559	0.03
Small Business Energy Saver	63,169,894	17,350,972	3.64
Smart Energy in Offices	1,067,480	891,010	1.20
Business Energy Report	696	126,680	0.01
EnergyWise for Business	2,530,761	2,484,618	1.02
PowerShare	41,482,644	13,316,535	3.12
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)			
Total Portfolio	**623,167,221**	**192,488,915**	**3.24**

2018	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-			
Energy Efficiency Education	2,863,856	1,992,260	480,232	-	1.44	1.89
Energy Efficient Appliances and Devices	137,713,128	42,687,244	36,512,751	18,375,327	3.23	5.61
HVAC Energy Efficiency	7,089,332	6,955,146	5,303,166	8,572,619	1.02	0.69
Income Qualified Energy Efficiency and Weatherization Assistance	4,253,631	6,490,735	4,835,515	-	0.66	2.57
Multi-Family Energy Efficiency	13,616,696	3,604,921	1,155,116	-	3.78	5.56
Energy Assessments	5,757,648	2,836,229	278,369	-	2.03	2.25
My Home Energy Report	22,687,264	12,765,286	-	-	1.78	1.78
Residential New Construction	-	-	0.00	-		-
PowerManager	61,927,510	14,423,610	7,213,282	-	4.29	8.59
Non Residential Smart Saver Custom Technical Assessments	67,315	407,293	7,794	24,493	0.17	0.16
Non Residential Smart Saver Custom	23,324,992	6,068,902	3,495,543	13,128,691	3.84	1.49
Energy Management Information Services	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	433,251	235,605	172,207	337,845	1.84	1.08
Non Residential Smart Saver Energy Efficient HVAC Products	2,810,482	1,620,748	1,418,533	1,481,662	1.73	1.67
Non Residential Smart Saver Energy Efficient Lighting Products	146,397,190	25,872,380	22,136,715	53,765,902	5.66	2.55
Non Residential Energy Efficient Pumps and Drives Products	1,617,951	277,785	221,861	360,094	5.82	3.89
Non Residential Energy Efficient ITEE	3,025	36,875	3,528	2,491	0.08	0.08
Non Residential Energy Efficient Process Equipment Products	226,753	67,509	51,787	49,376	3.36	3.48
Non Residential Smart Saver Performance Incentive	1,672,015	479,610	279,680	1,420,247	3.49	1.03
Small Business Energy Saver	46,838,770	15,977,993	14,439,122	22,510,536	2.93	1.95
Smart Energy in Offices	143,303	219,748	-	-	0.65	0.65
Business Energy Report	-	-	-	-		-
EnergyWise for Business	2,280,310	3,062,816	595,564	-	0.74	0.92
PowerShare	36,016,805	12,922,977	12,213,583	-	2.79	50.77
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)						
Total Portfolio	**517,741,229**	**159,005,671**	**110,814,347**	**120,029,284**	**3.26**	**3.08**

2019	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-	-	-	-
Energy Efficiency Education	2,519,645	1,644,077	457,087	512,554	1.53	1.48
Energy Efficient Appliances and Devices	102,716,013	40,433,533	33,722,488	26,495,135	2.54	3.09
HVAC Energy Efficiency	7,079,940	7,402,907	5,311,650	7,107,099	0.96	0.77
Income Qualified Energy Efficiency and Weatherization Assistance	3,421,362	7,344,325	5,590,035	5,662,865	0.47	0.46
Multi-Family Energy Efficiency	10,815,659	3,681,262	1,008,869	1,126,658	2.94	2.85
Energy Assessments	4,413,585	3,153,757	160,084	286,787	1.40	1.35
My Home Energy Report	23,361,954	10,558,344	-	-	2.21	2.21
Residential New Construction	-	-	0.00	-		-
PowerManager	69,783,157	13,386,942	7,654,406	-	5.21	12.17
Non Residential Smart Saver Custom Technical Assessments	691,285	296,006	165,648	750,359	2.34	0.78
Non Residential Smart Saver Custom	35,884,367	8,873,872	5,987,025	17,933,319	4.04	1.72
Energy Management Information Services	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	412,886	339,996	251,163	660,970	1.21	0.55
Non Residential Smart Saver Energy Efficient HVAC Products	5,516,665	2,208,364	1,950,484	2,962,253	2.50	1.71
Non Residential Smart Saver Energy Efficient Lighting Products	105,608,459	20,834,766	16,543,407	39,082,405	5.07	2.43
Non Residential Energy Efficient Pumps and Drives Products	720,816	189,172	102,810	228,894	3.81	2.29
Non Residential Energy Efficient ITEE	1,385	44,335	19,591	1,615	0.03	0.05
Non Residential Energy Efficient Process Equipment Products	416,343	119,843	99,668	173,953	3.47	2.14
Non Residential Smart Saver Performance Incentive	2,238,186	785,165	402,997	1,711,020	2.85	1.07
Small Business Energy Saver	25,661,729	11,421,399	10,040,202	15,796,578	2.25	1.49
Smart Energy in Offices	-	-	-	-	-	-
Business Energy Report	-	-	-	-	-	-
EnergyWise for Business	3,400,854	3,687,462	884,345	117,062	0.92	1.16
PowerShare	42,072,382	13,022,816	12,288,629	-	3.23	57.30
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)						
Total Portfolio	**446,736,672**	**149,428,343**	**102,640,586**	**120,609,526**	**2.99**	**2.67**

2020	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-	-	-	-
Energy Efficiency Education	1,234,203	1,113,485	236,103	265,776	1.11	1.08
Energy Efficient Appliances and Devices	62,028,986	22,124,101	16,886,727	15,061,064	2.80	3.06
HVAC Energy Efficiency	7,811,427	7,538,303	5,801,975	7,609,171	1.04	0.84
Income Qualified Energy Efficiency and Weatherization Assistance	1,024,203	2,787,490	2,033,569	1,958,074	0.37	0.38
Multi-Family Energy Efficiency	2,156,883	1,613,839	337,362	232,051	1.34	1.43
Energy Assessments	4,582,748	3,358,880	164,844	226,437	1.36	1.34
My Home Energy Report	23,927,899	12,749,651	-	-	1.88	1.88
Residential New Construction	-	-	-	-		-
PowerManager	74,785,083	14,303,277	9,209,212	-	5.23	14.68
Non Residential Smart Saver Custom Technical Assessments	518,862	330,629	94,787	204,660	1.57	1.18
Non Residential Smart Saver Custom	15,898,503	5,771,790	2,481,286	6,512,064	2.75	1.62
Energy Management Information Services	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	230,241	533,411	389,347	382,034	0.43	0.44
Non Residential Smart Saver Energy Efficient HVAC Products	7,423,034	2,450,713	2,120,437	3,638,965	3.03	1.87
Non Residential Smart Saver Energy Efficient Lighting Products	71,995,510	13,098,851	9,721,810	27,201,471	5.50	2.35
Non Residential Energy Efficient Pumps and Drives Products	757,993	167,464	95,170	268,706	4.53	2.22
Non Residential Energy Efficient ITEE	1,734	15,179	549	1,149	0.11	0.11
Non Residential Energy Efficient Process Equipment Products	236,299	29,681	18,834	32,431	7.96	5.46
Non Residential Smart Saver Performance Incentive	2,035,780	751,724	414,798	1,072,733	2.71	1.44
Small Business Energy Saver	16,483,207	6,933,130	5,852,828	9,368,664	2.38	1.58
Smart Energy in Offices	-	-	-	-		-
Business Energy Report	-	-	-	-		-
EnergyWise for Business	2,505,142	2,941,282	864,460	62,618	0.85	1.17
PowerShare	34,867,428	12,082,697	11,083,075	-	2.89	34.88
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)						
Total Portfolio	**330,505,163**	**110,695,578**	**67,807,173**	**74,098,067**	**2.99**	**2.83**

2021	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-	-	-	-
Energy Efficiency Education	1,513,478	1,147,501	287,993	297,471	1.32	1.31
Energy Efficient Appliances and Devices	25,474,094	10,824,171	7,464,271	6,438,448	2.35	2.60
HVAC Energy Efficiency	8,402,753	8,156,036	5,939,331	8,181,414	1.03	0.81
Income Qualified Energy Efficiency and Weatherization Assistance	1,452,358	4,634,161	3,253,356	3,485,104	0.31	0.30
Multi-Family Energy Efficiency	993,893	517,454	73,354	189,634	1.92	1.57
Energy Assessments	3,278,832	3,326,179	193,573	303,360	0.99	0.95
My Home Energy Report	21,313,709	7,072,233	-	-	3.01	3.01
Residential New Construction	-	-	-	-		-
PowerManager	57,584,854	16,829,058	9,334,358	-	3.42	7.68
Non Residential Smart Saver Custom Technical Assessments	432,158	293,539	104,303	448,174	1.47	0.68
Non Residential Smart Saver Custom	19,324,372	7,505,201	3,819,487	8,317,293	2.57	1.61
Energy Management Information Services	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	479,963	203,130	139,743	539,197	2.36	0.80
Non Residential Smart Saver Energy Efficient HVAC Products	14,900,228	4,899,800	4,051,494	6,702,725	3.04	1.97
Non Residential Smart Saver Energy Efficient Lighting Products	68,949,662	17,924,291	13,750,494	30,035,268	3.85	2.02
Non Residential Energy Efficient Pumps and Drives Products	666,628	202,615	129,869	213,087	3.29	2.33
Non Residential Energy Efficient ITEE	416	74,699	293	225	0.01	0.01
Non Residential Energy Efficient Process Equipment Products	257,010	87,540	54,963	73,732	2.94	2.42
Non Residential Smart Saver Performance Incentive	4,234,077	342,826	109,464	1,868,882	12.35	2.01
Small Business Energy Saver	18,680,538	8,935,952	6,815,950	11,321,049	2.09	1.39
Smart Energy in Offices	-	-	-	-		-
Business Energy Report	-	-	-	-		-
EnergyWise for Business	1,964,689	2,463,194	839,335	34,532	0.80	1.18
PowerShare	42,254,098	13,583,912	12,165,835	-	3.11	29.80
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)						
Total Portfolio	**292,157,811**	**109,023,491**	**68,527,466**	**78,449,595**	**2.68**	**2.46**

2022	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-	-	-	-
Energy Efficiency Education	3,145,767	2,264,641	654,001	631,821	1.39	1.40
Energy Efficient Appliances and Devices	34,272,497	15,072,228	11,819,651	16,953,447	2.27	1.70
HVAC Energy Efficiency	5,299,434	5,219,878	3,791,800	5,212,782	1.02	0.80
Income Qualified Energy Efficiency and Weatherization Assistance	6,175,591	8,220,067	6,832,601	6,849,158	0.75	0.75
Multi-Family Energy Efficiency	9,487,870	3,049,816	1,968,943	711,165	3.11	5.29
Energy Assessments	7,619,294	5,247,884	479,185	668,724	1.45	1.40
My Home Energy Report	21,443,834	11,379,147	-	-	1.88	1.88
Residential New Construction	-	-	-	-		-
PowerManager	76,782,152	18,025,787	9,488,763	-	4.26	8.99
Non Residential Smart Saver Custom Technical Assessments	2,749,737	1,378,847	554,376	2,870,477	1.99	0.74
Non Residential Smart Saver Custom	25,673,184	8,883,313	5,143,170	18,553,262	2.89	1.15
Energy Management Information Services	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	661,380	271,042	164,136	985,343	2.44	0.61
Non Residential Smart Saver Energy Efficient HVAC Products	9,554,016	3,143,794	2,611,680	4,395,437	3.04	1.94
Non Residential Smart Saver Energy Efficient Lighting Products	104,317,008	27,455,462	20,275,377	42,216,273	3.80	2.11
Non Residential Energy Efficient Pumps and Drives Products	1,118,710	370,116	253,320	402,195	3.02	2.16
Non Residential Energy Efficient ITEE	17,576	25,950	12,856	10,309	0.68	0.75
Non Residential Energy Efficient Process Equipment Products	556,380	234,358	189,635	255,761	2.37	1.85
Non Residential Smart Saver Performance Incentive	3,385,427	1,948,037	1,510,921	2,819,011	1.74	1.04
Small Business Energy Saver	55,375,251	18,189,200	15,319,498	29,148,203	3.04	1.73
Smart Energy in Offices	-	-	-	-		-
Business Energy Report	-	-	-	-		-
EnergyWise for Business	2,190,679	4,726,799	3,136,831	-	0.46	1.38
PowerShare	41,017,747	12,058,258	11,670,152	-	3.40	105.69
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)						
Total Portfolio	**410,843,534**	**147,164,622**	**95,876,895**	**132,683,368**	**2.79**	**2.23**

2023	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-	-	-	-
Energy Efficiency Education	2,757,352	2,109,368	631,332	571,005	1.31	1.35
Energy Efficient Appliances and Devices	32,335,837	12,034,947	8,360,189	8,559,957	2.69	2.64
HVAC Energy Efficiency	8,786,958	6,999,359	5,014,100	6,472,518	1.26	1.04
Income Qualified Energy Efficiency and Weatherization Assistance	6,733,294	8,330,637	6,048,993	6,048,993	0.81	0.81
Multi-Family Energy Efficiency	11,077,783	3,086,484	1,788,361	1,834,804	3.59	3.54
Energy Assessments	8,325,803	5,304,451	447,777	635,468	1.57	1.52
My Home Energy Report	25,502,532	7,094,738	-	-	3.59	3.59
Residential New Construction	22,757,696	10,868,340	9,512,700	13,999,834	2.09	1.48
PowerManager	83,384,154	18,746,511	9,761,490	-	4.45	9.28
Non Residential Smart Saver Custom Technical Assessments	1,566,844	704,137	197,664	1,475,668	2.23	0.79
Non Residential Smart Saver Custom	20,103,301	9,763,876	5,886,546	12,800,278	2.06	1.21
Energy Management Information Services	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	832,691	286,420	198,677	1,172,648	2.91	0.66
Non Residential Smart Saver Energy Efficient HVAC Products	20,024,436	5,468,627	4,639,056	8,024,945	3.66	2.26
Non Residential Smart Saver Energy Efficient Lighting Products	127,358,689	27,998,468	21,478,301	45,256,659	4.55	2.46
Non Residential Energy Efficient Pumps and Drives Products	1,081,241	409,753	324,012	490,183	2.64	1.88
Non Residential Energy Efficient ITEE	2,525	6,626	906	1,456	0.38	0.35
Non Residential Energy Efficient Process Equipment Products	1,007,474	352,314	300,524	403,662	2.86	2.21
Non Residential Smart Saver Performance Incentive	6,788,212	1,495,736	1,211,060	5,079,079	4.54	1.27
Small Business Energy Saver	39,702,935	12,275,232	10,312,424	18,570,186	3.23	1.93
Smart Energy in Offices	-	-	-	-		-
Business Energy Report	-	-	-	-		-
EnergyWise for Business	2,420,180	1,701,921	851,075	18,106	1.42	2.79
PowerShare	56,852,292	12,334,386	12,001,278	-	4.61	170.67
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)						
Total Portfolio	**479,402,228**	**147,372,330**	**98,966,466**	**131,415,449**	**3.25**	**2.67**

i UCT is the sum of the net present value of avoided capacity, energy and T&D divided by total program costs

TRC is the sum of the net present value of avoided capacity, energy and T&D divided by the sum of total program costs and the participant costs less participant incentives

ii See the UCT and TRC columns for part a for the formulas used to calculate the UCT and TRC scores.

Example of HVAC Measure:

NPV Avoided Energy = $195

NPV Avoided Capacity = $38

NPV Avoided T&D = $100

Total NPV Avoided Cost = $333

Program Cost = $270

Participant Incentive = $250

Participant Cost (net) = $525

UCT = $333/$270 = 1.23

TRC = $333/($270-$250+$525) = 0.61

I/A

SACE DR1-5

1-5. For each program in DEC's DSM/EE portfolio, please provide:

a. UCT and TRC cost-effectiveness test scores with corresponding total costs and benefits for 2017, 2018, 2019, and 2020, including

i. A detailed explanation of the inputs and calculation methods used for UCT and TRC

ii. An illustrative example showing how the calculations are done using a common efficient HVAC measure.

b. The projected cost effectiveness scores for each program in the 2021 and 2022 forecasts

Note: Due to the availability of actual participant costs, calculations of historical TRC prior to 2018 are unavailable.

Note: Minor variances in Total Portfolio NPV of AC and Program Costs due to rounding

	2017			2018					
	NPV of AC	Program Cost	UCT	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	5,307	0.00	-	-	-			
Energy Efficiency Education	3,597,724	2,077,611	1.73	2,863,856	1,992,260	480,232	-	1.44	1.89
Energy Efficient Appliances and Devices	105,352,687	30,340,728	3.47	137,713,128	42,687,244	36,512,751	18,375,327	3.23	5.61
HVAC Energy Efficiency	7,287,263	7,403,327	0.98	7,089,332	6,955,146	5,303,166	8,572,619	1.02	0.69
Income Qualified Energy Efficiency and Weatherization Assistance	3,185,867	5,505,992	0.58	4,253,631	6,490,735	4,835,515	-	0.66	2.57
Multi-Family Energy Efficiency	13,539,656	3,168,422	4.27	13,616,696	3,604,921	1,155,116	-	3.78	5.56
Energy Assessments	6,602,773	2,909,098	2.27	5,757,648	2,836,229	278,369	-	2.03	2.25
My Home Energy Report	21,728,369	13,812,250	1.57	22,687,264	12,765,286	-	-	1.78	1.78
Residential New Construction	-	-	0.00	-	-	0.00	-		-
PowerManager	61,074,105	14,021,500	4.36	61,927,510	14,423,610	7,213,282	-	4.29	8.59
Non Residential Smart Saver Custom Technical Assessments	10,272,302	2,139,875	4.80	67,315	407,293	7,794	24,493	0.17	0.16
Non Residential Smart Saver Custom	34,693,083	7,304,838	4.75	23,324,992	6,068,902	3,495,543	13,128,691	3.84	1.49
Energy Management Information Services	-	-		-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	959,251	306,488	3.13	433,251	235,605	172,207	337,845	1.84	1.08
Non Residential Smart Saver Energy Efficient HVAC Products	2,958,336	1,560,769	1.90	2,810,482	1,620,748	1,418,533	1,481,662	1.73	1.67
Non Residential Smart Saver Energy Efficient Lighting Products	240,054,511	66,689,770	3.60	146,397,190	25,872,380	22,136,715	53,765,902	5.66	2.55
Non Residential Energy Efficient Pumps and Drives Products	3,070,044	528,937	5.80	1,617,951	277,785	221,861	360,094	5.82	3.89
Non Residential Energy Efficient ITEE	523	61,215	0.01	3,025	36,875	3,528	2,491	0.08	0.08
Non Residential Energy Efficient Process Equipment Products	530,295	162,413	3.27	226,753	67,509	51,787	49,376	3.36	3.48
Non Residential Smart Saver Performance Incentive	8,958	320,559	0.03	1,672,015	479,610	279,680	1,420,247	3.49	1.03
Small Business Energy Saver	63,169,894	17,350,972	3.64	46,838,770	15,977,993	14,439,122	22,510,536	2.93	1.95
Smart Energy in Offices	1,067,480	891,010	1.20	143,303	219,748	-	-	0.65	0.65
Business Energy Report	696	126,680	0.01	-	-	-	-		-
EnergyWise for Business	2,530,761	2,484,618	1.02	2,280,310	3,062,816	595,564	-	0.74	0.92
PowerShare	41,482,644	13,316,535	3.12	36,016,805	12,922,977	12,213,583	-	2.79	50.77
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16									
Total Portfolio	**623,167,221**	**192,488,915**	**3.24**	**517,741,229**	**159,005,671**	**110,814,347**	**120,029,284**	**3.26**	**3.08**

	2019						2020					
	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-					-	-	-	-	-	-
Energy Efficiency Education	2,519,645	1,644,077	457,087	512,554	1.53	1.48	1,234,203	1,113,485	236,103	265,776	1.11	1.08
Energy Efficient Appliances and Devices	102,716,013	40,433,533	33,722,488	26,495,135	2.54	3.09	62,028,986	22,124,101	16,886,727	15,061,064	2.80	3.06
HVAC Energy Efficiency	7,079,940	7,402,907	5,311,650	7,107,099	0.96	0.77	7,811,427	7,538,303	5,801,975	7,609,171	1.04	0.84
Income Qualified Energy Efficiency and Weatherization Assistance	3,421,362	7,344,325	5,590,035	5,662,865	0.47	0.46	1,024,203	2,787,490	2,033,569	1,958,074	0.37	0.38
Multi-Family Energy Efficiency	10,815,659	3,681,262	1,008,869	1,126,658	2.94	2.85	2,156,883	1,613,839	337,362	232,051	1.34	1.43
Energy Assessments	4,413,585	3,153,757	160,084	286,787	1.40	1.35	4,582,748	3,358,880	164,844	226,437	1.36	1.34
My Home Energy Report	23,361,954	10,558,344	-	-	2.21	2.21	23,927,899	12,749,651	-	-	1.88	1.88
Residential New Construction	-	-	0.00	-		-	-	-	-	-		-
PowerManager	69,783,157	13,386,942	7,654,406	-	5.21	12.17	74,785,083	14,303,277	9,209,212	-	5.23	14.68
Non Residential Smart Saver Custom Technical Assessments	691,285	296,006	165,648	750,359	2.34	0.78	518,862	330,629	94,787	204,660	1.57	1.18
Non Residential Smart Saver Custom	35,884,367	8,873,872	5,987,025	17,933,319	4.04	1.72	15,898,503	5,771,790	2,481,286	6,512,064	2.75	1.62
Energy Management Information Services	-	-	-	-		-	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	412,886	339,996	251,163	660,970	1.21	0.55	230,241	533,411	389,347	382,034	0.43	0.44
Non Residential Smart Saver Energy Efficient HVAC Products	5,516,665	2,208,364	1,950,484	2,962,253	2.50	1.71	7,423,034	2,450,713	2,120,437	3,638,965	3.03	1.87
Non Residential Smart Saver Energy Efficient Lighting Products	105,608,459	20,834,766	16,543,407	39,082,405	5.07	2.43	71,995,510	13,098,851	9,721,810	27,201,471	5.50	2.35
Non Residential Energy Efficient Pumps and Drives Products	720,816	189,172	102,810	228,894	3.81	2.29	757,993	167,464	95,170	268,706	4.53	2.22
Non Residential Energy Efficient ITEE	1,385	44,335	19,591	1,615	0.03	0.05	1,734	15,179	549	1,149	0.11	0.11
Non Residential Energy Efficient Process Equipment Products	416,343	119,843	99,668	173,953	3.47	2.14	236,299	29,681	18,834	32,431	7.96	5.46
Non Residential Smart Saver Performance Incentive	2,238,186	785,165	402,997	1,711,020	2.85	1.07	2,035,780	751,724	414,798	1,072,733	2.71	1.44
Small Business Energy Saver	25,661,729	11,421,399	10,040,202	15,796,578	2.25	1.49	16,483,207	6,933,130	5,852,828	9,368,664	2.38	1.58
Smart Energy in Offices	-	-	-	-		-	-	-	-	-		-
Business Energy Report	-	-	-	-		-	-	-	-	-		-
EnergyWise for Business	3,400,854	3,687,462	884,345	117,062	0.92	1.16	2,505,142	2,941,282	864,460	62,618	0.85	1.17
PowerShare	42,072,382	13,022,816	12,288,629	-	3.23	57.30	34,867,428	12,082,697	11,083,075	-	2.89	34.88
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16												
Total Portfolio	**446,736,672**	**149,428,343**	**102,640,586**	**120,609,526**	**2.99**	**2.67**	**330,505,163**	**110,695,578**	**67,807,173**	**74,098,067**	**2.99**	**2.83**

	2021						2022					
	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-	-	-	-	-	-	-	-	-	-
Energy Efficiency Education	1,513,478	1,147,501	287,993	297,471	1.32	1.31	3,145,767	2,264,641	654,001	631,821	1.39	1.40
Energy Efficient Appliances and Devices	25,474,094	10,824,171	7,464,271	6,438,448	2.35	2.60	34,272,497	15,072,228	11,819,651	16,953,447	2.27	1.70
HVAC Energy Efficiency	8,402,753	8,156,036	5,939,331	8,181,414	1.03	0.81	5,299,434	5,219,878	3,791,800	5,212,782	1.02	0.80
Income Qualified Energy Efficiency and Weatherization Assistance	1,452,358	4,634,161	3,253,356	3,485,104	0.31	0.30	6,175,591	8,220,067	6,832,601	6,849,158	0.75	0.75
Multi-Family Energy Efficiency	993,893	517,454	73,354	189,634	1.92	1.57	9,487,870	3,049,816	1,968,943	711,165	3.11	5.29
Energy Assessments	3,278,832	3,326,179	193,573	303,360	0.99	0.95	7,619,294	5,247,884	479,185	668,724	1.45	1.40
My Home Energy Report	21,313,709	7,072,233	-	-	3.01	3.01	21,443,834	11,379,147	-	-	1.88	1.88
Residential New Construction	-	-	-	-		-	-	-	-	-		-
PowerManager	57,584,854	16,829,058	9,334,358	-	3.42	7.68	76,782,152	18,025,787	9,488,763	-	4.26	8.99
Non Residential Smart Saver Custom Technical Assessments	432,158	293,539	104,303	448,174	1.47	0.68	2,749,737	1,378,847	554,376	2,870,477	1.99	0.74
Non Residential Smart Saver Custom	19,324,372	7,505,201	3,819,487	8,317,293	2.57	1.61	25,673,184	8,883,313	5,143,170	18,553,262	2.89	1.15
Energy Management Information Services	-	-	-	-		-	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	479,963	203,130	139,743	539,197	2.36	0.80	661,380	271,042	164,136	985,343	2.44	0.61
Non Residential Smart Saver Energy Efficient HVAC Products	14,900,228	4,899,800	4,051,494	6,702,725	3.04	1.97	9,554,016	3,143,794	2,611,680	4,395,437	3.04	1.94
Non Residential Smart Saver Energy Efficient Lighting Products	68,949,662	17,924,291	13,750,494	30,035,268	3.85	2.02	104,317,008	27,455,462	20,275,377	42,216,273	3.80	2.11
Non Residential Energy Efficient Pumps and Drives Products	666,628	202,615	129,869	213,087	3.29	2.33	1,118,710	370,116	253,320	402,195	3.02	2.16
Non Residential Energy Efficient ITEE	416	74,699	293	225	0.01	0.01	17,576	25,950	12,856	10,309	0.68	0.75
Non Residential Energy Efficient Process Equipment Products	257,010	87,540	54,963	73,732	2.94	2.42	556,380	234,358	189,635	255,761	2.37	1.85
Non Residential Smart Saver Performance Incentive	4,234,077	342,826	109,464	1,868,882	12.35	2.01	3,385,427	1,948,037	1,510,921	2,819,011	1.74	1.04
Small Business Energy Saver	18,680,538	8,935,952	6,815,950	11,321,049	2.09	1.39	55,375,251	18,189,200	15,319,498	29,148,203	3.04	1.73
Smart Energy in Offices	-	-	-	-		-	-	-	-	-		-
Business Energy Report	-	-	-	-		-	-	-	-	-		-
EnergyWise for Business	1,964,689	2,463,194	839,335	34,532	0.80	1.18	2,190,679	4,726,799	3,136,831	-	0.46	1.38
PowerShare	42,254,098	13,583,912	12,165,835	-	3.11	29.80	41,017,747	12,058,258	11,670,152	-	3.40	105.69
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16												
Total Portfolio	**292,157,811**	**109,023,491**	**68,527,466**	**78,449,595**	**2.68**	**2.46**	**410,843,534**	**147,164,622**	**95,876,895**	**132,683,368**	**2.79**	**2.23**

i UCT is the sum of the net present value of avoided capacity, energy and T&D divided by total program costs

TRC is the sum of the net present value of avoided capacity, energy and T&D divided by the sum of total program costs and the participant costs less participant incentives

ii See the UCT and TRC columns for part a for the formulas used to calculate the UCT and TRC scores.

Example of HVAC Measure:

NPV Avoided Energy = $195

NPV Avoided Capacity = $38

NPV Avoided T&D = $100

Total NPV Avoided Cost = $333

Program Cost = $270

Participant Incentive = $250

Participant Cost (net) = $525

UCT = $333/$270 = 1.23

TRC = $333/($270-$250+$525) = 0.61

c. The measures and programs offered in 2018, 2019, and 2020 that were removed because there were deemed no longer cost effective for 2021 and 2022;

The EnergyWise for Business EE Thermostat measure has been removed for 2022.

d. Measures and programs that have UCT and/or TRC cost effectiveness score between 0.85 and 0.99 that were not included in DEC's 2021 and 2022 portfolios along with their respective cost effectiveness scores and projected kW and kWh savings impact that would have been expected if they had been included.

Measure	*Description*	*Program*	*UCT*	*TRC*	*Expected KWH*	*Expected KW*	*Additional information*
8,000BTU window AC unit	*Replacement*	*NES*	*0.91*	*0.91*	*500,000*	*50*	*Not included due to risk of incurring replacement window costs during direct install*

I/A

SACE DR1-5

1-5. For each program in DEC's DSM/EE portfolio, please provide:

a. UCT and TRC cost-effectiveness test scores with corresponding total costs and benefits for 2017, 2018, 2019, 2020 and 2021, including:

i. A detailed explanation of the inputs and calculation methods used for UCT and TRC

ii. An illustrative example showing how the calculations are done using a common efficient HVAC measure.

b. The projected cost effectiveness scores for each program in the 2022 and 2023 forecasts;

Note: Due to the availability of actual participant costs, calculations of historical TRC prior to 2018 are unavailable.

Note: Minor variances in Total Portfolio NPV of AC and Program Costs due to rounding

	2017			2018					
	NPV of AC	Program Cost	UCT	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	5,307	0.00	-	-	-			
Energy Efficiency Education	3,597,724	2,077,611	1.73	2,863,856	1,992,260	480,232	-	1.44	1.89
Energy Efficient Appliances and Devices	105,352,687	30,340,728	3.47	137,713,128	42,687,244	36,512,751	18,375,327	3.23	5.61
HVAC Energy Efficiency	7,287,263	7,403,327	0.98	7,089,332	6,955,146	5,303,166	8,572,619	1.02	0.69
Income Qualified Energy Efficiency and Weatherization Assistance	3,185,867	5,505,992	0.58	4,253,631	6,490,735	4,835,515	-	0.66	2.57
Multi-Family Energy Efficiency	13,539,656	3,168,422	4.27	13,616,696	3,604,921	1,155,116	-	3.78	5.56
Energy Assessments	6,602,773	2,909,098	2.27	5,757,648	2,836,229	278,369	-	2.03	2.25
My Home Energy Report	21,728,369	13,812,250	1.57	22,687,264	12,765,286	-	-	1.78	1.78
Residential New Construction	-	-	0.00	-	-	0.00	-		-
PowerManager	61,074,105	14,021,500	4.36	61,927,510	14,423,610	7,213,282	-	4.29	8.59
Non Residential Smart Saver Custom Technical Assessments	10,272,302	2,139,875	4.80	67,315	407,293	7,794	24,493	0.17	0.16
Non Residential Smart Saver Custom	34,693,083	7,304,838	4.75	23,324,992	6,068,902	3,495,543	13,128,691	3.84	1.49
Energy Management Information Services	-	-		-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	959,251	306,488	3.13	433,251	235,605	172,207	337,845	1.84	1.08
Non Residential Smart Saver Energy Efficient HVAC Products	2,958,336	1,560,769	1.90	2,810,482	1,620,748	1,418,533	1,481,662	1.73	1.67
Non Residential Smart Saver Energy Efficient Lighting Products	240,054,511	66,689,770	3.60	146,397,190	25,872,380	22,136,715	53,765,902	5.66	2.55
Non Residential Energy Efficient Pumps and Drives Products	3,070,044	528,937	5.80	1,617,951	277,785	221,861	360,094	5.82	3.89
Non Residential Energy Efficient ITEE	523	61,215	0.01	3,025	36,875	3,528	2,491	0.08	0.08
Non Residential Energy Efficient Process Equipment Products	530,295	162,413	3.27	226,753	67,509	51,787	49,376	3.36	3.48
Non Residential Smart Saver Performance Incentive	8,958	320,559	0.03	1,672,015	479,610	279,680	1,420,247	3.49	1.03
Small Business Energy Saver	63,169,894	17,350,972	3.64	46,838,770	15,977,993	14,439,122	22,510,536	2.93	1.95
Smart Energy in Offices	1,067,480	891,010	1.20	143,303	219,748	-	-	0.65	0.65
Business Energy Report	696	126,680	0.01	-	-	-	-		-
EnergyWise for Business	2,530,761	2,484,618	1.02	2,280,310	3,062,816	595,564	-	0.74	0.92
PowerShare	41,482,644	13,316,535	3.12	36,016,805	12,922,977	12,213,583	-	2.79	50.77
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)									
Total Portfolio	**623,167,221**	**192,488,915**	**3.24**	**517,741,229**	**159,005,671**	**110,814,347**	**120,029,284**	**3.26**	**3.08**

	2019						2020					
	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-					-	-	-	-	-	-
Energy Efficiency Education	2,519,645	1,644,077	457,087	512,554	1.53	1.48	1,234,203	1,113,485	236,103	265,776	1.11	1.08
Energy Efficient Appliances and Devices	102,716,013	40,433,533	33,722,488	26,495,135	2.54	3.09	62,028,986	22,124,101	16,886,727	15,061,064	2.80	3.06
HVAC Energy Efficiency	7,079,940	7,402,907	5,311,650	7,107,099	0.96	0.77	7,811,427	7,538,303	5,801,975	7,609,171	1.04	0.84
Income Qualified Energy Efficiency and Weatherization Assistance	3,421,362	7,344,325	5,590,035	5,662,865	0.47	0.46	1,024,203	2,787,490	2,033,569	1,958,074	0.37	0.38
Multi-Family Energy Efficiency	10,815,659	3,681,262	1,008,869	1,126,658	2.94	2.85	2,156,883	1,613,839	337,362	232,051	1.34	1.43
Energy Assessments	4,413,585	3,153,757	160,084	286,787	1.40	1.35	4,582,748	3,358,880	164,844	226,437	1.36	1.34
My Home Energy Report	23,361,954	10,558,344	-	-	2.21	2.21	23,927,899	12,749,651	-	-	1.88	1.88
Residential New Construction	-	-	0.00	-		-	-	-	-	-		-
PowerManager	69,783,157	13,386,942	7,654,406	-	5.21	12.17	74,785,083	14,303,277	9,209,212	-	5.23	14.68
Non Residential Smart Saver Custom Technical Assessments	691,285	296,006	165,648	750,359	2.34	0.78	518,862	330,629	94,787	204,660	1.57	1.18
Non Residential Smart Saver Custom	35,884,367	8,873,872	5,987,025	17,933,319	4.04	1.72	15,898,503	5,771,790	2,481,286	6,512,064	2.75	1.62
Energy Management Information Services	-	-	-	-		-	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	412,886	339,996	251,163	660,970	1.21	0.55	230,241	533,411	389,347	382,034	0.43	0.44
Non Residential Smart Saver Energy Efficient HVAC Products	5,516,665	2,208,364	1,950,484	2,962,253	2.50	1.71	7,423,034	2,450,713	2,120,437	3,638,965	3.03	1.87
Non Residential Smart Saver Energy Efficient Lighting Products	105,608,459	20,834,766	16,543,407	39,082,405	5.07	2.43	71,995,510	13,098,851	9,721,810	27,201,471	5.50	2.35
Non Residential Energy Efficient Pumps and Drives Products	720,816	189,172	102,810	228,894	3.81	2.29	757,993	167,464	95,170	268,706	4.53	2.22
Non Residential Energy Efficient ITEE	1,385	44,335	19,591	1,615	0.03	0.05	1,734	15,179	549	1,149	0.11	0.11
Non Residential Energy Efficient Process Equipment Products	416,343	119,843	99,668	173,953	3.47	2.14	236,299	29,681	18,834	32,431	7.96	5.46
Non Residential Smart Saver Performance Incentive	2,238,186	785,165	402,997	1,711,020	2.85	1.07	2,035,780	751,724	414,798	1,072,733	2.71	1.44
Small Business Energy Saver	25,661,729	11,421,399	10,040,202	15,796,578	2.25	1.49	16,483,207	6,933,130	5,852,828	9,368,664	2.38	1.58
Smart Energy in Offices	-	-	-	-		-	-	-	-	-		-
Business Energy Report	-	-	-	-		-	-	-	-	-		-
EnergyWise for Business	3,400,854	3,687,462	884,345	117,062	0.92	1.16	2,505,142	2,941,282	864,460	62,618	0.85	1.17
PowerShare	42,072,382	13,022,816	12,288,629	-	3.23	57.30	34,867,428	12,082,697	11,083,075	-	2.89	34.88
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)												
Total Portfolio	**446,736,672**	**149,428,343**	**102,640,586**	**120,609,526**	**2.99**	**2.67**	**330,505,163**	**110,695,578**	**67,807,173**	**74,098,067**	**2.99**	**2.83**

	2021						2022					
	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-	-	-	-	-	-	-	-	-	-
Energy Efficiency Education	1,513,478	1,147,501	287,993	297,471	1.32	1.31	3,145,767	2,264,641	654,001	631,821	1.39	1.40
Energy Efficient Appliances and Devices	25,474,094	10,824,171	7,464,271	6,438,448	2.35	2.60	34,272,497	15,072,228	11,819,651	16,953,447	2.27	1.70
HVAC Energy Efficiency	8,402,753	8,156,036	5,939,331	8,181,414	1.03	0.81	5,299,434	5,219,878	3,791,800	5,212,782	1.02	0.80
Income Qualified Energy Efficiency and Weatherization Assistance	1,452,358	4,634,161	3,253,356	3,485,104	0.31	0.30	6,175,591	8,220,067	6,832,601	6,849,158	0.75	0.75
Multi-Family Energy Efficiency	993,893	517,454	73,354	189,634	1.92	1.57	9,487,870	3,049,816	1,968,943	711,165	3.11	5.29
Energy Assessments	3,278,832	3,326,179	193,573	303,360	0.99	0.95	7,619,294	5,247,884	479,185	668,724	1.45	1.40
My Home Energy Report	21,313,709	7,072,233	-	-	3.01	3.01	21,443,834	11,379,147	-	-	1.88	1.88
Residential New Construction	-	-	-	-		-	-	-	-	-		-
PowerManager	57,584,854	16,829,058	9,334,358	-	3.42	7.68	76,782,152	18,025,787	9,488,763	-	4.26	8.99
Non Residential Smart Saver Custom Technical Assessments	432,158	293,539	104,303	448,174	1.47	0.68	2,749,737	1,378,847	554,376	2,870,477	1.99	0.74
Non Residential Smart Saver Custom	19,324,372	7,505,201	3,819,487	8,317,293	2.57	1.61	25,673,184	8,883,313	5,143,170	18,553,262	2.89	1.15
Energy Management Information Services	-	-	-	-		-	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	479,963	203,130	139,743	539,197	2.36	0.80	661,380	271,042	164,136	985,343	2.44	0.61
Non Residential Smart Saver Energy Efficient HVAC Products	14,900,228	4,899,800	4,051,494	6,702,725	3.04	1.97	9,554,016	3,143,794	2,611,680	4,395,437	3.04	1.94
Non Residential Smart Saver Energy Efficient Lighting Products	68,949,662	17,924,291	13,750,494	30,035,268	3.85	2.02	104,317,008	27,455,462	20,275,377	42,216,273	3.80	2.11
Non Residential Energy Efficient Pumps and Drives Products	666,628	202,615	129,869	213,087	3.29	2.33	1,118,710	370,116	253,320	402,195	3.02	2.16
Non Residential Energy Efficient ITEE	416	74,699	293	225	0.01	0.01	17,576	25,950	12,856	10,309	0.68	0.75
Non Residential Energy Efficient Process Equipment Products	257,010	87,540	54,963	73,732	2.94	2.42	556,380	234,358	189,635	255,761	2.37	1.85
Non Residential Smart Saver Performance Incentive	4,234,077	342,826	109,464	1,868,882	12.35	2.01	3,385,427	1,948,037	1,510,921	2,819,011	1.74	1.04
Small Business Energy Saver	18,680,538	8,935,952	6,815,950	11,321,049	2.09	1.39	55,375,251	18,189,200	15,319,498	29,148,203	3.04	1.73
Smart Energy in Offices	-	-	-	-		-	-	-	-	-		-
Business Energy Report	-	-	-	-		-	-	-	-	-		-
EnergyWise for Business	1,964,689	2,463,194	839,335	34,532	0.80	1.18	2,190,679	4,726,799	3,136,831	-	0.46	1.38
PowerShare	42,254,098	13,583,912	12,165,835	-	3.11	29.80	41,017,747	12,058,258	11,670,152	-	3.40	105.69
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)												
Total Portfolio	**292,157,811**	**109,023,491**	**68,527,466**	**78,449,595**	**2.68**	**2.46**	**410,843,534**	**147,164,622**	**95,876,895**	**132,683,368**	**2.79**	**2.23**

	2023					
	NPV of AC	Program Cost	Participant Incentives	NPV Participant Costs (net)	UCT	TRC
Appliance Recycling Program	-	-	-	-	-	-
Energy Efficiency Education	2,757,352	2,109,368	631,332	571,005	1.31	1.35
Energy Efficient Appliances and Devices	32,335,837	12,034,947	8,360,189	8,559,957	2.69	2.64
HVAC Energy Efficiency	8,786,958	6,999,359	5,014,100	6,472,518	1.26	1.04
Income Qualified Energy Efficiency and Weatherization Assistance	6,733,294	8,330,637	6,048,993	6,048,993	0.81	0.81
Multi-Family Energy Efficiency	11,077,783	3,086,484	1,788,361	1,834,804	3.59	3.54
Energy Assessments	8,325,803	5,304,451	447,777	635,468	1.57	1.52
My Home Energy Report	25,502,532	7,094,738	-	-	3.59	3.59
Residential New Construction	22,757,696	10,868,340	9,512,700	13,999,834	2.09	1.48
PowerManager	83,384,154	18,746,511	9,761,490	-	4.45	9.28
Non Residential Smart Saver Custom Technical Assessments	1,566,844	704,137	197,664	1,475,668	2.23	0.79
Non Residential Smart Saver Custom	20,103,301	9,763,876	5,886,546	12,800,278	2.06	1.21
Energy Management Information Services	-	-	-	-		-
Non Residential Smart Saver Energy Efficient Food Service Products	832,691	286,420	198,677	1,172,648	2.91	0.66
Non Residential Smart Saver Energy Efficient HVAC Products	20,024,436	5,468,627	4,639,056	8,024,945	3.66	2.26
Non Residential Smart Saver Energy Efficient Lighting Products	127,358,689	27,998,468	21,478,301	45,256,659	4.55	2.46
Non Residential Energy Efficient Pumps and Drives Products	1,081,241	409,753	324,012	490,183	2.64	1.88
Non Residential Energy Efficient ITEE	2,525	6,626	906	1,456	0.38	0.35
Non Residential Energy Efficient Process Equipment Products	1,007,474	352,314	300,524	403,662	2.86	2.21
Non Residential Smart Saver Performance Incentive	6,788,212	1,495,736	1,211,060	5,079,079	4.54	1.27
Small Business Energy Saver	39,702,935	12,275,232	10,312,424	18,570,186	3.23	1.93
Smart Energy in Offices	-	-	-	-		-
Business Energy Report	-	-	-	-		-
EnergyWise for Business	2,420,180	1,701,921	851,075	18,106	1.42	2.79
PowerShare	56,852,292	12,334,386	12,001,278	-	4.61	170.67
Disallowed Costs from 2015 Program Cost Audit (Order E-7 Sub 1105, dated 8/25/16)						
Total Portfolio	**479,402,228**	**147,372,330**	**98,966,466**	**131,415,449**	**3.25**	**2.67**

i UCT is the sum of the net present value of avoided capacity, energy and T&D divided by total program costs
TRC is the sum of the net present value of avoided capacity, energy and T&D divided by the sum of total program costs and the participant costs less participant incentives

ii See the UCT and TRC columns for part a for the formulas used to calculate the UCT and TRC scores.
Example of HVAC Measure:
NPV Avoided Energy = $195
NPV Avoided Capacity = $38
NPV Avoided T&D = $100
Total NPV Avoided Cost = $333
Program Cost = $270
Participant Incentive = $250
Participant Cost (net) = $525
UCT = $333/$270 = 1.23
TRC = $333/($270-$250+$525) = 0.61

Docket No. E-7, Sub 1265
Exhibit FBW-3

SACE et al.
Docket No. E-7, Sub 1265
2022 DSM/EE Rider
SACE Data Request No. 1
Item No. 1-12
Page 1 of 1

DUKE ENERGY CAROLINAS, LLC

Request:

Please provide:

a. total DSM/EE portfolio kWh savings at the generator for 2020, 2021, and forecast for 2022 and 2023;
b. total DSM/EE portfolio kWh savings at the meter for 2020, 2021, and forecast for 2022 and 2023; and
c. total retail sales for 2020 and 2021 and projected total retail sales for 2022 and 2023.

Response:

Please see attached file SACE DR 1-12 for response.

SACE%20DR1-12.xlsx

Person responding: Steven A. LoConte, Senior Program Performance Analyst

I/A

Duke Energy Carolinas

SACE DR 1-12

1-12. Please provide:

a. total DSM/EE portfolio kWh savings at the generator for 2020, 2021, and forecast for 2022 and 2023;

b. total DSM/EE portfolio kWh savings at the meter for 2020, 2021, and forecast for 2022 and 2023; and

c. total retail sales for 2020 and 2021 and projected total retail sales for 2022 and 2023.

Total DSM/EE portfolio kWh savings	b. Meter kWh		a. Generator kWh		
2020 Incremental Energy Savings	615,668,305	kWh	653,954,870	kWh	Evans Exhibit 1 page 3 (2020) line 28
2021 Incremental Energy Savings	599,650,652	kWh	636,941,127	kWh	Evans Exhibit 1 page 4 (2021) line 28
2022 Incremental Energy Savings	766,625,571	kWh	814,299,715	kWh	Evans Exhibit 1 page 5 (2022) line 28, E-7, Sub -1249
2023 Incremental Energy Savings	736,787,509	kWh	786,416,822	kWh	Evans Exhibit 1 page 5 (2023) line 28

DUKE ENERGY CAROLINAS

Request:

Please provide a calculation of DSM/EE portfolio savings with and without line loss (1) as percentage of total annual sales; and (2) as a percentage of annual sales to non-opt-out customers:

a. for the year 2019 (as a percentage of 2018 retail sales); and
b. forecasted for the year 2021 (as a result of forecasted 2020 sales).

Response:

Please refer to "CCL-SACE DR1-14.xlsx."

CCL-SACE%20DR1-14.xlsx

I/A

Duke Energy Carolinas

CCL_SACE DR 1-14

2019 Incremental Energy Savings	794,856,771	kWh	Evans Exhibit 1 page 3 (2019) line 28 - adjusted for line loss
2019 Opt Out Electricity Sales - NC	20,042,218,854	kWh	Miller Exh 6, Line 8
2019 Opt Out Electricity Sales - SC	10,446,567,023	kWh	Exhibit 3 pg 1 of 2, Line 12
2018 System Retail Billed Electricity Sales	81,399,234	MWh	2018 RAC Report
2021 Incremental Energy Savings	715,710,984	kWh	Evans Exhibit 1 page 4 (2021) line 27 - adjusted for line loss
2021 Opt Out Electricity Sales - NC	20,419,288,797	kWh	Miller Exh 6, Line 12
2021 Opt Out Electricity Sales - SC	10,490,870,196	kWh	Exhibit 3 pg 1 of 2, Line 16
2020 System Retail Electricity Sales	80,141,016	MWh	2019 Fall Forecast, sales at meter

1. Please provide a calculation of DSM/EE portfolio savings with and without line loss (1) as a percentage of total annual sales; and (2) as a percentage of annual sales to non-opt-out customers:
a. for the year 2019 (as a percentage of 2018 retail sales);

2019 Incremental Energy Savings	794,856.77	MWh
2018 System Retail Electricity Sales	81,399,234	MWh
Savings as % of 2018 Sales	0.98%	
2019 Incremental Energy Savings	794,856.77	MWh
2018 System Retail Electricity Sales, net of 2019 Opt Out	50,910,448	MWh
Savings as % of 2018 Sales, net of 2019 Opt Out	1.56%	

1. Please provide a calculation of DSM/EE portfolio savings with and without line loss (1) as a percentage of total annual sales; and (2) as a percentage of annual sales to non-opt-out customers:
b. forecasted for the year 2021 (as a result of forecasted 2020 sales).

2021 Incremental Energy Savings	715,710.98	MWh
2020 System Retail Electricity Sales	80,141,016	MWh
Savings as % of 2020 Sales	0.89%	

SACE et al.
Docket No. E-7, Sub 1265
2022 DSM/EE Rider
SACE Data Request No. 1
Item No. 1-13
Page 1 of 1

DUKE ENERGY CAROLINAS, LLC

Request:

For the years 2021, 2022(forecasted), and 2023 (forecasted), please identify the following at the total system level and broken out by North Carolina and South Carolina:

a. Total DSM non-residential opt-outs;
b. Total EE non-residential opt outs; and
c. Total non-residential sales.

Follow-up Response (May 12, 2022):

The 2022 data was included in the original request. The columns just need to be unhidden within the excel attachment, columns D, H and L.

Person responding: Shannon Listebarger, Rates & Regulatory Strategy Manager

Initial Response:

Please see attached file labeled SACE DR 1-13.xlsx for the requested data.

SACE%20DR%201-13.xlsx

Person responding: Shannon Listebarger, Rates & Regulatory Strategy Manager

I/A

SACE DR 1-13 First Data Request to Duke Energy Carolinas, LLC

		DSM			EE			Total Non-Residential Sales (kWh)		
	Source:	Actual 2021	Forecasted 2022	Forecasted 2023	Actual 2021	Forecasted 2022	Forecasted 2023	Actual 2021	Forecasted 2022	Forecasted 2023
NC	Listebarger Exhibit 6	18,648,145,239	18,248,487,084	18,386,911,672	20,390,666,139	19,640,593,176	20,085,420,707	35,643,438,235	36,242,826,711	36,242,826,711
SC	R14 Exhibit 3 page 1 of 2	8,925,008,018	8,643,100,545	8,862,400,408	9,693,186,294	9,579,821,484	9,555,989,829	13,661,787,145	14,898,064,380	14,723,254,836
Total		27,573,153,257	26,891,587,629	27,249,312,080	30,083,852,433	29,220,414,660	29,641,410,536	49,305,225,380	51,140,891,091	50,966,081,547

Docket No. E-7, Sub 1265
Exhibit FBW-6

SACE et al.
Docket No. E-7, Sub 1265
2022 DSM/EE Rider
SACE Data Request No. 1
Item No. 1-15
Page 1 of 1

DUKE ENERGY CAROLINAS, LLC

Request:

Please provide a spreadsheet of total energy savings achieved by each of the Company's DSM/EE programs, in GWh, for 2018, 2019, 2020 and 2021.

Response:

Please see attached spreadsheet, SACE DR 1-15, for total energy savings achieved by each of the Company's DSM/EE programs, in GWh, for 2018, 2019, 2020 and 2021.

SACE%20DR%201-15.xlsx

Person responding: Steven A. LoConte, Senior Program Performance Analyst

SACE DR 1-15

1-15. Please provide a spreadsheet of total energy savings achieved by each of the Company's DSM/EE programs, in GWh, for 2018, 2019, 2020 and 2021.

Residential Programs

		2018 System Energy Reduction (GWh)	2019 System Energy Reduction (GWh)	2020 System Energy Reduction (GWh)	2021 System Energy Reduction (GWh)
	EE Programs				
1	**Energy Efficiency Education**	5.53	6.71	4.75	7.01
2	**Energy Efficient Appliances and Devices**	194.36	187.57	110.99	51.70
3	**HVAC Energy Efficiency**	6.37	7.33	7.69	9.43
4	**Low Income Energy Efficiency and Weatherization Assistance**	6.85	8.50	2.04	2.55
5	**Multi-Family Energy Efficiency**	20.92	21.34	4.04	2.02
6	**Residential Energy Assessments**	7.72	7.89	7.89	6.59
7	**Total for Residential Conservation Programs**	241.74	239.34	137.40	79.30
8	**My Home Energy Report**	344.76	328.44	332.11	336.29
9	**Total Residential Conservation and Behavioral Programs**	586.50	567.78	469.50	415.59
10	**Power Manager®**	-	-	-	-
11	**Total Residential**	586.50	567.78	469.50	415.59

Non-Residential Programs

	EE Programs	2018 System Energy Reduction (GWh)	2019 System Energy Reduction (GWh)	2020 System Energy Reduction (GWh)	2021 System Energy Reduction (GWh)
12	**Non Residential Smart Saver Custom Technical Assessments**	0.08	1.93	1.41	0.92
13	**Non Residential Smart Saver Custom**	30.33	52.52	21.16	30.80
14	**Non Residential Smart Saver Energy Efficienct Food Service Products**	0.74	1.00	0.50	1.20
15	**Non Residential Smart Saver Energy Efficienct HVAC Products**	2.91	7.53	9.27	21.05
16	**Non Residential Smart Saver Energy Efficienct Lighting Products**	177.85	163.56	109.56	116.78
17	**Non Residential Smart Saver Energy Efficienct Pumps and Drives Products**	2.67	1.46	1.40	1.52

18	**Non Residential Energy Efficienct ITEE**	0.02	0.01	0.01	0.00
19	**Non Residential Smart Saver Energy Efficienct Process Equipment Products**	0.33	0.73	0.57	0.82
20	**Smart $aver(R) Non Residential Performance Incentive Program**	3.27	4.55	5.96	8.25
21	**Small Business Energy Saver**	76.70	53.67	32.01	38.56
22	**Smart Energy in Offices**	1.49	-	-	-
23	**Total for Non-Residential Conservation Programs**	296.39	286.97	181.85	219.92
24	**EnergyWise for Business**	2.60	5.15	2.60	1.44
25	**PowerShare®**	-	-	-	0.00
26	**Total for Non-Residential DSM Programs**	2.60	5.15	2.60	1.44
27	**Total Non Residential**	298.99	292.12	184.45	221.35
28	**Total All Programs**	885.49	859.90	653.95	636.94

(1) My Home Energy Report impacts reflect cumulative capability as of end of vintage year.
(2) Total System DSM programs allocated to Residential and Non-Residential based on contribution to retail system peak

SACE et al.
Docket No. E-7, Sub 1265
2022 DSM/EE Rider
SACE Data Request No. 1
Item No. 1-19
Page 1 of 1

DUKE ENERGY CAROLINAS, LLC

Request:

How does DEC determine the amount that will be spent on its low-income energy efficiency programs?

Response:

DEC determines the Low-Income program budget and savings targets by considering the current Commission-approved programs targeting low income customers. For each approved program, DEC evaluates the throughput capability of the program structure to deliver energy savings to targeted/qualified customers, projected customer demand, and the cost to complete the projected customer participation goals. It is important to note budgets and targeted participation are in no way a cap on the amount of program spend or participation, but rather an informed way to inform requested cost recovery.

Person responding: Rick Mifflin, Director, Products & Services

Duke Energy Carolinas

Docket No. E-7, Sub 1265
Exhibit FBW-8

CCL_SACE DR 2-2

2014 Incremental Energy Savings	508,689,316	kWh	Year 2014 Exhibit 2 - line 31 adjusted for line loss
2014 Opt Out Electricity Sales - NC	17,153,650,420	kWh	workpapers
2014 Opt Out Electricity Sales - SC	9,992,960,564	kWh	workpapers
2013 System Retail Billed Electricity Sales	76,021,887	MWh	2013 RAC Report
2015 Incremental Energy Savings	614,743,741	kWh	Year 2015 Exhibit 2 - line 32 adjusted for line loss
2015 Opt Out Electricity Sales - NC	17,296,168,323	kWh	Miller Exhibit 6
2015 Opt Out Electricity Sales - SC	9,824,240,223	kWh	Exhibit 3 pg 1 of 2
2014 System Retail Billed Electricity Sales	78,277,836	MWh	2014 RAC Report
2016 Incremental Energy Savings	754,838,256	kWh	Year 2016 Exhibit 2 - line 33 adjusted for line loss
2016 Opt Out Electricity Sales - NC	17,541,642,770	kWh	Miller Exhibit 6
2016 Opt Out Electricity Sales - SC	10,115,080,343	kWh	Exhibit 3 pg 1 of 2
2015 System Retail Billed Electricity Sales	79,056,620	MWh	2015 RAC Report
2017 Incremental Energy Savings	879,954,382	kWh	Year 2017 Exhibit 2 - line 33 adjusted for line loss
2017 Opt Out Electricity Sales - NC	17,749,899,702	kWh	Miller Exhibit 6
2017 Opt Out Electricity Sales - SC	10,211,024,604	kWh	Exhibit 3 pg 1 of 2
2016 System Retail Billed Electricity Sales	79,090,737	MWh	2016 RAC report
2018 Incremental Energy Savings	811,152,170	kWh	Year 2018 Exhibit 2 - line 33 adjusted for line loss
2018 Opt Out Electricity Sales - NC	18,347,183,120	kWh	Miller Exh 6, Line 10
2018 Opt Out Electricity Sales - SC	10,257,713,985	kWh	Exhibit 3 pg 1 of 2, Line 14
2017 System Retail Billed Electricity Sales	77,059,079	MWh	2017 RAC Report

2. Please provide a calculation of cumulative DSM/EE portfolio savings (1) as a percentage of total annual sales; and (2) as a percentage of annual sales to non-opt-out customers from 2014 through 2018, taking into account line loss.

2014 Incremental Energy Savings	508,689.32	MWh
2013 System Retail Electricity Sales	76,021,887	MWh
2013 System Retail Electricity Sales, net of 2014 Opt Out	48,875,276	
Savings as % of 2013 Sales	0.67%	
Savings as % of 2013 Sales, net of 2014 Opt Out	1.04%	
2015 Incremental Energy Savings	614,743.74	MWh
2014 System Retail Electricity Sales	78,277,836	MWh
2014 System Retail Electricity Sales, net of 2015 Opt Out	51,157,427	
Savings as % of 2014 Sales	0.79%	
Savings as % of 2014 Sales, net of 2015 Opt Out	1.20%	
2016 Incremental Energy Savings	754,838.26	MWh
2015 System Retail Electricity Sales	79,056,620	MWh
2015 System Retail Electricity Sales, net of 2016 Opt Out	51,399,896	
Savings as % of 2015 Sales	0.95%	
Savings as % of 2015 Sales, net of 2016 Opt Out	1.47%	

Docket No. E-7, Sub 1265
Exhibit FBW-9

SACE et al.
Docket No. E-7, Sub 1265
2022 DSM/EE Rider
SACE Data Request No. 1
Item No. 1-20
Page 1 of 1

DUKE ENERGY CAROLINAS, LLC

Request:

How does DEC determine the projected savings targets for low-income energy efficiency programs?

Response:

Energy savings are determined by using the most recent energy impact estimates (EM&V) and multiplying by the related number of measures or customers.

Response provided by: Rick Mifflin, Director, Products & Services

COST RECOVERY AND INCENTIVE MECHANISM OF DUKE ENERGY CAROLINAS, LLC, FOR DEMAND-SIDE MANAGEMENT AND ENERGY EFFICIENCY PROGRAMS

(Docket No. E-7, Sub 1032, as Modified by the Commission, to be Effective January 1, 2022)

The purpose of this Mechanism is to (1) allow Duke Energy Carolinas, LLC (Duke Energy Carolinas or the Company), to recover all reasonable and prudent costs incurred for adopting and implementing new demand-side management (DSM) and new energy efficiency (EE) measures in accordance with N.C. Gen. Stat. § 62-133.9, Commission Rules R8-68 and R8-69, prior Orders of the Commission, and the additional principles set forth below; (2) establish certain requirements, in addition to those of Commission Rule R8-68, for requests by Duke Energy Carolinas for approval of DSM and EE programs; (3) establish the terms and conditions for the recovery of Net Lost Revenues and a Portfolio Performance Incentive (PPI) to reward Duke Energy Carolinas for adopting and implementing new DSM and EE measures and programs in cases where the Commission deems such recovery and reward appropriate, and (4) provide for an additional incentive to further encourage kilowatt-hour (kWh) savings achievements. The definitions set out in N.C. Gen. Stat. § 62-133.8 and N.C. Gen. Stat. § 62-133.9 and Commission Rules R8-68 and R8-69 apply to this Mechanism. For purposes of this Mechanism, the definitions listed below also apply.

Changes in the terms and conditions of this Mechanism shall be applied prospectively only, to vintage years following any Commission order amending these terms and conditions. Approved programs and measures shall continue to be subject to the terms and conditions that were in effect when they were approved with respect to the recovery of reasonable and prudent costs and Net Lost Revenues. With respect to the recovery of the PPI, approved programs and measures shall continue to be subject to the terms and conditions in effect in the vintage year that the measurement unit was installed.

Definitions

1. *Common costs* are costs that are not attributable or reasonably assignable or allocable to specific DSM or EE programs but are necessary to design, implement, and operate the programs collectively.

2. *Costs* include program costs (including those of pilot programs approved by the Commission for inclusion in the Mechanism), common costs, and, subject to Rule R8-69(b), any other costs approved by the Commission for inclusion in the Mechanism. *Costs* include only those expenditures appropriately allocable to the North Carolina retail jurisdiction.

3. *Low-Income Programs or Low-Income Measures* are DSM or EE programs or DSM or EE measures approved by the Commission as programs or measures provided specifically to low-income customers.

4. *Measure* means, with respect to EE, an "energy efficiency measure," as defined in N.C. Gen. Stat. § 62-133.8(a)(4), that is new under G.S. 62-133.9(a); and, with respect to DSM, an activity, initiative, or equipment, physical, or program change, that is new under N.C. Gen. Stat. § 62-133.9(a) and satisfies the definition of "demand-side management" as set forth in N.C. Gen. Stat. § 62-133.8(a)(2).

5. *Measurement unit* means the basic unit that is used to measure and track the (a) incurred costs; (b) Net Lost Revenues; and (c) net kilowatt (kW), kWh, and dollar savings net of Net-to-Gross (NTG) for DSM or EE measures installed in each vintage year. A measurement unit may consist of an individual measure or bundles of measures. Measurement units shall be requested by Duke Energy Carolinas and established by the Commission for each program in the program approval process, and shall be subject to modification by the Commission when appropriate. If measurement units have not been established for a particular program, the measurement units for that program shall be the individual measures, unless the Commission determines otherwise.

6. *Measurement unit's life* means the estimated number of years that equipment or customer treatment associated with a measurement unit will operate if properly maintained or activities associated with the measurement unit will continue to be cost-effective, and produce energy (kWh) or peak demand (kW) savings, unless the Commission determines otherwise.

7. *Net Found Revenues* means any increases in revenues resulting from any activity by Duke Energy Carolinas' public utility operations that causes a customer to increase demand or energy consumption, whether or not that activity has been approved pursuant to Rule R8-68. The dollar value of Net Found Revenues will be determined in a manner consistent with the determination of the dollar value of NLR provided in Paragraph No. 8 below. In determining which activities constitute Net Found Revenues, the "decision tree" adopted by Order in Docket No. E-7, Sub 831 on February 8, 2011, should be applied. Net Found Revenues may be reduced, if such reduction is approved as reasonable and appropriate by the Commission, by a decrease in revenues resulting from an activity by Duke Energy Carolinas' public utility operations that causes a customer to reduce demand or energy consumption (negative found revenues). To be approved, it must be demonstrated that the activity producing the negative found revenues reduces the profitability of the Company. Additionally, the total amount of Net Found Revenues for a given vintage year will not be reduced to a level below zero by the inclusion of negative found revenues.

8. *Net Lost Revenues* means Duke Energy Carolinas' revenue losses, net of marginal costs avoided at the time of the lost kWh sale(s), or in the case of purchased power, in the applicable billing period, incurred by Duke Energy Carolinas' public utility operations as the result of a new DSM or EE measure. A PPI shall not be considered in the calculation of Net Lost Revenues or Net Lost Revenue recovery.

9. *Net-to-gross (NTG) factor* means an adjustment factor used to compute the net kW/kWh savings by accounting for but not limited to such behavioral effects as rebound, free ridership, moral hazard, free drivers, and spillover.

10. *Program* means a collection of new DSM or EE measures with similar objectives that have been consolidated for purposes of delivery, administration, and cost recovery, and that have been or will be adopted on or after January 1, 2007, including subsequent changes and modifications.

11. *Program costs* are costs that are attributable to specific DSM or EE programs and include all appropriate capital costs (including cost of capital and depreciation expenses), common costs, reasonably assignable or allocable administrative and general costs, implementation costs, incentive payments to program participants, operating costs, and evaluation, measurement, and verification (EM&V) costs, net of any grants, tax credits, or other reductions in cost received by the utility from outside parties.

12. *Portfolio Performance Incentive* (PPI) means a utility incentive payment to Duke Energy Carolinas as a bonus or reward for adopting and implementing new (as defined in N.C. Gen. Stat. § 62-133.9(a)) EE or DSM measures and/or Programs. The PPI is based on the sharing of avoided cost savings, net of Program Costs, achieved by those DSM and EE Programs in the aggregate. The PPI is also subject to certain limitations as further set forth in this Mechanism. PPI excludes Net Lost Revenues.

13. *Program Return Incentive* (PRI) means a utility incentive payment to Duke Energy Carolinas for adopting and implementing programs that fail to pass the Utility Cost Test, but are approved by the Commission due to the societal benefit they provide, such as low-income programs. For these types of programs, the PRI will be based on a percentage of the net present value of the avoided costs savings achieved by those DSM and EE Programs. The PRI is subject to certain additional factors and limitations, as further set forth in this Mechanism.

14. *Total Resource Cost* (TRC) *test* means a cost-effectiveness test that measures the net costs of a DSM or EE program as a resource option based on the total costs of the program, including both the participants' costs and the utility's costs (excluding incentives paid by the utility to or on behalf of participants). The benefits for the TRC test are avoided supply costs, i.e., the reduction in generation capacity costs, transmission and distribution costs, and energy costs caused by a load reduction. The avoided supply costs shall be calculated using net program savings, i.e., savings net of changes in energy use that would have happened in the absence of the program. Non-energy benefits, as approved by the Commission, may be considered in the determination of TRC results. The costs for the TRC test are the net program or portfolio costs incurred by the utility and participants, and the increased supply costs for any periods in which load is increased. All costs of equipment, installation, operation and maintenance (O&M), removal (less salvage value), and administration, no matter who pays for them,

are included in this test. Any tax credits are considered a reduction to costs in this test.

15. *Utility Cost Test* (UCT) means a cost-effectiveness test that measures the net costs of a DSM or EE program as a resource option based on the costs incurred by the utility (including incentive costs paid by the utility to or on behalf of participants) and excluding any net costs incurred by the participant. The benefits for the UCT are avoided supply costs, i.e., the reduction in generation capacity costs, transmission and distribution costs, and energy costs caused by a load reduction. The avoided supply costs shall be calculated using net program savings, i.e., savings net of changes in energy use that would have happened in the absence of the program. The costs for the UCT are the net program or portfolio costs incurred by the utility and the increased supply costs for any periods in which load is increased. Utility costs include initial and annual costs, such as the cost of utility equipment, O&M, installation, program administration, incentives paid to participants and participant dropout and removal of equipment (less salvage value).

16. *Vintage year* means an identified 12-month period in which a specific DSM or EE measure is installed for an individual participant or group of participants.

Term

17. This Mechanism shall continue until terminated pursuant to Order of the Commission.

Application for Approval of Programs

18. In evaluating potential DSM/EE measures and programs for selection and implementation, Duke Energy Carolinas will first perform a qualitative measure screening to ensure measures are:

(a) Commercially available and sufficiently mature.

(b) Applicable to the Duke Energy Carolinas service area demographics and climate.

(c) Feasible for a utility DSM/EE program.

19. Duke Energy Carolinas will then further screen EE and DSM measures for cost-effectiveness. For purposes of this screening, estimated incremental EM&V costs attributable to the measures shall be included in the measures' costs. With the exception of measures included in Low-Income Programs or other non-cost-effective programs with similar societal benefits as approved by the Commission, an EE or DSM measure with an estimated UCT result less than 1.0 will not be considered further, unless the measure can be

bundled into an EE or DSM Program to enhance the overall cost-effectiveness of that program. Measures under consideration for bundling, whether as part of a new Program or into an existing Program, should, unless otherwise approved by the Commission, be consistent with and related to the measure technologies, and/or delivery channels currently offered in the existing Program or to be otherwise offered in the new Program.

20. With the exception of Low-Income Programs or other non-cost-effective programs with similar societal benefits as approved by the Commission, all programs submitted for approval will have an estimated UCT result greater than 1.00. Additionally, for purposes of calculating cost-effectiveness for program approval, consistent with the Commission's Orders in Docket Nos. E-7, Sub 1130 and E-7, Sub 1164, the Company shall use projected avoided capacity and energy benefits specifically calculated for the program, as derived from the underlying resource plan, production cost model, and cost inputs that generated the avoided capacity and avoided energy credits reflected in the most recent Commission-approved Biennial Determination of Avoided Cost Rates for Electric Utility Purchases from Qualifying Facilities as of the date of the filing for the new program approval.

20A. However, for the calculation of the underlying avoided energy credits to be used to derive the program-specific avoided energy benefits, the calculation will be based on the projected EE portfolio hourly shape, rather than the assumed 24x7 100 MW reduction typically used to represent a qualifying facility. For purposes of determining cost-effectiveness, estimated incremental EM&V costs attributable to each program shall be included in program costs. Duke Energy Carolinas will comply, however, with Rule R8-60(i)(6)(iii), which requires that Duke Energy Carolinas' biennial Integrated Resource Plan, revised as applicable in its annual report, include certain information regarding the measures and programs that it evaluated but rejected.

20B. Moreover, for the Calculation of the underlying avoided capacity benefits, when authorized pursuant to Commission Rule R8-69(c) and unless the Commission determines otherwise in a G.S. 62-133.9 DSM/EE Rider proceeding, the Company shall be permitted to recognize the impact of the Reserve Margin Adjustment Factor used in the determination of the PPI and PRI values for its energy efficiency programs.

The Reserve Margin Adjustment Factor is equivalent to (1 + Reserve Margin) / (Performance Adjustment Factor) and will be applied to the avoided capacity costs of all energy efficiency programs.

The Reserve Margin employed shall be based upon the value reflected in the most recent Commission accepted Integrated Resource Plan proceeding as of December 31 of the year immediately preceding the date of the annual DSM/EE rider filing. The Performance Adjustment Factor employed shall be based upon value reflected in the most recent Commission approved Biennial Avoided Cost proceeding as of December 31 of the year immediately preceding the date of the annual DSM/EE rider filing.

21. If a program fails the economic test in Paragraph 20 above, Duke Energy Carolinas will determine if certain measures can be removed from the program to satisfy the criteria established in Paragraph 20.

22. Nothing in this Mechanism relieves Duke Energy Carolinas from its obligation to comply with Commission Rule R8-68 when filing for approval of DSM or EE measures or programs. As specifically required by Rule R8-68(c)(3)(iii), Duke Energy Carolinas shall, in its filings for approval of measures and programs, describe in detail the industry-accepted methods to be used to collect and analyze data; measure and analyze program participation; and evaluate, measure, verify, and validate estimated energy and peak demand savings. Duke Energy Carolinas shall provide a schedule for reporting the results of this EM&V process to the Commission. The EM&V process description should describe not only the methodologies used to produce the impact estimates utilized, but also any methodologies the Company considered and rejected. Additionally, if Duke Energy Carolinas plans to use an independent third party for purposes of EM&V, it shall identify the third party and include all third-party costs in its filing.

23. For those programs first approved in Duke Energy Carolinas' South Carolina jurisdiction and subsequently in its North Carolina jurisdiction, net dollar savings achieved in the South Carolina jurisdiction will be eligible for consideration

of inclusion in the determination of the incentive to be approved by the Commission.

Program Management

24. In each annual DSM/EE cost recovery filing, Duke Energy Carolinas shall (a) perform prospective cost-effective test evaluations for each of its approved DSM and EE programs, (b) perform prospective aggregated portfolio-level cost-effectiveness test evaluations for its approved DSM/EE programs (including any common costs not reasonably assignable or allocable to individual programs), and (c) include these prospective cost-effectiveness test results in its DSM/EE rider application.

25. Consistent with the Commission's Orders in Docket Nos. E-7, Sub 1130 and E-7, Sub 1164, for purposes of calculating prospective cost-effectiveness in each DSM/EE rider proceeding to be used to determine whether a program should remain in the portfolio, the Company shall assess each program by:

a. Using projected avoided capacity and energy benefits specifically calculated for each program, as derived from the underlying resource plan, production cost model, and cost inputs that generated the avoided capacity and avoided energy credits reflected in the most recent Commission-approved Biennial Determination of Avoided Cost Rates for Electric Utility Purchases from Qualifying Facilities as of December 31 of the year immediately preceding the date of the annual DSM/EE rider filing. However, for the calculation of the underlying avoided energy credits to be used to derive the program-specific avoided energy benefits, the calculation will be based on the projected EE portfolio hourly shape, rather than the assumed 24x7 100 MW reduction typically used to represent a qualifying facility; and,

b. Evaluating each cost-effectiveness test using projections of participation, savings, program costs, and benefits for the upcoming vintage year.

26. The parties acknowledge that prospective cost-effectiveness evaluations are snapshots of the program's performance, and that ongoing cost-effectiveness is impacted by many factors outside the Company's control, including but not limited to market and economic conditions, avoided costs, and government mandates. The parties shall continue to work to maintain the cost-effectiveness of its portfolio and individual programs. However, for any program that initially demonstrates a UCT, determined pursuant to Paragraph 24 above of less than 1.00, the Company shall include a discussion in its annual DSM/EE rider proceeding of the actions being taken to maintain or improve cost-effectiveness, or alternatively, its plans to terminate the program.

27. For programs that demonstrate a prospective UCT, determined pursuant to Paragraph 24 above, of less than 1.00 in a second DSM/EE rider proceeding, the Company shall include a discussion of what actions it has taken

to improve cost-effectiveness. Fluctuations of UCT above and below 1.0 should be addressed on a case by case basis.

28. For programs that demonstrate a prospective UCT, determined pursuant to Paragraph 24 above, of less than 1.00 in a third DSM/EE rider proceeding, the Company shall terminate the program effective at the end of the year following the DSM/EE rider order, unless otherwise ordered by the Commission.

29. The Company will seek to leverage available state and federal funds to operate effective efficiency programs. Its application for such funds will be transparent with respect to the cost, operation, and profitability of programs operated with those funds in a manner consistent with its authorized revenue recovery mechanism. Use of such funds helps offset the participant's project costs and is supplemental to Duke Energy Carolinas' incentives to participants. As such, these funds will not change the impacts or cost-effectiveness of Duke Energy Carolinas' programs as calculated using the UCT. Further, the amount of avoided costs recognized by the Company will not be reduced if participants also use state or federal funds to offset any portion of their project costs.

Program Modifications

30. Modifications to Commission-approved DSM/EE programs will be made using the Flexibility Guidelines filed on February 6, 2012, in Docket No. E-7, Sub 831, and approved July 16, 2012, by the Commission. Modifications filed

with the Commission for approval will be evaluated under the same guidelines and parameters used in DEC's most recently filed DSM/EE rider proceeding.

31. If under the Flexibility Guidelines Commission approval of a modification is required, the Company shall file a petition prior to the implementation of the program change no later than 30 days prior to the proposed effective date, pursuant to Commission Rule R8-68.

32. If under the Flexibility Guidelines advance notice is required, Duke Energy Carolinas shall file all program changes no later than 45 days prior to the proposed effective date of the change using the Advance Notice Program Modifications Reporting Template (Template). If any party has concern about the proposed program modification, it shall file comments with the Commission within 25 days of the Company's filing.

33. The Company shall file on a quarterly basis using the Template a notification of all program changes that have been made without Commission preapproval or advance notice.

34. Whenever a change in a program or measure goes into effect, the baseline cost effectiveness test results should be reset for the purposes of applying the Flexibility Guidelines to subsequent modifications.

Evaluation, Measurement and Verification

35. EM&V of programs, conducted by an independent third-party using a nationally-recognized protocol, will be performed to ensure that programs remain cost-effective. This protocol may be modified with approval of the Commission to reflect the evolution of best practices.

36. EM&V will also include updates of any net-to-gross (NTG) factors related to previous NTG estimates for programs and measures. All of the updated information will be used in evaluating the continued cost-effectiveness of existing programs, but updates to NTG estimates will not be applied retrospectively to measures that have already been installed or programs that have already been completed. If it becomes apparent during the implementation of a program that NTG factors are substantially different than anticipated, the Company will file appropriate program adjustments with the Commission.

37. Pursuant to the EM&V Agreement approved by the Commission in Docket No. E-7, Sub 979, for the Company's EE programs, with the exception of the Non-Residential Smart$aver Custom Rebate Program, initial EM&V results shall be applied retrospectively to the beginning of the program offering to replace initial estimates of impacts. For the purposes of the vintage true-ups, these initial EM&V results will be considered actual results for a program until the next EM&V results are received. The new EM&V results will then be considered actual results going forward and applied prospectively for the purposes of truing up vintages from

the first day of the month immediately following the month in which the study participation sample for the EM&V was completed. This EM&V will then continue to apply and be considered actual results until it is superseded by new EM&V results, if any.

38. EM&V for the Non-Residential Smart$aver Custom Rebate Program does not apply retrospectively and this program shall be trued up based on the actual participants and actual projects undertaken.

Opt-Outs for Industrial Customers and Certain Commercial Customers

39. Pursuant to Commission Rule R8-69(d), commercial customers with annual consumption of 1,000,000 kWh or greater in the billing months of the prior calendar year and all industrial customers may, by meeting certain requirements, elect not to participate in DSM/EE measures for which cost recovery is allowed through the DSM/EE rider and the DSM/EE EMF rider. For purposes of application of this option, a customer is defined as a metered account billed under a single application of a Company rate tariff. For commercial accounts, once one account meets the opt-out eligibility requirement, all other accounts billed to the same entity with lesser annual usage located on the same or contiguous properties are also eligible to opt out of the DSM/EE rider and the DSM/EE EMF rider.

40. Pursuant to the Commission's Orders in Docket No. E-7, Sub 938, eligible non-residential customers may opt out of either or both of the DSM and EE categories of programs for one or more vintage years, as well as opt back into

either or both the categories for a later vintage year. If a customer opts back into the DSM category, it cannot opt out again for three years; however, a customer has the freedom to opt in or out of the EE category for each vintage year. Additionally, if a customer opts out of paying the Rider for a vintage year after one or more in which the customer was "opted in"; the Company can charge the customer subsequent DSM/EE and DSM/EE EMF Riders only for those vintage years in which the customer actually participated in a DSM/EE program.

41. Eligible customers may opt out of the Company's EE or DSM programs each calendar year during the annual two-month enrollment period between November 1 and December 31 immediately prior to a new DSM/EE rider becoming effective on January 1. Eligible new customers have sixty days after beginning service to opt out.

42. In addition to the two month opt out period between November 1 and December 31 prior to the new DSM/EE rider becoming effective, during the first week of March (5 business days), customers who have previously opted out may elect to opt in and participate in EE and/or DSM programs during the remainder of the vintage year. Any customer choosing to opt in during the March window would be back-billed for the rider amount that they would have paid had the chosen to participate during the November/December enrollment period.

Collaborative

43. Duke Energy Carolinas will continue to conduct quarterly collaborative stakeholder meetings for the purpose of collaborating on new program ideas, reviewing modifications to existing programs, ensuring an accurate public understanding of the programs and funding, reviewing the EM&V process, giving periodic status reports on program progress, helping to set EM&V priorities, providing recommendations for the submission of applications to revise or extend programs and rate structures, and guiding efforts to expand cost-effective programs for low-income customers.

44. The Collaborative should continue to be comprised of a broad spectrum of regional stakeholders that represent a balanced interest in the Company's DSM/EE effort and its impacts, as well as national EE advocates and experts. A third party may facilitate the discussions. The collaborative will continue to determine its own rules of operation, including the process for setting the agendas and activities of the group, consistent with these terms. Members agree to participate in the advisory group in good faith consistent with mutually-agreed upon rules of participation. Meetings are open to additional parties who agree to the participation rules.

45. Duke Energy Carolinas will provide information related to the development of EE and DSM to stakeholders in a transparent manner. The Company agrees to disclose program-related data at a level of detail similar

to that which it has disclosed in other states or as disclosed by other regulated utilities in the Carolinas. The Company will share all aspects of the development and evaluation of programs, including the EM&V process.

46. At its discretion, the Company may require confidentiality agreements with members who wish to review confidential data or any calculations that could be used to determine the data. Disclosure of this data would harm Duke Energy Carolinas competitively and could result in financial harm to its customers.

47. Participation in the advisory group shall not preclude any party from participating in any Commission proceedings.

General Structure of Riders

48. All DSM/EE and DSM/EE EMF riders shall be calculated and charged to customers based on the revenue requirements for each separate vintage year. Separate DSM/EE and DSM/EE EMF riders shall be calculated for the Residential customer class and those rate schedules within the Non-Residential customer class that have Duke Energy Carolinas DSM/EE program options in which they can participate. One integrated (prospective) DSM/EE rider and one integrated DSM/EE EMF rider shall be calculated for the Residential class, to be effective each rate year. The integrated Residential DSM/EE EMF rider shall include all true-ups for each vintage year appropriately considered in each proceeding. Pursuant to the Commission's Orders in Docket No. E-7, Sub 938, separate DSM and EE billing factors shall be calculated for the Non-

Residential class. Additionally, the Non-Residential DSM and EE EMF billing factors shall be determined separately for each vintage year appropriately considered in each proceeding, so that the factors can be appropriately charged to Non-Residential customers based on their opt-in/out status and participation for each vintage year.

48A. The annual filing date of DEC's DSM/EE rider application, supporting testimony, and exhibits will be no later than 98 days prior to the hearing date prescribed by Commission Rule (currently the first Tuesday of June of each calendar year). Should the Company become aware prior to filing of a determined or possible change in the hearing date, the Company shall strive to file its application and associated documents no later than 98 days prior to the changed hearing date.

48B. DEC shall not request that the annual hearing to consider the proposed DSM/EE and DSM/EE EMF riders be held sooner than 98 days after the filing date of the Company's application, supporting testimony, and Exhibits.

Cost Recovery

49. As provided in Rule R8-69 and N.C. Gen. Stat. § 62-133.9(d), Duke Energy Carolinas shall be allowed to recover, through the DSM/EE rider, all reasonable and prudent costs reasonably and appropriately estimated to be

incurred in expenses during the current rate period for DSM and EE programs that have been approved by the Commission under Rule R8-68. As permitted by N.C. Gen. Stat. § 62-133.9(d), any of the Stipulating Parties may propose a procedure for the deferral and amortization in future DSM/EE riders of all or a portion of Duke Energy Carolinas' reasonable and prudent costs to the extent those costs are intended to produce future benefits.

50. The DSM/EE EMF rider shall reflect the difference between the reasonable and prudent costs incurred during the applicable test period (vintage year) and the revenues actually realized during such test period under the DSM/EE rider then in effect.

51. The cost and expense information filed by Duke Energy Carolinas pursuant to Commission Rules R8-68(c) and R8-69(f) shall be categorized by measurement unit or program, as applicable, and vintage year, consistent with the presentation included in the Company's application.

52. In accordance with Commission Rule R8-69(b)(6), Duke Energy Carolinas may implement deferral accounting for over- and underrecoveries of costs that are eligible for recovery through the annual DSM/EE rider. The balance in the deferral account(s), net of deferred income taxes, may accrue a return at the net-of-tax rate of return approved in Duke Energy Carolinas' then most recent general rate case. The methodology used for the calculation of interest shall be the same as that typically utilized for the Company's Existing DSM Program rider

proceeding (taking into account any extensions of the EMF measurement period pursuant to Commission Rule R8-69(b)(2)). Pursuant to Commission Rule R8-69(c)(3), the Company is not allowed to accrue a return on Net Lost Revenues or the PPI.

53. For purposes of cost recovery through the DSM/EE and DSM/EE EMF riders, system-level costs shall be allocated to the North Carolina retail jurisdiction by use of the North Carolina and South Carolina allocation determinants in the following manner (no costs of any approved DSM or EE program will be allocated to the wholesale jurisdiction):

(a) For EE programs, the costs of each program will be allocated based on the annual energy requirements of North Carolina and South Carolina retail customers (grossed up for line losses), as reflected in the annual cost of service studies.

(b) For DSM programs, the aggregated costs of DSM programs will be allocated based on the annual summer coincident peak demand of North Carolina and South Carolina retail customers, as reflected in the annual cost of service studies.

54. The allocation factors and inputs used to allocate the estimated rate period costs of DSM and EE programs shall be those drawn from the most recently filed cost of service study at the time the annual cost recovery filing is made. The allocations of costs shall be trued up at the time that finalized and trued-up costs

for a given test period are initially passed through the DSM/EE EMF, using the most recently filed cost of service study at the time the filing is made (but for no later year than the vintage year being trued up). For subsequent true-ups of that vintage year, the cost of service study used will be the same as that used for the initial true-up.

55. For purposes of recovery through the DSM/EE and DSM/EE EMF riders, the Company's North Carolina retail jurisdictional costs for approved DSM and EE programs and measures shall be assigned or allocated to North Carolina retail customer classes as follows. For EE programs offered to Residential or Non-Residential customers, the North Carolina retail jurisdictional costs will be directly assigned to the customer group to which the program is offered. For DSM programs, the aggregated North Carolina retail jurisdictional cost of those programs will be allocated to the Residential and Non-Residential classes based on the contribution of each class to the North Carolina retail jurisdictional peak demand used to make the jurisdictional allocation. The process of estimating and truing up the class assignments and allocations will be the same as practiced for jurisdictional allocations.

Net Lost Revenues

56. Unless otherwise ordered by the Commission, when authorized pursuant to Rule R8-69(c), Duke Energy Carolinas shall be permitted to recover,

through the DSM/EE and DSM/EE EMF riders, Net Lost Revenues associated with the implementation of approved DSM or EE measurement units, subject to the restrictions set out below.

57. The North Carolina retail kWh sales reductions that result from an approved measurement unit installed in a given vintage year shall be eligible for use in calculating Net Lost Revenues eligible for recovery only for the first 36 months after the installation of the measurement unit. Thereafter, such kWh sales reductions will not be eligible for calculating recoverable Net Lost Revenues for that or any other vintage year.

58. Programs or measures with the primary purpose of promoting general awareness and education of EE and DSM activities, as well as research and development activities, are ineligible for the recovery of Net Lost Revenues.

59. In order to recover estimated Net Lost Revenues associated with a pilot program or measure, Duke Energy Carolinas must, in its application for program or measure approval, demonstrate (a) that the program or measure is of a type that is intended to be developed into a full-scale, Commission-approved program or measure, and (b) that it will implement an EM&V plan based on industry-accepted protocols for the program or measure. No pilot program or measure will be eligible for Net Lost Revenue recovery upon true-up unless it (a) is ultimately proven to have been cost-effective, and (b) is developed into a full-scale, commercialized program.

60. Notwithstanding the allowance of 36 months' Net Lost Revenues associated with eligible kWh sales reductions, the kWh sales reductions that result from measurement units installed shall cease being eligible for use in calculating Net Lost Revenues as of the effective date of (a) a Commission-approved alternative recovery mechanism that accounts for the eligible Net Lost Revenues associated with eligible kWh sales reductions, or (b) the implementation of new rates approved by the Commission in a general rate case or comparable proceeding to the extent the rates set in the general rate case or comparable proceeding are set to explicitly or implicitly recover the Net Lost Revenues associated with those kWh sales reductions.

61. Recoverable Net Lost Revenues shall be calculated in a manner that appropriately reflects the incremental revenue losses suffered by the Company, net of avoided fuel and non-fuel variable O&M expenses.

62. Total Net Lost Revenues as measured for the 36-month period identified in paragraph 57 above shall be reduced by Net Found Revenues during the same periods (offset by any negative found revenues found appropriate and reasonable by the Commission pursuant to the provisions of Paragraph 7 of this Mechanism and other factors deemed applicable by the Commission). The "decision tree" adopted by Order in Docket No. E-7, Sub 831 on February 8, 2011, should be applied for determining what constitutes Net Found Revenues. Duke Energy Carolinas shall closely monitor its utility activities to determine if they are causing a customer to increase demand or consumption, and shall identify and

track all such activities with the aid of the "decision tree," so that they may be evaluated by intervening parties and the Commission as potential Net Found Revenues. Net found revenues shall be calculated in an appropriate and reasonable manner that mirrors the calculation used to determine Net Lost Revenues.

63. Recoverable Net Lost Revenues shall ultimately be based on kWh sales reductions and kW savings verified by the EM&V process and approved by the Commission. Recoverable Net Lost Revenues shall be estimated and trued-up, on a vintage year basis, as follows:

(a) As part of the DSM/EE rider approved in each annual cost and incentive recovery proceeding, Duke Energy Carolinas shall be allowed to recover the appropriate and reasonable level of recoverable Net Lost Revenues associated with each applicable program and vintage year (subject to the limitations set forth in this Mechanism), estimated to be experienced during the rate period for which the DSM/EE rider is being set.

(b) Net lost revenues related to any given program/measure and vintage year shall be trued-up through the DSM/EE EMF rider in subsequent annual cost and incentive recovery proceedings based on the Commission-approved results of the appropriate EM&V studies related to the program/measure and vintage year, as determined pursuant to the EM&V Agreement.

(c) The true-up shall be calculated based on the difference between projected and actual recoverable Net Lost Revenues for each measurement unit and vintage year under consideration, accounting for any differences derived from the completed and reviewed EM&V studies, including: (1) the projected and actual number of installations per measurement unit; (2) the projected and actual net kWh and kW savings per installation; (3) the projected and actual gross lost revenues per kWh and kW saved; and (4) the projected and actual deductions from gross lost revenues per kWh and kW saved.

(d) The reduction in Net Lost Revenues due to Net Found Revenues (offset by any approved and applicable negative found revenues) shall be trued up in a manner consistent with the true-up of Net Lost Revenues.

(e) The combined total of all vintage year true-ups calculated in a given year's Rule R8-69 proceeding shall be incorporated into the appropriate DSM/EE EMF billing factor.

64. Recoverable Net Lost Revenues shall be directly assigned to the program and vintage year with which they are associated.

Portfolio Performance Incentive (PPI) and Program Return Incentive (PRI)

65. When authorized pursuant to Rule R8-69(c), Duke Energy Carolinas shall be allowed to collect a PPI and PRI, as each is applicable, for its DSM/EE portfolio for each vintage year, separable into Residential, Non-Residential DSM,

and Non-Residential EE categories. The PPI and PRI, as applicable, shall be subject to the restrictions set out below.

66. Programs or measures with the primary purpose of promoting general awareness of and education about EE and DSM activities, as well as research and development activities, are ineligible to be included in the portfolio for purposes of the PPI or PRI calculations.

67. Unless (a) the Commission approves Duke Energy Carolinas' specific request that a pilot program or measure be eligible for PPI or PRI inclusion when Duke Energy Carolinas seeks approval of that program or measure, and (b) the pilot is ultimately commercialized, pilot programs or measures are ineligible for and the benefits and costs associated with those pilots will not be factored into the calculation of the PPI or PRI.

68. In its annual filing, pursuant to Commission Rule R8-69(f), Duke Energy Carolinas shall file an exhibit that indicates, for each Program or Measure for which it seeks a PPI or PRI, the annual projected and actual utility costs, participant costs, number of Measurement Units installed, per kW and kWh impacts for each Measurement Unit, and per kW and kWh avoided costs for each Measurement Unit, consistent with the UCT, related to the applicable Vintage Year installations that it requests the Commission to approve. Upon its review, the Commission will make findings based on Duke Energy Carolinas' annual filing for

each Program or Measure that is included in an estimated or trued-up PPI or PRI calculation for any given Vintage Year.

69. Low-Income programs and other specified societal programs approved with expected UCT results less than 1.00 and other non-cost-effective programs with similar societal benefits as approved by the Commission shall not be included in the portfolio for purposes of the PPI calculation until they demonstrate UCT results greater than 1.00. However, such programs will be eligible for the PRI, if so approved by the Commission, until they demonstrate UCT results greater than 1.00.

70. The PPI shall be based on net dollar savings for Duke Energy Carolinas' DSM/EE portfolio, as calculated using the UCT, on a total system basis. The North Carolina retail jurisdictional and class portions of the system-basis net dollar savings shall be determined in the same manner as utilized to determine the North Carolina retail jurisdictional and class portions of recoverable system costs.

71. Unless the Commission determines otherwise in an annual DSM/EE rider proceeding, and subject to the factors and limitations set forth elsewhere in this Mechanism, beginning for Vintage Year 2022, the amount of the pre-income-tax PPI initially to be recovered for the entire DSM/EE portfolio for a vintage year shall be equal to 10.60% multiplied by the present value of the estimated net dollar savings associated with the DSM/EE portfolio installed in that vintage year, calculated by DSM/EE program using the UCT (and excluding Low - Income

Programs and other specified societal programs). The present value of the estimated net dollar savings shall be the difference between the present value of the annual lifetime avoided cost savings for measurement units projected to be installed in that vintage year and the present value of the annual lifetime program costs for those measurement units. The annual lifetime avoided cost savings for measurement units installed in the applicable vintage year shall be calculated by multiplying the number of each specific type of measurement unit projected to be installed in that vintage year by the most current estimates of each lifetime year's per installation kW and kWh savings and by the most current estimates of each lifetime year's per kW and kWh avoided costs. In calculating the forecasted initial PPI it will be assumed that projections will be achieved.

72. Beginning with Vintage Year 2022, the dollar amount of the pre-tax PPI ultimately allowed for each Vintage Year, after true-up pursuant to Paragraph 83 of this Mechanism, shall be no greater than the dollar amount that produces a 19.50% margin over the aggregate pre-tax Program Costs for the Vintage Year of those programs in the Portfolio that are eligible for the PPI. Likewise, the dollar amount of the pre-tax PPI ultimately allowed for each Vintage Year, after true-up pursuant to Paragraph 83 of this Mechanism, shall be no less than the dollar amount that produces the following margins over the aggregate pre-tax Program Costs for the Vintage Year of those programs in the Portfolio that are eligible for the PPI.

Vintage Year 2022:	10.00%
Vintage Year 2023:	6.00%
Vintage Year 2024:	2.50%
Vintage Year 2025 and afterwards, until the next Mechanism review is completed:	2.50%

When making its initial estimates of the PPI pursuant to this Mechanism, Duke Energy Carolinas shall utilize the best and most accurate estimate of the margin and the resulting PPI percentage it can determine at that time.

73. At the outset of the application of this Mechanism, the entire PPI related to a vintage year shall be recoverable in the rate period covering that vintage year (subject to true-up). However, any of the Stipulating Parties may propose a procedure to convert a vintage year PPI into a stream of levelized annual payments not to exceed ten years through Vintage Year 2021, accounting for and incorporating Duke Energy Carolinas' overall weighted average net-of-tax rate of return approved in Duke Energy Carolinas' most recent general rate case as the appropriate discount rate. After Vintage Year 2021, the PPI will be recovered in the proceedings in which the applicable Vintage Year's revenue requirements are estimated or trued up. Levelized annual payments applicable to Programs in prior vintage periods will continue until all such amounts are recovered.

74. The PRI shall be based on the gross avoided costs of those programs eligible for the PRI. The North Carolina retail jurisdictional and class portions of the system-basis gross dollar savings shall be determined in the same manner as utilized to determine the North Carolina retail jurisdictional and class portions of recoverable system costs.

75. Unless the Commission determines otherwise in an annual N.C. Gen. Stat. § 62-133.9 DSM/EE rider proceeding, and subject to the factors and limitations set forth in this Mechanism, beginning for Vintage Year 2022 the amount of the pre-income-tax PRI initially to be recovered for Low Income Programs and other specified societal programs not eligible for a PPI shall be a percentage, as determined pursuant to this Mechanism, multiplied by the present value of the estimated gross dollar avoided cost savings associated with the applicable DSM/EE Programs installed in that Vintage Year, used in determination of the UCT. The present value of the estimated gross dollar savings shall be determined in the same manner as used for Programs eligible for the PPI.

76. The percentage used to determine the estimated PRI for each Vintage Year shall be 10.60%. This percentage will be multiplied by the Vintage Year avoided costs projected to be generated by each approved PRI-eligible program. When making its initial estimates of the PRI, DEP shall utilize the best and most accurate estimate of the UCT and the resulting PRI percentage it can determine at that time.

77. For the PPI and PRI for Vintage Years 2019 and afterwards, consistent with the Commission's Orders in Docket Nos. E-7, Sub 1130 and E-7, Sub 1164, the program-specific per kW avoided capacity benefits and per kWh avoided energy benefits used for the initial estimate of the PPI and PRI and any PPI or PRI true-up will be derived from the underlying resource plan, production cost model, and cost inputs that generated the avoided capacity and avoided energy credits reflected in the most recent Commission-approved Biennial Determination of Avoided Cost Rates for Electric Utility Purchases from Qualifying Facilities as of December 31 of the year immediately preceding the date of the annual DSM/EE rider filing. However, for the calculation of the underlying avoided energy credits to be used to derive the program-specific avoided energy benefits, the calculation will be based on the projected EE portfolio hourly shape, rather than the assumed 24x7 100 MW reduction typically used to represent a qualifying facility.

78. No later than December 31, 2021, Duke Energy Carolinas and the Public Staff will jointly review the issue of the appropriate avoided T&D costs to be used in the Company's prospective calculations of cost-effectiveness and achieved net dollar savings, and, if appropriate, recommend in the Company's annual DSM/EE rider proceeding adjustments to the avoided T&D cost rates.

79. The per kW avoided transmission and avoided distribution (avoided T&D) costs used to calculate net savings for a Vintage Year shall be based on the

study update at least every three years only if the study update results in a 20% change from the prior study's avoided T&D costs.

80. Unless the Stipulating Parties agree otherwise, Duke Energy Carolinas shall not be allowed to update its avoided capacity costs and avoided energy costs after filing its annual cost and incentive recovery application for purposes of determining the DSM/EE and DSM/EE EMF riders in that proceeding.

81. When Duke Energy Carolinas files for its annual cost recovery under Rule R8-69, it shall comply with the filing requirements of Rule R8-69(f)(1)(iii), reporting all final measurement and verification data to assist the Commission and Public Staff in their review and monitoring of the impacts of the DSM and EE measures.

82. Duke Energy Carolinas bears the burden of proving all dollar savings and costs included in calculating the PPI and PRI. As provided in Rule R8-68(c)(3)(iii), Duke Energy Carolinas shall be responsible for the EM&V of energy and peak demand savings consistent with its EM&V plan.

83. The PPI and PRI for each vintage year shall ultimately be based on net or gross dollar savings, as applicable, as verified by the EM&V process and approved by the Commission. The PPI and PRI for each vintage year shall be trued-up as follows:

(a) As part of the DSM/EE rider approved in each annual cost and incentive recovery proceeding, Duke Energy Carolinas shall be allowed to recover an appropriately and reasonably estimated PPI and PRI (subject to the limitations set forth in this Mechanism) associated with the vintage year covered by the rate period in which the DSM/EE rider is to be in effect.

(b) The PPI and PRI related to any given vintage year shall be trued-up through the DSM/EE EMF rider in subsequent annual cost and incentive recovery proceedings based on the Commission-approved results of the appropriate EM&V studies related to the program/measure and vintage year, as determined pursuant to the EM&V Agreement.

(c) The PPI amount ultimately to be recovered for a given vintage year shall be based on the present value of the actual net dollar savings derived from all measurement units installed in that vintage year, as associated with each DSM/EE program offered during that year (excluding Low Income Programs and other specified societal programs), and calculated by DSM/EE program using the UCT. The present value of the actual net dollar savings shall be the difference between the present value of the annual lifetime avoided cost savings for measurement units installed in that vintage year and the present value of the annual lifetime program costs for those measurement units. The annual lifetime avoided cost savings for measurement units installed in the applicable vintage year shall be calculated by multiplying the number of each specific type of measurement unit installed in that vintage year by each lifetime year's per installation kW and kWh savings (as verified by the appropriate EM&V study pursuant to the EM&V agreement) and by each lifetime year's per kW and kWh avoided costs as determined when calculating the initially estimated PPI for the vintage year. The ultimate PPI will also be subject to the additional factors and limitations set forth in this Mechanism. The Stipulating Parties agree to make all reasonable efforts to ensure that all vintages are fully trued-up within 24 months of the vintage program year.

(d) The amount of the PRI ultimately to be recovered for a given Vintage Year shall be based on the present value of the actual gross dollar savings derived from all Measurement Units installed in that Vintage Year, as associated with each DSM/EE program offered during that year that is eligible for the PRI. Furthermore, the percentage used to determine the final PRI for each Vintage Year will be based on the Company's ability to maintain or improve the cost effectiveness of the PRI-eligible programs. The PRI percentage for each PRI-eligible Program will be determined by comparing (1) the projected UCT ratio for the portfolio of PRI-eligible Programs for the Vintage Year at the time of the Company's DSM Rider filing first estimating that projected Vintage Year UCT ratio to (2) the actual UCT ratio achieved for that portfolio of PRI-eligible Programs as that Vintage Year is trued up in future filings. The ratio (UCT_{actual} / $UCT_{estimate}$) will then be multiplied by 10.60% to determine the PRI percentage that will be applied to the actual avoided costs generated by each approved PRI-eligible program. At no time will the PRI percentage utilized fall below 2.65% or rise above 13.25%. The present value of the estimated gross dollar savings shall be determined in the same manner as used for determining the recovery of the ultimate PPI. The ultimate PRI will also be subject to the additional factors and limitations set forth in this Mechanism. The Stipulating Parties agree to make all reasonable efforts to ensure that all vintages are fully trued-up within 24 months of the vintage program year.

(e) A program's eligibility for a PPI or PRI will be determined at the time of filing the projection for a Vintage Year and will continue to be eligible for the same incentive at the time of the Vintage Year true-up.

(f) If a program previously eligible for a PRI becomes cost effective under the UCT, it will no longer be eligible to receive a PRI in the next projected Vintage Year for the program, but will be eligible for the PPI.

84. The combined total of all vintage year true-ups of the PPI calculated in a given year's Rule R8-69 proceeding shall be incorporated into the appropriate DSM/EE EMF billing factor.

85. The PRI will be determined on the basis of the avoided costs employed in the determination of the UCT. PRI amounts will be assigned to the Program in which they were earned.

86. The PPI for each vintage year shall be allocated to DSM and EE programs in proportion to the present value net dollar savings of each program for the vintage year, as calculated pursuant to the method described herein.

Other Incentives

87. As further incentive to motivate the Company to aggressively pursue savings from cost-effective EE and DSM Programs, if the Company achieves annual energy savings of 1.0% of the prior year's Duke Energy Carolinas system retail electricity sales, in any year during the four-year 2022-2025 period, the Company will receive an additional incentive of $500,000 for that year. During that same period, if the Company fails to achieve annual energy savings of 0.5% of retail sales, net of sales associated with customers opting out of the Company’s EE programs, the Company will reduce its EE revenue requirement by $500,000. Verification of this achievement will be obtained through the EM&V process discussed elsewhere in this Mechanism.

Financial Reporting Requirements

88. In its quarterly ES-1 Reports to the Commission, Duke Energy Carolinas shall calculate and present its primary North Carolina retail jurisdictional earnings by including all actual EE and DSM program revenues, including PPI and Net Lost Revenue incentives, and costs. Additionally, the Company shall prepare and present (a) supplementary schedules setting forth its North Carolina retail jurisdictional earnings excluding the effects of the PPI; (b) supplementary schedules setting forth its North Carolina retail jurisdictional earnings excluding the effects of the Company's EE and DSM programs; and (c) supplementary schedules setting forth earnings, including overall rates of return, returns on common equity, and margins over program costs actually realized from its EE and DSM programs in total and stated separately by program class (program classes are hereby defined to be (i) EE programs and (ii) DSM programs). Detailed workpapers shall be provided for each scenario described above. Such workpapers, at a minimum, shall clearly show actual revenues, expenses, taxes, operating income, rate base/investment, including components, and the applicable capitalization ratios and cost rates, including overall rate of return and return on common equity. Net lost revenues realized (estimated, if not known) for each reporting period shall be clearly disclosed as supplemental information.

Review of Mechanism

89. The terms and conditions of this Mechanism shall be reviewed by the Commission every four years unless otherwise ordered by the Commission. The Company and other parties shall submit any proposed changes to the Commission

for approval at the time of the filing of the Company's annual DSM/EE rider filing. During the time of review, the Mechanism shall remain in effect until further order of the Commission revising the terms of the Mechanism or taking such other action as the Commission may deem appropriate.

No Precedential Effect

90. The terms of this Mechanism, including the methods and results of determining the PPI and PRI, as well as the other incentives outlined in Paragraph 87, shall not be considered precedential for any purpose other than their application to eligible DSM/EE Programs and cost and utility incentive recovery associated with those Programs, and only until those terms are next partially or wholly reviewed.

DOCKET NO. E-7, SUB 1265 - Public Staff
D. Williamson Exhibit 1

Docket Number E-7, Sub ___
Projected Program/Portfolio Cost Effectiveness

	Vintage 2020 Evans Exhibit 7 in Sub 1192				Vintage 2021 Evans Exhibit 7 in Sub 1230				Vintage 2022 Evans Exhibit 7 in Sub 1249				Vintage 2023 Evans Exhibit 7 in Sub 1265				Percent change from last year	
Program	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT	UCT	TRC
Residential Programs																		
Energy Efficiency Education	1.32	1.32	0.54	7.68	1.40	1.41	0.53	8.97	1.39	1.40	0.54	8.64	1.31	1.35	0.33	15.97	-6%	-4%
Energy Efficient Appliances & Devices	3.27	3.54	0.70	7.50	2.64	2.20	0.60	4.96	2.27	1.70	0.54	4.32	2.69	2.64	0.71	6.04	18%	56%
HVAC Energy Efficiency/Smart Saver EE	1.31	0.95	0.60	1.84	0.81	0.67	0.49	1.68	1.02	0.80	0.57	1.56	1.26	1.04	0.70	1.69	24%	30%
Income-Qualified Energy Efficiency and Weatherization Assistance	0.21	0.35	0.17	2.80	0.70	0.72	0.44	2.09	0.75	0.75	0.46	2.05	0.81	0.81	0.51	2.13	8%	8%
Multi-Family Energy Efficiency	2.97	2.97	0.61	22.81	3.14	3.16	0.66	20.52	3.11	5.29	0.68	24.02	3.59	3.54	0.77	9.41	15%	-33%
My Home Energy Report	1.89	1.89	0.61	-	1.89	1.89	0.66	-	1.88	1.88	0.63	-	3.59	3.59	0.85	-	91%	91%
Power Manager	4.22	8.72	4.22	-	4.33	9.80	4.33	-	4.26	8.99	4.26	-	4.45	9.28	4.45	-	4%	3%
Residential Energy Assessments	1.36	1.34	0.49	30.23	1.33	1.28	0.48	19.95	1.45	1.40	0.49	20.34	1.57	1.52	0.52	21.92	8%	8%
Residential New Construction	-	-	-	-	-	-	-	-	-	-	-	-	2.09	1.48	0.80	2.36		
Residential Total	2.50	3.02	1.04	6.61	2.50	2.82	1.04	6.18	2.40	2.55	0.95	5.08	2.70	2.84	1.07	5.00	13%	11%
Non-Residential Programs																		
Non Residential Smart Saver Custom Energy Assessments	3.07	1.08	0.84	1.99	2.70	0.80	0.84	1.38	1.99	0.74	0.76	1.44	2.23	0.79	0.80	1.45	12%	6%
Non Residential Smart Saver Custom	3.42	1.79	0.84	3.38	3.07	1.18	0.87	1.97	2.89	1.15	0.85	1.99	2.06	1.21	0.83	2.12	-29%	5%
EnergyWise For Business	0.72	1.25	0.61	-	0.63	1.26	0.55	-	0.46	1.38	0.46	-	1.42	2.79	1.23	69.03	207%	102%
Non Residential Smart Saver Energy Efficient Food Service Products	1.40	0.81	0.51	2.02	1.45	0.79	0.45	2.38	2.44	0.61	0.65	1.29	2.91	0.66	0.71	1.31	19%	9%
Non Residential Smart Saver Energy Efficient HVAC Products	1.57	1.24	0.70	2.06	1.47	1.12	0.64	2.05	3.04	1.94	0.61	4.39	3.66	2.26	0.70	4.37	20%	17%
Non Residential Smart Saver Energy Efficient Lighting Products	4.29	2.00	0.80	3.75	4.19	2.14	0.78	4.08	3.80	2.11	0.79	4.04	4.55	2.46	0.91	4.03	20%	16%
Non Residential Smart Saver Energy Efficient Pumps and Drives Products	3.68	2.63	0.86	5.38	3.11	2.41	0.82	4.99	3.02	2.16	0.74	4.71	2.64	1.88	0.75	3.67	-13%	-13%
Non Residential Smart Saver Energy Efficient IT Products	0.60	0.46	0.31	2.55	0.65	0.47	0.31	2.26	0.68	0.75	0.33	5.39	0.38	0.35	0.23	5.23	-44%	-53%
Non Residential Smart Saver Energy Efficient Process Equipment Products	2.14	1.85	0.70	3.86	3.50	2.26	0.97	3.66	2.37	1.85	0.72	3.79	2.86	2.21	0.81	3.94	20%	19%
Non Residential Smart Saver Performance Incentive	3.29	1.06	0.83	1.79	3.22	1.06	0.86	1.79	1.74	1.04	0.69	2.05	4.54	1.27	0.98	1.85	161%	22%
Small Business Energy Saver	2.70	1.67	0.80	2.93	2.32	1.43	0.76	2.60	3.04	1.73	0.82	3.06	3.23	1.93	0.98	2.88	6%	12%
PowerShare	3.35	112.28	3.35	-	3.37	137.02	3.37	-	3.40	105.69	3.40	-	4.61	170.67	4.61	-	36%	61%
Non-Residential Total	3.28	2.13	0.94	3.34	3.12	2.03	0.93	3.16	3.13	2.06	0.90	3.36	3.82	2.56	1.07	3.49	22%	24%
Overall Portfolio total	2.90	2.43	0.98	4.00	2.81	2.32	0.98	3.83	2.79	2.23	0.92	3.84	3.25	2.67	1.07	3.96	17%	19%

DOCKET NO. E-7, SUB 1265 - Public Staff
D. Williamson Exhibit 2

Docket Number E-7, Sub ___ Current Actual YTD Program/Portfolio Cost Effectiveness	Vintage 2019 Evans Exhibit 7 in Sub 1164				Vintage 2020 Evans Exhibit 7 in Sub 1192				Vintage 2021 Evans Exhibit 7 in Sub 1230				Percent change from last year	
Program	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT	UCT	TRC
Residential Programs														
Energy Efficiency Education	1.53	1.48	0.49	10.32	1.11	1.08	0.28	13.45	1.32	1.31	0.27	15.96	19%	21%
Energy Efficient Appliances & Devices	2.54	3.09	0.60	6.95	2.80	3.06	0.48	7.10	2.35	2.60	0.46	7.35	-16%	-15%
HVAC Energy Efficiency/Smart Saver EE	0.96	0.77	0.50	1.82	1.04	0.84	0.44	1.85	1.03	0.81	0.45	1.75	-1%	-3%
Income-Qualified Energy Efficiency and Weatherization Assistance	0.47	0.46	0.29	2.06	0.37	0.38	0.23	1.92	0.31	0.30	0.21	1.58	-15%	-21%
Multi-Family Energy Efficiency	2.94	2.85	0.56	20.00	1.34	1.43	0.38	18.85	1.92	1.57	0.38	11.49	44%	10%
My Home Energy Report	2.21	2.21	0.66	-	1.88	1.88	0.50	-	3.01	3.01	0.58	-	61%	61%
Power Manager	5.21	12.17	5.21	-	5.23	14.68	5.23	-	3.42	7.68	3.42	-	-35%	-48%
Residential Energy Assessments	1.40	1.35	0.50	22.77	1.36	1.34	0.41	33.13	0.99	0.95	0.34	19.30	-28%	-29%
Residential Total	2.56	2.99	0.81	6.74	2.70703	3.16	0.76	6.80	2.29	2.68	0.79	5.99	-16%	-15%
Non-Residential Programs														
Non Residential Smart Saver Custom Energy Assessments	2.34	0.78	0.52	2.33	1.57	1.18	0.37	5.65	1.47	0.68	1.47	0.25	-6%	-42%
Non Residential Smart Saver Custom	4.04	1.72	0.83	3.22	2.75	1.62	0.62	3.35	2.57	1.61	0.56	3.59	-7%	-1%
EnergyWise For Business	0.92	1.16	0.63	29.39	0.85	1.17	0.56	37.83	0.80	1.18	0.58	50.52	-6%	1%
Non Residential Smart Saver Energy Efficient Food Service Products	1.21	0.55	0.59	1.15	0.43	0.44	0.24	1.93	2.36	0.80	0.47	1.74	447%	82%
Non Residential Smart Saver Energy Efficient HVAC Products	2.50	1.71	0.62	3.65	3.03	1.87	0.57	3.45	3.04	1.97	0.62	3.28	0%	6%
Non Residential Smart Saver Energy Efficient Lighting Products	5.07	2.43	0.88	4.12	5.50	2.35	0.64	3.95	3.85	2.02	0.60	3.64	-30%	-14%
Non Residential Smart Saver Energy Efficient Pumps and Drives Products	3.81	2.29	0.83	4.84	4.53	2.22	0.52	5.13	3.29	2.33	0.53	5.40	-27%	5%
Non Residential Smart Saver Energy Efficient IT Products	0.03	0.05	0.03	11.79	0.11	0.11	0.09	3.59	0.01	0.01	0.01	6.20	-95%	-95%
Non Residential Smart Saver Energy Efficient Process Equipment Products	3.47	2.14	0.81	3.94	7.96	5.46	0.72	9.65	2.94	2.42	0.45	7.23	-63%	-56%
Non Residential Smart Saver Performance Incentive	2.85	1.07	0.63	2.78	2.71	1.44	0.44	3.89	12.35	2.01	2.08	0.95	356%	39%
Small Business Energy Saver	2.25	1.49	0.70	3.03	2.38	1.58	0.53	3.21	2.09	1.39	0.58	2.66	-12%	-12%
PowerShare	3.23	57.30	3.23	-	2.89	34.88	2.89	-	3.11	29.80	3.11	-	8%	-15%
Non-Residential Total	3.60	2.41	0.95	3.78	3.39	2.52	0.74	3.93	3.05	2.32	0.76	3.51	-10%	-8%
Overall Portfolio total	2.99	2.67	0.87	5.11	2.99	2.83	0.75	5.21	2.68	2.46	0.77	4.25	-10%	-13%

Commission Question 2

Historical (and projected for 2023 and 2024) North Carolina Energy Savings for MyHER Program

Year (Rider Rate Period)	Rider Docket	Projected/ Provisional Participants (Rider Application for the given Year)	Annual Savings (kwh) per Participant Presented in Rider Application for the year	Total Projected Savings as Presented in Rider Application	Actual Participants based on adjustments made after initial application	Final Annual Savings per Participant (if changed from EM&V after initial application)	Actual Total Savings Attributed to the Program
2017	E-7 Sub 1105	1,050,000	201.00	211,047,528	1,394,693	223.25	311,368,855
2018	E-7 Sub 1130	1,354,138	224.78	304,386,954	1,432,263	240.71	344,759,844
2019	E-7 Sub 1164	1,364,000	229.42	312,934,099	1,339,152	245.26	328,439,103
2020	E-7 Sub 1192	1,355,300	226.03	306,337,865	1,358,892	244.39	332,105,411
2021	E-7 Sub 1230	1,408,963	242.85	342,160,803	1,376,708	244.27	336,292,411
2022	E-7 Sub 1249	1,377,387	241.91	333,200,740			
2023	E-7 Sub 1265	1,368,084	244.95	335,107,189			
2024	TBD	1,371,065	243.80	334,271,371			

Savings are in kwh net at plant
kwh savings per participant represent blend of MyHER and MF MyHER measures. Participation mix impacts the savings.

I/A

Commission Question 3

Panel Cross-Examination Exhibit 1
Docket No. E-7, Sub 1265

Year (Rider Rate Year)	Actual* Net Lost Revenues attributed to the MyHER program	Actual* Total program costs/expenditures	Actual* PPI	Allocation Factor	Allocated Program Costs	Allocated PPI
2017	$ 14,455,527	$ 13,812,250	$ 910,354	72.81%	$ 10,056,526	$ 662,817
2018	$ 15,751,701	$ 12,765,286	$ 1,141,027	72.71%	$ 9,282,029	$ 829,676
2019	$ 16,556,381	$ 10,558,344	$ 1,472,415	73.09%	$ 7,717,135	$ 1,076,194
2020	$ 17,075,171	$ 12,749,651	$ 1,285,498	73.22%	$ 9,335,457	$ 941,258
2021	$ 17,258,649	$ 7,072,233	$ 1,637,770	73.52%	$ 5,199,744	$ 1,204,144
2022	$ 17,381,990	$ 12,151,901	$ 984,945	73.22%	$ 8,897,776	$ 721,189
2023	$ 17,467,498	$ 7,527,382	$ 1,905,366	73.52%	$ 5,534,384	$ 1,400,889
2024	$ 17,299,206	$ 8,059,630	$ 979,395	73.52%	$ 5,925,712	$ 720,084

* For years when final adjustments were not available, provide estimates/projections and indicate as estimates.

Commission Question 5

MyHER Customer Account Participation - Total and New Participants

Year (Rider Rate Year)	Total Participants (actual or provisional)	Estimated Participants participating in program for first time
2017	1,394,693	251,083
2018	1,432,263	141,113
2019	1,339,152	59,330
2020	1,358,892	149,652
2021	1,376,708	176,010
2022	1,377,387	281,713
2023	1,368,084	201,794
2024	1,371,065	202,234

CERTIFICATE OF SERVICE

I certify that a copy of Duke Energy Carolinas, LLC's DSM/EE Cost Recovery Rider – Pre-Filed Panel Cross-Examination Exhibit 1, in Docket No. E-7, Sub 1265, has been served by electronic mail, hand delivery, or by depositing a copy in the United States Mail, 1st Class Postage Prepaid, properly addressed to parties of record.

This the 6th day of June, 2022.

Kendrick C. Fentress

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