BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1073

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

I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Roshena M. Ham and my business address is 550 South Tryon Street, Charlotte, North Carolina.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed as Manager, Measurement and Verification for Duke Energy Carolinas, LLC ("Duke Energy Carolinas," "DEC," or the "Company").

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL QUALIFICATIONS.

A. I have a Bachelor's degree in engineering from Vanderbilt University and a Masters of Business Administration from Georgetown University.

From 1999-2001, I was in the management associate rotation program at Enron. From 2001-2004, I was co-founder and partner of Liberty Power Corporation, a retail electric provider in deregulated markets. From 2004-2008, I was a consultant on various energy projects including energy efficiency, renewable energy and energy procurement, and also during that time I taught business courses at Central Piedmont Community College. From 2006-2009, I worked for Duke University's Nicholas School of the Environment as the Energy and Environment program manager. In 2009, I began working for Duke Energy Business Services LLC, a wholly-owned service company subsidiary of Duke Energy Corporation ("Duke Energy"), as an energy efficiency program manager, managing the implementation of Non-

Residential Smart $aver Custom Incentives. In 2013, I assumed my current role as Manager, Measurement and Verification.

Q. PLEASE DESCRIBE YOUR DUTIES AS MANAGER, MEASUREMENT AND VERIFICATION.

A. As Manager, Measurement and Verification, I have responsibilities for a variety of analytical functions in support of product development and operations, including managing impact and process evaluation studies, energy efficiency load analysis, and cost-effectiveness analysis. In this role, I provide Evaluation, Measurement and Verification ("EM&V") services for Duke Energy affiliates, including DEC.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?

A. Yes, I submitted testimony in support of DEC's Application for approval of its demand-side management ("DSM") and energy efficiency ("EE") cost recovery rider, Rider EE, for 2015 in Docket No. E-7, Sub 1050.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. My testimony supports DEC's Application for Rider EE for 2016 ("Rider 7"). In particular, my testimony: (1) provides an overview of the EM&V process and activities; and (2) details the current findings from the Company's EM&V work.

Q. PLEASE DESCRIBE THE EXHIBITS ATTACHED TO YOUR TESTIMONY.

A. Ham Exhibit 1 provides a summary of the estimated activities and timeframe for completion of EM&V by program. Ham Exhibit 2 provides the actual and expected dates when the EM&V for each program or measure will become effective. Ham Exhibits A through I provide the detailed completed EM&V reports or updates for the following programs:

Ham Exhibit	EM&V Reports	Report Finalization Date	Evaluation Type
A	My Home Energy Report	2/20/2014	Process and Impact
B	Smart Energy Now	2/21/2014	Process and Impact
C	Appliance Recycling	4/25/2014	Process and Impact
D	Income-Qualified Energy Efficiency: Neighborhoods	11/14/2014	Process and Impact
E	Energy Efficient Appliances and Devices: Specialty Bulbs	11/19/2014	Process and Impact
F	HVAC Energy Efficiency: Tune & Seal	12/10/2014	Impact
G	Power Manager	3/18/2014	Process
H	Power Manager	5/28/2014	Impact
I	Power Share	7/31/2014	Impact

Q. WERE HAM EXHIBITS 1 AND 2 AND A THROUGH I PREPARED BY YOU OR AT YOUR DIRECTION AND SUPERVISION?

A. Yes, they were. The EM&V reports, however, were prepared by DEC's independent third party evaluator.

II. RESULTS FROM EM&V

Q. HOW WERE EM&V RESULTS UTILIZED IN DEVELOPING THE PROPOSED RIDER 7?

A. The Company has applied EM&V in accordance with the process as agreed upon by DEC, Southern Alliance for Clean Energy ("SACE") and the Public Staff and approved by the Commission in its *Order Approving DSM/EE Rider* *and Requiring Filing of Proposed Customer Notice* issued on November 8, 2011 in Docket No. E-7, Sub 979 ("EM&V Agreement"). In accordance with the Agreement and Stipulation of Settlement DEC reached with the Public Staff, the North Carolina Sustainable Energy Association ("NCSEA"), Environmental Defense Fund, SACE, the South Carolina Coastal Conservation League, the National Resource Defense Council and the Sierra Club, which was filed with the Commission in Docket No. E-7, Sub 1032 on August 19, 2013 (the "Stipulation") and approved in the Commission's *Order Approving DSM/EE Programs and Stipulation of Settlement* issued in the same docket on October 29, 2013 ("Sub 1032 Order"), DEC continues to apply EM&V in accordance with the EM&V Agreement.

Actual participation and evaluated load impacts are used prospectively to update net lost revenues estimated for 2016.

The EM&V Agreement provides that initial EM&V results shall be applied retrospectively to program impacts that were based upon estimated impact assumptions derived from industry standards (rather than EM&V results for the program in the Carolinas), specifically the DSM and EE programs initially approved by the Commission in Docket No. E-7, Sub 831 ("Sub 831 Programs"), with the exception of the Non-Residential Smart $aver Custom Rebate Program and the Low Income Energy Efficiency and Weatherization Assistance Program.

For purposes of the vintage true-ups and forecast, initial EM&V results are considered actual results for a program and continue to apply until superseded by new EM&V results, if any. For all new programs and pilots approved after the Sub 831 Programs, DEC will use the initial estimates of impacts until it has EM&V results, which will then be applied retrospectively back to the beginning of the offering and will be considered actual results until a second EM&V is performed.

All program impacts from EM&V apply only to the programs for which the analysis was directly performed, though DEC's new product development may utilize actual impacts and research about EE and conservation behavior directly attributed to existing DEC program offerings not already accounted for.

Since program impacts from EM&V in this Application apply only to the programs for which the analysis was directly performed, there are no costs associated with performing additional EM&V for other measures, other than the original cost for EM&V for these programs. As indicated in previous proceedings, DEC estimates that 5 percent of total portfolio program costs will be required to adequately and efficiently perform EM&V on the portfolio. The level of EM&V required varies by program and depends on that program's contribution to total portfolio, the duration the program has been in the portfolio without material change, and whether the program and administration is new and different in the energy industry. Duke Energy Carolinas estimates, however, that no additional costs above 5 percent of total program costs will be associated with performing EM&V for all measures in the portfolio.

Q. WHICH PROGRAMS CONTAIN IMPACT ESTIMATES BASED ON CAROLINAS-BASED EM&V?

A. The following programs have Carolinas-based EM&V applied and have been provided as Ham Exhibits A through I.

- My Home Energy Report *(Ham Exhibit A)*
- Smart Energy Now *(Ham Exhibit B)*
- Appliance Recycling *(Ham Exhibit C)*
- Income-Qualified Energy Efficiency: Neighborhoods *(Ham Exhibit D)*
- Energy Efficient Appliances and Devices: Specialty Bulbs *(Ham Exhibit E)*
- HVAC Energy Efficiency: Tune & Seal *(Ham Exhibit F)*
- Power Manager *(Ham Exhibit H)*
- Power Share *(Ham Exhibit I)*

Q. WHICH PROGRAMS WILL HAVE INITIAL ESTIMATES REPLACED WITH EM&V IN THE FUTURE?

A. The following programs will have Carolinas-based EM&V applied in future annual filings:

- Energy Efficient Appliances and Devices: *Pool Pumps, Water EE and Heater Products*
- Income-Qualified Energy Efficiency Program: *Weatherization and Refrigerator Replacement*
- Multi-Family Energy Efficiency Program: *Water EE Products*
- Small Business Energy Saver

Q. WHAT WERE THE LOAD IMPACTS FROM THE EM&V AND HOW DO THEY COMPARE TO DEC'S IMPACT ESTIMATES PRIOR TO EM&V?

A. The Company originally estimated gross per-household energy savings[1] from the **My Home Energy Report Program** at 211 kilowatt hours ("kWh"). Based on the most recent EM&V, the gross savings are 183.7 kWh (net energy savings[2] were modified from 224.12 kWh to 195.12 kWh). The gross coincident kilowatts ("kW") had an adjustment from 0.0569 kW to 0.0496 kW. These results became effective November 1, 2013 and apply to participants in the My Home Energy Report Program. This report has been provided as Ham Exhibit A.

The Company originally estimated gross energy savings from the **Smart Energy Now Program** at 5 percent kWh and kW savings for large buildings (greater than or equal to 100,000 square feet) and 3 percent kWh and kW savings for small buildings (less than 100,000 square feet), based upon estimated impact assumptions derived from industry standards. Based on the most recent EM&V, the gross savings are 8.7 percent kWh and kW for large buildings and 2.2 percent kWh and kW for small buildings (net energy savings are 6.4 percent for large buildings and 1.1 percent for small buildings). These results became effective January 1, 2011 (initial participation in program) and apply to participants in the Smart Energy Now

[1] Throughout this section, gross kWh and kW values without line losses.
[2] Net adjustments include free ridership, spillover and line losses.

Pilot and the Smart Energy in Offices Program. The Company provides this report as Ham Exhibit B.

The Company originally estimated gross per-unit energy savings from the **Appliance Recycling Program** at 1,642 kWh for recycled refrigerators and 1,222 kWh for recycled freezers, based upon estimated impact assumptions derived from industry standards. Based on the most recent EM&V, the gross savings are 952 kWh for refrigerators and 869 kWh for freezers (net energy savings were modified from 1,049.65 kWh to 544.03 kWh for refrigerators and from 778.8 kWh to 435.68 kWh for freezers). The coincident kW had an adjustment from 0.39 kW to 0.14 kW for refrigerators and from 0.29 kW to 0.1 kW for freezers. These results became effective October 1, 2012 (initial participation in program) and apply to participants in the Appliance Recycling Program. The Company provides this report as Ham Exhibit C.

The Company originally estimated gross per-household energy savings from the **Income-Qualified Energy Efficiency: Neighborhoods Program** at 882 kWh, based upon estimated impact assumptions derived from industry standards. Based on the most recent EM&V, the gross savings are 357 kWh (net energy savings were modified from 936.85 kWh to 371.59 kWh). The coincident kW had an adjustment from 0.220 kW to 0.0872 kW. These results became effective March 1, 2013 (initial participation in program) and apply to participants in the Income-Qualified Energy Efficiency: Neighborhoods Program. The Energy Information Security Act (EISA) of 2007 legislation limits the wattage of an incandescent lamp. As described in the evaluation report, the baseline lamp wattage decreases during each replacement of an incandescent lamp, and it is assumed that a baseline incandescent lamp will be replaced several times during the life of a CFL. As such, the portion of program's claimed impacts from CFL installations decrease each year until the end of the projected baseline lamp wattage decreases. Market data on the availability of non-compliant EISA bulbs will continue to be collected over time, which will be used to update projected baseline lamp wattages. The Company provides this report as Ham Exhibit D.

The Company updated gross energy savings from the **Energy Efficient Appliances and Devices: Specialty Bulbs Program** for the measures listed in the following chart.

	Gross kWh		**Gross kW**	
Specialty Bulb Measure	**Original Assumption**	**Evaluated**	**Original Assumption**	**Evaluated**
3 Way	58.39	53.19	0.008	0.006
A Line	39.77	34.66	0.005	0.004
A Line Dimmable	64.84	59.10	0.009	0.007
A Line LED	40.00	37.66	0.005	0.005
Candelabra	21.55	18.63	0.003	0.002
Globe	25.36	22.34	0.003	0.003
Recessed	41.82	39.57	0.006	0.005
Recessed Dimmable	41.26	38.37	0.005	0.005
Recessed LED	29.47	67.52	0.004	0.008
Recessed Outdoor	111.50	100.57	0.002	0.012

The Company based original estimates upon estimated impact assumptions derived from industry standards. Modifications to energy savings impacts are listed in the following chart:

	Net kWh		Net kW	
Specialty Bulb Measure	**Original Assumption**	**Evaluated**	**Original Assumption**	**Evaluated**
3 Way	52.71	42.88	0.007	0.005
A Line	35.91	27.94	0.005	0.003
A Line Dimmable	58.54	47.65	0.008	0.006
A Line LED	36.11	30.37	0.005	0.004
Candelabra	19.46	15.02	0.002	0.002
Globe	22.89	18.01	0.003	0.002
Recessed	37.76	31.90	0.005	0.004
Recessed Dimmable	37.26	30.93	0.005	0.004
Recessed LED	26.61	54.43	0.004	0.007
Recessed Outdoor	100.67	81.08	0.002	0.010

These results became effective May 1, 2013 (initial participation in program) and apply to participants in the Energy Efficiency Appliances and Devices: Specialty Bulb measures. The Company provides this report as Ham Exhibit E.

The Company updated gross energy savings from the **HVAC Energy Efficiency: Tune & Seal Program** for the measures listed in the following chart.

	Gross kWh		Gross kW	
Tune & Seal Measure	**Original Assumption**	**Evaluated**	**Original Assumption**	**Evaluated**
Attic Insulation & Air Seal	812.00	1163.00	0.19	0.18
Central Air Conditioner Tune Up	228.00	70.00	0.19	0.08
Duct Insulation	570.00	519.00	0.47	0.43
Duct Sealing	266.00	255.00	0.22	0.21
Heat Pump Tune Up	534.00	237.00	0.14	0.08

The Company based original estimates upon estimated impact assumptions derived from industry standards. Modifications to energy savings impacts are listed in the following chart.

	Net kWh		Net kW	
Tune & Seal Measure	**Original Assumption**	**Evaluated**	**Original Assumption**	**Evaluated**
Attic Insulation & Air Seal	603.75	1116.73	0.1417	0.1769
Central Air Conditioner Tune Up	188.90	67.22	0.1573	0.0762
Duct Insulation	472.25	498.35	0.3932	0.4149
Duct Sealing	220.38	244.86	0.1835	0.2039
Heat Pump Tune Up	442.42	227.57	0.12	0.08

These results became effective October 1, 2012 (initial participation in program) and apply to participants in the HVAC Energy Efficiency: Tune & Seal measures. The Company provides this report as Ham Exhibit F.

Q. WHAT IS THE PROJECTED ACTIVITIES SCHEDULE FOR EM&V AND ESTIMATED EFFECTIVE DATES OF IMPACTS?

A. The projected activities schedules for EM&V can be found in Ham Exhibit 1. The effective dates can be found in Ham Exhibit 2.

Q. PLEASE EXPLAIN ANY ADDITIONS OR CHANGES TO THESE SCHEDULES FROM THE PRIOR PROCEEDING?

A. There were a few additions and changes made from the previous EM&V Schedule filed as Ham Exhibit 2 in the Rider 6 Filing, which are reflected in Ham Exhibit 2.

In the program Energy Efficient Appliance and Devices, the evaluation of Water EE products has been delayed due to a later program launch, and the evaluation of heat pump water heater and pool pump measures has been delayed due to low program participation to date. In the program Income-Qualified Energy Efficiency, the evaluation of Weatherization has been delayed due to later program launch. An evaluation of the recently launched Small Business Energy Saver program has been added to the schedule. Participation in all measures is being monitored and further changes to the schedule may occur.

Ham Exhibit 2 also shows the current projected schedule for impact evaluation reports in 2014-2017. Actual report dates may vary depending on program participation to provide a significant sample and the time needed to collect adequate data.

In the situations where a program offered in DEC and Duke Energy Progress, Inc. are similar, and the evaluation schedules provide the opportunity for such efficiencies, evaluations of the programs across the two Companies will be combined in the future. In such cases, the allocation of combined EM&V costs is proposed to be based on the projected number of participants in the program for each Company.

Q. DO DEC'S CURRENT AND FUTURE EM&V REPORTS EVALUATE SNAPBACK AND PERSISTENCE?

A. Yes. Snapback can be thought of as the additional energy and capacity used by customers who feel they can consume more because they have implemented an energy-efficient product. For example, snapback occurs when a customer decides not to turn off a newly-installed CFL when leaving a room and thinks that his or her energy consumption does not matter because the CFL is more efficient than his previously-installed incandescent light bulb.

Persistence is the measurement of how long an energy-efficient product remains installed and utilized after its initial acquisition. For example, persistence measures if a customer decides to remove a CFL after installation because he or she does not like the quality of light produced. Both snapback and short-term persistence are measured and included (though not explicitly) in the EM&V reports, as they apply to EE programs.

Billing analysis and on-site metering capture the short-term effects of snapback and persistence, because they capture the impacts that occur soon after an EE action is taken. Because metering and utility bill analyses often examine electric consumption records before and after an action is taken, the effects of snapback and persistence are embedded in the analysis results.

The long-term effects of persistence, however, cannot be directly measured during the current 12- to 18-month cycle for each EM&V report. Long-term analysis of persistence requires regular, cyclical studies with the same respondents over the life of each measure. Such long-term evaluations would increase the cost of EM&V reporting significantly but would provide little, if any, increased accuracy in the analysis.

The EM&V reports for DEC's programs include an explicit paragraph explaining the evaluation of snapback and persistence, as described above.

III. LOST REVENUES

Q. PLEASE EXPLAIN HOW DEC CALCULATED THE ENERGY AND CAPACITY REDUCTIONS FOR THE NET LOST REVENUE CALCULATIONS FOR THE PROSPECTIVE COMPONENTS OF RIDER 7.

A. Based on the available EM&V analysis, DEC ran the DSMore model in order to calculate the kWh and kW reductions associated with net lost revenues. Energy and capacity associated with net lost revenues for one-half of year four of Vintage 4, year three of Vintage 2014, year two of Vintage 2015, and year one of Vintage 2016 were calculated beginning January 1, 2016 and ending December 31, 2016 using rates in effect as of September 25, 2013.

IV. CONCLUSION

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes.

Ham Exhibit 1 - March 2015

Planned Evaluation, Measurement and Verification (EMV) Activities through the rate period (Dec. 31, 2016)

		Evaluation Activities 2015-2016 [1]							
Residential Program	**Program/Measure**	**Q1 2015**	**Q2 2015**	**Q3 2015**	**Q4 2015**	**Q1 2016**	**Q2 2016**	**Q3 2016**	**Q4 2016**
Appliance Recycling Program	Refrigerator, Freezer		Process Analysis	Process Analysis	Process Evaluation Report				
			Impact Analysis	Impact Analysis	Impact Evaluation Report				
Energy Education Program for Schools	K12 Curriculum		Process Analysis	Process Analysis	Process Evaluation Report				
			Impact Analysis	Impact Analysis	Impact Evaluation Report				
Energy Efficient Appliances & Devices	Residential CFL	Process Analysis	Process Analysis	Process Evaluation Report					
		Impact Analysis	Impact Analysis	Impact Evaluation Report					
Energy Efficient Appliances & Devices	Water EE Products		Process Analysis	Process Analysis	Process Evaluation Report				
			Impact Analysis	Impact Analysis	Impact Evaluation Report				
Energy Efficient Appliances & Devices	Water Heater; Pool Pumps [2]			Process Analysis	Process Analysis	Process Evaluation Report			
				Impact Analysis	Impact Analysis	Impact Evaluation Report			
Income-Qualified EE Products & Services	Weatheriziation; Refrigerator Replacement						Process Analysis	Process Analysis	Process Evaluation Report
							Impact Analysis	Impact Analysis	Impact Evaluation Report
Income-Qualified EE Products & Services	Neighborhood Initiative					Process Analysis	Process Analysis	Process Analysis	Process Evaluation Report
						Impact Analysis	Impact Analysis	Impact Analysis	Impact Evaluation Report
Multi-Family Energy Efficiency	Water EE Products			Process Analysis	Process Evaluation Report				
				Impact Analysis	Impact Evaluation Report				
Multi-Family Energy Efficiency	Lighting					Process Analysis	Process Analysis	Process Evaluation Report	
						Impact Analysis	Impact Analysis	Impact Evaluation Report	
My Home Energy Report	My Home Energy Report					Process Analysis	Process Analysis	Process Analysis	Process Evaluation Report
						Impact Analysis	Impact Analysis	Impact Analysis	Impact Evaluation Report
Power Manager	Power Manager	Process Evaluation Report			Process Analysis	Process Evaluation Report			
		Impact Analysis	Impact Evaluation Report			Impact Analysis	Impact Evaluation Report		

The following Residential programs do not have evaluation reports scheduled for delivery in 2015-2016: EE Appliances and Devices Specialty Bulbs; HVAC EE Products & Services; Multi-Family Energy Efficiency Lighting (CFL Property Manager); Residential Energy Assessments

		Evaluation Activities 2015-2016 [1]							
Non-Residential Program	**Description**	**Q1 2015**	**Q2 2015**	**Q3 2015**	**Q4 2015**	**Q1 2016**	**Q2 2016**	**Q3 2016**	**Q4 2016**
Non-Residential Smart $aver Custom Incentive [3]	Custom Rebate	Process Analysis	Process Analysis			Process Analysis	Process Analysis		
				Impact Analysis	Impact Analysis			Impact Analysis	Impact Analysis
Non-Residential Smart $aver Energy Star Food Service Products [3]	Energy Star Food Service Products			Process Analysis	Process Analysis	Process Evaluation Report			
				Impact Analysis	Impact Analysis	Impact Evaluation Report			
Non-Residential Smart $aver HVAC [3]	HVAC			Process Analysis	Process Analysis	Process Evaluation Report			
				Impact Analysis	Impact Analysis	Impact Evaluation Report			
Non-Residential Smart $aver Lighting [3]	Lighting				Process Analysis	Process Analysis	Process Evaluation Report		
					Impact Analysis	Impact Analysis	Impact Evaluation Report		
Non-Residential Smart $aver Motors, Pumps & VFDs [3]	Motors, Pumps & VFDs			Process Analysis	Process Analysis	Process Evaluation Report			
				Impact Analysis	Impact Analysis	Impact Evaluation Report			
Process Equipment [3]	Process Equipment			Process Analysis	Process Analysis	Process Evaluation Report			
				Impact Analysis	Impact Analysis	Impact Evaluation Report			
PowerShare Call Option	PowerShare Call Option								
		Impact Evaluation Report				Impact Evaluation Report			
PowerShare	PowerShare								
		Impact Evaluation Report				Impact Evaluation Report			
Small Business Energy Saver	Small Business Energy Saver					Process Analysis	Process Analysis	Process Evaluation Report	
						Impact Analysis	Impact Analysis	Impact Evaluation Report	

The following Non-Residential programs do not have evaluation reports scheduled for delivery in 2015-2016: Custom Assessments, Information Technology and Smart Energy in Offices

[1] Future Process and Impact Evaluation Report dates are projections only. Actual report dates will vary depending on program participation to provide a significant sample and the time needed to collect adequate data.

[2] Evaluation work for Water Heaters and Pool Pumps will be delayed if participation remains low.

[3] Evaluation work for the following programs will be done in batches, with some data collected each year to contribute to the final analysis: Custom Incentive, Energy Star Food Service Products, HVAC, Lighting, Motors, Pumps & VFDs, and Process Equipment.

LEGEND	
Process Analysis	Process surveys/interviews (customers or other) for purposes of report that follows
Impact Analysis	Impact data collection (onsites, billing data) and analysis for purposes of report that follows
Evaluation Report	EM&V Report

Ham Exhibit 2

Ham Exhibit 2 - March 2015

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	2014				2015				2016				2017			
		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	1st EM&V	Report					2nd EM&V	Report							3rd 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							4th EM&V	Report	
	Lighting - Specialty Bulbs			1st EM&V	Report										2nd EM&V	Report	
	SF Water EE Products							1st EM&V	Report								
	HP Water Heater & Pool Pumps								1st EM&V	Report							
HVAC Energy Efficiency	Residential Smart $aver AC and HP															3rd EM&V	Report
	Tune & Seal Measures			1st EM&V	Report											2nd EM&V	Report
Income-Qualified Energy Efficiency	Weatherization											1st EM&V	Report				
	Refrigerator Replacement											1st EM&V	Report				
	Low Income Neighborhood			1st EM&V	Report							2nd EM&V	Report				
Multi-Family Energy Efficiency	MF Water EE Products							1st EM&V	Report								
	Lighting (CFL Property Manager)										2nd EM&V	Report					
My Home Energy Report	MyHER	Report										3rd EM&V	Report				
Residential Energy Assessments	Home Energy House Call														3rd EM&V	Report	
Non-Residential Smart $aver Energy Efficiency Custom	Non-Res Smart$aver Custom Rebate													2nd EM&V	Report		
Non-Residential Smart $aver Energy Effiency Food Service	Non-Res Smart $aver Energy Efficiency Food Service								2nd EM&V	Report							
Non-Residential Smart $aver Energy Effiency HVAC Products	Non-Res Smart $aver Energy Efficiency HVAC Products								2nd EM&V	Report							
Non-Residential Smart $aver Energy Effiency Lighting	Non Re Smart Saver Prescriptive Lighting									2nd EM&V	Report						
	Non Res Smart $aver Prescriptive Other									3rd EM&V	Report						
Non-Residential Smart $aver Energy Effiency Motors Pumps Drives	Non-Res Smart$aver Prescriptive (VFDs or other)								2nd EM&V	Report							
Non-Residential Smart $aver Energy Effiency Process Equipment	Non-Res Smart $aver Energy Efficiency Process Equip								2nd EM&V	Report							
Small Business Energy Saver	SBES										1st EM&V	Report					
Smart Energy in Offices	Smart Energy in Offices	Report													2nd EM&V	Report	

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

Final Report

Process and Impact Evaluation of the My Home Energy Report (MyHER) Program in the Carolina System

Prepared for

Duke Energy

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February 23, 2014

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Executive Summary

Key Findings and Recommendations

The key findings and recommendations identified through this evaluation are presented below.

Significant Impact Evaluation Findings: Billing Analysis

A billing analysis was conducted to estimate the net energy savings from the program. The billing analysis relies upon a statistical analysis of actual customer-billed electricity consumption of customers receiving the MyHER mailings, compared to the change in savings over that same period for a matched comparison group to estimate the impact for the MyHER program.

The estimated impacts are presented in the "Energy Savings: Billing Analysis" section of the report, and a summary of the results is shown below:

	Annual Savings, 95% Confidence Interval		
	Lower Bound	Estimate	Upper Bound
Per Participant Savings kWh	177	184	190
Per Participant coincident kW savings	0.0438	0.0496	0.0512

Table 1. Summary of Program Savings by Measure

Measure	Participation Count	Ex Post (Adjusted) Per unit kWh impact	Ex Post (Adjusted) Per unit kW impact	Gross Ex Post (Adjusted) kWh Savings	Gross Ex Post (Adjusted) kW Savings
MyHER Report	776,697	184	0.0496	184	0.0496

Key Findings: Management Interviews

- The My Home Energy Report program provides Duke Energy residential customers with a meaningful look at their homes' energy use compared to other homes similar to theirs.
    - See section titled "Program Description" on page 16.

- Participation numbers are on target and customer opt-outs represent a fraction of one percent of participating customers; this is an indication of the popularity of the reports.
    - See section titled "Participation" on page 8.

- Among the few customers who do opt out, the three most common reasons for opting out are that customers consider the reports to be an inappropriate use of Duke Energy's resources (40%), customers believe they are doing enough to save energy (16%), and no reason given (10%).
    - See section titled "Call Handling" beginning on page 36.

- The reports are carefully designed for at-a-glance reading. Data is clearly presented and easily understood. Messages are crisp and actionable.
    - See section titled "Report Messaging" on page 27.
- The primary reason why customers contact Duke Energy about the program is to correct household characteristics, which is understandable given some of the data's third party origin. The most frequently corrected data points are heat fuel type, square footage, and home age in that order.
    - See section titled "Call Handling" beginning on page 36.
- Call volume for the program is low. For all states served by the program, only 13,396 inbound calls have been received as of October 16, 2013. For North Carolina, the total call volume as of the same date was 6,393 calls since starting on October 17, 2012. For South Carolina there were 2,937 calls since starting on May 25, 2012. Given that reports are now sent to more than one million Duke Energy customers, this equates to less than one percent of customers and the same percentage of customers for the Carolina System.
    - See section titled "Call Volume" on page 35.
- The program vendor's platform has added appreciable functionality for the customization of messaging and the display of data, which is foundational to the program's ability to drive behavior change. But these technical feats are not without their challenges. Report production has been hampered by data quality concerns, most of which have been caught and fixed prior to mailing.
    - See section titled "Data Quality Assurance" on page 31.
- One issue in data quality that was not caught in advance of mailing arose from issues regarding heat fuel types and resulted in data presentation and clustering errors affecting 119,049 South Carolina and 58 North Carolina reports sent to customers in April 2013. This lapse resulted in a financial penalty due to service level contracts.
    - See section titled "Data Quality Assurance" on page 31.
- Another issue not caught before mailing caused 100 customers in the North Carolina control group to receive reports. They were subsequently added to the treatment group.
    - See section titled "Data Quality Assurance" on page 31.
- Report delivery has been on time, except for one lapse due to data quality mentioned above, in which case reports were mailed between 1-12 days late.
    - See sections titled "Report Delivery" on page 34.
- Print quality has also been an issue, but a series of diligent steps toward resolution appear to be successful.
    - See sections titled "Report Delivery" on page 34 and "Print Quality" on page 34.

- Call center operations and email support from the Customer Prototype Lab are operating smoothly and those teams interface effectively with the program management team.
    - See sections titled "Call Center Vendor" and "Customer Prototype Lab" on page 43.

- The working relationship between Duke Energy and the program vendor is operationally functional and productive.
    - See section titled "The Program Vendor" on page 41.

- Overall the program appears to be well designed and well run. Despite periodic technical challenges, the MyHER program represents a noteworthy contribution to Duke Energy's efficiency portfolio and an ambitious behavior change program for residential customers.
    - See section titled "Conclusions" on page 44.

Key Findings: Customer Survey

- There were 376 customers successfully contacted for the survey. Of these, 312 (83.0%) recalled receiving the Home Energy Report.
    - See section titled "Introduction" on page 49.

- 96.5% (301 out of 312) of the customers who recall MyHER are reading the report. If the full number of contacted customers are included in this calculation (N=376, as noted above), and the assumption is that those who don't recall MyHER throw the report away, this brings the percent of customers reading the MyHER down to 80.1% of the targeted customers.
    - See section titled "Customers Who Read the MyHER and Why" on page 49.

- Before being asked about what messages or tips customers recalled from the MyHER, most surveyed customers defined energy efficiency in simple terms: Energy efficiency means "trying to use less energy" (67.9% or 205 out of 302), and/or "saving money on bills" (31.8% or 96 out of 302). Customers whose recent MyHER reports show that they use "less than the efficient home" are significantly more likely to mention "saving money on bills" (39.8% or 35 out of 88) compared to others.
    - See section titled "What Energy Efficiency Means to Customers" on page 57.

- On average, surveyed MyHER customers scored their interest in energy efficiency (8.86 on a 10-point scale) higher than their interest in reading the next MyHER (8.40). This finding is statistically significant with 95% confidence, though much of the difference comes from customers who do not read MyHER (4.10 rating for reading next report, 8.00 rating for interest in energy efficiency). Customers who think they do "more than others" to save energy give significantly higher ratings for interest in energy efficiency (9.16) but there is no significant difference in interest in reading the next report.
    - See section titled "Interest in Energy Efficiency and MyHER" on page 62.

- Overall, about three-quarters (72.5% or 219 out of 302) of the customers are satisfied with how frequently they receive the MyHER, though about a quarter (27.8% or 84 out of 302) say they would prefer to receive reports by email instead of on paper.
    - See section titled "Frequency of Receiving MyHER" on page 64.

- Only about one MyHER recipient in fifteen (6.3% or 19 out of 302) reports that there are errors on their report. The most common inaccuracies have to do with the size of the home (9 of 19), the age of the home (5 of 19) and home heating (5 of 19).
    - See section titled "Accuracy of Home Information" on page 65.

- There is a strong, but not absolute, relation between customers' recent MyHER scores and their perception of how they are doing. While 62.5% (55 out of 88) of customers whose recent MyHER reports show they use "less than the efficient home" say their report usually shows they use less energy than average, 12.5% (11 out of 88) of these recipients say their reports usually show that they use *more* than average. Similarly, while 57.1% (84 out of 147) of customers who used "more than the average home" on their recent MyHER reports say that their reports usually show their energy use is more than the average home, another 11.6% (17 out of 147) of these customers say that their reports usually show they use *less* than the average home.
    - See section titled "Energy Efficiency Scores" on page 66.

- Overall, more than half of MyHER customers surveyed are using the report to track their homes' energy usage (62.3% or 188 out of 302) and about half are trying to improve their scores (47.7% or 144 out of 302). The customers who are most likely to be doing both of these things are the ones who say they "do more than others" for energy efficiency, and those who say their MyHER usually shows they "use more than the average home". However, the pattern is less clear for their actual recent MyHER scores (as opposed to their perception of their usual scores): customers whose recent MyHER score showed them using "more than the average home" are significantly less likely to use the report to track household usage, though there are no significant differences for trying to improve scores. Customers who are using the report to track usage and trying to improve their scores also generally give higher satisfaction ratings for the program.
    - See section titled "Energy Efficiency Scores" on page 66.

- About half of MyHER recipients surveyed (50.3% or 152 out of 302) were able to recall at least one tip or message from past reports. However, only 77.9% (271 out of 348) of the tips or messages recalled by recipients matched tips or messages that had been sent to them via Home Energy Reports. Once incorrectly recalled tips and messages were removed, 44.0% (133 out of 302) of customers correctly recalled an average of 2.04 tips or messages apiece. The messages and tips that are recalled most frequently are those that involve CFL lighting. Overall, 70.2% (212 out of 302) of surveyed customers report that the tips and messages are relevant for their household.
    - See section titled "Recalled Tips and Messages" on page 74.

- MyHER customers generally give the program high ratings for satisfaction, both overall (9.04 on a 10-point scale) and for specific aspects of the report and program (ranging from 7.38 to 9.26). There are no significant differences in overall program satisfaction between customers based on their recent, actual MyHER scores or their perception of how their energy efficiency efforts compare to others. For specific aspects of the program, the highest satisfaction ratings are for “the reports are easy to read and understand” (9.26 overall), “I find the graphics helpful in understanding how my energy usage changes over the seasons” (9.00) and “I find the graphics useful in understanding how my energy usage compares to others like me” (8.88). The lowest-rated aspect is “The energy saving tips in the report provided new ideas that I was not previously considering” at 7.38 overall.

- See section titled "Satisfaction with MyHER" on page 96.

Recommendations

For a full explanation of recommendations see section titled “Recommendations for Program Improvements” beginning on page 45.

- While there is insufficient room for all FAQs on the reports, returning an explanation of average and efficient to the report would provide clarity about the report comparisons and preempt the need for customer clarification phone calls.
- Investigate ways to engage advanced customers on a deeper level in order to derive additional savings.
- Take steps to ensure that energy saving suggestions remain fresh and interesting.
- Consider investigating the impact of customers’ knowledge of changing cluster sizes on energy savings by removing cluster size information from the monthly reports for a test group of customers to be compared to a control group who receive cluster size information on their reports. This investigation would provide additional validity to the notion that customer knowledge of cluster size influences their usage.
- Alternatively, add an answer to the MyHER FAQs to explain why cluster sizes change over time and why a customer may find themselves compared to different size clusters on different reports.
- Consider conducting a longitudinal analysis of existing data (plus or minus one year) to determine whether the energy savings observed from homes in small clusters is similar to energy savings from homes in larger clusters.
- Ensure continued implementation of enhanced quality control measures in advance of all customer mailings, and monitor closely for effectiveness.
- While the spirit of continuous improvement and increased customer responsiveness are central to the Duke Energy ethos, pause to consider if it is appropriate to make changes based upon a small number of errors or customer comments. The answer may well and appropriately be yes, but the threshold for change—and the impacts of doing so—should be clearly understood by all parties.

Introduction and Purpose of Study

Summary Overview

This document presents the process and impact evaluation report for Duke Energy's My Home Energy Report (MyHER) Program as it was administered in Carolina System. The evaluation was conducted by TecMarket Works and subcontractors Integral Analytics and Matthew Joyce.

Summary of the Evaluation

This document presents the process evaluation report for Duke Energy's My Home Energy Report (MyHER) Program as it was administered in the Carolina System. The evaluation was conducted by TecMarket Works and Matthew Joyce, subcontractor to TecMarket Works. The interview and survey instruments were developed by TecMarket Works and Matthew Joyce. The customer survey was administered and analyzed by TecMarket Works. Matthew Joyce conducted in-depth interviews with program management.

The impact findings presented in this report were calculated using monthly billing data (for program net savings).

Evaluation Objectives

This report's objectives include a presentation of the MyHER program's estimated energy impacts. The process evaluation is intended to provide insights to help Duke Energy, and other interested parties, evaluate the program as it is currently administered. The report reviews program history, evaluates current processes, and considers customer surveys and participant feedback in order to diagnose issues and present recommendations for changes intended to increase energy savings, improve operational efficiencies, and enhance customer satisfaction.

Researchable Issues

In addition to the objectives noted above, there were a number of researchable issues for this evaluation. These include:

1. To solicit feedback from program participants about their experience with the MyHER mailings, such as their recollection of the messages and tips, their home energy scores, and their satisfaction with the reports;
2. To gain an understanding of customer demographic categories responding positively to the MyHER program.

Description and Purpose of Program

The My Home Energy Report (MyHER) Program is an energy efficiency program currently operating in the Carolina System. The purpose of the program is to provide Duke Energy residential customers with customized home energy reports that compare their home's electric energy usage with similar homes in order to encourage behavior driven energy savings through the principles of social norming. Up to 12 reports are sent each year.

The program targets approximately 685,000 residential customers residing in individually metered single-family residences in Duke Energy's Carolina System service territory.[1] Rather than requiring people to sign up for the efficiency program, customers in the study group were automatically enrolled into the program. Starting in September of 2011 when the full commercial program was first launched in Ohio, the South Carolina pilot participants began receiving personalized reports comparing their monthly and annual energy usage with a group of homes of similar size, age, type of heating fuel and geography. The full commercial program for South Carolina customers began in May of 2012, with North Carolina customers starting in October of 2012.

Duke Energy works with a third party program vendor that uses proprietary methods to analyze the customer's energy use and compare it to a peer group. The customer's monthly and annual energy usage is then graphed in comparison to the usage of an average home and an efficient home within the peer group. The reports present specifically targeted tips to save energy and offers to participate in Duke Energy's other energy programs. These targeted suggestions are based specifically on the customer's energy consumption patterns and home characteristics.

Program Enrollment, Eligibility, and Participation

Opt Out Enrollment

Unlike other energy efficiency programs offered by Duke Energy, this program is designed to use opt-out enrollment, so that eligible customers automatically receive a welcome letter and begin receiving reports without the need to formally sign up. With a growing number of utilities offering comparable behavior change reports, opt out enrollment is considered an industry norm for programs of this type.

Opt out enrollment offers advantages to customers and to Duke Energy. First, it enables a greater number of customers to benefit from a better understanding of their homes' energy use and how the most effective ways that they can save energy. Second, it diminishes program costs by reducing the need for program marketing, since opt in enrollment necessarily requires making customers aware of the benefits of the program prior to signing them up. Third, as the reports directly state: "When customers reduce their energy needs, it reduces the costs to provide energy and the need to build more power plants, which lowers bills for you, your community, and Duke Energy."

[1] This number is different from the number of participants presented in the billing analysis section because 685,000 is the floating number of participants overall for each report period, while the 776,697 used in the billing analysis reflects the cumulative number of people who have participated at one time but not necessarily all at the same time.

The opt out enrollment method is considered appropriate because the reports contain useful information specific to each customer. For this reason, the reports are deemed to be informational communications about customer accounts rather than solicitations. Customers always retain the ability to opt out at any time with a phone call or email to the contact details listed on every report. However, as of October 21, 2013, the Carolina System opt out rate is extremely low at 0.01% or 930 people on a base of approximately 685,000 participants.

Eligibility

To be eligible for the program, customers must live in a single family home with a single electric meter. They must be on a rate plan that bills for the full amount of energy used during a month. Customers must also have 13 months of consecutive billing data at the present address. Full program eligibility requirements are as follows:

- Active customer on a residential rate plan in the Carolina System
- 13 months of consecutive usage history
- Individual electric meter
- Single family home
- Non-apartment
- Non-business
- Home address equals a billing address or post office box in same state as the service address
- Has not opted out of the program
- Not part of the control group (opt in is possible)
- Not on the Greenwood rate in South Carolina

Duke Energy customers are considered to be MyHER program participants when they have:

- Met the program's eligibility requirements
- Received at least one MyHER Report
- Not opted out of the program

Participation

The MyHER program sends a paper report by mail to approximately 487,000 participating households in North Carolina and 198,000 households in South Carolina for a system-wide total of approximately 685,000 participants each month. Participation numbers vary due to opt-outs and changes in customer eligibility status. Customer participation is validated monthly by Duke Energy using detailed reports from the program vendor.

Table 2 below shows official program participation numbers by month between program inception and October 21, 2013. Note that participation numbers for North Carolina decline after April 2013, when program managers deliberately sought to bring customer participation back below the agreed program size of 500,000 by gradually shedding customers who were no longer eligible and not replacing them. Those customers who became eligible to participate after that time were placed in a set aside group and can now begin to be added back into the program as overall enrollment numbers permit. When reading the table, it is also worth noting, that in months when no new reports are sent, participation numbers are considered the same as in the preceding month since customers are considered to remain in the treatment group until the next treatment report is mailed.

Table 2. Program Participation by Month

Month	# of SC Participants	# of NC Participants	# of Total Participants
March 2012	7,357*	0	7,357
April 2012	7,356*	0	7,356
May 2012	82,038	0	82,038
June 2012	184,772	0	184,772
Jul. 2012	215,783	0	215,783
Aug. 2012	217,325	0	217,325
Sept. 2012	215,869	313,841	529,710
Oct. 2012**	208,622	493,593	702,215
Nov. 2012**	208,622	493,593	702,215
Dec. 2012	210,475	501,249	711,724
Jan. 2013	211,259	505,057	716,316
Feb. 2013	210,372	502,554	712,926
Mar. 2013**	207,662	516,950	724,612
Apr 2013**	207,662	516,950	724,612
May 2013	207,251	506,703	713,954
Jun 2013	207,624	502,024	709,648
Jul 2013	207,635	499,922	707,557
Aug 2013	197,749	486,840	684,589
Sep 2013	197,749	486,840	684,589

** South Carolina pilot participants who continued in the program*
***In months when no new reports are sent participation numbers are considered the same as in the preceding month.*

Methodology

Overview of the Evaluation Approach

Study Methodology

The process evaluation has two components: management interviews and participant surveys. In-depth interviews were conducting with program management and the participant surveys were conducted with customers in the Carolina System. The impact estimates were done via billing analysis.

Billing Analysis

The billing analysis used consumption data from MyHER recipients in Carolinas (776,697 customers) that participated between June of 2012 and October of 2013 for South Carolina and between October 2012 and October 2013 for North Carolina. A panel model was used to determine program impacts, where the dependent variable was daily[2] electricity consumption from January of 2011 through October of 2013.

In order to determine the kW savings, the project used a Calibrated Load-Shape Differences Approach (CLSD). This approach is based on the results of the billing analysis (kWh saved) to establish the total and per participant amount of energy savings achieved by the program. The specific steps associated with this approach are as follows:

1. Conduct a billing analysis to identify program energy (kWh) savings achieved.
2. Use the utility-specific DSMore load shapes to calculate a kW coincident reduction factor for demand savings such that the total kW savings curve equals the annual savings estimate from the billing analysis.

This approach provides a reliable estimate of the per household and program-wide peak kW reduction for the least cost.

Management Interviews

In-depth interviews were conducted with the Duke Energy product manager, the Duke Energy database analyst, one of the Duke Energy managers responsible for new program development, and the Duke Energy manager of the Customer Prototype Lab (CPL), which provided call center and email support during the OH and SC pilots of this program, and which continues to provide email assistance for the full commercial version of the program. In addition to these Duke Energy employees, TecMarket Works interviewed four representatives from the third party program vendor that creates and mails the reports —the production manager, two client project managers, and a project engineer. We also spoke with the manager and the lead call center representative from the third party vendor that provides call center services for the program. The interviews covered program design, execution, operations, interactions between organizations,

[2] Daily electricity consumption was calculated by monthly usage divided by number of usage days in each bill cycle.

data transfer methods, and personal experiences in order to identify any implementation issues and discuss opportunities for improvement.

Customer Surveys

TecMarket Works developed a customer survey for the MyHER Program participants, which was conducted from April 30 to July 23, 2013.

Surveys were completed with a random sample of 302 MyHER customers; in addition, ten customers qualified for the survey but were not able to complete the interview. When the customer was successfully contacted, the surveyor asked that customer if they were familiar with the MyHER mailings. If not, the surveyor provided a short description of the MyHER mailings they have been receiving: *"This program provided information on how much electricity you used in the previous month and in the previous 12 months compared to your neighbors and provided tips on how you could lower your electricity use and costs in becoming more energy efficient."* If the customer still did not recall the MyHER, they were thanked for their time and the call was terminated (64 recipients, or 17.0% of those contacted, did not recall the program reports). If a customer did recall receiving MyHER, the survey continued regardless of whether they read the MyHER. There were 312 customers out of 376 contacted (83.0%) who recalled receiving the MyHER report, though only 302 recipients completed the entire survey (ten incomplete surveys are not included in this report).

MyHER customers were surveyed by TecMarket Works. The survey can be found in Appendix C: MyHER Customer Survey Instrument.

Data Collection Methods, Sample Sizes, and Sampling Methodology

Billing Analysis

The billing analysis used consumption data from all complete data provided for the MyHER recipients in Carolina (776,697 customers) that received the MyHER between June of 2012 and October of 2013 in South Carolina and between October 2012 and October 2013 in North Carolina. There were a total of 1,144,071 usable accounts after processing[3], of which 776,697 were report recipients, and 367,374 were control group members.

Management Interviews

Management interviews, as well as follow-up phone calls and emails, were conducted with staff members from Duke Energy, the program vendor, and the call center vendor. The interview instrument can be found in Appendix A: Program Manager Interview Instrument and Appendix B: Vendor Interview Instrument.

Customer Surveys

The complete survey was conducted with a random sample of 302 MyHER customers. The survey protocol can be found in Appendix C: MyHER Customer Survey Instrument. We

[3] Useable accounts are those accounts which have billing data for both a portion of the pre- and post-participation period.

attempted to contact program participants by telephone no more than four times at different times of the day and different days before dropping them from the randomly sampled contact list. Call times were from 10:00 a.m. to 8:00 p.m. Eastern Monday through Saturday.

Number of Completes and Sample Disposition for Each Data Collection Effort

Billing Analysis

N/A (all participants included, sampling was not used)

Management Interviews

Between February and October of 2013, TecMarket Works interviewed four Duke Energy employees and five representatives from two vendors for this evaluation. This represents a completion rate of 100%.

Customer Surveys

A sample list of customer records was randomly pulled by TecMarket Works from a list of 547,556 participants with contact information provided by Duke Energy. Surveys were conducted by telephone with 302 participants. The survey instrument can be found in Appendix C: MyHER Customer Survey Instrument.

Table 3. Summary of Data Collection Efforts

Data Collection Effort	State	Size of Population in Sample for Interviews	# of Completed Interviews	Sample Rate
Management Interviews	Total NC + SC	10	10	100%
Customer Surveys	NC	334,129	151	0.05%
Customer Surveys	SC	213,427	151	0.07%
Customer Surveys	Total NC + SC	547,556	302	0.06%

Expected and Achieved Precision

Billing Analysis

All savings estimates from the billing analysis were statistically significant at the 95% confidence level.

Customer Surveys

The survey sample methodology had an expected precision of 90% +/- 4.7% and an achieved precision of 90% +/- 4.7%.

Description of Measures and Selection of Methods by Measure(s) or Market(s)

This behavioral program does not include any energy efficient measures. The MyHER program consists of regular mailings to a targeted list of customers as described above.

Threats to validity, sources of bias and how those were addressed

Billing Analysis

The specification of the model used in the billing analysis was designed specifically to avoid the potential of omitted variable bias by including monthly variables that capture any non-program effects that affect energy usage, such as number of people in the home, as well as other Duke Energy offers.

Energy Savings: Billing Analysis

The goal of this billing analysis is to evaluate the energy impacts from MyHER since June of 2012 for South Carolina and October 2012 for North Carolina. The estimated MyHER savings obtained from the billing data analysis are presented below.

Table 4. Estimated MyHER Impacts

	Annual Savings, 95% Confidence Interval		
	Lower Bound	Estimate	Upper Bound
Per Participant kWh Savings since 06/2012	177	184	190

This table shows that the MyHER program produced statistically significant savings for participants in the Carolina System.

Note that the billing data analysis includes variables to capture effect of participation in other Duke Energy programs after participation in MyHER. This is to explicitly control for any impacts from other program participation.

For this analysis, data are available both across households (i.e., cross-sectional) and over time (i.e., time-series covering both pre- and post-treatment periods). With this type of data, known as "panel" data, it becomes possible to control, simultaneously, for differences across households as well as differences within each household over time. This is accomplished through the use of a "fixed-effects" panel model specification. The fixed-effect refers to the inclusion of a customer-specific intercept terms. This term captures all time-invariant characteristics that affect the level of energy use, whether observed or not. The other variables in the model are time-variant variables that change over time, such as weather and program treatment.

The fixed effects model can be viewed as a type of differencing model in which all characteristics of the home, which (1) are independent of time and (2) determine the level of energy consumption, are captured within the customer-specific constant terms. In other words, differences in customer characteristics that cause variation in the level of energy consumption, such as building size and structure, are captured by constant terms representing each unique household.

Algebraically, the fixed-effect panel data model is described as follows:

$$y_{it} = \alpha_i + \beta x_{it} + \varphi P_{it} + \theta T + \delta DP_{it} + \varepsilon_{it}$$

where:

y_{it} = energy consumption for home *i* during month *t*
α_i = constant term for site *i* (the fixed-effect)
T = indicator variables for each time period in the analysis
P = indicator for the treatment for the program in question
DP = indicators for other utility-sponsored programs
$\beta, \varphi, \theta, \delta$ = vectors of estimated coefficients

x = vector of non-program variables that represent factors causing changes in energy consumption for home i during month t (i.e., weather)

ε = error term for home i during month t.

With this specification, the only information necessary for estimation is those factors that vary month to month for each customer, and that will affect energy use, which effectively are weather conditions and program participation. Other non-measurable time-variant factors (such as economic conditions and season loads) are captured through the use of monthly indicator variables.[4] To control for weather effects, the model includes temperature, humidity, and wind speed variables. This is more flexible and inclusive than only including HDD and CDD terms, as those variables assume a constant baseline of 65° for heating and cooling across all customers. The model delivers savings estimates that are based on actual weather during the treatment period.

Moreover this analysis involves both a treatment group and a control group. Treatment group includes customers who received the MyHER reports whereas control group includes customers who did not receive any MyHER report and was kept separately to provide comparison to the treatment group.

The effects of the MyHER program are captured by including a variable which is equal to one for all months after the household participated in the program. In order to account for differences in billing days, the usage was normalized by days in the billing cycle. The estimated electric model for the MyHER program is presented in Table 5. Aside from converting usage data from billing cycle to calendar cycle, there was no data cleaning involved in this analysis.

Table 5. Estimated Savings Model for MyHER – dependent variable is daily kWh usage (savings are negative)

Independent Variable	Coefficient (daily kWh Savings)	t-value
MyHER Impact since June 2012	-0.50	-54.61
Sample Size	33,888,620 observations (1,144,071 homes)	
R-Squared	69%	

The complete estimate model, showing the weather and time factors, is presented in "Appendix M: Estimated Statistical Model". Based on these kWh savings and the load curves in DSMore, the implied summer coincident kW savings is 0.0496 kW/participant.

The relationship between the impact of MyHER and the customer rate class was also investigated, and while there are indications that customers in the RE rate class have a higher level of savings than other rates, the differences are not statistically significant at the 95% level.

[4] See Jeffrey Wooldridge Econometric Analysis of Cross Section and Panel Data (Cambridge: MIT Press, 2002), 283-284 for a discussion of this model and its applicability to program evaluation.

Management Interview Findings

Program Description

The My Home Energy Report program is an energy efficiency program that sends periodic personalized reports to residential customers who meet eligibility criteria. The reports are designed to increase energy savings behaviors by showing customers how their electric energy usage compares to an average neighbor and an efficient neighbor living in residences in the same geographic area with similar square footage, heating type, and home age.

Energy usage is displayed in a monthly bar chart comparison and in a 13-month line chart comparison. If customers perform better than average, the average household is dropped from the monthly comparison, so that customers strive to match the lower energy usage of their more efficient neighbors. Average home values are always shown on the 13-month line chart, since customer energy usage may be above average for some months and below during others. An example report is shown in Appendix D: Example MyHER Mailing.

Reports are created up to 12 times per year and are distributed in paper format via U.S. mail. The reports present energy efficiency suggestions that are customized according to that customer's specific household characteristics. The suggestions are designed to further spur the customer to action by providing an estimate of the dollar savings that may be achieved by making the effort. The reports also contain customized marketing messages that encourage customer participation in other Duke Energy efficiency programs for which that specific customer is eligible.

Program Theory and Design

The program's design for generating behavior driven energy savings is based on the theory of "social norms." Social science research demonstrates that people tend to conform to social norms even when they deny such influence[5,6]. By sending letters that compare one utility customer's energy use with that of similar customers, several utility companies have used this normative effect to generate between 1.5 to 2.5% savings.[7] Longitudinal studies about the persistence of these energy savings are underway.

The MyHER program design is based in part on this research and on studied observations of market participants. It is also based upon information garnered from Duke Energy's Personalized Energy Report® (PER) and Home Energy House Call (HEHC) programs. However, the current design is most appropriately ascribed as the outgrowth of two years of pilot efforts in Ohio and South Carolina.

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[5] Jessica M. Nolan, P. Wesley Schultz, Robert B. Cialdini, Noah J. Goldstein, Vladas Griskevicius, Normative Social Influence is Underdetected, *Pers Soc Psychol Bull July 2008 vol. 34 no. 7 913-923,* DOI: 10.1177/0146167208316691

[6] P. Wesley Schultz, Jessica M. Nolan, Robert B. Cialdini, Noah J. Goldstein and Vladas Griskevicius, The Constructive, Destructive, and Reconstructive Power of Social Norms, *Psychological Science* May 2007 vol. 18 no. 5 429-434 *DOI:* 10.1111/j.1467-9280.2007.01917

[7] Hunt Alcott, Social Norms and Energy Conservation, *Journal of Public Economics*, Volume 95, Issues 9–10, October 2011, Pages 1082–1095, DOI: http://dx.doi.org/10.1016/j.jpubeco.2011.03.003

Program Goals and Objectives

Because this program is designed with an opt-out enrollment mechanism it does not have new customer acquisition goals (see Opt Out Enrollment). Instead, the program's primary numeric goals focus directly on energy savings. The program has an energy savings target of an average 211 kWh per participant per year for both North Carolina and South Carolina. Progress toward this goal is to be determined by an impact evaluation.

In the absence of energy savings numbers to be derived from an analysis of the results of the impact evaluation, Duke Energy and its partnering third party vendors have been focusing the preponderance of their managerial efforts on the program's other strategic objectives for which feedback is more readily available. Those strategic objectives include:

- Educating customers about their energy use and encouraging them to take energy saving actions,
- Generating interest in other energy efficiency offerings,
- Deepening customer engagement,
- Responding to customer comments and suggestions in order to improve the reports and the program, and
- Increasing customer satisfaction.

When asked to comment on the place of this behavior modification program in Duke Energy's energy efficiency portfolio, one interviewee from Duke Energy used an analogy of a car to explain the role of the home energy report:

> "People constantly receive cues about their cars' gas consumption. The speedometer, odometer, gas gauge, and the price of gas are readily available to help people judge how much they're using and how much it is costing them in near real-time. That's not the case with your home's electric consumption. You just get a bill at end of month after you've used the energy. And, the bill isn't very informative for those customers who only look at the amount they owe and the due date. The home energy report helps to change that by showing customers how they're doing over time compared to others. It's a bit like comparing miles per gallon, but the reports also tell people how they can be more efficient and how much each action is likely to save them. In short, the reports provide a customer feedback loop and help people learn how to improve."

As important as this is, Duke Energy sees the home energy reports as serving other functions as well. The home energy reports are seen as a means of helping to strengthen customer satisfaction. Perhaps even more strategically, the educational aspects of the report and the periodic frequency of their delivery also serve as a starting point to begin engaging residential customers in the active management of their energy consumption as larger commercial customers have done for years. As another interviewee said, "We want to become their energy partner and not just a utility they write a check to." In other words, the home energy reports may be a one-way communication, but they are an invitation to the customer to begin a meaningful two-way conversation.

Market Barriers

Based on its previous pilot efforts, Duke Energy identified three potential market barriers to success: 1) customers not opening the reports; 2) not understanding the information presented; and 3) not taking action. The program design incorporates elements to address each of these. First, because the reports are delivered by paper mail, there is a risk that customers will assume the envelopes contain junk mail and not open them. To overcome this, the reports are sent in envelopes clearly displaying the Duke Energy logo and company address to denote the sender and nature of the communication. Second, customers may not have sufficient time available to read the report, nor may they have a comprehensive understanding of how energy is used in their homes. To overcome this, the reports are designed for at-a-glance reading with easy-to-understand graphics and simply worded explanations (see Report Design and Data Presentation). Third, customers may lack the financial resources and motivation to change their energy use over time. To overcome this, the reports present predominantly low cost / low effort energy saving recommendations. They also encourage adoption by showing the customer how much money that particular measure could save. The report delivery schedule of eight months per year provides ongoing contact and encourages continuous engagement. No additional market barriers were identified during the interview process.

Operational Roles

Operational roles for the MyHER program are shared between Duke Energy, two primary vendors, and several subcontractors. These roles are described briefly below and more fully in the following portions of this management review.

Duke Energy provides monthly billing and other customer data necessary to customize the energy reports, such as account information, records of participation in other efficiency programs, and data regarding customers' homes collected through direct customer communication or via the Personalized Energy Report and Home Energy House Call programs.

The Duke Energy product manager provides full operational oversight with responsibility for overall strategy, product planning, market expansion, determining messaging, selecting the criteria for customers to receive messaging, regulatory filing, financial reporting, vendor management, and quality assurance.

The Duke Energy database analyst is primarily responsible for ensuring the program's data integrity. She provides systematic quality assurance, full program data support, and regular oversight on data interactions between Duke Energy and the program vendor.

The Duke Energy Customer Prototype Lab provides email support for customer inquiries.

The call center vendor handles all phone-related functions. They are staffed Monday to Saturday.

The program vendor handles report production and distribution from start to finish. The program vendor receives data from Duke Energy and transforms the information into individualized home energy reports by creating data clusters to compare customer usage to similar homes, suggesting energy saving actions, and presenting targeted Duke Energy communications. The program vendor is also responsible for printing, comingling, and mailing the reports, although these functions are handled through subcontractors.

Program Development

The initial steps for planning and launching the My Home Energy Report program began during 2008, when Duke Energy recognized it was possible to influence behavior in order to produce energy savings. Duke Energy had already done much work on its efficiency programs designed to achieve energy savings via structural and equipment improvements, and the utility's senior managers were seeking a different approach to augment their portfolio. Work began in earnest as they researched academic studies and real world tests by market actors. During 2009, regulatory approvals came through and Duke Energy prepared to deploy two pilot efforts using in-house resources and a third party printer to produce the reports.

The first pilot launched in Ohio on February 22, 2010. It was designed to test data presentation and the frequency of report delivery. A comparable pilot effort was launched in South Carolina on May 28, 2010. The initial treatment groups consisted of 10,000 residential customers in Ohio and 8,258 residential customers in South Carolina. For each pilot effort, these overall treatment groups were divided into two groups. One group received quarterly reports and the other received monthly reports. These two groups were each then subdivided into receiving two different types of reports, with one subgroup receiving a report showing usage data with line graphs, while the other subgroup received their information in bar chart format. Process and impact evaluations were conducted by TecMarket Works to determine the results of these efforts in 2011. The findings from these evaluations and the many learnings from the pilots were incorporated into the improved design and deployment of a fully commercialized version of the program.

The first commercial version of the program launched in Ohio on September 10, 2011, with a target of 240,000 participants and a multi-staged startup process that added approximately 25,000 additional customers per week until the target was reached. The same internal Duke Energy departments that handled operations for the pilot efforts managed the delivery of the first full commercial version of the program.

While Duke Energy was preparing for this full commercialized roll out, the utility was simultaneously using an RFP process to select a third party contractor specializing in data analysis with a platform robust enough to produce and mail the home energy reports on a scale sufficient to reach its distribution targets in all approved service territories. The winning program vendor worked with Duke Energy during the latter half of 2011 to design, develop, and deploy systems for generating the home energy reports according to contract specifications. Full commercialized systems transition from Duke Energy to the program vendor occurred during March of 2012.

At the time of transition, a letter was sent to all participating pilot customers in Ohio to tell them of the upcoming changeover. The letter focused on the improvements to the report that the transition made possible. The text of the letter read:

> "You've asked for more, so we're adding on! There may be a slight 'construction delay,' but when your new My Home Energy Report arrives, it will have two pages of valuable information about your energy usage and even more energy saving tips. Oh, don't worry. You and your home will still be front and center. How Am I Doing charts will continue to show how your energy use compares to similar homes – each month and over time. But now we'll have more room to answer your questions, like 'What can I do to reduce energy use?' and 'How much could this tip save me?' Stay tuned! We think you're going to like your new report!"

After a few months to fine tuning efforts, on May 25, 2012, a commercialized version of the program launched in South Carolina with a target of 215,000 customers. Pilot customers in South Carolina received a letter similar to the one sent to Ohio customers.

Then, on June 12, 2012, Duke Energy made its next handoff, transitioning call center operations from the Customer Prototype Lab to the call center vendor. With this segue complete, the respective program actors assumed their currently assigned roles.

A commercialized roll out to 46,000 residential customers in Kentucky occurred on August 22, 2012. North Carolina followed on October 17, 2012, with the largest target yet, 500,000 residential customers. In contrast to these commercial launches, Indiana began with a pilot effort in May of 2012.

Operations in all service territories are mentioned here because the same systems and methodologies are used to create and distribute reports in all states. Thus, overall report volumes, operational challenges, and any decisions made concerning the program in one state are likely to impact operations in the others.

MyHER Report

Overview

The program vendor receives a secure transfer of customer data on a nightly basis from Duke Energy, which includes updated energy usage, billing records, account and rate changes, eligibility criteria, and household demographics. This customer data is then passed through two distinct stages — integration and production — in order to create the MyHER reports. The integration stage runs daily and is designed to sort, catalog, parse, and combine the data according to a complex set of software rules that prepare the data for report production.

Report production occurs eight times per year, with each report corresponding to a calendar month. For each report cycle, the data is divided into four weekly batches. Each batch is processed independently, as customers are clustered with others having similar billing dates and similar household characteristics. Each batch then consists of hundreds of clusters containing tens to thousands of houses in each.

Once the dynamically assigned clusters are established, the kWh energy use of individual households in each cluster are used to determine how much electricity the "average" home and the "efficient" home use. Each individual household's kWh usage is then compared to the average and efficient homes in their cluster to show relative performance each month for the previous 13 months.

To further encourage energy savings behaviors, the front page of the report presents two specific tips that suggest seasonal and household-appropriate ways to save energy, such as weatherization or using task lighting. The tips, which are developed by the program vendor, also show how much money enacting that tip is likely to save that particular customer based on household characteristics. The rear page of the report presents two additional messages developed by Duke Energy. The program vendor uses yet another set of software rules to ensure that the Duke Energy messages displayed on the report promote specific energy efficiency programs for which the customer is eligible or a more general energy saving suggestion in the event that no specific program promotion is available.

Once these tips and messages have been dynamically assigned, PDF versions of the individual customer home energy reports are produced. The program vendor maintains quality assurance measures throughout the production process to catch potential errors. However, Duke Energy also performs a number of second-level quality control checks, including reviewing a representative sampling of pre-print PDFs and a flat file containing all up-to-date customer data for each weekly batch of reports.

Once this second level of quality assurance has been successfully completed, the program vendor sends the full batch of PDFs to a subcontractor for printing and mailing. The PDFs are also uploaded into a program vendor -hosted web portal called the Enterprise system, so that the reports can be viewed by representatives from the call center vendor and the Customer Prototype Lab. The following sections discuss this process in more detail.

Data Handling

Throughout the creation and development of the data integration and report production processes, the program vendor worked with Duke Energy to identify common issues that might arise with the data used to generate a customer's report. For instance, if a customer is missing the current month's billing data, then a software rule flags the customer ID and labels it as ineligible for a report since there is no new data available to create the monthly comparison. A similar rule applies to customers who are missing their thirteenth month of previous billing data since that anchors the beginning of the year-to-date comparison. Likewise, the program vendor needed to write a software rule that stops the report process if the customer is missing two bills within the 13 month period, excluding the first and thirteenth months, since too many missing data points cause the graphs to render poorly. Missing billing data is reconciled with Duke Energy on a nightly basis to mitigate such issues, but the rules must be in place in order to control the small percentage of situations to which they apply at the time the batch is processed.

Because the data integration process is so complex, it has required ongoing process improvements to fine tune the most appropriate ways to handle data idiosyncrasies. On numerous occasions, additional software rules needed to be written to deal with the unforeseen circumstances. Billing data issues provide a good example. In some cases customers may receive two bills in a single month. Under the originally envisioned scenario, the second bill would be added to the first bill. However, in another scenario, the first bill should be considered cancelled, while the second bill shows the corrected amount. Without a software rule in place to address this real world business practice, the customer's MyHER report would present inaccurate information. These types of fixes are made whenever issues are discovered.

Home Characteristics

The comparative nature of the MyHER reports relies upon the program vendor's ability to automate the creation of data clusters of similar homes. The program vendor's data integration process ensures that each customer ID is paired with several identifying household characteristics:

- Age of home
- Size (square footage)
- Heating fuel type
- Location (multiple vectors based on latitude and longitude)
- State (ensures neighborhoods do not cross state lines during clustering)
- Bill dates (ensures billing periods are of similar duration to produce accurate comparisons for consumption)

These characteristics are compiled from a variety of data sources with a specific order of precedence based upon their availability and deemed degree of accuracy. Those data sources are:

1. Customer specified information, such as corrected numbers for home square footage, age, and heat fuel type, as captured via telephone conversations with the call center vendor or email exchanges with the Customer Prototype Lab;
2. Household characteristics recorded during a visit by a professional auditor as part of Duke Energy's Home Energy House Call (HEHC) program;
3. Duke Energy algorithms applied to confirm customer provided data, such as heating fuel type, since customers may erroneously think they have gas or electric heat, while an analysis of their annual electric load shape reveals otherwise;
4. Household characteristics provided directly by customers when they completed a data collection survey as part of Duke Energy's Personalized Energy Report (PER) program; and
5. Household characteristics acquired by the program vendor via publically available Experian third party data.

Once these characteristics have been appended to the customer ID, the characteristics are used to help identify other similar households that will be clustered together later in the process to generate the home energy use comparisons.

All parties agree that this aspect of the report generation process is well-conceived, but data quality issues have hampered implementation to varying degrees. In one instance, data quality issues involving heat fuel types caused large numbers of erroneous reports to be sent out to South Carolina participants during April of 2013. (See Data Quality Assurance starting on page 31 for more information on this.).

Data Clustering

One key difference between the original clustering methodology used during the early program development and the current deployment is that Duke Energy's original methodology relied on static clusters of homes that were generated one time based upon similar home characteristics. This static clustering offered the advantage of facilitating comparisons with a consistent set of homes each month. However, the static clustering method did not easily accommodate the fact that new comparable homes became eligible each report cycle, while other homes needed to be dropped from the comparison pool based upon eligibility changes or upon customer requested corrections to their home characteristics. The program vendor's clustering methodology accommodates these data changes by employing a K-means data clustering methodology that creates new and accurate cluster assignments for each report cycle. While sacrificing a static comparison to the exact same houses each month, the K-means clustering methodology offers the advantage of ensuring a more accurate, consistent, and unbiased comparison of homes with similar attributes each report cycle, which Duke Energy deemed fundamental given the changing nature of the data.

Despite its differing dynamic nature, the program vendor's methodology yields clusters closely similar to those generated by Duke Energy's original static method. The dynamic clustering methodology works by creating a coordinate, or vector, for each piece of household information — bill date, home size, home age, fuel type, longitude, latitude, proximity of location, etc. — to receive a weight. Heuristic algorithms then run until convergence is reached and clusters of similarly weighted homes are generated. The reports refer to these clusters as "neighborhoods," but the homes are grouped based upon their similarly weighted attributes rather than being grouped as customers might commonly think of a neighborhood, such as homes sharing sidewalks, streets, and proximity to local landmarks.

The number and size of the data clusters changes each month because they are dynamically generated based upon the vector weightings of the data. A sample of the program vendor data for March of 2013 revealed that North Carolina has an average of 973 neighborhood clusters per month, while South Carolina averages 660 neighborhood clusters. Across the entire Duke Energy service territory, the program vendor's system is generating an average of 3,275 clusters. The analysis also showed that the numbers of homes within a cluster ranges from a low of 10 homes to a peak cluster size of 8,924 homes, which happened to be in North Carolina. The average cluster in North Carolina contains 806 homes. In South Carolina the average cluster contains 369 homes, while its average maximum is 4,380 homes. Theoretically there is no maximum to the number of clusters or to the number of homes. However, the numbers noted above represent typical cluster sizes.

In essence, the program vendor's clustering methodology recognizes clusters that are too large do not provide an accurate comparison, while clusters that are too small may have their average and efficient home comparisons swayed by the undue weighting of individual homes. It is for this reason that if a cluster contains less than 10 similar homes then the customer does not receive a report. Duke Energy and the program vendor are currently considering the trade-offs between raising that minimum to provide greater statistical significance versus the reduced energy impacts resulting from sending reports to fewer homes.

Calculating Average and Efficient Homes

The key to the social norming process employed by the MyHER reports is the way that the reports compare a customer's energy usage with others. The reports make two different comparisons.

The first comparison is to the "average" home. Average is calculated by determining the arithmetic mean for the cluster. This is calculated by summing all kWh usage in the cluster and then dividing by the number of homes in the cluster. So, for a hypothetical cluster of three homes with 1000 kWh, 1200 kWh, and 1400 kWh, the sum would be 3600 kWh. When divided by three, this equals an average of 1200 kWh.

Because social norms tend to influence behavior toward the group average, Duke Energy also adds a second comparison designed to further influence customers toward additional energy savings. For this reason, the reports also compare customer energy usage to an "efficient" home. The efficient home represents the 25th percentile (first quartile) of energy usage such that homes at this mark use less energy than 75% of homes in the cluster.

Report Design and Data Presentation

The focal points of the MyHER reports are the monthly energy use comparison on the front page of the report and the annual energy use comparison on the back page of the report. The monthly comparison commands at-a-glance visual attention. The headline: "How am I doing?" immediately establishes context, while three bold bars compare the reader's home energy use to that of the average home and efficient home. Bar lengths provide a graphic display of information, while kWh amounts specify the exact values.

The second page of report also sports a prominent graph; this one is a line graph displaying monthly energy use for 13 months to facilitate year-to-year comparisons of energy usage. Average and efficient homes are also shown, so that customers can see how their annual performance compares to their peers. In this way, the line graph encourages both internal and external competition as customers strive to better both their own performance and that of others.

The program vendor provided a significant enhancement to fostering this sense of competition when it created a way to alter the display of the monthly bar chart. When the reports were produced by Duke Energy, the amounts displayed for the average home, your home, and the efficient home would change each month as the data changed. But pilot testing and industry research revealed that when customers were shown that their energy usage was lower than average, their performance tended to revert toward average rather than continuing to improve toward the efficient home. Duke Energy and the program vendor resolved this issue when the program vendor developed a way to drop the column displaying average home performance and center the remaining two columns (see Appendix D: Example MyHER Mailing for an example). This change necessarily causes readers to focus on the difference between their homes and efficient homes, thereby continuing to spur a sense of competition toward achieving even greater energy savings. However, even when customers use less energy than average for a given month, the average home performance continues to be displayed on the annual usage line graph since the customer may be above average and below average at different times of the year.

Similar attention to detail has gone into the explanations that accompany the monthly comparison chart (Figure 1). To the right of the monthly bar chart a legend explains whose electricity usage is being compared to the customer. The legend then lists the number of households in the data cluster, as well as providing the heat source, range of square footage, and age range of the houses in the cluster. This information is presented so that customers understand how closely similar the homes they are being compared with are. This is intentionally stated to increase credibility and build customer trust in the accuracy and reliability of the comparisons.

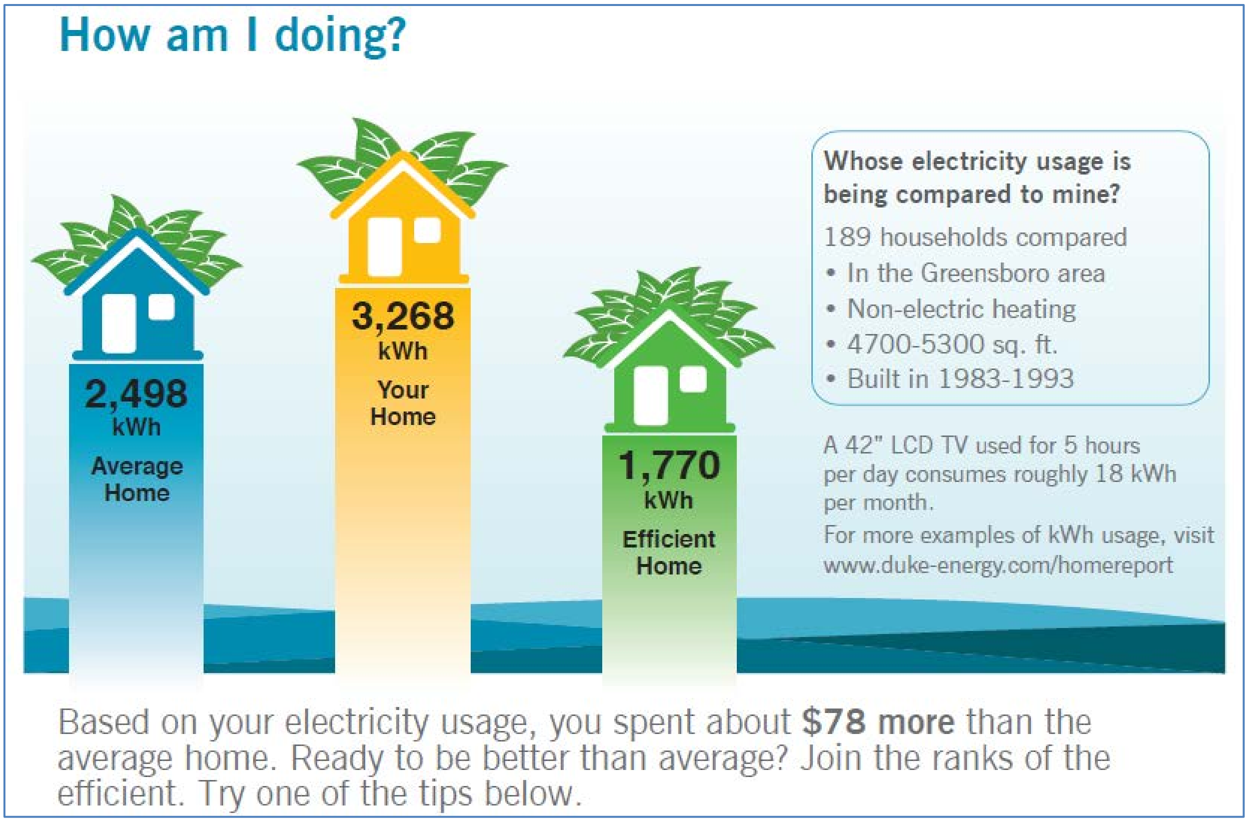


Figure 1. Monthly Energy Use Comparison

This verisimilitude became a point of disagreement between Duke Energy and the program vendor during the development phase. The program vendor felt strongly that the number of homes, square footage, and age range shown on the reports should be changed each month to automatically and accurately reflect the exact homes in that month's dynamically generated comparison cluster. Duke Energy disagreed, citing calls and emails from customers who were confused as to why those numbers were changing each month. Because customers were focusing on those "wrong" changes instead of focusing on their changing energy use, the two parties eventually agreed to display a fixed range of comparison for the square footage and home age. Those were set at +/- 300 square feet and +/- five years from those attributes of the customer's home. This change ensured that customers would see a consistent and reliable benchmark for the comparisons, even though the actual numbers may vary slightly according to the data points in that month's dynamically generated cluster.

Other elements of the report have been the subject of careful consideration as well. According those we interviewed, each element and detail of the reports has been carefully considered to elicit a trusting and positive response from Duke Energy customers. The typeface, colors, gradient fades, and differing layouts between the first and second page were all specifically chosen. For instance, the color yellow was selected to show the homeowner's energy usage since it is the easiest color to see, while green was picked for the "efficient" home to reinforce the "green is environmentally friendly" message. Likewise the houses atop the monthly bar chart columns were selected for their simple iconic representation of a home, and the green leaves were designed to simultaneously imply financial savings and environmental friendliness.

The current two page format was expanded in March of 2012, when the program vendor began producing the reports in order to provide more space for additional information. Prior to that time, the reports consisted of a single page of new information with monthly and annual graphs showing on the same page along with the energy saving tips. The rear of the report consistently listed frequently asked questions. To create extra space for the graphs and messages, the FAQs were shifted to a welcome letter (see Appendix F: Welcome Letter and Frequently Asked Questions) that arrives by mail along with the first report. The program website replicates these FAQs so customers can refer to them long after the welcome letter has been disposed of.

Two questions: "What is this report?" and "Why would Duke Energy try to help me save energy?" were retained on the front page of each report since they were considered important to establish and ensure context for the reader. The reports also contain other consistent elements including email and telephone contact details, a link to the program website, and a Quick Response (QR) code inviting those with mobile phone scanners to watch an online video about the home energy reports.

Participant surveys, conducted as a part of this evaluation, had not yet been completed when we spoke with the product manager, call center representative, and the Customer Prototype Lab (CPL) manager, but all three people indicated that customers are responding positively to report design, according to unsolicited customer feedback obtained via the call center and email. (This finding was later corroborated by satisfaction ratings from the participant surveys as discussed in the Satisfaction with MyHER section below.) A link to a new online customer opinion survey was added to the reports in March of 2013. It was anticipated to provide ongoing feedback, but no survey results had yet been prepared at the time of this evaluation.

Presenting Monthly Energy Costs in kWh and Dollars

While home energy use comparisons are currently presented using kWh, this practice began during July of 2013. Prior to that time the data was graphed on the reports in terms of dollars. Dollar amounts are calculated using the actual kWh usage and a multiplier known as a rate factor, which is a composite figure created to represent the blended value of all the charges a customer would be presented with on the bill. This single number was multiplied by the kWh used by each customer to determine the dollar amount to display on the reports. While the monthly bar charts are now displayed in kWh, rate factors are still used to generate the dynamic dollar values presented below the graphic. The $78 amount shown in Figure 1 was calculated using a rate factor.

The rate factor for North Carolina is $0.1006, while that of South Carolina is $0.1062.The rate factor is calculated by the Duke Energy rates department after allowing for the various tariffs that eligible customers may be on, as well as riders, taxes, and other fees. This single number is considered to be the most appropriate way to create a statewide “apples-to-apples” dollar value comparison between sets of customers who may be on different rate schedules.

Duke Energy made the decision to switch from graphics displaying dollars to using kWh for several reasons. First, when data is displayed in kWh it is an accurate reflection of the customer’s actual energy usage, whereas rate factor-generated dollar amounts tend to be close approximations. Second, by changing the data labels from dollar amounts to kWh, Duke Energy brought the MyHER reports into closer alignment with customer bills. Based upon feedback from customer focus groups, Duke Energy felt this would help to increase the perceived accuracy of the MyHER reports, and thus positively influence their effects on customers.

The switch from dollars to kWh was anticipated to yield other benefits as well. The Duke Energy product manager cites an additional advantage being that kWh figures are the true metric of customer usage. KWh is also the metric for measuring the impact of the energy savings for the MyHER program. Thus, a commonality of metrics and language may be achieved by reporting the values in kWh. Moreover, reporting usage in kWh serves to begin educating customers about the importance of kWh for their homes in a manner akin to miles per gallon for their cars. In the same way that fuel economy influences their driving behavior and vehicle purchases, a stronger understanding of home energy economy has the potential to lead to greater and more persistent savings.

Report Messaging

Duke Energy devotes considerable time and effort to ensuring that the language in the home energy reports remains consistent with the company brand — TecMarket Works finds the copywriting to be crisp, the wording friendly, and the tone encouraging. This messaging discipline is maintained through a combination of creative freedom on the part of the writers and keen editorial oversight during the internal review process. While every word on the reports has been carefully considered, three areas of the report contain dynamic messaging sections that serve to turn an otherwise static report into an individually targeted mailing to encourage the adoption of specific energy saving measures appropriate to that particular home.

Explaining the Graphics

One of the hallmarks of the MyHER program is the program vendor’s ability to customize the messages that a customer sees according to their home’s monthly usage, their cluster’s values for average and efficient home, and the specific characteristics of their home. This customization applies to captions below the graphics, to home-specific energy savings tips on the front page, and to tailored messages from Duke Energy on the second page.

The first area with customized messaging is the caption below the monthly energy use graphic on the front page. That wording is automatically generated based on software rules designed around the numeric differences between the monthly cluster’s unique values for the average home, your home, and the efficient home. So, if a customer uses more energy than the average home, the message might say, “You spent $36 more than the average home. Ready to be better than average? Join the ranks of the efficient. Try one of the tips below." However, if the customer uses less energy than the efficient home, then the message might say, "Way to go! You are among the most efficient homes in your area. You can always save more. Try one of the tips below."

A similar customization methodology applies to the 13-month comparison on the second page. Using the same customer examples as just described, these messages might say, "Your usage for this month has <increased> compared to a year ago. You spent <$ value> <more> than the <efficient homes> in your area in the last 12 months." Or it might say, "Your usage for this month has <decreased> compared to a year ago. You are <among the most efficient homes in your area for the year. Great job.>" The brackets < > are inserted here to illustrate conditional text delivered according to preset conditions in the program vendor's software coding. In all cases, the messages are intended to be encouraging and are written to prompt customers to take the next step.

Presenting Energy Saving Ideas

Just below the current month comparison chart on the front page is a headline that reads, "What can I do to save money and energy?" This headline tops a two column box that presents home energy tips specifically targeted at that home for that month. The tips suggest ways the customer can save energy and improve their monthly comparisons with neighboring homes.

Tips cover topics ranging from lighting, HVAC, and water heating to weather sealing, appliance use, and new Energy Star recommendations. While many tips are generally applicable to all customers at any time, others are seasonally appropriate and are tailored to the particular characteristics of a given home. So, a tip about air conditioning appears during the summer and new homes don't receive suggestions about replacing old windows. A sample tip is shown in Figure 2 below.

Figure 2. Energy Saving Tip

Tips can also be prioritized by potential energy saving impacts, so recommendations that can produce higher savings are mentioned before those likely to have a lesser impact. This dynamic system makes it possible to present one customer with a message about CFLs in January, while a neighbor who becomes eligible to participate in the program in February may see that same CFL message in March, while the first customer sees a message about task lighting that month.

To further increase the likelihood of the customer taking action, the program vendor pairs each tip with an estimate of the dollar savings that action might bring. Savings estimates are calculated based on a combination of deemed energy savings for the measure and particular household characteristics. For standard measures, such as replacing an incandescent bulb with a CFL, these calculations are fairly straightforward. However, others can be considerably more complicated. For instance, showing an accurate savings estimate for changing a thermostat setting requires building model calculations based upon variables like heating fuel, square footage, and type of HVAC system, which may or may not be known depending upon the data available. Going to such lengths is far more complicated than simply presenting one standard dollar amount to everyone, but Duke Energy feels the extra effort is worthwhile because it demonstrates for the customer the real world financial value of making the effort.

The program vendor maintains a library of tips (Appendix E: Summary of Energy Saving Action Tips and Messages) and is contractually responsible for writing new tips and calculating the associated energy savings. Tips were written at the start of the contract and revised to align with Duke Energy’s technical specifications and branding considerations. The savings estimates were likewise approved.

To ensure the tips remain fresh, the system is designed to present new tips to participants each month, with no repeated tips until all unseen messages in the tip library have been used. The original tip library contained a total of 23 energy savings tips, five of which were coded not to apply to newer homes, leaving a total of 18 tips for those customers. By April of 2013, the program vendor had reached the end of its original collection of 18 tips for Ohio participants, who had been receiving the program vendor-generated reports since March of 2012. (South Carolina customers would not run out original tips until July of 2013, while North Carolina customers had enough original tips to last until September of 2013.)

In April of 2013 because the program vendor had not yet written new tips, some Ohio customers began receiving repeated tips. By intention, the tip generation system was to recycle tips by age, repeating the oldest ones first so that customers were less likely to recall seeing them before. However, spot check quality control measures at that time revealed that program vendor programming issues caused at least one participant to receive the same tip two months in a row. As a result, the automated tip assignment system was suspended for all service territories until the software code could be updated. The program vendor’s human resources were not available to make this fix until after the dollar to kWh changes (discussed under “Presenting Monthly Energy Costs in kWh and Dollars” above) had been completed. As a result, dynamic tip assignment shifted to a more universal methodology in the interim.

In May of 2013 the program vendor wrote 28 new energy savings tips for its library, 14 of which will be paired with energy saving calculations, and 14 of which won’t show specific dollar amounts for the energy savings, such as cleaning the lint trap on the clothes dryer or storing hot coffee in a thermos, since the savings will be small. Two new energy saving tips were selected for the reports that all participants were to receive in June. For the July reports, the program vendor worked with three new tips, including one about grilling outside in summer, and one about installing a programmable thermostat. The grilling tip was sent to all report recipients, while the thermostat tip only applied to 99% of customers. So the third tip to check the temperature of your freezer and refrigerator was sent to the remaining 1% of customers.

This interim solution was used until updated software code for dynamic tip assignment was ready for generating the reports mailed to customers in November. The updated system also adds a new feature: one no cost/low suggestion, such as closing window blinds, and one more expensive suggestion, such as having your HVAC system serviced, will now be presented to customers. Roll out of this update feature was scheduled to begin with the resumed dynamic messaging in November of 2013.

Duke Energy Messages

The second page of the report is visually commanded by the annual energy trend chart. Below that is the headline "Take action. Reduce your use." This marks the section of the report reserved for two customized messages directly from the Duke Energy MyHER product manager. The messages come in two types — general energy savings suggestions and promotions for other Duke Energy efficiency programs. The messages the customer sees are determined by the customer's previous participation in other Duke Energy programs. See Figure 3.

Take action. Reduce your use.

Heading out for a vacation?

Don't let energy vampires run wild in your house while you're out of town this summer. Every appliance with a clock, "power brick" or remote control is CONSTANTLY drawing power – even when switched off. Fight back! Do some unplugging before you head out the door. And consider installing a power strip or two. That way saving energy is as easy as flipping a switch.

One more thing: Be sure to turn your thermostat up or off before you head out. No point paying to cool a house when nobody's home!

Wouldn't it be great if doctors still made house calls?

Think those days are gone?

If you qualify for a Home Energy House Call, your free in-home energy assessment includes personalized information tailored to your home and energy practices, along with a free Energy Efficiency Starter Kit.

Visit www.Duke-Energy.com/MyHER612 to find out if our Energy Experts are accepting appointments in your neighborhood.

Figure 3. Duke Energy Messages

The MyHER product manager creates and maintains a calendar of messages for the year. Typically, one of the two messages shown each month is either a seasonally appropriate or a general message that can run at any time of the year. Seasonally appropriate tips could include suggestions for how to save energy while baking (delivered during November) or the direction ceiling fans should spin in summer (delivered in June). General messages could include energy savings tips like how to check the seal on a refrigerator door with a dollar bill, safety messaging such as calling 811 before you dig, or requests for contributions to help with heating assistance. These messages are generally shown on all reports. The second message slot tends to be more customized, based on promotions for other efficiency programs each month.

The MyHER product manager works with colleagues to develop a schedule to encourage enrollment in various Duke Energy efficiency and rebate programs each month. The program vendor's system cross-checks Duke Energy's customer participation records, and if the database indicates that the customer has not yet participated in the featured program, it includes a promotional message encouraging the customer to enroll (see Figure 3 above). If the database indicates that the customer has already participated in the program, then the program vendor's software coding replaces the program promotion with a more general substitute, such as a message encouraging readers to visit the Duke Energy website to watch energy efficiency videos.

Messaging Challenges

This system generally worked well for months. But the team ran into a challenge in October of 2012 when it sought to send out segmented messages regarding participation in Duke Energy's CFL program. This particular promotion added a new wrinkle to the system. Instead of requiring a software look up to determine whether a customer had previously participated in the program at all, this segmentation scheme required the program vendor to query data regarding the number of CFLs that the customer had previously ordered. If the customer had ordered 9 or fewer CFLs, then they were to receive a message encouraging them to order additional bulbs. If they had ordered 10 or more CFLs, they were to receive a message encouraging them to be sure to install the bulbs that they already had.

Querying this new data field proved to be problematic, as was revealed during quality assurance checks. The underlying issue was subsequently identified and fixed before the next month's cycle. While it took multiple attempts for the program vendor to correct a problem, the effort exemplifies the determination that the team has to ensure that customers receive accurate data and messaging. What is more, the effort proved effective, lifting CFL participation by more than three percent in OH, NC, and SC where the messages were sent.

With a dynamic system as complex as the one the program vendor uses to generate the reports, a certain number of technical challenges are inevitable. Other issues, however, are more accurately considered to be data quality lapses resulting from the complex nature of the data integration and report generation process. Those challenges are discussed below.

Data Quality Assurance

The above-mentioned challenges represent the types of issues that Duke Energy and the program vendor work closely to resolve either through advance strategic planning or upon discovering a problem during the process of data quality assurance. Quality control checks are built into each step of the data ingestion and report generation process on the program vendor side. Duke Energy also maintains its own quality control measures to ensure that the reports are generated using accurate data, that graphs and messages are displaying correctly, and that the appropriate customers are receiving reports.

When the program vendor assumed report generation in March of 2012, much of the quality assurance process resided within its production arm. However, as errors have been discovered, Duke Energy has added layers of oversight. Since that transition, the following types of data quality issues have been discovered and corrected:

- Incomplete data population,
- Improperly rendered graphs due to missing data,
- Data precedence issues, whereby older inaccurate data replaced corrected information,
- Inappropriate data ranges,
- Inaccurate messaging per household characteristics,
- Dollar savings estimates of incongruous amounts,
- Not accounting for program participation,
- Inaccurate message segmentation,
- Repeated energy saving tips two months in a row,
- Duplicate mailings to some participants within a single month (sent several weeks apart),
- Mailing to approximately 100 participants in a control group in North Carolina, and
- Heat fuel type coding issues resulting in inaccurate rendering of energy saving calculations for some customers and in improper cluster comparisons shown in reports sent during April of 2013 (discussed below).

Many, but not all, of these errors were corrected prior to mailing. To ensure they don't return, as well as to find as yet undiscovered issues, in January of 2013 Duke Energy instituted a quality assurance policy whereby the program vendor provided Duke Energy with weekly batches of 10,000 PDF examples of reports (up from 1,000 PDFs beginning in July of 2012) for a representative visual inspection, plus a quality assurance file that contains all pertinent customer data used for that month. With approximately one million customers receiving reports and still more customers not receiving reports that month due to various eligibility requirements, the file size is immense. The Duke Energy data analyst reviewed this file each month. It was during such a review that the inadvertent mailing of 100 customers in a control group in North Carolina was discovered. The source of the problem was identified and the fix applied. The 100 customers were removed from the control group and the database was updated with a note explaining the reason for the transfer.

While this error involved 100 people, other errors involving fuel type inaccuracies caused issues with more than 119,000 reports sent during April of 2013 (Table 6). The problem was discovered during May of 2013, at which point the current month's report creation cycle was halted for seven days while the problem was identified and rectified. The difficulty arose from issues with the software coding used to reference the type of heat associated with each customer's home. While all states except Indiana were affected, the issue predominantly involved South Carolina customers, who represented 99% of all inaccurate reports due to a program vendor mistake of not accurately updating all customer records for that state. In all, 119,049 South Carolina customers were affected. This represents 57% of South Carolina MyHER recipients. Only 58 North Carolina customers received reports containing inaccurate fuel type references.

Table 6. Number of Reports with Incorrect Heat Fuel Type*

Number of Reports Sent with Incorrect Heat Fuel Type					
OH	**IN**	**KY**	**NC**	**SC**	**Total**
35	0	5	58	119,049	119,147

**Shows total number of reports sent. Actual numbers of reports whose clusters were affected are higher.*

Duke Energy deemed these data quality problems and mail delays to be violations of the vendor's Service Level Agreements and resulted in a financial penalty for the vendor. Despite this, customer response regarding the issue was negligible. The call center reported receiving "only two or three calls" (on a volume of 119,147 erroneous reports sent) from customers who noticed anything related to the fuel type issue. Likewise, the Customer Prototype Lab reported no noticeable customer feedback via email correspondence.

To address these quality assurance issues Duke Energy and the program vendor instituted the following systematic, procedural, and staffing changes beginning in June of 2013:

Program Vendor

- Dedicated three new employees to the MyHER project, bringing the total to seven people;
- Defined new roles and hierarchies for support, quality control, and software development;
- Assigned one new project employee to conduct an end-to-end review of all MyHER processes and document everything;
- Mandated full documentation for each change by any party;
- Automated systems to reduce the possibility of human error;
- Created specific checklists for each process that requires human activity; and
- Improved post monthly-cycle reporting.

Duke Energy and Vendor

- Began full review of all customer data file for each weekly batch prior to report generation (Previously this was conducted monthly after reports were sent.);
- Initiated data reconciliation of all customer demographic data, including heat type, on a cycle basis;
- Required signatures from program vendor and Duke Energy for each change; and
- Engaged continuous dialog to better understand, implement, and document all feature requests, technical fixes, and quality assurance issues.

Duke Energy and the program vendor considered the additional quality assurance efforts to be necessary in eliminating the opportunity for similar types of errors in the future. Implementation of these efforts was said to be smooth by both parties.

Printing and Delivery

Once Duke Energy has confirmed that the PDF data complies with quality assurance requirements and that all necessary corrections have been made, the program vendor receives the go-ahead to release the PDFs to the printing subcontractor that handles the paper production and mail delivery. The printing subcontractor prints the reports and envelopes. Then it sends them to a commingler for processing and mailing via the U.S. post office. The printing subcontractor also checks for first-time program participants and inserts a welcome letter for those who have not previously received a report.

Report Frequency

Pilot testing in Ohio and South Carolina compared the effectiveness of monthly versus quarterly delivery of the reports. Results showed that customers who received monthly reports saw greater energy impacts. However, the MyHER reports are currently delivered to qualifying customers eight times per year. Since heating and cooling costs account for the largest shares of a typical home's energy usage, the reports are generally sent three months in a row during winter and three months in a row during the summer, since these are peak heating and cooling months. The reports are also sent every other month during fall and spring when customers typically require less HVAC. This frequency of delivery was deemed to be the optimum balance between reinforcing energy saving behaviors and managing program costs for production, printing, and delivery. Duke Energy retains the ability to shift report delivery months for a given state without impacting delivery in other states based upon weather, programming needs, or regulatory requirements.

Print Quality

Both the Duke Energy staff and the program vendor employees we spoke with expressed concerns about the quality of the printing done by the printing subcontractor. Minor issues regarding text, color, and gradient fades had been identified and resolved. But one significant issue involved the presence of streaks or bands of white in the color banner that made it appear that the printer is running out of ink.

The printing subcontractor maintains its own quality control process that duplicates one report out of every thousand for a visual inspection prior to mailing. Employees at the printer were satisfied, but the MyHER product manager double checks the print quality using returned mail and seed names of fellow Duke Energy employees who share their reports in the office. It was these Duke Energy second level checks that identified the printing issues.

Once made aware of the issue, the program vendor worked with the printing subcontractor to resolve the situation. As of June 2013 the program vendor and Duke Energy agreed that the print quality was acceptable, although efforts to fine tune the system persisted into September 2013.

Report Delivery

The service level agreement between Duke Energy and the program vendor specifies that the vendor, and hence the printing subcontractor, will ensure the 98% on-time delivery of each batch of reports in a 17-day production cycle, with four batches per month and a total volume of approximately one million reports across all service territories. Of these reports, approximately 685,000 are currently designated for Carolina System customers.

Both the program vendor and Duke Energy report that these service levels have been satisfactorily met in all months, except June of 2013, when data quality lapses, and the necessitated corrections and fixes, caused report production to halt for seven days, as discussed under Data Quality above. As a result of the week-long production halt, the first reports in the June cycle entered the mail stream 12 days late. A shorted production cycle incrementally reduced the delay to a single day for the last batch of reports sent in that monthly cycle. This brought the next month's reports back into a normal timeframe for delivery. The program vendor was assessed a financial penalty for this delay according to service level contracts.

Enterprise Server

In addition to holding responsibility for producing and distributing the reports, the program vendor also provides an online web portal, called the Enterprise server, which hosts customer household data, as well as PDF copies of each customer's monthly reports. This system makes it possible for agents of the call center vendor and Customer Prototype Lab to input customer-generated corrections for their household data (e.g. square footage, home age, heating fuel type) and call up copies of monthly reports to discuss them with customers on the phone or via email.

The Enterprise system is designed to run 24 hours per day, even though the system only needs to be accessible to customer service representatives during business hours. As with any server, it must be maintained and it occasionally experiences operational issues. The majority of the time, those issues are fixed through scheduled maintenance and planned performance upgrades. However, as may be expected with an online system, the server has also experienced a few crashes that have taken it offline. The root causes of these issues have been different each time. Most often, the system has gone down for only a few hours or less due to a software issue that was quickly fixed. Once, a hardware failure required a day for replacement. This also occasioned the installation of redundancy measures to prevent the issue from reoccurring. Despite this handful of down times, the call center and email support agents report that they are pleased with the system's ease of use and robust reliability.

Call Center Customer Support

Because the MyHER program is designed as an opt-out program that delivers reports throughout the year, Duke Energy deemed it important to have a toll-free number and a dedicated call center for customer support. The call center vendor provides call center operations for the MyHER program in all Duke Energy service territories that offer the program. This same third party vendor provides call center support for other Duke Energy programs, as well. For this program, the call center vendor staffs 13 trained customer service representatives (CSRs) and two team leads. The call center vendor began supporting the MyHER program overall on June 11, 2012.

Call Volume

Call volume for the program is low. For all states served by the program, only 13,396 inbound calls have been received as of October 16, 2013. For North Carolina, the total call volume as of the same date was 6,393 calls since starting on October 17, 2012. For South Carolina there were 2,937 calls since starting on May 25, 2012. Given that reports are now sent to more than one million Duke Energy customers, this equates to less than one percent of total MyHER recipients. The percentage of calls by customers from the Carolina System is correspondingly low.

Overall, call volume averages less than 30 calls per day from all states, with lows of typically less than 20 and peaks reaching less than 100 calls per day when reports are mailed. The call center team leader that we interviewed reports that individual state call volume follows a predictable month over month pattern. Each time a new round of customers is added to the program, the percentage of calls rises for the first two reports, peaks by the third report, and then diminishes since by this time the majority of customers who desire to correct errors or ask questions have done so.

TecMarket Works considers this pattern, and the correspondingly low percentage of customer calls, to be a positive indication that the reports are well-designed with accurate data, meaningful comparisons, and clear messaging.

Call Handling

All CSRs are equipped with a Telescript software system that generates context-specific scripting to guide them in the most appropriate responses. The system also captures all call data for record keeping, reporting, and quality assurance.

When customers call in, agents are trained to acknowledge the customer’s request and to ask for an account number. This is used to locate the appropriate household records. If the customer has called previously and is calling from same number, the Telescript system will auto-populate the information. However, agents always have the customer confirm the account to ensure they have the proper file just in case someone is calling from one phone to discuss a different household’s report or they are using a different phone. If no existing record is found, the agent inputs the customer’s name, address, phone number, and account number.

After ensuring the customer’s contact information is in the system, the customer’s specific desires are addressed. Depending upon the request, the CSR uses a dropdown menu to select the most appropriate call type. This brings up a script that specifies how to deal with that kind of call.

If the customer has specific concerns, those are addressed first. For instance, customers sometimes ask why the amount on the reports doesn’t match the amount on their bills. The Telescript system provides the CSR with a response akin to the following: “Your bill uses your kWh and your actual rate, but to compare everyone on a level playing field we use an average price per kilowatt-hour because customers may have different rates.” Similarities between bill and report also arise because billing cycles do not necessarily correspond with monthly report cycles, so agents explain that the reports are intended to be informative and advisory rather than duplicative.

Once specific concerns have been addressed, the agents access the program vendor’s online Enterprise system that provides online access to the customer’s specific reports, so they can view customer reports in real time, while the customer is on the phone. The agent verifies that the most recent report, which is typically what the customer has in hand, is showing the correct square footage, heating type, and year the home was built. Making one or more of these corrections is the most common reason to call, so customers frequently mention them. But the agents are trained to always ask in an effort to be thorough, since the conversation presents an ideal opportunity to improve Duke Energy’s records and the accuracy of the home report comparisons. Any corrections are updated in the Enterprise system. The changes are also captured to show how many customers are calling to correct their information and which data points are the most frequently corrected. The most frequently corrected data points are heat fuel type, square footage, and home age, in that order.

Next, the agents direct customers to the energy saving action items on bottom of page one and the Duke Energy message section on page two. Depending upon the interest of the customer, a discussion of other energy efficiency saving measures may follow. The Telescript system contains answers to previously asked customer questions. So agents are prepared to discuss where to install energy efficiency upgrades, where customers can find tax incentives for energy efficiency, CFL mercury content, and more. The agents are also trained to discuss basic information about Duke Energy's other energy efficiency programs. If customers are interested in a specific program, the agents provide the toll-free phone number and an offer to transfer the caller to the appropriate department. If the customer is calling to order free CFLs, this service is also taken care of during the phone call.

The Telescript system also guides the CSR in the event that a customer wants to stop receiving the reports. As the agents accommodate the request, they are trained to inquire for a specific reason the customer wants to opt-out. Check boxes in the system make it easy to capture common reasons, including when customers feel they're already efficient enough; they no longer need the report; they don't feel the report is accurate; they don't want to waste paper and/or postage; or the report is being sent for a garage account or a home business. Another field captures less standard reasons. The three most common reasons for opting out are that the reports are an inappropriate use of Duke Energy's resources (40%), customers believe they are doing enough (16%), and no reason given (10%).

Conversely, if a customer wants to opt-in to the program, the Telescript system guides the agent through that process as well. The agent collects account information and confirms eligibility based on disqualifiers such as an apartment number or a lack of 13 months of billing information. If the customer is qualified, then the data and request are passed to Duke Energy for processing, since the customer may be part of a control group and further tracking adjustments may need to be made. If the customer is ineligible due to lack of 13 months of billing data, they are informed that they will be automatically enrolled when they become eligible.

Approximately 95 percent of customer calls follow one of the previously mentioned general scenarios. The remaining five percent of customers may have specific concerns that require redirection to other Duke Energy departments, such as bill inquiries, making payments, arranging credit, and speaking with customer service about other account-related matters. The frequency of redirected calls was notably diminished beginning on September 17, 2012, when an interactive voice response (IVR) system was installed on the front end of the program's phone system. The system intercepts inbound calls and says:

> "Thank you for calling My Home Energy Report. To ensure that you receive accurate and courteous service this call may be recorded. For questions or more information about My Home Energy Report press one. For questions about your Duke Energy bill, electric services and all other questions press two."

This less-than-30-second step helps to ensure that customers reach the right department as swiftly as possible. It also helps reduce call handling costs, since it frees up MyHER agents to spend more time focusing on program-related calls.

Training

In addition to the on-the-spot support provided by the Telescript system, the call center vendor's customer service team underwent two days of intensive training on June 7 and 8, 2012. Training was provided by Duke Energy representatives from the MyHER new product development and product management teams, as well as by representatives from Duke Energy's Customer Prototype Lab (CPL), which handled call center functions during the previous two years of piloting and operational functioning. Training included a program overview, PowerPoint presentations, training playbooks, sample reports for agent review, the program welcome letter, and a comprehensive compilation of frequently asked questions and suitable replies developed and tested during two years of customer phone calls. The agents were also trained on how to use the program vendor's Enterprise system.

All customer responses generated by the Telescript system and used by the call center vendor and CPL (see Email Customer Support below) have been carefully crafted by Duke Energy to deepen customer engagement and foster customer satisfaction.

In the event the program vendor's Enterprise server goes down, CSRs are trained to report the issue so a trouble ticket can be sent to the program vendor. CSRs then manually note the customer's account information and any requested data corrections, so the information can be added to the Enterprise system when it comes back online. If customers have questions about their reports, then the agents return the customer's calls when the system is operational. The call center vendor reports that this has only been an issue approximately five times during their usage of the Enterprise system.

Quality Control

Quality assurance is maintained through three layers of call monitoring. For all Duke Energy programs that it supports, not just MyHER, the call center vendor's internal review process randomly reviews two calls by each agent per week. The call center vendor's quality assurance lead then meets with the agent to review the call and conduct coaching according to an agreed upon checklist. This is the first level of review. The next level is conducted by Duke Energy staffers who randomly select 50 calls per month and perform a similar checklist review and coaching session. The final layer of review is performed by the MyHER product manager, who also randomly selects calls to listen to.

Call review primarily focuses on set standards for interpersonal engagement with the customer, such as building rapport, being apologetic, remaining professional, explaining things effectively, avoiding slang terms or abbreviations the customer may not be familiar with, and providing respectful service. Agents are also judged on call management, such as how well they steer the course of the call and keep the caller on point. Another point quality controllers look at is customer focus, which is a category for assessing an agent's job knowledge and problem-solving skills as applied to meeting customer's expectations, offering solutions to customers, and acting with customer interests in mind. Yet another category of review looks at call results to ensure that business objectives are being met and supported, such as trying for one-call resolution, properly identifying the caller, being proficient, and upholding the Duke Energy brand.

When interviewed, the MyHER product manager reported that current call center operations are going well. Earlier in the program cycle, shortly after call center launch, she indicated that quality assurance revealed a discrepancy between call monitoring suggestions and initially trained procedures for reviewing a customer's report. That has since been resolved.

Service Level Agreements

In addition to meeting quality assurance standards, the call center vendor's service level agreements specify requirements for average answer time, average call handle time, and abandonment rates. Both the call center vendor and Duke Energy report that the call center is well-staffed, well-trained and that call standards are being met.

Email Customer Support

In addition to call center support, customers also have the option of receiving support via email. The email address, HomeReport@duke-energy.com, is printed on the front of every MyHER report. Email messages are routed to Duke Energy's Customer Prototype Lab (CPL), which has supported the program since its pilot stages in Ohio and South Carolina. CPL handles the program's email support for all Duke Energy service territories. CPL service representatives receive the same training and use the same customer response playbook and Enterprise software system as their counterparts at the call center vendor.

As with the customer call center, weekly email volume depends upon report batch timing. Likewise, email volume tends to drop off after customers have received their fourth or fifth report. Total CPL email volume during a representative week of Feb 18-22, 2013 was 51 emails. During the next week, 88 inquiries were received. Of these, North Carolina customers sent in 48 emails, while South Carolina customers sent in 13. These numbers appear to be consistent with fact that both groups of customers had received multiple reports by February, although those in South Carolina had received more reports by then. The ratio of email inquiries to customers enrolled in a given state appears to be consistent.

Also, like the call center, the most frequent reason for customer email is to correct comparison criteria (i.e. heating type, square footage, home age) for their home. Other customer emails focus on the following categories, which are not ranked in order of popularity.

- Opt-out (the reason why is captured, see below)
- Opt-in
- General energy efficiency questions
- Billing, service, and credit questions
- Other

When customer requests such as these are processed, the CPL staff use the program vendor's Enterprise system to make the requested change to the customer's account.

Reasons for customer opt-outs include:
- Customers feel they are doing all they can (most popular)
- Not concerned about usage
- Have received the report enough times

- Report is incorrect and they are not patient enough to correct it
- Color commentary similar to “This is a waste of money”
- No reason stated
- Other

Quality Control

Quality assurance is maintained through two levels of monitoring by the CPL director and the response team supervisor. Both conduct weekly reviews of all CPL inbound and outbound communications. They also conduct spot checks of emails specifically for the MyHER program. Because CPL has supported the program for a considerable time, the majority of customer requests or questions are routine. So the quality reviews skim standard exchanges such as square footage corrections and focus more closely on other questions such as, “I’ve followed all the tips on the reports and I want to save even more. What else can I do?” Even these responses are routine at this point, according to the CPL director, but they are regularly reviewed to maintain quality.

Service Level Agreements

CPL’s customer service level agreement provides for MyHER program support between 8 a.m. and 5 p.m., Monday through Friday, and allows two business days for responses to customer queries by U.S. mail, email, fax or social media. These agreements are being met or exceeded. The level of support provided by the CPL is considered to be of high quality by all parties TecMarket Works spoke with.

Customer Paper Mail

Periodically, customers also send in paper mail to the program. Those messages are directed by Duke Energy mail code to the product manager, who reads the message and forwards the message to the call center for processing, unless a personal response from the manager is seen as necessary.

Website

The current program website consists of a limited number of web pages containing static information, such as a primer on how to read the report and a list of frequently asked questions. It also has one interactive feature, a two minute online video featuring an actress who explains more about the reports. The website is generating increasing levels of traffic according to Google Analytics, which Duke Energy deploys to track website metrics for the My Home Energy Report web pages.

Web site visits to the North Carolina pages increased from a mere 129 between the program launch in October 17, 2012 and January 31, 2012 compared to 2,483 visits between January 1 and September 30, 2013. During that same period, visitors stayed longer as well with a 2012 average of 1.35 pages visited over 1:04 minutes compared to 2.25 pages and an average visit time of 2:33 minutes during 2013. South Carolina website traffic also increased albeit not quite as dramatically. Between May 25, 2012 and year end 2012 the South Carolina site had 310 visits compared to 611 between January and September 30, 2013. However, unlike North Carolina, the number of page visits dropped from an average of 3.01 minutes during 2012 to 2.4 minutes during 2013. Time on site also declined from an average of 3:47 minutes to 2:35 minutes. More details are provided in the table below.

Table 7 Website Traffic

State		Visits	% New Visits	New Visits	Bounce Rate	Pages/Visit	Average Visit
NC	2013	2483	72.9%	1810	16.7%	2.25	2:33
	2012	129	79.1%	102	27.1%	1.35	1:04
	% Change	1824.8%	-7.8%	1674.5%	-38.4%	66.6%	138.0%
SC	2013	611	77.1%	471	1342.0%	2.40	2:35
	2012	310	82.6%	256	6.1%	3.01	3:47
	% Change	97.1%	-6.7%	84.0%	119.0%	-20.1%	-32.0%

Social Media

As a service to the program, the Duke Energy Customer Prototype Lab monitors social media for various mentions of the Home Energy Report. Most online commentary is dealt with internally, such as making changes to household characteristics. However, on occasion an online comment requires a different level of handling. For instance, an agent in the CPL discovered a negative customer comment on Twitter complaining about the tone of the report wording (see unintentional sarcasm in Report Messaging above). Per Duke Energy protocol, the comment was forwarded to Duke Energy's social media liaison for products, services, and complaints. The liaison responded promptly to apologize to the customer and explain the wording was intended to be complimentary. In a multipart exchange that followed, the liaison addressed the customer's concern, answered a follow-up question, and noted a feature request for an online version of the reports in the future. The incident is mentioned here to demonstrate Duke Energy's overarching efforts to monitor and respond to customer feedback regarding the program in whatever channels customers prefer to use.

Working Relationships

The Program Vendor

The program vendor and Duke Energy have worked together since the vendor was awarded the contract in 2011. The joint program operations team meets weekly via teleconference and uses email and phone calls as necessary, often on a daily basis. The weekly meetings cover feedback from customers, data quality, new system fixes and upgrades, progress on features being worked on, and the current weekly production cycle. Monthly operational meetings review the previous month's entire production cycle. Separate quarterly governance meetings bring together senior management from both organizations to discuss business forecasts and strategic planning, progress toward goals, issues management, and service level performance, including on time delivery, data quality, and print quality.

Because this program requires billing analysis to determine energy savings, throughout the first year of operations the program has received no feedback about progress toward its energy saving goals. That information will predominantly come from the impact evaluation that will follow this process evaluation. Short of having this information, the program team has focused on enhancing customer experience and improving system functionality to ensure data quality.

Since the program vendor was awarded the contract in 2011, the vendor and Duke Energy have worked closely to engineer a largely automated mechanism for generating more than one million customized energy reports each monthly cycle. With a program as highly customized as MyHER, myriad changes needed to be made to ensure that all the complexities of report generation work smoothly. During the development process and first nine months of full commercial operation, the two companies experienced periodic friction regarding quality control issues and change requests. These came to a head in December of 2012 when they disagreed about the display of the date printed at the top of the monthly reports (Figure 4).

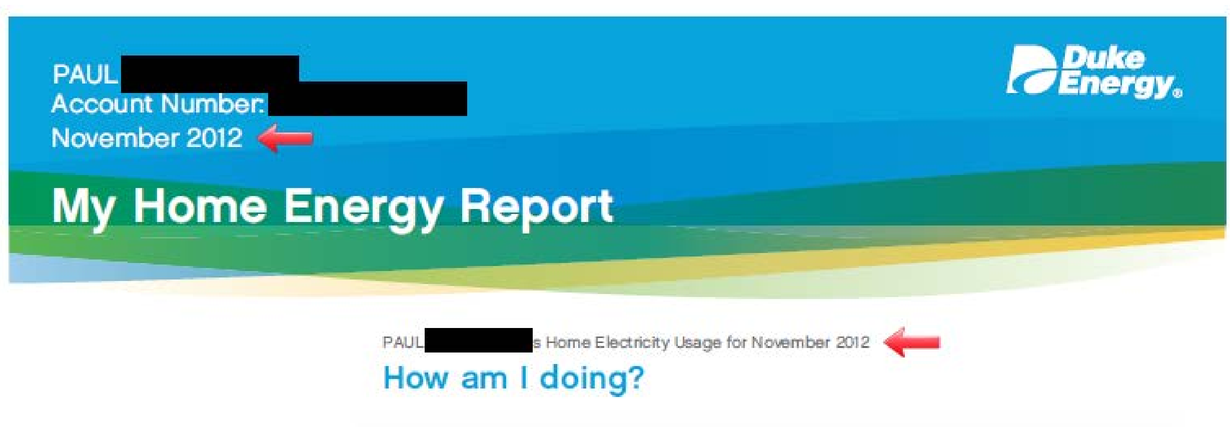


Figure 4. Production Issue Example

Duke Energy's quality assurance measures revealed that the program vendor was generating reports with inconsistent dates for the customer's energy usage on a percentage of reports whose billing periods crossed months (e.g., Nov. 8 – Dec. 5). The problem arose because the program vendor was generating the report month based on the end date of the customer's billing cycle, so the report dates would be consistent with the customer's bill date, rather than creating a monthly header that is consistent across all reports for the monthly cycle as specified by Duke Energy in order to help customers draw a distinction between the bills and the reports. There was a misunderstanding in the business requirements written in the contract that led to this incongruence.

As of July 2013, all members of the team (both Duke Energy and the program vendor) reported that day-to-day communications and normal operations are now functioning smoothly and effectively. With time to reflect upon the matter, they have concluded that the difficulties arose because the parties' expectations were not in alignment regarding quality assurance requirements, service level agreements, and business exigencies.

TecMarket Works' investigation finds that this misalignment was likely caused by shifting operational conditions and changes in personnel on both sides. As discussed in the Program Development section above, the program underwent two significant changes in a matter of months. First came the shift from pilot program to full commercialization using Duke Energy production. Then came the transition from Duke Energy to external operations handled by the program vendor. During approximately this same time frame, Duke Energy shifted program oversight from its new product development group to its ongoing program management team. Likewise, staffing also shifted at the program vendor. These changes in both operating conditions and personnel meant that while the operating agreement between the two companies remained unchanged, its interpretation by the original individuals was not the same as that of their successors on either side.

Since then, Duke Energy has established clearer parameters about the thresholds for data quality, print quality, and customer feedback that will be permitted before fixes and improvements become necessary. These clarified requirements were enforced after the data quality and report delivery service level violations in June of 2013. Despite the penalty, working relations representatives from both parties indicated that working relationships remain positive and they expressed a commitment to a continuing strengthening of their partnership. In summary, the program manager described the current vendor relations as “going better now that the new processes are in place. They’re flexible, responsive, and timely.”

With up to one million reports being generated each month, it is important to carefully consider the scale of the program, the complexity of the change, and the resulting costs and consequences of making that change. Continuous process improvement is fundamental to Duke Energy’s brand and business model. Indeed, it is this spirit of innovation and customer focus that makes the utility a standout in the industry. However, it remains commonsensical to ask if it is appropriate to make changes based upon a small number of errors or customer comments. The answer may well and appropriately be yes, but the threshold for change—and the impacts of doing so—should be clearly understood by all parties.

With these parameters in mind, the program team members from both companies will be better assured of enjoying a shared set of expectations and a clear imperative to make the program as effective as possible.

Call Center Vendor

The call center vendor works with Duke Energy to provide call center services for a number of the utility’s energy efficiency programs. The MyHER program represents one facet of this larger relationship. All parties indicate that working relationships are positive, professional, and productive.

Customer Prototype Lab

The Customer Prototype Lab is a department within Duke Energy that worked on the pilot program and continues to provide email support for the commercialized version of the MyHER program. As such, members of this group work closely and effectively with their Duke Energy counterparts.

Program Changes Interviewees Would Like to See

Messaging

The program vendor’s system ostensibly tracks which tips the customer has previously seen and which programs the customer has previously participated in. But program vendor’s software engineers have not yet devised a method for cross-checking whether the tips written by program vendor and presented on the front page are similar to those written by Duke Energy and shown on the second page. The task is fairly easy for humans who can naturally grasp the degrees of relative similarity or difference between lighting messages, for instance. But it is more complicated for a computer that requires hard coded distinctions. Until this matter is resolved, closely similar messages remain possible. Such an upgrade was said to be on the program improvement to-do list, but it had not risen in priority enough to be implemented yet.

Another challenge involves the ability to deliver two Duke Energy program promotions each month, rather than one as is the norm. Because this functionality was not envisioned from the start, it was not available and could not be swiftly implemented when the opportunity arose in March of 2013. This too is a planned upgrade.

So far the MyHER program's ability to customize messages is based primarily on static household characteristics (age, square footage, location) and program participation data. However, those we interviewed envision even more customization in the future, whereby suggestions are further targeted based upon how efficient customers' homes are compared to their neighbors. "We'd like to be able to suggest buying new equipment when that makes more sense than trying to squeeze more efficiency via lots of efforts with relatively small yields," said one interviewee. Plans to develop models for this were under exploration, but no details were yet available.

Data Transfer

Successful report production depends upon successful data integration and generation. This, in turn, depends upon a highly effective data transfer between Duke Energy's computer system and those at program vendor. One step in this regard taken during the quality assurance upgrades in the summer of 2013 was the development of "data delivery documents" to accompany transferred files. Much like a delivery packing slip that lists the contents of a shipment, the data documents make it easier to identify and examine the contents of the transferred files. While no other changes have been suggested, all parties expressed a general eagerness for the data transfers to be continually refined in an ongoing effort to eliminate errors, reduce processing time, and improve report production capabilities.

Website

Interviewees expressed a desire to increase the level of interactivity on the website to provide more reasons for customers to visit and more opportunities to deepen customer engagement. Examples of potential website additions might include interactive energy saving tips (e.g. click the button to reveal a hidden tip), demonstration videos, and customer testimonials.

Conclusions

The My Home Energy Report program provides Duke Energy residential customers with a meaningful look at their homes' energy use compared to other homes similar to theirs. Overall, the program is well-designed and well run, but its implementation has been troubled by periodic software coding limitations and data quality concerns. Some challenges are to be expected due the high volume of data and the complex nature of the dynamic report production process. Yet other issues are the result of mistakes made by the implementation contractor.

Participation numbers are on target and customer opt-outs represent a fraction of one percent of participating customers.

TecMarket Works considers the reports to be well designed for at-a-glance reading. Data is clearly presented and easily understood. Messages are crisp and actionable. Low call and email volume from customers attests to the above. The top reason why customers reach out is to correct household information, which is understandable given the data's third party origin.

The program vendor's platform continues to change as newly envisioned ways of presenting customized information arise. Report production has been periodically hampered by data quality concerns, many of which have arisen as a result of increasing software coding demands to add more functionality. Most data quality concerns have been caught and fixed prior to mailing. Two important errors were not: One caused 100 people in the North Carolina control group to receive reports. Another error resulted in heat fuel type inaccuracies on more than 119,000 reports sent to South Carolina customers during the month of April 2013. Despite this error affecting 57% of South Carolina's program participant base, "only two or three" customers contacted Duke Energy regarding the issue. Correcting the problem caused report delivery to be delayed by several days during one month, although the timing differences may have gone unnoticed by customers due to fact that reports are not sent every month. Print quality has also been an issue, but steps toward resolution appear to be successful.

Call center operations and email support from the Customer Prototype Lab are operating smoothly and those teams interface effectively with the program management team. Duke Energy – the program vendor working relations are operationally functional and productive. Tensions from disagreements regarding data quality issues and change requests were an issue, but appear to be resolved now that clear expectations and performance parameters are established.

Overall the program appears to be well designed and well run. Despite continuing technical challenges, the MyHER program represents a noteworthy contribution to Duke Energy's efficiency portfolio and an ambitious behavior change program for residential customers.

Recommendations for Program Improvements

TecMarket Works presents the following recommendations for improvements.

Clustering

1. The dynamic clustering used to generate the peer groups for energy use comparisons ensures that customers' homes are compared to others that are most closely similar to their own. This method increases the accuracy of the comparisons, but is dynamic in nature and does not allow for customers to remain in one static group over time. However, this upside is offset by the downside of comparing customers to a different group each month, rather than comparing usage to a consistent or static group over time as was done previously when Duke Energy produced the reports. Both methods have their advantages.

   Some members of the Duke Energy team wondered about the potential for confusion on the part of customers who may not understand why the sizes of their comparison groups are changing each month. That this confusion does not appear to be widespread is evidenced by the fact that the call center vendor and CPL do not have records indicating these concerns in their customer contact databases. However, it remains unclear whether changing customer cluster assignments is influencing customer behavior and thus energy savings.

RECOMMENDATION: If dynamic clustering is to continue and this question persists, consider investigating the impact of customers' knowledge of changing cluster sizes on energy savings by removing cluster size information from the monthly reports for a test group of customers to be compared to a control group who receive that information on their reports. This would give additional validity to the notion that customer knowledge of cluster size influences their usage. Alternatively, add an answer to the MyHER frequently asked questions to explain why cluster sizes change over time and why customers may find themselves compared to different size clusters on different reports.

2. The current minimum cluster size for peer group comparisons has been set by Duke Energy at 10 homes. If a customer's home does not have at least nine other homes that match its characteristics (square footage, age, heat fuel type, location, etc.), then that home does not receive a report. Duke Energy is considering raising the minimum to more than 10 homes, but says the advantages of increasing the cluster size minimum must outweigh the disadvantages of making fewer homes eligible to receive reports.

   One notable advantage of increasing the cluster size is that Duke Energy will be able to demonstrate statistical validity of the comparisons made on the reports. Without a sufficiently large n-size for the comparison group, the average and quartile rankings are subject to a lack of statistical power, and thus the generalizability of the data to the homes in the cluster might be questioned.

   RECOMMENDATION: Consider changing cluster sizing or conducting a longitudinal analysis of existing data (plus or minus one year) to determine whether the energy savings observed from homes in small clusters is similar to energy savings from homes in larger clusters.

Tips and Messages

1. Some customers have asked to see on their reports an explanation of what the "average" and "efficient" home references represents. Without this, customers do not know what their energy usage is being compared with. The definitions appeared regularly on early iterations of the report, but were removed and transferred to the welcome letter and FAQ section of the website to save space. The customers making this request did not recall the definitions from the welcome letter, so, seeking clarification, they called the toll-free number rather than visiting the website.

   RECOMMENDATION: While there is insufficient room for all FAQs on the reports, returning an explanation of average and efficient to the report would provide clarity about the report comparisons and preempt the need for participant phone calls.

2. The energy saving messages on the front and back of the report are necessarily short, crisp, and simple because space is limited. As a result the advice tends to be directed to readers who are less familiar with the range of energy saving options available to them. Given the goal of maximizing program impacts for a mass audience this approach makes sense, but it comes at the expense of being less engaging to more advanced readers who may already be familiar with the basic information. Fortunately, this need not be an either/or situation, since the reports can be customized to the individual reader. With this in mind, it may be possible to change the software coding, so that customers performing better than average see more advanced tips than those customers performing worse than average. Another possibility for creating an opportunity for extended engagement would be to provide a link to a web page that gives more detailed advice in written form or via video.

   RECOMMENDATION: Whether the specific suggestions noted above are adopted or not we encourage Duke Energy to investigate ways to engage advanced customers on a deeper level in order to derive even more savings.

3. Sending energy reports to customers eight times per year on an ongoing basis presents an inherent challenge to keep the reports interesting to readers. While new monthly energy usage comparisons will always be timely and relevant, the other messages in the report may lead to reader disinterest if they appear to be repetitive. One possible option might be to consider including an energy facts section to the reports, somewhat like the fast facts box used prior to the switch to the two-page format. Such a box could enable Duke Energy to share energy-related trivia and questions to spur reader thinking, such as: "If you added up the size of all the little gaps in your homes windows, doors, floors, and ceiling, how big do think they would be? A. The size of a golf ball. B. The size of a softball. C. The size of a basketball. D. The diameter of a hula hoop. Answer: Every home is different, but a typical home has enough gaps to equal at least the size of a basketball. That's a lot of air moving in and out of your house. Sealing these…"

   RECOMMENDATION: Take steps to ensure that energy saving suggestions remain fresh and interesting.

Data Quality

4. Spot checking of data quality in advance of report generation and full data file checking after the reports were mailed has been demonstrated to be insufficient to catch errors that affect accurate data presentation to customers, in some cases on a virtually statewide basis.

   RECOMMENDATION: While acknowledging that significant quality assurance improvements have been made, we encourage the program team to continue to implement those measures in advance of all customer mailings and monitor customer data closely for accuracy.

Overall

5. With a program of this magnitude that involves the generation of more than one million reports each month, it is important to carefully consider the above mentioned recommendations—and any other changes that may be contemplated—in light of the overall the scale of the program, the complexity of the change, and the resulting costs and consequences of making such a change.

   RECOMMENDATION: Consider if it is appropriate to make changes based upon a small number of errors or customer comments. The answer may well and appropriately be yes, but the threshold for change—and the impacts of doing so—should be clearly understood by all parties.

Results From MyHER Customer Surveys

Introduction

TecMarket Works completed telephone surveys with 302 randomly selected program participants in North and South Carolina from April 30 to July 23, 2013. This section presents the results from the surveys. The survey instrument can be found in Appendix C: MyHER Customer Survey Instrument.

When the customer was successfully contacted, the surveyor asked that customer if they were familiar with the MyHER mailings. If not, the surveyor provided a short description of the MyHER mailings they have been receiving: *"This program provided information on how much electricity you used in the previous month and in the previous 12 months compared to your neighbors and provided tips on how you could lower your electricity use and costs in becoming more energy efficient."* If the customer still did not recall the MyHER report, they were thanked for their time and the call was terminated (N=64, or 17.0% of those contacted, did not recall the program reports). If they did recall the MyHER report, the survey continued regardless of whether they read the MyHER report. There were 312 customers out of 376 contacted (83.0%) who recalled receiving the MyHER report, though only 302 recipients completed the entire survey (ten incomplete surveys are not included in this evaluation).

Customers Who Read the MyHER and Why

Almost all of the surveyed customers report that they read the MyHER when they receive it: 96.7% (292 out of 302) of the customers surveyed who remembered receiving the reports are reading them. If the full number of contacted customers are included in this calculation (N=376 including partially-completed surveys, as noted above), and it is assumed that those who do not remember receiving the MyHER reports or don't recall reading them are throwing them away, this brings the percent of customers reading the MyHER down to 80.1% (301[8] out of 376) of the targeted customers. Table 8 below shows the percent of surveyed customers that read the MyHER when they receive it. There are no statistically significant differences by state.

Table 8. Customers That Read MyHER

	North Carolina		South Carolina		Total	
	Count	Percent	Count	Percent	Count	Percent
All customers contacted	190	100.0%	186	100.0%	376	100.0%
Recalled receiving MyHER	156	82.1%	156	83.9%	312	83.0%
Customer read MyHER	149	78.4%	152	81.7%	301	80.1%
Recall receiving but threw MyHER away	7	3.7%	4	2.2%	11	2.9%
Do not recall receiving MyHER	34	17.9%	30	16.1%	64	17.0%

Duke Energy provided recent actual MyHER scores for surveyed customers; there does not appear to be a significant relationship between a customer's score and the likelihood that they read it or throw it away, as seen in Table 9.

[8] In addition to the 292 out of 302 customers who completed the entire survey, nine out of ten customers who only partially completed the survey said that they read the MyHER report.

Table 9. Customers That Read MyHER by Recent MyHER Score

	Less than efficient home (N=88)	Less than average, but more than efficient home (N=59)	More than average home (N=147)
Read MyHER	97.7%	100.0%	95.2%
Throw MyHER away	2.3%	0.0%	4.8%

Note: eight surveyed recipients do not have recent MyHER scores and are not included in this table, although these recipients are included in our analysis elsewhere where recency is not a factor.

TecMarket Works next asked customers who read MyHER why they read it. Most customers surveyed (70.9% or 207 out of 292 who read the report) said they read MyHER because they were interested in learning about how their household uses energy, with learning about saving energy being the next most-mentioned response (28.1% or 82 out of 292).

Table 10. Why Customers Read MyHER

Base: customers who read the reports	North Carolina (N=144)	South Carolina (N=148)	Total (N=292)
Interested in learning how my household uses energy	74.3%	67.6%	70.9%
Interested in learning more about how to save energy	23.6%	32.4%	28.1%
Avoid increases in power costs or lower rates	20.8%	8.1%	14.4%
Interested in comparison with other households	8.3%	18.9%	13.7%
It is from Duke Energy	15.3%	10.8%	13.0%
To save money on my energy bills	3.5%	2.0%	2.7%
To see how my household usage changes over time	0.0%	5.4%	2.7%
Interested in learning more about climate change or environmental reasons	0.0%	2.7%	1.4%
Read everything that comes in the mail	1.4%	0.7%	1.0%
Measuring the effect of home improvements and appliance upgrades (before and after comparison based on EE actions)	1.4%	0.7%	1.0%
For the tips and suggestions	0.7%	0.7%	0.7%
Unique responses (listed below)	1.4%	0.0%	0.7%
Don’t know / just curious / no reason	0.7%	1.4%	1.0%

Percentages total to more than 100% because respondents could give multiple responses.

Two recipients gave unique reasons for why they read MyHER, which are listed below.

- *“Seeing if I’m successful with energy efficiency.”*
- *“Seeing what programs Duke offers to help its customers with energy savings. Duke used to do things like offer energy-saving appliances; it doesn't anymore, but I wish it still did.”*

The ten surveyed customers (3.3% out of 302) who reported that they throw MyHER away provided the following reasons for not reading the report:

- Unique reasons (listed below) (N=6 or 60% of 10)
  - *It doesn't pertain to me; I know what I need to do but haven't had time to make improvements.*
  - *The tips are things I already know.*
  - *The reports don't do anything to help me lower my bill.*
  - *I'm on a fixed income and I can't do the energy efficiency things.*
  - *Our house is a rental.*
  - *My wife throws them away without telling me.*
- *I am too busy/don't have time*. (N=2 or 20% of 10)
- *I am already doing the best I can*. (N=2 or 20% of 10)
- *Too low a priority for me*. (N=1 or 10% of 10)
- *I don't believe it is accurate for my home*. (N=1 or 10% of 10)
- Don't know (N=2 or 20% of 10)

Percentages total to more than 100% because respondents could give multiple responses.

Of the ten customers surveyed who threw out MyHER, six (60% of 10) said that they did read them at one time but have since stopped, while four (40% of 10) said that they never read the reports. Of those who used to read the reports but have stopped, all six were able to tell us how many reports they read before they stopped: These six customers read an average of 1.9 reports apiece in the six months to over a year[9] since they started receiving them (ranging from one report up to three), during which time these six customers received an average of 5.5 Home Energy Reports apiece.

Customer Perceptions of Their Efforts Regarding Energy Efficiency

TecMarket Works asked MyHER customers how they thought their efforts to decrease energy consumption compared to what others typically do to save energy, both currently and before the MyHER program. The wording of the first question was: *"When you consider the efforts you and your household are currently making to decrease your energy consumption at your home, do you feel that on average your efforts are less than what others typically do, about the same as what others typically do, or more than what others typically do?"* The results are presented below in Figure 5.

Of the surveyed customers that read the Home Energy Report, almost half (45.9% or 134 out of 292) believe that they do about the same as others do to be more energy efficient, while 43.8% (128 out of 292) believe that they are currently doing more than the average household. Only 7.2% (21 out of 292) believe that they do less than others, and 3.1% (9 out of 292) are not sure how they compare to others.

[9] These six customers joined the program between May and November of 2012, and the survey was conducted in April 30 to July 23, 2013.

Among the ten customers surveyed who say that they throw out the Home Energy Report, 60% (6 out of 10) say they do more than others, 20% (2 out of 10) say they do about the same and 10% (1 out of 10) says they do less than others, while the other 10% (1 out of 10) was not sure. Compared to those who throw the reports away, customers who read them are significantly more likely to say they do about the same as others (p<.10 using student's t-test).

These results suggest that most customers believe they are doing the same or more than others with regard to efficiency and few believe they are doing less.

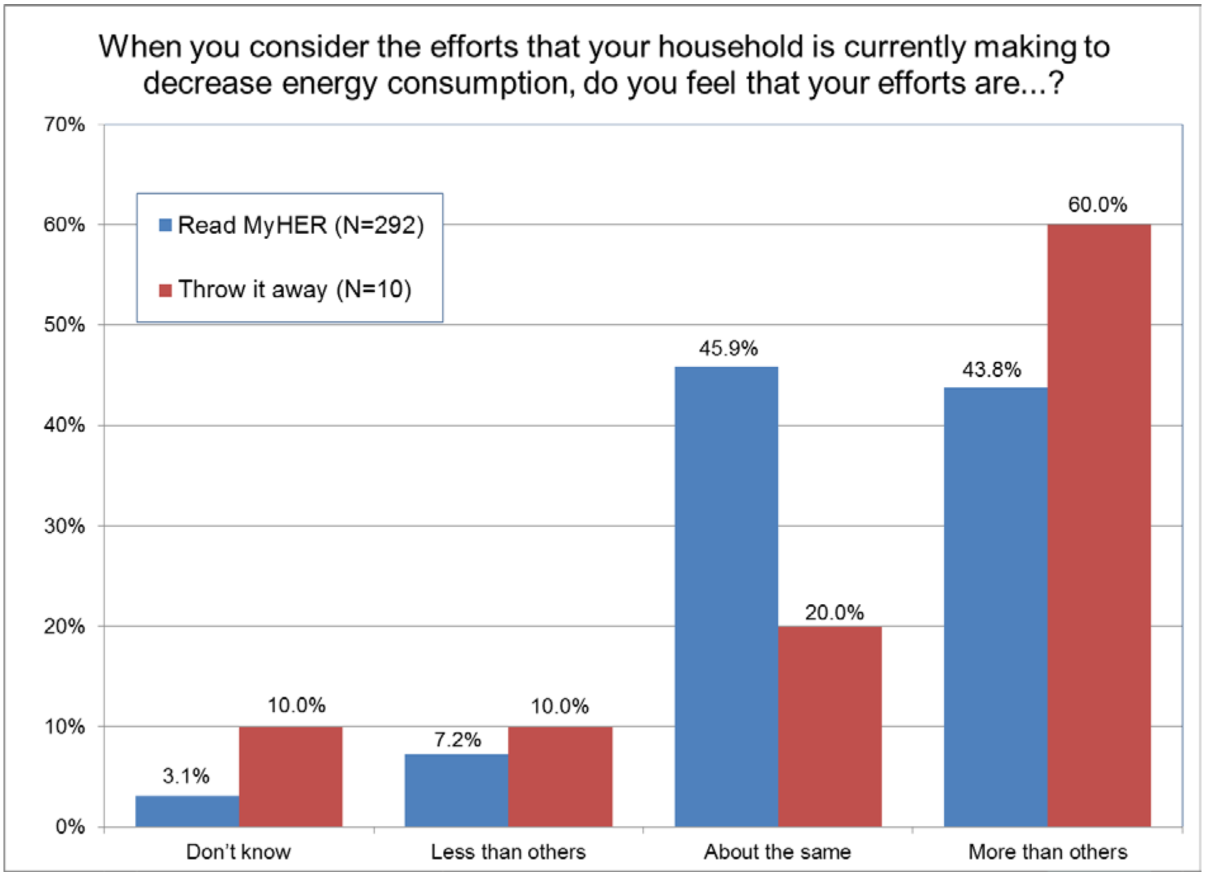


Figure 5. Current Effort to Reduce Energy Consumption Compared to Others by Read or Throw Away Reports

Figure 6 shows recipients' perception of how their efforts to save energy compare to others separated by state; there are no statistically significant differences between North and South Carolina recipients.

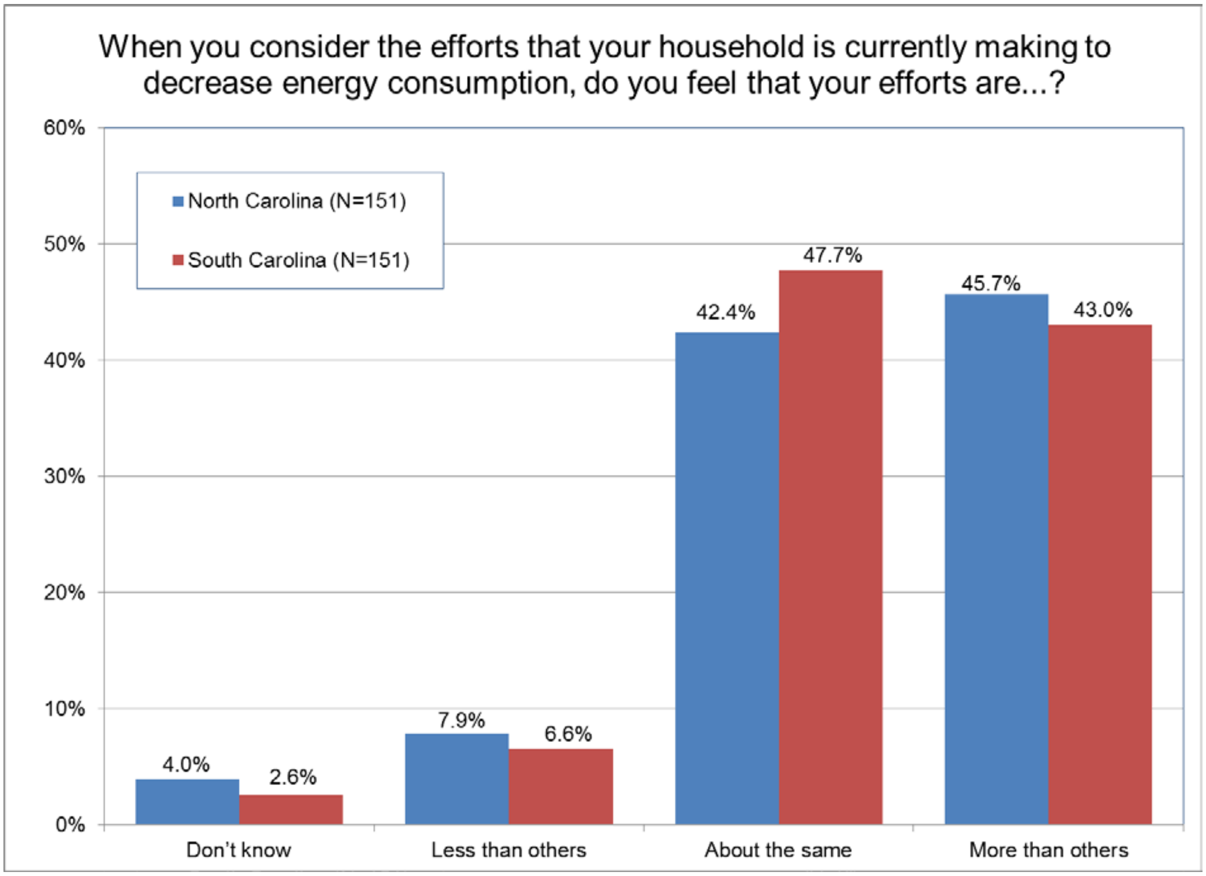


Figure 6. Current Effort to Reduce Energy Consumption Compared to Others by State

TecMarket Works also asked MyHER customers how they thought their efforts to decrease energy consumption compared to what others typically do before MyHER. The exact wording for this question was: *"Now think back to the time before you began receiving the Home Energy Report. At that time, would you say your efforts to decrease energy consumption were less than what others were typically doing, about the same, or more than what others were typically doing?"* The results are presented in Figure 7.

Compared to current efforts, surveyed customers who read the Home Energy Report report that they were more likely to have been doing “less than others” (16.8% or 49 out of 292) and less likely to have been doing “more than others” (31.2% or 91 out of 292) before the MyHER program. Both of these differences between “current” and “before the program” efforts are significant for customers who read the report at $p<.05$ using student’s t-test.

Among the ten recipients who did not read the report, there were no changes at all between their stated “current” and “before the program” efforts.

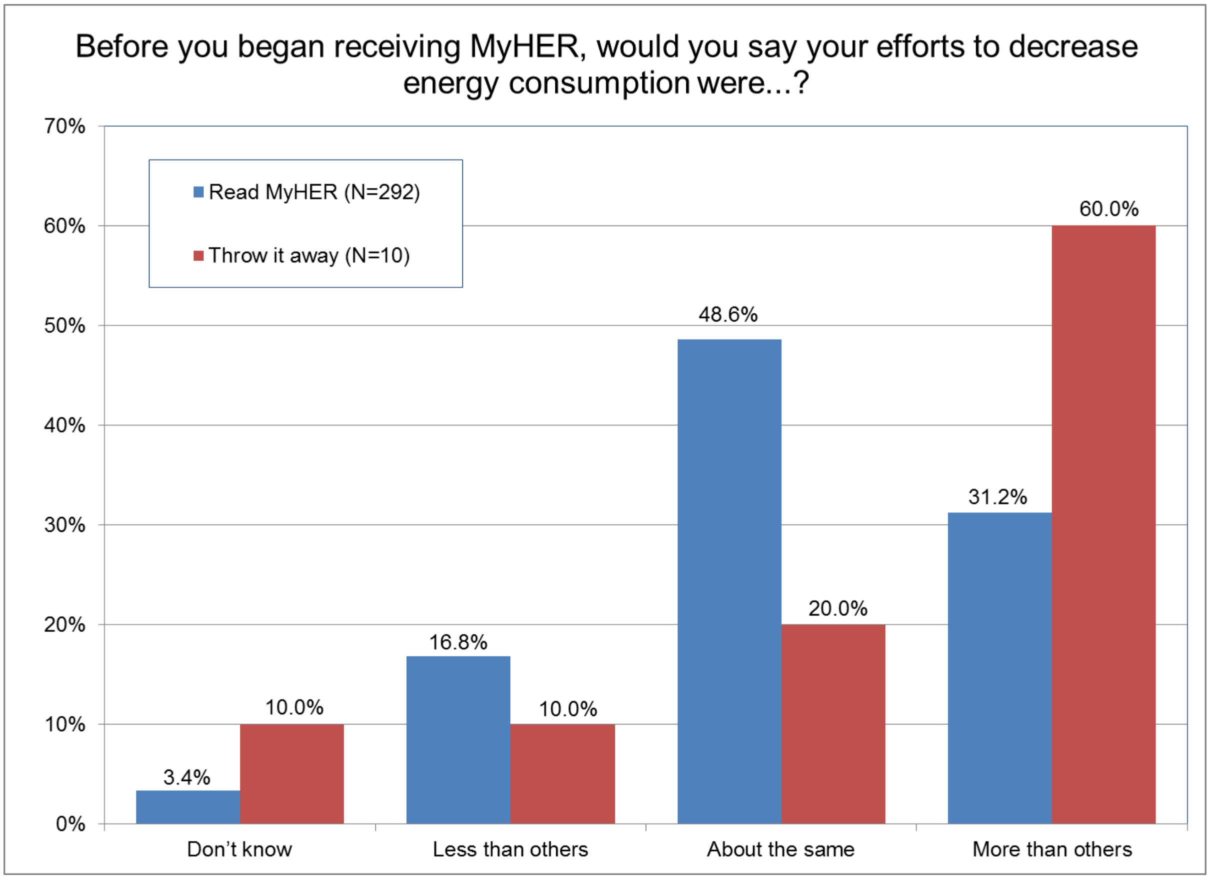


Figure 7. Effort to Reduce Energy Consumption Compared to Others Before MyHER

Finally, TecMarket Works asked MyHER recipients which of four statements best described the difference between their earlier efforts before MyHER and their current efforts after joining the program; these responses are shown in Figure 8. More than half of recipients report that they are doing "about the same" before and after joining MyHER (54.8% or 160 out of 292 for customers who read the report, and 80% or 8 out of 10 among those who did not read the report; this difference is significant at $p<.10$ using student's t-test). Most of the remaining customers surveyed report that they either "used to do less and now do more" or "were already doing more than most, but are doing even more now" (combined 40.1% or 117 out of 292 for customers who read the report, and 10% or 1 out of 10 among those who did not read the report; this difference is significant at $p<.05$ using student's t-test). Only ten customers surveyed (3.4% of 292 who read the report) said they are doing less now than they were before (none of the ten customers who didn't read the report said that they are doing less than they were before; this difference is not statistically significant).

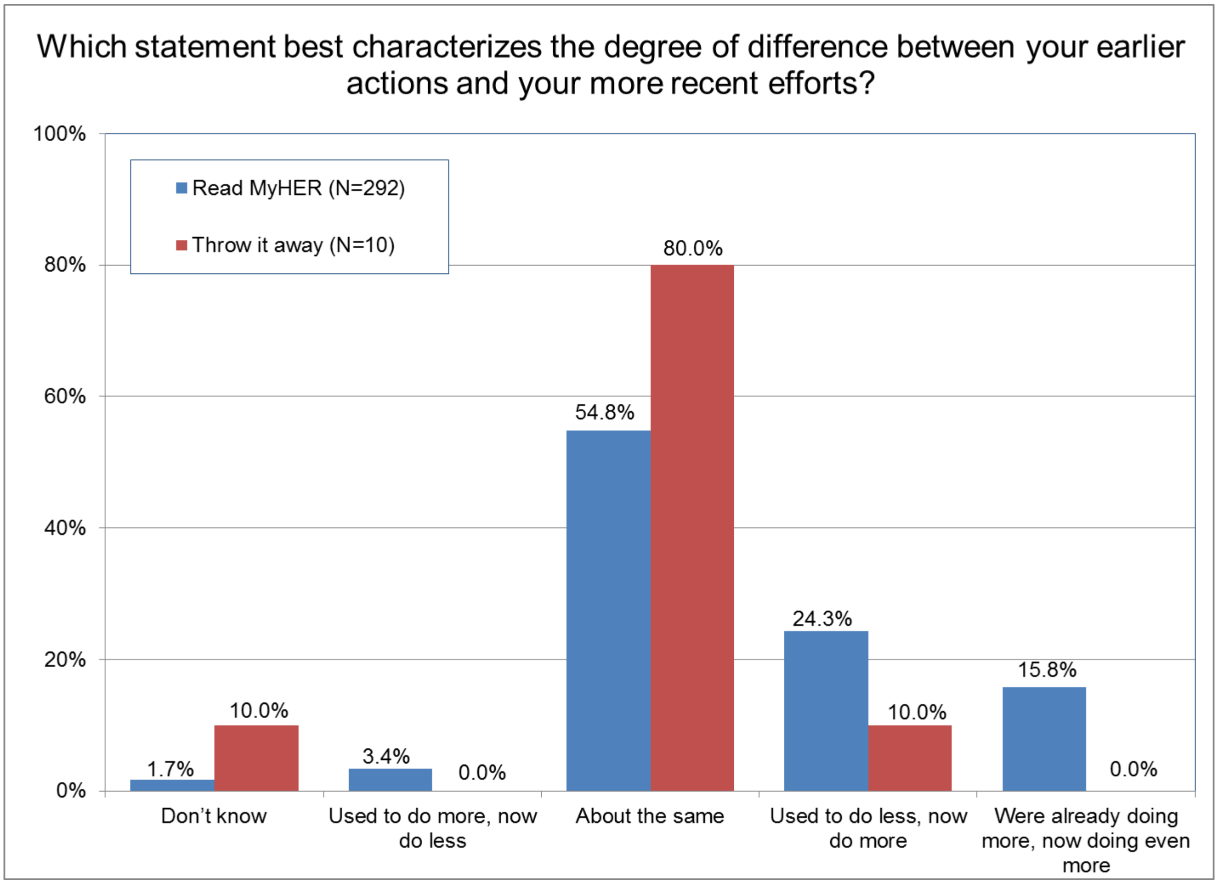


Figure 8. Difference Between Earlier and Current Efforts to Reduce Energy Consumption by Read Reports or Throw Away

Customers in North and South Carolina give somewhat different responses to this question, as reported in Figure 9. Compared to North Carolinians who receive MyHER, South Carolina recipients are more likely to say that they "used to do less, now do more" (29.8% or 45 out of 151) and less likely to say they do "about the same" (51.0% or 77 out of 151; both of these differences between states are significant at p<.10 or better using student's t-test).

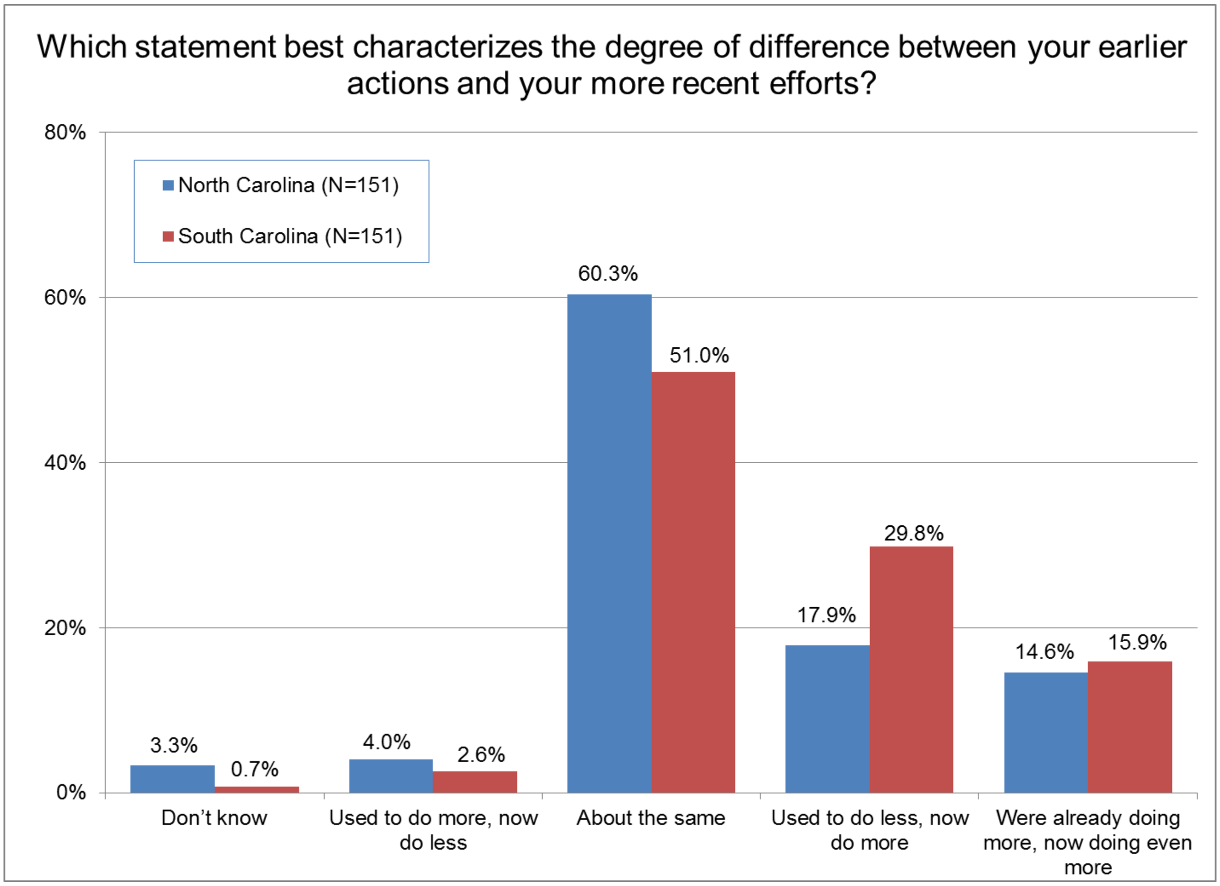


Figure 9. Difference Between Earlier and Current Efforts to Reduce Energy Consumption by State

Customer Perceptions Compared to Recent MyHER Scores

Duke Energy provided actual recent MyHER scores[10] for surveyed customers, which are used to categorize customers into three groups: those whose energy usage is "less than the efficient home", "less than average, but more than the efficient home", or "more than the average home".[11] These scores can be compared to customer's perceptions of how energy efficient they are compared to others. As Figure 10 shows, there is some relationship between self-perception and actual performance (as measured by a recent MyHER score), but there are many customers who think they do more than others but have below average scores, or think their efforts are average when the results are not.

[10] Most of the recent scores used in this analysis (95.4% or 288 out of 302) are from the June 2013 MyHER reports; another six survey respondents (2.0% of 302) did not receive June reports, so May or March 2013 scores were used. Since each report is a "snapshot" of energy usage for a particular month, customers' scores may change over time or vary throughout the year. In other words, a customer who uses less energy than average on their June 2013 MyHER report may not be below average on other reports.

[11] Eight survey respondents (2.6% or 302) became ineligible for the program after receiving one or more reports (due to changes in billing status, renter status, or their service address did not match their billing address). These eight customers are not included or reported in analyses that show responses categorized by recent MyHER scores.

Regardless of actual MyHER scores, very few customers describe their efforts as being "less than others", which is consistent with the theory of social norming (people don't want to be seen as being below the norm). In fact, 54.4% (80 out of 147) of MyHER recipients whose used "more than the average home" on their recent report say that they do "about the same as others" and 35.4% (52 out of 147) actually say they do "more than others" for energy efficiency. Even among customers whose recent MyHER reports show them using "less than the efficient home", only 56.8% (50 out of 88) believe they are doing "more than others" for energy efficiency and 6.8% (6 out of 88) actually say they do "less than others" for energy efficiency.

The differences in self-described energy efficiency efforts between those with "less than efficient" and "less than average, but more than efficient" scores are not statistically significant. Customers whose recent reports show their usage was "more than the average home" are significantly more likely to say they do "about the same" as others and less likely to say they "do more than others" compared to the two groups that use less than the average home (these differences are significant at p<.05 using student's t-test).

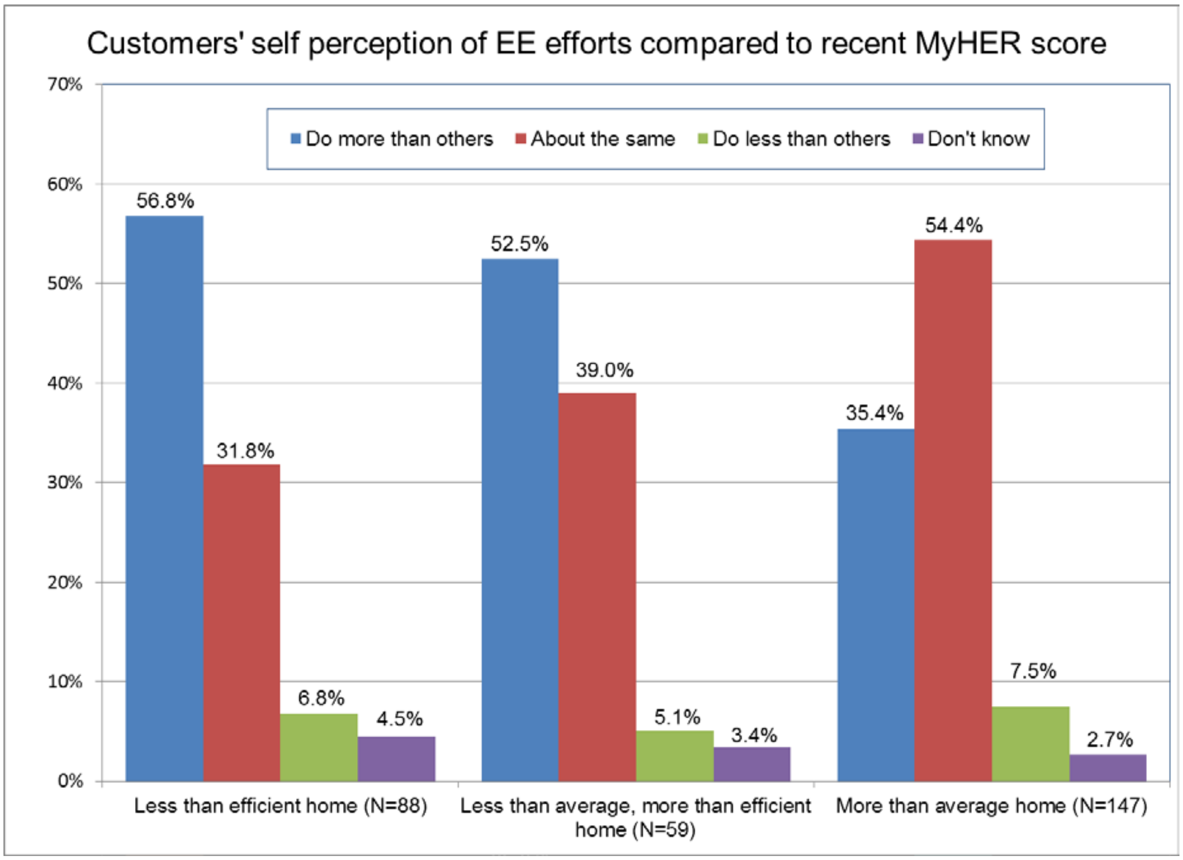


Figure 10. Comparing Customers' Actual Recent MyHER Scores to Self-Perception

What Energy Efficiency Means to Customers

We asked all surveyed customers to define, in their own words, "what it means to be energy efficient". The responses are categorized below in Table 11. Most customers defined energy efficiency to include "using less energy / using the least amount of energy necessary / not wasting energy" (67.9% or 205 out of 302), about a third (31.8% or 96 out of 302) mentioned "saving money / being cost effective / keeping rates down" and one in ten mentioned environmental concerns (9.6% or 29 out of 302).

A number of specific actions that can be taken to conserve energy were mentioned by customers who read MyHER, though none were mentioned by more than about 5% of respondents. Although none of the customers who throw MyHER away mentioned these types of actions, the differences between customers who read reports and throw them away are not statistically significant due to the small sample size.

Table 11. In Your Own Words, Please Tell Me What It Means To Be Energy Efficient

	Read MyHER (N=292)	Throw MyHER Away (N=10)	Total (N=302)
Try to use less energy / least amount necessary / don't waste	68.8%	40.0%	67.9%
Saving money on bills / being cost effective / keeping rates down	32.2%	20.0%	31.8%
Helping the environment / sustainability / being green	9.9%	0.0%	9.6%
Turn off lights / appliances when not in use	5.5%	10.0%	5.6%
Upgrading home and appliances with efficient equipment	4.8%	0.0%	4.6%
Being aware of energy use	4.8%	0.0%	4.6%
Heating & cooling decisions / trading comfort for savings	2.7%	0.0%	2.6%
Insulation / seal doors, windows and other leaks	1.0%	0.0%	1.0%
Educating children about energy and conservation	1.0%	0.0%	1.0%
Use CFLs	0.7%	0.0%	0.7%
Try to use less water / don't waste	0.3%	0.0%	0.3%
Unique responses (listed below)	1.7%	30.0%	2.6%
Don't know	1.4%	0.0%	1.3%

Percentages total to more than 100% because respondents could give multiple responses.

Eight customers surveyed (2.6% of 302) gave unique responses when asked to define energy efficiency; these responses are categorized and listed below.

<u>Read MyHER (N=5)</u>

- *It's also a safety thing; my husband is a firefighter and he is conscious about cords plugged in and the overuse of outlets.*
- *Being energy efficient also means increasing the value of my home.*
- *Energy efficient means to save money by not wasting or using more energy than we should, which in turn, saves the power plants from needing to expand, and saves them money as well.*
- *I think energy efficiency is a gimmick to get people to spend more money by telling people that they can save money by spending more money.*

- *Not to live in a millhouse because of all the windows.*

Throw MyHER away (N=3)

- *Being energy efficient means to look out for your light bill and budget yourself.*
- *Use things wisely.*
- *I stay ahead on my payments and keep my bills paid up.*

Six customers surveyed (2.4% of 252) mentioned unique, specific actions as part of their definition of energy efficiency, which are categorized and listed below.

Complete responses to this question can be found in Appendix G: What It Means to be Energy Efficient.

Though "try to use less energy" is the most-mentioned definition of energy efficiency for all groups of customers, Table 12 shows some significant differences in how energy efficiency is defined by customers with different MyHER scores. Customers whose recent MyHER reports show they use "less than the efficient home" were the most likely to define energy efficiency in terms of "saving money" (39.8% or 35 out of 88), as well as the most likely to mention "turn off lights and appliances" (8.0% or 7 out of 88) and "heating and cooling decisions" (4.5% or 4 out of 88; significantly different from other groups at p<.10 or better using student's t-test). Customers who use "more than the average home" are the least likely to mention "turning off lights and appliances" (3.4% or 5 out of 147) and "heating and cooling decisions" (1.4% or 2 out of 147), and the most likely to mention "upgrading home and appliances" (6.1% or 9 out of 147; significantly different from other groups at p<.10 or better using student's t-test). It is suggestive that the most efficient customers are more likely to mention simple and relatively cost-free behaviors that save energy (turning things down or off), while those who use the most energy are more likely to mention expensive purchases (upgrading with more efficient equipment) and less likely to view energy efficiency as a money-saving proposition.

Customers who used "less than average, but more than the efficient home" were the least likely to mention "helping the environment" (5.1% or 3 out of 59; significantly different from other groups at p<.10 using student's t-test). Statistically significant differences are marked in Table 12 with **bold text** for p<.10, and ***bold italic*** text for p<.05.

Table 12. What It Means To Be Energy Efficient by Recent MyHER Score

	Less than efficient home (N=88)	Less than average, but more than efficient home (N=59)	More than average home (N=147)
Try to use less energy / least amount necessary / don't waste	63.6%	72.9%	69.4%
Saving money on bills / being cost effective / keeping rates down	***39.8%***	**28.8%**	***28.6%***
Helping the environment / sustainability / being green	**11.4%**	**5.1%**	**10.9%**
Turn off lights / appliances when not in use	**8.0%**	5.1%	**3.4%**
Upgrading home and appliances with	**2.3%**	5.1%	**6.1%**

efficient equipment			
Being aware of energy use	6.8%	5.1%	3.4%
Heating & cooling decisions / trading comfort for savings	**4.5%**	3.4%	**1.4%**
Insulation / seal doors, windows and other leaks	2.3%	1.7%	2.7%
Educating children about energy and conservation	**0.0%**	0.0%	**2.0%**
Use CFLs	0.0%	1.7%	1.4%
Try to use less water / don't waste	1.1%	0.0%	0.0%
Unique responses	**1.1%**	**0.0%**	**4.1%**
Don't know	1.1%	1.7%	1.4%

Percentages total to more than 100% because respondents could give multiple responses.

Next, customers were asked what actions they do, or could do, to be more energy efficient. The question was worded, *"When you think about what you and your household does or can do to decrease energy consumption, what things come to mind?"*, and was repeated to allow for up to six responses. The full list of responses can be found in Appendix H: What Surveyed Customers Do to be More Energy Efficient.

Only one customer surveyed (0.3% of 302) could not answer the question (“*I really don’t know what more I could do.”)* Another 7.3% (22 out of 302) of customers surveyed only gave one response to the question. However, most participants in the program were able to give three or more responses (72.5% or 219 out of 302), as seen in Figure 11 below.

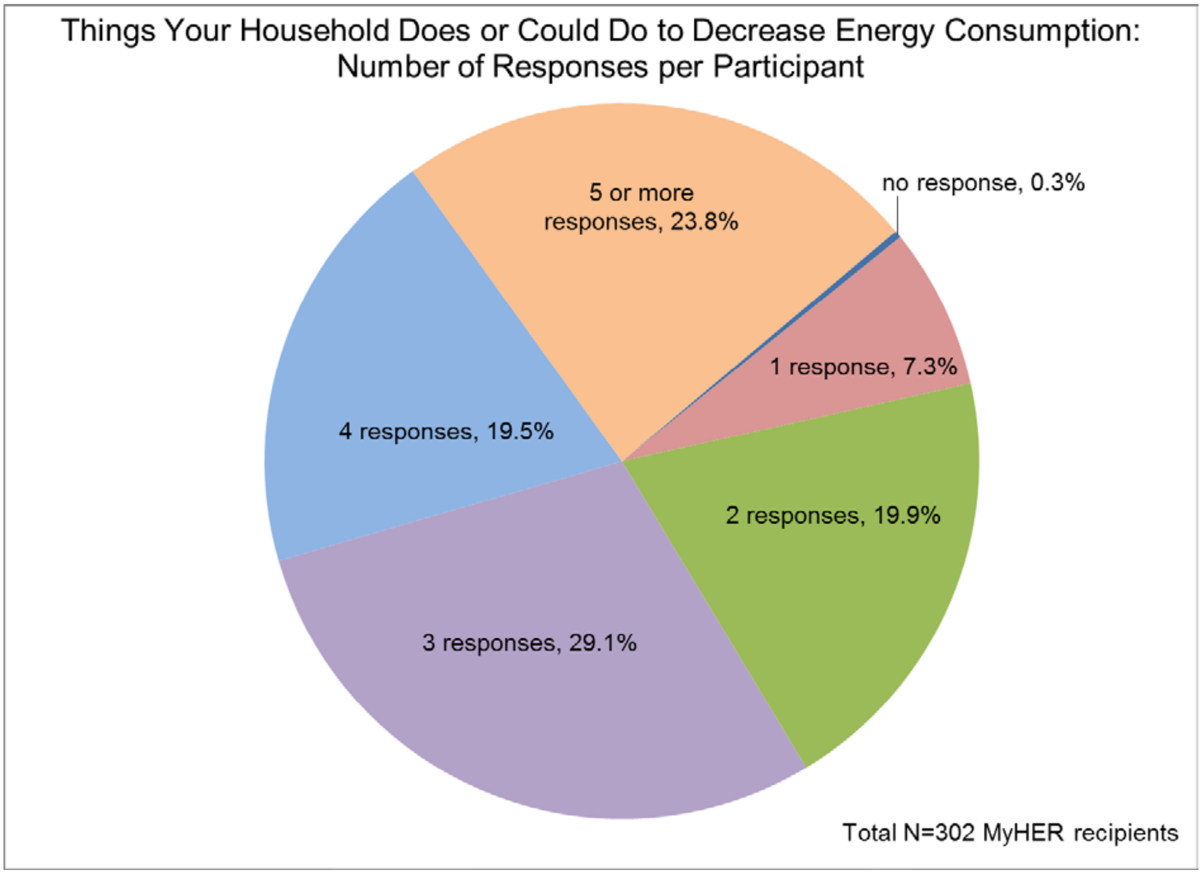


Figure 11. Things Your Household Does or Could Do to Decrease Energy: Number of Responses per Participant

There were a total of 1041 verbatim responses reported by the 302 customers surveyed, which when coded into categories yields 1116 coded responses[12] (a mean of 3.7 per customer surveyed).

Figure 12 shows all categories of response mentioned by at least 5% of customers surveyed, plus mentions of Duke Energy programs and non-responses. The full list of verbatim responses to this question is presented in Appendix H: What Surveyed Customers Do to be More Energy Efficient.

The two most frequently mentioned responses are both about lighting: “turn off lights when not in use” (55.3% or 167 out of 302) and “use more efficient light bulbs (CFLs and LEDs)” (41.7% or 126 out of 302). The next three most frequent responses are also behavior-based: “turn

[12] Verbatim and coded responses do not always correspond exactly because some verbatim responses received multiple codes (“turn off lights and appliances” is coded as two categories of action), and other responses duplicated responses already given by that customer (if someone said they “seal leaks” and “caulk windows” these are both considered actions within the same code category).

appliances and other items off when not in use" (35.4% or 107 out of 302), "use less cooling" [13] (32.5% or 98 out of 302) and "use less heating" (22.8% or 69 out of 302).

Only a few customers surveyed mentioned specific Duke Energy programs: two MyHER recipients (0.7% of 302) report joining Power Manager, and one (0.3% of 302) participated in the Home Energy House Call program. Additionally, three recipients (1.0% of 302) unplugged or recycled a spare freezer or refrigerator, though we do not know if this was due to the influence of a Duke Energy program or not.

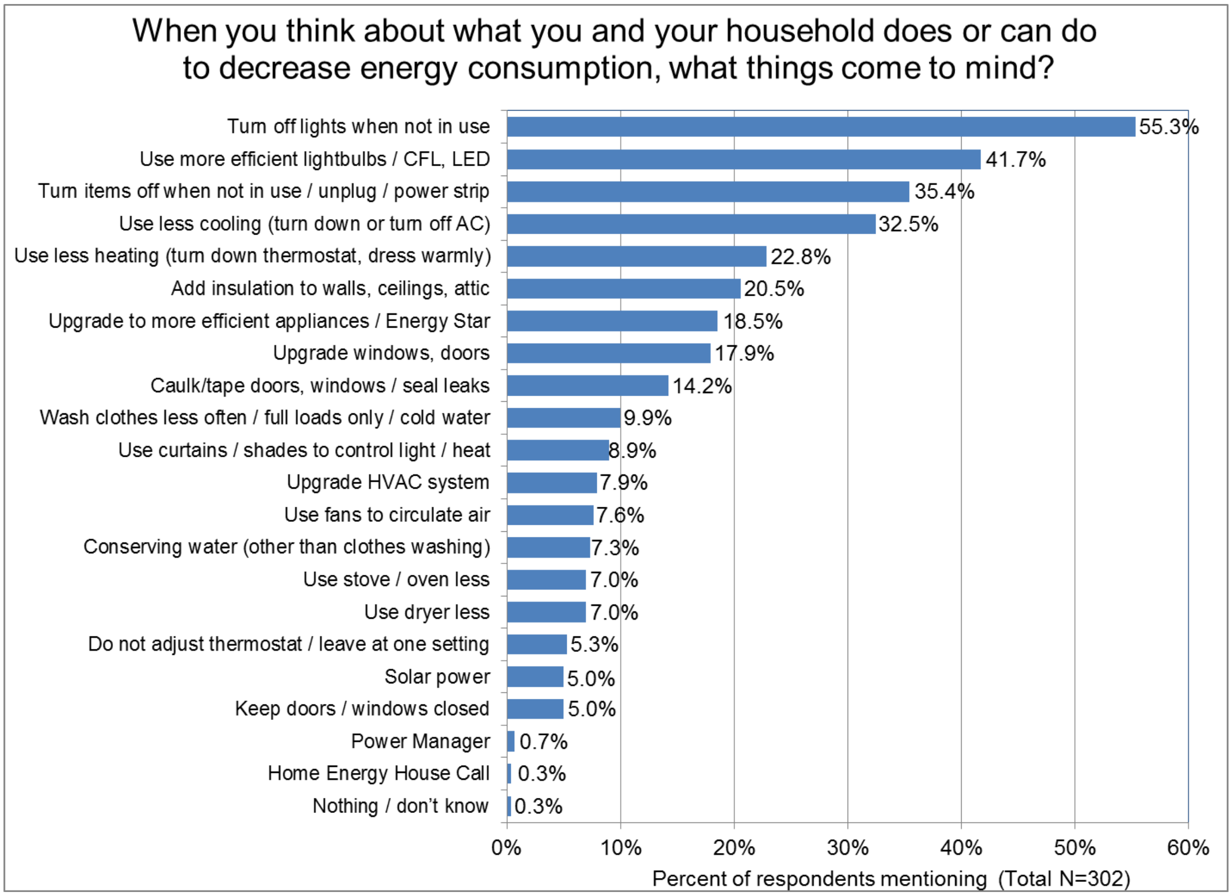


Figure 12. What Surveyed Customers Do or Can Do To Save Energy
Percentages total to more than 100% because respondents could give multiple responses.

Interest in Energy Efficiency and MyHER

TecMarket Works asked MyHER customers about their interest in energy efficiency and their interest in reading the next Home Energy Report they will receive. Customers were asked to rate their interest on a 10-point scale, with 1 meaning "very uninterested" and 10 meaning "very interested". Mean ratings scores for these questions are shown in Table 13.

[13] This survey was conducted in the Carolina System during cooling season (May, June and July), which may account for the larger number of cooling mentions (32.5%) compared to heating mentions (22.8%).

Overall, surveyed MyHER customers scored their interest in energy efficiency (8.86) higher than their interest in reading the next MyHER (8.40; significant at p<.05 using student's t-test); this difference is significant for both customers who read the reports (8.89 for efficiency, 8.55 for reading the next report) and especially for those who throw them away (8.00 for efficiency, 4.10 for reading the next report; all differences significant at p<.05 using student's t-test).

Customers who say they do "more than others" for energy efficiency do indeed give a higher rating for their interest in energy efficiency compared to other customers, with an overall mean score of 9.16 (significantly higher than the mean interest in efficiency of the other groups at p<.05 using ANOVA). These customers are also the most interested in reading the next MyHER, with a mean score 8.61, though this is not significantly higher than for the other groups. None of the differences in mean ratings scores between customers who do "about the same", "do less" and "don't know" are statistically significant for either of these ratings.

Customers in North and South Carolina are equally interested in saving energy in their homes (8.84 and 8.87, respectively), though South Carolina recipients are more interested in reading the next MyHER (8.72 compared with 8.08 in North Carolina; this difference is significant at p<.05 using ANOVA).

Table 13. Mean Customer Interest in Energy Efficiency and Reading MyHER

	Interest in Energy Efficiency	Interest in Reading the Next MyHER
All Surveyed Customers by Read or Throw Away		
Read It (N=292)	8.89	8.55
Throw It Away (N=10)	8.00	4.10
Total (N=302)	8.86	8.40
Surveyed Customers Indicating EE Actions are "More Than" Others		
Read It (N=128)	9.24	8.84
Throw It Away (N=6)	7.50	3.67
Total (N=134)	9.16	8.61
Surveyed Customers Indicating EE Actions are "About the Same" as Others		
Read It (N=134)	8.59	8.32
Throw It Away (N=2)	8.50	4.00
Total (N=136)	8.59	8.26
Surveyed Customers Indicating EE Actions are "Less Than" Others		
Read It (N=20)	8.60	8.29
Throw It Away (N=1)	10.00	10.00
Total (N=21)	8.67	8.36
Surveyed Customers Indicating EE Action Comparison to Others is "Don't Know"		
Read It (N=9)	8.89	8.33
Throw It Away (N=1)	8.00	1.00
Total (N=10)	8.80	7.60
AllSurveyed Customers by State		
North Carolina (N=151)	8.84	8.08
South Carolina (N=151)	8.87	8.72

When these ratings of interest are examined by recent MyHER scores, customers who use more energy than the average home have slightly lower interest scores for energy efficiency (8.71) and interest in reading the next MyHER (8.27), although none of the differences between groups shown in Table 14 are statistically significant (p>.10 using ANOVA).

Table 14. Customer Interest in Energy Efficiency and Reading MyHER by Recent MyHER Score

	Less than efficient home (N=88)	Less than average, more than efficient (N=59)	More than average home (N=147)
Interest in energy efficiency	8.95	9.10	8.71
Interest in reading the next MyHER	8.30	8.80	8.27

Frequency of Receiving MyHER

Table 15 below presents the preferences of surveyed MyHER customers on the frequency in which they receive the MyHER, along with each group's mean interest score (in reading the next MyHER). About three-quarters (72.5% or 219 out of 302) of surveyed customers are satisfied with how frequently they currently receive the MyHER (about eight times per year). Only 30.0% (3 out of 10) of those who throw MyHER away without reading it say they don't want to receive the reports at all, and none (0 out of 292) of the customers who do read the report said they don't want to receive it. In a separate question also presented in Table 15, about one-quarter (27.8% or 84 out of 302) of MyHER recipients surveyed said they would prefer reports by email.

Table 15. Frequency of Receiving MyHER

Would you prefer to get the reports . . .	**Read MyHER (N=292)**	**Throw it away (N=10)**	**Total (N=302)**
More Frequently	**N=33**	**N=0**	**N=33**
Percent	11.3%	0.0%	10.9%
Interest Score	*9.5*	-	*9.5*
Same Frequency	**N=215**	**N=4**	**N=219**
Percent	73.6%	40.0%	72.5%
Interest Score	*8.7*	*7.3*	*8.7*
Less Frequently	**N=43**	**N=3**	**N=46**
Percent	14.7%	30.0%	15.2%
Interest Score	*6.9*	*2.7*	*6.6*
Do not want any	**N=0**	**N=3**	**N=3**
Percent	0.0%	30.0%	1.0%
Interest Score	-	*1.3*	*1.3*
Don't know	**N=1**	**N=0**	**N=1**
Percent	0.3%	0.0%	0.3%
Interest Score	*5.0*	-	*5.0*
Prefer E-mail version	**N=81**	**N=3**	**N=84**
Percent	27.7%	30.0%	27.8%
Interest Score	*8.7*	*4.0*	*8.5*

Of the 46 MyHER customers that would prefer to get the MyHER less frequently (15.2% of 302 customers surveyed), three-quarters (78.3% or 36 out of 46) said they would prefer to receive the reports quarterly, 10.9% (5 out of 46) said they would like to get them every other month and only one (2.2% of 46) said they would prefer the reports annually.

Of the 33 MyHER customers that would prefer to get the MyHER more frequently (10.9% of 302 customers surveyed), most (81.8% or 27 out of 33) said they would like to receive the reports monthly.

Accuracy of Home Information

Table 16 indicates that more than two-thirds (70.9% or 214 out of 302) of the surveyed customers report that their home information is correct on their Home Energy Report, and about a quarter of them (22.8% or 69 out of 302) do not know. This could be because they don't know the age or size of their home[14], or because they don't look at the house data on their MyHER. Only 6.3% (19 out of 302) customers surveyed said there was incorrect information about their home on the report.

Compared to customers who read the reports, customers who throw them away are twice as likely not to know if their home information on the report is correct or not (50.0% or 5 out of 10 "don't know"), and are also more likely to say their home information is not accurate (20.0% or 2 out of 10; these differences are significant at p<.05 using student's t-test).

Table 16. Accuracy of Home Information

Are the home characteristics correct on your report?	**Read MyHER**		**Compared to Others**			**Overall** (N=302)
	Read (N=292)	**Throw Away** (N=10)	**Do More** (N=134)	**Same** (N=136)	**Do Less** (N=22)	
Correct	72.3%	30.0%	73.1%	69.9%	63.6%	70.9%
Incorrect	5.8%	20.0%	7.4%	4.4%	9.1%	6.3%
Don't Know	21.9%	50.0%	19.4%	25.7%	27.3%	22.8%

Those who "don't know" how they compare to others are not shown in this table.

About one in fifteen (6.3% or 19 out of 302) of the surveyed MyHER customers report that there is incorrect information on their mailings. The issues reported by these customers are categorized and listed below: The most common problems reported were incorrect home size (mentioned by 9 of 19), incorrect age of the home (5 out of 19) and incorrect type of heating (5 out of 19).

<u>House Size: (N = 9)</u>

- *Our one story home is being compared with two story homes.*
- *The square footage was off by about 500-600 square feet.*
- *Square footage is off by 700 square feet.*
- *The square footage is wrong. The report says that it's 1800, but it's really 3000.*
- *The square footage is wrong. The report says my home is smaller than it is.*
- *The square footage on the report is underestimated.*

[14] We asked customers later in the survey for the square footage and age of their home: Although only 5.3% (16 out of 302) of customers surveyed did not know how old their home was, 20.9% (63 out of 302) did not know the square footage. It should also be noted that the age or footage they gave us may not be correct (some respondents who provided answers may be "guesstimating"; these responses were not checked against other records for accuracy.)

- *The square footage is wrong. My home is 1100 square feet, the report says my home is much bigger than it really is.*
- *Our home is a little smaller than your average two bedroom, about 900 square feet.*
- *I am not sure if the home size is correct.*

Age of Home: (N = 5)

- *The age of our home as listed on the report is incorrect.* (N=2)
- *Our home is much older than what is listed in the report.*
- *The age of my home is from 1982 and the report says it from the 2000s.*
- *The age was listed as newer than it should be.*

Type of Heating: (N = 5)

- *I'm using portable electric heaters for my heating and not natural gas.*
- *It shows we are natural gas but we are electric.*
- *Possibly the type of heating unit; I have a natural gas-fueled boiler with radiator heat.*
- *The report says we have non-electric heating, but we have an electric heat pump.*
- *Our heating used to be oil, but we have replaced it with propane and electric.*

Energy Efficiency Scores

The front page of Home Energy Reports present a comparison of monthly energy cost for the customers' households compared to the "average home" and/or the "efficient home". An example of the portion of the report that presents a customer's scores is shown in Figure 13 below[15]. In this example, the customer's energy usage is "more than average", so they are shown both the average and efficient comparison home scores. If a customer's MyHER score is "less than average" (or "less than the efficient home"), then only the efficient home is presented for comparison and the average home is not shown on front of the report.

[15] This is an example of the format used when the customer surveys were conducted. Since then, the front of the report shows kWh values instead of dollars.

Figure 13. Monthly Energy Use Comparison: Front of MyHER Report

A second comparison chart is currently presented on the back page of the Home Energy Reports, which shows the customer's energy usage for the past 13 months compared to both the average and efficient homes, as seen in Figure 14. Regardless of the customer's recent MyHER score, all report recipients are shown both the efficient and average homes on these annual usage comparison charts.

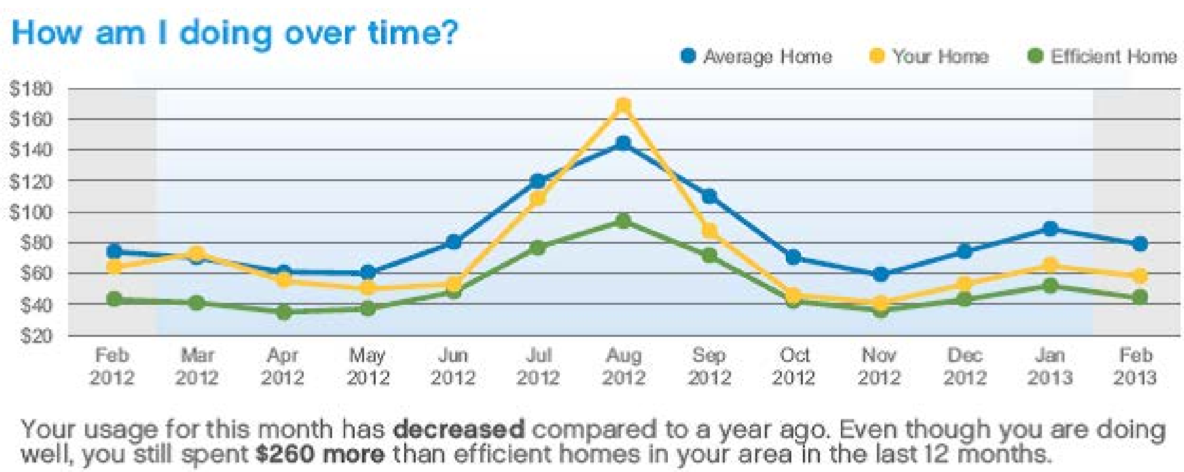


Figure 14. Annual Energy Use Comparison: Back of MyHER Report

Table 17 shows that about a third of customers surveyed (32.8% or 99 out of 302) say that their Home Energy Report usually shows that they use less energy than the average comparable home, while a similar number (36.8% or 111 out of 302) say that the report shows they use more energy than the average comparable home.[16] Among the ten MyHER recipients surveyed who throw their report away without reading it, most (60.0% or 6 out of 10) don't know how they compare, and none (0% of 10) say the reports show their usage is above average.

Customers who say they do "more than others" for energy efficiency are more likely to say their report shows their home uses "less than average" (43.3% or 58 out of 134) compared to those who do "about the same" and "less than others" (combined 24.1% or 38 out of 158; significant at p<.05 using student's t-test). Customers who say they do "less than others" (50.0% or 11 out of 22) and "about the same as others" (41.9% or 57 out of 136) are also significantly more likely to say that their report shows their home uses more energy than average compared to those who do "more than others" (28.4% or 38 out of 134; significant at p<.05 using student's t-test).

Table 17. MyHER Comparison to the Average Home

MyHER usually shows home uses . . .	**Read MyHER**		**Compared to Others**			**Overall** (N=302)
	Read (N=292)	**Throw Away** (N=10)	**Do More** (N=134)	**Same** (N=136)	**Do Less** (N=22)	
Less than average	33.2%	20.0%	43.3%	22.8%	31.8%	32.8%
About average	23.3%	20.0%	22.4%	27.2%	9.1%	23.2%
More than average	38.0%	0.0%	28.4%	41.9%	50.0%	36.8%
Don't know	5.5%	60.0%	6.0%	8.1%	9.1%	7.3%

Those who "don't know" how they compare to others are not shown in this table.

Customers' perception of what their MyHER comparison shows corresponds to their actual recent MyHER scores (though it should be noted that what the recent report shows may not be what their reports "usually" show, since customer scores can change from report to report). Most customers whose reports show their recent usage was "less than the efficient home" say that their reports usually show their usage is "less than average" (62.5% or 55 out of 88), while a plurality of customers with "above average, below efficient" scores also say their reports usually show their usage is "less than average" (39.0% or 23 out of 59). A majority of customers whose recent report shows they use "more than the average home" say that their reports usually show they use "more than average" (57.1% or 84 out of 147). The differences in distribution in Figure 15 are highly significant (p<.01 for the entire table using chi-square). However, there are still many customers whose recent scores do not match their perception of their usual scores: 12.5% (11 out of 88) of customers who use "less than the efficient home" say their reports usually show they use "more than average", while 11.6% (17 out of 147) of customers whose recent usage is "more than the average home" say that their reports usually show they use less energy than the average home.

[16] Customers were not asked what their reports usually show "compared to the efficient home". Though not all reports include the average home comparison on the front of the report, all reports in the Carolina System include the average home comparison on the annual usage chart on the back of the report.

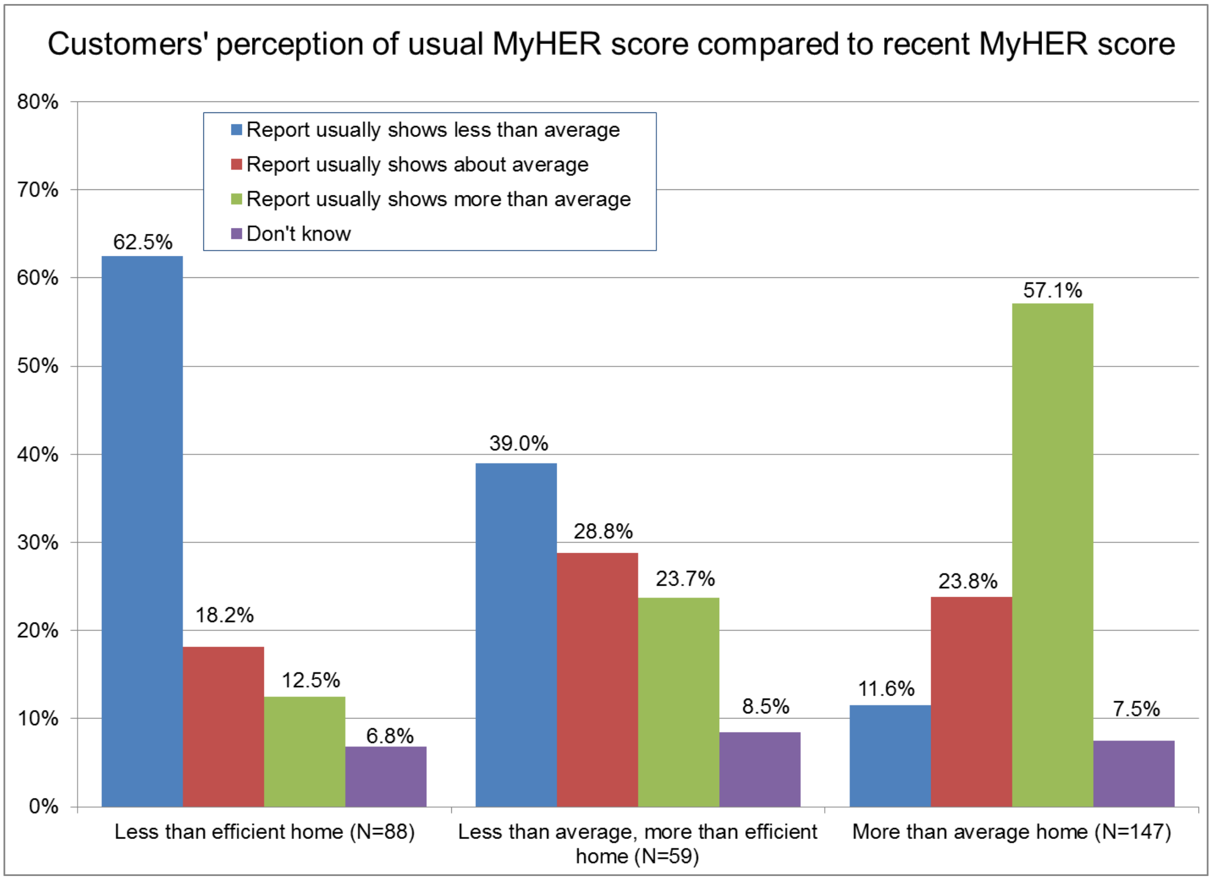


Figure 15. Customers' Perception of Their Usual MyHER Score Compared to Their Actual Recent MyHER Score

Overall, more than six out of ten customers surveyed (62.3% or 188 out of 302) say they use the charts in the Home Energy Report to track their home's energy usage. The percentages of key groups using MyHER in this way are shown in Table 18: Customers who say they do "more than others" for energy efficiency are more likely than those who do the same as or less than others to track their usage using MyHER charts (68.7% or 92 out of 134; $p<.10$ or better using student's t-test).

There are no significant differences in using the reports to track usage by what customers report their Home Energy Reports usually show. However, when comparing actual MyHER scores, customers who used "more than the average" on their recent report are the least likely to say they use MyHER to track their usage (58.5% or 86 out of 147; significantly more than the other groups at $p<.10$ using student's t-test).

Customers who do not read MyHER reports (20.0%), those who don't know how their energy usage compares to others (30.0%), and those who don't know how MyHER charts compare their home to others (36.4%) are the least likely to use the MyHER charts to track their energy usage (significantly less than other groups at $p<.05$ using student's t-test). There is no significant difference between customers in North and South Carolina however.

Table 18. Using MyHER to Track Home Energy Usage

	% who use MyHER charts to track home energy usage
Overall (N=302)	62.3%
Read MyHER reports or throw them away	
Read MyHER (N=292)	63.7%
Throw away MyHER (N=10)	20.0%
Efforts to decrease energy consumption compared to others	
Do more than others (N=134)	68.7%
Do about the same as others (N=136)	61.0%
Do less than others (N=22)	45.5%
Don't know how compare to others (N=10)	30.0%
Usage usually shown on MyHER chart	
MyHER shows home uses less than average (N=99)	61.6%
MyHER shows home uses about the same as the average home (N=70)	65.7%
MyHER shows home uses more than average (N=111)	65.8%
Don't know how MyHER shows comparison to average home (N=22)	36.4%
Recent MyHER Score	
Recent MyHER score: less than efficient home (N=88)	65.9%
Recent MyHER score: less than average, but more than efficient home (N=59)	69.5%
Recent MyHER score: more than average home (N=147)	58.5%
State	
North Carolina (N=151)	58.9%
South Carolina (N=151)	65.6%

As seen in Table 19, about half of MyHER customers surveyed (47.7% or 144 out of 302) say they are trying to improve how their energy efficiency compares to their neighbors. Customers who say they do "more than others" for energy efficiency (58.2% or 78 out of 134) are significantly more likely to be making efforts than other customers (combined 39.3% or 66 out of 168; significant at p<.05 using student's t-test). Customers who throw away MyHER (10.0%) or who don't know what their MyHER usually shows (27.3%) are the least likely to be trying to improve their home energy comparisons.

There are no significant differences in the rate of trying to improve efficiency between customers with different recent MyHER scores, or based on what customers report their MyHER usually shows. However, South Carolina recipients (52.3% or 79 out of 151) are more likely to be trying to improve their scores than North Carolina recipients (43.0% or 65 out of 151; this difference is significant at p<.05 using student's t-test).

Table 19. Trying to Improve How Home Efficiency Compares to Others

	% trying to improve efficiency
Overall (N=302)	47.7%
Read MyHER reports or throw them away	
Read MyHER (N=292)	49.0%
Throw away MyHER (N=10)	10.0%
Efforts to decrease energy consumption compared to others	
Do more than others (N=134)	58.2%
Do about the same as others (N=136)	38.2%
Do less than others (N=22)	45.5%
Don't know how compare to others (N=10)	40.0%
Usage usually shown on MyHER chart	
MyHER shows home uses less than average (N=99)	45.5%
MyHER shows home uses about the same as the average home (N=70)	50.0%
MyHER shows home uses more than average (N=111)	52.3%
Don't know how MyHER shows comparison to average home (N=22)	27.3%
Recent MyHER Score	
Recent MyHER score: less than efficient home (N=88)	47.7%
Recent MyHER score: less than average, but more than efficient home (N=59)	45.8%
Recent MyHER score: more than average home (N=147)	49.0%
State	
North Carolina (N=151)	43.0%
South Carolina (N=151)	52.3%

Table 20 shows the mean ratings for satisfaction with aspects of the program and Duke Energy overall according to whether they use the MyHER charts to track their usage or not, and whether they are trying to improve their comparison with others or not. Customers who do use the charts and those who are intending to improve their comparison to others give higher satisfaction scores across the board. Statistically significant differences at p<.10 or better using ANOVA are marked in ***bold italic*** text in the table below; differences are significant for every item except overall satisfaction with Duke Energy and "reports are easy to understand" by tracking usage or not.

Table 20. Satisfaction Scores for Those Who Use Charts to Track Usage and Who Are Trying to Improve Their Comparison to Others

Statement	Use charts to track usage		Trying to improve comparison		Overall
	Yes (N=188)	No (N=107)	Yes (N=144)	No (N=144)	(N=302)
The report's comparisons are reasonable and appropriate.	***7.70***	***7.03***	***7.86***	***6.98***	7.46
The report's comparisons are useful.	***8.03***	***6.75***	***8.36***	***6.76***	7.61
The reports are easy to read and understand.	9.35	9.10	***9.45***	***9.08***	9.26
The energy saving tips in the report provided new ideas that I was not previously considering.	***7.69***	***6.73***	***8.04***	***6.68***	7.38
I find the reports useful.	***8.96***	***7.85***	***9.15***	***7.90***	8.56
I enjoy receiving and reading the reports.	***8.79***	***7.63***	***8.89***	***7.83***	8.36
I find the graphics helpful in understanding how my energy usage compares to others like me.	***9.18***	***8.33***	***9.30***	***8.46***	8.88
I find the graphics helpful in understanding how my energy usage changes over the seasons.	***9.30***	***8.44***	***9.29***	***8.74***	9.00
Overall I am satisfied with the reports.	***9.14***	***8.81***	***9.25***	***8.80***	9.04
Overall satisfaction with Duke Energy	8.27	8.07	8.17	8.17	8.20

Those who answered "don't know" if they track usage or are trying to improve are only included in the "Overall" column of this table.

Customers in the Carolina System were asked to rate the usefulness of three options for presenting the home comparisons on reports: using dollars spent per month (the current method), as well as presenting kilowatt hours per month or pounds of pollution produced per month. These ratings were recorded on a 10-point scale, where 10 means "very useful" and 1 means "not useful", and the average ratings by groups are shown in Table 21. The current dollars per month comparison receives the highest average ratings for usefulness (8.73), significantly higher than the average ratings for kilowatt hours per month (5.85), which in turn received a significantly higher average rating than pounds of pollution per month (4.42). There are no significant differences between customers who read or throw away reports, or by how customers feel their efficiency efforts compare to others.

Table 21. Ratings for Three Home Comparison Units

Average rating for usefulness	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Dollars spent per month	8.73	8.71	8.69	8.84	8.36	8.73
Kilowatt hours per month	5.87	4.86	6.11	5.75	5.43	5.85
Pounds of pollution per month	4.42	4.60	4.66	4.30	4.40	4.42

Those who "don't know" how they compare to others are not shown in this table.

Tips and Messages

The series of questions regarding recalled tips and message that were asked of surveyed MyHER customers can be found in Appendix C: MyHER Customer Survey Instrument starting on page 161, and begin with question 9. First we asked if they recalled any of the tips that they read on the MyHER, and if they did, we asked which tips they recalled. For all recalled tips and messages (up to three), we asked a series of questions about those tips or messages they recalled. We asked if their response to the tip or message was favorable, if it was believable, if and what they did in response to the tip or message, and how influential the MyHER was in their decision to take the action.

Duke Energy provided TecMarket Works with examples of MyHER mailings, and the database of customer contacts provided to TecMarket Works included which MyHER mailings customers received and when (by the mail drop date provided). With this information, we determined if the message or tip they recalled was a correct or false recollection of a tip or message they received. If the recalled tip or message was correct, we calculated how many days passed from the day they received the MyHER with that tip or message to the day that they were surveyed by TecMarket Works.

If a message or tip was sent to a customer on multiple MyHERs, then the days to recall—or days from receiving the MyHER mailing with that MyHER message or tip to the day the customer was surveyed—is from the most recent MyHER mailing with that message. For example, if the customer received a weatherization tip on a report with a mail drop date of January 2, 2013 and again received a weatherization tip with a mail drop date of April 9, 2013, and then was surveyed on May 9, 2013, we count the number of days from the April drop date for the "days to recall" metric, which would be 30 days in this example (instead of 127).

The Difference Between Tips and Messages

One important difference between tips and messages is their location on the MyHER: Two tips are presented on the front page, while two messages are generally shown on the back page. Tips are customized so that every month customers receive those most appropriate to their household, while all customers receive messages from the same set of monthly messages (all participants receive one or two messages from a set of up to three messages each month). During the period of the eleven reports covered by this evaluation (reports titled "May 2012" through "June 2013"), a total of 30 separate[17] tips were sent to customers. These eleven reports also included 23

[17] Two similar tips are counted separately for reporting purposes: "install a programmable thermostat" is a revised version of the earlier tip "install and program a programmable thermostat" with updated text.

separate messages. A key to messages and tips can be found in Appendix J: Summary of Tips and Messages. An example of a report provided to TecMarket Works can be found in Appendix D: Example MyHER Mailing.

Recalled Tips and Messages

Surveyed MyHER customers that read the MyHER were asked if they recalled any of the tips or messages on any of the MyHERs they received. Table 22 presents a summary of how many surveyed MyHER customers recalled tips or messages.

The bottom rows in Table 22 present the same metrics as the top rows, but only consider tips and messages that were correctly recalled (and also adds a row for "percentage of tips and messages recalled correctly"). Half of MyHER customers surveyed (50.3% or 152 out of 302) could recall at least one tip or message from MyHER. Among these customers who could recall at least one tip or message, the majority (87.5% or 133 out of 152) recalled something that correctly matched the tips and messages that were sent to them. Overall, only 77.9% (271 out of 348) of the tips and messages which were recalled by survey participants correctly matched tips and messages that were actually sent.

Table 22 also presents the overall mean number of tips or messages recalled, and the mean for only those surveyed customers who recalled at least one tip or message. For those that recall at least one tip or message, the mean number of tips or messages recalled was 2.29 apiece, and the mean number correctly recalled by those making at least one correct recollection was 2.04 apiece.

MyHER recipients who throw the reports away are less likely to recall any tips or messages (30.0% or 3 out of 10, compared to 51.0% or 149 out of 292 among those who read the reports; this difference is significant at $p<.10$ using student's t-test). The three recipients who throw MyHER away but recalled a tip or message anyhow are also significantly less likely to recall tips and messages correctly (42.9% or 3 out of 7 recalls matching tips or messages that were sent on their reports, compared to 78.6% or 268 out of 341 for those who read the reports; this difference is significant at $p<.05$ using student's t-test).

Table 22. Summary of Combined Tips and Messages Recalled

	Read MyHER (N=292)	Throw away MyHER (N=10)	Total (N=302)
Count of Customers Indicating They Recalled Tips or Messages	149	3	152
Percent of Customers Indicating They Recalled Tips or Messages	51.0%	30.0%	50.3%
Total Number of Tips or Messages Recalled	341	7	348
Mean Number of Tips or Messages Recalled (maximum of 3), All Surveyed	1.17	0.70	1.15
Mean Number of Tips or Messages Recalled (maximum of 3), All Surveyed With At Least One Recalled Tip or Message	2.29	2.33	2.29
The Values Below Consider Only Correctly Recalled Tips and Messages			
Count of Customers Recalling At Least One Tip or Message Correctly	131	2	133
Percent of Customers Recalling At Least One Tip or Message Correctly	44.9%	20.0%	44.0%
Total Number of Tips or Messages Recalled Correctly	268	3	271
Percentage of Tips and Messages that were Recalled Correctly	78.6%	42.9%	77.9%
Mean Number of Correctly Recalled Tips or Messages (maximum of 3), All Surveyed	0.92	0.30	0.90
Mean Number of Correctly Recalled Tips or Messages (maximum of 3), All Surveyed With At Least One Correctly Recalled Tip or Message	2.05	1.50	2.04

Comparison: Messages versus Tips

A primary difference between a tip and a message is the location of the statement on the MyHER: Tips are presented on the front of the reports, while messages are presented on the back. Tips are customized for each household, while messages are generally the same for all customers each month.[18] For a complete list of messages and tips included in this analysis, please see Appendix J: Summary of Tips and Messages.

Table 23 presents the mean number of tips and messages recalled, and the mean number of days to recall that tip or message. Surveyed MyHER customers correctly recalled more tips (0.53 per respondent) than messages (0.36 per respondent), and the mean days to recall was lower for tips (140 days) than messages (196 days). Customers who throw their MyHER away recalled fewer tips (0.20 per respondent) and messages (0.10 per respondent) correctly.

[18] Because messages are not randomized like tips, larger numbers of surveyed customers were exposed to messages relative to tips; on the high end, 97% (293 out of 302) of survey respondents received the “Smart Saver Health Check” and “Dial 811” messages, while there was only one message received by fewer than 20% of respondents (“Power of Giving Back” was sent to only 2% or 7 out of 302). However, the number of recipients who have seen each tip during this same time period ranges from less than 1% (2 out of 302 for “check the temperature of your refrigerator and freezer”) up to a maximum of only 58% (176 out of 302 for “insulate outlets and switch plates”). The number of customers receiving each tip and message is shown in the left-hand columns of Table 25 and Table 26.

Table 23. Number of Tips and Messages Correctly Recalled

	Read MyHER (N=292)	Throw away MyHER (N=10)	Total (N=302)
Number of Correctly Recalled Tips	159	2	161
Mean Number of Tips per Customer	0.54	0.20	0.53
Mean Days to Recall Tips	140	91	140
Number of Correctly Recalled Messages	109	1	110
Mean Number of Messages per Customer	0.37	0.10	0.36
Mean Days to Recall Messages	196	173	196

The tables below present all of the correctly recalled tips and messages, the number of surveyed customers recalling the tip or message, how many of them responded to the tip or message favorably, how many found it believable, and finally, how many of them took action based on the tip or message along with the influence of the MyHER on their taking the action. The Influence Score was determined by calculating the mean response to the following: *"Please indicate how influential the Home Energy Report was to your decision to take this action using a 1 to 10 scale with 1 meaning the report had no influence and you would have taken this action on your own, and 10 meaning that the report was very influential and that you would not have taken this action on your own without reading the tip on the Report."*

Table 24 presents all the recalled tips in one table, combining all counts and averaging the favorability scores of all responses for each tip. The most commonly recalled tips are “use efficient bulbs for your outdoor lighting” (34 recipients), “use energy efficient lighting indoors” (31 recipients) and “keep your shades closed in the summer” (9 recipients), all of which were recalled by more than 10% of the customers receiving those tips on their MyHER reports. The two most frequently recalled tips from MyHER reports are about CFL’s, which corresponds to customers’ responses about energy efficiency actions shown in Figure 12.

Customers surveyed found most of the tips to be believable and gave them high favorability scores. The lowest-rated tip in terms of favorability is “unplug your second refrigerator or freezer” (6.7 on a 10-point scale based on three ratings), and most tips received ratings higher than 8.0 out of 10. All of the tips were deemed believable by a clear majority of customers recalling those tips, except for “install a programmable thermostat (believable for 50% or 2 out of 4 customers).

In most cases, a majority of customers recalling a tip took action based on that tip. Among tips recalled by more than five respondents, there were four where fewer than 50% of customers took action: “buy an Energy Star computer” (16.7% or 1 out of 6), “insulate your attic” (20% or 1 out of 5), “replace your windows with low-E Energy Star windows” (40% or 2 out of 5) and “buy an Energy Star television” (42.9% or 3 out of 7). For almost all of the tips, a majority of customers who took action were satisfied with the results.

The amount of time to recall these tips ranged from about 4 weeks to more than eight months, with the top two most frequently recalled tips having been recalled on average from 151 to 155 days (about five months) after the reports containing those tips were sent.

All but two of the tips sent to Carolina System customers on MyHER reports were recalled by fewer than 10 survey respondents apiece, which is not a large enough sample for significance testing. Differences between tips in terms of ratings and actions should be considered directional indicators, not statistically significant findings.

Table 24. All Recalled Tips

Recalled Tip (Number of Respondents Receiving)	**Number of Recalls for This Tip** (percent recalling)	**Mean Favora-bility Score**	**Number Finding It Believable** (percent yes)	**Number of Customers Taking Action** (percent yes)	**Satisfied With Results** (percent of those taking action)	**Customers Planning to Take Action** (percent of those recalling)	**Mean Days to Recall**
Use efficient bulbs for your outdoor lighting (N=169)	34* (20%)	8.7	33 (97%)	22 (65%)	21 (95%)	1 (3%)	151
Use energy efficient lighting indoors (N=159)	31* (19%)	8.9	30 (97%)	24 (77%)	23 (96%)	1 (3%)	155
Keep your shades closed in the summer (N=76)	9 (12%)	9.6	9 (100%)	6 (67%)	5 (83%)	1 (11%)	28
Buy an Energy Star computer (N=74)	6 (8%)	8.3	6 (100%)	1 (17%)	1 (100%)	2 (33%)	29
Replace your windows with low-E Energy Star windows (N=88)	5 (6%)	8.8	5 (100%)	2 (40%)	2 (100%)	1 (20%)	68
Turn off outdoor lights during the day (N=165)	8 (5%)	8.5	8 (100%)	6 (75%)	6 (100%)	0 (0%)	233
Insulate electrical outlets and switch cover plates (N=176)	8* (5%)	9.7	8 (100%)	4 (50%)	2 (50%)	2 (25%)	207
Weatherize your home (N=149)	7 (5%)	9.3	7 (100%)	7 (100%)	6 (86%)	0 (NA)	122
Buy an Energy Star television (N=152)	7* (5%)	9.4	7 (100%)	3 (43%)	2 (67%)	2 (29%)	164
Cut the standby power used for home entertainment (N=151)	6 (4%)	7.3	5 (83%)	5 (83%)	4 (80%)	0 (0%)	209
Insulate your attic (N=147)	5* (3%)	9.8	5 (100%)	1 (20%)	0 (0%)	1 (20%)	146
Cut standby power to your home computing system (N=135)	4 (3%)	8.8	4 (100%)	4 (100%)	3 (75%)	0 (NA)	73
Install a programmable thermostat (N=146)	4 (3%)	7.3	2 (50%)	3 (75%)	2 (67%)	0 (0%)	17
Minimize the run time of your dryer (N=157)	4 (3%)	10.0	4 (100%)	4 (100%)	4 (100%)	0 (NA)	196
Save on hot water use (N=96)	3 (3%)	9.7	3 (100%)	2 (67%)	2 (100%)	1 (33%)	227
Use task lighting (N=149)	3 (2%)	8.0	3 (100%)	3 (100%)	3 (100%)	0 (NA)	253
Dust off that crock pot (N=150)	3 (2%)	7.7	2 (67%)	2 (67%)	2 (100%)	0 (0%)	33
Buy an Energy Star	3	9.0	3	0	NA	1	124

Recalled Tip (Number of Respondents Receiving)	**Number of Recalls for This Tip** (percent recalling)	**Mean Favora-bility Score**	**Number Finding It Believable** (percent yes)	**Number of Customers Taking Action** (percent yes)	**Satisfied With Results** (percent of those taking action)	**Customers Planning to Take Action** (percent of those recalling)	**Mean Days to Recall**
dehumidifier (N=152)	(2%)		(100%)	(0%)		(33%)	
Replace your old hot water heater (N=153)	3 (2%)	8.0	2 (67%)	2 (67%)	2 (100%)	1 (33%)	146
Buy an Energy Star dishwasher (N=155)	3* (2%)	8.7	3 (100%)	0 (0%)	NA	1 (33%)	142
Unplug your second refrigerator or freezer (N=163)	3 (2%)	6.7	3 (100%)	2 (67%)	2 (100%)	0 (0%)	76
Install and program a programmable thermostat (N=47)	1 (2%)	9.0	1 (100%)	1 (100%)	1 (100%)	0 (NA)	259
Enable energy management on your computer (N=156)	2 (1%)	9.0	2 (100%)	1 (50%)	1 (100%)	0 (0%	217
Use your microwave instead of a conventional oven (N=159)	2 (1%)	10.0	2 (100%)	0 (0%)	NA	0 (0%)	54
It is time for summer cookouts and energy savings (N=148)	1 (0.7%)	10.0	1 (100%)	1 (100%)	1 (100%)	0 (NA)	24
Buy an Energy Star refrigerator (N=156)	1 (0.6%)	9.0	1 (100%)	1 (100%)	1 (100%)	0 (NA)	88
Put your outdoor lights on motion detectors or timers (N=156)	1 (0.6%)	8.0	1 (100%)	1 (100%)	1 (100%)	0 (NA)	103

** Six surveyed participants recalled communications that matched two similar tips sent on the same report (such as "use efficient lighting indoors" and "use efficient lighting outdoors"), thus these six cases are counted twice in this table (once for each tip that is considered a match). Note: If a customer already took action based on a tip, they were not asked if they planned to take action based on that tip in the future (thus "NA" for the percent planning to take action for tips where 100% of customers already took action).*

Table 25 presents messages recalled by customers surveyed, with the most recently recalled messages at the top. For most months' reports, MyHER includes the same two messages sent to all recipients at the same time. The most frequently recalled report messages are "CFL Twist" (48 recipients or 28.7% of 167 who received this message) and "CFL Free" (23 recipients or 30.3% of 76 who received this message). Both of these messages were included on the October 2012 reports, and as is the case with the most-recalled tips from reports, these messages are also about CFL's. None of the other messages were recalled by as many as 10% of customers receiving those messages.[19]

[19] May, June and July 2013 reports were being mailed to customers while this survey was in progress. The earliest May 2013 reports were mailed on June 4, 2013, by which time 160 (52.6% of 305) of participants in the Carolina

Customers who received the "CFL Twist" message had previously received CFL's through a Duke Energy program (this message encouraged them to install the light bulbs they already have) while "CFL Free" was sent to customers who were eligible to receive free CFL's from Duke Energy (this message encouraged them to enroll in the free bulb program). Compared to those receiving "CFL Free", customers who received the "CFL Twist" message gave higher favorability ratings (9.3 on a 10-point scale, compared to 8.4 for "CFL Free") and were more likely to have taken action based on the tip (72.9% or 35 out of 48, versus 60.9% or 14 out of 23 for "CFL Free"), although neither of these differences rise to the level of statistical significance ($p>.10$ using student's t-test).

Among the remaining messages recalled, favorability ratings are quite high (8.9 or higher for all messages recalled by at least five respondents), and large majorities find these messages believable (88.9% or 8 out of 9 for even the least-believable message).

Table 25. All Recalled Messages

Recalled Message (Number of Respondents Receiving)	**Number of Recalls for This Message** (percent recalling)	**Mean Favora-bility Score**	**Number Finding It Believable** (percent yes)	**Number of Customers Taking Action** (percent yes)	**Satisfied With Results** (percent of those taking action)	**Customers Planning to Take Action** (percent of those recalling)	**Mean Days to Recall**
Refrigerator Jun 2013 (N=148)	1 (0.7%)	7.0	1 (100%)	0 (0%)	NA	1 (100%)	12
Out With The Old May 2013 (N=143)	2 (1%)	7.0	2 (100%)	1 (50%)	0 (0%)	0 (0%)	34
Smart Saver Health Check Mar 2013 (N=293)	2 (0.7%)	8.0	2 (100%)	2 (100%)	2 (100%)	0 (NA)	112
Screen Savers Jan 2013 (N=291)	9 (3%)	8.9	8 (89%)	8 (89%)	7 (88%)	0 (0%)	127
Hugs For Heaters Dec 2012 (N=260)	6 (2%)	9.3	6 (100%)	4 (67%)	3 (75%)	2 (33%)	165
Dirty Laundry Oct 2012 (N=243)	7 (3%)	9.3	7 (100%)	4 (57%)	4 (100%)	1 (14%)	205
CFL Twist Oct 2012 (N=167)	48 (29%)	9.3	45 (94%)	35 (73%)	32 (91%)	0 (0%)	201
CFL Free Oct 2012 (N=76)	23 (30%)	8.4	22 (96%)	14 (61%)	14 (100%)	1 (4%)	199

System had already been surveyed. The earliest June 2013 reports were mailed on June 24, 2013, by which time 60.6% (185 out of 305) of participants had been surveyed. July 2013 reports only started going in the mail on July 23, 2013, which was the last day of participant surveys (so none of the surveyed participants would have seen the July 2013 report by the time they were surveyed). All survey respondents would have received all reports from March 2013 and earlier by the time they were surveyed (based on their months of participation in the program; due to billing and other issues, some customers do not receive every report).

Recalled Message (Number of Respondents Receiving)	**Number of Recalls for This Message** (percent recalling)	**Mean Favora-bility Score**	**Number Finding It Believable** (percent yes)	**Number of Customers Taking Action** (percent yes)	**Satisfied With Results** (percent of those taking action)	**Customers Planning to Take Action** (percent of those recalling)	**Mean Days to Recall**
Drafts Sep 2012 (N=88)	1 (1%)	9.0	1 (100%)	0 (0%)	NA	1 (100%)	266
Read Write Reset Aug 2012 (N=151)	6 (4%)	9.6	6 (100%)	1 (17%)	0 (0%)	2 (33%)	261
Vacation Jun 2012 (N=132)	3 (2%)	6.3	3 (100%)	0 (0%)	NA	1 (33%)	317
Smart Saver May 2012 (N=59)	2 (3%)	6.5	2 (100%)	1 (50%)	1 (100%)	0 (0%)	348

Notes: If a customer already took action based on a message, they were not asked if they planned to take action based on that message in the future (thus "NA" for the percent planning to take action for messages where 100% of customers already took action).

There were another eleven messages and three tips which none of the surveyed participants recalled; these are listed below in Table 26, along with the number of survey participants receiving each message or tip on their MyHER reports.

Table 26. Tips and Messages That Were Not Recalled by Any Surveyed Participants

	Number of Respondents Receiving Message or Tip
Messages that were not recalled (and monthly report)	
Water and Electricity (Jun 2013)	148
Heads Up Cool Down (May 2013)	150
Power of Giving Back (May 2013)	7
Dial 811 (Mar 2013)	293
Power Manager (Jan 2013)	247
Videos (Jan 2013)	44
Go Green (Dec 2012)	260
Winter Magic (Sep 2012)	88
Know Your Home (Jul 2012)	148
Home Energy House Call (Jun 2012)	132
Spring Cleaning (May 2012)	59
Tips that were not recalled (not tied to particular months)	
Air dry your laundry	155
Try an LED light bulb	44
Check the temperature of your refrigerator or freezer	2

If customers said a tip or message was "not believable", they were asked why. These verbatim responses are listed below for customers who found tips or messages to be "not believable". Overall, there were only five cases where a tip was "not believable" and four cases where a message was deemed "not believable" (though three of these cases represent a customer's recollection matching both a tip and a message, so these comments are reported below twice for the corresponding tips and messages). Another two tips and one message were recalled by customers who "don't know" if those messages are believable, though these customers were not asked to explain the reasons for their answers.

Why tips were not believable

Cut the standby power used for home entertainment (N=1)

- *"I felt like plugging it in and pulling it out was a waste, until I realized that I was saving energy. One example was the Glade Plug-ins; while I like to come home to a house that smells nice, I researched more and found that they use energy because they're on all the time. It was the same with my coffee pot: even with a timer, that's using energy. I didn't think about it until I started getting the reports."*

Replace your old hot water heater (N=1)

- *"I don't feel like this is really the problem with my electric bill, but I plan on buy a new water heater anyway."*

Install a programmable thermostat (N=1)

- *"I would have to replace three thermostats which would be more expensive than just manually adjusting the thermostats myself."*

Use efficient bulbs for your outdoor lighting (N=1)

- *"We didn't see any difference in our bill."*

Use energy efficient lighting indoors (N=1)

- *"The Reveal lights bulbs work just as well and I like the light quality better."*

Why messages were not believable

CFL Twist (N=3)

- *"I have not seen any evidence in my bill yet."*
- *"We didn't see any difference in our bill."*
- *"The Reveal lights bulbs work just as well and I like the light quality better."*

Screen Savers (N=1)

- *"I felt like plugging it in and pulling it out was a waste, until I realized that I was saving energy. One example was the Glade Plug-ins; while I like to come home to a house that smells nice, I researched more and found that they use energy because they're on all the time. It was the same with my coffee pot: even with a timer, that's using energy. I didn't think about it until I started getting the reports."*

Influence of MyHER Tips and Messages On Actions Taken

Customers who took action based on a tip or message were asked to rate the influence of the MyHER program on their action using a 10-point scale, where "10" means "very influential." Overall, among the 105 actions taken based on tips the average rating of influence was 7.94, while for the 70 actions taken based on messages the average rating of influence was 7.53. The mean influence ratings for all tips and messages for which customers took action are shown below in Figure 16 and Figure 17.

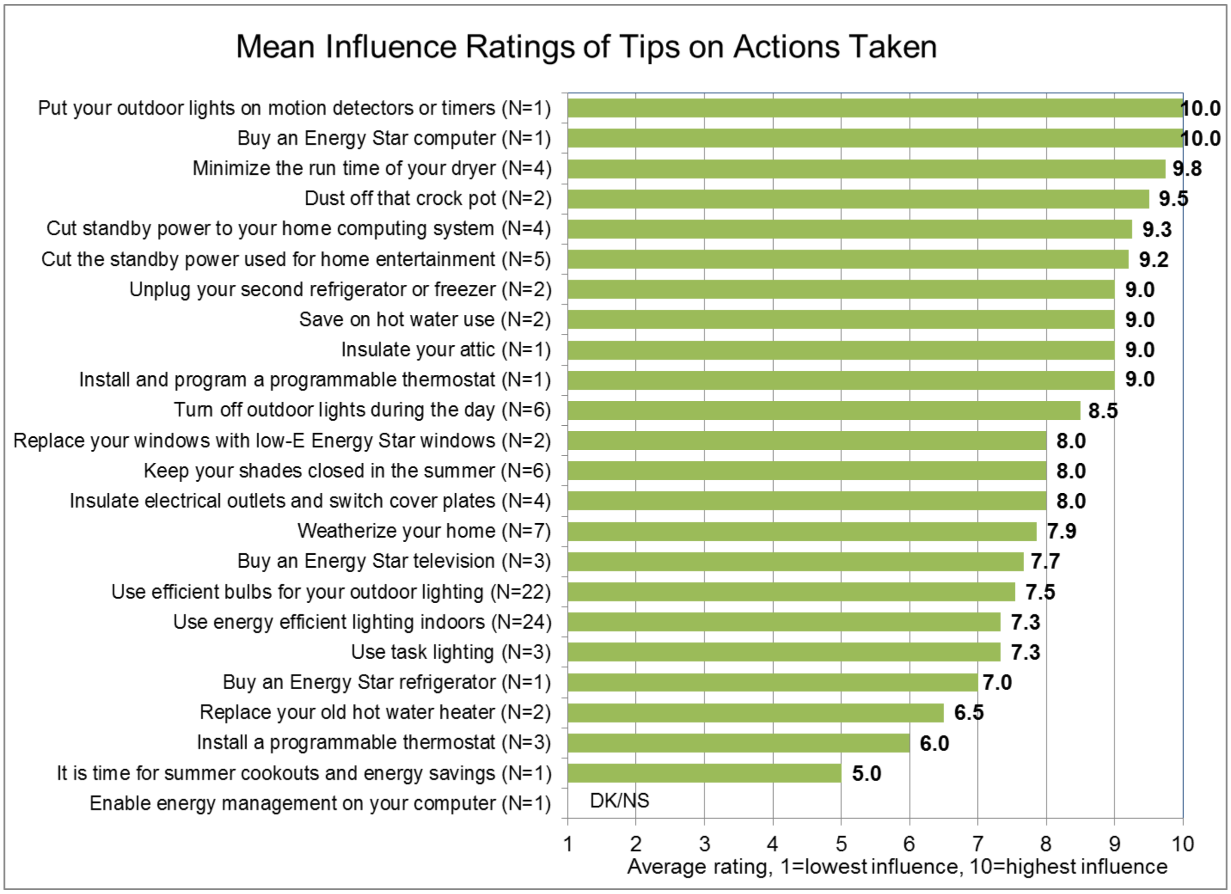


Figure 16. Mean Influence Ratings of Tips on Actions Taken

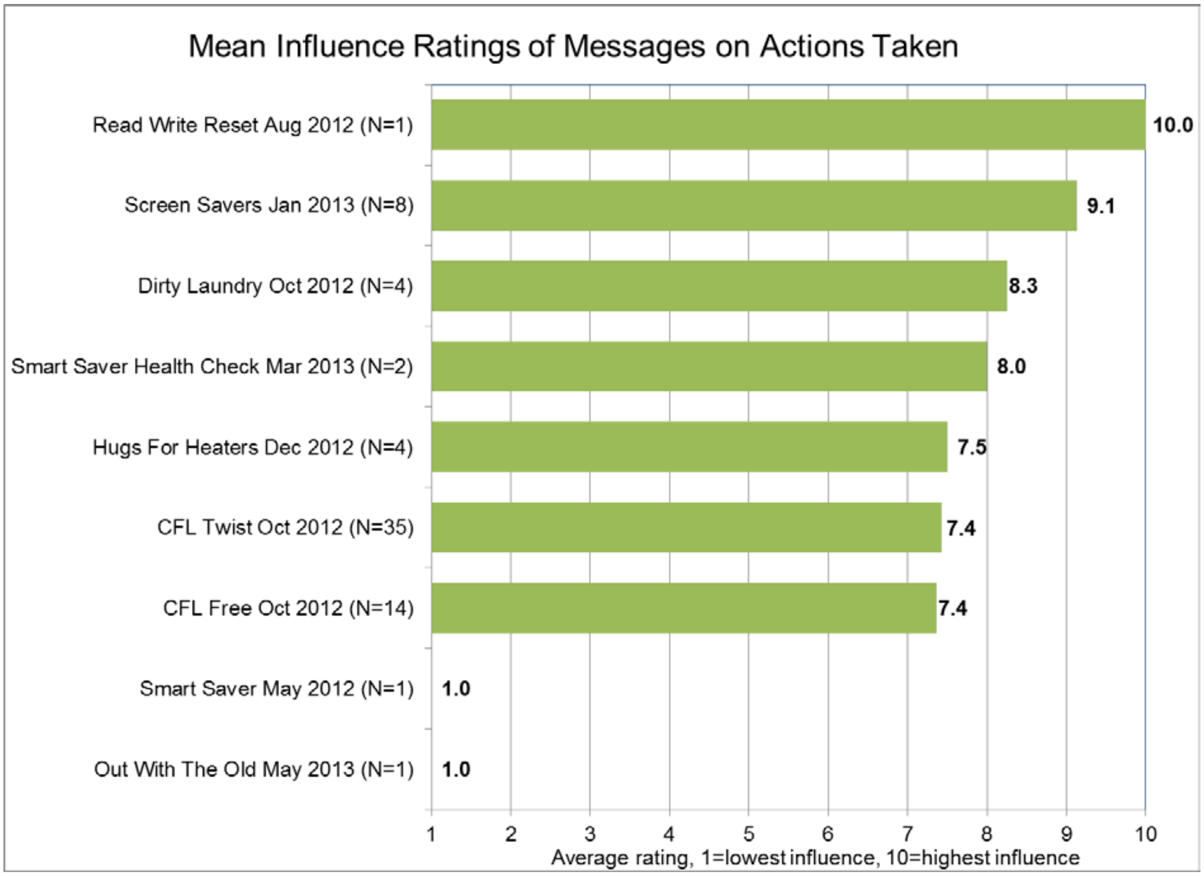


Figure 17. Mean Influence Ratings of Messages on Actions Taken

Tip and Message Relevance

Surveyed MyHER recipients were asked if they felt that the tips and messages included on the report were relevant and applied to their household. These results are shown in Table 27. Overall, more than two-thirds (70.2% or 212 out of 302) of customers felt that the tips and messages are relevant and apply to their households. Specific subgroups that are significantly less likely to feel the tips and messages are relevant and applicable include those who throw away the reports (30.0% or 3 out of 10) and those who don't know what their MyHER usually shows in comparison to other households (50.0% or 11 out of 22; these groups are significantly different from the others at p<.10 or better using student's t-test). However, there was little difference between groups based on their actual, recent MyHER scores or efforts to improve energy efficiency.

Table 27. Relevance and Applicability of Tips and Messages for Customers' Households

	% who feel tips are relevant and apply to household
Overall (N=302)	70.2%
Read MyHER reports or throw them away	
Read MyHER (N=292)	71.6%
Throw away MyHER (N=10)	30.0%
Efforts to decrease energy consumption compared to others	
Do more than others (N=134)	71.6%
Do about the same as others (N=136)	69.9%
Do less than others (N=22)	59.1%
Don't know how compare to others (N=10)	80.0%
Usage usually shown on MyHER chart	
MyHER shows home uses less than average (N=99)	67.7%
MyHER shows home uses about the same as the average home (N=70)	74.3%
MyHER shows home uses more than average (N=111)	73.9%
Don't know how MyHER shows comparison to average home (N=22)	50.0%
Recent MyHER Score	
Recent MyHER score: less than efficient home (N=88)	69.3%
Recent MyHER score: less than average, but more than efficient home (N=59)	81.4%
Recent MyHER score: more than average home (N=147)	66.0%
State	
North Carolina (N=151)	71.5%
South Carolina (N=151)	68.9%

Customers who said the tips and messages on the MyHER report were not relevant were asked if there were any specific tips or messages that stood out to them as not being applicable to their household. All but ten of the recipients surveyed who did not feel the tips were relevant or applicable either did not know if the tips and messages were relevant or applicable, or could not recall any particular tips or messages that were not relevant or applicable. The ten responses from customers who commented about tips and messages not being applicable or relevant are categorized and listed below.

Does not apply to renters (N=3)

- *Add insulation to your attic, walls, and crawlspace, and install Energy Star A/C and heat pump do not apply. We can't do these because the home is a rental.*
- *I live in a rental apartment, so I have no control over changes for energy efficiency.*
- *Most of the tips are great, but some are directed at homeowners and we rent.*

Reject tips and messages in general (N=4)

- *Since I already knew most of the tips, I wasn't paying very close attention.*
- *I feel that the tips are very elementary or basic and that this information is readily available elsewhere.*
- *Many of the tips do not apply to me because I am a frugal bachelor.*
- *I cannot afford to do many tips.*

Specific tips and messages which were not relevant or applicable (N=3)

- *I was already in the habit of turning lights off when they're not needed.*
- *The turning lights off tip was very general, so not very useful.*
- *Tips about setting the thermostat higher during the summer do not apply to me due to health reasons.*

Tip and Message Savings

Customers were asked to estimate their monthly savings from taking actions inspired by MyHER tips and messages, in terms of dollars on their monthly bill and in terms of energy saved. Only one surveyed participant[20] who took action was able to answer the question about energy savings in terms of kWh (though they answered in terms of "kilowatts per month"), and customers were only able to give dollar savings estimates for about half (49.7% or 83 out of 167) of actions described (including actions which did not match recalled tips). These verbatim estimates are listed below by tips and messages recalled.

<u>Estimated Monthly Savings from Tips</u>

Use efficient bulbs for your outdoor lighting (N=12)

- *$20 to $25*
- *$15* (N=2)
- *$10*
- *$5 to $10*
- *$7 or $8; I saved 50 to 60 kilowatts per month.*
- *$7*
- *$4 to $5*
- *$3* (N=2)
- *No savings* (N=2)

Use energy efficient lighting indoors (N=9)

- *$40*
- *$25*
- *$20 to $25*
- *$20*
- *Less than $10*
- *$7 or $8; I saved 50 to 60 kilowatts per month.*
- *$6*

[20] The recalled communication by the participant who estimated that they saved "50 to 60 kilowatts per month" was matched to the "CFL Twist" message as well as both tips about "efficient lighting", since this customer received both "efficient lighting" tips at the same time on the same report. Thus this estimate is repeated three times in this section, once for each of the three tips and messages this customer's recollection was matched to.

- *$5*
- *$5 or $6*

Cut standby power to your home computing system (N=3)

- *$25*
- *$20 to $25*
- *$2*

Minimize the run time of your dryer (N=3)

- *$20 including all efforts*
- *$5*
- *$2 to $3*

Turn off outdoor lights during the day (N=3)

- *$45*
- *$20 to $30*
- *$10*

Dust off that crock pot (N=2)

- *$7 per month when combined with other strategies.*
- *$3*

Install a programmable thermostat (N=2)

- *3% savings*
- *No savings*

Insulate electrical outlets and switch cover plates (N=2)

- *$50*
- *$5 to $10*

Keep your shades closed in the summer (N=2)

- *$5*
- *$3*

Weatherize your home (N=2)

- *15% to 18% savings*
- *$5*

Use task lighting (N=2)

- *$20 to $25*
- *$20*

Cut the standby power used for home entertainment (N=1)

- *$7 per month when combined with other strategies.*

Enable energy management on your computer (N=1)

- *$25*

Install and program a programmable thermostat (N=1)

- *$30*

It's time for summer cook outs and energy savings (N=1)

- *$3*

Put your outdoor lights on motion detectors or timers (N=1)

- *$50*

Replace your windows with low-E Energy Star windows (N=1)

- *$10*

Save on hot water use (N=1)

- *$30*

Unplug your second refrigerator or freezer (N=1)

- *$30 to $40*
- *$4*

Buy an Energy Star computer (N=1)

- *$50* (This participant's recollection was matched to the "computer" tip since that was the appliance-related tip they received most recently; however, this respondent specified that they purchased a new high efficiency A/C unit.)

Buy an Energy Star television (N=1)

- *I think my energy bill was nearly cut in half. I'm probably saving around $40 per month.* (This participant's recollection was matched to the "television" tip since that was the appliance-related tip they received most recently; however, this respondent specified that they purchased a new stove, refrigerator, dishwasher, washer, dryer, and deep freezer.)

No estimates were provided for the following tips (N=0):

Air dry your laundry
Buy an Energy Star dehumidifier
Buy an Energy Star dishwasher
Buy an Energy Star refrigerator
Check the temperature of your refrigerator or freezer
Insulate your attic

Replace your old hot water heater
Use your microwave instead of a conventional oven

Estimated Monthly Savings from Messages

CFL Twist (N=17)

- *$40*
- *$25*
- *$20 to $25 per month*
- *$20*
- *$10 or $15, maybe as much as $20 a month.*
- *$15*
- *$10*
- *Maybe $10*
- *Less than $10*
- *$5 to $10*
- *$7 or $8; I saved 50 to 60 kilowatts per month.*
- *$7*
- *$6*
- *$5 or $6*
- *$3*
- *No savings* (N=2)

CFL Free (N=4)

- *$10*
- *$5*
- *$4 to $5*
- *$3*

Hugs For Heaters (N=3)

- *$50*
- *$10*
- *$3*

Screen Savers (N=3)

- *$20 to $25*
- *$7 per month when combined with other strategies.*
- *$4*

Dirty Laundry (N=2)

- *$20 including all efforts*

- *$5*

Smart Saver Health Check (N=2)
- *Less than $10*
- *$3*

Read Write Reset (N=1)
- *$50*

Smart Saver (N=1)
- *$35*

No estimates were provided for the following messages (N=0):

Dial 811
Drafts
Go Green
Heads Up Cool Down
Home Energy House Call
Know Your Home
Out With The Old
Power Manager
Power of Giving Back
Refrigerator
Smart Saver Insulate & Seal
Spring Cleaning
Two Minute Warning
Vacation
Videos
Water and Electricity
Who Knows Your Home
Winter Magic

Effect of Actions Taken on Comfort

Customers were asked if the actions they have taken based on recalled tips and messages changed the comfort level in their home. These results are shown in Figure 18 for tips and Figure 19 for messages.

Actions taken based on tips and messages are generally described as either increasing comfort or not effecting comfort, with a small minority mentioning decreases in comfort. Some tips that recipients generally reported as improving their comfort level include “insulate electrical outlets and switch cover plates”, “weatherize your home”, and a number of tips for which only one or two customers took action. The only tip that decreased comfort more than increasing it is “buy an Energy Star computer”, though only one customer took action based on this tip.

Only three other tips and two messages caused any customers at all to report a decline in comfort: the tips “install a programmable thermostat”, “efficient lighting indoors” and “efficient lighting outdoors”, and the messages “CFL Free” and “CFL Twist”.

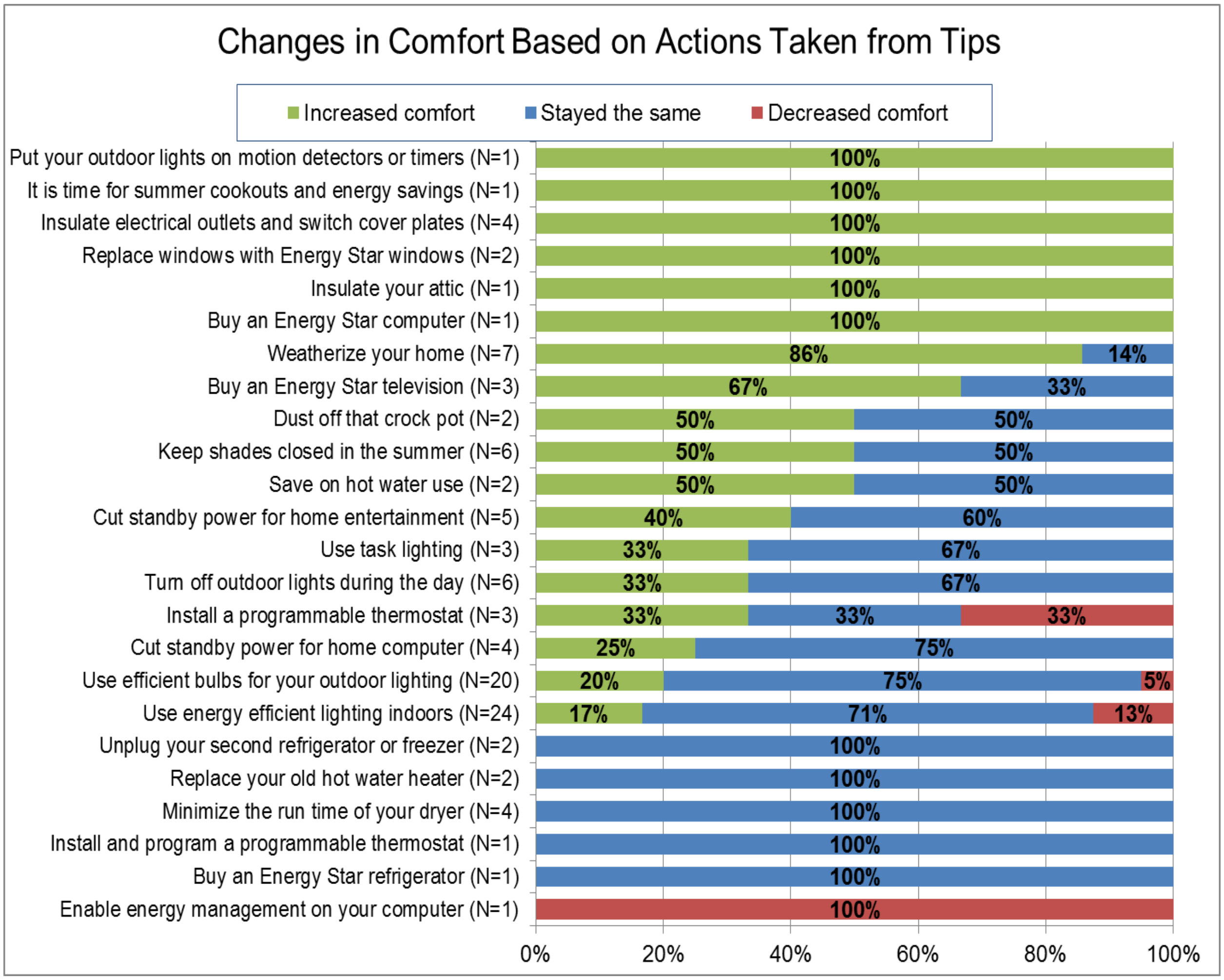


Figure 18. Changes in Comfort Due to Actions Taken from Tips

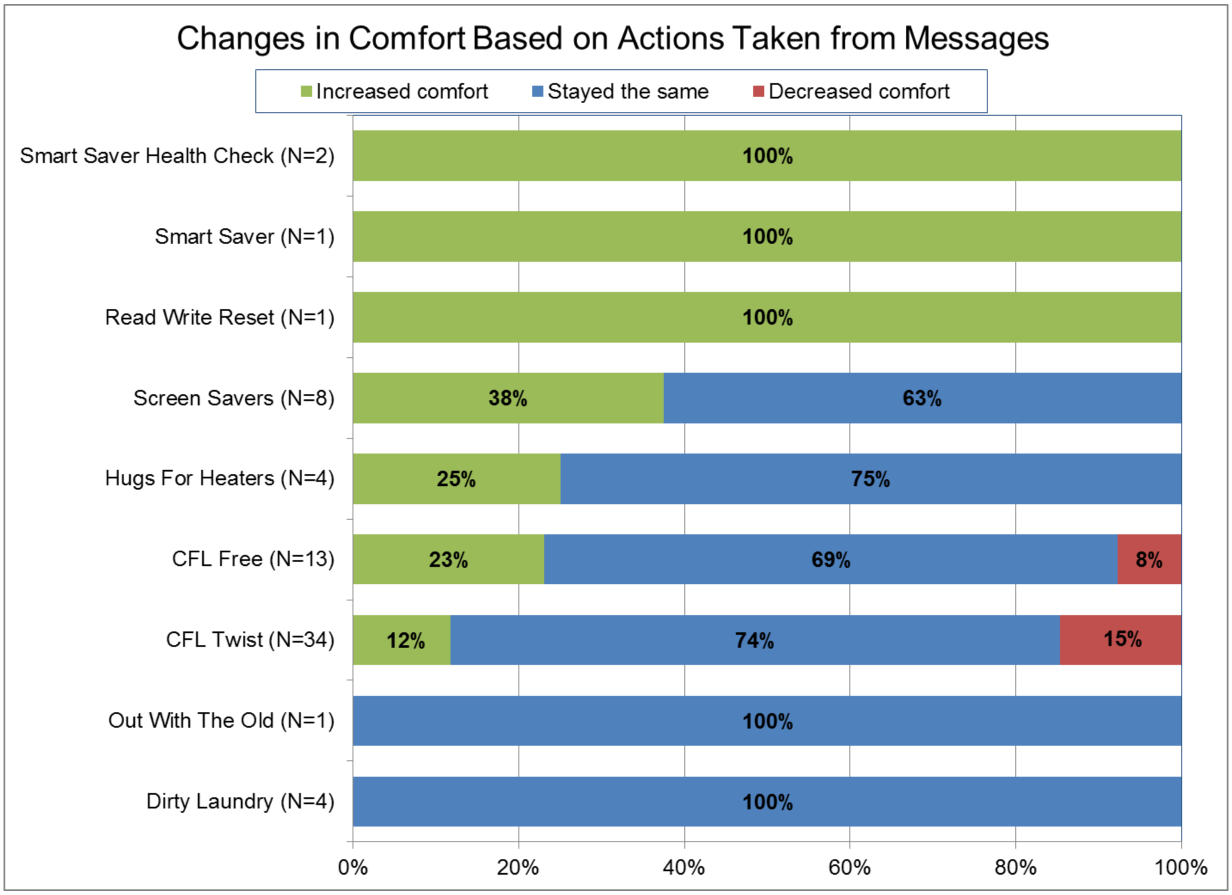


Figure 19. Changes in Comfort Due to Actions Taken from Messages

Customers Receiving Duplicate Reports

During some months, a portion of customers in the MyHER program received more than one MyHER report. This was apparently due to a data handling issue at the program vendor. Duke Energy became aware of the problem, having discovered it independently during their own quality control process. As of Spring 2013 this problem has been corrected. Most of the duplicate reports for the Carolina System were sent in August 2012 (2.6% or 8 out of 302 customers surveyed received two reports that month), though there were also a small number in June and December 2012. Among customers surveyed for this evaluation, there were no duplicate reports sent for the most recent five MyHER reports, January 2013 through July 2013. When these duplicate reports were sent, both included the same messages but (usually) different sets of tips.

Table 28. Customers Receiving Multiple Reports in the Same Month

Month of Report	Customers Receiving Two Reports (N=302)
May 2012	0.0%
June 2012	0.3%
July 2012	0.0%
August 2012	2.6%
September 2012	0.0%
October 2012	0.0%
December 2012	0.7%
January 2013	0.0%
March 2013	0.0%
May 2013	0.0%
June 2013	0.0%
July 2013	0.0%

For the purposes of matching tips and messages to what customers recall from the reports, duplicate reports were included in the analysis (if a customer remembered a tip from either report received in a month, it was considered a correct match and the "days to recall" is calculated from the drop date of the report with the matching tip or message).

In the Carolina System, we also found a few examples of customers receiving the same tip on two consecutive reports (tips are not supposed to be duplicated until a customer has received all of the tips relevant for their household). Six survey participants (2.0% of 302) received an identical tip on their May and June 2012 reports, while one participant (0.3% of 302) received duplicate reports for the month of June 2012 with both versions of this report containing an identical tip. In all six of these cases, the second report received contained one tip identical to the previous report, but also one new tip the customer had not previously received. A summary of duplicate tips can be found in Table 29.

Table 29. Customers Receiving Duplicate Tips

Tip	Customers Receiving Tip Twice (N=302)
Buy an Energy Star television	0.7%
Turn off outdoor lights during the day	0.3%
Cut the standby power used for home entertainment	0.3%
Minimize the run time of your dryer	0.3%
Insulate electrical outlets and switch cover plates	0.3%
Replace your windows with low-E Energy Star windows	0.3%

Other Energy Efficiency Actions Taken

Some of the surveyed MyHER customers have taken actions since they started receiving the Home Energy Reports that they say were not influenced by MyHER messages or tips. Table 30 presents percentages of customers surveyed who have reported that they have taken such additional energy efficient actions. If the customer indicated that they took action, we asked them what they did. These open-ended responses are in Appendix K: List of Self-Reported Energy

Efficiency Actions. The first question was open-ended, directed towards activities not influenced by MyHER, and contains a variety of responses. The series of questions following the first asked about specific changes that they may have made in their homes, and includes both actions inspired by the program and actions not inspired by the program.

When the initial open-ended question about actions taken beyond those recommended by MyHER tips and messages was asked, none (0% of 10) of the customers who throw away the Home Energy Report said they had taken additional actions compared to 14.4% (42 out of 292) of those who read the reports (this difference is significant at $p<.10$ using student's t-test).

However, when we probed about specific areas of action, many customers who throw away their reports said they did take actions. For reducing energy use from heating (overall 33.4%), cooling (40.7%) and water heating (20.2%), customers who throw the reports away are statistically just as likely to have taken action as those who read the reports; though customers who read the reports are more likely to have taken action to reduce energy usage from appliances (32.9% versus 10.0%), lighting (58.2% versus 30.0%) and home entertainment (35.3% versus 10.0%; all significant at $p<.10$ or better using student's t-test).

Customers who say they do "more than others" for energy efficiency are significantly more likely to have taken action to reduce energy from heating (41.0%) and from hot water heating (24.6%) compared to the other groups ($p<.10$ or better using student's t-test). Among the 23 surveyed customer who have pools, those who say they do "more than others" are also more likely to have taken steps to save energy usage by their pools (60.0%, significantly more than other groups at $p<.10$ using student's t-test).

Customers who say they do "less than others" for energy efficiency (22.7%) are significantly more likely to those who do "about the same as others" (11.0%) to have taken additional actions beyond the program ($p<.10$ using student's t-test), but neither of these groups is significantly different from those who do "more than others" (14.9%).

Table 30. Energy Efficiency Actions Taken by Customers

Statement	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Taken additional action to save electricity in the home (beyond actions influenced by MyHER)	14.4%	0.0%	14.9%	11.0%	22.7%	13.9%
Reduce energy used to light home (including actions influenced by MyHER)	58.2%	30.0%	59.0%	56.6%	54.5%	57.3%
Reduce energy used to cool home (including actions influenced by MyHER)	40.8%	40.0%	37.3%	44.1%	36.4%	40.7%
Reduce energy from home computers or electronics (including actions influenced by MyHER)	35.3%	10.0%	37.3%	33.1%	36.4%	34.4%
Reduce energy used to heat home (including actions influenced by MyHER)	33.9%	20.0%	41.0%	27.9%	22.7%	33.4%
Reduce energy from home appliances (including actions influenced by MyHER)	32.9%	10.0%	32.8%	30.1%	31.8%	32.1%
Reduce energy used to heat water (including actions influenced by MyHER)	20.2%	20.0%	24.6%	17.6%	18.2%	20.2%
Have a pool	7.5%	10.0%	7.5%	7.4%	9.1%	7.6%
Base: respondents with a pool	**N=22**	**N=1**	**N=10**	**N=10**	**N=2**	**N=23**
Made changes to pool to make it more efficient	31.8%	100.0%	60.0%	20.0%	0.0%	34.8%

Those who "don't know" how they compare to others are not shown in this table.

After asking customers whether they have taken actions to reduce energy in their home in the categories shown above, we asked what they did (recording up to three actions taken per respondent) and if MyHER had any influence on the actions taken: MyHER recipients could either say MyHER was the "main reason", "one reason among several (but not the main reason)" or that MyHER "did not have an influence" on their action. These results are shown in Figure 20 for six specific areas of energy efficiency action (lighting, cooling, heating, water heating, home computers and electronics, and appliances).

Customers who took actions cited MyHER as the "main reason" for from 19.2% to 26.2% of actions taken, depending on the category. The greatest number of actions were taken in the area of lighting (N=225 actions[21] taken by the 302 customers surveyed), and this was also the area where MyHER's influence was greatest overall, with MyHER being either the "main reason" or

[21] This survey recorded up to three actions per customer for each of the six specific areas of energy efficiency asked about. Thus the "number of actions" reported in Figure 20 is not the same as the "number of surveyed customers" who took at least one action in a given area, which is reported in Table 31Table 31.

"one reason of several" for 81.8% (184 of 225) of actions taken to reduce energy used to light the home (significantly higher than the percentage of actions influenced by the program for all other categories asked about at p<.10 or better using student's t-test) . The program also had some influence on the majority of actions taken to reduce energy usage in other areas; the least influence of the program was on water heating, but even then 58.9% (43 out of 73) of actions taken in this area were influenced by the program to some degree (though this represents significantly less influence of the program than any of the other areas asked about at p<.05 using student's t-test).

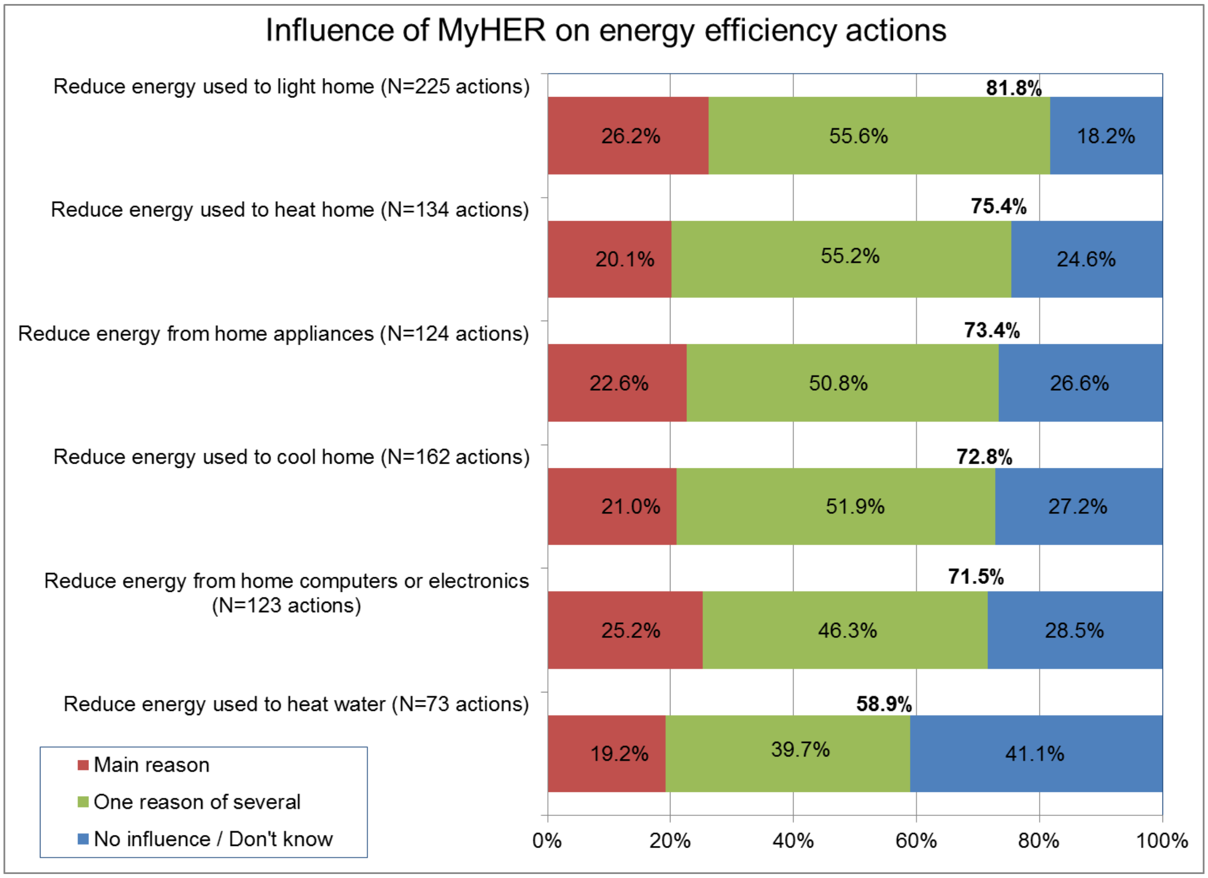


Figure 20. Influence of MyHER on Energy Efficiency Actions

MyHER customers in this survey were also asked if they had taken any actions since they started receiving the reports that might have increased their energy usage. These results are shown in Table 31; overall, the proportion of MyHER customers taking such actions is under 10% for every category that was asked about. The most common actions taken that would increase energy use involve home computers and electronics (8.3% or 25 out of 302) and home appliances (5.6% or 17 out of 302). The least common areas for such actions are cooling the home (3.0% or 9 out of 302) and heating the home (3.3% or 10 out of 302).

Table 31. Actions Taken by Customers that Increase Energy Use

Statement	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Increased energy from home computers or electronics	8.2%	10.0%	9.7%	6.6%	4.5%	8.3%
Increased energy from home appliances	5.8%	0.0%	4.5%	5.1%	13.6%	5.6%
Increased energy used to heat water	4.8%	0.0%	3.7%	4.4%	9.1%	4.6%
Increased energy used to light home	4.1%	0.0%	4.5%	3.7%	4.5%	4.0%
Increased energy used to heat home	3.4%	0.0%	2.2%	4.4%	0.0%	3.3%
Increased energy used to cool home	3.1%	0.0%	1.5%	3.7%	4.5%	3.0%

Those who "don't know" how they compare to others are not shown in this table.

Satisfaction with MyHER

Surveyed customers provided ratings of satisfaction with various aspects of the MyHER, their overall satisfaction with the program and their satisfaction with Duke Energy. These satisfaction scores are presented in this section.

Surveyed MyHER customers that read the report were asked to indicate their agreement with a series of statements using a 10-point scale, with 1 indicating that they strongly disagreed with the statement, and 10 indicating that they strongly agreed with the statement. A summary of the results are presented in Table 32.

Overall, the aspects of the program which received the highest ratings were the reports being easy to read and understand (9.26), graphics being helpful for understanding how usage changes over the year (9.00) and graphics being helpful for understanding how usage compares to others (8.88). The lowest-rated aspects of the program are for the energy-saving tips providing new ideas (7.38), the reasonableness and appropriateness of the comparisons (7.46) and usefulness of those comparisons (7.61). Overall satisfaction with the Home Energy Reports is quite high at 9.04, and these customers are also satisfied with Duke Energy, giving their utility a mean satisfaction score of 8.20.

Customers who read the Home Energy Report consistently give higher program satisfaction ratings than those who throw them away, overall and for every aspect of the program inquired about (all at $p<.05$ using ANOVA). The only rating that is not significantly different between customers who read the reports and those who throw them away is for overall satisfaction with Duke Energy.

Customers who say they do "more than others" to save energy rate their satisfaction with the usefulness of the report's comparisons higher than others ($p<.05$ using ANOVA), however this is the only rating in Table 32 that differs significantly according to how customers feel their efforts compare to others.

Table 32. Mean Satisfaction with MyHER

Statement	Read MyHER		Compared to Others			Overall
	Read (N=292)	**Throw Away** (N=10)	**Do More** (N=134)	**Same** (N=136)	**Do Less** (N=22)	**Overall** (N=302)
The report's comparisons are reasonable and appropriate.	7.50	5.00	7.84	7.20	7.16	7.46
The report's comparisons are useful.	7.65	4.75	8.06	7.26	7.45	7.61
The reports are easy to read and understand.	9.30	7.67	9.39	9.17	8.90	9.26
The energy saving tips in the report provided new ideas that I was not previously considering.	7.45	4.33	7.30	7.53	7.53	7.38
I find the reports useful.	8.61	6.17	8.74	8.57	8.09	8.56
I enjoy receiving and reading the reports.	8.44	4.67	8.59	8.24	8.14	8.36
I find the graphics helpful in understanding how my energy usage compares to others like me.	8.93	6.20	9.08	8.84	8.77	8.88
I find the graphics helpful in understanding how my energy usage changes over the seasons.	9.04	7.17	8.98	9.13	8.86	9.00
Overall I am satisfied with the reports.	9.07	7.33	9.10	9.05	8.95	9.04
Overall satisfaction with Duke Energy	8.20	8.00	8.31	8.13	8.41	8.20

Those who "don't know" how they compare to others are not shown in this table.

MyHER recipients who rated aspects of the program at "7" or less on a 10-point scale were asked how this could be improved; verbatim responses are listed in Appendix L: Improving Aspects of the Program.

There are also a couple of significant differences by actual recent MyHER scores when it comes to satisfaction ratings, shown in Table 33. Compared to both of the groups that use less energy, customers whose recent MyHER report showed their usage was "more than the average home" gave lower satisfaction scores for the report's comparisons being reasonable and appropriate (6.86); these customers also gave lower ratings than the "less than average, more than efficient" group for the comparisons being useful (7.31; both differences significant at p<.10 or better using ANOVA). For all of the remaining satisfaction ratings (including overall satisfaction with the reports and satisfaction with Duke Energy), there were no significant differences by recent MyHER score.

Table 33. Mean Satisfaction with MyHER by Recent MyHER Score

Statement	Recent MyHER Score		
	Less than efficient home (N=88)	Less than average, but more than efficient home (N=59)	More than average home (N=147)
The report's comparisons are reasonable and appropriate.	7.85	8.30	6.86
The report's comparisons are useful.	7.54	8.34	7.31
The reports are easy to read and understand.	9.25	9.49	9.14
The energy saving tips in the report provided new ideas that I was not previously considering.	6.96	7.78	7.51
I find the reports useful.	8.53	8.66	8.52
I enjoy receiving and reading the reports.	8.50	8.68	8.12
I find the graphics helpful in understanding how my energy usage compares to others like me.	9.02	9.19	8.65
I find the graphics helpful in understanding how my energy usage changes over the seasons.	9.23	9.22	8.74
Overall I am satisfied with the reports.	9.07	9.27	8.90
Overall satisfaction with Duke Energy	8.06	8.39	8.15

Those who "don't know" how they compare to others are not shown in this table.

Sharing MyHER and Using Social Media

Most of the surveyed MyHER customers in the Carolina System are sharing or discussing their reports with others (56.6% or 171 out of 302). Table 34 presents the percent of customers sharing or discussing their Home Energy Report with other people. MyHER customers are most likely to discuss their report with family members (40.7% or 123 out of 302), and they are significantly more likely to discuss the report with others if they read the reports rather than throw them away ($p<.05$ using student's t-test). Customers who feel they do "more than others" to save energy are more likely to discuss the reports with friends ($p<.05$ using student's t-test).

Table 34. Percent of MyHER Customers Sharing Their Reports with Others

	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Percent discussing their MyHER with others (total)	58.2%	10.0%	59.7%	53.7%	50.0%	56.6%
Discussed with family	42.1%	0.0%	40.3%	39.7%	40.9%	40.7%
Discussed with friends	13.7%	0.0%	17.2%	10.3%	9.1%	13.2%
Discussed with neighbors	12.0%	10.0%	14.2%	9.6%	18.2%	11.9%
Discussed with co-workers	5.5%	0.0%	5.2%	5.1%	9.1%	5.3%

Those who "don't know" how they compare to others are not shown in this table.

Though more than a third of customers surveyed (39.4% or 119 out of 302) use social media, only 1.3% (4 out of 302) said they have interacted with Duke Energy through Facebook, and only 3.3% (10 out of 302) said they have communicated with other people about energy-related issues through social media.

Table 35. Social Media Usage

	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	**Throw Away** (N=10)	**Do More** (N=134)	**Same** (N=136)	**Do Less** (N=22)	
Use social media (in general)	39.4%	40.0%	39.6%	39.0%	45.5%	39.4%
Interacted with Duke Energy through Facebook	1.4%	0.0%	1.5%	1.5%	0.0%	1.3%
Interacted with Duke Energy through Twitter	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Interacted with Duke Energy through other social media site (listed below)	0.7%	0.0%	0.7%	0.0%	4.5%	0.7%
Use social media to communicate with other people about energy-related topics	3.4%	0.0%	4.5%	2.9%	0.0%	3.3%

Those who "don't know" how they compare to others are not shown in this table.

The two MyHER recipients (0.7% of 302) who said they communicated through "other" social media portals were asked how they communicated with Duke Energy. These responses are listed below.

- *Facebook storm page*
- *Tumbler and Google+*

The ten MyHER recipients (3.3% of 302) who said they discussed energy-related issues through social media were asked what they communicated about. These responses are listed below.

- *I commented on, and read, some Facebook posts on energy efficiency topics.*
- *I discussed energy efficient washing machines with friends on Facebook.*
- *I read the comments, but don't make any personally, for discussions about changes which are the things that most catch my interest: especially for the projects Duke is spending money to build.*
- *I discussed the water levels of Lake Jocassee, a Duke-created reservoir.*
- *Google+ communities for Renewable Energy, Reduce Reuse Recycle, Solar Energy and Solar Power.*
- *A friend and I compared the rates of different power companies.*
- *Comparing energy companies and rates with people in other states.*
- *We compared energy costs of different states.*
- *I have complained, on Face Book, about Duke Energy raising the prices.*
- *We discussed differences in our energy bills.*

Customers Contacting Duke Energy

More than a third of MyHER recipients in the Carolina System (39.4% or 119 out of 302) say they have visited the Duke Energy website in the past year, as seen in Table 36. The most commonly cited reason for visiting the website is to pay bills (24.5% or 74 out of 302 customers overall, or 62.2% or 74 out of 119 who visited the website).

Table 36. Duke Energy Website Usage

	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Visited Duke Energy website within the past year (for any reason)	39.0%	50.0%	42.5%	34.6%	45.5%	39.4%
Pay bill at website	24.0%	40.0%	25.4%	22.8%	27.3%	24.5%
Review or change account info	5.8%	0.0%	5.2%	5.9%	9.1%	5.6%
Search for ways to save on bills	4.8%	0.0%	7.5%	1.5%	9.1%	4.6%
Search for info on EE programs	4.5%	0.0%	4.5%	3.7%	4.5%	4.3%
Review / print out bill (not pay it)	1.7%	0.0%	0.7%	2.9%	0.0%	1.7%
Find Duke Energy contact info (looking up phone numbers)	1.7%	0.0%	2.2%	0.7%	4.5%	1.7%
Find out about Duke Energy activities	1.7%	0.0%	2.2%	0.0%	4.5%	1.7%
Find out about Duke Energy company news (mergers, executives, etc.)	1.0%	0.0%	0.7%	1.5%	0.0%	1.0%
Order CFL light bulbs	1.0%	0.0%	0.7%	0.0%	4.5%	1.0%
Unique reasons (listed below)	4.1%	0.0%	6.0%	0.7%	9.1%	4.0%
Don’t know why visited website	2.1%	10.0%	1.5%	3.7%	0.0%	2.3%

Those who “don’t know” how they compare to others are not shown in this table.

Twelve MyHER recipients (4.0% of 302) visited the Duke Energy Website for unique reasons, which are listed below.

- *I had a question about the Home Energy Report, though I don't remember what the issue was.*
- *When I receive an email from Duke, I often click the links, such as the CFL Program or for the Home Energy Audit. These links take me to the Duke Energy website.*
- *I was looking for discounts on LEDs.*
- *I researched a green initiative for my daughter's school project, and I received a home energy efficiency kit.*
- *I was voting for our school for a program that did something for the school if they won.*
- *I read the Personal Energy Report.*
- *I looked at my usage of electricity and compare how much I use each month.*
- *I now own another property so I've been getting things in order for that. I use the website to keep tabs on my properties’ energy usage.*
- *To see the payback rates for solar energy, and to investigate net metering.*

- *Checking for power outages.*
- *I look at it for work-related reasons; I've done home audits.*
- *I was looking for job opportunities.*

About one MyHER recipient in six (17.2% or 52 out of 302, including both phone and email) has contacted customer support (for any reason), as shown in Table 37. The vast majority of these contacts were made by telephone (94.2% or 49 out of 52 customers contacting Duke Energy); only three recipients surveyed (5.8% or 3 out of 52) contacted Duke Energy by email.

Table 37. MyHER Customers Contacting Customer Support

	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Called customer support	16.4%	10.0%	15.7%	15.4%	18.2%	16.2%
Emailed customer support	1.0%	0.0%	1.5%	0.7%	0.0%	1.0%
Did not contact customer support	82.2%	90.0%	82.1%	83.8%	81.8%	82.5%
Don't know	0.3%	0.0%	0.7%	0.0%	0.0%	0.3%

Those who "don't know" how they compare to others are not shown in this table.

When MyHER recipients who said they contacted Duke Energy were asked what they contacted Duke Energy about, about half of these customers said they were calling about bills and billing-related issues (51.9% or 27 out of 52 customers who contacted Duke Energy, or overall 8.9% of 302 customers surveyed). Issues with power outages were mentioned by seventeen customers (overall 5.6% of 302 surveyed), while only two (0.7% of 302) called about their Home Energy Report, and four (1.3% of 302) contacted Duke Energy about CFLs. These responses are categorized and listed below.

<u>Billing or payment issues (N=27)</u>

- *Needed to arrange a payment* (N=3)
- *Had a billing issue / question* (N=2)
- *I called regarding a perceived discrepancy on my bill.*
- *I wanted to see how to lower my bill, so I called.*
- *My light bill was high, and I called to get it taken care of.*
- *There was a spike in my bill.*
- *My bill was getting higher every month, no matter what I did, so I called to see if the meter was broken.*
- *My bill was very high and I thought that the meter readers read my meter wrong.*
- *I called because I was concerned about the accuracy of my energy bill; I felt my bill was higher than it should be.*
- *I emailed because I was concerned about the accuracy of my energy bills; I felt my bills were higher than they should be.*
- *To discuss the unreasonable increase in our bill during the winter months. I am not real happy with how my bill skyrockets in the winter. My gas bill creeps up even before I turn*

the furnace on. The bill creeps up around $100 a month from December through March. We keep our thermostat set constant. There are only two people living in the house. Although we have two furnaces we only use the one for the downstairs as the upstairs is only used during the summer when we have house guests. I don't understand why the bill goes up so much.

- *Duke cut off our power due to accidental past-due payment issues we incurred while on vacation.*
- *I called about a service outage resulting from a missed bill payment.*
- *I called twice because my name is spelled incorrectly on the bill.*
- *I had the account for an additional property that I own changed to my name from the previous tenant.*
- *To report a name change.*
- *I used to send my son to pay the bill with a check and because he was the one dropping off the check they forced me to have my son's name on the account even though he was just a kid back then and my name was on the checking account.*
- *I had a question about paying my bills at local stores.*
- *Set up account for automatic payment.*
- *I called to set up a payment plan, while husband was transferring for his job.*
- *I called to discuss my bills and the equal payment plan. The equal payment plan's monthly rate was the equal payment plan's monthly rate was too expensive for me to pay. I called to cancel my participation in the program.*
- *I was having financial trouble paying my bill.*
- *I called about a $430 charge on my bill for some sort of security deposit. I don't understand what the charge is really for.*
- *I called about a bill because I was confused. I also complained that there is a charge for paying online. I also said their website is difficult to navigate to pay your bill. The website has too much information on it for a consumer who just wants to find out how to pay a bill.*

Power outages (N=17)

- *To report a power outage.* (N=12)
- *We had three power outages.*
- *A tree took down the line.*
- *The power went out because of the weather.*
- *Power outage; storms regularly knock out our transformers.*
- *They cut my power off for no reason once, but they fixed it.*

For free CFLs / questions about CFLs (N=4)

- *I called about the free light bulb program.*
- *I called about the free CFL program.*

- *I called to try to get some more CFLs.*
- *To ask questions about the CFLs.*

<u>To correct MyHER information / questions about MyHER (N=2)</u>

- *I called because the home characteristics listed on MyHER were incorrect.*
- *When I first started getting the reports I called to find out why I was getting them.*

<u>Other reasons (N=2)</u>

- *I reported a street lamp that was burnt out.*
- *I wanted to have information to give to my husband about frequent adjustments to the thermostat. I understand this is very wasteful.*

MyHER recipients who contacted Duke Energy customer support were asked if they were satisfied with the response they received. Nearly three-quarters (71.1% or 37 out of 52) reported that they were satisfied, while twelve customers said they were not satisfied (23.1% of 52), and three customers (5.8% of 52) reported mixed or inconclusive results. Among the twelve customers who say they were not satisfied with their customer support experience, all but two contacted Duke Energy about billing-related issues. The negative, mixed and inconclusive results are categorized and listed below.

<u>Not satisfied, billing-related (N=10)</u>

- *No, my name is still spelled incorrectly.*
- *No, I felt the customer service representative was cold and unwilling to entertain the possibility that we might have been billed incorrectly.*
- *No. Duke did not send someone to re-read the meter.*
- *Not really. No one investigated why our home's bill went up so much. A technician never came, no service was offered, they just offered to set up a payment plan.*
- *No. We were told that the increase in our bill was based on the meter readings.*
- *No, they just confirmed what was on my paper, what was on my bill.*
- *No, they should have been more understanding, especially considering we have been Duke customers for28 years.*
- *No, the person in customer service was a 'foreigner' and was unable to explain the charge. I think she said it was something about overdue charges or a security deposit. She was not good at communicating and I still have not made any progress with my problem.*
- *No. The person I spoke to about getting the name switched back to mine said I would have to pay a deposit of $200 which is after I gave them a $200 deposit to get the power turned on in the first place. It's been fifteen years and the account is in my son's name.*
- *No, not satisfied at all. The customer services is absolutely horrible! Normally, when you call a company, they are more than willing to make sure you're happy. One specific example of how horrible Duke's customer service is this, which happened a year ago: my husband was being transferred for work and I called to set up a payment plan for our*

energy bill. Now, I've NEVER had to set up anything like this before. I ALWAYS paid our bills on time and everything. I set up a date to make our first payment and was told I had until 5 p.m. that day to make it. When I got home that day at 3:30 or so, my power was off. I called to find out why and was told I'd missed the deadline. The customer service supervisor said they would go back and listen to the recording of the first call to find out what the date and time was. They got back to me and said I'd missed the date by a day and wouldn't let me listen to the recording. They pulled my payment plan and I had to pay it all that day, plus a reconnection fee. I've never been late before and I had to go on their word that I got the wrong date for my first payment. They would not let me listen to the recording. They had me over a barrel. They didn't care; they weren't without power. If it had been my fault, fine. But, here I was doing what I was supposed to and we set it up, but they had me over a barrel. I couldn't not pay my bill. If it was my fault, I accept that, but they didn't give me a chance to listen to the earlier conversation and that's what's made me so upset.

Not satisfied, other reasons (N=2)

- *No, I dislike the automated phone rigmarole. When calling, I would prefer to speak to a customer service representative right away.* (Called about power outage)
- *No. I was told I would receive information in the mail about frequent adjustments to the thermostat, however I never received anything from Duke.* (Called about information on thermostat settings)

Mixed or inconclusive results, billing-related (N=2)

- *I was mostly satisfied, though I was disappointed to learn that Duke does not provide home energy audits for mobile homes.*
- *Yes, it was resolved, but I had to pay the bill twice.*

Mixed or inconclusive results, other reasons (N=1)

- *No, because I didn't get to talk to a person. Yes, because the power was back on quickly.* (Called about power outage)

Customer-Suggested Changes to the MyHER

Nearly one in three MyHER recipients surveyed (30.1% or 91 out of 302) had something they would like to see changed about the MyHER program, as seen in Table 38.

Table 38. Customers That Would Like Changes Made to the MyHER

	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Customers that would like to see changes to the MyHER	29.5%	50.0%	31.3%	25.7%	45.5%	30.1%
No change / fine as is / don't know / not specified	70.5%	50.0%	68.7%	74.3%	54.5%	69.9%

Those who "don't know" how they compare to others are not shown in this table.

Table 39 shows the types of suggestions made by MyHER customers who made suggestions to improve the program. Among the five customers making suggestions who throw MyHER reports away, most (60.0% or 3 out of 5) said they either want to receive reports less frequently or not at all.

The most common suggestions involved wanting to see more information or detail on the report (made by 33 customers overall, or 10.9% of all 302 customers surveyed), concerns about the accuracy of household comparisons (mentioned by thirteen customers, or 4.3% of 302), wanting more/better tips (twelve customers or 4.0% of 302), preferring email or internet access to reports (ten customers or 3.3% of 302) and wanting to have the number of residents in a household included when making household comparisons (nine customers or 3.0% of 302).

Customers who throw the reports away are significantly more likely to say they want the reports less often (40.0% or 2 out of 5) and to make unique suggestions (40.0% or 2 out of 5), while customers who read the reports are more likely to want more information and details (38.4% or 33 out of 86; all three differences are significant at p<.05 using student's t-test).

Table 39. Changes Customers Would Like Made to the MyHER

Base: customers who made specific suggestions to improve program	**Read MyHER**		**Overall** (N=91)
	Read (N=86)	**Throw Away** (N=5)	
Want more information / details (listed below)	38.4%	0.0%	36.3%
Household info or comparison group is not accurate / could be more accurate	14.0%	20.0%	14.3%
More / better / less repetitious tips	14.0%	0.0%	13.2%
Send by email / available online	10.5%	20.0%	11.0%
Include number of residents in home for comparisons	10.5%	0.0%	9.9%
Better graphics / layout / larger print	8.1%	0.0%	7.7%
Send reports more often	7.0%	0.0%	6.6%
Send reports less often	3.5%	40.0%	5.5%
Want less information / simplify	2.3%	20.0%	3.3%
Include report with / on monthly bill	3.5%	0.0%	3.3%
Unique suggestions (listed below)	4.7%	40.0%	6.6%
Don't want to receive reports	2.3%	20.0%	3.3%
Lower energy rates (not program related)	1.2%	0.0%	1.1%

Percentages total to more than 100% because respondents could give multiple suggestions.

Thirty-three customers (10.9% of 302), all of whom read the reports, said they wanted more information or details on their Home Energy Report, which was the most frequently made suggestion. The verbatim responses of these customers which explain the type of details or information are listed below.

<u>Read MyHER: suggest more information or details (N=33)</u>

- *Add a comparison of kilowatts used.*
- *Do the comparison in kilowatt hours instead of dollars spent.*
- *For the comparison change dollars spent per month to kilowatt hours*

- *Include kilowatt hours and dollars spent per month in the comparison because rates are different in different areas.*
- *Include kilowatt hours and dollars spent per month in the comparison.*
- *Would like to see the use of kilowatt hours charted. Would also like to have reports show the money saved from month to month.*
- *I would like to see the comparisons added that include kilowatt hours, pollution, and dollars spent per month.*
- *Showing the amount of pollution that your house puts out would be very interesting to me.*
- *I would like to see the report focus on our respective carbon footprints and provide targeted goals for reducing home energy usage.*
- *It's hard to know what the cost savings of my efforts are when the rates change. I might be using less energy but my bill is going up.*
- *I would like to see a thorough explanation of what a kilowatt hour is.*
- *I'd like an online access link to monitor the usage differently, like being able to find out where exactly I am using energy, and if I am wasting or overusing it in a particular category.*
- *I would be interested in finding out how much energy is being used by certain things in the home, like how much energy is being used to run the refrigerator for the day or how much energy is being used by the TV and it's accoutrements in an hour.*
- *It would be nice to know the breakdown of how I use electricity.*
- *I'd like the reports weekly by email and maybe twice-a-month in hard copy or printed mail. I'd like to be able to look back from the very first day I moved in and see how I'm doing now. I'd like a record over the years. I'd like to know how I'm using energy, it would be nice to see an energy usage trend over years, not money-wise.*
- *There needs a better average on the reports. The reports need to include more specifics about our home in the comparisons. I'd like see a semi-annual average, a 6-month average. It's hard for me to track over the seasons with month-to-month reports.*
- *I would like more information about how Duke Energy came up with the information that they are using for the comparisons. I don't know about their methodology.*
- *I need proof about the comparison or more information about it.*
- *I think it should be more detailed in terms of the home comparisons.*
- *Show charts comparing last year's energy use vs. the current year.*
- *I'd like to see a graph on each report showing the energy consumption from the same time the year before to compare to the current consumption. The graph could show KWH and dollars spent to show how much more we are paying in the current year compared to last. It would also be a good comparison to see how much the rates have been increased from year to year.*
- *Have the results on the report more keyed in to particular climates and consider how the climate has been changing recently.*

- *Add charting of ambient outdoor temperature from month to month to monitor changes from year-to-year and month-to-month.*
- *I would like to see the comparison based on location: city vs. country homes.*
- *On the energy comparison, there are two bars now; I would like to see multiple months compared on one graphic.*
- *I would like more specific suggestions as to why my energy bill is so high.*
- *I would like to see a clearer breakdown of the costs associated with different types of heating units.*
- *I'd like some additional information included. I'd be interested in finding out more information about the environmental impact of energy conservation and how doing certain things can help with conservation.*
- *I'd be interested in getting more details about how the energy reports are helping us save money and how we can save more money in the reports.*
- *It would be great if there was some way to show people how much they are improving when they do.*
- *I'd like to see some information on the reports that is new and more complex, all the information on the MyHER is way too generic and common.*
- *I want more information.*
- *Provide more details so the report would be more meaningful.*

Six customers (2.0% of 302) made unique suggestions for improving the program, which are listed below.

Read MyHER: unique suggestions (N=4)

- *Educate customers to be a little more maternal or paternal and then educate their children on how to limit their use of gizmos and go outside and play again.*
- *I would like Duke to offer more things, rather than tell me to find a way to do it myself. Piedmont offers products to enhance their services; I wish Duke would also offer similar products.*
- *The reports should do more to promote the various energy conservation services that Duke provides.*
- *I'd like to have someone to talk to about the reports so I can understand my energy usage better.*

Throw away MyHER: unique suggestions (N=2)

- *I find the graph that compares my home to other homes complicated, but I understood the one that shows energy use over the year pretty well.*
- *No more telephone surveys like this one.*

Participation and Interest in Other Duke Energy Programs

Surveyed customers were asked what other Duke Energy programs they have participated in, which is shown in Table 40. The most frequently mentioned programs were CFLs (overall 73.8%

or 223 out of 302), Power Manager (13.6% or 41 out of 302) and Home Energy House Call (5.0% or 15 out of 302).

Compared to those who say they do "about the same" as others for energy efficiency, MyHER recipients who say they do "more than others" are more likely to have participated in CFL programs (79.1% or 106 out of 134), Power Manager (19.4% or 26 out of 134), Home Energy House Call (7.5%% or 10 out of 134) and Smart $aver HVAC (5.2% or 7 out of 134; these differences are all significant at p<.05 using student's t-test). Customers who do "more than others" also participate in the greatest number of programs (an average of 1.18 apiece) and are the most likely to participate in more than one program (26.1% 35 out of 134; these differences are significant at p<.05 using ANOVA and student's t-test, respectively). Customers who do "about the same" as others are more likely to have not participated in any programs (26.5% or 36 out of 136); customers who do "less than others" are not significantly different from other groups due to small sample size.

Table 40. Self-Reported Participation in Other Duke Energy Programs

	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	**Throw Away** (N=10)	**Do More** (N=134)	**Same** (N=136)	**Do Less** (N=22)	
CFLs by mail (not HEHC or PER)	74.3%	60.0%	79.1%	69.9%	68.2%	73.8%
Power Manager	14.0%	0.0%	19.4%	8.1%	9.1%	13.6%
Home Energy House Call (HEHC)	5.1%	0.0%	7.5%	2.9%	4.5%	5.0%
Residential Smart $aver HVAC	3.1%	10.0%	5.2%	0.7%	9.1%	3.3%
Personalized Energy Report (PER)	3.1%	0.0%	3.7%	2.9%	0.0%	3.0%
Appliance Recycling	1.7%	10.0%	3.0%	1.5%	0.0%	2.0%
None of the above	20.2%	40.0%	15.7%	25.7%	22.7%	20.9%
Average number of programs participated in (from the list above)	1.01	0.80	1.18	0.86	0.91	1.01
Participating in two or more programs (from the list above)	18.5%	10.0%	26.1%	11.8%	13.6%	18.2%

Those who "don't know" how they compare to others are not shown in this table; percentages may total to more than 100% since respondents can participate in more than one program.

Duke Energy provided customer record data about participation in other energy efficiency programs. Table 41 shows that 82.1% (247 out of 302) of MyHER recipients have participated in another Duke Energy program (closely matching the 79.1% or 239 out of 302 customers who self-reported participating in other Duke Energy programs, as seen in Table 40). All of these customers participated in a Duke Energy Residential Smart $aver program, with one customer participating in this program and also the Duke Energy Appliance Recycling program. Four out of five customers surveyed (79.8% or 241 out of 302) received CFLs from Duke Energy's Residential Smart $aver program, while no more than about 5% of respondents participated in any of the other programs. Customers who read MyHER are more likely to have participated in a program than those who throw the reports away, and customers who do "more than others" are more likely to have participated in another program compared to those who do "less than others" (both significant at p<.10 or better using student's t-test).

Table 41. Energy Efficiency Measures from Other Duke Energy Programs (Customer Records)

	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Duke Energy Residential Smart $aver – CFLs	80.5%	60.0%	82.8%	78.7%	72.7%	79.8%
Duke Energy Residential Smart $aver – Residential Energy Assessments - Home Energy House Call	5.5%	0.0%	6.0%	5.1%	0.0%	5.3%
Duke Energy Residential Smart $aver – Residential Energy Assessments - Personalized Energy Report	5.1%	10.0%	6.7%	3.7%	0.0%	5.3%
Duke Energy Residential Smart $aver – Energy Efficiency Education Program for Schools	5.5%	0.0%	5.2%	4.4%	9.1%	5.3%
Duke Energy Residential Smart $aver – HVAC	3.8%	0.0%	5.2%	1.5%	9.1%	3.6%
Duke Energy Residential Smart $aver – Low Income Energy Efficiency and Weatherization Assistance Program	1.0%	0.0%	1.5%	0.7%	0.0%	1.0%
Duke Energy Residential Smart $aver – Low Income Neighborhood	1.0%	0.0%	0.7%	1.5%	0.0%	1.0%
Duke Energy Residential Smart $aver – Specialty Bulbs	0.7%	0.0%	1.5%	0.0%	0.0%	0.7%
Duke Energy Appliance Recycling Program	0.3%	0.0%	0.0%	0.7%	0.0%	0.3%
Duke Energy Residential Smart $aver – Property Manager CFLs	0.3%	0.0%	0.0%	0.7%	0.0%	0.3%
None of the above	17.1%	40.0%	14.9%	19.9%	27.3%	17.9%

Those who "don't know" how they compare to others are not shown in this table; percentages total to more than 100% because respondents could participate in multiple programs.

MyHER recipients were also asked to rate their interest in participating in Duke Energy programs in which they had not already participated. Mean interest ratings on a 10-point scale (where 10 is most interested and 1 is least interested) are shown in Table 42.

The highest interest score is for CFLs by mail at 8.68 overall, and Smart $aver HVAC had the next-highest mean interest score (7.49), though it is significantly lower than the interest in CFLs ($p<.05$ using ANOVA). Power Manager received the lowest interest ratings, with an overall mean of only 4.85 on a 10-point scale (significantly lower than all other programs listed at $p<.05$ using ANOVA).

Customers who read their reports are more interested in HEHC and PER than customers who throw their reports away ($p<.05$ using ANOVA), and customers who do "less than others" to save energy are significantly more interested in Residential Smart $aver HVAC compared to those who do "about the same" or "more than others" ($p<.05$ using ANOVA).

Table 42. Ratings of Interest in Other Duke Energy Programs

	Read MyHER		Compared to Others			
	Read (N=292)	**Throw Away** (N=10)	**Do More** (N=134)	**Same** (N=136)	**Do Less** (N=22)	**Overall** (N=302)
CFLs by mail (not HEHC or PER)	8.69	8.40	8.51	8.92	8.27	8.68
Residential Smart $aver HVAC	7.52	6.80	7.47	7.30	8.73	7.49
Appliance Recycling	7.13	4.80	6.73	7.17	7.91	7.05
Home Energy House Call (HEHC)	7.09	5.70	6.94	7.11	7.19	7.04
Personalized Energy Report (PER)	7.04	5.30	7.10	6.86	7.41	6.98
Power Manager	4.90	3.50	4.53	4.97	5.15	4.85

Those who "don't know" how they compare to others are not shown in this table. Customers were only asked to rate programs that they had not already participated in.

Additional Services from Duke Energy

TecMarket Works asked surveyed MyHER customers (those that read it and those that throw the MyHER away, N=302) about their interest in a list of additional services that Duke Energy may offer. TecMarket Works read the following statement: *"As a follow up to the report, Duke Energy is interested in providing further services that might be of interest to customers. I am going to read a list of possible services that Duke Energy may consider offering. On a scale from 1-10, with 1 indicating that you would be very uninterested, and 10 indicating that you would be very interested, please rate your interest in the following services."*

A summary of the responses is presented in Table 43 below. Surveyed MyHER customers in the Carolina System have the most interest (mean rating 8.48 on a 10-point scale) in rebates for energy efficient home improvements, which are provided through Duke Energy's Smart $aver® program (the overall average rating for this service is higher than any of the other services inquired about at $p<.05$ using ANOVA). Mean interest ratings for most of the other services inquired about ranged from 5.8 to 6.8 on a 10-point scale, while the least interest (3.74 on a 10-point scale) was generated by the idea of social networking sites set up by Duke Energy to read about or discuss energy efficient solutions with energy experts (ratings for this service are significantly lower than all others asked about at $p<.05$ using ANOVA).

Surveyed customers who read their reports give higher mean interest ratings for "inspection services of work performed by contractors", "help in finding weatherization contractors to make your home more efficient" and "social networking sites such as Facebook and Twitter to read about or discuss energy efficient solutions with energy experts" compared to those who throw their reports away (significant at $p<.10$ or better using ANOVA). The only significant difference by how customers feel their energy-saving efforts compare to others is that report recipients who do "less than others" give higher interest ratings for "financing for energy efficient home improvements" compared to other recipients (significant at $p<.10$ using ANOVA).

There was not a follow up question asking customers how they would like to receive information if they indicated they were interested in getting help in any of these areas, but most of these customers read the MyHER, directions to finding this kind of information could be included in a MyHER mailing.

Table 43. Ratings of Interest in Additional Duke Energy Services

	Read MyHER		Compared to Others			
	Read (N=292)	**Throw Away** (N=10)	**Do More** (N=134)	**Same** (N=136)	**Do Less** (N=22)	**Overall** (N=302)
Rebates for energy efficient home improvements	8.52	7.50	8.48	8.55	8.55	8.48
Help in finding energy efficient equipment and appliances	6.84	6.00	6.66	6.97	7.41	6.81
Home energy audits or inspections of your home with specific recommendations for improvements	6.56	5.20	6.49	6.50	7.50	6.52
Inspection services of work performed by contractors	6.47	4.20	6.21	6.54	7.27	6.39
Financing for energy efficient home improvements	6.70	6.10	6.48	6.73	8.09	6.68
Help in finding weatherization contractors to make your home more efficient	5.90	3.90	5.51	6.11	6.36	5.83
Social Networking sites such as Facebook and Twitter to read about or discuss energy efficient solutions with energy experts	3.81	1.80	3.55	3.97	4.18	3.74

Those who "don't know" how they compare to others are not shown in this table.

Customers were also asked an open-ended question, "*What other services could Duke Energy provide to help improve home energy efficiency?*" Seventy-one customers (23.5% of 302) made suggestions, which are categorized and listed below (there are more than 71 suggestions listed because some customers made more than one suggestion).

Green energy (N=11)

- *A program that involves solar panel installation and rebates.*
- *A program that offers rebates for solar panels or solar leasing.*
- *A rebate program for solar panels.*
- *Help with installing home solar with either financing or rebates or something of that nature.*
- *Help people with solar power. Getting some literature out to customers about how to get solar power for their homes would be beneficial to the environment and then Duke wouldn't have to build so many new power plants after the government outlaws coal plants.*
- *I can't really think of anything offhand, unless a solar panel rebate is an option. I read somewhere that South Carolina is the worst state in the nation for support of energy efficiency improvement initiatives. I'm not sure if this is still true, but I know I can't afford to do the things I want to do. There are no tax credits to take advantage of.*
- *Leasing out roofs of customers for solar cells. Give customers alternatives to standard energy supplies.*
- *To promote green energy such as windmills and solar panels.*

- *Duke should provide more education about global warming and sustainable energy.*
- *Have rebates for solar hot water heaters.*
- *Duke should provide a program that would help homeowners install hybrid car and boat chargers.*

Light bulbs (N=10)

- *A program that provides free LEDs.*
- *A program for free/discounted LEDs.*
- *I'd like to see more information and an expansion with the LED program.*
- *A program that offers free LEDs, or better discounts on them.*
- *A program that offers coupons for LEDs or mail them directly to the home.*
- *Add smaller sized CFLs to your free CFL program.*
- *Duke should mail the free CFLs in smaller boxes that fit in average-sized mailboxes.*
- *I'd like to be able to get more free CFLs.*
- *Advertise free CFLs.*
- *A program that helps people upgrade their outdoor lighting, either with the fixtures or the bulbs.*

Appliances (N=7)

- *More information about tankless water heaters.*
- *A program that offers rebates for tankless water heaters.*
- *Rebates for installing energy efficient water heaters.*
- *A program that provides rebates for installing or recycling water heaters.*
- *Duke should recycle water heaters as part of their appliance recycling program.*
- *An appliance recycling program for washers and dryers.*
- *Duke Energy should have a website that lets people know about energy efficient appliances and other products.*

Other free or discounted items (not including appliances and light bulbs) (N=10)

- *A program that provides rebates for programmable thermostats.*
- *Offer a service to check A/C units and furnaces. Upgrade to a digital or programmable thermostat. Provide free furnace filters.*
- *Duke should provide rebates for eMonitor purchases.*
- *Duke could provide customers with timers for home lighting.*
- *Duke could provide free surge protectors. The frequent power outages and surges may be taking a toll on my electronics and electrical system.*
- *Rebates for energy efficient windows.*
- *Provide financing for replacement of heating and cooling systems.*
- *Duke should offer financing for HVAC equipment.*

- *Duke should provide energy efficient space heaters and A/C rentals, especially to elderly people.*
- *More free stuff.*

Changes to rates (N=11)

- *It would be a good idea to have rates drop over night to encourage people to use their appliances during off peak hours.*
- *I'd like it if there were different rates throughout the day.*
- *Operate as frugally as they can and efficiently so they can keep their energy rates as low as possible. Use cam-casts instead of sending your big-wigs off to a big event in Hawaii. Don't spend like a 'drunken sailor'.*
- *Provide lower rates for the disabled.*
- *Lower the rates, then maybe I could afford to do some improvements.*
- *It would be great if Duke Energy cut their rates a little bit, it gets more expensive every year.*
- *Lower the rates.* (N=4)
- *I wish that we didn't have to pay the power bill, it should be free.*

More elderly, disabled and low-income programs (N=6)

- *An assistance program for the elderly.*
- *Anything to help the elderly and disabled. Fixed incomes make improvements so limited.*
- *Duke should have a program that specifically provides home audits and energy efficiency education to senior citizens.*
- *Duke should provide a low income assistance program for disabled people.*
- *I used to work for an agency that helped low-income people with their, food, rent, and their energy bills. I think Duke Energy needs a program for low-income individuals where a Duke Energy employee comes out to check what might be causing a spike in energy usage in a low-income household. This should be a program where Duke contacts the household, where Duke identifies what might cause a significant difference in a bill from month to month. Preventative measures. I can't tell you how often I saw this problem, when I was working with these people. They have no idea what could have caused such a difference when it wasn't even a change of season.*
- *Develop an energy-efficient window program: upgrade low-income homes with double pane/double tilt sash. They're easy to clean and there's no need for storm windows. Develop a similar low-income roofing program.*

Auditing and consulting (N=6)

- *Duke should offer an infrared home energy analysis.*
- *Someone could come check the house for energy leaks during the winter..*
- *I would like a home energy audit that would analyze the ductwork in my attic.*
- *Duke should provide home energy audits for mobile homes.*

- *If Duke would come and inspect my home and help me fix some things, that would help me save money.*
- *Duke Energy could be participating in consultation when people are planning to build a new house: to make it energy efficient in ways they might not think of.*

Insulation and sealing (N=3)

- *Provide home insulation services or provide a reputable company to do a good job.*
- *I would like a program where there is a rebate for installing insulation throughout the house.*
- *I'd like help with fixing the underpinning of my house and help with getting the heating and cooling duct work fixed.*

Metering and usage reporting (N=3)

- *Provide home meters for private home use that displays real-time usage in dollars.*
- *I really don't know, other than getting the reports more frequently by email, weekly, something I could tap into when I want. I watch my meter sometimes; I haven't done this for a while. I just want to see how my appliances affect my energy usage. If I know I'm going to leave one of my computers running for a week, I want to see how different it would be with two, or if I had them both shut down.*
- *I wouldn't mind seeing a one-time, long-term energy consumption history to stack up against our house's consumption over time, and this report could also contain a seasonal-by-year temperature graph to see what is due to abuse or what could not be helped due to the weather.*

More advertising and awareness (N=3)

- *They could do a better job of communicating that the Duke Energy programs are available. We all get busy in our lives so the last thing we have time to do is search for this type of information. Have more media advertising these programs or mailing information about these programs with the bill.*
- *They just need to make people more aware of the energy-efficiency programs that already exist. Also, I wish we still had a Duke office we could visit in person.*
- *Just keep us up-to-date with info about the newest services, please.*

Unique suggestions (N=4)

- *No more power bills by mail, just use e-mail.*
- *Duke should offer the ability to adjust programmable thermostats via a WiFi connection.*
- *They offered that they would do electrical work a few years back, and I didn't take advantage of that. I would jump on that now. I would like them to have a wire assurance program like the phone company does.*
- *Air filters: does Duke have recommendations? How often should they be changed? Does the type of filtration matter? Filtration rates: what does it all mean?*

Electric Vehicles and Solar Power

MyHER customers were also asked if they had an electric vehicle, solar water heating or solar panels for their home. Only eight program participants surveyed (2.6% of 302) have electric vehicles (all have one vehicle apiece except for one respondent who has three), four (1.3% of 302) have solar power (not including solar-powered outdoor night lights) and one (0.3% of 302) has a solar water-heating system.

Table 44. Electric Vehicles and Solar Power

	Read MyHER		Compared to Others			Overall (N=302)
	Read (N=292)	Throw Away (N=10)	Do More (N=134)	Same (N=136)	Do Less (N=22)	
Own an electric vehicle	2.7%	0.0%	3.7%	0.7%	9.1%	2.6%
Solar water heating system	0.3%	0.0%	0.0%	0.7%	0.0%	0.3%
Solar photovoltaic system (solar panels)	1.4%	0.0%	0.7%	2.2%	0.0%	1.3%

Those who "don't know" how they compare to others are not shown in this table.

Conclusions and Recommendations for Program Changes

The Home Energy Report provides Duke Energy residential customers with a meaningful comparison of their home's energy use compared to other homes similar to their own.

TecMarket Works presents the following recommendations for program changes.

1. Add CFL coupons to the MyHER mailing, if it can be shown that the participants can use additional CFLs that they are not likely to purchase on their own. Customers who use the coupons will show that they are reading the MyHER, are open to the messages and tips, and possibly to solicitations for participation in other Duke Energy programs. The number of redeemed coupons can also be utilized in the billing analysis and allow for engineering estimates of energy savings.

2. Some surveyed customers suggested including the number of people in the household as a factor in drawing comparisons with other homes, since more people living in a home does correspond to more energy usage. Duke Energy should consider adding this variable to the comparison group clustering algorithm and reporting household size on reports along with other facts about comparison groups. Doing so may help to increase the perceived accuracy of the home energy use comparisons in the minds of these customers. Although, such a potential advantage should be weighed against the data collection and programming required to add such a factor to the clustering methodology.

3. Since participation in other Duke Energy efficiency programs is twice as high among MyHER report readers compared to those who throw the reports away, the messaging section on the second page of the reports presents an opportunity to communicate directly with a segment of customers who are particularly inclined toward participating in additional programs. Consider replacing more of the general efficiency messages on the second page of the report with more specific marketing messages for other Duke Energy programs.

Appendix A: Program Manager Interview Instrument

Name: ____

Title: ____

We are conducting this interview to obtain your opinions about and experience with the [STATE NAME] My Home Energy Report Program. We'll talk about the Program and its objectives, your thoughts on improving the program and its participation rates, and the technologies the program covers. Do you have any questions before we begin?

PROGRAM DESCRIPTION

In your own words, please describe the [STATE NAME] My Home Energy Report Program.

Please discuss the history and development of the program. What was the influence of HECR pilot on the full program? How has MyHER changed since the pilot phase?

Why did Duke Energy chose to use vendors instead of launching this as an in house commercialized project as you did for the pilots? What were the pros and cons of using vendors vs. doing it in-house? How did using vendors change program design and program implementation?

What are the current program's objectives? That is, what is the program trying to accomplish (e.g. generate energy savings via behavior change, installation of efficiency devices, enrollment in other programs, non-energy benefits)? In your opinion, which objectives do you think are being met or will be met? Have the objectives changed over time. If yes, how do you think they have changed?

Are there any program objectives that are not being addressed or that you think should have more attention focused on them? If yes, which ones? How should these objectives be addressed? What should be changed? How will these changes improve the program? Would it improve customer satisfaction, lower program costs or delivery a better product to customers?

Should the program objectives be changed in any way because of market conditions, other external or internal program influences, or any other conditions that have developed since the program objectives were devised? What changes would you put into place, and how would it affect the objectives?

How many households receive the MyHER report in [service territory]?

What are the program requirements for inclusion/participation? Does MyHER go to renters as well as homeowners? Why or why not?

What kinds of marketing, outreach and customer contact approaches do you use to make your customers aware of the program and its options?

Why is the program designed as opt-out and not opt-in? How have customers responded to this? How many (what percentage) have opted out? How are customers informed about their opt-out choice? What are the steps they need to take to opt-out? Conversely, how does the program handle customers who want to opt-in?

Since the opt-out nature of the program naturally brings together different types of customers into one large pool, are the customers segmented after inclusion? For instance, does MyHER go to residential customers of different rate classes beyond standard, such as TOU? If so, how is this differentiated?

What are the program's goals? That is, what goals and metrics are you tasked with achieving (such as energy savings targets, numbers of new enrollments, numbers of installs, website visits, etc.)? What is the current performance towards these targets?

Are there any program changes that you think would improve the program's performance towards its goals and objectives?

PROGRAM MANAGEMENT AND OPERATIONS

Please describe your role and scope of responsibility in detail. What is it that you are responsible for as it relates to this program? When did you take on this role? If a recent change in management…Do you feel that Duke Energy gave you enough time to adequately prepare to manage this program? Did you get all the support that you needed to manage this program?

Please review with us how the My Home Energy Report Program operates relative to your duties, that is, please walk us through the processes and procedures and key events that allow you do currently fulfill your duties.

Have any recent changes been made to your duties? If so, please tell us what changes were made and why they were made. What are the results of the change?

Is there any other person or group within Duke Energy that you work with on the implementation of this program? Who is that and what role do they serve?

Which third parties or vendors do you work with to implement this program? Please describe their roles in the implementation of the program.

How effective is the vendor in its assigned role? What works well? What could be improved? (Repeat for each third party vendor.)

How often and in what form do you communicate with the vendors? How would you characterize your working relationships?

How do you manage and monitor or evaluate third-party involvement or performance? What do you do if contractor performance is exemplary or below expectations?

Describe the use of any advisors, technical groups or organizations that have in the past or are currently helping you think through the program's approach or methods. How often do you use them? What do you use them for?

PROGRAM IMPLEMENTATION

What information, research or assessments are you using to identify barriers and to develop more effective approaches/mechanisms for achieving program goals?

Can you cite any market, operational or technical barriers that impede a more efficient program operation? Please describe.

How does the program accommodate that customers may become eligible and ineligible at any time? Please describe the process used for forecasting participation and production. How are differences between forecasts and actual numbers adjusted?

Overall, what about the My Home Energy Report Program works well and why?

Do you have any suggestions for how program performance toward goals can be increased?

In what ways can the My Home Energy Report Program's operations be improved?

If you could change any part of the program what would you change and why?

What are your quality assurance measures? What have those efforts uncovered?

REPORT GENERATION AND DELIVERY

Please describe the process by which the reports are actually generated and distributed.

Please describe any challenges or quality concerns with the report generation and delivery process.

In what format are reports delivered? Why was it chosen? What other formats were considered? How has it been working out?

How was the current report delivery schedule determined? How has it been working? Any challenges? Any changes made or planned?

COMPARISONS

Now let's look more closely at the actual home energy reports and the process that you use to generate them. More specifically let's discuss the framework for scoring homes and the comparisons between similar homes.

The reports compare the customer's energy usage with other customers. My notes indicate that the pilot considered homes that are similar in four main characteristics: heat source, square footage, age of home, and number of occupants. Is this true of the current program? How are each of these characteristics defined?

Another factor is geography. How is that accounted for?

Where does the data for these comparisons come from?

How are similar homes actually identified and grouped?

What is the range of sample sizes used for comparison? What is the smallest allowable pool for comparison? What is the largest? Why these limits?

Once the comparison pool is established, it is my understanding that the customer's energy usage is calculated and compared to the pool average and to the most efficient homes in the comparison pool. Is this correct?

How is the individual customer home's monthly energy use figure generated?

How is the average home's energy usage determined within the pool of comparable homes?

How is the efficient home's usage determined? What percentage of households is considered efficient? How is this group determined? How do you control for households with unusually low or high usage?

Is the program making an attempt to verify information about the home characteristics used for comparisons? During an earlier evaluation of PER, Kelly Griffin mentioned that PER data was considered to be more accurate than public records because it was self-generated by the customer. Is this type of data being incorporated into the program? If so, how?

Is the energy usage figure different from the comparison score? If so, how? How is the comparison score generated? How is the score adjusted for variations in house attributes such as age, size, heat source, and number of occupants within the pool? Are there other adjustments?

The pilot evaluation in OH discussed single month scores versus long term scores. Please explain the difference, tell me which you use now and why. Are there any drawbacks? What are they? How are they addressed?

Can you suggest any ideas for improving the comparisons used by the program?

DATA PRESENTATION

The data presented in the reports is designed to drive energy savings. On what research or communications principles (such as social norms, psychology, logic, persuasion, etc.) did you base your decisions for how to present the data?

How do you establish the context of your data presentation? For instance, the data can be presented in terms of saving energy, saving money, helping the environment, etc. How do you present the concept of reducing energy use and why do you this approach?

Why is monthly energy use presented in dollars and not kWh?
How is the influence of data presentation measured or otherwise accounted for?

The pilot evaluation considered questions about layout, language, and other data presentation. How were those findings incorporated into the current format? What changes have been made since the roll out? Is further testing being conducted? Are additional changes planned? If so, what are those changes?

When did you change from one to two page reports? Why did this happen? What was the impact of the change? How do you know?

Have you made any other changes to the way you present the data? If so why? What was done?

Can you suggest any ideas for improving the data presentation aspect of the program?

ENERGY SAVING TIPS AND MESSAGES

What is the difference between an energy saving tip and a message?

How are energy savings tips and messages generated?

Do you draw a distinction between encouraging persistent behaviors and taking action to be more efficient? That is, do you make a distinction between repeated behaviors such as turning off or unplugging and one time actions such as the purchase and installation of equipment that is more efficient? If so how? Which are you driving toward? Why? How? Please provide examples.

How do you ensure the tips are relevant to the household in question? For instance, are tips different for renters than homeowners, older homes versus newer homes, for pool owners vs. people without pools, or for people who are already enrolled in other Duke Energy programs?

The pilot evaluation mentions concerns about the ability to determine which tips are presented to which customers and when. Is this still true? If so, why? If so, what do you do about it? If not, what was changed? How has this change improved things?

Part of the challenge of presenting an on-going report is maintaining customer interest and driving continued energy savings. How do you address this consideration? For instance, the Ohio pilot evaluation states “While tips directly aimed at energy savings are necessary to supplement social norm messaging, it may be useful to include other relevant and interesting facts so that customers continue to be engaged and interested.” How is this addressed? How do you keep tips fresh for people who have been the program for a while?

In addition to driving customers to take energy savings actions, the reports also prompt customers to take other behaviors such as visiting the MyHER website. Why get them to visit the website? What are you trying to achieve?

Is Duke Energy tracking website visits? Are you making a distinction between program participants who only receive the reports and participants who also visit the website? If so, how are you separating and attributing energy impacts? Do you have a big enough sample size to address this question?

Can you suggest any changes or improvements to this aspect of the program?

Please provide a list of tips presented to customers in [STATE NAME].

CUSTOMER RESPONSE

How many (what percentage of) recipients are reading the MyHER reports? How is the level of readership determined? How often is it measured? How has it changed over time?

Do you assess, track or measure customer reaction to the reports? If so, how? How do customers respond to the reports? What differences and similarities do you find among their responses?

Are you measuring the effectiveness of your data presentation? If so, how? What are you finding? How effective are the home energy comparisons? How do you know?

Besides website visits, are there other customer interactions you are trying to drive, like other program enrollments? If so, which programs and why? How does that work?

DATA COLLECTION AND ENERGY SAVINGS

How does Duke Energy track and attribute energy savings?

Does the program differentiate between energy savings generated via repeated conservation behaviors (turn off lights, wash in cold water, wash full loads, etc.) and one time improvements in efficiency, such as CFLs, new appliances, adding insulation, new HVAC, etc.? If not, why? If so, how? If so, does the program investigate synergies between the two?

Can and do you track savings by individual behavior or action? Which behaviors or actions does the program seek to encourage? Why those? How do you measure them?

Can and do you track attribution of actions that are high energy savings/no cost to Duke such the purchase of new appliances?

How does the program address persistence of energy saving? How long are impacts from this program projected to last?

How do you handle enrollments by new customers? In what month do you begin counting energy savings? (e.g. the month they become eligible to join, or the next month after their first report.)

How do you analyze the data you collect? Do you segment the data in any way, such as by household characteristics, timing, message, rate class, change in usage etc.? Which groups are returning the greatest savings? The least? What does Duke Energy do with the data it collects?

How are customer scores changing over time? How do you know? For instance, do you compare to previous individual household usage info or changes relative to the average and efficient home? What percentage of customers is improving? Are they trying? How do you know?

Since program launch has Duke Energy conducted any testing, such as messages, tips, promotions, coupons, timing, etc.?

The nature of the MyHER program is one of energy use comparisons. Do you track or measure the influence of other exchanges that customers may be having beyond receiving the energy reports, such as conversions occurring via social media? If so, how? What are you finding?

Can you suggest any changes or improvements to this aspect of the program?

CLOSING SUGGESTIONS AND COMMENTS

If you could change anything else about the program, what would you change and why?

Are there any other issues or topics you think we should know about and discuss for this evaluation?

Is there anyone else that I should speak with to better complete this evaluation?

Appendix B: Vendor Interview Instrument

Name: ____

Title: ____

We are conducting this interview to obtain your opinions about and experiences with the [STATE NAME] My Home Energy Report program. We'll talk about the program and its objectives, your thoughts on improving the program, and the technologies the program covers. The purpose of this study is to capture the program's current operations as well as help identify areas where the program might be improved. Your responses will feed into a report that will be shared with Duke Energy and the state regulatory agency. I want to assure you that the information you share with me will be kept confidential; we will not identify you by name. However, you may provide some information or opinions that could be attributed to you by virtue of your position and role in this program. If there is sensitive information you wish to share, please warn me and we can discuss how best to include that information in the report. Do you have any questions for me before we begin?

OVERVIEW

In your own words, please describe the [STATE NAME] My Home Energy Report Program.

Please describe your organization's role and scope of responsibility in the implementation of this program.

How does the way your company implements this program for Duke Energy differ from other implementations your company provides for other utilities?

What is it that you are personally responsible for as it relates to this program? When did you take on this role? If a recent change in management, do you feel that Duke Energy gave you enough time to adequately prepare to manage this program? Did you get all the support that you needed to manage this program?

Please review with us how the [STATE NAME] MyHER program operates relative to your duties, that is, please walk us through the processes and procedures and key events that allow you do currently fulfill your duties.

Have any recent changes been made to your duties? If so, please tell us what changes were made, when, and why they were made. What are the results of the change?

Is there any other person or group within Duke Energy that you work with on the functioning of this program? Who is that and what role do they serve?

PROGRAM GOALS AND OBJECTIVES

In your own words, please describe the [STATE NAME] MyHER program's current objectives. That is, what is the program trying to accomplish (e.g. generate energy savings via behavior change, installation of efficiency devices, enrollment in other programs, non-energy benefits)? In your opinion, which objectives do you think are being met or will be met? Have the objectives changed over time. If yes, how do you think they have changed?
Are there any program objectives that are not being addressed or that you think should have more attention focused on them? If yes, which ones? How should these objectives be addressed? What should be changed? How will these changes improve the program? Would it improve customer satisfaction, lower program costs or delivery a better product to customers?

Should the program objectives be changed in any way because of market conditions, other external or internal program influences, or any other conditions that have developed since the program objectives were devised? What changes would you put into place, and how would it affect the objectives?

What are the program's goals? That is, what targets is the overall program set to achieve?

How is program progress against these goals measured? Do you know the current performance against these goals? Which goals are being met or will be met?

What specific metrics is your company tasked with achieving? How is your company's performance relative to your goals?

Describe your quality control and tracking process.

OTHER VENDOR AND DUKE ENERGY ASSESSMENT

(If not captured earlier) Please explain how the interactions between Duke Energy, your company and another other vendors work. Who within Duke Energy and which others vendors do you work with to implement this program? Please describe their roles, relative to you company's, in the implementation of the program.

How effective are they in their assigned role? What works well? What could be improved? *(Repeat for each group.)*

Do you think these interactions should be changed in any way? If so, how and why?

How often and in what form do you communicate with Duke Energy and other vendors? How would you characterize your working relationships?

Are key industry experts, trade professional or peer used to identify program enhancements, cost reduction opportunities or process improvements? If so, how does this work?

Are key industry experts and trade professionals used in other advisory roles such as market or marketing experts or industry professionals? If so how does this work and what kind of support is obtained?

OVERALL STRENGTHS, NEEDS, AND SUGGESTIONS

Overall, what about the [STATE NAME] MyHER program works well and why?

What doesn't work well and why? Do you think this discourages customer acceptance or the quality of the offer to the customer?

Do you have suggestions for improvements to the program that would increase offer quality, customer interest or lower costs?

Do you have suggestions for the making the program operate more smoothly or effectively?

Do you have suggestions for improving or increasing energy impacts?

OPERATIONAL, MARKET, & TECHNICAL BARRIERS AND SUGGESTIONS

What information, research or assessments are you using to identify barriers to implementation and develop more effective ways to deliver this program?

Can you identify any market, operational or technical barriers that impede a more efficient program operation?

Anything on the horizon that you think will impact the energy savings generated by this program?

In what ways can program operations or operational efficiencies be improved?

INCREASING READERSHIP AND CUSTOMER ACTIONS (SUGGESTIONS)

In what ways can the program increase the number of customers who read the reports and take energy saving actions?

In what ways can the program encourage customers to follow the recommended energy saving actions?

CLOSING SUGGESTIONS AND COMMENTS

If you could change anything else about the program, what would you change and why?

Are there any other issues or topics you think we should know about and discuss for this evaluation?

Is there anyone else that I should speak with to better complete this evaluation?

Appendix C: MyHER Customer Survey Instrument

State
( ) Indiana
( ) Kentucky
( ) Ohio
( ) North Carolina
( ) South Carolina

Info
Surveyor Name: ________________________
Survey ID: ________________________

Month & Year customer started getting MyHER reports (from calling sheet)
____

Use four attempts at different times of the day and different days before dropping from contact list. Call times are from 10:00 a.m. to 8:00 p.m. EST or 9-7 CST Monday through Saturday. No calls on Sunday. (Target: 250 per state)

Note: Only read aloud words in bold type.
Instructions are in italics.

Introduction

for answering machine 1st through penultimate attempts:
Hello, my name is _____ . I am calling to conduct a customer survey, on behalf of Duke Energy. I'm sorry I missed you. I'll try again another time.

for answering machine - Final Attempt:
Hello, my name is _____ . I am calling to conduct a customer survey, on behalf of Duke Energy. This is my last attempt at reaching you, my apologies for any inconvenience.

if person answers
Hello, my name is ______. I am calling to conduct a customer survey, on behalf of Duke Energy. May I speak with _____________ please?

If person talking, proceed. If person is called to the phone reintroduce.
If not home, ask when would be a good time to call and schedule the call-back:

We are conducting this survey to obtain your opinions about the My Home Energy Report. Our records indicate that you have been receiving the Home Energy Report in the mail from Duke Energy. We are not selling anything. Your answers will be confidential, and if you qualify for the survey we will send you $20 for your time today. The survey will take about 30 minutes. May we begin the survey?

Note: If this is not a good time, ask if there is a better time to schedule a callback.

1. **Do you remember receiving the Home Energy Reports in the mail from Duke Energy since** *(Month and Year of first report)* **?**

( ) Yes
( ) No
( ) DK/NS

If No or DK/NS, ask:
1a. **This program provided information on how much electricity you used in the previous month and in the previous 12 months compared to your neighbors and provided tips on how you could lower your electricity use and costs in becoming more energy efficient.**

Do you remember receiving these reports now?

( ) Yes
( ) No
( ) DK/NS

If No or DK/NS terminate interview and go to next participant.

2. **What do you do with the Home Energy Report when you receive it?**
(Mark all that apply)

[ ] I read it.
[ ] Someone else in the house reads it
[ ] Throw it away/ignore it
[ ] Other

If customer does not read it, but someone else in the house reads it, ask:

Can I talk to that person?
If another person does take the call, go back to Introduction.
or
Schedule callback if necessary, and do survey from beginning at that time.
or
Continue with person you are talking to if that is what they wish.

If answer to q2 is 'I read it', ask:
2a. **Why do you read the Home Energy Report?**
(Mark all that apply)

[ ] It is from Duke Energy
[ ] I am interested in learning how my household is using energy
[ ] I am interested in learning more about how to save energy
[ ] I am interested in learning more about climate change or environmental reasons
[ ] Avoid increases in power costs or lower rates
[ ] Other

[ ] DK/NS

If answer to q2 is "Throw it away/ignore it", ask:
2b. **Why do you throw it away or ignore it?**
(Mark all that apply)

[ ] I'm too busy/don't have time
[ ] It's too confusing
[ ] I don't believe it's accurate for my household
[ ] I've done all the tips it suggests
[ ] I'm already doing the best that I can
[ ] I do not care about energy savings or use
[ ] I don't use very much energy
[ ] Too low a priority for me
[ ] Other
[ ] DK/NS

If answer to q2 is "Throw it away/ignore it", ask:
2c. **Did you always ignore the report, or did you read some but have since stopped?**

( ) Never read them
( ) I read some *ask:* **About how many did you read?** : _________________
( ) DK/NS

3. **When you consider the efforts that you and your household are currently making to decrease energy consumption at your home, do you feel that on average your efforts are less than what others typically do, about the same as what others typically do, or more than what others typically do?**

( ) Less than others
( ) About the same
( ) More than others
( ) DK/NS

3a. **Now think back to the time before you began receiving the Home Energy Report. At that time, would you say your efforts to decrease energy consumption were less than what others were typically doing, about the same, or more than what others were typically doing?**

( ) Less than others
( ) About the same
( ) More than others
( ) DK/NS

3b. **Of the following four statements, which best characterizes the degree of difference between your earlier actions and your more recent efforts?**

( ) **We used to do less, but now we are doing more.**
( ) **We used to do more, but now we are doing less.**
( ) **I think we were already doing more than others, but we're doing even more now.**
( ) **About the same**

( ) DK/NS

4. **In your own words, please tell me what it means to be energy efficient.**

5. **When you think about what you and your household does or can do to decrease energy consumption, what things come to mind?**
after each answer, ask:? **Anything else?**
(repeat until exhausted)
a.: ___________________________
b.: ___________________________
c.: ___________________________
d.: ___________________________
e.: ___________________________

If more than five answers to q5, put spillover here:

6. **Using a 1 to 10 scale with 1 meaning "very uninterested" and 10 meaning "very interested", what is your level of interest in saving energy in your home?**
( ) 1
…
( ) DK/NS

7. **Using the same 1 to 10 scale with 1 meaning "very uninterested" and 10 meaning "very interested", what is your level of interest in reading your next report?**
( ) 1
…
( ) 10
( ) DK/NS

8. **Would you like to receive these reports more frequently, less frequently, or at the same frequency they are now being sent to you?**
If they ask, tell them that Reports are sent about 8 times a year.
( ) More frequently
( ) Less frequently
( ) Same frequency
( ) Don't want to get any
( ) DK/NS

If q8 is 'more' or 'less', ask:
8a: **How often would you prefer to get the reports?**
( ) Daily
( ) Weekly
( ) Monthly
( ) Every other month
( ) Few times a year/quarterly
( ) Annually

( ) Other
( ) DK/NS

8b. **Would you prefer to get the reports electronically through email?**
( ) Yes
( ) No
( ) DK/NS

If they never read the reports, Skip to question 21.

9. **You received multiple tips on how to save energy on the Home Energy Reports. Do you recall what any of the tips were?**
( ) Yes
( ) No
( ) DK/NS

If No or DK/NS, skip to question 13

If yes to q9, ask:
10. **What tip do you remember?** *{Tip1}*

____

10z. Did the customer get this tip in a report?
( ) Yes
( ) No
( ) DK/NS

If remembered a tip in q10, ask:
11. **Do you remember any other tip?** *{Tip2}*

____

11z. Did the customer get this tip in a report?
( ) Yes
( ) No
( ) DK/NS

If remembered a tip in q11, ask:
12. **Do you remember any other tip?** *{Tip3}*

____

12z. Did the customer get this tip in a report?
( ) Yes
( ) No
( ) DK/NS

Ask questions 10a to 10m for the tip indicated in response to question 10.
Tip 1:

10a. **Using a 1 to 10 scale with 1 meaning your reaction to the tip** *{Tip1}* **was very unfavorable and 10 meaning your reaction was very favorable, please tell me about your reaction to this tip.**

( ) 1
…
( ) 10
( ) DK/NS

10b. **Did you feel that this tip was believable, that is, that it really could help you reduce your energy consumption?**

( ) Yes
( ) No *ask: 10c.* **What about it was not believable?**: __________________
( ) DK/NS

10d. **Did you do anything to your home/behavior in response to this tip?**

( ) Yes
( ) No
( ) DK/NS

If no to q10d, ask:
10e. Do you plan to do anything in response to this tip?

( ) Yes *ask:* 10f. **When?** __________________
( ) No
( ) DK/NS

If yes to q10d, ask:
10g. **What did you do?**

10h. **Are you satisfied with the results of following the tip?**

( ) Yes
( ) No
( ) DK/NS
( ) Other __________________

10i. **Please answer the following question as best you can: How much money do you think you saved each month as a result of the changes?**

( ) None
( ) amount __________________
( ) DK/NS

10j. **Do you happen to know the actual amount of energy that was saved?**

( ) Yes: __________________
( ) No

( ) DK/NS
( ) Other _________________

10k. **Do you think the changes you made resulted in increased or decreased comfort in your home, or did it stay the same?**
( ) Increased comfort
( ) Decreased comfort
( ) Stayed the same
( ) DK/NS

10m. **Please indicate how influential the Home Energy Report was to your decision to take this action using a 1 to 10 scale with 1 meaning the report had no influence and you would have taken this action, and 10 meaning that the report was very influential and that you would not have taken this action without reading the tip on the Report.**
( ) 1
…
( ) 10
( ) DK/NS
( ) Didn't Take the Action

Ask questions 11a to 11m for the tip indicated in response to question 11.
Tip 2:

11a. **Using a 1 to 10 scale with 1 meaning your reaction to the tip** *{Tip2}* **was very unfavorable and 10 meaning your reaction was very favorable, please tell me about your reaction to this tip.**
( ) 1
…
( ) 10
( ) DK/NS

11b. **Did you feel that this tip was believable, that is, that it really could help you reduce your energy consumption?**
( ) Yes
( ) No *ask: 11c.* **What about it was not believable?**: _________________
( ) DK/NS

11d. **Did you do anything to your home/behavior in response to this tip?**
( ) Yes
( ) No
( ) DK/NS

If no to q11d, ask:
11e. **Do you plan to do anything in response to this tip?**
( ) Yes *ask:* **11f. When?** : _________________

( ) No
( ) DK/NS

If yes to q11d, ask:
11g. **What did you do?**

11h. **Are you satisfied with the results of following the tip?**
( ) Yes
( ) No
( ) DK/NS
( ) Other ___________________

11i. **Please answer the following question as best you can: How much money do you think you saved each month as a result of the changes?**
( ) None
( ) amount: ___________________
( ) DK/NS

11j. **Do you happen to know the actual amount of energy that was saved?**
( ) Yes: ___________________
( ) No
( ) DK/NS
( ) Other ___________________

11k. **Do you think the changes you made resulted in increased or decreased comfort in your home, or did it stay the same?**
( ) Increased comfort
( ) Decreased comfort
( ) Stayed the same
( ) DK/NS

11m. **Please indicate how influential the Home Energy Report was to your decision to take this action using a 1 to 10 scale with 1 meaning the report had no influence and you would have taken this action, and 10 meaning that the report was very influential and that you would not have taken this action without reading the tip on the Report.**
( ) 1
…
( ) 10
( ) DK/NS
( ) Didn't Take the Action

Ask questions 12a to 12m for the tip indicated in response to question 12.
Tip 3:

12a. **Using a 1 to 10 scale with 1 meaning your reaction to the tip** *{Tip3}* **was very unfavorable and 10 meaning your reaction was very favorable, please tell me about your reaction to this tip.**

( ) 1
…
( ) 10
( ) DK/NS

12b. **Did you feel that this tip was believable, that is, that it really could help you reduce your energy consumption?**

( ) Yes
( ) No *ask: 12c.* **What about it was not believable? _________________**
( ) DK/NS

12d. **Did you do anything to your home/behavior in response to this tip?**

( ) Yes
( ) No
( ) DK/NS

If no to q12d, ask:
12e. **Do you plan to do anything in response to this tip?**

( ) Yes *ask:* 12f. **When? _________________**
( ) No
( ) DK/NS

If yes to q12d, ask:
12g. **What did you do?**

12h**. Are you satisfied with the results of following the tip?**

( ) Yes
( ) No
( ) DK/NS
( ) Other _________________

12i. **Please answer the following question as best you can How much money do you think you saved each month as a result of the changes?**

( ) None
( ) amount _________________
( ) DK/NS

12j. **Do you happen to know the actual amount of energy that was saved?**

( ) Yes _________________
( ) No
( ) DK/NS
( ) Other _________________

12k. **Do you think the changes you made resulted in increased or decreased comfort in your home, or did it stay the same?**

( ) Increased comfort
( ) Decreased comfort
( ) Stayed the same
( ) DK/NS

12m. **Please indicate how influential the Home Energy Report was to your decision to take this action using a 1 to 10 scale with 1 meaning the report had no influence and you would have taken this action, and 10 meaning that the report was very influential and that you would not have taken this action without reading the tip on the Report.**

( ) 1
…
( ) 10
( ) DK/NS
( ) Didn't Take the Action

13. **Did you feel that the tips included on the report were relevant and applied to you and your household?**

( ) Yes
( ) No
( ) DK/NS

If no to q13, ask:
13a. **Do any specific tips stand out to you as <u>not applying</u> to you or your house? Why?**
after each answer, ask: **Any others? Why?**

1: ___________________________
2: ___________________________
3: ___________________________

14. **The report presented a comparison of your home energy usage to that of similar homes. As part of the comparison, the report provides detailed information regarding which homes yours is being compared to, including the number of homes, the age and size of the homes, and the type of heating they use. Using a 1 to 10 scale with 1 meaning this comparison was not at all reasonable or appropriate and 10 meaning it was very reasonable or appropriate, how did you find this comparison?**

( ) 1
…
( ) 10
( ) DK/NS

15. **Using a 1 to 10 scale with 1 meaning this comparison was not at all useful and 10 meaning it was very useful, how useful did you find this comparison?**

( ) 1
…
( ) 10
( ) DK/NS

16. **How does your home's energy use compare, does your report show that you usually use more than the average home, less than the average home or about the same as average?**
( ) More than average
( ) About the same
( ) Less than average
( ) DK/NS

17. **Do you use the charts to track your home's energy usage?**
( ) Yes
( ) No
( ) DK/NS

18. **Are you trying to improve how your home efficiency compares to your neighbors?**
( ) Yes
( ) No
( ) DK/NS

19. **Are the characteristics such as your home size and age correct on your report?**
( ) Yes
( ) No *ask:* 19a. **What is incorrect? __________________**
( ) DK/NS

20. **Did you move into a new home since *(The Month & Year the customer began getting reports.)*?**
( ) Yes *ask:* 20a. **When did you move? __________________**
( ) No

21. **Since *(Month and Year of first report)*, have you done anything else to save electricity in your home that was not included as a tip contained in the Home Energy Reports?**
( ) Yes
( ) No
( ) DK/NS

If yes to q21, ask:
21a. What have you done?
after each answer, ask: **Anything else?**
Get details on what was done and when. Leave blank if they reply "Nothing else".

1: ___________________________
2: ___________________________
3: ___________________________

The following questions ask you to tell us if you did anything in a particular category. We may ask you to duplicate some information you already gave us, but please do tell us again because we want to get more details in each category.

Home Appliances

Repeat the series "did you take any steps..." If Yes "how much influence the MyHER report was..." up to three times

22. **Since receiving your first Home Energy Report did you take any steps to reduce the amount of energy used by your home appliances, such as removing a second refrigerator or upgrading old appliances?**

( ) Yes *ask:* **What have you done? __________________**
( ) No
( ) DK/NS

22a. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
(read answers aloud, select only one)

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **it did not have an influence**
( ) DK/NS

22b. **Did you do anything else to reduce the amount of energy used by your home appliances?**

(since receiving the 1st report.)
( ) Yes *ask:* **What have you done? __________________**
( ) No
( ) DK/NS

22c. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

22d. **Did you do anything else to reduce the amount of energy used by your home appliances?**

(since receiving the 1st report.)
( ) Yes *ask:* **What have you done? __________________**
( ) No

( ) DK/NS

If yes,
22e. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

22f. **Did you do anything that might have <u>increased</u> the energy usage by your appliances? An example of increasing your home appliance energy use would be to add another appliance, such as a new freezer.**

( ) Yes
( ) No
( ) DK/NS

If yes to q22f, ask:
22g. **What have you done?**
after each answer, ask: **Anything else?**
Get details on what was done and when.

1: ___________________________
2: ___________________________
3: ___________________________

Home Cooling

Repeat the series "did you take any steps..." If Yes "how much influence the MyHER report was..." up to three times
23. **Since receiving your first Home Energy Report did you take any steps to <u>reduce</u> the amount of energy used to cool your home?**

( ) Yes *ask:* **What have you done? __________________**
( ) No
( ) DK/NS

23a. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
(read answers aloud, select only one)

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

23b. **Did you do anything else to <u>reduce</u> the amount of energy used to cool your home?**
(since receiving the 1st report.)

( ) Yes *ask:* **What have you done? __________________**

( ) No
( ) DK/NS

23c. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

23d. **Did you do anything else to <u>reduce</u> the amount of energy used to cool your home?** *(since receiving the 1st report.)*
( ) Yes *ask:* **What have you done? _________________**
( ) No
( ) DK/NS

If yes,
23e. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

23f. **Did you do anything that might have <u>increased</u> the energy used to cool your home? An example of something that might increase your energy use is to purchase a larger AC unit, as opposed to a new one of similar size.**
( ) Yes
( ) No
( ) DK/NS

If yes to q23f, ask:
23g. **What have you done?**
after each answer, ask: **Anything else?**
Get details on what was done and when.
1: _________________________
2: _________________________
3: _________________________

Home Heating

Repeat the series "did you take any steps..." If Yes "how much influence the MyHER report was..." up to three times
24. **Since receiving your first Home Energy Report did you take any steps to <u>reduce</u> the amount of energy used to heat your house?**
( ) Yes *ask:* **What have you done? _________________**

( ) No
( ) DK/NS

24a. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
(read answers aloud, select only one)
( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

24b. **Did you do anything else to <u>reduce</u> the amount of energy used to heat your house?**
(since receiving the 1st report.)
( ) Yes *ask:* **What have you done? _________________**
( ) No
( ) DK/NS

24c. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

24d. **Did you do anything else to <u>reduce</u> the amount of energy used to heat your house?**
( ) Yes *ask:* **What have you done? _________________**
( ) No
( ) DK/NS

If yes,
24e. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

24f. **Did you do anything that might have <u>increased</u> the amount of energy you use to heat your home? An example of a change that would increase the energy used is if you purchased a larger heat pump.**
( ) Yes
( ) No
( ) DK/NS

If yes to q24f, ask:
24g. **What have you done?**

after each answer, ask: **Anything else?**
Get details on what was done and when.

1: ___________________________
2: ___________________________
3: ___________________________

Home Lighting

Repeat the series "did you take any steps..." If Yes "how much influence the MyHER report was..." up to three times

25. **Since receiving your first Home Energy Report did you take any steps to <u>reduce</u> the amount of energy used to light your home?**

( ) Yes *ask:* **What have you done?** __________________
( ) No
( ) DK/NS

25a. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
(read answers aloud, select only one)

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

25b. **Did you do anything else to <u>reduce</u> the amount of energy used to light your home?**
(since receiving the 1st report.)

( ) Yes **What have you done?** __________________
( ) No
( ) DK/NS

25c. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

25d. **Did you do anything else to <u>reduce</u> the amount of energy used to light your home?**
(since receiving the 1st report.)

( ) Yes *ask:* **What have you done?** __________________
( ) No
( ) DK/NS

If yes,
25e. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

25f. **Did you do anything that may have <u>increased</u> the amount of energy used to light your home? An example of increasing the energy used to light your home would be adding new inside light fixtures or outdoor flood lights.**
( ) Yes
( ) No
( ) DK/NS

If yes to q25f, ask:
25g. **What have you done?**
after each answer, ask: **Anything else?**
Get details on what was done and when.
1: ___________________________
2: ___________________________
3: ___________________________

Home Computers or Electronics

Repeat the series "did you take any steps..." If Yes "how much influence the MyHER report was..." up to three times
26. **Since receiving your first Home Energy Report did you take any steps to <u>reduce</u> the amount of energy used by home computers or electronics?**
( ) Yes *ask:* **What have you done?** __________________
( ) No
( ) DK/NS

26a. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
(read answers aloud, select only one)
( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

26b. **Did you do anything else to <u>reduce</u> the amount of energy used by home computers or electronics?**
(since receiving the 1st report)
( ) Yes *ask:* **What have you done?** __________________
( ) No
( ) DK/NS

26c. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

26d. **Did you do anything else to <u>reduce</u> the amount of energy used by home computers or electronics?**
(since receiving the 1st report)

( ) Yes *ask:* **What have you done? _________________**
( ) No
( ) DK/NS

If yes,
26e. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

26f. **Did you do anything that may have <u>increased</u> the amount of energy used to power your home computer or electronics? An example would be if you purchased another TV or computer.**

( ) Yes
( ) No
( ) DK/NS

If yes to q26f, ask:
26g. **What have you done?**
after each answer, ask: **Anything else?**
Get details on what was done and when.

1: _________________________
2: _________________________
3: _________________________

Water Heater

Repeat the series "did you take any steps..." If Yes "how much influence the MyHER report was..." up to three times
27. **Since receiving your first Home Energy Report did you take any steps to <u>reduce</u> the amount of energy used to heat the hot water in your home?**

( ) Yes *ask:* **What have you done? _________________**
( ) No
( ) DK/NS

27a. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**
(read answers aloud, select only one)

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

27b. **Did you do anything else to <u>reduce</u> the amount of energy used to heat the hot water in your home?**
(since receiving the 1st report.)

( ) Yes *ask:* **What have you done? ________________**
( ) No
( ) DK/NS

27c. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

27d. **Did you do anything else to <u>reduce</u> the amount of energy used to heat the hot water in your home?**
(since receiving the 1st report.)

( ) Yes *ask:* **What have you done? ________________**
( ) No
( ) DK/NS

If yes,
27e. **Please tell us how much influence the MyHER report was on your decision to take this step, was it...**

( ) **the main reason,**
( ) **one reason among several, but not the main reason, or**
( ) **It did not have an influence**
( ) DK/NS

27f. **Did you do anything that would have <u>increased</u> the amount of energy used to heat the hot water in your home? An example of something that would increase the amount of energy is to turn up your hot water tank's temperature.**

( ) Yes
( ) No
( ) DK/NS

If yes to q27f, ask:

27g. **What have you done?**
after each answer, ask: **Anything else?**
Get details on what was done and when.
1: ___________________________
2: ___________________________
3: ___________________________

Pool

28. **Do you have a pool?**
( ) Yes
( ) No
( ) DK/NS

If yes. ask:
28a. **Did you make any changes to your pool's heating or filtering systems to make it more efficient?**
( ) Yes
( ) No
( ) DK/NS

If yes to q28a, ask:
28b. **What have you done?**
after each answer, ask: **Anything else?**
Get details on what was done and when.
1: ___________________________
2: ___________________________
3: ___________________________

If they never read the reports, Skip to q40

Now I am going to ask you some general agreement statements. On a scale from 1-10, with 1 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statements.

29. **The reports are easy to understand.**
( ) 1
…
( ) 10
( ) DK/NS

If 7 or less, ask:
29a. **How could this be improved?**
____

*Ask question 29b if they were receiving the reports before April or May 2012***.**
29b. **Do you recall noticing a change in the reports in April or May 2012?**

( ) Yes *ask:* 29c. **What changed? ______________________**
( ) No
( ) DK/NS
( ) Not applicable

If yes to 29b, ask:
29d. **Are the reports now easier to understand, more difficult, or about the same?***

( ) Easier
( ) More difficult
( ) About the same
( ) DK/NS

30. **The energy saving tips in the report provided new ideas that I was not previously considering.**

( ) 1
…
( ) 10
( ) DK/NS

If 7 or less, ask:
30a. **How could this be improved?**

____

31. **I find the reports useful.**

( ) 1
…
( ) 10
( ) DK/NS

If 7 or less, ask:
31a. **How could this be improved?**

____

32. **I enjoy receiving and reading the reports.**

( ) 1
…
( ) 10
( ) DK/NS

If 7 or less, ask:
32a. **How could this be improved?**

____

33. **I find the graphics helpful in understanding how my energy usage compares to others like me.**

( ) 1
…
( ) 10
( ) DK/NS

If 7 or less, ask:
33a. **How could this be improved?**

____

34. **I find the graphics helpful in understanding how my energy usage changes over the seasons.**

( ) 1
…
( ) 10
( ) DK/NS

If 7 or less, ask:
34a. **How could this be improved?**

____

35. **Overall I am satisfied with the reports.**

( ) 1
…
( ) 10
( ) DK/NS

If 7 or less, ask:
35a. **How could this be improved?**

____

36. **Is there anything that you would like to see changed about the report?**

____

37. **On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please indicate your overall satisfaction with Duke Energy.**

( ) 1
…
( ) 10
( ) DK/NS

If 7 or less, ask:
37a. **How could this be improved?**

____

38. **Have you shared or discussed this report with others?**

( ) Yes
( ) No
( ) DK/NS

If Yes to q38, ask:
38a. **Who did you share it with?**
(Mark all that apply)

[ ] Family
[ ] Friends
[ ] Neighbors
[ ] Co-workers
[ ] Other
[ ] DK/NS

39. **If you were rating your overall satisfaction with the Home Energy Report, would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?**

( ) Very Satisfied
( ) Somewhat Satisfied
( ) Neither Satisfied nor Dissatisfied
( ) Somewhat Dissatisfied
( ) Very Dissatisfied
( ) Refused
( ) DK/NS

39a. **Why do you give it that rating?**

____

40. **There is a phone number and email address for Customer Support on the reports, have you called or emailed Customer Support for any reason?**

[ ] Yes, emailed
[ ] Yes, called
[ ] No
[ ] DK/NS

If yes,
40a. **Why did you call/email?**

____

If yes,
40b. **Were you satisfied with the response you received? Why or why not?**

____

41. **Do you use Facebook, Twitter and/or other social media?**

( ) Yes
( ) No
( ) DK/NS

If yes to q41, ask:
41a. **Have you ever interacted with Duke Energy thru social media? And if so, what did you use?**
(Mark all that apply)

[ ] Yes, Facebook
[ ] Yes, Twitter
[ ] Yes, Other
[ ] No
[ ] DK/NS

If yes to q41, ask:
41b. **Have you ever used social media to communicate with other people about Duke Energy, energy efficiency, energy prices, or other energy related topics?**

( ) Yes
( ) No
( ) DK/NS

If yes to 41b, ask:
41c. **What did you communicate about? ____________**

42. **Have you or someone in your household visited the Duke Energy web site in the past year?**

( ) Yes
( ) No
( ) DK/NS

If Yes to 42, ask:
42a. **What did you do while you were accessing the website?**
(Do not read answers. Mark all that apply)

[ ] Pay my bill
[ ] Review or change account information
[ ] Search for ways to save on my bill (energy savings tips, etc.)
[ ] Search for information on energy efficiency (rebates, incentives, programs, etc.)
[ ] Find out about Duke Energy activities (e.g. plant building, community actions etc.)
[ ] Other
[ ] DK/NS

As a follow up to the report, Duke Energy is interested in providing further services that might be of interest to customers. I am going to read a list of possible services that Duke

Energy may consider offering. On a scale from 1-10, with 1 indicating that you would be very uninterested, and 10 indicating that you would be very interested, please rate your interest in the following services.

43. **Help in finding weatherization contractors to make your home more efficient**
( ) 1
…
( ) 10
( ) DK/NS

44. **Help in finding energy efficient equipment and appliances**
( ) 1
…
( ) 10
( ) DK/NS

45. **Rebates for energy efficient home improvements**
( ) 1
…
( ) 10
( ) DK/NS

46. **Inspection services of work performed by contractors**
( ) 1
…
( ) 10
( ) DK/NS

47. **Financing for energy efficient home improvements**
( ) 1
…
( ) 10
( ) DK/NS

48. **Home energy audits or inspections of your home with specific recommendations for improvements**
( ) 1
…
( ) 10
( ) DK/NS

49. **Social Networking sites such as Facebook and Twitter to read about or discuss energy efficient solutions with energy experts**
( ) 1
…
( ) 10

( ) DK/NS

50. **Are you now or have you ever been a participant in any of the following Duke Energy programs**
(Mark all that apply)
(Enter DK if they do not recall when they participated)
If they ask "What is that program?" you may use the explanation given in q51.

[ ] Power Manager
ask: **What month and year did you participate in this program? ________________**
[ ] Residential Smart Saver HVAC
ask: **What month and year did you participate in this program? ________________**
[ ] Home Energy House Call
ask: **What month and year did you participate in this program? ________________**
[ ] Personalized Energy Report
ask: **What month and year did you participate in this program? ________________**
[ ] Appliance Recycling
ask: **What month and year did you participate in this program?**
[ ] CFLs shipped to your home *(IVR/WEB – NOT HEHC or PER -callers, please verify)*
ask: **What month and year did you participate in this program? ________________**
[ ] None of the above

For all programs not checked in q50, ask the following questions:
51. **On a scale from 1-10, with 1 indicating not at all interested and 10 indicating very interested, please rate your interest in Duke Energy providing the following programs:**

(Power Manager)
51a. **A program that provides bill credits in exchange for allowing Duke Energy to temporarily turn your air conditioning unit off and on during periods of high use on hot days**

( ) 1
…
( ) 10
( ) DK/NS

(Residential Smart Saver HVAC)
51b. **A program that provides rebates for energy efficient improvements to your house such as energy efficient heating and cooling units.**

( ) 1
…
( ) 10
( ) DK/NS

(Home Energy House Call)
51c. **A program in which an assessor comes to your house, suggests energy efficiency improvements, and Duke Energy provides certain low-cost improvement materials for free.**

( ) 1

…
( ) 10
( ) DK/NS

(Personalized Energy Report)
51d. **A program that provides personalized energy analysis and ways to save energy and money by filling out a short survey with questions about your home.**
( ) 1
…
( ) 10
( ) DK/NS

(Appliance Recycling)
51e. **A program that provides a rebate to pick up and properly recycle an inefficient refrigerator or freezer from your home**
( ) 1
…
( ) 10
( ) DK/NS

(Free CFLs - IVR/WEB)
51f. **A program that provides free CFLs mailed directly to your home**
( ) 1
…
( ) 10
( ) DK/NS

52. **What other services could Duke Energy provide to help improve home energy efficiency? __________________**

I would now like you ask you a few demographic questions before we get off the phone.

e1. **Do you own an electric vehicle?**
( ) Yes *ask:* **How many? __________________**
( ) No
( ) Refused

e2. **Do you have a solar water heating system?**
( ) Yes *ask:* **What size? __________________**
( ) No
( ) Refused

e3. **Do you have a solar photovoltaic system?** ***(****Solar panels****)***
( ) Yes *ask:* **What size? __________________**
( ) No

( ) Refused

d1. **In what type of building do you live?**

( ) Single-family home, detached construction
( ) Single family home, factory manufactured/modular
( ) Single family, mobile home
( ) Row House
( ) Two or Three family attached residence-traditional structure
( ) Apartment (4 + families)---traditional structure
( ) Condominium---traditional structure
( ) Other __________________
( ) Refused
( ) DK/NS

d2. **What year was your residence built?**

( ) 1959 and before
( ) 1960-1979
( ) 1980-1989
( ) 1990-1997
( ) 1998-2000
( ) 2001-2007
( ) 2008-present
( ) DK/NS

d3. **How many rooms are in your home (excluding bathrooms, but including finished basements)?**

( ) 1-3
( ) 4
…
( ) 9
( ) 10 or more
( ) DK/NS

d4. **Which of the following best describes your home's heating system?**
(Mark all that apply)

[ ] None
[ ] Central forced air furnace
[ ] Electric Baseboard
[ ] Heat Pump
[ ] Geothermal Heat Pump
[ ] Other

d5. **How old is your heating system?**

( ) 0-4 years
( ) 5-9 years
( ) 10-14 years

( ) 15-19 years
( ) 19 years or older
( ) DK/NS
( ) Do not have
( ) Other ________________

d6. **What is the primary fuel used in your heating system?**
( ) Electricity
( ) Natural Gas
( ) Oil
( ) Propane
( ) Other ________________

d7. **What is the secondary fuel used in your primary heating system, if applicable?**
( ) Electricity
( ) Natural Gas
( ) Oil
( ) Propane
( ) Other ________________
( ) None

d8. **Do you use one or more of the following to cool your home?**
(Mark all that apply)
[ ] None, do not cool the home
[ ] Heat pump for cooling
[ ] Central air conditioning
[ ] Through the wall or window air conditioning unit
[ ] Geothermal Heat pump
[ ] Other ________________

d9. **How many window-unit or "through the wall" air conditioner(s) do you use?**
( ) None
( ) 1
…
( ) 7
( ) 8 or more

d10. **What is the fuel used in your cooling system?**
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] None

d11. **How old is your cooling system?**

( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) 19 years or older
( ) DK/NS
( ) Do not have

d12. **What is the fuel used by your water heater?**
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No water heater

d13. **How old is your water heater?**
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) More than 19 years
( ) DK/NS

d14. **What type of fuel do you use for indoor cooking on the stovetop or range?**
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No stovetop or range

d15. **What type of fuel do you use for indoor cooking in the oven?**
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No oven

d16. **What type of fuel do you use for clothes drying?**
(Mark all that apply)
[ ] Electricity

[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No clothes dryer

d17. **About how many square feet of living space are in your home?**
(Do not include garages or other unheated areas)
Note: A 10-foot by 12 foot room is 120 square feet
( ) Less than 500
( ) 500 to 999
( ) 1000 to 1499
( ) 1500 to 1999
( ) 2000 to 2499
( ) 2500 to 2999
( ) 3000 to 3499
( ) 3500 to 3999
( ) 4000 or more
( ) DK/NS

d18. **Do you own or rent your home?**
( ) Own
( ) Rent

d19. **How many levels are in your home (not including your basement)?**
( ) One
( ) Two
( ) Three

d20. **Does your home have a heated or unheated basement?**
( ) Heated
( ) Unheated
( ) No basement

d21. **Does your home have an attic?**
( ) Yes
( ) No

d22. **Are your central air/heat ducts located in the attic?**
( ) Yes
( ) No
( ) N/A

d23. **Does your house have cold drafts in the winter?**
( ) Yes
( ) No

d24. **Does your house have sweaty windows in the winter?**
( ) Yes
( ) No

d25. **Do you notice uneven temperatures between the rooms in your home?**
( ) Yes
( ) No

d26. **Does your heating system keep your home comfortable in winter?**
( ) Yes
( ) No

d27. **Does your cooling system keep your home comfortable in summer?**
( ) Yes
( ) No

d28. **Do you have a programmable thermostat?**
( ) Yes
( ) No

d29. **What temperature is your thermostat set to on a typical summer weekday afternoon?**
( ) Less than 69 degrees
( ) 69-72 degrees
( ) 73-78 degrees
( ) Higher than 78 degrees
( ) Off
( ) DK/NS

d30. **What temperature is your thermostat set to on a typical winter weekday afternoon?**
( ) Less than 67 degrees
( ) 67-70 degrees
( ) 71-73 degrees
( ) 74-77 degrees
( ) 78 degrees or higher
( ) Off
( ) DK/NS

d31. **Do You Have a swimming pool, spa or hot tub?**
( ) Yes
( ) No

Read all answers until they reply
d32. **Would a two-degree increase in the summer afternoon temperature in your home affect your comfort..**
( ) **Not at all**

( ) **Slightly**
( ) **Moderately, or**
( ) **Greatly**

d33. **How many people live in this home?**
( ) 1
…
( ) 7
( ) 8 or more
( ) Prefer not to answer

d34. **How many of them are teenagers?** *(age 13-19)*
If they ask why: Explain that teenagers are generally associated with higher energy use.
( ) 0
…
( ) 7
( ) 8 or more
( ) Prefer not to answer

d35. **How many persons are usually home on a weekday afternoon?**
( ) 0
…
( ) 7
( ) 8 or more
( ) Prefer not to answer

d36. **Are you planning on making any large purchases to improve energy efficiency in the next 3 years?**
( ) Yes
( ) No
( ) DK/NS

The following questions are for classification purposes only and will not be used for any other purpose than to help Duke Energy continue to improve service.

d37. **What is your age group?**
( ) 18-34
( ) 35-49
( ) 50-59
( ) 60-64
( ) 65-74
( ) Over 74
( ) Prefer not to answer

d38. **Please indicate your annual household income.**
( ) Under $15,000

( ) $15,000-$29,999
( ) $30,000-$49,999
( ) $50,000-$74,999
( ) $75,000-$100,000
( ) Over $100,000
( ) Prefer Not to Answer

We've reached the end of the survey. As I mentioned earlier, we would like to send you $20 for your time and feedback today. Should we send the $20 to {*address on file*}, or would a different address be better?

Either way, enter entire address here:
Name: ___________________________
Address: ___________________________
City: ___________________________
State: ___________________________
Zip: ___________________________

You should receive your $20 check in about 4-6 weeks. It will come in an envelope from our company: TecMarket Works. Thanks again for your time today!

Appendix D: Example MyHER Mailing

JOHN DOE
Account Number: 00001-00001
July 2013

DUKE ENERGY.

My Home Energy Report

JOHN DOE's Home Electricity Usage for July 2013

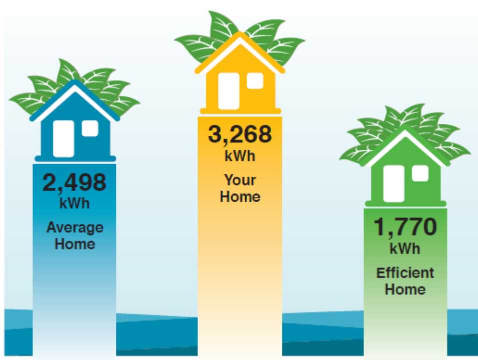
How am I doing?

What is this report?

Duke Energy developed this report to help you understand your energy usage and find ways to help you save money and energy. The report compares your home energy efficiency with similar homes.

Why would Duke Energy try to help me save energy?

When customers reduce their energy needs, it reduces the costs to provide energy and the need to build more power plants, which lower bills for you, your community, and Duke Energy.



Whose electricity usage is being compared to mine?

189 households compared
- In the Greensboro area
- Non-electric heating
- 4700-5300 sq. ft.
- Built in 1983-1993

A 42" LCD TV used for 5 hours per day consumes roughly 18 kWh per month.
For more examples of kWh usage, visit www.duke-energy.com/homereport

Based on your electricity usage, you spent about **$78 more** than the average home. Ready to be better than average? Join the ranks of the efficient. Try one of the tips below.

Tips Based on Your Usage and Home Profile

What can I do to save money and energy?

Cold water, cold cash!

Wash your laundry in cold water

Save up to $24 per year.

Did you know that most of the energy consumed doing laundry is used to heat the water? All of that heat (and your hard earned money) then gets washed down the drain. Wash more of your laundry using cold water and save. As a bonus, colors will last longer and fabrics will stay stronger. Look for laundry detergents that are specifically formulated to work using cold water and you'll find your clothes still get as clean as before, but your wallet won't be feeling so light.

Try just one!

Try an LED light bulb

Save up to $12 per year.

LED light bulbs have become very affordable and are one of the best ways to save on your electric bill. You don't have to change all the bulbs in your house right now, but how about trying just one? Replacing a single 60–watt incandescent bulb with an equivalent LED model can save you real money now. And since LED bulbs last many times longer than old–fashioned incandescents, over time, the savings will become a really big deal!

Questions?

Visit:
www.duke-energy.com/homereport

Email:
HomeReport@duke-energy.com

Call:
888-873-3853
M-F 7AM-7PM ET
SAT 8AM-1PM ET

Check out this video to learn more about your personalized report.

JOHN DOE's Home Electricity Usage for the Past Year

How am I doing over time?

Your usage for this month has **decreased** compared to a year ago. Based on your electricity usage, you spent **$1819 more** than efficient homes in your area in the last 12 months.

Take action. Reduce your use.

Run a Tight Ship

You wouldn't try to sail a leaky boat. Why waste money heating a **leaky house?**

Now is a great time to make your home ship-shape. Our **Smart $aver Insulate and Seal** program provides **incentives of up to $350** for improving the efficiency of your home and duct system.

Visit **duke-energy.com/MyHER13** to locate a qualifying vendor and learn how much you can save.

Who knows your home better than you?

Duke Energy uses the square footage, age, location and heating source of your home and others like it to create our comparison groups. Since **no one knows your home better than you, please take a moment to check the information we have on your home**. You'll find it to the right of the houses on your report. Updating this information will allow us to **provide you with detailed reports that are customized... just for YOUR home.**

Please email us at **HomeReport@duke-energy.com** or call **888-873-3853** with any corrections you may have.

DUKE ENERGY®

www.duke-energy.com
Customer Support: 888-873-3853
P.O. Box 1006
Charlotte, NC 28201-1006

JOHN DOE
2112 MAPLE AV
GREENSBORO, NC 27455-2005

Appendix E: Summary of Energy Saving Action Tips and Messages

NOTE: Each customer receives each tip one time.

Teaser	Action Title	Action Text	Savings in kWh	Age Threshold (> years: Only applies to homes that meet age requirement.
Original Tip Library				
Put a lid on your home!	Insulate your attic	A house with no insulation is like a coffee cup with no lid: all the heat goes up and out. Your furnace has to use more energy to replace the lost heat, and in the summer, the same thing happens with cool air and your AC. Keep the lid on by insulating your attic and reduce the energy used for both heating and cooling. It's one of the best energy efficiency investments you can make in your home.	Model	10
Reduce drafts and save!	Weatherize your home	Weatherize is a complicated sounding word, but don't let it throw you. Just get some caulk and weather stripping and use it to plug air leaks around your doors and windows. When you do this, you keep warm air from leaking in during the summer and leaking out during the winter. That means you'll use less energy when cooling and heating and be more comfortable with reduced drafts.	Model	5
Creep up a degree or two...	Set your thermostat as high as comfortable in summer	Air conditioners use a lot of energy. Turning up the temperature by just a few degrees can cut your energy bills: on average, you can save about 3% per degree! You can start by just turning up the temperature 1-2 degrees, and see how it feels. Try another 1-2 degrees a few days later. You might be pleasantly surprised how comfortable you feel while you save energy!	Model	
Upgrade that old tank!	Replace your old hot water heater	If your water heater is more than 10 to 15 years old, consider buying a new, more efficient model. If you heat your water with electricity, water heating can be one of your biggest energy consumers. Do some research into your options, then talk to a trusted contractor and be sure to tell them that you want the most efficient model possible.	Model	10

Lighting up the night, not the day.	Turn off outdoor lights during the day	If you prefer leaving you outdoor lights on at night for security or aesthetics, be sure to turn them off during daylight hours. Every morning, make it a habit to turn your outdoor lights off when you get the paper or let the dog out. If you have trouble remembering to do this, consider installing a light sensor, timer, or motion sensor on your outdoor lights, or switch to solar powered lights.	650	
Is your second fridge eating cash?	Unplug your second refrigerator or freezer	Most backup refrigerators are at least 10 years old and use huge amounts of energy. Many families keep a second refrigerator to hold extra drinks or to use in the basement during parties. If you're one of them, retire that second fridge -- or plug it in only when you really need it -- and you'll be surprised how much energy you save.	550	
Save loads of energy!	Air dry your laundry	Skip the dryer and air dry your laundry. Dryers are amazing, but they're energy hogs. One dryer load uses enough energy to power a CFL light bulb for 200 hours. Air drying just one load of laundry each week can save you energy each year. (Bonus! Your clothes will last longer, too.)	550	
Why pay for power you don't use?	Cut the standby power used for home entertainment	Your TV and all the associated gadgets use power even when they are off. This "standby" power is waste and can account for as much as 10% of the energy used in your home! To reduce this waste, plug your television and its accessories into a power strip or surge protector, and turn of the strip when these items aren't in use.	350	
Easy habits that can add up!	Save on hot water use	Making a few small changes in how you use water can easily save you 5% on your hot water use. Start in the morning by shortening your showers by a minute or two, and don't let the hot water run when you shave or brush your teeth. When doing laundry, wash your clothes in cold water. In the kitchen, run the water only when rinsing the dishes.	330	
Give your computer a rest!	Enable energy management on your computer	Change the settings on your computer so that it goes to sleep after 15 minutes of inactivity. Enabling "power management" or "sleep mode" on your computer could cut your computer's energy consumption in half!	300	
Plug into savings.	Cut standby power to your home computing system	Your computers and all the gadgets that go with them use power even when they are off. This "standby power" accounts for over 50% of the total energy used by many of these devices! The easiest way to cut this waste is to plug all your gadgets into a power strip and turn it off when you're not using those devices.	220	

Increase security and cut costs!	Put your outdoor lights on motion detectors or timers	Do you leave your outdoor lights on all night? Try installing motion detectors or timers on your outdoor lights to reduce the power they burn through. Motion detectors help ward off trouble while significantly reducing energy use. Using motion detectors or timers is a great way to get the benefits of outdoor lighting while cutting your energy use.	220	
A bright idea for outside!	Use efficient bulbs for your outdoor lighting	Put efficient ENERGY STAR compact fluorescent (CFL) bulbs in your outdoor light fixtures. CFL bulbs use 75% less energy, and they last 10 times longer than incandescent bulbs. Outdoor lights can be on for 12-14 hours of every day, so you'll really save energy when you switch. Here's the bonus: ENERGY STAR lights last so long, you won't have to get out your ladder so often to change bulbs.	220	
Stay dry and save energy!	Buy an ENERGY STAR dehumidifier	Choose a dehumidifier with the ENERGY STAR label when purchasing a new unit. An ENERGY STAR qualified dehumidifier uses 15% less energy than a standard model. That means that an ENERGY STAR dehumidifier can save as much energy as a small refrigerator uses in a year! Choose the right size for your home, and keep in mind that larger units typically operate more efficiently than smaller ones.	210	
A bright idea for indoors!	Use energy efficient lighting indoors	Use energy efficient compact fluorescent (CFLs) bulbs to provide quality lighting throughout your home. CFLs use 75% less energy than incandescent bulbs and last 10 times longer. Only air conditioning and heating use more electricity in people's homes. Since most of the electricity used by an incandescent bulb is wasted as heat, you can actually save on air conditioning by switching to CFLs.	200	
Light your task, not your room.	Use task lighting	Use task lighting - lighting directed at a specific area - instead of overhead or general lighting. If you light the area well that you are working in, you can light the rest of the room less. The fewer lights you have on, the more energy you can save.	120	
Good shows, great savings!	Buy an ENERGY STAR television	If you are in the market for a new TV, consider buying an ENERGY STAR model. TVs in use in the U.S. consume over 50 billion kWh of energy each year - enough electricity to power all the homes in the state of New York for an entire year! ENERGY STAR qualified TVs, which cover standard models, HD-ready TVs, and flat-screen plasma TVs, use about 30% less energy than conventional units.	120	

Give your filters a clean start!	Clean or replace your furnace filters	Clean or replace the filters in your forced-air heating and cooling system once a month or as needed. Energy is lost when your heating and cooling systems have to work harder to draw air through dirty filters. Give your furnace a break and save up to 5% on air conditioning by cleaning or changing your filters.	120	
Use sensors and save.	Minimize the run time of your dryer	Not quite ready to air dry your laundry? No problem - just try the auto-sensing setting on your dryer to reduce your energy use. This setting will automatically stop the dryer when your laundry is dry. No auto-sensing on your dryer? Set the timer for 5-10 minutes less than usual and see how you do. Remember, it's better to add a few minutes at the end than run the dryer for too long.	100	
Keep cool when buying a fridge...	Buy a ENERGY STAR refrigerator	Look for the ENERGY STAR label when purchasing a refrigerator. ENERGY STAR refrigerators use at least 20% less energy than non-ENERGY STAR models. To maximize your savings, consider a model with the fridge on top or bottom (not side by side) that doesn't have an ice maker in the door.	100	5
Cook smart and save.	Use your microwave instead of a conventional oven	When reheating food or cooking smaller dishes, use your microwave whenever possible. You can save up to 50% of your cooking energy usage by using a microwave oven instead of a conventional electric oven. Using a microwave where you can is an easy way to save energy, and it cooks your food much faster than a traditional oven.	90	
Newly Added Tips (Display Cost Savings)				
Leaky ducts condition the wrong air.	Check to see if your ducts are sealed.	Are you losing air? Over time the ducts that move your cool or hot air throughout your home can become leaky or poorly connected. According to Energy Star, a typical home can lose 20% of its conditioned air that is meant to keep your home comfortable. This means that the nice cool or warm air goes to places where it's not needed, like your attic or crawlspace. Sealing or repairing leaky ducts will increase your comfort and decrease your energy use.	Model	
Help your cooling system breathe.	Clean your cooling system filter.	While your cooling system is cooling the air in your home, it can also be pulling in dust and other particles. Over time, this starts to clog the filter making your unit work harder and less efficiently. Keeping the filter clean can lower energy use by 5 to 15%.	Model	
A yearly checkup to keep you cool!	Have your central air conditioner serviced.	If you have a central air conditioner, optimize its efficiency by having the unit serviced annually. In most homes, the central air conditioner uses more electricity than any other device. Regular maintenance will keep it operating at peak performance.	Model	

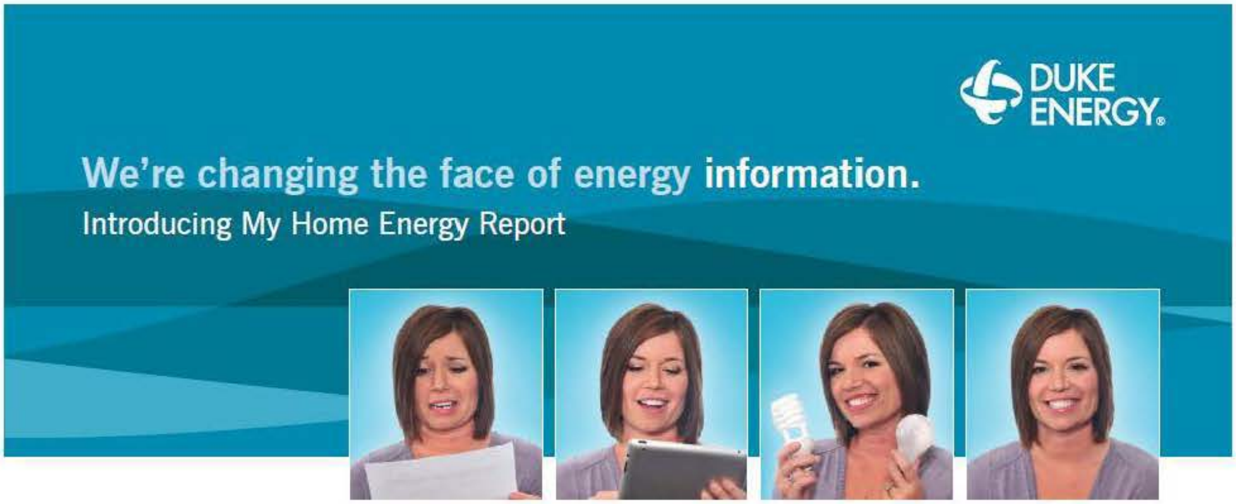
What's your temperature?	Turn down your hot water heater's thermostat.	We don't go so far as to recommend COLD showers. But water that is too hot can be costly and even dangerous. Some manufacturers preset water heater temperatures to 140 degrees Fahrenheit, but 115-120 degrees is adequate for most households. For every 10 degrees you lower your water heater's temperature you could reduce your costs by 3-5% .	Model	
Clean savings.	Five minutes could save you fifty gallons.	A 5 minute shower uses 10 to 25 gallons of hot water, while a full bath tub can hold up to 70 gallons. Save water and energy by choosing a quick shower.	Model	
Hot water just when you need it.	Do you know that if you have a standard tank water heater, it cycles on to heat the water overnight, even when you are not using hot water?	Your water heater's job is to make sure you have hot water available whenever you turn on the tap. With standard tank heaters, that means continuously cycling to keep the stored water heated. Remembering to turn off your water heater when you go on vacation - some systems even have a vacation setting - will save energy (and money toward your next vacation). If your household has particular pattern, you can take it a step further by installing a timer so the water heater thermostat turns down or all the way off after morning showers are done or everyone is off to work or school.	Model	
Dishwashing made even easier!	Let the dishwasher do the work.	No more dishpan hands. Do you rinse your dishes before loading them into the dishwasher? If you plan to run it immediately, skip this step. Just scrape, load and press the start button. According to Consumer Reports, most dishwashers on the market today have an efficient pre-rinse cycle that will save you time, water and energy.	Model	
Check your head.	Go for a low-flow showerhead.	Water heating accounts for nearly 15 percent of the average home's energy usage. Low-flow showerheads can reduce water usage by up to 50 percent. Thanks to the variety of low-flow showerheads on the market today, it's easy to find one that will save you water and energy.	Model	
Invite a STAR into your kitchen.	Buy an ENERGY STAR dishwasher.	Next time you're in the market for a new dishwasher, be sure to choose one with the ENERGY STAR label. Not only does an ENERGY STAR certified dishwasher use 10 percent less energy than standard units, it also uses 30 percent less water per load. That's a great way to reduce both your energy and water usage.	Model	5

Clean up with energy savings!	Choose an ENERGY STAR washing machine.	Laundry is a dirty job, but somebody has to do it. If that somebody is you, be sure you're using a machine that is efficient. Whenever you see the Energy Star label, you can be assured of using less electricity to power the machine, less energy to heat the water, and saving more money getting your laundry clean.	Model	
Shut those shades!	Keep your shades closed in the summer.	Sunny windows can account for 40 percent of unwanted heat and can make your air conditioner work two to three times harder. You can minimize this heat by closing your blinds or curtains on sunny days. Focus on South and West facing windows as those allow the most amount of heat into your home.	450	
Grill to keep cool!	Enjoy grilling season and save	Try cooking a meal or two per week on your barbeque grill. This will help keep your house cooler in the summer and save on your electricity bill. Cooking outside with a gas or charcoal grill uses no electricity at all and won't release heat into your kitchen. Your refrigerator and air conditioner won't have to work as hard to keep things cool - so you'll save event more on your electricity bill!	200	
Reach for that crock pot all year!	Dust off that Crock Pot.	Cooking in a crock pot can be much more efficient than using your oven. A crock pot costs 10 cents to run for 8 hours while an oven costs 32 cents to run for just one hour.	114	
An idea that really computes!	Buy an ENERGY STAR computer.	Look for the ENERGY STAR label when purchasing a new computer. ENERGY STAR models use 30% to 65% less energy than other models. The more you use your computer, the greater your savings will be.	100	
		Newly Added Tips (Don't Display Cost Savings)		
Colder is not always better!	Check the temperature of your refrigerator or freezer.	Use a thermometer to check the temperature of your refrigerator or freezer. A refrigerator that is 10 degrees too cold can use up to 25% more energy than one running at the ideal temperature. Recommended temperatures are 37 to 40 degrees for the fresh food compartment, and 5 degrees for the freezer. If you have a separate freezer for long term storage, you should set it to 0 degrees.	84	
One Simple Step to Save	Turn off that ice maker.	Did you know that automatic ice makers generate heat that the freezer has to work against ? Or that ice makers can increase your refrigerator's energy use by 10% or more? To save energy, keep your automatic ice maker off until you *really* need a lot of ice.	70	

Cold, hard, cash savings!	Buy an ENERGY STAR freezer.	When buying a new freezer, look for the ENERGY STAR label to find the most efficient models. ENERGY STAR qualified freezers use at least 10% less energy than other models and up to 30% less energy than required by current federal standards. Since your freezer is on every hour of the day, these savings can really add up!	65	
Dish up some energy savings!	Air dry your dishes.	Is your dishwasher full of steam? Most dishwashers today are equipped with an electrical heating element that can account for up to 15 percent of the energy used. Instead of using the heated drying cycle, choose the "energy saver" or "economy" function. If your model doesn't have these options, stop the dishwasher before it enters its drying cycle. Open the door and let your dishes air dry instead.	45	
Put your computer to bed.	Turn off your computer at night.	Did you know that even when your computer is in "sleep mode", it is still awake enough to consume electricity? For energy savings, turn your computer and monitor OFF when not in use - especially overnight. Better still, unplug the unit from the wall outlet or use a smart strip to eliminate even standby power.	40	
Wake up and smell the savings!	Store hot coffee in a thermos/carafe.	Coffee - it's not just for mornings anymore. To save money and energy while savoring the rich flavors of your favorite brew, turn off the hot plate on your coffee maker and transfer your coffee to a thermos or insulated carafe instead. You'll save big and your coffee will stay fresh for a longer period of time.	30	
Is your TV too bright?	Lower your TV's brightness setting.	Did you know that most new televisions are shipped "showroom ready," with picture settings at full brightness? Most homes do not require such a bright display. A lower setting could make your television (easier on the eyes and) 15-30% more efficient.	30	
Keep your hairstyles cool.	If you use a hair dryer, try using it on a cool setting.	Hair dryers use between 1200 and 1875 watts, with most of the energy going to generate the heat. Setting it to cool cuts your energy consumption more than half (some dryers use as little as 400 watts on the cool setting).	20	
Don't over exhaust yourself.	Turn off exhaust fans when they are not in use.	Exhaust fans are great for removing moisture from your kitchen or bathroom. But they don't need to run more than 20 minutes to do their job. Leaving a fan on too long not only wastes energy, it also wastes cool air in the summer and hot air in the winter by exhausting them outdoors.	20	
Smart habits that save.	Clean your dryer's lint filter before every use.	Your dryer works by circulating air to remove the moisture from your wet, clean clothes. A clogged filter prevents air from moving freely. Take it a step further by making sure the exterior opening for your dryer vent is clear (in winter, just watch for the team coming out). Once a year go all the way and clean out the dryer vent completely.	15	

Keep it at a low boil.	Next time you boil water, try turning down the heat after the water boils.	Have you ever been told you couldn't even boil water? If so, here's a hot tip just for you! Next time your water reaches boiling point, reduce the heat and cover your pot with a lid. This will help keep the water boiling while saving energy.	15	
Do your fridge a favor… or three.	Maintain your fridge for peak performance.	A few simple steps can keep your fridge in shape. First, clean the coils (usually on the back or bottom of the fridge) with a vacuum or duster. Next, verify that the door seals tightly by closing a dollar bill in the door. If the bill slides out easily, you may need to clean or replace your seals. Finally, keep your fridge stocked! Refrigerators and freezers work most efficiently when they are full, but not overstuffed.	15	
Let the air flow!	Clean your dryer lint filter.	Improve the air circulation in your dryer by cleaning the lint filter after each load. Your clothes will dry faster and more efficiently. For even more savings, periodically scrub the lint filter with mild soap and water to remove residue left by dryer sheets and fabric softeners.	15	
Cut. Print. Save. A STAR is born!	Choose an ENERGY STAR printer, scanner or all-in-one.	If you are in the market for a new printer, scanner or all-in-one unit, be sure to choose an ENERGY STAR model. ENERGY STAR rated imaging equipment is designed to run cooler, last longer and be 40% more efficient than other models.	13	

Appendix F: Welcome Letter and Frequently Asked Questions



Enclosed you'll find My Home Energy Report, which shows how your energy use compares to similar homes in your community. It also gives practical, personalized advice – based on your home's size, age, location and other factors – on ways to use less energy.

My Home Energy Report includes:

- **Easy-To-Read Graphs**
  See how your home performs on a month-to-month basis and how it compares to similar homes.
- **Timely Tips**
  Relevant and seasonal tips on how to improve your home's energy efficiency.
- **Regular Updates**
  Updated reports will be sent periodically throughout the year, so you can see how your energy saving efforts have paid off over time.

Your voluntary participation in My Home Energy Report can be a practical first step in understanding your electricity usage and identifying steps to take more control.

Please review the frequently asked questions on the reverse side of this letter. If you have additional questions, please visit www.duke-energy.com/HomeReport, email HomeReport@duke-energy.com or call 888-873-3853.

My Home Energy Report is another way we're changing the face of energy information.

Sincerely,

K. Griffin

K. Griffin
Program Manager

Frequently Asked Questions about My Home Energy Report

What is My Home Energy Report?
Duke Energy developed this report to help you understand and conserve energy. The report compares your home's energy efficiency over time, and to similar homes in your area. This energy efficiency program is endorsed by your state utility commission.

Why is Duke Energy trying to help me save energy?
When customers reduce their energy consumption, it reduces the costs to provide energy and the need to build more power plants in the future, which actually lowers bills for everyone. So saving energy makes business sense and common sense.

How often will I receive the report?
Your report will be delivered through the mail periodically throughout the year. Keep an eye out for your next My Home Energy Report so you can track your progress.

Why doesn't this amount match what I see on my actual bill?
Because everyone is on different billing cycles, we multiply your actual energy usage (in kilowatt hours) over a fixed, common-time period with the average residential rate. This calculates the costs shown on your report.

How do you choose the homes used in my comparison?
Duke Energy compiles energy usage figures, customer-supplied data and public information (location, size and home age) on nearby, similar homes to develop the comparison. However, public information sometimes becomes outdated as homes are renovated or situations change. If the information on your report appears to be incorrect, please provide us the correct information by emailing HomeReport@duke-energy.com or calling 888-873-3853, so we can update it on future reports.

Is my home energy use being shared with other customers?
No. All of the comparison information is aggregated to create your report. Your specific information and home characteristics are not shared with others.

Whose home qualifies as the "Efficient Home"? Are these real people and homes?
Yes, these are real households. This report uses a scale of 1 to 100 to rank all of the homes that are similar to yours. The "Average Home" represents the ones in the middle of the pack, performing at the 50-percent mark. The "Energy Efficient Home" represents households that fall at the 25-percent mark, which means that 25 percent of the homes in your comparison spend this amount – or less – on energy.

How do my most efficient neighbors manage to use so much less energy than me?
They may be taking a variety of savings-actions, like: adjusting or programming their thermostats to manage heating and cooling costs; turning off lights and home electronics when not in use; running only full laundry and dishwasher loads; and installing more efficient heating/air-conditioning systems or water heaters.

I have gas heating. Does this report compare energy usage for both electricity and gas?
No, the report only accounts for a household's electricity use, so the costs for gas are not included. However, you are only being compared to homes that are like yours, so we do not compare an all-electric home to a gas-heated home.

What is a kilowatt-hour?
A kilowatt-hour (kWh) is a universal unit of measure for electricity use. One 100-watt light bulb left on for 10 hours consumes one kWh of electricity (100 watts x 10 hours = 1,000 watt-hours = 1 kWh).

What if I have more questions, want to correct my household data or want to stop receiving this report?
Please email questions, data corrections or requests to HomeReport@duke-energy.com or call 888-873-3853.

Appendix G: What It Means to be Energy Efficient

Surveyed customers were asked to tell us "*in your own words what it means to be energy efficient*."

Table 45. In Your Own Words, Please Tell Me What It Means To Be Energy Efficient

	Total (N=302)
Try to use less energy / least amount necessary / don't waste	67.9%
Saving money on bills / being cost effective / keeping rates down	31.8%
Helping the environment / sustainability / being green	9.6%
Turn off lights / appliances when not in use	5.6%
Upgrading home and appliances with efficient equipment	4.6%
Being aware of energy use	4.6%
Heating & cooling decisions / trading comfort for savings	2.6%
Insulation / seal doors, windows and other leaks	1.0%
Educating children about energy and conservation	1.0%
Use CFLs	0.7%
Try to use less water / don't waste	0.3%
Unique responses	2.6%
Don't know	1.3%

Percentages total to more than 100% because respondents could give multiple responses.

<u>Try to use less energy / least amount necessary / don't waste</u>

Most responses (67.9% or 205 out of 302) included something close to the standard definition of energy efficiency: trying to use less energy, using the least amount of energy necessary, not wasting energy, etc. All 205 of the verbatim responses in this category are listed below (note that multiple responses are accepted for this question, so some of these responses also include comments categorized under the other headings listed above).

- *It means saving energy.* (N=5)
- *Being energy efficient is being mindful of energy usage and making attempts to not waste it.*
- *Being energy efficient is about being aware of and finding ways to cut down on electricity usage.*
- *It's just being conscious of where your energy goes and you should just try and cut back on it. I like to be aware of whether I'm only using as much energy as I need.*
- *Being energy efficient is about always being conscious of the energy you're using. Try to use to least amount of energy you can. Be aware of things both big and small that affect energy use.*
- *Conserving more; being more aware of using what I need instead of wasting energy. Only using what you need and being mindful of what you need to have on.*

- *I think we all need to conserve; energy is a big thing, everybody should especially be conscious of the amount of energy they use and the amount that they could be cutting back on.*
- *It means that you take all measures to save energy while still doing the things you need and want to do.*
- *Being energy efficient is about using things that don't consume as much energy.*
- *It means that you cut down your energy use and then save money on your bill.*
- *Being energy efficient is about doing everything that you can to get the most out of it.*
- *It means that you make the best use of energy as you can.*
- *Being energy efficient means to use as little energy as possible for day-to-day activities.*
- *That the energy is there when I need it but I don't over use it.*
- *Being energy efficient means to be conservative and when getting ready to leave the house, to turn my stereo and lights out.*
- *Being energy efficient is about not wasting energy.*
- *Being energy efficient is about doing things to save energy.*
- *Being energy efficient is about reducing costs by consuming less energy.*
- *Being energy efficient is about not using unnecessary energy.*
- *Being energy efficient is about not using more energy than you need.*
- *It's to use as little voltage and wattage as possible.*
- *Being energy efficient is about decreasing energy usage.*
- *Being energy efficient is about using the latest technology to decrease energy use.*
- *It means that you try to use as little power as possible.*
- *It means making the best use of all energy.*
- *It means that you get by with using the least amount of energy possible.*
- *Being energy efficient means to have good insulation, good heating and air units, and just to use energy wisely.*
- *It means that you utilize a better use of electricity.*
- *It means that you are saving money and power.*
- *Use as little energy as possible.*
- *It means that you use less energy more effectively.*
- *It means that you do things to save energy.*

- *It means that you are using the least amount of energy as possible to do the things you need to or want to.*
- *Being energy efficient is not wasting energy. I keep my thermostat comfortable, but not cold: about 71 in the winter and 75 in the summertime.*
- *Try to conserve electricity when you can.*
- *It means that you use as little energy as possible.*
- *Being energy efficient is about using less watts.*
- *Using the least amount of energy and getting the most for your money.*
- *Try to use as little energy as possible.*
- *It means that you are saving power and money.*
- *It means that you watch your power usage and avoid wasting energy.*
- *Use less energy to save money.*
- *Conserve as much energy as possible.*
- *Not using more energy than you need.*
- *Being energy efficient means to conserve as much energy as you can because energy is eventually going to run out and it's really important to teach children about energy. I'm 65-years-old and I want to teach my grandchildren.*
- *To try to conserve as much power as possible so that I pay less, but it helps the environment too.*
- *It means that you save money on your bills by not being wasteful.*
- *It means that we save all the energy we can for the future. It also means that we are saving money.*
- *To use energy when it is needed but not waste it.*
- *It means use the best possible alternatives to minimize energy consumption.*
- *Being energy efficient is about using as little energy as possible while still maintaining comfort.*
- *Don't waste energy. Don't be careless with power.*
- *It means that you try to not waste electricity.*
- *It means that you are trying to use as little energy as possible to do what you do.*
- *It means that you save energy and money.*
- *It means ways that you can reduce energy use.*
- *It means that you conserve energy and try not use more than needed.*

- *Being energy efficient is about reducing energy use to keep your bills lower.*
- *It means that you conserve by not using more than you have to, to do the things you need and want to do.*
- *To save energy throughout the house.*
- *Being energy efficient is about reducing energy usage and using the latest technology to further that goal.*
- *Use energy wisely.*
- *Being energy efficient is about doing the best that you can to not waste energy, but instead to have it work for you to be comfortable.*
- *It means that your energy use will be less than it was.*
- *Being energy efficient is about getting the most effective use out of a service or object.*
- *It means that you try not to use a whole of energy.*
- *Being energy efficient is about using less energy by changing habits.*
- *It means that you use less electricity.*
- *It means that you don't waste energy.*
- *It means that you are saving money by saving energy.*
- *To use less energy so it can cost you less.*
- *Being energy efficient is about being aware of and finding ways to conserve as much energy as possible.*
- *It means that you're using less energy to do the things that you need and want to do.*
- *Being energy efficient is about doing what you can to save energy.*
- *To make the best use of the energy you are using.*
- *It means that you are using the least amount of energy possible.*
- *It means that you're not wasteful with power.*
- *It means to be careful about how much energy you use.*
- *It means that you saving money by finding ways to use less power.*
- *Being energy efficient is about not using excess energy.*
- *It means that you use the least amount energy as possible to get the job done.*
- *Conserve energy and using less energy to run your household.*
- *It means saving on everything you use.*
- *It means to save energy as much as you can*

- *It means that you are conserving energy.*
- *It means to conserve power.*
- *It means that you use less power.*
- *It means that you are not wasting resources.*
- *Being energy efficient is about doing things to help the environment: finding ways to save energy, time, and money.*
- *It means that you are saving energy and money.*
- *It means that you conserve energy to avoid waste and help other people: conserve so other people will have energy when they need it.*
- *Being energy efficient is about using the least amount of energy possible.*
- *Being energy efficient means to save as much energy as you can.*
- *Being energy efficient is about using the least amount of energy possible to get the job done.*
- *Being energy efficient is about keeping energy usage down and trying not to waste energy.*
- *Conserving energy.*
- *It means that you do not waste energy.*
- *It means saving money and saving energy.*
- *Being energy efficient is about following energy saving strategies.*
- *Saving money on our power bills and not being wasteful with power. Being energy efficient is better for the environment.*
- *To not waste electricity.*
- *Energy efficiency means to use new technologies and products that can help you reduce your energy consumption.*
- *To save as much power as possible.*
- *It means that you do not waste energy, that you use little as possible, and use the power as wisely as possible.*
- *It means that you are not to wasting any energy.*
- *Being energy efficient is about not using more energy than I need and being careful about ways to cut back.*
- *Being energy efficient is about using energy to maximum effect.*
- *To use the least amount of energy possible and still be comfortable in our home.*

- *To save energy or cut back on using energy.*
- *Conserving energy and buying energy efficient appliances.*
- *Only use what is necessary.*
- *Energy efficiency means to just use less energy at the right times, don't use energy when you are not at home.*
- *Energy efficiency means to save energy wherever you can.*
- *It means that you try to use as little energy as possible.*
- *Energy efficiency means to use energy wisely, to not let energy go to waste.*
- *To make sure that we conserve energy and power, to use only the power we need, and to try and cut down on the cost of electricity. As a single parent I am conscious of use: to not overuse, and to look for ways to save money.*
- *I save as much electricity as I can.*
- *It means that you do the little things to keep your usage power down so you can save some money.*
- *It means that you are trying to make sure the home is consuming as little energy as possible and that your activities are done with conserving energy in mind.*
- *Being energy efficient is about reducing our carbon footprint and energy consumption.*
- *Trying to save as much energy as possible.*
- *Being energy efficient is about saving power to help the environment and provide for the future.*
- *Being energy efficient is about not wasting energy and not using it when it's not needed.*
- *Using less energy: less electricity, water, and gas. Wasting less and utilizing more.*
- *It means that you use less power.*
- *It means using only the energy that is required to do what you are doing.*
- *Using power in the most efficient way possible and not wasting it; also, turning things off.*
- *To reduce costs by using less energy.*
- *It means using the energy in the best manner possible.*
- *Energy efficient means that you don't use as much electricity.*
- *It means that you are saving energy.*
- *It means that you try not to waste energy.*
- *It means that you conserve the power you use.*

- *It means that you are able to maintain a comfortable lifestyle while not using too much energy.*
- *To be energy efficient you need to use as little energy as possible, or however much is the most practical.*
- *Don't be a 'power hog'. Reduce greenhouse gases.*
- *Energy efficiency is conserving energy in both cost and usage of energy in a space.*
- *Using the least amount of energy while still living comfortably.*
- *To use as little electricity as possible.*
- *Energy efficient means to limit the amount of energy you use on a daily basis.*
- *To make wise decisions on how you use your energy in order to be efficient and save money.*
- *It means to attempt to use energy more wisely or in smaller amounts.*
- *Energy efficiency means trying to intelligently use the resources available to us properly: to not waste energy.*
- *It means that you try to use as little energy as possible.*
- *It means that you make the best use of the power source that you use.*
- *It means saving money by conserving energy.*
- *It means that you are using as little energy as you can.*
- *Being as conservative as you can be but still comfortable.*
- *It means that you conserve energy by not being wasteful.*
- *It means that you try to finds ways lower your power usage.*
- *Being energy efficient is to try to save money, to try to save the electricity I use, try not use lights or cook during the daytime, try not to turn my oven on during the daytime, and I only use lights in two rooms most of the time.*
- *It means that you are saving money and energy.*
- *Not wasting any energy.*
- *Being energy efficient is about using less energy yet still accomplishing what you need to get done.*
- *Being energy efficient means that I want to do better to save the earth. If I limit my use of energy, the better it is for everybody else.*
- *To be energy efficient you just do all you can do to save energy.*
- *It means that you are burning less energy.*

- *Being energy efficient is about not using more energy than you need.*
- *It means to try to not waste energy.*
- *Energy efficient means being conservative with energy use and making sure things are not wasting power.*
- *It means you are saving energy from not leaving the lights on and everything.*
- *Energy efficient just means to try to cut back on your consumption and to not waste energy to try to keep your cost for energy down.*
- *Keep your energy use down.*
- *It means to do things in your house to save energy: for example, if you use the efficient CFL light bulbs, you are using less energy.*
- *Energy efficient means to use energy in a logical manner, to save energy, to make sure your home has proper insulation and that the windows are keeping the drafts out.*
- *It means that we, as people, are saving on all the natural resources as much as possible. We are cutting our usage and saving as much as possible.*
- *Use energy less so it has doesn't leave a negative impact on the environment.*
- *Being energy efficient is about using products and changing habits to reduce energy consumption.*
- *Energy efficient means to be less wasteful with our energy by using fewer kilowatts. Energy is very expensive now, we have to be cleaner with our energy, plus it will save me money on my monthly bills if we are conservative with our energy use.*
- *Energy efficient means being more cautious about turning out the lights and doing things to try to save energy.*
- *Energy efficient means to save money by not wasting or using more energy than we should, which in turn, saves the power plants from needing to expand and saves them money as well.*
- *Less power consumption in general.*
- *Energy efficiency basically means doing things in your home to try to save energy and to not waste electricity. Also, being conscious to try to reduce your footprint, so to say, on the earth.*
- *Energy efficiency means to try to decrease my footprint, to try to use less energy and resources for everything I do, to be more green.*
- *To be energy efficient I cut the light out when I leave the room. I try to be conscious about how much energy I burn. I try to be frugal.*
- *Energy efficiency means cutting back on your energy usage as much as you can, basically using the utilities less.*

- *To do everything possible to minimize the amount of energy used.*
- *Being energy efficient is about being conservative with the energy you use.*
- *Energy efficient means to use less power for less money.*
- *Energy efficient means to not be wasteful; our country has become too wasteful, I try not to waste anything.*
- *Energy efficiency basically means being able to conserve energy.*
- *To get the maximum efficiency out of your power.*
- *To use less energy.*
- *Use less resources.*
- *Do not use more than you have to.*
- *The more I try to save energy, the less I'll be paying out for monthly bills in the long run.*
- *Energy efficient means to get the services you need from electricity for the lowest cost available.*
- *To use the least amount of energy that you can possibly can.*
- *Making sure that what I am using is not wasteful, or that I am not using more than what is needed.*
- *To be energy efficient means saving money on my monthly utility bill by reducing the amount of stuff that I use that consumes energy.*
- *It means conserve energy so there is energy available for everyone to use.*
- *Energy efficiency means trying to use as little energy as possible.*
- *Make sure that you are not wasting energy by making sure everything is working properly.*
- *Energy efficient means to take action towards saving energy and making sure you are not wasting energy.*
- *Energy efficient just means to not consume energy when you don't need it: To take care of your lights and so forth, don't burn lights that you don't need.*
- *I try to use as little energy as possible.*
- *It means being able to use what I need while not wasting power.*
- *Energy efficiency means to use less energy: cut it off if you are not using it, don't be wasting it.*
- *Conserve everything so you can keep your bill low.*
- *It means to use the least amount of electricity that you can by doing things that will improve your home's efficiency.*

- *Energy efficient means to consider conservation for our future generations, to conserve energy and essentially the fuels where the energy comes from.*

Saving money on bills / being cost effective / keeping rates down

The next most frequent category of response had to do with saving money on energy bills (31.8% or 96 out of 302). Some of the comments listed above under "try to use less energy" also include mentions of saving money. All 64 verbatim responses mentioning saving money which are not already included in the list above are listed below.

- *It means saving money*. (N=16)
- *Being energy efficient is about being conscientious of your energy bills and finding ways to reduce them.*
- *Energy efficiency means having lower energy costs, preserving the resources of the country; it means having the knowledge of what amounts of energy you are consuming.*
- *Someone who doesn't run up their bill by running lights all the time and fiddling with the thermostat.*
- *Set the temperature warmer in the summer and cooler in the winter. It's nice to know that your energy costs are cheaper. It makes me able to sit back and relax.*
- *I like the economy factor. I do not like wasting things. I like the notion that were living in an economic investment in this house.*
- *Saving money, that's the name of the game.*
- *Being energy efficient is about doing everything you can to decrease your power bill.*
- *Being energy efficient is about making energy bills as low as possible while maintaining comfort.*
- *It means that you're saving money and you do it because it's good for the environment.*
- *Energy efficiency saves you money and you're helping the environment all at the same time.*
- *It means lower electric bills.*
- *To do everything you to keep cost down.*
- *It means cheaper bills.*
- *It means that you have lower lighting bills.*
- *Being energy efficient is about trying to save money on my bill.*
- *It means I am saving money and being eco-friendly.*
- *It means to keep my costs down, and to keep my house warm in the winter and cool in the summer.*
- *It means whatever saves me money and whatever we can do to help my grandchildren in the future.*
- *Being energy efficient is about being a cheap miser that doesn't want to pay for more electricity than he has to.*

- *Being energy efficient means to decrease my energy bills and to increase the value of my home.*
- *It means less money spent on energy.*
- *It's cheaper for both the consumer and the energy provider if I am energy efficient with my power usage. I'm always challenging myself to do better with my energy use.*
- *It means saving money while conserving resources.*
- *Being energy efficient can save me money. By being energy efficient, I can prevent having additional hazardous material released into the atmosphere. The impact on the environment is less severe when we limit our energy usage.*
- *I can save money and it makes sense.*
- *It means that you have low bills.*
- *It means keeping energy costs down.*
- *Saving on your energy bill and helping the earth as well.*
- *For us and this very old house it means that we are saving money.*
- *It means to keep the power bill down.*
- *Keep bills down.*
- *It means that you are saving money and the environment*
- *Be fiscally responsibility and wise in order not to be wasteful.*
- *I want my energy bill to be less.*
- *It means paying less to you guys at Duke.*
- *It means saving money, the taxpayers' and mine. I know what it's going to take to improve my efficiency, but how long will it take to receive payback?*
- *Taking the extra steps to lower my bill as much as I can.*
- *It means receiving a lower energy bill.*
- *It means getting your bill down to the lowest it can be while still being comfortable in your home.*
- *Cut down on the energy bill.*
- *It is the relationship between comfort and cost.*
- *Energy efficiency is all part of saving money, about frugality; it saves money to be energy efficient. There are environmental concerns too, we need to provide fresh air to breathe, and it helps the environment when we all are trying to be more efficient with energy.*
- *Energy efficiency means to do everything you can to keep your power bill down.*
- *Energy efficiency basically means to not have a high power bill.*
- *It saves on the power bill.*
- *Get the most out of your systems at the lowest possible cost.*
- *Try to keep energy costs low by using Energy Star products.*
- *Save on your energy bill and reduce global warming.*

All other responses

There were another 29 responses to the question "what does energy efficiency mean to you" which did not involve either "saving energy" or "saving money". Most of these responses are either generic statements ("be aware of energy use") or specific actions ("use CFLs"); they are listed below. (The four survey respondents whose verbatim comments are not listed in this appendix responded "I don't know" to this question).

- *Be smart about what you use.*
- *Be conscious of what you use.*
- *Watch your energy consumption: turn the A/C down, change light bulbs to CFLs, add weather-stripping.*
- *Watching how you use electricity and how much time you run things.*
- *Being energy efficient is about being aware of the energy you use.*
- *It means that you are conscious of your energy usage and that you try to minimize the impact on the environment.*
- *It means turning lights off when you go out of the room, not using central air, leaving maybe one lamp on while I'm watching TV, and hanging clothes out instead of using the dryer.*
- *I would say turning the temperature down to 65-68 in winter, which I do not do, but I do lower the air conditioning.*
- *Make sure the house is insulated, seal window cracks and doors. I don't plan to run air conditioning this year.*
- *It is not just a financial issue, but also about saving resources. We need to look at the future; my 15-year-old son is pushing efficiency. It's also a safety thing: my husband is a firefighter and he is conscious about cords being plugged in and the overuse of outlets.*
- *Saving the environment, and saving electricity so that my grandson will have the opportunity to enjoy things. It's also turning around to kids and letting them know not to take stuff for granted.*
- *It means that you are decreasing your carbon footprint.*
- *It is something you do to not waste cold air in the summer or warm air in the winter. Keep the cold air out in the winter and warm air out in the summer.*
- *It's about turning out lights when I'm not in the room, making sure the doors and windows are tight, and not letting air in or out.*
- *Keep things turned off, period.*
- *Being energy efficient means to look out for your light bill and budget yourself.*
- *It means using things wisely.*
- *Energy efficiency means a lot to me. Our seven-year-old is learning about energy efficiency in school and she's bringing this information home. We live very near a Duke Energy power plant, so the kids are learning a lot about ecology in school.*
- *I stay ahead on my payments and keep my bills paid up.*

- *I think energy efficiency is a gimmick to get people to spend more money by telling people that they can save money by spending more money.*
- *Not to live in a millhouse because of all the windows.*
- *Buy energy saving appliances.*
- *It means that you are able to afford new, high efficiency appliances.*
- *Basically, it means turning lights off, getting efficient appliances, and maybe solar power for your hot water heater.*
- *It means to use energy efficient appliances and CFL lights, and making sure your home is draft-free. I try to do all that.*
- *Energy efficient means having well-made and currently-developed construction and items in your home to ensure that your home is using and keeping energy in an efficient manner.*
- *Energy efficiency is whether you use energy efficient light bulbs.*
- *To not be wasteful in using HVAC and other appliances. Purchase Energy Star products.*
- *It means that you are not using stuff that you don't need.*

Appendix H: What Surveyed Customers Do to be More Energy Efficient

This survey asked MyHER customers: "*When you think about what you and your household does or can do to decrease energy consumption, what things come to mind?*" Figure 21 shows the responses by category, with verbatim responses following.

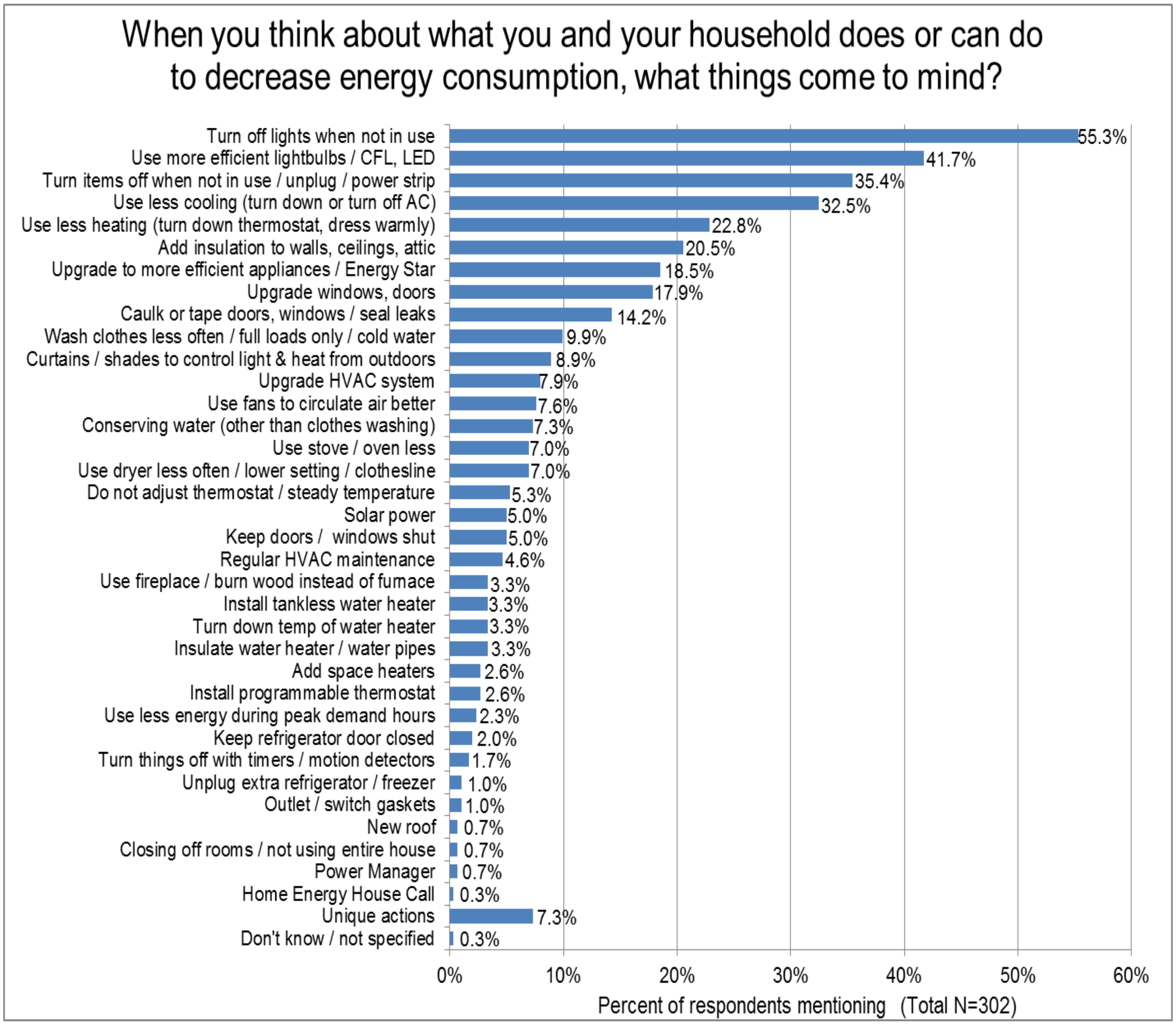


Figure 21. What Surveyed Customers Do To Save Energy (complete responses)

<u>Turn off lights when not in use, N=167</u>

- Turn off lights when not in use (N=142)
- Turn fewer lights on / use less (N=12)

Unique/multiple responses:

- *I turn lights off that are not in use and I really don't use the lights a lot. The outdoor lights are only on when I know I will be coming home late.*
- *I shut off an exterior light before I go to bed so it doesn't burn all night.*
- *I make sure the lights get turned out in the evening and before I leave the house.*
- *We don't have the lights on in the day, we open the blinds for natural lighting.*
- *We turn the lights off, especially in the day; we try not to waste the electricity.*
- *I cut out the lights out when I don't need them. I use a flashlight at night sometimes so I don't have to turn on a light.*
- *Don't use lights unnecessarily. Use minimal lights. Use night lights.*
- *Keep lights off unless needed. Use night lights instead of overhead lights.*
- *Discontinue using night lights.*
- *We don't light up the whole house. We turn off lights when not needed. I have a neighbor with nine kids. One of the kids is assigned 'light patrol' per week. It is their responsibility to make sure that there are no unnecessary lights on.*
- *I train the kids to turn the lights off.*
- *Get my family to turn lights off when not in use.*
- *I should get rid of the kids because they never turn out the lights like I ask them to.*

Use more efficient light bulbs (CFL, LED, halogen), N=126

- Use CFLs / replace incandescents (N=94)
- Using CFLs received from Duke Energy (N=9)
- Use CFLs and LEDs (N=6)
- Use more efficient bulbs (type not specified) (N=14)

Unique/multiple responses:

- *We're using halogen and CFLs bulbs instead of incandescents.*
- *I tried the new light bulbs, but I don't like them too much.*
- *I could put in dangerous CFLs. I cut myself in high school on a fluorescent tube light and it took three and a half years to heal; it needed X-ray treatment.*

Turn items off when not in use / unplug / use power strip, N=107

- Turn items off when not in use (in general) (N=34)
- Unplug items when not in use (in general) (N=31)
- Turn off computers/TV/home entertainment when not in use (N=16)
- Unplug / turn everything off when out of town (N=9)
- Unplug chargers when not in use (N=8)
- Use power strips to turn things off (N=2)

Unique/multiple responses:

- *Unplug appliances when not in use, turn off the computer when not in use, unplug items on multiple sockets. Make sure kids don't have multiple things on; teach children not to use more energy than needed.*

- *We turn the TVs off when we are not watching them. We unplug all phone and camera chargers when they are not in use. I make sure the kids turn their games off when they are not playing them.*
- *I don't watch my TV during the day, but my son has his on all day long and plays video games.*
- *I don't watch TV as much.*
- *I don't leave the TV and stuff like that on. I've heard some people completely turn their computers off, but I don't turn mine off. I've heard that appliances, even if off, drain energy, but I have to be honest I don't unplug mine. I'm not currently unplugging my cell phone chargers and stuff. I guess I could be doing that.*
- *We could turn off that extra computer.*
- *I turn off the hot tub.*

Use less cooling (turn down or turn off A/C), N=98

- Set temperature higher in the summer / use A/C less often (N=72)
- Use natural cooling whenever possible / open windows (N=12)
- Turn up temperature when not home (N=5)

Unique/multiple responses:

- *We turn down A/C when leave town. When it's cool out we open the windows instead of running the A/C.*
- *I've adjusted my heating and cooling to the temperatures that Duke Energy has suggested on the MyHER.*
- *We set the HVAC settings to use less energy.*
- *I can keep the A/C on the reserve setting to conserve power.*
- *I don't use A/C until afternoon.*
- *With our window unit A/C, we usually only use it at night and we tend to turn it off when nobody's home.*
- *I only run the air conditioner upstairs, because heat rises.*
- *I use a fan in my window now. I got rid of my window air conditioner; it made my bill too high.*
- *I keep a general comfort zone on the thermostat: not too low in summer. I also keep windows open as much as possible to cool the house in summer.*

Use less heating (turn down thermostat, dress warmly), N=69

- Turn down thermostat / use less heat in winter (N=57)
- Use natural heating whenever possible (N=5)
- Lower temperature when not at home (N=2)

Unique/multiple responses:

- *I've adjusted my heating and cooling to the temperatures that Duke Energy has suggested on the MyHER.*
- *We set the HVAC settings to use less energy.*

- *Use an electric blanket and nice flannel sheets so you can turn the heat down at night.*
- *Use an electric blanket at night.*
- *Keep your heat set lower and use blankets to keep warm in winter.*

<u>Insulate walls, ceilings, attic, basement, N=62</u>

- Add insulation (not specified) (N=25)
- Add insulation to the attic (N=11)

Unique/multiple responses:

- *Add insulation to walls, attic and basement.*
- *Add insulation to attics, walls and crawl spaces when needed.*
- *Good insulation in attic, walls, and crawlspace.*
- *Insulate attic, walls, and crawlspace.*
- *Add insulation to attic, walls, and crawlspaces.*
- *Add insulation to walls, attic, and basement.*
- *Add insulation in attic and walls.*
- *Reinsulate ceilings, walls, and basement.*
- *Add insulation to the attic and basement.*
- *We have insulation in our ceilings and walls.*
- *Insulate your walls and under the house.*
- *We have insulation in the attic and under the house.*
- *We insulated the floor and attic of our 200-year-old home.*
- *Add insulation to attic, walls, and basement.*
- *I made sure I have proper insulation in my home. I just had the floors entirely insulated.*
- *Add insulation to attic, basement, and walls.*
- *Have sufficient wall and ceiling insulation.*
- *Insulate walls and ceiling and under the floor.*
- *Add insulation to attic and walls.*
- *We need to insulate exterior walls.*
- *We installed super-insulation in our sunroom. If I had the money and the determination, I would also have the sheet rock ripped in my garage.*
- *Underpinning/skirting under mobile home.*
- *Put insulation in roof of garage.*
- *Make sure insulation in attic is OK. Considering insulated garage door.*
- *I have insulated the walls of my cinderblock home and am working on adding insulation to the walls internally. I am also working on adding insulation to the attic.*
- *Add more insulation to attic and add reflective foil on the joists to keep heat out of the attic.*

Upgrade appliances / Energy Star, N=56

- Newer / more energy efficient appliances (not specific) (N=31)
- “Energy Star” appliances (not specific) (N=15)

Unique/multiple responses:

- *I went to HH Gregg and priced energy-saving appliances; I’ve got good idea what it will cost.*
- *I would like to replace appliances; they're not Energy-Star rated.*
- *We bought an energy efficient washer and dryer. We replaced our 30 year old water heater with a high efficiency one.*
- *I have energy efficient appliances such as refrigerator, washer and dryer. I have an energy efficient TV.*
- *We use energy efficient appliances including stove and refrigerator.*
- *Possible new refrigerator.*
- *I'm planning on replacing my hot water heater.*
- *I want a better hot water heater; it's likely as old as the house.*
- *I'm aware that I need of new fridge, so I will be purchasing a new one very soon. My current fridge runs constantly which I know is wasting energy.*
- *We installed all energy efficient appliances including the dishwasher, the washer and dryer, the refrigerator and the water heater.*

Upgrade windows / doors, N=54

- Install energy efficient windows (N=39)
- Install energy efficient doors (N=2)
- Install energy efficient windows and doors (N=9)

Unique/multiple responses:

- *I installed a storm door in the kitchen to keep hot air out in summer, but it can open its shade in winter; installed energy efficient windows.*
- *We could add a storm door to the back and replace the storm door in front; it has gaps in sealing to the frame.*
- *In the past, I've replaced three windows; I need to replace the rest of them.*
- *We need to replace our windows. We should have good insulating doors and windows, but we don't.*

Caulk/tape doors, windows / seal leaks, N=43

- Seal home / fix leaks (in general) (N=8)
- Caulking and weather stripping (N=5)
- Seal windows (N=5)
- Seal doors (N=5)
- Seal windows and doors (N=11)

Unique/multiple responses:

- *We sealed the crawlspace.*
- *Last year, I patched all the duct work to cover leaks.*
- *I've done caulking around windows to make sure there is a good seal around the windows. Also, making sure you have good seals everywhere else inside and outside the home.*
- *Put Styrofoam over my windows in summer to keep the sunlight out and then remove it in winter to let it in.*
- *Seal windows and use thermal window coverings.*
- *Plastic over the windows in winter. Under-door air shields.*
- *I weatherize the house for winter; I cover the windows with plastic.*
- *Put plastic on windows to block out sun.*
- *Add reflective foil on the joists to keep heat out of attic.*

<u>Wash clothes less often / full loads only / cold water, N=30</u>

- Only do full loads of laundry (N=8)
- Wash clothes in cold water (N=8)
- Do laundry less often / wash less (N=8)

Unique/multiple responses:

- *Do full loads of laundry in cold water.*
- *I wash in cold water, about 5 loads a week, much less than last year.*
- *Do laundry at night when rates are low, and do full loads.*
- *When doing laundry, I do the loads back to back.*
- *I always rinse my clothes in cold water.*
- *Run washer at efficient settings.*

<u>Use curtains/shades to control light and heat from outdoors, N=27</u>

- Close blinds / shades / curtains to keep sun out (N=14)
- Close blinds / shades / curtains to keep sun out, open them to let sun in (N=5)

Unique/multiple responses:

- *Tint windows to keep sunlight out of the home in summer.*
- *I keep drapes, which are insulated, closed in the winter.*
- *I use shades and blinds.*
- *Use efficient blinds.*
- *Open blinds when needed.*
- *In the summer, I let the cool air in at night and shade the windows during the day.*
- *Open the shades and rely on natural light instead of turning on the lights.*
- *We don't have the lights on during the day, we open the blinds for natural lighting.*

<u>Upgrade HVAC system, N=24</u>

- Replace furnace with heat pump (N=5)
- Energy efficient furnace (N=2)
- Energy efficient air conditioning (N=7)
- Energy efficient furnace and air conditioning (N=8)

Unique/multiple responses:

- *I installed a new heating and cooling unit for the rental property.*
- *Geothermal heating and cooling.*

Use fans to circulate air better, N=23

- Use ceiling fans to circulate air better (N=12)
- Use fans instead of A/C (N=3)
- Install attic fan (N=2)

Unique/multiple responses:

- *Install a fan in the attic that is solar powered.*
- *We use fans to circulate air throughout the house.*
- *I use fans to move the air.*
- *Use fans to cool your home.*
- *Use fans in summer.*
- *We always have a couple fans running at night, which again may increasing our usage.*

Conserving water (other than clothes washing), N=22

- Use less water (in general) (N=6)
- Use less hot water (N=2)
- Minimize dishwasher usage / full loads (N=7)
- Take shorter / fewer showers (N=5)

Unique/multiple responses:

- *I have two low-flow shower heads: one from the kit and one I purchased. Also a faucet aerator in the kitchen, and I am using the dishwasher less.*
- *While waiting for the hot water to reach the faucet, I collect the excess cold water for plant-watering.*

Use dryer less often / lower setting / clothesline, N=21

- Use dryer less (in general) (N=6)
- Air dry clothing instead of using dryer (N=10)

Unique/multiple responses:

- *Run dryer at efficient settings.*
- *I dry clothes on sensor-dry instead of using the timer on the dryer.*
- *I hang the towels outside to dry in summer instead of using the dryer.*
- *Putting a dry towel in with a wet load will make the load dry faster.*
- *When doing laundry, I do the loads back to back.*

Use stove / oven less, N=21

- Use microwave instead of stove / oven (N=4)
- Use slow cooker or toaster oven instead of stove / oven (N=4)

Unique/multiple responses:

- *I use a Crock-Pot instead of the oven, and we cook outdoors.*
- *I often use a George Foreman grill, which saves a lot of energy.*
- *I grill out a lot in the summertime, instead of using the oven. I use the oven more often in the wintertime.*
- *I have meals on wheels deliver food five times a week and mainly use the microwave instead of the oven.*
- *I'm trying not to cook so many different meals using all the appliances.*
- *I make meals that don't require cooking.*
- *I hardly ever cook and I eat out a lot.*
- *I don't cook much.*
- *I use the stove less than I used to.*
- *Turn off the oven.*
- *Try not to use automatic oven cleaning setting.*
- *We have two ovens and I usually use the smaller oven.*
- *I try not to use the microwave all the time.*

Do not adjust thermostat / maintain steady temperature, N=16

- Do not adjust thermostat / maintain steady temperature (N=14)

Unique/multiple responses:

- *We keep the A/C and heat at 72 all year round now, which is quite a difference from what we used to do.*
- *Adjusting the thermostat is really, really important, but we keep ours at 68 throughout the year. So we know we are using a lot more energy in the summer and a lot less in the winter.*

Solar power, N=15

- Install solar panels (N=2)

Unique/multiple responses:

- *Use solar lights.*
- *Install a fan in the attic that is solar powered.*
- *Use solar battery chargers.*
- *Use a solar blanket to heat your pool.*
- *Use passive solar power.*
- *We are planning on getting solar energy in the future.*
- *We are considering solar power.*

- *I am researching information on solar panels.*
- *We could put in solar panels.*
- *If I could afford it, I would love to do solar panels.*
- *If I could add a windmill or solar panels I could be off the grid.*
- *Some people use those things on your roof, solar panels, but not me; I want to know more about them.*
- *Solar energy.*

<u>Keep doors / windows shut, N=15</u>

- Shut doors / keep doors closed (N=8)
- Keep doors and windows tightly closed (N=4)

Unique/multiple responses:

- *Keep doors closed in the room with the refrigerator.*
- *I try to the keep garage door down, it helps to keep the heat and cold in.*
- *Keep windows shut to keep the cold or heat out, depending on the season.*

<u>Regular HVAC maintenance, N=14</u>

- *Do regular preventive maintenance by replacing filters.*
- *Keep your furnace filter clean; replace the filter every one to three months.*
- *Change furnace filter every three months.*
- *Change furnace filters.*
- *Keep your furnace filter clean.*
- *Change your A/C filter once a month.*
- *Change air filters regularly.*
- *Changing filters.*
- *Get your heater and A/C serviced every year; don't wait to make repairs.*
- *Check to see that systems such as the furnace and A/C are in good working order.*
- *Get your heat pump serviced every year.*
- *Get your A/C checked and tuned up every year.*
- *Keep your A/C unit clean and serviced.*
- *We service our A/C unit.*

<u>Install tankless water heater, N=10</u>

- Install a tankless water heater (N=7)

Unique/multiple responses:

- *I switched out water tanks to consume less energy to heat the water; I have an on-demand water heater.*
- *We installed an on-demand water heater, tankless, about three years ago.*
- *We installed a 'Rinnai' tankless hot water heater.*

Use fireplace / burn wood for heat, N=10

- *I have a wood burning fireplace as my primary heat source.*
- *We heat the house mainly with wood.*
- *We use wood to heat our home in the winter.*
- *In the winter we use a wood stove on extremely cold days.*
- *Use a wood stove in the winter.*
- *I use wood heat in winter.*
- *We supplement heating with a wood stove.*
- *We use a wood stove.*
- *Use wood heat.*
- *I've started using the fireplace insert.*

Turn down hot water temperature, N=10

- Reduce temperature of hot water heater (N=6)

Unique/multiple responses:

- *I insulated the hot water pipes which resulted in being able to lower the thermostat on the hot water heater.*
- *Weatherization Assistance turned my water heater down to 120 from 140.*
- *Turn your water heater down to 110 degrees Fahrenheit.*
- *Turn hot water heater down and thermostat down when leaving on vacation.*

Insulate water heater / water pipes, N=10

- *Insulate water heater.*
- *Wrap insulation around the water heater.*
- *Install hot water heater insulation blanket.*
- *The weatherization program wrapped my water heater and the pipes and turned the water heater down to 120 from 140.*
- *We replaced our water heater and wrapped a blanket around it.*
- *I insulated the hot water pipes which resulted in being able to lower the thermostat on the hot water heater.*
- *Put a blanket on the water heater and insulate the pipes.*
- *Our water heater is wrapped in a jacket.*
- *We wrapped the pipes in the basement.*
- *I turned down the water heater and insulated all the pipes and the heater itself.*

Install / use programmable thermostat, N=8

- Install / use programmable thermostat (N=8)

Use space heaters, N=8

- Use space heaters to supplement heating (N=6)

Unique/multiple responses:

- *Use space heaters and blankets to keep warm.*
- *We use an oil space heater during the winter, which may actually be increasing our energy use.*

Use less energy during peak demand hours, N=7

- *Use appliances such as the dishwasher and clothes dryer during off-peak hours.*
- *Run dishwasher late at night to lessen the strain on the electrical grid.*
- *Wash clothing in the evening when most people aren't doing laundry.*
- *I wash my clothes in the evening when there is less demand for power.*
- *Do laundry at night when rates are low.*
- *Do laundry at night.*
- *I do the laundry early in the morning.*

Keep refrigerator door closed, N=6

- Close refrigerator door / keep door closed (N=5)

Unique/multiple responses:

- *When I'm cooking, I try to open the fridge just once while retrieving or putting items back into the fridge.*

Turn things off with timers / motion detectors, N=5

- *Use sensors to turn off lights.*
- *I use an automated system for most of the home's lighting, a program called 'Xten' lets me control the lights from my computer.*
- *Use timer to turn off TV if I fall asleep.*
- *I put timers on the swimming pool so it's not running constantly anymore.*
- *Motion sensors on outdoor lights.*

Unplug or remove extra refrigerator / freezer, N=3

- *Unplug second refrigerator and freezer.*
- *Only use one refrigerator.*
- *We downsized our refrigerator and freezer.*

Outlet / switch gaskets, N=3

- Install outlet / switch gaskets (N=3)

Shut off rooms / don't use entire house, N=2

- *Use zone heating and cooling.*

- *Close off all rooms in the house that don't need to be heated or cooled.*

Power Manager, N=2

- *I participate in the Power Manager program that Duke offers, the one that shuts my A/C off when needed in high-use times of the summer. I have a separate heating and cooling unit for the upper floor of my house which is rarely used. It is only turned on when I have guests in the house.*
- *We participate in the Duke Energy Power Manager where we get about an $8 credit monthly on our cooling in the summer months.*

New roof, N=2

- *I have had a new roof put on the house.*
- *We installed a white metal roof for higher reflectivity in the summer.*

Home Energy House Call, N=1

- *I had a Duke representative inspect my house and give suggestions for ways to save on energy.*

Unique actions, N=22

- *Build an energy efficient home.*
- *Move to a newly built home.*
- *I stay at work a lot to not use my energy at home.*
- *To have no more than myself living in the home.*
- *Drive energy efficient vehicles.*
- *I have no heat.*
- *Heat more with gas and less with electricity; use the gas fireplace instead of the heat pump.*
- *We could use green roofing paint to minimize summer absorption and winter reflectivity.*
- *Use trees around the house for shade to keep house cool in summer*
- *I have shade trees to keep the house cool.*
- *I put a sheet of cardboard over the insulation in the attic.*
- *Install fewer light bulbs than the fixtures can hold.*
- *Do things manually, like use a knife instead of a food processor.*
- *I wash the dishes by hand.*
- *I rinse dishes with cold water.*
- *Use cold water to rinse dishes.*
- *Keep the clothes dryer clean.*
- *Keep your dryer filter clean.*
- *We need to clean the ductwork.*

- *I try to fix things that require repair on the house.*
- *Make sure to keep things in good working order: appliances, electronics, windows, doors, etc.*
- *You can use the home energy report to watch for an energy spike which will let you know if there's something going wrong.*

<u>Don't know, N=1</u>

- *I really don't know what more I could do.*

Appendix I: Surveyed MyHER Customer Demographics

Surveyed MyHER customers were asked a series of demographic and household questions at the end of the survey. These results are for internal Duke Energy use only.

MyHER customers were also asked if they had moved into a new home since the time they started receiving Home Energy Reports. None of the recipients in North Carolina have moved (0.0% of 151), but three recipients in South Carolina (2.0% of 151) did move into new homes. These recipients moved in August of 2012, May of 2013, and the third recipient had been maintaining two homes for the seven months prior to being surveyed (their old home as well as the new one they have moved into).

In what type of building do you live? * State

			State		Total
			South Carolina	North Carolina	
In what type of building do you live?	Single-family home, detached construction	Count	118	123	241
		% within State	78.1%	81.5%	79.8%
	Single family home, factory manufactured/modular	Count	9	12	21
		% within State	6.0%	7.9%	7.0%
	Single family, mobile home	Count	17	4	21
		% within State	11.3%	2.6%	7.0%
	Row House	Count	0	2	2
		% within State	0.0%	1.3%	0.7%
	Two or Three family attached residence-traditional structure	Count	1	3	4
		% within State	0.7%	2.0%	1.3%
	Apartment (4 + families)---traditional structure	Count	1	4	5
		% within State	0.7%	2.6%	1.7%
	Condominium---traditional structure	Count	1	0	1
		% within State	0.7%	0.0%	0.3%
	Other: Duplex	Count	2	1	3
		% within State	1.3%	0.7%	1.0%
	Other: listed below	Count	1	2	3
		% within State	0.7%	1.3%	1.0%
	DK/NS	Count	1	0	1
		% within State	0.7%	0.0%	0.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Other types of buildings:

- *My home is an octagon built into a mountainside, half underground with a brick upper floor.*
- *Single family converted barn.*
- *Town house.*

What year was your residence built? * State

			State		Total
			South Carolina	North Carolina	
What year was your residence built?	1959 and before	Count	32	44	76
		% within State	21.2%	29.1%	25.2%
	1960-1979	Count	27	29	56
		% within State	17.9%	19.2%	18.5%
	1980-1989	Count	27	14	41
		% within State	17.9%	9.3%	13.6%
	1990-1997	Count	19	20	39
		% within State	12.6%	13.2%	12.9%
	1998-2000	Count	5	14	19
		% within State	3.3%	9.3%	6.3%
	2001-2007	Count	24	14	38
		% within State	15.9%	9.3%	12.6%
	2008-present	Count	9	8	17
		% within State	6.0%	5.3%	5.6%
	DK/NS	Count	8	8	16
		% within State	5.3%	5.3%	5.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

How many rooms are in your home (excluding bathrooms, but including finished basements)? * State

			State		Total
			South Carolina	North Carolina	
How many rooms are in your home (excluding bathrooms, but including finished basements)?	4	Count	9	17	26
		% within State	6.0%	11.3%	8.6%
	5	Count	29	35	64
		% within State	19.2%	23.2%	21.2%
	6	Count	35	32	67
		% within State	23.2%	21.2%	22.2%
	7	Count	27	20	47
		% within State	17.9%	13.2%	15.6%
	8	Count	14	25	39
		% within State	9.3%	16.6%	12.9%
	9	Count	9	6	15
		% within State	6.0%	4.0%	5.0%
	1-3	Count	3	1	4
		% within State	2.0%	0.7%	1.3%
	10 or more	Count	25	15	40
		% within State	16.6%	9.9%	13.2%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Which of the following best describes your home's heating system?	South Carolina N=151		North Carolina N=151		Total N=302	
None	1	0.7%	0	0.0%	1	0.3%
Central forced air furnace	80	53.0%	85	56.3%	165	54.6%
Electric Baseboard	3	2.0%	7	4.6%	10	3.3%
Heat Pump	62	41.1%	50	33.1%	112	37.1%
Geothermal Heat Pump	0	0.0%	0	0.0%	0	0.0%
Electric space heaters	7	4.6%	11	7.3%	18	6.0%
Wood fireplace / wood stove	6	4.0%	13	8.6%	19	6.3%
Gas pack / gas log fireplace	1	0.7%	3	2.0%	4	1.3%
Boiler / radiators	2	1.3%	0	0.0%	2	0.7%
Dual heat pumps (upstairs and downstairs)	2	1.3%	0	0.0%	2	0.7%
Other: listed below	6	4.0%	2	1.3%	8	2.6%
Don't know	3	2.0%	2	1.3%	5	1.7%

May total to more than 100% because respondents could give multiple responses.

Other types of heating system:

- *'Through the wall' heating and A/C unit*
- *Electric in ceiling*
- *Two electric radiators*
- *Ceramic heaters*
- *Fuel furnace*
- *Oil furnace*
- *Kerosene*
- *Propane heater*

How old is your heating system? * State

			State		Total
			South Carolina	North Carolina	
How old is your heating system?	0-4 years	Count	43	48	91
		% within State	28.5%	31.8%	30.1%
	5-9 years	Count	44	27	71
		% within State	29.1%	17.9%	23.5%
	10-14 years	Count	14	25	39
		% within State	9.3%	16.6%	12.9%
	15-19 years	Count	12	13	25
		% within State	7.9%	8.6%	8.3%
	19 years or older	Count	16	19	35
		% within State	10.6%	12.6%	11.6%
	DK/NS	Count	20	17	37
		% within State	13.2%	11.3%	12.3%
	Do not have	Count	2	1	3
		% within State	1.3%	0.7%	1.0%
	Other: "*12 years for the furnace, 2 years for the heat pump*"	Count	0	1	1
		% within State	0.0%	0.7%	0.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

What is the primary fuel used in your heating system? * State

			State		Total
			South Carolina	North Carolina	
What is the primary fuel used in your heating system?	Electricity	Count	97	76	173
		% within State	64.2%	50.3%	57.3%
	Natural Gas	Count	46	58	104
		% within State	30.5%	38.4%	34.4%
	Oil	Count	2	5	7
		% within State	1.3%	3.3%	2.3%
	Propane	Count	3	2	5
		% within State	2.0%	1.3%	1.7%
	Wood	Count	1	10	11
		% within State	0.7%	6.6%	3.6%
	Kerosene	Count	1	0	1
		% within State	0.7%	0.0%	0.3%
	DK/NS	Count	1	0	1
		% within State	0.7%	0.0%	0.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

What is the secondary fuel used in your primary heating system, if applicable? * State

			State		Total
			South Carolina	North Carolina	
What is the secondary fuel used in your primary heating system, if applicable?	Electricity	Count	17	33	50
		% within State	11.3%	21.9%	16.6%
	Natural Gas	Count	2	5	7
		% within State	1.3%	3.3%	2.3%
	Oil	Count	0	3	3
		% within State	0.0%	2.0%	1.0%
	Propane	Count	4	0	4
		% within State	2.6%	0.0%	1.3%
	Wood	Count	4	3	7
		% within State	2.6%	2.0%	2.3%
	Gas logs	Count	2	1	3
		% within State	1.3%	0.7%	1.0%
	Kerosene	Count	2	0	2
		% within State	1.3%	0.0%	0.7%
	Other: listed below	Count	0	2	2
		% within State	0.0%	1.3%	0.7%
	None	Count	119	102	221
		% within State	78.8%	67.5%	73.2%
	DK/NS	Count	1	2	3
		% within State	0.7%	1.3%	1.0%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Other types of secondary fuel:

- *Energy efficient 'Eden Pure' space heaters.*
- *Natural gas fireplace.*

Do you use one or more of the following to cool your home?	South Carolina N=151		North Carolina N=151		Total N=302	
None, do not cool the home	0	0.0%	1	0.7%	1	0.3%
Heat pump for cooling	61	40.4%	48	31.8%	109	36.1%
Central air conditioning	79	52.3%	86	57.0%	165	54.6%
Through the wall or window air conditioning unit	16	10.6%	21	13.9%	37	12.3%
Geothermal Heat pump	0	0.0%	0	0.0%	0	0.0%
Fans (ceiling, window, portable)	8	5.3%	4	2.6%	12	4.0%
Gas pack for cooling	0	0.0%	2	1.3%	2	0.7%
Dual heat pumps (upstairs and downstairs)	2	1.3%	0	0.0%	2	0.7%
Other: "*portable A/C unit*"	1	0.7%	0	0.0%	1	0.3%
Don't know	2	1.3%	1	0.7%	3	1.0%

May total to more than 100% because respondents could give multiple responses.

How many window-unit or through the wall air conditioner(s) do you use? * State

			State		Total
			South Carolina	North Carolina	
How many window-unit or through the wall air conditioner(s) do you use?	1	Count	12	10	22
		% within State	7.9%	6.6%	7.3%
	2	Count	5	10	15
		% within State	3.3%	6.6%	5.0%
	3	Count	4	4	8
		% within State	2.6%	2.6%	2.6%
	4	Count	1	1	2
		% within State	0.7%	0.7%	0.7%
	5	Count	1	0	1
		% within State	0.7%	0.0%	0.3%
	None	Count	128	126	254
		% within State	84.8%	83.4%	84.1%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

What is the fuel used in your cooling system?	South Carolina N=151		North Carolina N=151		Total N=302	
Electricity	149	98.7%	144	95.4%	293	97.0%
Natural Gas	3	2.0%	3	2.0%	6	2.0%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
Butane	0	0.0%	1	0.7%	1	0.3%
None (no cooling system)	0	0.0%	1	0.7%	1	0.3%
None (use fans only)	1	0.7%	0	0.0%	1	0.3%
DK/NS	1	0.7%	2	1.3%	3	1.0%

May total to more than 100% because respondents could give multiple responses.

How old is your cooling system? * State

			State		Total
			South Carolina	North Carolina	
How old is your cooling system?	0-4 years	Count	56	46	102
		% within State	37.1%	30.5%	33.8%
	5-9 years	Count	46	37	83
		% within State	30.5%	24.5%	27.5%
	10-14 years	Count	13	31	44
		% within State	8.6%	20.5%	14.6%
	15-19 years	Count	11	8	19
		% within State	7.3%	5.3%	6.3%
	19 years or older	Count	10	10	20
		% within State	6.6%	6.6%	6.6%
	DK/NS	Count	14	17	31
		% within State	9.3%	11.3%	10.3%
	Do not have	Count	1	2	3
		% within State	0.7%	1.3%	1.0%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

What is the fuel used by your water heater?	South Carolina N=151		North Carolina N=151		Total N=302	
Electricity	112	74.2%	106	70.2%	218	72.2%
Natural Gas	35	23.2%	51	33.8%	86	28.5%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	3	2.0%	0	0.0%	3	1.0%
No water heater	1	0.7%	0	0.0%	1	0.3%
DK/NS	2	1.3%	0	0.0%	2	0.7%

May total to more than 100% because respondents could give multiple responses.

How old is your water heater? * State

			State		Total
			South Carolina	North Carolina	
How old is your water heater?	0-4 years	Count	47	37	84
		% within State	31.1%	24.5%	27.8%
	5-9 years	Count	47	31	78
		% within State	31.1%	20.5%	25.8%
	10-14 years	Count	25	35	60
		% within State	16.6%	23.2%	19.9%
	15-19 years	Count	6	14	20
		% within State	4.0%	9.3%	6.6%
	More than 19 years	Count	4	13	17
		% within State	2.6%	8.6%	5.6%
	DK/NS	Count	22	21	43
		% within State	14.6%	13.9%	14.2%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

What type of fuel do you use for indoor cooking on the stovetop or range?	South Carolina N=151		North Carolina N=151		Total N=302	
Electricity	134	88.7%	135	89.4%	269	89.1%
Natural Gas	15	9.9%	17	11.3%	32	10.6%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	2	1.3%	1	0.7%	3	1.0%
None (no stove)	0	0.0%	1	0.7%	1	0.3%
DK/NS	0	0.0%	0	0.0%	0	0.0%

May total to more than 100% because respondents could give multiple responses.

What type of fuel do you use for indoor cooking in the oven?	South Carolina N=151		North Carolina N=151		Total N=302	
Electricity	140	92.7%	136	90.1%	276	91.4%
Natural Gas	10	6.6%	15	9.9%	25	8.3%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	1	0.7%	1	0.7%	2	0.7%
None (no oven)	0	0.0%	1	0.7%	1	0.3%
DK/NS	0	0.0%	0	0.0%	0	0.0%

May total to more than 100% because respondents could give multiple responses.

What type of fuel do you use for clothes drying?	South Carolina N=151		North Carolina N=151		Total N=302	
Electricity	145	96.0%	138	91.4%	283	93.7%
Natural Gas	3	2.0%	7	4.6%	10	3.3%
Oil	0	0.0%	0	0.0%	0	0.0%
Air dry (clothesline)	1	0.7%	3	2.0%	4	1.3%
Propane	0	0.0%	1	0.7%	1	0.3%
None (no dryer)	3	2.0%	4	2.6%	7	2.3%
DK/NS	0	0.0%	0	0.0%	0	0.0%

May total to more than 100% because respondents could give multiple responses.

About how many square feet of living space are in your home? * State

			State		Total
			South Carolina	North Carolina	
About how many square feet of living space are in your home?	500 to 999	Count	9	8	17
		% within State	6.0%	5.3%	5.6%
	1000 to 1499	Count	37	32	69
		% within State	24.5%	21.2%	22.8%
	1500 to 1999	Count	33	38	71
		% within State	21.9%	25.2%	23.5%
	2000 to 2499	Count	16	16	32
		% within State	10.6%	10.6%	10.6%
	2500 to 2999	Count	9	8	17
		% within State	6.0%	5.3%	5.6%
	3000 to 3499	Count	9	5	14
		% within State	6.0%	3.3%	4.6%
	3500 to 3999	Count	2	4	6
		% within State	1.3%	2.6%	2.0%
	4000 or more	Count	8	5	13
		% within State	5.3%	3.3%	4.3%
	DK/NS	Count	28	35	63
		% within State	18.5%	23.2%	20.9%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Do you own or rent your home? * State

			State		Total
			South Carolina	North Carolina	
Do you own or rent your home?	Own	Count	136	130	266
		% within State	90.1%	86.1%	88.1%
	Rent	Count	15	21	36
		% within State	9.9%	13.9%	11.9%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

How many levels are in your home (not including your basement)? * State

			State		Total
			South Carolina	North Carolina	
How many levels are in your home (not including your basement)?	One	Count	105	95	200
		% within State	69.5%	62.9%	66.2%
	Two	Count	41	54	95
		% within State	27.2%	35.8%	31.5%
	Three	Count	5	2	7
		% within State	3.3%	1.3%	2.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Does your home have a heated or unheated basement? * State

			State		Total
			South Carolina	North Carolina	
Does your home have a heated or unheated basement?	Heated	Count	12	22	34
		% within State	7.9%	14.6%	11.3%
	Unheated	Count	22	18	40
		% within State	14.6%	11.9%	13.2%
	No basement	Count	117	111	228
		% within State	77.5%	73.5%	75.5%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Does your home have an attic? * State

			State		Total
			South Carolina	North Carolina	
Does your home have an attic?	Yes	Count	118	116	234
		% within State	78.1%	76.8%	77.5%
	No	Count	33	35	68
		% within State	21.9%	23.2%	22.5%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Are your central air/heat ducts located in the attic? * State

			State		Total
			South Carolina	North Carolina	
Are your central air/heat ducts located in the attic?	Yes	Count	46	41	87
		% within State	30.5%	27.2%	28.8%
	No	Count	67	76	143
		% within State	44.4%	50.3%	47.4%
	N/A	Count	38	34	72
		% within State	25.2%	22.5%	23.8%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Does your house have cold drafts in the winter? * State

			State		Total
			South Carolina	North Carolina	
Does your house have cold drafts in the winter?	Yes	Count	40	46	86
		% within State	26.5%	30.5%	28.5%
	No	Count	111	105	216
		% within State	73.5%	69.5%	71.5%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Does your house have sweaty windows in the winter? * State

			State		Total
			South Carolina	North Carolina	
Does your house have sweaty windows in the winter?	Yes	Count	27	22	49
		% within State	17.9%	14.6%	16.2%
	No	Count	124	129	253
		% within State	82.1%	85.4%	83.8%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Do you notice uneven temperatures between the rooms in your home? * State

			State		Total
			South Carolina	North Carolina	
Do you notice uneven temperatures between the rooms in your home?	Yes	Count	80	70	150
		% within State	53.0%	46.4%	49.7%
	No	Count	71	81	152
		% within State	47.0%	53.6%	50.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Does your heating system keep your home comfortable in winter? * State

			State		Total
			South Carolina	North Carolina	
Does your heating system keep your home comfortable in winter?	Yes	Count	138	145	283
		% within State	91.4%	96.0%	93.7%
	No	Count	13	6	19
		% within State	8.6%	4.0%	6.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Does your cooling system keep your home comfortable in summer? * State

			State		Total
			South Carolina	North Carolina	
Does your cooling system keep your home comfortable in summer?	Yes	Count	140	147	287
		% within State	92.7%	97.4%	95.0%
	No	Count	11	4	15
		% within State	7.3%	2.6%	5.0%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Do you have a programmable thermostat? * State

			State		Total
			South Carolina	North Carolina	
Do you have a programmable thermostat?	Yes	Count	98	78	176
		% within State	64.9%	51.7%	58.3%
	No	Count	53	73	126
		% within State	35.1%	48.3%	41.7%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

How many thermostats are there in your home? * State

			State		Total
			South Carolina	North Carolina	
How many thermostats are there in your home?	0	Count	0	6	6
		% within State	0.0%	4.0%	3.9%
	1	Count	1	109	110
		% within State	100.0%	72.2%	72.4%
	2	Count	0	23	23
		% within State	0.0%	15.2%	15.1%
	3	Count	0	4	4
		% within State	0.0%	2.6%	2.6%
	4 or more	Count	0	8	8
		% within State	0.0%	5.3%	5.3%
	DK/NS	Count	0	1	1
		% within State	0.0%	0.7%	0.7%
Total		Count	1	151	152
		% within State	100.0%	100.0%	100.0%

What temperature is your thermostat set to on a typical summer weekday afternoon? * State

			State		Total
			South Carolina	North Carolina	
What temperature is your thermostat set to on a typical summer weekday afternoon?	Less than 69 degrees	Count	17	3	20
		% within State	11.3%	2.0%	6.6%
	69-72 degrees	Count	47	38	85
		% within State	31.1%	25.2%	28.1%
	73-78 degrees	Count	72	78	150
		% within State	47.7%	51.7%	49.7%
	Higher than 78 degrees	Count	7	12	19
		% within State	4.6%	7.9%	6.3%
	Off	Count	6	12	18
		% within State	4.0%	7.9%	6.0%
	DK/NS	Count	2	8	10
		% within State	1.3%	5.3%	3.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

What temperature is your thermostat set to on a typical winter weekday afternoon? * State

			State		Total
			South Carolina	North Carolina	
What temperature is your thermostat set to on a typical winter weekday afternoon?	Less than 67 degrees	Count	26	10	36
		% within State	17.2%	6.6%	11.9%
	67-70 degrees	Count	73	61	134
		% within State	48.3%	40.4%	44.4%
	71-73 degrees	Count	31	28	59
		% within State	20.5%	18.5%	19.5%
	74-77 degrees	Count	10	25	35
		% within State	6.6%	16.6%	11.6%
	78 degrees or higher	Count	4	7	11
		% within State	2.6%	4.6%	3.6%
	Off	Count	4	11	15
		% within State	2.6%	7.3%	5.0%
	DK/NS	Count	3	9	12
		% within State	2.0%	6.0%	4.0%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Do You Have a swimming pool, spa or hot tub? * State

			State		Total
			South Carolina	North Carolina	
Do You Have a swimming pool, spa or hot tub?	Yes	Count	25	15	40
		% within State	16.6%	9.9%	13.2%
	No	Count	126	136	262
		% within State	83.4%	90.1%	86.8%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Would a two-degree increase in the summer afternoon temperature in your home affect your comfort * State

			State		Total
			South Carolina	North Carolina	
Would a two-degree increase in the summer afternoon temperature in your home affect your comfort	Not at all	Count	46	48	94
		% within State	30.5%	31.8%	31.1%
	Slightly	Count	56	43	99
		% within State	37.1%	28.5%	32.8%
	Moderately, or	Count	26	42	68
		% within State	17.2%	27.8%	22.5%
	Greatly	Count	23	18	41
		% within State	15.2%	11.9%	13.6%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

How many people live in this home? * State

			State		Total
			South Carolina	North Carolina	
How many people live in this home?	1	Count	34	34	68
		% within State	22.5%	22.5%	22.5%
	2	Count	59	69	128
		% within State	39.1%	45.7%	42.4%
	3	Count	29	24	53
		% within State	19.2%	15.9%	17.5%
	4	Count	17	18	35
		% within State	11.3%	11.9%	11.6%
	5	Count	5	4	9
		% within State	3.3%	2.6%	3.0%
	6	Count	5	0	5
		% within State	3.3%	0.0%	1.7%
	7	Count	2	2	4
		% within State	1.3%	1.3%	1.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

How many of them are teenagers? * State

			State		Total
			South Carolina	North Carolina	
How many of them are teenagers?	0	Count	130	133	263
		% within State	86.1%	88.1%	87.1%
	1	Count	16	12	28
		% within State	10.6%	7.9%	9.3%
	2	Count	4	6	10
		% within State	2.6%	4.0%	3.3%
	3	Count	1	0	1
		% within State	0.7%	0.0%	0.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

How many persons are usually home on a weekday afternoon? * State

			State		Total
			South Carolina	North Carolina	
How many persons are usually home on a weekday afternoon?	0	Count	20	17	37
		% within State	13.2%	11.3%	12.3%
	1	Count	57	65	122
		% within State	37.7%	43.0%	40.4%
	2	Count	43	43	86
		% within State	28.5%	28.5%	28.5%
	3	Count	17	18	35
		% within State	11.3%	11.9%	11.6%
	4	Count	6	7	13
		% within State	4.0%	4.6%	4.3%
	5	Count	2	1	3
		% within State	1.3%	0.7%	1.0%
	6	Count	4	0	4
		% within State	2.6%	0.0%	1.3%
	7	Count	1	0	1
		% within State	0.7%	0.0%	0.3%
	Prefer not to answer	Count	1	0	1
		% within State	0.7%	0.0%	0.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Are you planning on making any large purchases to improve energy efficiency in the next 3 years? * State

			State		Total
			South Carolina	North Carolina	
Are you planning on making any large purchases to improve energy efficiency in the next 3 years?	Yes	Count	62	32	94
		% within State	41.1%	21.2%	31.1%
	No	Count	70	100	170
		% within State	46.4%	66.2%	56.3%
	DK/NS	Count	19	19	38
		% within State	12.6%	12.6%	12.6%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

What is your age group? * State

			State		Total
			South Carolina	North Carolina	
What is your age group?	18-34	Count	21	18	39
		% within State	13.9%	11.9%	12.9%
	35-49	Count	41	39	80
		% within State	27.2%	25.8%	26.5%
	50-59	Count	34	34	68
		% within State	22.5%	22.5%	22.5%
	60-64	Count	17	12	29
		% within State	11.3%	7.9%	9.6%
	65-74	Count	21	32	53
		% within State	13.9%	21.2%	17.5%
	Over 74	Count	17	15	32
		% within State	11.3%	9.9%	10.6%
	Prefer not to answer	Count	0	1	1
		% within State	0.0%	0.7%	0.3%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Please indicate your annual household income * State

			State		Total
			South Carolina	North Carolina	
Please indicate your annual household income	Under $15,000	Count	19	18	37
		% within State	12.6%	11.9%	12.3%
	$15,000-$29,999	Count	18	20	38
		% within State	11.9%	13.2%	12.6%
	$30,000-$49,999	Count	23	21	44
		% within State	15.2%	13.9%	14.6%
	$50,000-$74,999	Count	33	21	54
		% within State	21.9%	13.9%	17.9%
	$75,000-$100,000	Count	11	10	21
		% within State	7.3%	6.6%	7.0%
	Over $100,000	Count	16	17	33
		% within State	10.6%	11.3%	10.9%
	Prefer Not to Answer	Count	31	44	75
		% within State	20.5%	29.1%	24.8%
Total		Count	151	151	302
		% within State	100.0%	100.0%	100.0%

Appendix J: Summary of Tips and Messages

Eleven different MyHER reports have been sent to customers in the Carolina System since the program was rolled out commercially in May 2012. Each report included two tips (on the front of the report) and one or two messages (on the back of the report). The tips presented on each report were customized for each individual household (thus any given month's report could have included up to 30 different tips sent to different customers). However, all customers who received MyHER reports for a given month received the same one or two messages from a set of up to three (listed in Table 47). The complete list of 30 tips is shown in Table 46.

Table 46. MyHER Tips and Text

Tip Title	Tip Text
Air dry your laundry	Dryers are amazing, but they're energy hogs. Air drying just one load of laundry each week can save you loads of money and energy. Remember, you can do it year round right in your home - no sunshine or clothesline is needed! Try hanging wet laundry on hangers or doorknobs, or even laying it flat on dry towels. Almost anywhere can work! Not ready to go all the way? Try air drying just a few items from each load.
Buy an ENERGY STAR computer	Look for the ENERGY STAR label when purchasing a new computer. ENERGY STAR models use 30% to 65% less energy than other models. The more you use your computer, the greater your savings will be.
Buy an ENERGY STAR dehumidifier	Choose a dehumidifier with the ENERGY STAR label when purchasing a new unit. An ENERGY STAR qualified dehumidifier uses 15% less energy than a standard model. That means that an ENERGY STAR dehumidifier can save as much energy as a small refrigerator uses in a year! Choose the right size for your home, and keep in mind that larger units typically operate more efficiently than smaller ones.
Buy an ENERGY STAR dishwasher	Look for the ENERGY STAR label when buying a new dishwasher. ENERGY STAR qualified dishwashers use 10% less energy and 30% less water than those without the ENERGY STAR label. You will reduce both your energy and water bills in one move!
Buy an ENERGY STAR refrigerator	Look for the ENERGY STAR label when purchasing a refrigerator. ENERGY STAR refrigerators use at least 20% less energy than non-ENERGY STAR models. To maximize your savings, consider a model with the fridge on top or bottom (not side by side) that doesn't have an ice maker in the door.
Buy an ENERGY STAR television	If you are in the market for a new TV, consider buying an ENERGY STAR model. TVs in use in the U.S. consume over 50 billion kWh of energy each year - enough electricity to power all the homes in the state of New York for an entire year! ENERGY STAR qualified TVs, which cover standard models, HD-ready TVs, and flat-screen plasma TVs, use about 30% less energy than conventional units.
Check the temperature of your refrigerator or freezer	Use a thermometer to check the temperature of your refrigerator or freezer. A refrigerator that is 10 degrees too cold can use up to 25% more energy than one running at the ideal temperature. Recommended temperatures are 37 to 40 degrees for the fresh food compartment, and 5 degrees for the freezer. If you have a separate freezer for long term storage, you should set it to 0 degrees.
Cut standby power to your home computing system	Your computers and all the gadgets that go with them use power even when they are off. This standby power" accounts for over 50% of the total energy used by many of these devices! The easiest way to cut this waste is to plug all your gadgets into a power strip and turn it off when you're not using those devices."
Cut the standby power used for home entertainment	Your TV and all the associated gadgets use power even when they are off. This standby power accounts for over 50% of the total

Tip Title	Tip Text
	energy used by many of these devices! The easiest way to cut this waste is to plug all your gadgets into a power strip and turn of the strip when these items aren't in use."
Dust off that crock pot	Cooking in a crock pot can be much more efficient than using your oven. A crock pot costs 10 cents to run for 8 hours while an oven costs 32 cents to run for just one hour.
Enable energy management on your computer	Change the settings on your computer so that it goes to sleep after 15 minutes of inactivity. Enabling power management or "sleep mode" on your computer could cut your computer's energy consumption in half!"
Install a programmable thermostat[22]	You'd never leave a burner on if you weren't cooking anything, right? Are you paying to cool your home while people sleep... or aren't even there? The majority of your power bill each summer goes to cooling your home. Invest in a programmable thermostat and set a program that works for your family. Just one degree difference can make a 3% difference in your energy usage.
Install and program a programmable thermostat	Install a programmable thermostat and program it to save energy. When used properly, programmable thermostats can save you energy on heating and cooling - especially while you sleep and when you're not home. Set the program that works for your family and stick to it!
Insulate electrical outlets and switch cover plates	Add insulation covers (often called gaskets) to outlets and switches on the exterior walls of your home. Gaps in insulation coverage typically happen at the outlets and switches on exterior walls. Drafts find their way into your home through these gaps. Adding outlet and switch gaskets will reduce your energy usage, and make your home more comfortable by eliminating drafts.
Insulate your attic	A house with no attic insulation is like a coffee cup with no lid: all the heat goes up and out. Your furnace has to use more energy to replace the lost heat, and in the summer, the same thing happens with cool air and your AC. Keep the lid on by insulating your attic and reduce the energy used for both heating and cooling. It's one of the best energy efficiency investments you can make in your home.
It is time for summer cookouts and energy savings	This summer, stay cooler by turning off the stove and turning up the savings. By cooking a few meals each week on your barbeque grill, your house will be cooler and you'll reduce your energy use. So enjoy some outdoor family time and save some energy!
Keep your shades closed in the summer	Sunny windows can account for 40 percent of unwanted heat and can make your air conditioner work two to three times harder. You can minimize this heat by closing your blinds or curtains on sunny days. Focus on south and west facing windows as these allow the most amount of heat into your home.
Minimize the run time of your dryer	Not quite ready to air dry your laundry? No problem - just try the auto-sensing setting on your dryer to reduce your energy use. This setting will automatically stop the dryer when your laundry is dry. No auto-sensing on your dryer? Set the timer for 5-10 minutes less than usual and see how you do. Remember, it's better to add a few minutes at the end than run the dryer for too long.
Put your outdoor lights on motion detectors or timers	Do you leave your outdoor lights on all night? Try installing motion detectors or timers on your outdoor lights to reduce the power they burn through. Motion detectors help ward off trouble while significantly reducing energy use. Using motion detectors or timers is a great way to get the benefits of outdoor lighting while cutting

[22] "Install a programmable thermostat" is a revised version of the previous tip "Install and program a programmable thermostat" with updated text that gives more specific information about the expected amount of savings. During the time period being evaluated in this report, both of these tips were sent to some recipients.

Tip Title	Tip Text
	your energy use.
Replace your old hot water heater	If your water heater is more than 10 to 15 years old, consider buying a new, more efficient model. If you heat your water with electricity, water heating can be one of your biggest energy consumers. Do some research into your options, then talk to a trusted contractor and be sure to tell them that you want the most efficient model possible.
Replace your windows with low-E ENERGY STAR windows	When it's time to replace your windows make sure that you choose efficient, low-E ENERGY STAR windows. Low-E glass has a special coating that helps to keep heat in during the winter, and out during the summer. Efficient windows also have multiple panes of glass that are usually filled with insulating" gases to help keep your home comfortable."
Save on hot water use	Making a few small changes in how you use water can easily save you 5% on your hot water use. Start in the morning by shortening your showers by a minute or two, and don't let the hot water run when you shave or brush your teeth. When doing laundry, wash your clothes in cold water. In the kitchen, run the water only when rinsing the dishes.
Try an LED light bulb	LED light bulbs have become very affordable and are one of the best ways to save on your electric bill. You don't have to change all the bulbs in your house right now, but how about trying just one? Replacing a single 60-watt incandescent bulb with an equivalent LED model can save you real money now. And since LED bulbs last many times longer than old-fashioned incandescents, over time, the savings will become a really big deal!
Turn off outdoor lights during the day	If you prefer leaving your outdoor lights on at night for security or aesthetics, be sure to turn them off during daylight hours. Every morning, make it a habit to turn your outdoor lights off when you get the paper or let the dog out. If you have trouble remembering to do this, consider installing a light sensor, timer, or motion sensor on your outdoor lights, or switch to solar-powered lights.
Unplug your second refrigerator or freezer	Most backup refrigerators are at least 10 years old and use a lot of energy. Many families keep a second refrigerator to hold extra drinks or to use in the basement during parties. If you're one of them, retire that second fridge -- or plug it in only when you really need it -- and you'll be surprised how much energy you save.
Use efficient bulbs for your outdoor lighting	Put efficient ENERGY STAR compact fluorescent (CFL) bulbs in your outdoor light fixtures. CFL bulbs use 75% less energy, and they last 10 times longer than incandescent bulbs. Outdoor lights can be on for 12-14 hours of every day, so you'll really save energy when you switch. Here's the bonus: ENERGY STAR lights last so long, you won't have to get out your ladder so often to change bulbs.
Use energy efficient lighting indoors	Use energy efficient compact fluorescent (CFLs) bulbs to provide quality lighting throughout your home. CFLs use 75% less energy than incandescent bulbs and last 10 times longer. Since most of the electricity used by an incandescent bulb is wasted as heat, you can actually save on air conditioning by switching to CFLs.
Use task lighting	Use task lighting - lighting directed at a specific area - instead of overhead or general lighting. If you light the area well that you are working in, you can light the rest of the room less. The fewer lights you have on, the more energy you can save.
Use your microwave instead of a conventional oven	When reheating food or cooking smaller dishes, use your microwave whenever possible. You can save up to 50% of your cooking energy usage by using a microwave oven instead of a conventional electric oven. Using a microwave where you can is an easy way to save energy, and it cooks your food much faster than a traditional oven.
Weatherize your home	Weatherize is a complicated sounding word, but don't let it throw

Tip Title	Tip Text
	you. Just get some caulk and weather stripping and use it to plug air leaks around your doors and windows. When you do this, you keep warm air from leaking in during the summer and leaking out during the winter. That means you'll use less energy when cooling and heating and be more comfortable with reduced drafts.

The 23 messages included with the first eleven Home Energy Reports for North and South Carolina are listed below in Table 47. In months with two messages listed, both messages were sent to all recipients on the same report. In some months, customers were sent reports with two messages customized from a list of three: One of the messages was the same on every report, with the second message being the most appropriate for a given household (for example, on October 2012 reports customers were either given a message encouraging them to sign up for free CFLs, or else to install the free CFLs they had already received, depending on their eligibility and past participation in Duke Energy CFL programs).

Table 47. MyHER Messages by Month

Report	Drop Dates	Message(s)	Name of PDF(s)
May 2012	May 25, June 4,	1. **Spring Cleaning** 2. **Smart Saver**	May2012SpringCleaningSS
June 2012	June 21, July 2, July 12	3. **Vacation** 4. **Home Energy House Call**	June2012VacationHEHC
July 2012	July 31, Aug 8, Aug 10, Aug 14	5. **Know Your Home**	July2012KnowYourHome
Aug 2012	Aug 22, Aug 28, Sep 7, Sep 12	6. **Read Write Reset**	August2012ReadWriteReset
Sep 2012	Oct 17, Oct 25	7. **Drafts** 8. **Winter Magic**	September2012DraftsWinterMagic
Oct 2012	Nov 11, Nov 14, Nov 29, Nov 30	*Received 2 of 3 messages:* 9. **Dirty Laundry** (N=243) *plus* 10. **CFL Twist** (N=167) *or* 11. **CFL Free** (N=76)	October2012Twist October2013Free
Dec 2012	Dec 19, Jan 2, Jan 8, Jan 11	12. **Go Green** 13. **Hugs For Heaters**	December2012GoGreen
Jan 2013	Jan 31, Feb 4, Feb 7, Feb 12	*Received 2 of 3 messages:* 14. **Screen Savers** (N=291) *plus* 15. **Power Manager** (N=247) *or* 16. **Videos** (N=44)	January2013PowerManager January2013Videos
March 2013	Mar 27, Apr 7, Apr 9, Apr 17	17. **Smart Saver Health Check** 18. **Dial 811**	March2013SSHC-Dial811
May 2013	June 4, June 6, June 11, June 12	*Received 2 of 3 messages:* 19. **Heads Up Cool Down** (N=150) *plus* 20. **Out With The Old** (N=143) *or*	May2013OutWithTheOld May2013PowerOfGivingBack

Report	Drop Dates	Message(s)	Name of PDF(s)
		21. Power Of Giving Back (N=7)	
June 2013	June 24, June 29, July 6, July 14	**22. Refrigerator** **23. Water And Electricity**	June2013Refrigerator-Water

Appendix K: List of Self-Reported Energy Efficiency Actions

10d/11d/12d. Did you do anything to your home/behavior in response to this tip? What have you done?

<u>Recalled tip "Use energy efficient lighting indoors" and took action</u>

- *After we began receiving the reports, we changed out almost all of the light bulbs in our house that weren't already energy efficient ones, even the outside lights.*
- *We are switching over to CFLs that we got from Duke Energy in November of 2012.*
- *I put in the CFLs that Duke sent me.*
- *I ordered the CFLs from Duke Energy.*
- *I used the free CFLs that Duke sent me. I replaced some commonly-used bulbs to try to save on electricity consumption. I would not have bought or used the bulbs on my own, I only used them because they were free.*
- *I started to use the energy saving bulbs. Some we purchased and some we received free from Duke.*
- *We bought some CFLs after we didn't get the ones that Duke Energy said they would send us. I installed the CFLs in all the bedrooms, and I'll do the rest of the bulbs in the future.*
- *We switched to CFLs.* (N=2)
- *I'm using CFLs in all fixtures.*
- *Every light socket that can take a CFL now has one in it.*
- *Changed more bulbs, especially the outside lighting; we went from 50-75% CFL use to 100% use.*
- *We replaced 15 light bulbs with CFLs.*
- *I have installed CFLs in most light fixtures.*
- *I would estimate that we have CFLs in 90% of our lighting fixtures now.*
- *We changed 75% of our bulbs to CFLs.*
- *I switched over half of my bulbs to CFLs.*
- *We have been changing some of our standard bulbs to CFLs.*
- *I started installing CFLs in highly-used lights. I've been trying to gradually replace all of the lights with CFLs; the bulbs are pretty expensive so it's been a slow and gradual change.*
- *We are replacing our standard bulbs with CFLs when the standard bulbs burn out. I like using the higher wattage bulbs for reading.*
- *I have been using CFLs for the last five years and plan on using LEDs.*
- *I continue to use the CFL and LED light bulbs.*
- *We continue to use CFLs.* (N=2)

Recalled tip "Use efficient bulbs for your outdoor lighting" and took action

- *I switched all my light bulbs to CFLs, which I received from Duke.*
- *We replaced our standard bulbs with CFL bulbs. I received the bulbs from Duke.*
- *We installed several of the free CFLs from Duke in five rooms.*
- *When prompted to get bulbs while paying bill online, I arranged to get a box of CFLs from Duke.*
- *I have CFLs in every light that will take one, even the outdoor floor light is now a CFL.*
- *I replaced most all of my bulbs with CFLs, including the specialty bulbs.*
- *Almost all of my light fixtures have CFLs.*
- *We have CFLs in nearly every available light fixture.*
- *I have CFLs installed in 95% of my light fixtures.*
- *I would estimate that we have CFLs in 90% of the available fixtures.*
- *I would estimate that we have CFLs in 75% of the available light fixtures.*
- *We changed 75% of our bulbs to CFLs.*
- *I am gradually replacing incandescent bulbs with CFLs as they burn out. I would estimate that 60% of the bulbs in my house are now CFLs.*
- *I would estimate that we have CFLs in 50% of the available light fixtures.*
- *We changed most of our bulbs to CFLs.*
- *We installed CFLs in most of our light fixtures.*
- *We started using CFLs in some locations; we went from zero usage to 40% usage.*
- *I would estimate that we have CFLs in 30% of our light fixtures.*
- *We are gradually replacing incandescent bulbs with CFLs.*
- *I have been installing more CFLs.*
- *We have been using the CFLs for a few years and continue to use them.*
- *I have been using CFLs for the last 5 years and plan on using LEDs.*

Recalled tip "Weatherize your home" and took action

- *We added weather stripping and cloth under-door air baffles.*
- *I put weather stripping around doors. I'm checking the seals on the windows and weather stripping the ones that need it.*
- *I weather stripped the doors.*
- *I created a double-pane by screwing a clear plastic panel over the existing window frame. This allows light and cuts drafts.*
- *I checked the seals on the windows to see if caulking or weather stripping was needed, but it wasn't. I added weather stripping around the doors to prevent drafts and to prevent the heating and cooling from escaping.*
- *I weather stripped doors and windows.*
- *I used weather stripping to seal doors and windows as best I could..*

<u>Recalled tip "Turn off outdoor lights during the day" and took action</u>

- *We turn the outside lights off when they aren't needed.*
- *We have an outside light that my wife used to leave on constantly. I now shut it off more, usually before we go to bed.*
- *I have turned off more lights, and have instructed my children to turn off lights as well.*
- *I encourage other members of my household to turn off the lights when not in use.*
- *We are more alert to turning off lights when we leave the room.*
- *We installed CFLs and are now more aware of turning off lights and various electronic items such as computers, cell phone chargers, etc.*

<u>Recalled tip "Keep your shades closed in the summer" and took action</u>

- *We keep our blinds closed in summer.*
- *I try to keep the curtains closed during the day in the summer.*
- *I close the shades on sunny days to keep the house cooler.*
- *I closed the blinds on nine windows; the A/C now cuts off more often instead of running almost constantly.*
- *We control the sunlight getting in by closing and opening the blinds.*
- *I continue to close the shades. I have been taking this action for years.*

<u>Recalled tip "Cut the standby power used for home entertainment" and took action</u>

- *I unplug the computer and lamp, and also use a power strip for some items.*
- *My wife started unplugging the TV's that we were not using very often.*
- *I am unplugging air fresheners, unplugging the coffee maker when not in use, and no longer using my water pixer as I am looking to purchase a new one. I only use phone chargers when needed.*
- *We are unplugging appliances and electronics that we don't use often.*
- *I unplugged the toaster, the microwave, and most major appliances.*

<u>Recalled tip "Insulate electrical outlets and switch cover plates" and took action</u>

- *I put insulation covers over my sockets.*
- *I did gasket insulators on the downstairs level: about 10 to 15 panels.*
- *I increased the amount of insulation around the home.*
- *We added insulation to the attic and crawlspace.*

<u>Recalled tip "Cut standby power to your home computing system" and took action</u>

- *When not in use, I have unplugged lamps, computers, the XBox game and television.*
- *I have been in the habit of turning off electronic items for many years.*
- *I'm trying harder to turn off unused lights, although my wife isn't so diligent.*

- *I've unplugged some things, but not the electronics or appliances that I use every day.*

Recalled tip "Minimize the run time on your dryer" and took action

- *I am using the sensor-dry setting on my dryer all the time.*
- *I set the clothes dryer for a minimum time depending on what it is. When the alarm goes off, I take clothes out that are dry and add five minutes as needed to dry the rest. I also try to have the washer and dryer end at the same time, so that washed clothes are going into a warm dryer.*
- *We will now iron a shirt or hang it up after washing and drying, rather than throw it in the dryer to remove wrinkles.*
- *I did start to clean the lint out of the dryer more frequently.*

Recalled tip "Use task lighting" and took action

- *We don't use lights unless we need to. We will open up the curtains to let in light instead. This has made our home less gloomy.*
- *We're trying to be more conscious about turning off every light when we leave a room.*
- *We try to turn lights off when they're not needed.*

Recalled tip "Buy an Energy Star television" and took action

- *Now, all of my appliances are Energy Star-rated appliances.*
- *We changed out most all of our appliances. We bought a new stove, fridge, dishwasher, washer and dryer, and a new deep freezer.*
- *We bought an Energy Star dishwasher and washing machine.*

Recalled tip "Install a programmable thermostat" and took action

- *My son installed a programmable thermostat for me. He is an HVAC professional.*
- *I set the temperature one degree higher during the summer.*
- *We reduce the heat and A/C and make sure the lights are turned off when leaving the house for an extended period of time.*

Recalled tip "Unplug your second refrigerator or freezer" and took action

- *I unplug appliances when not using them. I checked my daughter's room and unplugged things that did not need to be plugged in.*
- *I unplug some electronic items when they're not needed.*

Recalled tip "Replace your old hot water heater" and took action

- *We installed a tankless water heater. We had been thinking about doing that before we got the reports, because we knew that the old water heater wasn't going to last much longer.*
- *I replaced the water heater with an energy saving on-demand water heater.*

<u>Recalled tip "Replace your windows with low-E ENERGY STAR windows" and took action</u>

- *I installed a new bathroom window which stopped an air leak.*
- *I installed new windows in March 2012.*

<u>Recalled tip "Save on hot water use" and took action</u>

- *My wife and I take shorter showers. Also, when the kids are home from college, we urge them to conserve the hot water.*
- *I don't leave the water running while I brush my teeth.*

<u>Recalled tip "Dust off that crock pot" and took action</u>

- *We use our crock pot and microwave instead of the stovetop and oven.*
- *I started doing more cooking with crock pots. I got a cookbook and found a lot of recipes.*

<u>Recalled tip "Buy an Energy Star refrigerator" and took action</u>

- *When it came time for me to get a new fridge, I made sure it was one of those energy efficient ones. Same with the freezer: I bought a freezer that does not use a whole lot of energy.*

<u>Recalled tip "Insulate your attic" and took action</u>

- *We added insulation to the attic and crawlspace.*

<u>Recalled tip "Put your outdoor lights on motion detectors or timers" and took action</u>

- *I now use an auto-timer for turning off my lights.*

<u>Recalled tip "Install and program a programmable thermostat" and took action</u>

- *We sealed our home shell and now set our thermostat at a consistent temperature.*

<u>Recalled tip "It is time for cookouts and energy savings" and took action</u>

- *We tend to cook outdoors at least once per week.*

<u>Recalled tip "Enable energy management on your computer" and took action</u>

- *I use the sleep mode on my computer.*

<u>Recalled message "CFL Twist" and took action</u>

- *After we began receiving the reports, we changed out almost all of the light bulbs in our house that weren't already energy efficient ones, even the outside lights.*
- *I had gotten free CFLs from Duke in late 2011, but didn't install them until I read about CFLs in the Home Energy Reports. I put them in most outlets, but didn't put them in the overhead fans because they are too ugly.*
- *I filled out the form for the free CFLs through Duke Energy. We installed all of them in outlets that are used often. Since receiving them from Duke, I have been purchasing CFLs only.*

- *I put in the CFLs that Duke sent me.*
- *I received CFLs about a year ago. Since then I have installed most of them.*
- *We replaced our standard bulbs with CFL bulbs. I received the bulbs from Duke.*
- *We installed several of the free CFLs from Duke in five rooms.*
- *I started to use the energy saving bulbs. Some we purchased and some we received free from Duke.*
- *We bought some CFLs after we didn't get the ones the Duke Energy said they would send us. I installed the CFLs in all the bedrooms and I'll do the rest of the bulbs in the future.*
- *We changed the standard bulbs in our most frequently used lamps to CFLs.*
- *We are replacing our standard bulbs with CFLs when the standard bulbs burn out. I like using the higher wattage bulb for reading.*
- *We are gradually replacing incandescent bulbs with CFLs.*
- *We've been replacing bulbs that burn out with CFLs.*
- *I replaced all my light bulbs with CFLs.*
- *I'm using CFLs in all fixtures*
- *Every light socket that can take a CFL now has one in it.*
- *Almost all my light fixtures have CFLs.*
- *We have CFLs in nearly every available light fixture.*
- *I replaced most all of my bulbs with CFLs, including the specialty bulbs, with CFLs.*
- *I have CFLs installed in 95% of my light fixtures.*
- *Changed more bulbs, especially the outside lighting; we went from 50-75% CFL use to 100% use.*
- *Changed 75% of bulbs to CFLs*
- *I would estimate that we have CFLs in 75% of the available light fixtures.*
- *I am gradually replacing incandescent bulbs with CFLs as they burn out. I would estimate that 60% of the bulbs in my house are now CFLs.*
- *I have installed CFLs in most light fixtures.*
- *We changed most of our bulbs to CFLs.*
- *I switched over half my bulbs to CFLs.*
- *We have been changing some of our standard bulbs to CFLs.*
- *We started using CFLs in some locations; we went from zero usage to 40% usage.*
- *I am now using 10 CFLs.*
- *We have been using the CFL for a few years and continue to use them.*
- *We continue to use CFLs.* (N=2)
- *We continue to use CFLs.*
- *We use CFLs.*
- *I have been using CFLs for the last five years and plan on using LEDs.*

Recalled message "CFL Free" and took action

- *We are switching over to CFLs that we got from Duke Energy in November of 2012.*
- *When prompted to get bulbs while paying bill online, I arranged to get a box of CFLs from Duke.*
- *I ordered the CFLs.*
- *I would estimate that we have CFLs in 90% of our lighting fixtures.*
- *I purchased CFLs. As the incandescent bulbs burn out I am replacing them with CFLs.*
- *I started installing CFLs in highly-used lights. I've been trying to gradually replace all of the lights to CFLs, the bulbs are pretty expensive so it's been a slow and gradual change.*
- *We switched to CFLs.*
- *I have been installing more CFLs.*
- *I've been replacing burnt-out bulbs with new CFLs.*
- *We replaced 15 light bulbs with CFLs.*
- *I would estimate that we have CFLs in 50% of the available light fixtures.*
- *I would estimate that we have CFLs in 30% of our light fixtures.*
- *I continue to use the CFL and LED light bulbs.*

Recalled message "Screen Savers" and took action

- *When not in use, I have unplugged lamps, computer, XBox game, and television.*
- *We cut off power to computer and peripheries, which also helps extend the life of the equipment.*
- *I unplug the computer and lamp, and also use a power strip for some items.*
- *We are unplugging appliances and electronic that we don't use often.*
- *I unplug some electronic items when they're not needed.*
- *I unplugged the toaster, the microwave, and most major appliances.*
- *I am unplugging air fresheners, unplugging the coffee maker when not in use, and no longer using my water pixer as I am looking to purchase a new one. I only use phone chargers when needed.*
- *I've unplugged some things, but not the electronics or appliances that I use every day.*

Recalled message "Dirty Laundry" and took action

- *I used to do laundry about four times a week. I have limited my laundry cycles to now just two or three per week, and have been doing larger loads.*
- *I reset to cold water on loads that I feel I can. Undergarments and towels still get warm water to kill bacteria.*
- *We turned down the temperature on our hot water heater.*
- *I turned down the temperature on the hot water heater.*

Recalled message "Hugs For Heaters" and took action

- *We wrapped our hot water heater with insulation about one month ago*
- *We wrapped our water heater with home insulation in November 2012.*
- *I insulated the hot water pipes.*
- *Increased the amount of insulation around the home.*

Recalled message "Smart Saver Health Check" and took action
- *My husband cleaned our furnace thoroughly and replaced the filters.*
- *I change my furnace and A/C filters more often.*

Recalled message "Out With The Old" and took action
- *We replaced the two heat pumps in our home.*

Recalled message "Read Write Reset" and took action
- *I set my thermostat, if not conservatively, at least at a consistent temperature.*

Recalled message "Smart Saver" and took action
- *I upgraded my heating and cooling system. My old unit died.*

21. Since [month and date of first report], have you done anything else to save electricity in your home that was not included as a tip contained in the Home Energy Reports? What have you done? Anything else?

- *I bought "D. Light" brand solar lights. I use space heaters.*
- *I caulked around the windows. I replaced the baseboard on the floor. I plan on doing some insulation on the floors.*
- *I converted the water heater from electricity to gas.*
- *I cut back on using the dryer. I hang dry most of clothes. I cut back on doing laundry. I wait until I have a full load before using the washing machine.*
- *I hang clothes up rather than using the electric dryer. I keep doors closed. I bought an eMonitor.*
- *I have a manufactured home and I plan to change from a vinyl underpinning to a brick underpinning.*
- *I installed a smaller window A/C unit; I use that instead of using central air. I installed and use a propane fueled wall heater fireplace.*
- *I keep electronics unplugged when not in use.*
- *I keep some unused rooms closed off to the rest of the home. I had someone come in and fill some holes in the walls of my trailer.*

- *I keep the water heater temperature set as low as I can stand. I have the dishwasher set to reuse the water for the dishwasher, plus it uses less water because it's a new Energy Star appliance. I have my water heater wrapped with an insulating blanket.*
- *I put black plastic on some windows and thermal curtains in some windows during the summer of 2012.*
- *I put plastic over our windows in the winter.*
- *I put solar vents near the ground around my house for moisture control and it ended up saving electricity.*
- *I quit cooking.*
- *I recaulk certain windows every spring or fall.*
- *I replaced one door on my house that was not insulated.*
- *I replaced our nighttime lights with solar-powered lights.*
- *I replaced some exterior doors.*
- *I run appliances such as the washer, dry and dishwasher at night.*
- *I started turning the porch light off at night back in October 2012.*
- *I unplug things when I am gone for the weekend. I turn my computer completely off at night.*
- *Since summer of 2012, I keep chargers unplugged when not in use.*
- *I purchased an energy-efficient Apple laptop for my daughter to use at college.*
- *I replaced the rubber threshold gasket for an outside door.*
- *I replaced windows.*
- *I replaced windows in January 2013.*
- *The landlords installed a larger cooling unit for the apartment complex which has actually reduced the amount we spend on cooling.*
- *We are using blackout curtains on the side of the house where sun shines.*
- *We bought a new washer and dryer in March 2013.*
- *We bought a new washing machine.*
- *We bought a new water heater.*
- *We built an additional room that has energy efficient windows.*
- *We got a new energy reducing air conditioning unit. We installed low flow toilets in the house. We also have energy or water saving sinks.*
- *We got CFL candelabra bulbs.*
- *We have a heat pump for both floors, and I shut it off the upstairs unit in Dec 2012/Jan 2013.*
- *We have installed CFL and LED light bulbs.*
- *We installed two low-flow toilets.*
- *We put in new energy efficient windows before we began receiving the reports.*

- *We replaced our heating and air conditioning units. There are two sets, one for upstairs and one for downstairs.*
- *We sealed our windows.*
- *We switched from regular electric heaters to infrared heaters.*
- *We use air-blocking curtains in doorways between rooms. We use space heaters to supplement heating.*

Questions 22 through 28 were asked after reading the following statement: "*The following questions ask you to tell us if you did anything in a particular category. We may ask you to duplicate some information you already gave us, but please do tell us again because we want to get more details in each category.*" Thus, some of the actions listed below duplicate actions already reported as influenced by the program's tips and messages. Customers were also asked to rate the influence of the program on the actions taken below, which is shown in Figure 20.

22. Since receiving your first Home Energy Report, did you take any steps to reduce the amount of energy used by your home appliances, such as removing a second refrigerator or upgrading old appliances? What have you done? Anything else?

- *We have all brand new appliances at both trailer homes.*
- *Although I have been using appliances such as the dishwasher, dryer and washer in the evening for many years, I have become more conscious and have increased this action due to receiving the reports.*
- *I don't cook as much; we are doing more grilling out and eating sandwiches.*
- *We got an Energy Star refrigerator.*
- *I got a new dryer.*
- *We are heating less of the house by shutting off the rooms we aren't using.*
- *I am purchasing a new Energy Star dishwasher today or tomorrow.*
- *I began unplugging many major appliances.*
- *I began using cold water more often in the clothes washer. I set a minimum dry time on the dryer. We replaced the dishwasher with a much more energy efficient model and one that wasn't leaking water all over the place. I also always the energy saving setting, so that it shuts off after the rinse cycle and before the dry cycle, allowing the plates to drip dry.*
- *I bought a more efficient refrigerator.*
- *I bought a new stove.*
- *I bought a new washer and dryer.*
- *I do my dishes by hand because I live alone, but I am wondering if it would be better if I just waited until my dishwasher was full and then ran the dishwasher.*
- *I got a new energy-efficient stove and refrigerator.*

- *I got a new Energy Star oven and range. I vacuumed the back of the refrigerator. The new oven I purchased has two ovens, of which one is small. I don't need to warm up a large oven each time I use the oven.*
- *I got a new refrigerator. I do wash less frequently. I used to do wash daily and now I do it once a week.*
- *I got a smaller oven which I use whenever possible. We have two right now.*
- *I got rid of a fridge that was in the garage. I bought a new fridge and replaced the one in my kitchen. I purchased a new washer and dryer to replace my old ones.*
- *I got rid of a second freezer. I upgraded the refrigerator and the stove. I reduced the amount of wash I'm doing to once a week and have upgraded the washing machine to a more energy efficient model.*
- *I have reduced my clothes dryer usage. I clean my clothes dryer ducts regularly. I minimize microwave usage.*
- *I keep my dryer unplugged until I am ready to use it. I unplug my microwave when not in use.*
- *I limit my use of the washer and dryer by only doing full loads.*
- *I made efforts to minimize appliance use.*
- *I make sure the fridge is closed tight, sometimes the seal doesn't connect unless you push on the door to make sure it's sealed.*
- *I never use the drying option on the dishwasher, I always let them air dry.*
- *I now unplug the toaster and coffee maker when I don't need them.*
- *I purchased a new Energy Star deep freeze and refrigerator. I try to use the microwave as much as possible instead of using the oven.*
- *I purchased a new refrigerator and stove.*
- *I purchased a new refrigerator, which is Energy Star-rated.*
- *I purchased a new super efficient washer and dryer and a super efficient dishwasher.*
- *I purchased an Energy Star washer and dryer.*
- *I quit using my stove so much and starting using my microwave and outdoor grill more.*
- *I reduced my clothes dryer use.*
- *I reduced my clothes washer use.*
- *I removed a second refrigerator.*
- *I replaced our old fridge and freezer with new energy efficient appliances.*
- *I replaced our old washer and dryer with newer energy efficient appliances.*
- *I replaced the clothes washer with one that uses less electricity and less water.*
- *I stopped using our extra refrigerator. I cleaned it out, turned it off, and unplugged it.*
- *I traded with my brother for a smaller chest freezer.*
- *I try to keep the refrigerator closed.*
- *I turned down the refrigerator. I stopped using my dishwasher.*
- *I unplug the microwave when it’s not in use.*

- *I unplug the appliances when I don't need them.*
- *I unplug the smaller appliances, like the toaster and microwave, when I don't need them.*
- *I unplugged a small second refrigerator.*
- *I upgraded appliances. I bought a new fridge, dishwasher, microwave and stove.*
- *I upgraded my microwave.*
- *I upgraded the fridge and bought a new one.* (N=2)
- *I installed a new Energy Star refrigerator.*
- *I installed a new high-efficiency stove.*
- *I installed an Energy Star dishwasher and washing machine.*
- *I installed a new Energy Star dishwasher and washing machine.*
- *I've reduced my laundry loads from four times per week to just two or three times per week.*
- *I unplug anything I'm not using, including the washer and dryer.*
- *We got a new dishwasher.*
- *We got a new dishwasher; the brochure claims 'outstanding savings' on energy use, but it takes longer to complete a cycle.*
- *We have a new energy-saving fridge.*
- *We got a new fridge and new stove.*
- *I had a new refrigerator installed in November or December 2012*
- *We have a new washer.*
- *We have a new washer and dryer and a new microwave, which are all energy efficient.*
- *I have priced replacement appliances, and hope to start replacing them this year if I can be called back to work. We are using the stovetop less and crock pot more. We don't use the dishwasher anymore.*
- *Reduced dishwasher use.*
- *I replaced my refrigerator with a more efficient model about a year ago, and we are unplugging more appliances.*
- *The stove was removed; I am a renter. I use the microwave and toaster oven in place of the stove. The door had become loose and rats ate through some wiring and it caught on fire.*
- *I unplugged the garage refrigerator.*
- *We unplugged our second refrigerator and freezer.*
- *We unplugged the toaster and blender.*
- *We upgraded our stove and refrigerator.*
- *We upgraded our refrigerator, freezer, and A/C.*
- *I upgraded all of the kitchen appliances, which includes the refrigerator, range, and dishwasher.*
- *We upgraded to an energy efficient refrigerator and dishwasher. When I cook, I use the medium-high setting for smaller pans.*

- *We are upgrading appliances with a new washer and dryer and refrigerator.*
- *We bought a new stove and dishwasher.*
- *We bought a new stove and refrigerator.*
- *We bought a new washer and dryer.*
- *We bought a new washing machine.*
- *We got a new fridge and cookstove to replace the old ones.*
- *We got a new refrigerator.*
- *We got rid of the hospice stuff after the death of my father in May 2013: electric bed, air mattress, oxygen machine, etc.*
- *We installed a new Energy Star refrigerator.*
- *We purchased a new washer, dryer and freezer. All of these are energy efficient.*
- *We removed a second refrigerator.*
- *We removed our hot tub.*
- *We replaced a dishwasher with a high efficiency one. We replaced our washer and dryer with high-efficiency ones.*
- *We stopped using the oven as often. We use the toaster oven when possible instead. I began using the sensor-dry setting on the dryer. I began to wash laundry in cold water.*
- *We unplug appliances that we don't use often.*
- *We upgraded and got new appliances: a toaster oven and coffee pot. I don't use the toaster oven or oven very often, I use an electric frying pan instead. I placed the coffee pot a timer so it would turn off by itself.*
- *We upgraded the kitchen refrigerator, and we unplugged the one in the basement that we are not using.*
- *We upgraded our fridge.*
- *We upgraded our refrigerator to an Energy Star one.*
- *We upgraded our refrigerator. We starting unplugging all the appliances we're not using that we can, like the coffee maker.*
- *We upgraded our washer and dryer.*
- *We upgraded the refrigerator to an Energy Star one.*
- *We use our appliances less than we used to. We purchased a high efficiency dishwasher.*

22f. Did you do anything that might have <u>increased the energy usage by your appliances</u>? An example of increasing your home appliance energy use would be to add another appliance, such as a new freezer. What have you done? Anything else?

- *We added an additional refrigerator in the basement, but it's less than five years old.*
- *Due to house guests this summer, we are using an additional appliance, a small freezer.*
- *We have an extra three to four kids in the home. We added a small refrigerator.*
- *I bought a second freezer. I built a pond that includes a water pump.*

- *I bought a space heater.*
- *We increased our use of washer and dryer, since we are now on city water instead of sharing a well.*
- *We installed a hot tub in May 2013.*
- *Our family grew by two people since November. We adopted a 6 year old and an 8 year old child.*
- *We are planning on buying a chest freezer and are making comparisons. I have noted that chest freezers are more efficient than upright freezers.*
- *We added an Energy Star deep freezer.*
- *We bought a small chest freezer at the same time we got the new fridge.*
- *We bought an extra freezer.*
- *We have a new baby in our home. Every facet of our energy use has increased.*
- *We have a new baby in our home. Our laundry usage has increased.*
- *We have been storing an extra refrigerator which had been plugged in.*
- *We recently purchased a chest freezer for the garage, but it's Energy Star.*
- *We wash more clothes now.*

23. Since receiving your first Home Energy Report did you take any steps to <u>reduce the amount of energy used to cool your home</u>? What have you done? Anything else?

- *A new cooling unit was installed for my apartment complex. I've been trying to regulate and keep the cooling at a slightly warmer temperature than I used to, by one or two degrees.*
- *We added insulation.*
- *I had a new heat pump installed in August 2012.*
- *I caulked around windows and doors. I'm also using an aftermarket metering system, watching to reduce spikes in use and pinpointing what uses the most energy.*
- *I closed the blinds on nine windows to reduce sunlight. Using ceiling fans more instead of A/C. Replaced the A/C core inside the house that had been malfunctioning for the previous two years.*
- *I eased the programming for the thermostat; raised the temperature from 72 to 74 when I'm at work.*
- *We got a new A/C.*
- *I raised the temperature on the thermostat from 70-72 degrees to 74-75 degrees. I close the window curtains to prevent the sun coming in in the summer in order to keep the house cooler.*
- *I added a ceiling fan and an attic fan.*
- *I added thermal window coverings.*
- *I adjust the temperature when leaving the house, even for a few hours.*

- *I adjusted the temp up for the air conditioner.*
- *I adjusted the temperature to be 2-3 degrees warmer.* (N=2)
- *I am in the process of replacing the HVAC.*
- *I am using the heat pump even less.*
- *I bought under-door air blockers.*
- *I change my HVAC filters monthly. I sealed and insulated my doors and windows.*
- *I change the filters in the air conditioning unit.*
- *I close the shades on hot days to keep the house cooler.*
- *I delay using my A/C until I have to, though I have been doing this for years. I use ceiling fans in place of using the A/C when possible, but again I have been doing this for years. I don't bother cooling the upstairs of my home because I usually spend my time downstairs.*
- *I encourage my wife to close the door so cool air does not escape when she heads outside to sit on the porch. I turned the thermostat up.*
- *I got a new cooling unit, it's electric.*
- *I had Freon added to my A/C. I weather stripped doors and windows.*
- *I had new windows installed.* (N=2)
- *I had the heating and cooling ducts checked for breaks, gaps, and seals to make sure there were no places the cooling was leaking out.*
- *I installed a new heating and cooling unit.*
- *I installed a smaller window A/C unit. I use that instead of using central air.*
- *I installed window shades and we have them down in the daytime to reduce how much the house heats up.*
- *I keep doors closed. I switched from halogen bulbs to CFLs, which generate less heat.*
- *I keep my thermostat set at 72 degrees to 74 degrees. I try to not switch it.*
- *I keep the house a little warmer than I used to in the summer.*
- *I keep the thermostat at a constant temperature.*
- *I limit the usage of the cooling by turning it off at night and I open the windows for natural cooling.*
- *I make sure that I don't leave the A/C running when I'm not home.*
- *I now have a programmable thermostat and use it according to my lifestyle.*
- *I now turn the temperature up to 72 during the day. I started keeping blinds closed to keep the cool in.*
- *I only use the air conditioner in the room that I am in, though I have air conditioners in several rooms.*
- *I purchased a new Energy Star A/C unit. I close the air vents in rooms we are not using and shut the doors. I set the temperature one degree higher.*
- *I purchased a new super efficient air conditioning/heating unit combo.*
- *I purchased an Energy Star A/C unit.*
- *I put a fan in the window, so I don't have to use an air conditioner.*

- *I raised the temperature on my air conditioner, so it would run less.*
- *I replaced my central A/C unit.*
- *I replaced some doors. I put foam around the windows. I purchased a new window unit, a more energy efficient model.*
- *I replaced windows.*
- *I run my ceiling fans to help keep my home cool. This has resulted in not having to use the A/C at such a low temperature. I change the A/C filters monthly. I adjusted my thermostat from 70 degrees up to 73 degrees during summer.*
- *I set my thermostat at more consistent temperatures.*
- *I set my thermostat more conservatively.*
- *I stopped running the air conditioner.*
- *I try to just keep the thermostat set to one constant temperature. If I do adjust the temperature, it is by only one or two degrees.*
- *I turn off the A/C and close the window shades before I leave the house. I participate in Power Manager. The upper level of the house has a separate cooling unit which is only on when needed.*
- *I turn up the thermostat to about 75 when I can stand it. I caulked around the windows.*
- *I turned up the temperature to 73 from 69 to 70 and locked it; I don't let anybody touch it now.*
- *I upgraded the A/C unit to a higher efficiency one.*
- *I use three ceiling fans to circulate the air from the air conditioner and heater.*
- *I use the programmable thermostat to adjust the temperature in the house according to my work schedule.*
- *I'm using ceiling fans more instead of turning the A/C up.*
- *I increased thermostat setting from 77 to 79 or 80.*
- *I increased the thermostat temperature in summer from 72 to 76. Using upstairs heat pump about 40% less.*
- *I installed a fan in the attic that is solar powered in winter 2012*
- *I installed a new heat pump.*
- *I installed a new heat pump in June 2012.*
- *I installed a new heat pump in Sep or Oct 2012.*
- *I installed an energy efficient window air conditioning unit in the bedroom.*
- *I've adjusted the lowest temperature by two degrees, making it slightly warmer in my home. I've scheduled regular maintenance for the cooling unit and change the filters regularly.*
- *I've been keeping the home warmer this summer.*
- *I've been turning the A/C off when I'm not there.*
- *I've had the cooling unit serviced to make sure it is running efficiently.*
- *I've raised the temperature on the cooling when I will be out or away for a while.*

- *I've reduced air conditioning use. I'm pulling the shades more in order to keep the house cool as long as possible during the hottest part of the day.*
- *I keep the thermostat at a constant temperature. I installed outlet gaskets. I am using the blinds to close off daytime sun.*
- *I keep my A/C set at a steady temperature.*
- *We've got a new A/C.*
- *We have a new energy saving A/C.* (N=3)
- *We have a new heat pump and central air system. We installed a programmable thermostat.*
- *Our A/C wasn't keeping the house as cool as it should, so we had someone fix the A/C. It's running a lot less than it used to and keeps the house much cooler.*
- *We are putting up blackout curtains.*
- *We replaced the A/C with a new energy saving A/C.*
- *We routinely change air filters and have an annual HVAC inspection and tune-up.*
- *We turned our thermostat up a few degrees, from 70 to 75. We watch to make sure the A/C isn't on when we're out of home, trying not to cool when nobody is home.*
- *I turned up the thermostat from 74 to 76. Using ceiling fans in the summertime.*
- *I use my ceiling fans and use less A/C.*
- *We are using less air conditioning.*
- *We adjusted the temp up to 72, from 69 or 70.*
- *We are keeping the A/C set a little higher*
- *We are replacing worn out weather stripping around the doors.*
- *We change our filters more frequently now.*
- *We change the filters and have maintenance service done on the A/C unit.*
- *We changed the temperature on the thermostat to be closer to the outdoor temperature.*
- *We discontinued using our inefficient central A/C in favor of three window units. We installed new windows.*
- *We don't use the A/C as much.*
- *We had coolant added to our central A/C unit.*
- *We had maintenance performed on our heat pump.*
- *We had our A/C compressor replaced.*
- *We have a dual system A/C and one of the units broke. We are getting that replaced the first week of June.*
- *We increased our thermostat temperature by two degrees.*
- *We installed a new A/C in the upstairs.*
- *We installed a new storm door. We've been increasing the temperature, so it doesn't cut on as much.*
- *We installed new windows. We added crawlspace and attic insulation.*

- *We installed two new high efficiency A/C units, one for upstairs and one for downstairs. We upgraded the efficiency of the units from 80% to 92%.*
- *We moved the location of our thermostat so it would no longer cue unnecessary heating and cooling.*
- *We purchased a new air conditioning unit. I try to keep the window curtains closed in the summer.*
- *We put weather stripping around the doors and I am doing the windows.*
- *We raised our A/C setting by three or four degrees.*
- *We raised the thermostat two degrees higher in the summer.*
- *We raised the thermostat up to 76 from 72 degrees.*
- *We replaced an A/C unit with a higher efficiency one.*
- *We run our A/C less often.*
- *We sealed our windows and doors. I try to keep the thermostat at a higher setting.*
- *We try not to run the A/C as much as we used to.*
- *We turn off the air conditioning and open windows and use fans to help cool the house.*
- *We turned up the thermostat.*
- *We use all of our ceiling fans.We change our filter on the heat pump according to manufacturer's recommendation. We keep our thermostat set at 77 degrees.*
- *We use the ceiling fans more often to aid cooling.*
- *We wait longer to the A/C on than before.*
- *We will open the windows and use fans on days that are not too hot. We insulated the windows by caulking around them.*
- *We've been turning the temperature up to 75. We had 40 new windows installed.*
- *We've raised the temperature for the cooling by three to five degrees.*

23f. Did you do anything that might have <u>increased the energy used to cool your home</u>? An example of something that might increase your energy use is to purchase a larger AC unit, as opposed to a new one of similar size. What have you done? Anything else?

- *Due to house guests, we are using our air conditioners more often and at a lower temperature.*
- *I had to cut some trees, and now more sun beats down on the house.*
- *I lowered the temperature on the thermostat. I work at a place that is very hot and sticky, so when I come home I need to cool off. I am also going through menopause complete with hot flashes, so I turn the temperature down then also.*
- *We added a small portable A/C unit in one room.*
- *We got a new window A/C unit, so now we have three instead of two.*
- *We started setting the thermostat quite low, 68 degrees.*
- *We have a new baby in our home. Every facet of our energy use has increased.*
- *We have a new baby, so we lowered the thermostat setting for summer from 76 to 74.*

- *We run the A/C more often due to the increase in the number of people living in the home. Our family grew by two people since November; we adopted a 6 year old and an 8 year old child.*

24. Since receiving your first Home Energy Report did you take any steps to reduce the amount of energy used to heat your house? What have you done? Anything else?

- *I added insulation. We got a new heating/cooling system: a heat pump. We also installed a wood stove.*
- *Again, I adjust the temperature when I leave. I'm now using a space heater where needed, since last fall.*
- *We had a new heat pump installed in August 2012.*
- *I caulked around windows and doors. I'm also using an aftermarket metering system, watching to reduce spikes in use and pinpointing what uses the most energy. I found the blower motor uses a surprising amount of electricity, even with gas heat.*
- *I got a different heater.*
- *I added thermal window coverings.*
- *I adjusted the temperature to be two or three degrees warmer.*
- *I am changing our furnace air filters bi-monthly.*
- *I am in the process of replacing the HVAC.*
- *I began using the propane artificial log to take the chill out of the house in the winter rather than warming up the entire house.*
- *I bought a small space heater to heat the room I'm using at the time.*
- *I bought under-door air blockers.*
- *I caulked around the windows. I turn down the thermostat to 70 or 71 most of the time, sometimes 68.*
- *I change my HVAC filters monthly. I sealed and insulated my doors and windows.*
- *I change the furnace air filter more frequently than I used to.*
- *I close the air vents in rooms we are not using and shut the doors. I close the shades to keep heat in during the winter. I close the air vents in rooms we are not using and shut the doors.*
- *I encourage my wife to close the door so warm air does not escape when she heads outside to sit on the porch. I bought and run a small electrical heating unit to heat smaller areas so I don't need to run the heat as high.*
- *I had new windows installed.* (N=2)
- *I had the heating and cooling ducts checked for breaks, gaps, and seals to make sure there were no places the heating could leak get out.*
- *I have been keeping the heat off as much as possible.*
- *I have been using my fireplace more. Turning down the heater to 67 or 68 degrees.*
- *I installed a new heating and cooling unit.*

- *I installed and use a propane fueled wall heater fireplace.*
- *I installed window shades. It helps to have them down in the evenings to keep heat in and cold out.*
- *I keep my thermostat set at 68 degrees and try not to change it.*
- *I keep the thermostat at a constant temperature.*
- *I lowered the thermostat.*
- *I now have a programmable thermostat and use it according to my lifestyle.*
- *I open the window shades to allow warming sunlight into the house. The upper level of the house has a separate heating unit which is only on when needed.*
- *I purchased a new super-efficient air conditioning and heating unit combo.*
- *I replaced my furnace.*
- *I replaced the furnace, the heat is now natural gas. We've zoned an area of the house which is only used when our kids are home from college. That area of the home is only heated or cooled when they are here.*
- *I replaced windows.*
- *I set my thermostat at more consistent temperatures.*
- *I try to just keep the thermostat set to one constant temperature. If I do adjust the temperature, it is by only one or two degrees.*
- *I turn the heat down at night. I also zone the heating in the house by turning it down in rooms I don't use as often.*
- *I upgraded the heating unit, a gas furnace, to higher efficiency one.*
- *I use three ceiling fans to circulate the air from the air conditioner and heater.*
- *I use a low voltage space heater rather than turning up the heat in the winter.*
- *I use the programmable thermostat to adjust the temperature in the house according to my work schedule. I use fans to circulate the heat in the house.*
- *I weather stripped doors and windows.*
- *I'm using the wood fireplace insert with a blower and with a temperature shut off. I shut off rooms I'm not using.*
- *I'm wrapping up in a blanket and I'm not turning up the temperature as high.*
- *I installed outlet gaskets and keep the house at a constant temperature.*
- *I installed a new heat pump.*
- *We installed a new heat pump in September or October 2012.*
- *I've been keeping the house a little cooler than I used to, by about two to six degrees, depending on the outside temperature.*
- *I've had the cooling unit serviced to make sure it is running efficiently.*
- *I've lowered the temperature on the heating when I will be out or away for a while.*
- *I've reduced the heat by two or three degrees.*
- *I've reduced use of some of my portable heaters. I've been turning the temperature down on my portable heaters.*

- *I've scheduled regular maintenance for the cooling unit and change the filters regularly. I've adjusted the highest temperature by two degrees, making it slightly colder in my home.*
- *I keep my heat set at a steady temperature.*
- *Most of the time, I'm only heating the rooms we are using. I close the vents off to the other rooms. The heat is not working right; the thermostat can't be set right.*
- *We had a new furnace installed in February 2013.*
- *We have a new heat pump and a programmable thermostat.*
- *We reduced the thermostat from 70 or 72 to 68 for winter.*
- *We reduced the thermostat from 74 to 72, and use gas logs for heat.*
- *We reduced the thermostat setting from 77 to 74 or 75, and are using gas logs more for heating.*
- *We replaced door threshold gaskets and did sealing around windows to reduce drafts.*
- *We replaced most of the doors last Christmas.*
- *We replaced the roof about 6 months ago.*
- *We replaced windows in the kitchen, and added insulation to an outside wall. Also blew in insulation under floor and in walls.*
- *We sealed the crawlspace and added more insulation in May 2013.*
- *Someone had connected the thermostat incorrectly to the heat pump so I had that fixed, which lowered my bill.*
- *We stopped using the fireplace. I signed up with a Piedmont Natural Gas program; part of their plan is to come out four times per year to monitor gas usage and suggest changes that can be adopted in the same season. I am changing furnace filters every 30 - 35 days instead of every three months.*
- *The gas pack broke on our heat pump last December.*
- *There was a drafty room, so I sealed it up tight.*
- *We added a propane gas fireplace insert last November or December.*
- *We added energy-efficient heating stoves in October 2012.*
- *We adjusted the temperature down from 76 or 77 to 72.*
- *We adjusted the thermostat so it would not turn on as early as we had it. We sealed windows and keep doors closed.*
- *We are replacing worn out weather stripping around the doors.*
- *We are using space heaters instead of using the gas heater. We put weather stripping around the doors and I doing the windows.*
- *We change the filters more frequently.*
- *We discontinued using our inefficient oil furnace in favor of space heaters. We installed new windows.*
- *We don't heat upstairs as much and use more blankets instead.*
- *We don't run the heat as much as we used to.*

- *We don't use as much heat.*
- *We had maintenance performed on our heat pump.*
- *We have a heat pump for both floors, and I shut it off the upstairs unit in December 2012 or January 2013.*
- *We installed 40 new windows.*
- *We installed a heat pump.*
- *We installed a new storm door.*
- *We installed electric fireplaces in all rooms to heat the home.*
- *We installed liners behind outlets to stop air from getting in or out. I turn the temperature down to 67 or 68.*
- *We installed new windows. We added crawlspace and attic insulation.*
- *We installed two new high-efficiency heating units, one for upstairs and one for downstairs. We upgraded the efficiency of the units from 80% to 92%.*
- *We insulated the windows by caulking around them. I unplugged the space heaters; I have three or four space heaters. We added blankets to the bed.*
- *We keep the heat really low in the winter, we keep it as cold as we can stand it, sometimes around 50 degrees.*
- *We moved the location of our thermostat so it would no longer cue unnecessary heating and cooling.*
- *We reduced our heat setting by three or four degrees.*
- *We sealed our windows and doors. We use space heaters instead of turning the heat up on the thermostat.*
- *We set our thermostat at a consistent temperature.*
- *We switched to infrared electric heaters.*
- *We turned the thermostat down.* (N=2)
- *We use Amish heaters; we have been doing this for a few years. They use about nine cents-worth of power per hour. We turned down the thermostat by a few degrees.*
- *We weather stripped the windows and used plastic sheeting in winter.*
- *We've reduced the temperature on the thermostat and now use an infrared space heater in the spaces we occupy more often.*

24f. Did you do anything that might have <u>increased the energy used to heat your home</u>? An example of a change that would increase the energy used is if you purchased a larger heat pump. What have you done? Anything else?

- *I began using a space heater due to health concerns.*
- *I did not change my air filters as often as recommended.*
- *I had three extra fans running last June, but I stopped using them in September.*
- *I kept the heat higher than normal.*

- *I opened up areas of the house to be heated. A bedroom that was closed off before to save energy is now in use.*
- *Our heat pump had a Freon leak which made it run inefficiently.*
- *We have a new baby in our home. Every facet of our energy use has increased.*
- *We switched to electric heaters after our furnace broke down. We have three.*
- *We use a space heater in addition to the heat pump.*
- *With the new baby, we increased the winter temperature from 66 to 68.*

25. Since receiving your first Home Energy Report did you take any steps to reduce the amount of energy used to light your home? What have you done? Anything else?

- Install CFLs (in general) (N=77)
- Install CFLs (in general) AND turn lights off (N=19)
- Install CFLs received from Duke Energy (N=13)
- Install CFLs received from Duke Energy AND turn lights off (N=8)
- Turn lights off / use less light (N=12)
- Replacing incandescent bulbs with CFLs only as they burn out (N=4)

- *I had received the free CFLs from Duke over a year ago and didn't install them, but then I read about them in the Energy Report so I switched most of the lights. Though I didn't do the candelabra lights in the ceiling fan because those curls would be too ugly.*
- *We changed as many bulbs as we could to CFLs when we received bulbs from Duke Energy last August. We've been turning off a lot more lights when we're not in the room. We no longer use the overhead lighting; they use different bulbs than the CFLs.*
- *We began using the CFLs that were sent to us by Duke. We started using lamps instead of using the ceiling lights which use one bulb instead of two.*
- *I purchased a few energy efficient lamps. We replaced standard bulbs with the CFLs that Duke supplied. We open the window shades to let the light in instead of turning on lights.*
- *I use a timer on my lamps. I use the CFLs that Duke sent to me.*
- *We are more attentive to turning off lights. We reduced the wattage of incandescent bulbs, from 100 to 75, from 75 to 60, and from 60 to 40.*
- *We started using CFLs, but then stopped after learning about the mercury content and the dangers involved if they broke. We turn off lights when not needed. We open our blinds to make use of natural light rather than turning on a light. We also cleaned the windows.*
- *I bought three CFLs which I installed in fixtures where the bulb was not visible. I don't like the way the CFLs look or that they have mercury in them. Also, I want to buy USA-made bulbs.*

- *We continue to replace standard bulbs with CFLs. We installed motion detection outdoor lights replacing standard lighting that was left on at night. We removed our landscape lighting and switched our outside Christmas lights to LEDs.*
- *We have installed CFL and LED light bulbs.*
- *We installed two LED bulbs in two motion detector flood lights outside.*
- *We're switching to LEDs.*
- *We're using both CFLs and LEDs - about 70% CFLs, 20% LEDs, and 10% incandescent or halogen bulbs.*
- *We are adding CFLs and LEDs.*
- *I purchased a pack of LED bulbs.*
- *I'm using about five LEDs in my home now.*
- *I installed CFLs in five rooms, or 11 or 12 bulbs total. I am asking wife to turn off lights that aren't in use. Using LEDs for night lights.*
- *Most all of my lights are now LEDs.*
- *I continue to replace standard bulb with CFLs and plan on using LEDs.*
- *I installed more CFLs in the house; we went from 40% to 80% usage in fixtures. The remaining fixtures are on dimmer switches or lit by LED bulbs. I put the outside lighting on a motion detector, rather than switching them on and forgetting to turn them off.*
- *I utilize ten "d.light" brand solar lights.*
- *I went to the newer, low-energy light bulbs.*
- *When I buy light bulbs I make sure to compare the amount of energy used.*
- *I follow the kids through house to tell them to turn off lights.*
- *I encourage my wife to turn the lights off when she leaves the room.*
- *I've been making the kids turn off the lights when they're just watching TV.*
- *I began using an auto-timer for my lighting. I began to use CFLs.*
- *I keep the lights by the pool and down by the lake off and I have the front lights on a timer so they're only on two hours a day.*
- *I now have the exterior lights on a timer to shut off at midnight so they are not burning electricity all night long.*
- *I replaced most of my standard bulbs with CFLs, though I still use fluorescent in some of my fixtures. I use natural light from the windows to light my home during the day.*
- *I use lamps instead of overhead lighting. I switched to CFLs in all fixtures.*
- *Installed CFLs in ten fixtures and have a lot of halogens. Three-quarters of my screw-in fixtures are now CFLs.*
- *I am installing CFLs. I have installed a sensor so that my porch light will turn on only if there is motion.*
- *I've been using energy-efficient light bulbs. I turn off more lights and don't have all kind of lights running for no reason. I installed motion detectors on the outdoor lights.*
- *I turn off lights when not needed and use small light instead of overhead light.*

- *We are using night lights in bathroom and kitchen.*
- *We changed out many more light bulbs to CFLs, including outside. We changed to a lower watt bulbs, as well.*
- *We continue to use CFLs. We installed fluorescent bulbs in our kitchen.*
- *We installed additional CFLs. We reduced the number of light fixtures.*
- *We turn lights off when they're not needed. We have reduced the number of bulbs installed in our light fixtures.*

25f. Did you do anything that may have <u>increased the amount of energy used to light your home</u>? An example of increasing energy used to light your home would be adding new inside light fixtures or outdoor flood lights. What have you done? Anything else?

- *Due to house guests our lights are being used more often. Our house guests live upstairs, which is a part of the house that is only used when we have house guests.*
- *Due to macular degeneration, I now use higher wattage light bulbs. I used to use 40 watt bulbs but now I use 100 watt bulbs in the kitchen and bedroom. I am unable to reach the other fixtures so they still have 40 watt bulbs in them.*
- *I had the basement wired for lighting; it is almost finished with a basement rec room and home theater.*
- *I added outdoor flood lights that have motion detectors.*
- *I installed new floodlights, but hardly ever use them.*
- *I installed two motion sensor flood lights in September 2012.*
- *I keep my outside light on at night.*
- *I put lights in one of my restrooms.*
- *We have more people in the home, so use more lighting.*
- *Our family grew by two people since November. We adopted a 6 year old and an 8 year old child.*
- *I am using brighter lights for reading newspapers.*
- *We have a new baby in our home. Every facet of our energy use has increased.*

26. Since receiving your first Home Energy Report did you take any steps to <u>reduce the amount of energy used by home computers or electronics</u>? What have you done? Anything else?

- Turn electronics off when not in use (units not specified) (N=16)
- Turn computers off when not in use (N=20)
- Turn TVs off when not in use (N=3)
- Unplug chargers when not in use (N=3)
- Unplug items that use standby power (N=9)
- Turn electronics off using power strips (N=8)

- *Everything is charged once, and I use a car charger for some things.*
- *We got an energy-saving flat screen TV for Christmas.*
- *We got an energy-saving TV.*
- *We got newer computers.*
- *I began using the sleep mode on my computer.*
- *I got a “K-bar” unit to cut down on energy use.*
- *I got a new cell phone that is more energy efficient than the last one.*
- *I got a new plasma TV that is energy efficient which replaced an older TV.*
- *I make sure that everything is turned off when not in use. I cut back on how much TV I watch.*
- *I make sure the vents on the hard drive are free of dust to stop the computer from continually running the fan. We started to shut down my husband's computer completely when he's not home.*
- *I purchased a new laptop that is more energy efficient than my last computer.*
- *I purchased a new flatscreen TV. I watch TV less than I used to.*
- *I replaced an old TV with a flat screen one.*
- *I replaced my desktop computer with a laptop.*
- *I shut off my old desktop and laptop computers which used to run constantly. I turned my television off at night which used to run constantly.*
- *I things when they are not in use, like the toaster, microwave, and phone chargers.*
- *I turn my computer off at night. I won't run the TV and radio at the time.*
- *I turn off the cable box when not needed. We shut our computers down over the weekend.*
- *I unplug some electronic items when they're not being used. I bought a more efficient laptop computer.*
- *I use a power strip which I turn off at night. I got rid of an old TV. We don't leave peripherals, such as cell phones, plugged in.*
- *I use the “Power Saver” option on my computer.*
- *We have a new TV which is supposed to be energy efficient.*
- *Our computers are Energy Star and we turn them off when not in use. We turn all electronics off completely when not in use.*
- *I rebuilt two home computers with newer parts.*
- *I stopped using my desktop machine which had been running all the time as a server. I've now gone with a cloud-based system and a laptop. Also changed from CRT to LED television; our new unit is an Energy Star.*
- *The computers and gadgetry gets used less often since my kids aren't home as much.*
- *We upgraded the living room TV, from an older big screen to a newer flat screen. We also stopped using a 30-gallon fish tank and equipment.*

- *I am using a timer on the TV to turn it off if I fall asleep while watching. I replaced two TVs with energy-saving flat screen TVs. We got rid of control boxes from the cable company which the new TVs did not need; those boxes also use energy.*
- *We are not using the Internet anymore. We are not watching as much TV as we used to.*
- *We changed out two old TVs for two energy efficient TVs.*
- *We changed the power setting to energy saving mode on our computer and TV.*
- *We cut down on using the computer.*
- *We got an energy efficient TV.*
- *We got an LED flat screen TV eight or nine months ago.*
- *We got rid of a desktop computer that had stayed on 24/7.*
- *We have reduced our television and internet usage.*
- *We have reduced the amount of electronic gadgetry.*
- *We now have fewer people living in the house and are therefore using less electricity.*
- *We reduced our television and computer use.*
- *We replaced all of our previous TVs with flat screen TVs, which use less power.*
- *We replaced our old TV with an energy-efficient one.*
- *We replaced three TVs with more energy efficient models.*
- *We started using the sleep mode on our computers. We unplugged the chargers on our cell phones when we are not charging them.*
- *We turn off computers all the way now. We unplug our cable box at night now.*
- *When not in use, I turn the computer completely off. I'm using the timer on my TV.*

26f. Did you do anything that may have <u>increased the amount of energy used to power your home computer or electronics</u>? An example would be if you purchased another TV or computer. What have you done? Anything else?

- *I added a server and other computer equipment.*
- *We added an extra TV.*
- *We have an additional stereo, computer, TV, etc.*
- *We now have four more people and two game systems.*
- *I got a new cell phone for my stepson.*
- *I added three TVs, but am not sure if it was before or after we started receiving Energy Reports. I also added another computer, but am also not sure if it was before or after the first report.*
- *I added a wi-fi box.*
- *I bought a plasma television.*
- *I have added a small TV, but this probably saves energy because it's in my bedroom and I'm not up burning all the lights in the living room.*
- *I have increased my electronics usage because I'm home more often.*

- *I installed a larger TV.*
- *I purchased a laptop computer.*
- *I started using a space heater.*
- *I installed two TVs with a surround sound system in the basement den.*
- *My son bought a new television. We now have two large herpetariums.*
- *We are using more electronic gadgetry such as laptops, phones, etc.*
- *We bought three tablet computers.*
- *We bought a larger television.*
- *We bought a Wii to watch Netflix on. My brother was living with us for a while, and he watched a lot of television.*
- *We bought an additional laptop.*
- *We bought an iPad.*
- *We got a new computer, but we don't use it that much.*
- *We have added a new computer that stays on more often.*
- *With the increase in family size the TV is used more often. Our family grew by two people since November.*
- *We have a new baby in our home. Every facet of our energy use has increased.*

27. Since receiving your first Home Energy Report did you take any steps to <u>reduce the amount of energy used to heat the hot water in your home</u>? What have you done? Anything else?

- New efficient water heater (N=13)
- Reduced temperature of water heater (details not specified) (N=8)

- *I decreased my shower time and don't use the dishwasher as often.*
- *Our water heater has a smart box on top of it.*
- *I am trying to reduce my hot water usage.*
- *I have reduced the amount of hot water I use to wash clothes.*
- *I installed a timer on the water heater in 2012.*
- *I now have a tankless 'on demand' water heater.*
- *I reduced the temperature I use when taking showers.*
- *I replaced the water heater with an energy saving on-demand water heater.*
- *I take fewer showers and more baths.*
- *I try to conserve hot water more now.*
- *I turn the water off while I am soaping up in the shower and brushing my teeth.*
- *I turned down the thermostat on our hot water heater. I use warm water in place of hot water to do the laundry.*
- *I turned the thermostat down a notch. I used to have it set at 220 [sic] degrees.*

- *I use less hot water when I do wash.*
- *I wash clothes using cold water.*
- *I wrapped the hot water heater pipes. We take more hot showers at the gym using less hot water.*
- *I'm encouraging my family to use less shower time.*
- *I'm using cold water in the washing machine.*
- *Installed two low-flow shower heads; one from the Duke kit and one store-bought that uses a squeeze trigger. Also have faucet aerator for the kitchen sink.*
- *I joined the Piedmont hot water heater service program; it lets them monitor use and then gives you a notice if you are using too much. I installed a hot water cut-off valve to stop continuously heating hot water and improve performance. We are doing only large wash loads, and I am combining loads with my daughter. We only wash twice a week, late at night or in early in the morning.*
- *We got a new water heater about nine months ago, and have the temperature set between 130 and 140.*
- *We installed a tankless water heater in May 2012.*
- *We are planning to replace the water heater. We turn off the hot water heater at the breaker when we go out of town for a few days.*
- *We changed the temperature setting to 120 for the water heater, which is lower than the previous temperature.*
- *We converted our hot water heater from electricity to gas.*
- *We decreased the temperature. We take shorter showers.*
- *We do laundry less often. We run the dishwasher less often.*
- *We installed low flow showerheads.*
- *We now have fewer people living in the house and are therefore using less hot water.*
- *We replaced our 30 year-old water heater with an Energy Star water heater. We insulated the water pipes all the way to the faucets.*
- *We started using less hot water to wash clothes.*
- *We try to use less hot water.*
- *We turned the temperature down on the hot water heater by like two to five degrees.*
- *We use less hot water now since someone moved out. We bought a new dishwasher.*
- *We wash all the laundry in cold water.*
- *We wrapped our water heater with insulation in November 2012.*
- *When we are going away for any length of time we turn the hot water temperature. And we plan to purchase a tank-less hot water heater in the next couple of years.*
- *Wrapped the hot water heater with insulation.*
- *Wrapped the water heater in a blanket and insulated the pipes.*

27f. Did you do anything that may have increased the amount of energy used to heat the hot water in your home? An example of something that would increase the amount of energy used is to turn up your hot water tank's temperature. What have you done? Anything else?

- *I take longer showers. I wash dishes too frequently.*
- *We are doing more laundry now.*
- *I am washing more laundry and taking longer showers now that we are on city water.*
- *We have increased our use of the hot tub. Our high mineral content water caused a flow issue which greatly reduced the efficiency of our water.*
- *Due to house guests, more people are using the hot water to shower.*
- *We have an additional person living with us.*
- *We have more grandchildren living with us now.*
- *We use cloth fiber diapers; they get washed daily. One extra bath per day (for the baby)*
- *We have four more people in household.*
- *We use more water since our family grew. Our family grew by two people since November.*
- *We have a new baby in our home.* (N=4)

Table 48. Do you have a pool?

Count *Percent*	Read MyHER (N=292)	Throw it away (N=10)	North Carolina (N=151)	South Carolina (N=151)	Total (N=302)
Yes, have a pool	22 7.5%	1 10.0%	8 5.3%	15 9.9%	23 7.6%
No, do not have a pool	270 92.5%	9 90.0%	143 94.7%	136 90.1%	279 92.4%

28a. Did you make any changes to your pool's heating or filtering systems to make it more efficient? What have you done? Anything else?

- *Our pool cleaning system installed May 2013 is supposed to be more efficient.*
- *I changed the filter last month (April 2013). I set the pool's timer to come on only one time per day and once at night. It used to run almost constantly.*
- *I changed the filter. Now the filtering system runs 12 hours a day instead of 24.*
- *I replaced the filters.*
- *We got rid of the hot tub in March 2013.*
- *We have an energy efficient pump, and now we don't run the pump as often.*
- *We have the heater run only six to eight hours, according to how hot the outside temperature is. We used to have the heater run constantly, now we don't have it on all the time. We make sure to have the filter changed and replaced as needed; we monitor it more closely.*
- *We keep the pool clean so everything is working efficiently.*

Appendix L: Improving Aspects of the Program

Customers were asked to rate their satisfaction with various aspects of the MyHER program, and if they gave ratings of "7" or less on a 10-point scale, they were asked how these aspects of the program could be improved. These verbatim suggestions are listed below.

29. The reports are easy to understand: how could this be improved?

21 respondents rated this aspect of the program a "7" or less, and 12 of them gave suggestions for improving this aspect.

- *I really only understand the graphs. I don't understand the reading part.*
- *There should be more clarity and explanation regarding the home comparisons.*
- *Duke should provide more education and instruction about how to understand the reports.*
- *Maybe make the terms easier to understand.*
- *I think they need to break it down into simpler parts.*
- *Duke should send the reports monthly and also simplify the terms and wording used.*
- *I don't understand why the reports say that my energy usage goes up and down.*
- *Present greater detail so it would easier to understand. I find it too vague.*
- *Provide more info on how they gathered the information on the report. I'd like to see more than square footage and age. Maybe the report should include the home's building materials on the roof, windows, insulation, or brick, stone, or vinyl siding.*
- *Perhaps change the layout or design of the report. Have it sectioned or squared off. Have different sections for categories.*
- *There's too much information in them. By the time I get home from work, I'm too tired to read something that long*
- *My eyesight is going so I have a hard time reading the reports.*

30. The energy saving tips in the report provided new ideas that I was not previously considering: how could this be improved?

97 respondents rated this aspect of the program a "7" or less, and 54 of them gave suggestions for improving this aspect.

- *Newer tips* (N=3)
- *Newer tips that I haven't read about.*
- *Different tips that aren't so well known.*
- *Different tips that I haven't already read about somewhere else.*
- *Different tips that I haven't read somewhere.*
- *Provide different tips that I haven't heard of before, and tips that I can actually afford to implement.*
- *I knew or was doing many of the tips before we started getting the energy reports.*

- *I knew quite a few of the tips listed.*
- *I knew the tips listed in the one I read, so newer tips would be better.*
- *More current tips that I haven't already been doing.*
- *I don't remember the tips.*
- *Make the tips more memorable.*
- *I knew, or was already doing, at least half of the tips given. I guess Duke Energy could provide other tips that I don't know or haven't done.*
- *I don't have much room for improvement, I'm already doing those things and conserving as much as I can.*
- *I was already doing those tips before I read them on the report. I like the tips though. The tips help by keeping us informed and reminding us to do these things.*
- *Have more cutting edge tips. I always try to follow the latest energy saving tips, so I knew pretty much all of the tips given in the reports.*
- *Provide more tips and newer ones. It seems like the tips are always the same and I've done almost all of them before I started receiving the reports.*
- *We were already doing all of those things.*
- *I was already doing them.*
- *I want more tips, more variety in the kinds of tips.*
- *More cutting edge tips and ideas for energy conservation.*
- *More new, up-to-date tips.*
- *We already knew them, we just weren't doing them*
- *The tips were all things that I do anyhow; they are common sense to me and I knew about them already. I can see how the tips are valuable to others who may not know about doing those things.*
- *The tips are too common, they were all things that I was already doing before I read any of those reports. I think the tips could be more specialized.*
- *The tips are too generic. I want to see some more specific and detailed tips. Show me something I don't already know.*
- *The tips need to be more memorable or impressive. I can't remember any of the tips because I'm pretty sure they were things that I was already doing, so I did not give them my attention.*
- *The tips seemed too general and we had done many of the recommended things already or, in the case of the tankless water heater, the recommendations didn't apply.*
- *I knew many of the tips, so newer tips would help. Also, many of the tips don't seem to apply to our home, which was built in the 1870s.*
- *I was already energy literate; the tips are too general for me.*
- *I have a job as a remodeling contractor; every tip was something I knew already.*
- *I don't think that you can improve the tips for me because I'm a retired contractor; but, newer tips that I haven't heard of or read about might do it.*

- *Have newer tips. I worked in HVAC sales and installation, so I keep current with the new innovations in the field.*
- *I don't think that you can improve the tips for me. My husband works in HVAC and he's always coming home with new information.*
- *I have knowledge and experience as a science teacher; so the ideas weren't new, just reminders.*
- *The tips are too common, the small things that were suggested, like using CFLs, were things I was already aware of. The bigger tips, like installing insulation, are difficult because most people won't have the finances to execute those tips.*
- *Because we rent, there are some things we cannot do compared to home owners.*
- *Include more current tips, and tips that people in rentals can do.*
- *The information is valid and well presented, but some things I cannot do. I have budget concerns.*
- *I really don't understand the reading parts of the report.*
- *Provide information that is not easily available elsewhere, such as what a smart meter is and how to use it.*
- *Much of the information is readily available from other sources.*
- *Offer information which is not so easily available.*
- *I feel like I am already bombarded by so many other sources giving the same information. There are only so many tips you can give to a person. If there are truly new tips to be known, then yes, I'd like to see them.*
- *Provide more detailed information.*
- *Provide more information about kilowatt hours.*
- *The reports should provide payback time estimates for various efficiency upgrades.*
- *The reports should include more information about programmable thermostats and LED lighting.*
- *I think it would be helpful to have improvements grouped and priced: easy and inexpensive things; middle of road steps; and then the large budget items. Also, I would like to have discussion of things to look for, such as ratings, when going for large budget items. I have done more low-dollar, easy-fix, common sense items up to this point. Eventually, I will need to replace the air conditioner and would like to learn more about the Seasonal Energy Efficiency Ratio and expectations for going from one rating to another, especially the cost savings over the equipment's lifetime.*
- *The tips should be specifically tailored for the homes they're sent to.*
- *These tips should probably be included in an email or a twice-a-month mailing.*
- *I scan through the tips, but I don't really read them. I don't really know anything about them. I mainly look at the reports for the comparisons and our energy usage.*

<u>31. I find the reports useful: how could this be improved?</u>

53 respondents rated this aspect of the program a “7” or less, and 27 of them gave suggestions for improving this aspect.

- *Duke Energy should provide monetary incentives to get people to save energy.*
- *The reports should include valuable coupons and more information about possible tax incentives.*
- *The tips section needs to stand out from the rest of the report.*
- *Have more cutting edge tips. I always try to follow the latest energy saving tips, so I knew pretty much all of the tips given in the reports.*
- *Provide an at-a-glance summary section on the report.*
- *Provide newer, up-to-date tips.*
- *I'm confused as to why or where all of my power is being consumed from. I'd like to know where or what I am drawing the most energy from.*
- *I don't see how they can group a bunch of different houses.*
- *It would be more useful if the comparisons took into account the number of people in a household and how much time is spent at home. For example, retired people will be spending more time at home than working people.*
- *Compare our home to homes with electric only. We don't use a heat pump, we use electric fireplaces instead.*
- *The reports should be more specifically tailored per-home and have accurate home characteristics.*
- *Our home is 500 to 600 square feet and we're being compared to a much larger place. Also, we're renting, so we can't do anything to the home.*
- *I can't make any changes as a renter.*
- *I don't think that you can improve this because my home is up to par and I don't really need to do anything. But, I think the reports can really help other people.*
- *I don't think that you can improve this. I use the reports to make sure nothing's going wrong with the home, but it's an efficient home, so I'm not worried about increasing energy efficiency at all.*
- *I don't think you can improve the report because we know so many of the tips, but the comparison is nice to see.*
- *I don't know how they could be more useful to me. I like reading them because I like to see the comparison, but they don't give me any new information about things that I can do to my home.*
- *The reports are good for a general population, but how useful they are depends on your experience. I used to teach these things. For me, the reports' value is just as a refresher, not something new.*
- *My bill is already low because the home was built very efficiently.*
- *I like looking at the reports, but my home is already well below the average home, so there's really nothing that I'd be interested in doing.*
- *Newer tips might make them more useful, but since the reports say we use less energy than the average home, we're not looking to do much.*

- *They're nice to read, but I really don't use them for anything. I don't think that we will use them for anything because we don't have the money to make a lot of changes.*
- *Everything is too expensive for us to change. I can't even pay for my heart medication.*
- *I don't pay attention to the reports. At 76, I'm not going to make any changes to my home.*
- *I don't think that there is anything that you can do because our house is already efficient, so I don't read the reports thoroughly.*
- *I haven't been reading them. I only look at the graphs.*
- *There's too much information in them, so I don't read them.*

32. I enjoy receiving and reading the reports: how could this be improved?

58 respondents rated this aspect of the program a "7" or less, and 35 of them gave suggestions for improving this aspect.

- *Make me look forward to the receiving and reading the report by providing an incentive, such as a discount on my bill, free light bulbs, free filters, or coupons. Perhaps the report can direct a customer to the website to register to receive the perk.*
- *There should be a reward program for people that consume less energy.*
- *The reports should show year-to-year comparisons including kilowatt usage.*
- *Make them larger print because I can't read the tips.*
- *The reports should be made more graphically interesting in order to catch my eye.*
- *Maybe have bolder colors and colored charts.*
- *More up-to-date tips would make them more worth reading.*
- *Strategically place tips targeting the energy spikes in the graph section.*
- *I'd like to receive them less often.* (N=2)
- *Send them less often. Y'all stop wasting all these trees!*
- *I'd rather get them less often. I enjoy seeing that my home is so efficient, but they don't really do anything for me. I'd rather have lower rates.*
- *I'm not much of a reader, neither is my husband. Also, the reports come too often. I might pay more attention to the report if it came less often.*
- *If I could get my bill lower, I might like reading the reports more. I'm always using more than the other houses.*
- *If our rating was lower, I would enjoy them much more. Our family makes a lot of effort to be energy conscious, however it is not reflected in the report.*
- *The reports tell me that the home we built seven years ago with energy efficiency as a high priority isn't energy-efficient and that we are using more than the average home.*
- *Nobody likes to read that they could be more energy-efficient.*
- *When it comes, I just think to myself oh, I'm dreading this. I don't know how this comparison can be right, I mean, we're not dumb.*
- *The reports should be as accurate as possible, especially the home characteristics.*

- *It just frustrates me to know what I can't do.*
- *I can't do what the reports say I need to do right now, maybe later this year.*
- *I don't care about the reports because we're renting and we can't really change anything about the home.*
- *I'm pretty neutral. I will say the report is a good reminder and I appreciate it. But, most of the things we try to do need to fit into our budget. Some of the big appliances or changing windows are beyond our means all at once. We try to do all we can.*
- *I find them annoyingly redundant. The tips that are given have been in newspapers and other publications numerous times before.*
- *I was already energy literate and the tips are too general for me.*
- *I would like more detailed or obscure information that I could not easily learn elsewhere.*
- *The reports are good for a general population, but how useful they are depends on your experience. I used to teach these things. For me, the reports' value is just as a refresher, not something new. I wonder how many people really know what the reports are talking about, those with a lack of scientific literacy.*
- *I don't think that there is anything that you can do because our house is already efficient, so I don't read the reports thoroughly.*
- *I don't really read them thoroughly. I like to look at the comparison graph to see how we're doing, but I don't really take the time to read the rest.*
- *I only look at the graphs. I've never taken the time to read the reports all the way through.*
- *There's too much information in them, so I don't read them.*
- *I've set them aside and haven't taken time to read the in-depth. I need to not just glance at them, but read them cover-to-cover.*
- *I like reading them fine, but I don't really enjoy them. I'd rather read my library book.*
- *I don't enjoy getting them, but I don't mind getting them.*
- *They're nice to get, but I can't say I get a ton of enjoyment out of them.*

33. I find the graphics helpful in understanding how my energy usage compares to others like me: how could this be improved?

35 respondents rated this aspect of the program a “7” or less, and 25 of them gave suggestions for improving this aspect.

- *There is already a lot of information in the report. I don't feel that the graphics are necessary. I feel that some of the information is redundant.*
- *I would like to see more information about the average home, like a graph of how much energy they're using for lights and appliances.*
- *Include information about the number of people in the home.*
- *Compare our home to homes with electric only. We don't use a heat pump, we use electric fireplaces instead. I just don't believe that the comparison is accurate.*

- *Compared to our monthly bill, and what we keep our thermostat set on, our house is barely efficient according to the reports. We added 15 inches of insulation and we're still very off from the average. I think my house is more efficient and I don't know how it could be so off on the reports.*
- *I built the home 12 years ago with energy efficiency in mind. While most of our appliances are 12 years old, they were the most energy-efficient available at the time. We used thermopane windows and efficient doors. The attic, walls, and crawl spaces are insulated and all the duct work is wrapped. We used efficient light fixtures and use mainly CFLs. The only extravagance we have is a fountain in the backyard. I don't think that the comparison to these other homes is accurate because of how efficient my home is.*
- *I don't think that these other homes that my home is being compared to are equal. When we moved in in 2006, we had the whole house completely re-wired and new insulation added to the attic and walls, replaced the windows, and got Energy Star appliances. We also added two large rooms to the house at the same time.*
- *I don't think the comparison is accurate. We have such a small home, we use wood heat, and rarely use the A/C. There's no reason that the reports should say that we're using more energy than the average home.*
- *The report says that we have 1,800 square feet when we actually have 3,000.*
- *Our home has 500 to 600 square feet and we are being compared to a much larger place.*
- *I've got such a large house and there aren't any other large homes in the neighborhood.*
- *My home is not like others in that we have five refrigerators due to my volunteer food collection program for needy people.*
- *The reports should have more types of comparisons.*
- *I like the comparison, but I don't think that all the information that you're using is completely accurate. I'm retired, so I'm home a lot, so that uses more energy than some other homes. Then, you can't really compare all these homes because you don't know what appliances they're using.*
- *I doubt that I'm that much more efficient than comparable customers, so I don't trust the numbers.*
- *I don't think that the comparison is accurate because there's no information about how the energy is being used in the home.*
- *I don't know about the house that's being compared to mine; perhaps the report could be more specific.*
- *I don't know how Duke comes up with the comparison. The graphs are easy to figure out, but I can't read the print that goes with them.*
- *I don't understand why the reports say that my energy usage goes up and down.*
- *I really don't care about how other people are doing.*
- *The graphics should be made to look less childish.*
- *I've always found graphs complicated, so I just didn't grasp what you're trying to tell me.*
- *I don't really look at the graphics.*

- *The graphics are not important to me.*
- *I don't read this section thoroughly.*

34. I find the graphics helpful in understanding how my energy usage changes over the seasons: how could this be improved?

27 respondents rated this aspect of the program a "7" or less, and 12 of them gave suggestions for improving this aspect.

- *The reports should include natural gas heating information.*
- *The graphics should include rainfall data as it relates to water consumption.*
- *Their graphs look like the same ones all the time.*
- *I would like better explanations of the graphs.*
- *I doubt that I'm that much more efficient than comparable customers, so I don't trust the numbers.*
- *I don't need a graph to understand how my energy usage changes over the seasons because I can see the changes on my bills.*
- *The charts I received only began in October, which is when I began receiving the reports.*
- *There is already a lot of information in the report. I don't feel that the graphics are necessary.*
- *There's too much information in them, so I don't read them.*
- *I don't pay any attention to the graphics.*
- *I don't read this section.*
- *Honestly, it isn't helpful.*

35. Overall I am satisfied with the reports: how could this be improved?

26 respondents rated their satisfaction with the program overall a "7" or less, and 19 of them gave suggestions for improvement.

- *If our rating was lower, I would enjoy them much more. Our family makes a lot of effort to be energy conscious, however it is not reflected in the report.*
- *The reports tell me that the home that we built seven years ago with energy efficiency as a high priority isn't energy-efficient and that we are using more than the average home.*
- *My bill being lower would be good. Right now, the reports are bad.*
- *The report needs to be more accurate when it comes to the statistics of my home. I'd like to see some information on the reports that is new and more complex. All of the information on the report is way too generic and common.*
- *The reports should be more specifically tailored per-home and have accurate home characteristics.*
- *I find them annoyingly redundant. The tips that are given have been in newspapers and other publications numerous times before. I also don't believe that the comparison*

between our home and other homes is accurate because our home was built in the 1870s and we use electric fireplaces to heat the home.

- *I'd be more satisfied with better tips and perhaps a more personalized report.*
- *Provide more new, up-to-date tips.*
- *Send them less often.*
- *The reports should be sent quarterly.*
- *The reports I receive should be specifically targeted towards mobile home owners and offer helpful encouragement rather than negative reinforcement.*
- *Our home is 500 to 600 square feet and we are being compared to a much larger place. I don't care about the reports because we're renting.*
- *The reports are good for a general population, but how useful they are depends on your experience. I used to teach these things. For me, the reports' value is just as a refresher, not something new. I wonder how many people really know what the reports are talking about, those with a lack of scientific literacy.*
- *The reports aren't useful to me, even though I always read them. The reports are job security for someone, so I don't hate getting them. But, if my rates would go down without this program, then I'd rather not get the reports at all.*
- *They're good and simple for the people who need to learn these things.*
- *These are not helpful.*
- *I could take it or leave it.*
- *It is just a waste a paper.*
- *Spend less on the materials used for the report.*

37. Overall satisfaction with Duke Energy: how could this be improved?

83 respondents rated their satisfaction with Duke Energy overall a "7" or less, and 77 of them gave suggestions for improvement.

- Lower the rates / stop increasing rates (N=27)
- *I think their rates are entirely too high. However, I do appreciate that they are making these reports available, so we can lower our bills. I appreciate the CFLs and would like more of them. Perhaps they could do a contest or provide a reward for getting involved in saving energy and telling friends about their programs. I suggest to give people a month free, so they could catch up on their bills.*
- *They should just have an option for different power companies. The area we live in is a monopoly. Rates tend to be a lot higher here.*
- *I am from Pennsylvania; they have stricter laws about monopolies there and my electric bills were considerably lower due to the competition between the power companies at $60 a month with my highest bill being almost $80. Duke Energy doesn't offer any energy assistance programs for the elderly, but the power companies in Pennsylvania did.*

- *Places that accept Duke Energy payments should not charge a service fee of 75 cents per transaction. Duke should merge with another energy provider and stop the rate increases.*
- *Stop the rate increases. The one you are planning is the third increase in the last four years. Duke mergered with the other company and they said that there wouldn't be any need for increases and yet, here you are raising the rates again when many people are having financial difficulties due to the economy. If the company would have had the sense to invest in green power supplies over 40 years before the government demanded it, then we won't have to face another rate increase next year.*
- *One, keep your rates lower. Two, I work in real estate and I once had to call about getting power turned on at an address so many times. I was finally told that the home needed a repair before the power could be turned on. It would have been better if someone could have told me sooner instead having to call at least 10 times about it. Three, Duke Energy should be preparing for industry by having the power grid set before a company wants to move into the area; other power companies are doing it in other areas and I think that it would be a good way to encourage industries to move into our area.*
- *Duke Energy suppresses all technologies that they can't make money off of. If it weren't for Duke, we'd all have solar power, which is ridiculous because I'm sure there's some way for them to profit off green technologies.*
- *Keep the rates low. We can't afford to pay our bill and I tried to get assistance through the government and they didn't have any more money; they had already run out of money to help people for the year.*
- *Avoid rate increases. We're older and about half of our combined Social Security goes to paying our electric bill.*
- *Duke Energy has always provided good service, but the rates are just too high. The latest rate increase that they are planning is only $7, but my only source of income is Social Security, so for me to find that $7 is going to be a burden.*
- *Duke Energy keeps raising rates even when they report large profits and they should invest in renewable energy.*
- *I am concerned with the rates increase that Duke is thinking about. I'm having great difficulty with paying my bills as it is and, if the rates go up more, I'm worried that I won't be able to afford it.*
- *I am not pleased that there is going to be another rate increase. I am on a fixed income. I feel that I have been making a lot of effort to cut back on the energy I use, however I have to pay more.*
- *I am dissatisfied that we are getting a 16 percent rate increase at all once. It's difficult to fit that large of an increase into our budget. I would have preferred smaller, spaced out increases.*
- *I am not real happy with how my bill sky rockets in the winter. My gas bill creeps up even before I turn the furnace on. The bill creeps up around $100 a month from December through March. We keep our thermostat set constant. There are only two people living in the house. Although we have two furnaces, we only use the one for the downstairs; the*

upstairs is only used during the summer when we have house guests. I don't understand why the bill goes up so much.

- *The rates need to stop going up and energy prices, especially in the wintertime, really hurt us people on a fixed income. At least 25% of my income goes to Duke.*
- *I can't afford to pay my winter bills; the summer ones are doable, but the winter ones are horrible.*
- *Duke is having an eight percent rate increase for the second year in a row totaling approximately fifteen percent; I am not happy with this increase. Also, there is very long response time to repair power outages. And, Duke has been cutting many trees on my property with no impact on my power outages.*
- *They're raising rates to build plants. I think that sometimes companies get too greedy and shareholders also need to chip in.*
- *Duke needs to stop raising the rates every year. Duke needs to stop killing all the plants on my property with the poison they use around their power poles, they always over spray the perimeter where they are applying poison and it kills plants on my property. Duke never calls or notifies me when they will be applying the pesticides or herbicides and I expect that they should do at least that. Duke Energy also needs to do more towards burying the power lines.*
- *Lower rates or offer solar power to people who can't afford their power. Help people out.*
- *Lower the rates and use less nuclear energy.*
- *Duke Energy needs to have better water management on the Catawba River; the improper management of the water level is causing huge damage to property. Duke's floodwater control is very poor, it needs to be improved greatly.*
- *Duke needs to better address environmental issues. Unfortunately, Duke is a monopoly in North Carolina. There should be long-term, forward thinking about finite resources. Duke's mindset needs to change towards long-term sustainability.*
- *One, bury more power lines in the ground. Two, Duke needs to speak up about Belews Creek Steam Station in Stoke County; this plant is very efficient and clean and uses SCR devices, which reduce emissions 80%, and scrubbers, which reduces emissions 95%. The government is trying to shut down coal-burning plants. Duke needs to educate the government and prevent them from shutting down this plant. The government, meanwhile, is allowing China to drill in the Gulf, but trying to shut down U.S. companies.*
- *I'm on a fixed income and my check comes the fourth Wednesday of each month; this caused a billing issue and I explained to Duke I would like to change my billing schedule.*
- *I signed up for receiving my bill by email quite some time ago. The email address I used as part of my log-in is one I am no longer using. I have not been able to update the email in order to discontinue receiving my bills by email. I wish to go back to receiving my bills in the mail, but I can’t.*
- *Duke should correct my misspelled name on the bill.*
- *Duke should offer more tips on how to save energy. Duke should be on Google+.*
- *Duke should show more appreciation for long-time energy customers.*

- *Duke needs to update the CFL pricing on their website. Duke should also make better efforts to bury residential power lines and keep energy rates competitive.*
- *I filled out the form for free CFLs and I didn't receive them.*
- *I think that Duke should consider why someone has a spike in their bill.*
- *Let people use solar energy and sell back excess power to Duke Energy.*
- *They cut my power off for no reason once.*
- *Make it easier to pay off high bills and avoid power shut-offs.*
- *I have to pay a deposit for power because I was late for a bill or two.*
- *There was a large charge for a security deposit on my bill that I received this week; it's an additional charge of $430. I don't understand the charge and think there is a mistake. After 12 to 15 years of service with Duke Energy, I don't know why I'm getting this charge now. I still have not been able to alleviate the issue and customer service has been of no help to me.*
- *Decrease the number of power outages. I live in an area where there are a lot of outages.*
- *I have had a couple of power failures and voltage hiccups. I think reliability could be improved, especially in thunderstorms. I ended up purchasing an uninterruptable power supply for my computer.*
- *It takes too long to restore power after an outage; a few days ago, it took 10 hours. Last week, there was an outage and it took three or four hours to restore power and there wasn't even a major storm.*
- *We have lost electric in this house two times in the last week for 10 hours or more; it was just our street. When you have a house like this, and you pay $5,000 a year in taxes, you shouldn't be losing electric like that. I've heard Dominion Energy is pretty good and I wish we could get them instead of Duke.*
- *We have quite a few power outages and I worry about how the surges and outages are affecting the electricity in my old home.*
- *Duke should make better efforts to keep trees trimmed, bury power lines, and generally maintain their infrastructure.*
- *I would like Duke to do a better job of trimming trees, so we won't have as many power outages.*
- *I'd like to see more underground utility lines and less interruption of service.*
- *At least come out and do an inspection of the meter to see if it's functioning properly.*
- *I don't like the new meters. Since the new meter was installed, I've had higher rates and higher consumption and my bill has nearly doubled since the new meter was installed; that just does not seem right to me.*
- *They were very nasty to me. That hurt.*
- *I don't like that when I call customer services there's never a human to talk to; there's always some robot that doesn't understand what I'm trying to say.*
- *The customer service is absolutely horrible! Normally, when you call a company, they are more than willing to make sure you're happy. One specific example of how horrible Duke's customer service is this, which happened a year ago: my husband was being*

transferred for work and I called to set up a payment plan for our energy bill. Now, I've NEVER had to set up anything like this before. I ALWAYS paid our bills on time and everything. I set up a date to make our first payment and was told I had until 5:00 p.m. that day to make it. When I got home that day at 3:30 or so, my power was off. I called to find out why and was told I'd missed the deadline. The customer service supervisor said they would go back and listen to the recording of the first call to find out what the date and time was. They got back to me and said I'd missed the date by a day and wouldn't let me listening to the recording. They pulled my payment plan and I had to pay it all that day, plus a reconnection fee. I've never been late before and I had to go on their word that I got the wrong date for my first payment. They would not let me listen to the recording. They had me over a barrel. They didn't care; they weren't without power. If it had been my fault, fine. But, here I was doing what I was supposed to and we set it up, but they had me over a barrel. I couldn't not pay my bill. If it was my fault, I accept that, but they didn't give me a chance to listen to the earlier conversation and that's what's made me so upset.

Appendix M: Estimated Statistical Model

Variables:

- 201102 – 201308: Binary indicator variables for that YYYYMM
- temp: temperature
- humid: humidity
- wins: windspeed
- Indicator variables for participation in other Duke Energy programs:
    - cfl_promo: Residential Energy Efficiency: CFLs
    - free cf: : Residential Energy Efficiency: CFLs
    - hehc: Home Energy House Call
    - k12: Energy Education for Schools (NTC)
    - lowinc_weath: Low Income Weatherization
    - per-ohec: Personalized Energy Report
    - cfl_special: Residential Energy Efficiency: Specialty Bulbs
    - smsvr_hvac: Residential Smart $aver: HVAC
    - hvac_tune: Residential Smart $aver: Additional Measures
    - appl_recycle: Appliance Recycling Program
- partpilot: indicator variable for participation in MyHER pilot program
- Treat: indicator variable for participation in MyHER

Fixed-effects (within) regression		Number of obs	=	33888620
Group variable: id		Number of groups	=	1144071
R-sq:	within = 0.2098	Obs per group: min	=	1
	between = 0.0012	avg	=	29.6
	overall = 0.0616	max	=	32
		F(46,32744503)	=	189043.29
corr(u_i, Xb)	= -0.0385	Prob > F	=	0.0000

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
rdate						
201102	-14.78495	.036695	-402.91	0.000	-14.85687	-14.71303
201103	-23.4922	.0527177	-445.62	0.000	-23.59552	-23.38887
201104	-28.73476	.089918	-319.57	0.000	-28.91099	-28.55852
201105	-18.67737	.1147174	-162.81	0.000	-18.90221	-18.45253
201106	-9.980805	.1443215	-69.16	0.000	-10.26367	-9.69794
201107	-4.306629	.1571501	-27.40	0.000	-4.614638	-3.99862
201108	-9.165645	.1486072	-61.68	0.000	-9.456909	-8.87438
201109	-20.50542	.125495	-163.40	0.000	-20.75138	-20.25945
201110	-26.02354	.0771956	-337.11	0.000	-26.17484	-25.87223
201111	-19.79658	.058262	-339.79	0.000	-19.91077	-19.68239
201112	-13.13489	.0433049	-303.31	0.000	-13.21977	-13.05001
201201	-12.69383	.0312897	-405.69	0.000	-12.75516	-12.6325
201202	-16.08896	.0381011	-422.27	0.000	-16.16364	-16.01428
201203	-25.62193	.082443	-310.78	0.000	-25.78352	-25.46035
201204	-27.39705	.0831699	-329.41	0.000	-27.56006	-27.23404
201205	-21.96216	.1217103	-180.45	0.000	-22.2007	-21.72361
201206	-13.41366	.1294531	-103.62	0.000	-13.66739	-13.15994
201207	-6.94197	.1570174	-44.21	0.000	-7.249718	-6.634221
201208	-11.79442	.1440124	-81.90	0.000	-12.07668	-11.51216
201209	-20.92092	.123403	-169.53	0.000	-21.16279	-20.67906
201210	-24.50205	.0839397	-291.90	0.000	-24.66657	-24.33754
201211	-17.73075	.0412326	-430.02	0.000	-17.81156	-17.64993
201212	-13.23617	.044691	-296.17	0.000	-13.32376	-13.14858
201301	-9.488124	.0361203	-262.68	0.000	-9.558918	-9.417329
201302	-10.78169	.0261483	-412.33	0.000	-10.83294	-10.73044
201303	-17.57914	.0330122	-532.50	0.000	-17.64384	-17.51443
201304	-25.88954	.0805806	-321.29	0.000	-26.04748	-25.7316
201305	-23.96238	.1035104	-231.50	0.000	-24.16526	-23.7595
201306	-16.50796	.13974	-118.13	0.000	-16.78184	-16.23407
201307	-11.61436	.1495991	-77.64	0.000	-11.90757	-11.32115
201308	-13.27284	.1419556	-93.50	0.000	-13.55107	-12.99462
temp	.1218335	.0034765	35.04	0.000	.1150197	.1286473
humid	-.064362	.0011315	-56.88	0.000	-.0665797	-.0621442
wins	1.09087	.005668	192.46	0.000	1.079761	1.101979
cfl_promo	-4.998192	1.958089	-2.55	0.011	-8.835977	-1.160408
free_cf	-.2080289	.0091598	-22.71	0.000	-.2259817	-.190076
hehc	-2.306814	.0537345	-42.93	0.000	-2.412132	-2.201496
k12	.4221564	.0290386	14.54	0.000	.3652417	.4790711
lowinc_weath	-.0578045	.2646395	-0.22	0.827	-.5764883	.4608793
per_ohec	-1.908495	.0283667	-67.28	0.000	-1.964092	-1.852897
cfl_special	.8479179	.3214789	2.64	0.008	.2178308	1.478005
smsvr_hvac	-4.787584	.0499097	-95.93	0.000	-4.885405	-4.689763
hvac_tuneup	-.8169563	1.681548	-0.49	0.627	-4.112731	2.478818
appl_recycle	-2.028312	1.0662	-1.90	0.057	-4.118026	.0614026
partpilot	.1575164	.0567558	2.78	0.006	.0462771	.2687557
treat	-.503229	.0092151	-54.61	0.000	-.5212903	-.4851678
_cons	50.89793	.1776885	286.44	0.000	50.54967	51.2462

Appendix N: Number of Total Participants / Control Members by Month

monthID	Num. of Participant in Control	Num. of Participants in Test
201206	365406	85250
201207	365100	159367
201208	364817	215230
201209	362452	216003
201210	363965	333468
201211	362263	525203
201212	357764	701270
201301	356166	713243
201302	353479	716981
201303	350767	713379
201304	347992	726669
201305	345023	724317
201306	339488	706612
201307	338211	716931
201308	334781	714587
201309	279080	468208
201310	499	982

Appendix O: DSMore Table

Per Measure Impacts Summary for MyHER Carolina Duke Energy Customers

Impacts / Technology ⇩	Product code	State	EM&V gross savings (kWh/unit)	EM&V gross kW (coincident peak/unit)	EM&V gross kW (non-coincident peak/unit)	Unit of measure	Combined spillover less freeridership adjustment	EM&V net savings (kWh/unit)	EM&V net kW (coincident peak/unit)	EM&V net kW (non-coincident peak/unit)	EM&V load shape (yes/no)	EUL (whole number)
MyHER		Carolinas	183.7	0.0496	0.0572	home	0.00%	183.7	0.0496	0.0572	no	1
Program wide			**183.7**	**0.0496**	**0.0572**		**0.00%**	**183.7**	**0.0496**	**0.0572**		**1**

Notes: 1. Technology names should match the DSMore naming convention.
2. Energy impacts are average per installed unit for each DSMore technology and unit description (measure/ton/sq.ft., etc.)
3. Any analysis using a control group (such as billing analysis with a control group) does not need a freeridership adjustment (it is already in the analysis via the control group adjustment)
4. EM&V load shape: "no" if using standard DSMore load shape for technology units, "yes" if an evaluation-provided load shape should be used for DSMore.

Final Report

Impact Evaluation of the Smart Energy Now Program (NC) (Pilot)

Prepared for
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139 East Fourth Street
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February 21, 2014

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Executive Summary

The report presents the impact evaluation of Smart Energy Now (SEN), a pilot program offered by Duke Energy that also supports the "energy pillar" of Envision Charlotte. The study provides an estimate of the gross and net energy and peak demand savings associated with Smart Energy Now. The evaluation is focused on the energy savings achieved by SEN participants, with the evaluation objective to determine energy savings at the pilot program level. At the launch of the program, key building stakeholders (owners, whole building managers, and building occupants that are Duke Energy account holders) of the targeted buildings signed pilot program agreements with Duke Energy to be included in the pilot program. While a single building can have multiple tenants or occupants taking actions that support SEN, the analysis conducted for this study focused on energy consumed and saved at the sampled building level for the purpose of projecting savings for the pilot program.[1]

This evaluation is designed to assess the program's impacts as noted in the Commission decision approving the pilot for cost recovery and evaluation recommendations (Docket No. E-7 Sub 961). The evaluation effort also included a separate process evaluation[2] that developed recommendations for program design and operational changes to be considered for future commercial building information programs. The process evaluation also addressed the relationship between SEN and Envision Charlotte and the degree of overlap between those separate but coordinated activities. The conclusion of the process evaluation is that the Envision Charlotte energy savings initiatives were those associated with SEN. Envision Charlotte had no other energy savings initiatives that were associated with SEN, however the gross savings documented in this report include savings caused by non-SEN initiatives. The net savings documented in this report are those that are directly attributable to the influence of SEN, which removes savings attributable to the Duke Energy commercial Smart $aver efficiency program, and adjusts for free-ridership. The net energy savings are estimated based on information provided by owners, occupants, and tenants concerning those actions that were caused by SEN rather than those caused by or taken as a result of non-SEN reasons. The Commission decision (referenced above) instructs Duke Energy to evaluate the savings of the Envision Charlotte effort. The impact evaluation addresses the savings from the SEN program and, combined with the process evaluation (provided in a separate document) fulfills the evaluation requirements of the Commission's decision.

[1] The original evaluation plan included an assessment of the spillover energy impacts achieved within the homes of the building owners, managers, and operators as a result of SEN, and an assessment of the SEN program's reach outside of the SEN participants to non-participating SEN buildings and homes as a function of the program's spillover effects, but this component was dropped from the study at Duke Energy's request.

[2] TecMarket Works. "Process Evaluation of the Smart Energy Now Pilot Program Implemented in Charlotte, NC as a component of Envision Charlotte Sustainability Initiative," Prepared for Duke Energy, July 2013.

Key Findings

Table 1. Gross and Net Savings by Building Size

Building Size[3]	Gross Savings	Savings Less Smart $aver Program Participation	SEN Net Savings
Overall	8.4%	7.6%	6.2%
>= 100,000 Square Feet	8.7%	7.8%	6.4%
< 100,000 Square Feet	2.2%	1.3%	1.1%

The energy savings in terms of total kWh are shown in the tables below.

All Buildings	kWh/yr	% of Total
Total Consumption	511,563,334	
Gross Savings	43,129,055	8.4%
Savings Less Smart $aver rebates	38,872,425	7.6%
Net Savings after Smart $aver rebates and free riders	31,875,388	6.2%

Buildings >= 100,000 Square Feet		
Total Consumption	494,269,008	
Gross Savings	42,755,090	8.7%
Savings Less Smart $aver rebates	38,644,460	7.8%
Net Savings after Smart $aver rebates and free riders	31,688,457	6.4%

Buildings < 100,000 Square Feet		
Total Consumption	17,294,326	
Gross Savings	373,965	2.2%
Savings Less Smart $aver rebates	227,965	1.3%
Net Savings after Smart $aver rebates and free riders	186,931	1.1%

[3] Please note that all building sizes are self-reported in the Compass Tool as conditioned space in square feet.

Program Description

Smart Energy Now (SEN) is a program offered by Duke Energy dedicated to helping reduce energy consumption in Charlotte's Uptown office buildings through behavior change. SEN focuses significant efforts in helping building owners and operators reduce energy consumption and in educating and motivating building tenants and occupants to use energy wisely within their workspace. The program accomplishes this by focusing educational efforts and motivational campaigns on office workers within the participating businesses and by working with building owners and operators to identify ways in which the buildings' energy systems can be made to operate more efficiently.

Through the Envision Charlotte initiative, the goal is to reduce energy usage in Uptown Charlotte by 20% overall in five years. The specific goals of SEN are to reduce total energy consumption by 5% in buildings greater than 100,000 square feet (SF) in size, and reduce electricity consumption by 3% in buildings less than 100,000 square feet as a result of the pilot program's initiatives.

SEN is the first commercial energy efficiency behavior-change program launched in the United States and employs a first-of-its-kind wireless digital display in the participating buildings that shows real-time energy consumption levels of the population of participating buildings.

The SEN program is projected to impact the energy use of two distinct groups of people. These are:

1. **The tenants and occupants of the participating buildings** who have some control over the use of energy within their individual office and their leased common areas. These individuals may take action as a part of the motivational pushes of the SEN program by lowering their energy usage associated primarily with the operations of the lighting systems and office equipment within their office spaces.

2. **The building owners and managers** who operate the buildings and who are responsible for the performance of the capital equipment of the buildings. These individuals directly control the building's energy systems and purchasing decisions and have a good deal of control over the building equipment and energy management systems and approaches. This group includes personnel that operate and maintain the building HVAC and lighting systems, generally through a central building automation system.

Specific program activities targeted at these two groups are described below.

Occupants of the Participating Buildings

Kiosks

Real-time building energy consumption information is provided to building occupants via large real-time active public-area displays that provide detailed information on the Community's energy usage. This data includes information about real-time usage, historical trends, and information about what those numbers actually mean. SEN refers to these displays as "kiosks."

Campaigns

Smart Energy Now's campaigns were designed to promote behaviors that reduced energy use. These campaigns could be self-designed and implemented by a participating company, or the company could choose from several campaigns that had been developed by Duke Energy. Often, these campaigns took the form of games or challenges, sometimes with small incentives (such as a restaurant dining gift card) or recognition as a reward for participating. In other instances, the campaigns took the form of messaging to company employees.

The SEN program managers took a laissez-faire approach to the campaigns developed by tenants and occupants in order to minimize barriers to implementing campaigns. The theory behind this decision was the belief that campaigns developed and implemented by participants have the potential to be more effective than campaigns developed by others. In addition, this approach allowed for a host of new campaigns to be developed through or in coordination with SEN that could be assessed by Duke Energy for future replication or alteration. As a result, SEN did not always have complete descriptive details about the campaigns, or their associated implementation rates or more generic general progress reporting metrics from the campaigns. This also meant that other campaigns may have been implemented without SEN's knowledge. The campaigns developed and implemented are described in the process report.

Energy Champions

The Energy Champions are a group of approximately 1,000 individuals from the participating buildings who have volunteered to be the key energy efficiency expediters for their offices. Duke Energy supported the development of the SEN Energy Champions by providing training and materials. These Energy Champions were often the central focus point for the campaigns implemented in the participating buildings that resulted in occupant energy savings.

Website

A website dedicated to Smart Energy Now (www.smartenergycharlotte.com) provides the online channel with which SEN engages the Uptown Charlotte community. Some of the features it offers visitors include: access to the same live energy usage data that is available on the kiosks, information about SEN's activities including campaigns that are currently being conducted by the participating companies, ideas for new campaigns, and suggestions on how they can support SEN as an individual and as a company.

Building Owners and Managers

Participating building owners and managers also served as key program contact points. SEN worked with these stakeholders to help identify and capture savings from the central HVAC systems within the participating buildings. SEN provided these stakeholders with additional diagnostic and energy management tools and interactions beyond those provided to the building occupants. These are described below.

Compass Tool

The program targeted owners and managers of commercial buildings by providing them with real-time, web-based information directly to their office computers via their links to the Compass tool. The Compass tool allows users to go into their individual accounts and see how their building is performing, in real-time, at a high level of accuracy. At any 15-minute interval, the building owner or facility manager can see what their energy use is against an adjusted baseline representing the pre-program consumption. The tool also has a self-reporting feature to allow users to log changes to the way their building is operated. These logs can be useful for tracking building-specific accomplishments and updating the baseline energy use associated with that building.

Town Hall Meetings

Owners and managers were invited to "Town Hall" meetings, where professional energy experts helped them understand what kinds of actions can be taken to control energy use and understand what types of energy savings equipment and equipment use approaches can provide savings. A series of three Town Hall meetings were held from March through November 2012.

Channeling to Duke Energy Non-Residential Incentive Programs

To support the behavior change savings, building owners and managers have full access to Duke Energy's Smart $aver® Non-Residential Custom and Prescriptive programs. These and other relevant incentive programs were shared by appropriate Program Managers in conjunction with the Town Hall meetings. Building managers were also educated about the different types of audits they could conduct, and how to build the business case to upper management for carrying out those audit recommendations that include retrofits and upgrades. Savings for these other programs were tracked using the respective program tracking[4] databases, and the savings resulting from participation in the Smart $aver® Non-Residential Custom and Prescriptive programs were subtracted from the gross SEN program impacts.

The Targeted Area

This program targeted commercial office buildings in Uptown Charlotte. Participating buildings must have at least 10,000 square feet of commercial operations. A total of 59 participating buildings representing 74 businesses or operational organizations are included in this evaluation. Within this Community, there are 70 unique Duke Energy accounts engaged with Smart Energy Now. Buildings owned by Duke Energy have been excluded from the population of participating buildings analyzed for energy impacts.

[4] Savings from the program tracking databases are expressed as ex-ante gross savings estimates.

Methodology

The impact evaluation used a combination of pre/post billing data analysis and engineering analysis linked to occupant and building operator surveys about what actions were taken and the motivation for those actions. This approach guided the estimate of the SEN induced savings and savings that are not associated with SEN. The billing analysis was conducted across all participating buildings. The engineering analysis and DOE-2.2 calibration was informed by a combination of survey data and on-site measurement and verification data collection (M&V) on a sample of participating buildings. These activities are described below.

Company Representative Survey

The evaluation conducted a combination of phone and web-based surveys with Company Representatives. The Company Representatives were surveyed for their interaction with SEN and their office's efforts to save energy as part of SEN. The results of the survey were compiled to identify the actions taken and the number of occupants associated with each action. Company Representative surveys were sent out to individuals expected to know what actions were taken within their companies and the extent of those actions. The interviews also asked the respondent about what, if any, of the changes made would have been implemented without the efforts associated with the SEN program. Company Representatives were identified largely from the list of Energy Champions developed by SEN program staff. A total of 40 responses across 25 buildings were received.

Sampling Frame

The sampling frame for the Company Representative survey included the tenant companies that were participants in the Smart Energy Now program. These were all companies that had signed the Declaration of Change as an indication of their commitment. Because of concerns that an open solicitation for survey participants would yield uneven representation across the 59 participating buildings in the Uptown Charlotte region, this survey targeted the most knowledgeable person within each company to ask for their overall assessment as to the extent of energy efficiency behaviors in the company.

In this sampling frame there were 78 offices across 40 different buildings[5], with some individuals listed as the Company Representative for more than one office location. The data used in this study came from representatives from companies located across 24 different buildings.

The Company Representative survey instrument can be found in *Appendix B: Company Representative Survey* and consisted of two major sections. The first section focused on campaign-related behaviors that were left up to the respondent to specify, and the second section asked about behaviors around specific end-use measures.

For the campaign-related behaviors, respondents were asked to select from 8 options:

1. Computer-related
2. Plug load-related

[5] We formed a sample frame from contact lists within the SEN program buildings. Generally, there was more than one contact person per building due to multiple tenants within the buildings. At the time of the survey, we had contact information for 78 company representatives across 40 of the 59 buildings.

3. Lighting-related
4. HVAC-related
5. Double-sided printing
6. Turning off the coffee maker
7. Use of stairs
8. Use of revolving Doors

Several questions were included that gauged the overall influence of SEN on their behavior. These questions were used to determine an overall attribution score.

For the second section on specific behaviors, the evaluation team selected office behaviors with the largest energy savings potential. These behaviors were around:

- Computer and Monitor Use
- Lighting Use
- HVAC
- Equipment upgrades
- Actions in common/shared spaces

The responses to the Company Representative survey are summarized in Table 2.

Table 2. Company Representative Survey Disposition

Stratum	N Buildings with Responses	N Responses	N Buildings per Stratum	Sum SF of Responding Buildings	Sum SF in Stratum	Percent of Stratum Responding
1	5	11	6	4,740,319	5,676,290	84%
2	6	11	13	3,618,750	7,928,228	46%
3	14	18	40	2,873,812	6,797,474	42%

Facility Manager and Property Manager Survey

In-depth phone surveys were conducted with the building managers and operators of the participating buildings. The surveys were conducted in two waves. The purpose of the first wave was to gather baseline information about building systems and control strategies, and any energy management practices currently in place. The second wave of surveys was conducted near the end of the SEN pilot to inform the impact analysis by identifying changes in building operations and energy management practices, and assessing the role of SEN in motivating those changes.

The sampling frame for the Facility Manager and Property Manager survey is the same frame as used for the baseline survey. The survey instrument also was based upon the items in the baseline survey, with the addition of two types of questions. The original baseline survey asked about current operating conditions of equipment throughout the building. Responses to that survey were pre-filled in the second survey, and the facility manager was asked whether the operating conditions had changed. If there was a change to either the operation or to the equipment, the Facility Manager was asked to what extent SEN was responsible for the change. The survey instrument can be found in *Appendix C: Property/Facility Manager Survey*.

The facility/property manager survey disposition is shown in Table 3.

Table 3. Facility/Property Manager Survey Disposition

Wave	Survey	Responses	Percent of Floor Space Represented
1	Baseline	45 responses representing 46 buildings	69%
2	Impact	25 responses representing 25 buildings	50%

The second wave of Facility Manager and Property Manager surveys were conducted soon after an extensive survey activity was completed for the process evaluation. The lower survey response rate in the second wave is attributed to “survey fatigue” resulting from repetitive coordination and activity assessment communications with SEN, a set of surveys and interviews conducted by an academic institution that was allowed access to many of these same individuals, and the effects of two rounds of evaluation surveys and interviews.

Billing Analysis

The assessment approach consisted of a commercial building weather-normalized analysis of participant billing data, comparing the pre-program consumption with post-program consumption, adjusted for naturally occurring consumption changes through the use of control variables within a regression analysis to factor out other non-program impacts. To assess program impacts, billing data between the months of January 2010 and August 2013 were obtained for all participants of the program, allowing for pre and post participation billing data to be utilized in the billing analysis. The demarcation between the pre and post periods for each building was based upon the kiosk installation date.

Since each building had multiple accounts, the first step in the analysis was to aggregate all accounts associated with a given building on a monthly basis. This allowed the evaluation to focus its impact assessment at the building level. Accounts were identified by premise ID in order to capture all relevant accounts. Accounts that closed during the evaluation period due to ownership changes were paired with new accounts to establish a complete billing record. Since most of the buildings were multi-use buildings, small businesses such as restaurants and retail were associated with the premise. Small businesses that did not meet the SEN program qualifications were eliminated from the analysis. In order to account for differences in billing cycles, the usage for each sub-account was converted from billing cycle to calendar months based on each bills start and end date.

While data were available both across buildings (i.e., cross-sectional) and over time (i.e., time-series), it was determined that pooling the data into a panel dataset was not appropriate as the variability across was too great. Therefore, a single time-series model was estimated for each building, and the total program effect was found by averaging these individual results.

Algebraically, the regression model used in for each building is described as follows:

$$y_t = \beta_0 + \beta x_t + \gamma P_t + \varepsilon_t$$

where:

y_t = energy consumption for the building during month t
β_0 = constant term for the building
$ß$ = vector of coefficients
x_t = vector of variables that represent factors causing changes in energy consumption for the building during month t (i.e., weather, time)
γ = the estimated savings for the building
P_t = the binary program participation variable
ε_t = error term for month t.

With this specification, the only information necessary for estimation are those factors that vary month to month for each customer, and that will affect energy use, which effectively are weather conditions. Other non-measurable factors can be captured through the use of monthly indicator variables (e.g., to capture the effect of potentially seasonal energy loads and major changes to building occupancy or operations not attributed to the SEN program).

The effect of the program was captured by including a variable which is equal to one for all months after the SEN kiosk was installed at the building. The coefficient associated with this variable is the savings associated with the program.

Engineering Analysis

The billing analysis described above is the primary method used to compute energy savings for the SEN program. The billing data analysis allowed the team to estimate savings for a census of SEN program participants, thus eliminating sampling error. The engineering analysis described below was used to partition the billing analysis results into a set of specific actions. The engineering analysis used a combination of approaches.

Engineering Calculation Approach. Simple engineering estimates using onsite survey data and secondary research were used to estimate energy savings. This method of performing these analyses was similar to those used in deemed savings approaches embodied in various Technical Reference Manuals (TRM).

Prototypical Building Energy Model. A typical building model was created of representative buildings to generate impacts for various actions across typical building and HVAC system designs.

Datalogging of Selected Mechanical and/or Electrical Systems. Metering equipment was installed and building automation system (BAS) trend logs were established on equipment affected by the behavior changes. Monitoring occurred over a three week time period near the end of the summer in 2013.

The specific steps in the engineering analysis are described below:

1. On-site familiarization visit

The engineering analysis efforts began in December 2010 with an on-site familiarization visit to each of buildings participating or expecting to participate in the program. The purpose of the on-site visit was to begin to classify the types of buildings into building categories by the size and type of the building (square footage, stories, age, construction type, etc.) as well as the operations occurring within the buildings (office, retail, educational, medical, etc.). The general layout of the lobby areas of each building and potential kiosk locations were also assessed.

2. Preparation of sample selection criteria

The sample selection criteria to apply to the participant population were developed with the primary criterion being the "level of engagement." The intention was to pick buildings with a deep level of engagement so that representative levels of energy change could be identified within those buildings based on the actions that they had taken. The impacts quantified at the sampled buildings were used to develop unit energy savings estimates for a variety of energy savings actions. These unit savings estimates were applied to survey data on actions reported by Facility Managers, Property Managers, and Building Operators.

Additional criteria used to select buildings included building type, building size, and HVAC system type. The population was divided into 3 size-based strata. Each stratum represented approximately one third of the total conditioned floor space. Stratum 3 was further split into 3a and 3b to include smaller buildings under 100,000 SF.

Stratum	Size	Number of Buildings	Percent Total Floor Space
1	> 824,000 SF	6	27.8%
2	465,000 – 824,000 SF	13	38.9%
3	< 465,000 SF	40	33.3%
Total		59	100%
3a	100,000 – 465,000 SF	22	29.5 %
3b	< 100,000 SF	18	3.8%
Stratum 3 subtotal		40	33.3%

3. Preliminary selection of representative buildings

Seven buildings were selected across the three size strata. Two buildings were selected from Stratum 1, three buildings were selected from Stratum 2, and two buildings were selected from Stratum 3, as shown below.

Stratum	Building Selected
1	SEN-03
1	SEN-67[6]
2	SEN-07
2	SEN-19
2	SEN-41
3	SEN-22
3	SEN-08

[6] SEN-67 was reassigned to stratum 2 for billing analysis based on on-site verification of conditioned floor area.

4. On-site visit of preliminary sample of buildings

In this task we visited the preliminary sample of buildings and conducted more detailed examinations of the buildings' design, configuration, equipment profiles, and use conditions. This effort allowed a more complete understanding of the type and operational conditions and status of the building and its occupants. Interviews with building managers and operators were conducted to better understand the operations of the building and associated lighting and HVAC systems. The layout of the electrical room switchgear and trend logging capabilities of the building automation systems were assessed to help prepare site-specific M&V plans. A total of seven buildings were included in the initial site visits.

5. Final selection of buildings

Following the on-site visit and the interviews, a final selection of six buildings was made by the evaluation team. Site SEN-03 was dropped from the engineering analysis due to lower than expected level of SEN program engagement.

6. Site specific M&V plans

Site-specific measurement and verification (M&V) plans were developed for each building to guide the field evaluation work. The M&V plans and results are shown in *Appendix D: Site Reports*.

7. Analysis of energy impacts

An engineering estimate of the energy and peak demand savings associated with a variety of potential actions was developed based on the results of the M&V activities. A combination of simple engineering equations, DOE-2.2 modeling and metered data analysis was used, as described in *Appendix D: Site Reports*. The savings were normalized per square foot and per person and were expanded based on the Company Representative and Facility/Property Manager surveys conducted over a larger group of buildings. Since the billing analysis focused on kWh savings only, the engineering analysis was also used to calculate a set of demand savings factors, in terms of peak kW saved per kWh saved. The demand savings factors derived from the engineering analysis were applied to the kWh savings estimates from the billing analysis to estimate the customer and coincident peak demand savings reported in *Appendix F: DSMore Table*.

8. Coordination with Smart $aver Custom and Prescriptive programs for rebated savings

A search of the program tracking databases for the Non-Residential Smart $aver Prescriptive and Custom programs was conducted for each SEN participant. Savings associated with the SEN participants was identified.

Evaluation Dates

Evaluation Component	Dates of Analysis
Online Surveys with Occupants of SEN Buildings	April, 2013
Online and Telephone Surveys with Property Managers and Facility Managers	April 25, 2013 – May 10, 2013
First and last billing data dates used	January 1, 2010 – September 30, 2013
First and last dates of monitoring for engineering analysis	September 17, 2013 – October 3, 2013

Impact Analysis Results

The results of the billing analysis for each participating building are shown below. The results are shown by stratum, with Stratum 3 subdivided into Stratum 3a (100,000 SF to 465,000 SF) and Stratum 3b (less than 100,000 SF). Stratum 3b was created to separately investigate the savings from smaller buildings; buildings in Stratum 3b have a savings goal of 3%, while all other buildings have a savings goal of 5%. The t-values indicate the change in consumption during the pre/post period is statistically significant for most of the buildings. Note: a negative value in the columns of Table 4 through Table 7 indicate an increase in energy consumption.

Table 4. SEN Billing Analysis Results for Stratum 1

TMW ID	Building Address	Gross Energy Savings (kWh/day)	t-value	Consumption (kWh/day)	Gross Energy Savings (% of total)	Gross Annual Savings (MWh)
SEN-44	[redacted]	5,850	3.44	81,653	7.2%	2,135
SEN-31	[redacted]	-6,283	-2.58	66,258	-9.5%	-2,293
SEN-34	[redacted]	3,249	3.65	48,029	6.8%	1,186
SEN-43	[redacted]	4,127	3.73	36,141	11.4%	1,506
SEN-54	[redacted]	12,754	4.56	86,693	14.7%	4,655
SEN-03	[redacted]	-2,508	-1.60	50,891	-4.9%	-915

Stratum 1 represents 27.8% of the square footage in the pilot program and 14.5% of gross annual savings achieved (6,274 MWh). In all, four buildings met the 5% savings goal, and two did not. The average unweighted building savings was 4.3% and the savings for the stratum taken as a whole was 4.7%.

Table 5. SEN Billing Analysis Results for Stratum 2

TMW ID	Building Address	Gross Energy Savings (kWh/day)	t-value	Consumption (kWh/day)	Gross Energy Savings (% of total)	Gross Annual Savings (MWh)
SEN-68	[redacted]	39,502	6.25	135,282	29.2%	14,418
SEN-67	[redacted]	6,060	2.76	63,663	9.5%	2,212
SEN-91	[redacted]	2,494	4.57	37,388	6.7%	910
SEN-04	[redacted]	3,220	1.36	32,511	9.9%	1,175
SEN-19	[redacted]	3,070	4.17	87,391	3.5%	1,120
SEN-64	[redacted]	2,288	1.49	30,306	7.6%	835
SEN-07	[redacted]	589	0.47	38,961	1.5%	215
SEN-24	[redacted]	2,742	2.84	26,686	10.3%	1,001
SEN-26	[redacted]	3,427	3.97	35,872	9.6%	1,251
SEN-13	[redacted]	6,829	2.65	49,857	13.7%	2,493
SEN-10	[redacted]	-1,997	-2.73	34,441	-5.8%	-729
SEN-02	[redacted]	2,860	4.29	28,274	10.1%	1,044
SEN-41	[redacted]	7,812	11.50	32,890	23.8%	2,851

Stratum 2 represents 38.9% of the square footage in the pilot program and 66.8% of gross annual savings achieved (28,796 MWh). In all, ten buildings met the 5% savings goal, and three did not.

The average unweighted building savings was 10.0% and the savings for the stratum taken as a whole was 12.5%.

Table 6. SEN Billing Analysis Results for Stratum 3a

TMW ID	Building Address	Gross Energy Savings (kWh/day)	t-value	Consumption (kWh/day)	Gross Energy Savings (% of total)	Gross Annual Savings (MWh)
SEN-32	[redacted]	2,401	5.97	25,469	9.4%	876
SEN-01	[redacted]	1,908	3.37	23,761	8.0%	696
SEN-53	[redacted]	1,610	4.93	23,405	6.9%	588
SEN-45	[redacted]	-2,076	-2.86	19,984	-10.4%	-758
SEN-56	[redacted]	-588	-0.79	23,888	-2.5%	-215
SEN-06	[redacted]	3,097	7.23	22,093	14.0%	1,130
SEN-25	[redacted]	-545	-1.18	10,569	-5.2%	-199
SEN-22	[redacted]	1,382	3.73	19,207	7.2%	504
SEN-21	[redacted]	1,989	3.65	46,806	4.2%	726
SEN-15	[redacted]	3,639	4.37	21,489	16.9%	1,328
SEN-57	[redacted]	413	2.23	15,460	2.7%	151
SEN-66	[redacted]	3,145	7.39	14,703	21.4%	1,148
SEN-37	[redacted]	1,188	3.43	10,629	11.2%	434
SEN-42	[redacted]	579	1.81	6,014	9.6%	211
SEN-46	[redacted]	1,170	3.47	11,198	10.4%	427
SEN-62	[redacted]	-369	-3.60	5,761	-6.4%	-135
SEN-47	[redacted]	202	1.09	12,376	1.6%	74
SEN-20	[redacted]	373	2.04	9,015	4.1%	136
SEN-49	[redacted]	115	0.40	14,411	0.8%	42
SEN-14	[redacted]	353	1.24	5,384	6.6%	129
SEN-61	[redacted]	474	8.02	4,658	10.2%	173
SEN-12	[redacted]	591	3.75	4,692	12.6%	216

Stratum 3a represents 29.6% of the square footage in the pilot program and 17.8% of gross annual savings achieved (7,682 MWh). In all, 13 buildings met the 5% savings goal, and nine did not. The average unweighted building savings was 6.1% and the savings for the stratum taken as a whole was 6.0%.

Table 7. SEN Billing Analysis Results for Stratum 3b

TMW ID	Building Address	Gross Energy Savings (kWh/day)	t-value	Consumption (kWh/day)	Gross Energy Savings (% of total)	Gross Annual Savings (MWh)
SEN-16	[redacted]	-341	-1.29	6,239	-5.5%	-124
SEN-63	[redacted]	-287	-1.25	5,207	-5.5%	-105
SEN-08	[redacted]	184	1.10	3,852	4.8%	67
SEN-60	[redacted]	266	0.87	3,834	6.9%	97
SEN-05	[redacted]	624	12.57	2,111	29.6%	228
SEN-29	[redacted]	-326	-0.83	7,013	-4.7%	-119
SEN-36	[redacted]	482	2.92	2,314	20.8%	176
SEN-90	[redacted]	442	5.55	2,541	17.4%	161
SEN-51	[redacted]	153	1.48	2,061	7.4%	56

SEN-35	[redacted]	8	0.31	368	2.3%	3
SEN-69	[redacted]	-2	-0.02	2,534	-0.1%	-1
SEN-09	[redacted]	67	2.01	1,315	5.1%	24
SEN-23	[redacted]	60	1.88	637	9.5%	22
SEN-50	[redacted]	185	3.95	970	19.1%	68
SEN-30	[redacted]	-15	-0.66	583	-2.6%	-5
SEN-11	[redacted]	45	1.00	631	7.1%	16
SEN-28	[redacted]	86	3.14	545	15.8%	31
SEN-39	[redacted]	-607	-7.59	4,627	-13.1%	-222

Strata 3b represents just 3.7% of the square footage in the pilot program and 1% of gross annual savings achieved (373 MWh). The savings goal for buildings less than 100,000 SF was 3%. In all, 11 buildings met the 3% savings goal, and seven did not. The average unweighted building savings was 6.1% and the savings for the stratum taken as a whole was 2.2%.

The stratum contribution of the overall gross electricity savings is shown in Figure 1 below.

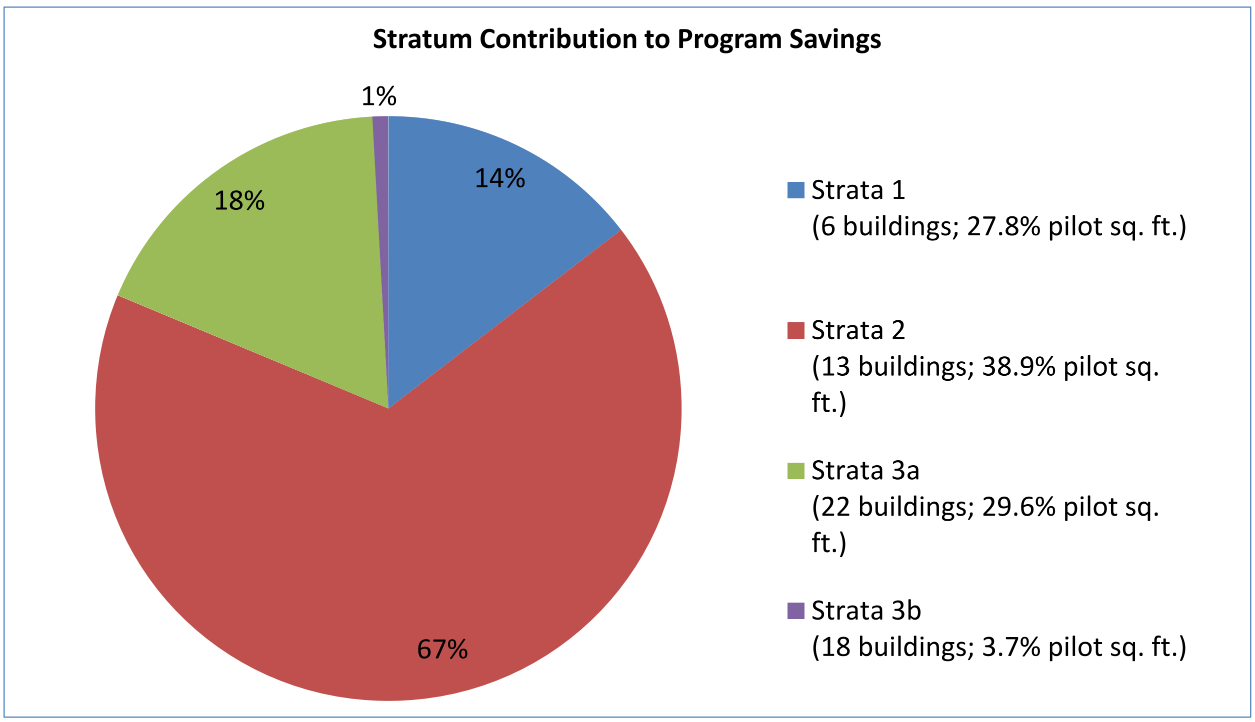

Figure 1. Stratum Contribution to Gross Program Savings

Stratum 2 has the highest contribution to program savings. Although there is more total conditioned floor area in Stratum 2, the fraction of the total savings exceeds the floor area fraction. The number of buildings meeting the percent savings goals by stratum is shown in Figure 2 below.

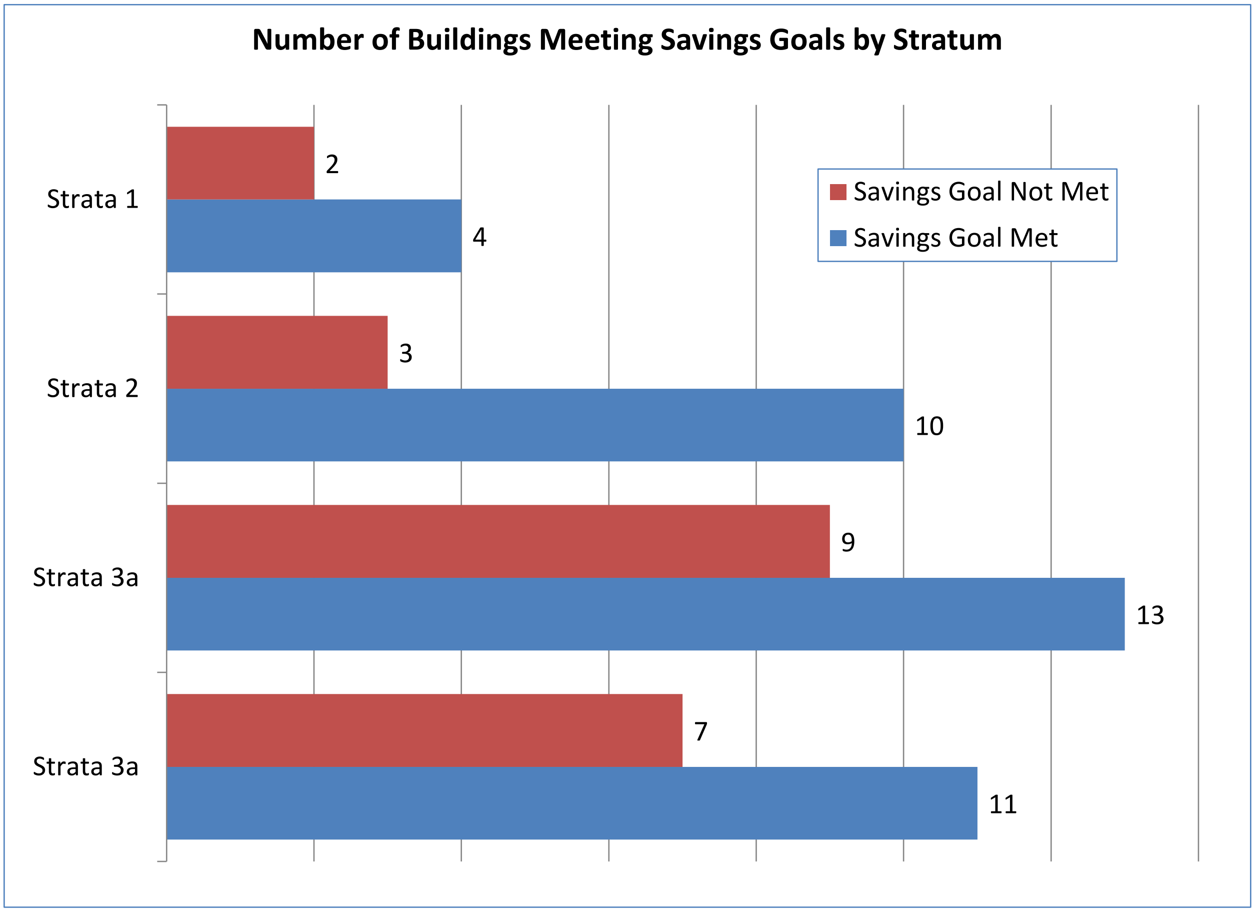

Figure 2. Number of Buildings Meeting Savings Goals by Stratum

Buildings in the higher size strata were more likely to meet the savings goals. Only about 60% of the buildings in the small stratum met the savings goals. The total savings and high/low range of savings as a percent of total consumption by stratum is shown in Figure 3 below.

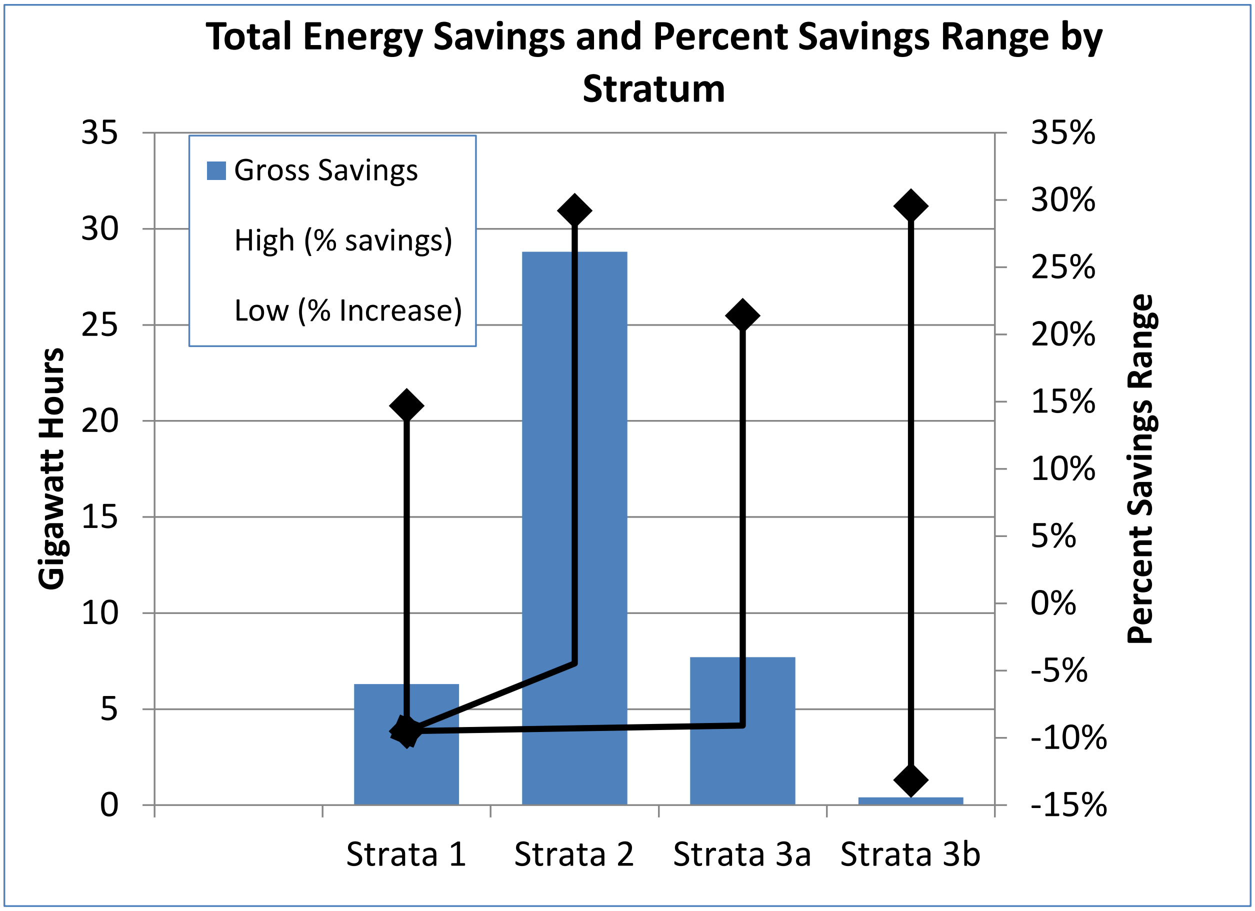

Figure 3. Total Gross Energy Savings and Percent Savings Range by Stratum

A few of the buildings showed an increase in consumption between the pre and post SEN program periods. The increase in consumption may be caused by differences in the building occupancy or operations that were not reported. The billing analysis incorporated variables to account for non-SEN related actions that can affect building energy consumption, such as changes in occupancy rates, tenants, and operating hours, and additions or removals of major equipment or process loads. The analysis relied on survey data to identify those changes. Given the relatively low response rate to the Facility/Property Manager survey, it is expected that some of the non-SEN related changes went unreported. Adjusting the analysis to account for non-SEN related changes will likely reduce the magnitude of the consumption difference at these sites and thereby increase the overall program savings. Thus the billing analysis represents a conservative estimate of overall program savings.

The contribution to total program savings, number of buildings meeting savings goals, savings range and number of buildings across the strata are shown in Figure 4.

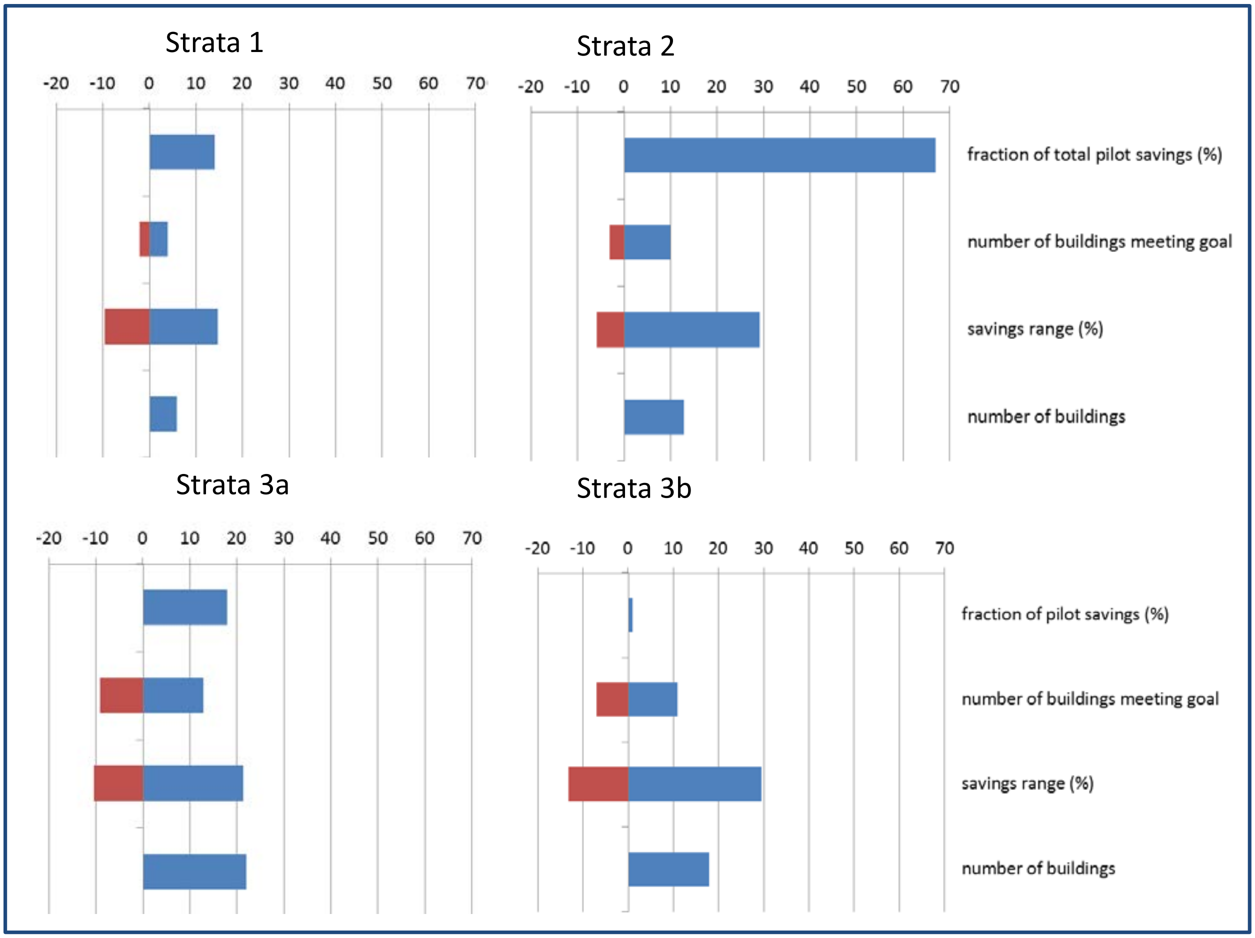

Figure 4. Energy Savings Metrics Across Strata

The dependency of energy savings energy use intensity (kWh/SF) across the strata was investigated. The results are presented in Figure 5 below.

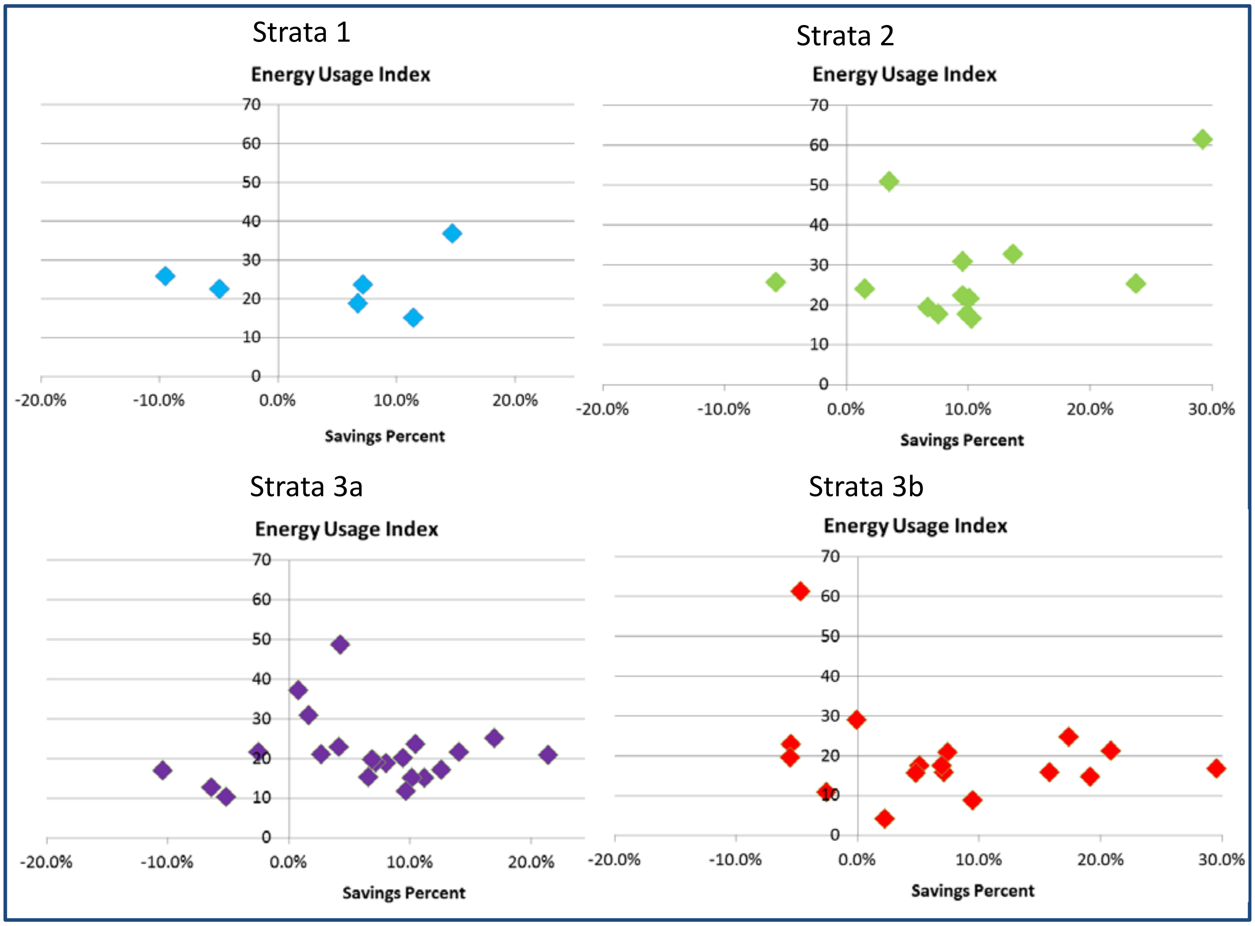

Figure 5. Energy Savings as a Function of Building Size Stratum and EUI

There is no strong trend in energy savings as a function of energy use intensity. Most buildings tend to cluster around an EUI of 20 kWh/SF, and the energy savings vary strongly across buildings with similar EUIs.

The engineering analysis was used to partition the energy savings into specific components. The components were defined from the survey data, and were grouped into the following categories:

- Turn off lighting in personal workspace
- Turn off lighting in common areas
- Turn off computers when not in use
- Replace desk lamp with energy efficient model
- Update computer monitor
- Replace desktop computer with laptop

The Facility/Property Manager surveys were also used to partition the savings into specific actions taken by facility and/or property managers. Actions reported included:

- Implement a Supply Air Reset strategy
- Reduce air handler fan run time

- Implement additional thermostat setback and setup strategies
- Install VFDs on cooling tower fans

Unit energy savings estimates for each of these actions is shown in *Appendix E: Engineering Estimates of Unit Energy Savings*.

The unit energy savings estimates are projected into the survey results[7] to estimate the relative fraction of energy savings resulting from these actions. The results are shown below.

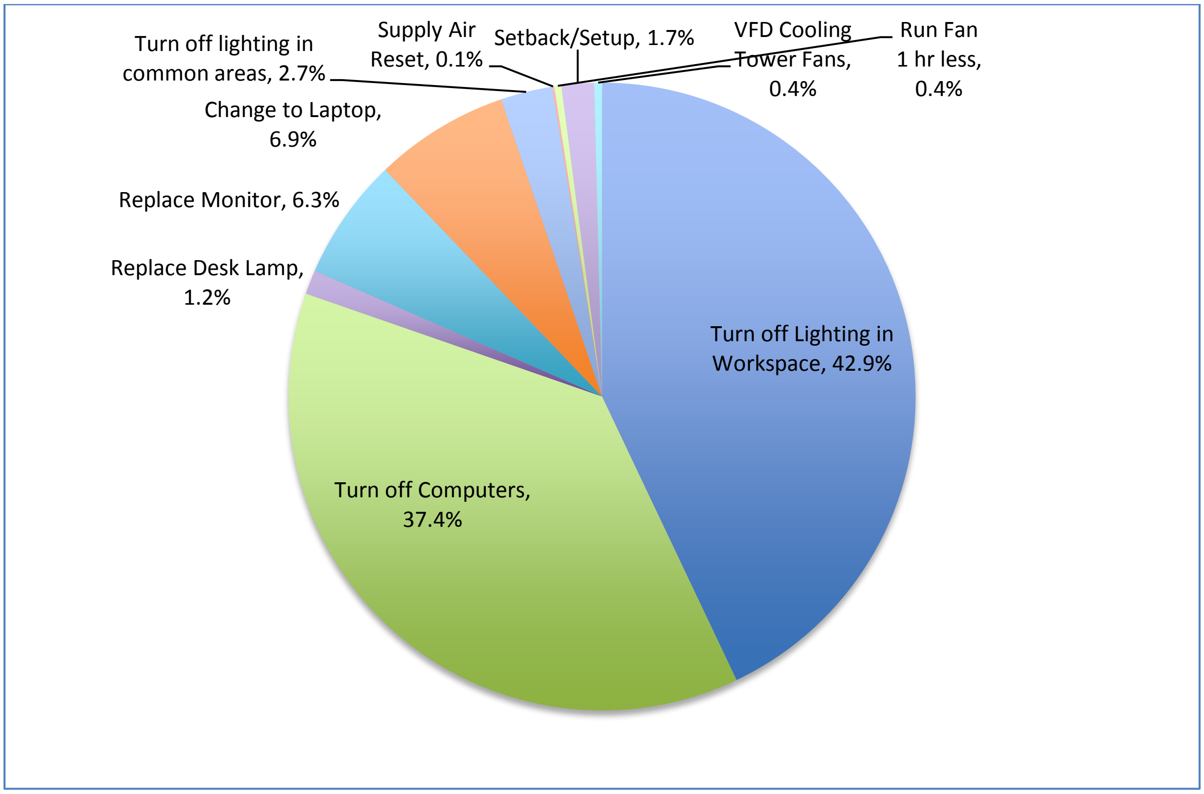

Figure 6. Energy Savings Fraction by Action from Engineering Analysis

[7] The number of survey responses to questions about specific behaviors was low, ranging from 1 to 10 responses. Because it is likely that this low response rate would not be representative of the larger SEN population, we recommend that further studies be conducted before the program design is changed, and that the program not be changed on the basis of Figure 6 alone. In particular, the low response rate to the Facility/Property Manager survey may be responsible for the low overall impact of actions taken by this group (about 2.6% overall).

Net Savings Analysis

The Company Representative and Facility/Property Manager surveys contained questions regarding the relative influence of SEN on their decisions to take an energy saving action. Because the SEN program was launched in coordination with Envision Charlotte, there was some concern that some energy savings perhaps should be attributed to Envision Charlotte. This may be due to reports from the program staff that building occupants sometimes used the names SEN and EC interchangeably. The findings from the process evaluation's Company Representative survey also showed some confusion around the two names. Smart Energy Now was clearly defined at the start of all surveys, and the survey concluded with a question about awareness around Envision Charlotte. Responses indicated there was a limited degree of confusion around the two names. When asked, "*Can you please tell us some of the things that Envision Charlotte is trying to accomplish*," responses included, "*I never understood the difference between Envision Charlotte and Smart Energy Now*," and "*Same as Smart Energy Now*", in addition to many correct answers. Despite this, there are several reasons the concern about incorrect attribution of energy savings is unfounded, even if some of the participants may have confused the names.

The first reason is a chronological one. Other than SEN, there were no behavior change activities, campaigns, or programs that had been launched in any of the other pillars. Envision Charlotte's other pillars remained in the planning stages. This was confirmed in the process evaluation interviews with the Envision Charlotte stakeholders, who acknowledge that the energy pillar campaigns were funded entirely by Duke Energy's Smart Energy Now. At the time of the process evaluation interviews, the Envision Charlotte stakeholders reported that no other source of funding had yet been identified for funding non-Duke Energy campaigns, though the Envision Charlotte board did have enough funding to hire an Executive Director to coordinate future fundraising and planning efforts. The Executive Director confirmed: "*Smart Energy Now was well underway when I came on board. With Vincent's leadership and Duke's support, that really had been going well. It was well established and had forward momentum…Really, most of the work with Envision Charlotte was Smart Energy Now. When I came on board a year ago, there were some plans underway for waste, some preliminary plans for an air program. Water was a concept but not well established. So my charge was, 'Let's flesh out the plans for all of these other pillar areas so we can start moving forward on an operational basis, so we can say we are something other than just SEN'*."

Second, the survey questions acknowledged the possibility of many influences, and took pains to clarify that the question only addressed SEN-specific issues. For example, the Company Representative survey asked, "*Please rate the extent to which this campaign influenced your company to take those actions, compared with all other influences. Please rate on a scale of 0 to 10, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence*." Similarly, in the facility manager impact survey, every attribution question made clear that they were being asked to only rate the influence of Smart Energy Now, using the following language, "*There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influenced your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?"*

Attribution to SEN over other influences was scored using a preponderance of evidence approach based upon the responses to the survey questions on campaign-related behaviors[8]. This approach queried the people who are most knowledgeable about the action being taken on the degree of attribution of those actions taken. The evaluation team developed a rubric for the scoring process. This process relies on responses from experts most knowledgeable about their company's energy efficiency activities. In most cases, as in this study, respondents provide consistence allocation of attribution across the battery of multiple questions. However, because the attribution questions are asked independently, one question at a time, there were occasions in which respondents can provide more than one reason for why an action is taken, or in some cases can provide reasons that appear inconsistent, such as in the example provided below to show this potential relationship.

There were four questions asked of surveyed representatives or managers that were relevant to SEN attribution scoring.

A) How did you first learn about this campaign?

( ) It was suggested by a SEN staff member
( ) We learned about it on the SEN website
( ) I designed it myself
( ) Someone in my company designed it
( ) I don't know
( ) Other: ____________________

B) Since this Smart Energy Now campaign started promoting certain activities and actions in the workplace, did your company:

( ) Start doing the activity/action for the first time,
( ) Increase the frequency of the activity/action that your company had already been doing,
( ) Not change any actions at all,
( ) Decrease the frequency of the activity/action that your company had already been doing, or
( ) Stop doing the activity/action?

C) Please rate the extent to which this campaign influenced your company to take those actions, compared with all other influences. Please rate on a scale of 0 to 10, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence."

D) Of the other sources that influenced your company to change their actions in response to this campaign, what were the biggest influences? Please provide up to three of the most important ones.

[8] Unfortunately, the response rate to the individual behaviors in the second section were too low to yield usable data, with a range of 1 to 10 responses per behavior.

The score was determined by looking at the first two questions and starting with a score of 10 if either, 1) the respondent reported that they first learned about the campaign from a SEN staff member or on the SEN website, or 2) the respondent reported that their company started taking an action since SEN started promoting that action. If only one of these conditions were met, the initial score started at 9 and if neither was met, the score started with 8. From that score, we reviewed the numerical rating given by the respondent to question C, subtracting 1 point if

- the rating was less than 10 and another influence was cited in question D,
- the rating was low (less than 7)

This rubric covered all but two responses where there seemed to be an inconsistency among a respondent's answers: One respondent reported that at least a part of their campaign was already in place prior to SEN but still rated SEN's influence on the actions taken by the company as a 7; thus, we scored this respondent's attribution as 7. Another respondent reported that while someone in their company came up with the idea of the campaign, it was SEN that caused them to start taking the action for the first time. In this similar case the respondent rated SEN's attribution with a score of 3, thus we scored this respondent's attribution at 3 for the purposes of the allocation of savings. As noted in these two cases, the respondent's attribution prevailed in the evaluation scoring process. That is, only the action attribution score provided by these two respondents were used, even when circumstances suggested that it might have been a somewhat higher or a somewhat lower score than what was provided. Because these possible inconsistences only occurred in two cases and did not significantly impact estimated savings, the evaluation team is confident in allocating net attribution results based on these scores.

Across the 25 valid responses, the mean attribution score was 8.2 with a standard deviation of 1.7. Based upon this, we used 0.82 as the Net to Gross (NTG) for attribution of energy saving behaviors to SEN.

In addition to adjusting for the net to gross ratio, savings resulting from participation in the Duke Energy Smart $aver Non-Residential Prescriptive and Smart $aver Custom programs was removed from the gross savings estimated from the billing analysis. The program tracking databases for these programs were queried, and SEN buildings that also participated in these programs were identified. A total of 14 buildings were identified as participants in the Duke Energy Smart $aver programs. The energy savings associated with the rebates provided by these programs as recorded in the program tracking system were subtracted from the gross savings for each building.

The net savings, accounting for Smart $aver program participation, is shown in Table 8 below. Consistent with the filing approving the SEN program, the savings are shown separately for buildings 100,000 SF and higher, and buildings less than 100,000 SF.

Table 8. Gross and Net Savings by Size Category

Size Category	Gross Savings	Savings Less Smart $aver Program Participation	SEN Net Savings
Overall	8.4%	7.6%	6.2%
>= 100,000 SF	8.7%	7.8%	6.4%
< 100,000 SF	2.2%	1.3%	1.1%

The energy savings in terms of total kWh are shown in the Tables below.

All Buildings	kWh/yr	Percent of Total
Total Consumption	511,563,334	
Gross Savings	43,129,055	8.4%
Savings Less Smart $aver rebates	38,872,425	7.6%
Net Savings after Smart $aver rebates and free riders	31,875,388	6.2%

Buildings >= 100,000 SF		
Total Consumption	494,269,008	
Gross Savings	42,755,090	8.7%
Savings Less Smart $aver rebates	38,644,460	7.8%
Net Savings after Smart $aver rebates and free riders	31,688,457	6.4%

Buildings < 100,000 SF		
Total Consumption	17,294,326	
Gross Savings	373,965	2.2%
Savings Less Smart $aver rebates	227,965	1.3%
Net Savings after Smart $aver rebates and free riders	186,931	1.1%

Gross and net energy savings across all size strata are shown in Figure 7 below.

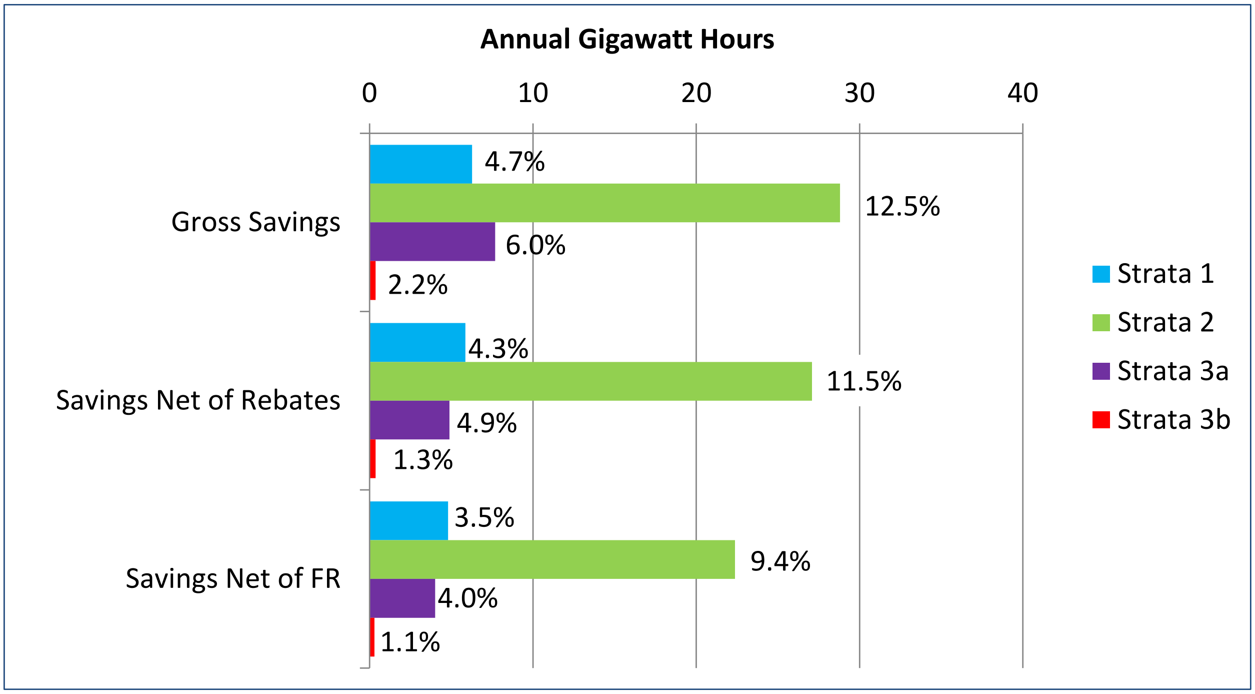

Figure 7. Gross and Net Savings by Stratum

Stratum 2 provided the largest average per building savings percentage across all categories. Smart $aver rebates accounted for 7.5% of the Stratum 1 savings, 7.6% of the Stratum 2 savings, 19.0% of the Stratum 3a savings, and 39.0% of the Stratum 3b savings. Although the influence of the rebate programs overall was small, the savings in Strata 3a and 3b were most influenced by rebate program participation.

Appendix A: Memo on Impact Evaluation Schedule

TecMarket Business Center
165 Netherwood Road
2nd Floor, Suite A
Oregon, WI 53575

Memorandum

To: Ashlie Ossege, Duke Energy
From: Nick Hall, TecMarket Works
Date: January 18, 2012
Subject: Changes to the Impact Evaluation Schedule for “Smart Energy Now”

Description of Smart Energy Now Program

Smart Energy Now is a pilot program aimed at approximately 170 commercial customers in roughly 65 office buildings (buildings with a minimum of 10,000 sq. ft.) within the Charlotte city center as defined by the I-277 loop. The program is designed to create energy and capacity reductions through behavioral modifications and community commitment to create an environmentally sustainable urban core, called Envision Charlotte.

The Smart Energy Now program provides new information to customers (owners, facility managers, and occupants of commercial office buildings), giving them increased insights into their own energy use by providing them with more detailed information on the building’s energy usage and allowing them to make comparisons between their building’s energy performance and others within their community, as well as actionable recommendations to improve their energy performance.

The goal is for participants (owners, managers, and occupants) to act on this new knowledge by changing their behaviors, thus creating energy savings. These savings likely will not have occurred without Smart Energy Now.

The pilot consists of two main components: Providing customers with detailed, near real-time information on their energy consumption, and providing analytic tools to allow reductions of total energy use, energy intensity, and load shapes. While customers only receive specific information related to their accounts, they are also provided with near real-time data on aggregate community-level energy performance. This occurs through digital displays placed in the main lobby of participating buildings and in public areas. This pilot also tests various forms of building owner and tenant engagement and education.

Brief Summary of Evaluation Plan

The evaluation plan submitted by TecMarket Works and dated December 28, 2011 includes a process and impact evaluation of Smart Energy Now. The plan presented a broad-scope evaluation effort designed to document the energy impacts associated with Smart Energy Now and to assess the design and operational components of the program through a series of process evaluation efforts.

Changes to the Impact Evaluation Timeline

The original timeline as filed indicated that the full report presenting both the process and impact evaluation results would be final in June of 2013. However, in response to the pilot being approved through the end of 2013, the timing for SEN displays to be two full years of summer and winter, and newly designed energy reduction campaigns discovered during the program management process evaluation interviews that focus on tenant behaviors that are expected to impact the 2013 air conditioning load, the evaluation team recommends moving the completion date for the impact evaluation report to January of 2014. This will allow the evaluation team to include the savings achieved via the developing campaign that focuses on the 2013 air conditioning load reductions. The inclusion of the 2013 assessment will allow more complete and more reliable impact savings estimates achieved via the Smart Energy Now pilot program. If the impact report due date remains June 2013, the savings from the 2013 air conditioning load reduction will not be included in the impact analysis report, and will substantially under-count the full three year pilot program effects. The due date for the process evaluation can remain as planned because a significant amount of customer and program management feedback can be collected and reported prior to the end of 2013. The following table provides the current report due dates and the recommended changes to these dates.

Evaluation Component	Report Date Indicated in Evaluation Plan Dated December 28, 2011	Recommended Report Due Date
Final Process Evaluation Report	June 28, 2013	Unchanged
Final Impact Evaluation Report	June 28, 2013	January 31, 2014

Appendix B: Company Representative Survey

Hello,
My name is ___________ and I am with TecMarket Works. Duke Energy's Smart Energy Now program manager gave us your name and suggested we contact you as the person who may have the most knowledge about any company-wide efforts to reduce energy use at your workplace.

We are the independent evaluation team that is responsible for evaluating any changes in energy use at your office. Would you be willing to help us with this evaluation study? Or, is there someone else at your company who might have more knowledge about any efforts at your company to reduce energy use?

We would like to have you complete a questionnaire on behalf of your company about actions that you and your colleagues may, or may not, be taking. The questionnaire will take about half an hour by phone at any time convenient for you or I could give you a link to the online version of this questionnaire for you to fill out no later than *<insert deadline here>*.

( ) Via phone, now
( ) Via phone, at (date & time) ____________
( ) Online (*read or email them the tiny URL*)

Intro/Background

1. **What is the name of the company for which you work?** ____________

2. **What is your title at your company?** ____________

3. **What is the name or street address of the building you work in?** ____________

3a. **Please rate on a scale of 0 to 10 your familiarity with how successful efforts have been to reduce energy use in your office, where 0 means "zero familiarity" and 10 means "complete familiarity".**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

4. **Approximately how many people in your company work in this building?**
( ) Approximately ____________
( ) Don't Know

4a. **Does your company have offices in other buildings in Uptown Charlotte?**
( ) Yes
( ) No

4b. **Please give me the names of those buildings and rate on a scale of 0 to 10 your familiarity with how successful efforts have been to reduce energy use in those offices,**

where 0 means "zero familiarity" and 10 means "complete familiarity".

	Building Name or address	Familiarity Rating	Alternate Contact
1			
2			
3			
4			
5			

(If building rating is either >= rating for their own building (3a) or ≥7, please include that building in the survey, with a maximum of two additional buildings with the highest rankings)

For these next questions, I'd like you to respond as they apply to the building in which you work.

5. **Are you familiar with a program called Smart Energy Now or Envision Charlotte?**
( ) Yes
( ) No
( ) Don't Know

If no or DK:
Smart Energy Now is a program from Duke Energy dedicated to helping reduce electric energy consumption in Charlotte's Uptown office buildings.

5a. **Do you recall hearing about this program?**
( ) Yes
( ) No
( ) Don't Know

6. **Have you been working at this office for more than one year?**
( ) Yes
( ) No

7. **Has your company conducted any kind of workplace energy audit to see where energy use could be reduced?**
( ) Yes
( ) No
( ) Don't Know

If Yes, 7a. **Would you have a copy of the recommendations from that audit, or would you happen to remember some of the recommendations?**
( ) Don't remember
( ) recommendations _____________

If Yes, 7b. **Which recommendations did your company use?**
( ) Don't remember
( ) recommendations _____________

8. **Has your office participated in or adopted specific activities that are part of the Smart Energy Now Campaigns?**
( ) Yes
( ) No
( ) Don't Know

If no or don't know: 8a. **Some examples of Smart Energy Now Campaigns are "Crab You're It" and "Adopt A Light", which are games that co-workers play to motivate each other to turn off unused lights. Do either of those campaigns sound familiar?**
( ) Yes
( ) No
( ) Don't Know

If yes, 8b. **How many total campaigns have been launched at your workplace?**
( ) 0
( ) 1
( ) 2
( ) 3 or more
( ) Don't know

9. **Including Crab You're It and Adopt a Light, please tell us about each of the campaigns that has been launched at your company and describe what activity or action it was promoting. If you do not recall either the name of the campaign or what it asked you to do, please indicate that as well.**
( ) Name ____________
( ) I don't remember the name

9a. **Action/Activity being promoted**
( ) Computer-related
( ) Plug load-related
( ) Lighting-related
( ) HVAC-related
( ) Double-sided printing
( ) Turn off coffee maker
( ) Use stairs
( ) Use revolving Doors
( ) I don't remember the activity
( ) Other ____________

9b. **How did you first learn about this campaign?**
( ) It was suggested by a SEN staff member
( ) We learned about it on the SEN website
( ) I designed it myself
( ) Someone in my company designed it
( ) I don't know

( ) Other ____________

9c. **Since this Smart Energy Now campaign started promoting certain activities and actions in the workplace, did your company…**

( ) **Start doing the activity/action for the first time,**
( ) Increase the frequency of the activity/action that your company had already been doing,
( ) Not change any actions at all,
( ) Decrease the frequency of the activity/action that your company had already been doing, or
( ) Stop doing the activity/action?
( ) Don't Know

If response indicates that the company changed their actions associated with a campaign
9d. **Please rate the extent to which this campaign influenced your company to take those actions, compared with all other influences.. Please rate on a scale of 0 to 10, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence."**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

9e. **Of the total number of people in your company at this office, how many people would you estimate took this action?**
( ) # ____________
( ) Don't know

9f. **Of the other sources that influenced your company to change their actions in response to this campaign, what were the biggest influences? Please provide up to three of the most important ones.**
a ____________
b ____________
c ____________

10. **Is there one more 'Smart Energy Now' campaign launched at your office that you can tell us about?**
( ) Yes
( ) No

Second SEN Campaign

11. **Name of Campaign**
( ) Name ____________
( ) I don't remember the name

11a. **Action/Activity being promoted**
( ) Computer-related
( ) Plug load-related

( ) Lighting-related
( ) HVAC-related
( ) Double-sided printing
( ) Turn off coffee maker
( ) Use stairs
( ) Use revolving Doors
( ) I don't remember the activity

11b. **How did you first learn about this campaign?**
( ) It was suggested by a SEN staff member
( ) We learned about it on the SEN website
( ) I designed it myself
( ) Someone in my company designed it
( ) I don’t know
( ) Other ____________

11c. **Since this Smart Energy Now campaign started promoting certain activities and actions in the workplace, did your company…**
( ) Start doing the activity/action for the first time,
( ) Increase the frequency of the activity/action that your company had already been doing,
( ) Not change any actions at all,
( ) Decrease the frequency of the activity/action that your company had already been doing, or
( ) Stop doing the activity/action?
( ) Don't Know

If response indicates that the company changed their actions associated with a campaign
11d. Please rate the extent to which this campaign influenced your company to take those actions, compared with all other influences.. Please rate on a scale of 0 to 10, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence."
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

11e. **Of the total number of people in your company at this office, how many people would you estimate took this action?**
( ) # ____________
( ) Don't know

11f. **Of the other sources that influenced your company to change their actions in response to this campaign, what were the biggest influences? Please provide up to three of the most important ones.**
a ____
b ____
c ____

Non-SEN Programs

12. **Since October of 2011, has your office been a participant of any other program or company effort to reduce energy use, other than Smart Energy Now?**

( ) Yes
( ) No
( ) Don't know

If yes, 12a. **Please provide the program name (if possible) and describe the action that you were requested to take.**

Name ____________
Action Requested ____________

12b. **Of the total number of people in your company at this office, how many people participated or took an action as a result of this other program or company effort?**

( ) # ____________
( ) Don't know

In this next section, we will show a list of actions that might be taken in your office. For each item, we will ask you to indicate three things for each item: the number of people doing this, when they began, and why.

It's okay if you don't know, but we would appreciate it if you could give us your best estimate. Please take as much time as you need. Or, if you can't give an estimate, please move on to the next one.

13. **Of the total number of people in your office, how many would you say set their computer to energy-saving mode (e.g. display and/or computer will automatically sleep after a period of inactivity)?**

( ) # ____________
( ) Don't know

13a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don't know

13b. **Why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other
[ ] I don't know

14. **If there is no energy-saving setting, and people must manually turn off their monitor and/or computer, we would like to know their actions for the monitor and computer separately. First, how many would you say manually turn off their monitor when not in use?**

( ) # ____________
( ) Don't know

14a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don't know

14b. **Why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know

15. **Second, how many people in your office would you say manually turn off their computer when not in use?**

( ) # ____________
( ) Don't know

15a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don't know

15b. **Why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know

16. **Of the total number of people in your office how many would you say use desk lamp or task lighting instead of lighting entire workspace with overhead lights?**

( ) # ____________
( ) Don't know

16a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don’t know

16b. **Why do you think they started taking this action?**
[ ] Due to one of SEN’s campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person’s own interest in reducing energy use
[ ] Other ____________
[ ] I don’t know

17. **How many would you say manually turn off desk lamp or task lighting when leaving the room?**
( ) # ____________
( ) Don't know

17a. **Please estimate when the majority of these people started doing this.**
( ) On *(date)* ____________
( ) Other ____________
( ) I don’t know

17b. **Why do you think they started taking this action?**
[ ] Due to one of SEN’s campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person’s own interest in reducing energy use
[ ] Other ____________
[ ] I don’t know

18. **How many would you say manually turn off desk lamp or task lighting and <u>use natural daylight</u>?**
( ) # ____________
( ) Don't know
( ) NA

18a. **Please estimate when the majority of these people started doing this.**
( ) On *(date)* ____________
( ) Other ____________
( ) I don't know
( ) NA

18b. **Why do you think they started taking this action?**
[ ] Due to one of SEN's campaigns or communications

[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know
[ ] NA

19. **How many would you say manually turn off overhead light <u>when leaving the room</u>?**
( ) # ____________
( ) Don't know

19a. **Please estimate when the majority of these people started doing this.**
( ) On *(date)* ____________
( ) Other ____________
( ) I don’t know

19b. **Why do you think they started taking this action?**
[ ] Due to one of SEN’s campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person’s own interest in reducing energy use
[ ] Other ____________
[ ] I don’t know

20. **How many would you say manually turn off overhead light and <u>use natural daylight?</u>**
( ) # ____________
( ) Don't know
( ) NA

20a. **Please estimate when the majority of these people started doing this.**
( ) On *(date)* ____________
( ) Other ____________
( ) I don’t know
( ) NA

20b. **Why do you think they started taking this action?**
[ ] Due to one of SEN’s campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person’s own interest in reducing energy use
[ ] Other ____________
[ ] I don’t know
[ ] NA

21. **Of the total number of people in your office, how many would you say set a thermostat to decrease energy consumption (e.g. slightly less cool in the summer and slightly less warm in the winter).**

( ) # ____________
( ) Don't know
( ) NA

21a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don't know
( ) NA

21b. **Why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know
[ ] NA

22. **How many would you say removed a personal space heater?**

( ) # ____________
( ) Don't know
( ) NA

22a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don't know
( ) NA

22b. **Why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know
[ ] NA

23. **Of the total number of people in your office how many would you say replaced a standard desk lamp with an efficient (Energy Star) desk lamp?**

( ) # ____________
( ) Don't know

23a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don't know

23b. **Why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know

24. **How many replaced a standard computer monitor with an efficient (Energy Star) monitor**

( ) # ____________
( ) Don't know

24a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don't know

24b. **Why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know

25. **How many replaced a standard desktop computer with a laptop computer?**

( ) # ____________
( ) Don't know

25a. **Please estimate when the majority of these people started doing this.**

( ) On *(date)* ____________
( ) Other ____________
( ) I don't know

25b. **Why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know

26. **For each of these common or shared spaces please indicate how frequently the following actions are taken. Please indicate which types of common spaces (rooms) are affected (list).** *Please enter a percentage of time these actions are taken (such as '50' when done half of the time) or NA (for Not Applicable)*

	Manually turn off light when leaving the room	**Manually turn off light to use natural daylight**
Conference rooms		
Lunchrooms		
Storage rooms		
Copy and/or printer rooms		
Break room		
Library		
Other (list)		

27. **For the common spaces, why do you think they started taking this action?**

[ ] Due to one of SEN's campaigns or communications
[ ] Due to another campaign or communication unrelated to SEN
[ ] Due to a request or initiative from management or the IT department, outside of any program or campaign
[ ] Due to each person's own interest in reducing energy use
[ ] Other ____________
[ ] I don't know

Thank you so much for answering these questions about the building in which you work. We don't have many people on our call list who have knowledge about offices in other buildings, you are one of the few.

Would you be willing to tell us about efforts to reduce energy use in another one of these offices, the one in ________________ *(pick building with 2nd highest familiarity rating, if more than one, ask* **"Which of these offices contains the most office workers?").**

28. **Can we continue now or would you like me to call you another time?**

( ) Yes *conduct "CoRep 2nd Survey"*
( ) No
( ) Another time

Schedule another time. At that time, remind them of the building, and conduct "CoRep 2nd Survey" ____

Thank you very much for your company's support of Smart Energy Now and for your help with this survey!

Appendix C: Property/Facility Manager Survey

TMW Info

Surveyor Name _______________
TMW ID _______________

Property Info

Customer Name _______________
Email address _______________
Building address _______________

List of Space Types

(e.g. Office - Data Center, Office - 1st Floor, etc.)

1 _______________
2 _______________
3 _______________
4 _______________
5 _______________
6 _______________
7 _______________
8 _______________
9 _______________
10 _______________
11 _______________
12 _______________
13 _______________
14 _______________
15 _______________

Instructions are in italics. Read only that which is in ***Bold****.*

Hello, my name is ______. I am calling on behalf of Duke Energy to obtain some information about your facility. May I speak with _____________ please?
If person is talking, proceed. If person is called to the phone, reintroduce. If not free to talk, ask when would be a good time to call and schedule the call-back.

We need your help. Duke Energy has given us your name as someone who might be able provide some information about your building's operation practices so that we can help improve some of Duke Energy's energy efficiency programs for commercial customers, including the Smart Energy Now program. We are especially interested in speaking with someone who has knowledge of control of the building HVAC system. We would like to conduct a short interview that will take about 45 minutes. Would you be able to help us?

ES-0. **Would you please tell me what facility you manage?** _______________
(If they manage more than one facility)

... square footage of each facility that you manage? _______________

Would you please answer the following questions as it pertains to the building with the largest square footage?
(At the end of the survey, ask if they have time to answer the same questions about the buildings with the second largest square footage, etc.…

ES-1. **Our records indicate that you and your building are currently participating in the Smart Energy Now program that is offered by Duke Energy. Do you recall participating in this program?**

( ) Yes
( ) No
( ) DK/NS

If No or DK/NS: ask ES-2:

ES-2 **Smart Energy Now is a program from Duke Energy dedicated to helping reduce energy consumption in Charlotte's Uptown office buildings by 5% overall in five years. Smart Energy Now uses a digital grid infrastructure to help building managers and tenants see the energy usage for all participating buildings. This data includes information about real-time usage, load factors and historical trends.**

Do you remember participating in this program?

( ) Yes
( ) No
( ) DK/NS

Conduct the survey whether or not they recall participating in the program.

I will be asking you to provide information on changes you may have made to your building's occupancy, operations or equipment. If you have already provided this information to Duke Energy, the purpose of these questions is to confirm and/or update information we have obtained from Duke Energy.
(Please read each question and the multiple choice options to the interviewee.)

Repeat questions Occ-1 to Occ-4 for each of the "Space Type - Space Name"s listed above.

Occ-1. **For the [***Space Type - Space Name***] Space in your building, please tell me in the past year and a half (since October of 2011),**
Have there been any changes in the occupancy rate ? _______________
What was the original occupancy rate? _______________
What were the occupancy rate change(s)? _______________
What were the date of the(se) change(s)? _______________
Can you give me some details about why this change occurred?
(e.g. name of tenant that moved in/out; name of tenant that took more or less SF etc.)

____

Have there been any changes in the Operating Hours? _______________
What were the original operating hours? _______________
What were the changes to the operating hour? _______________
What were the date of these change(s)? _______________
Can you give me some details about why the(se) change(s) occurred?
(e.g. name of tenant that changed their hours of operation.) _______________
Have there been any changes in space utilization? _______________
What was the original floor area devoted to the space? _______________
What was the change in space utilization? _______________
old use _______________
new use _______________
Was the change in utilization accompanied by a change in floor space? _______________
New floor area devoted to space(s) _______________
Floor area removed from space(s) _______________
Please give me details on why the change in space utilization occurred. _______________

Occ-2. **Were any major energy uses added to or removed from the building (***e.g. data centers or process loads***)? Please describe the equipment or process (***e.g. data center, printing press, etc.***)**

____

Occ-3. **How much additional equipment was added or removed?**
(e.g. number of servers, number of presses, SF of data center operation etc.)

____

Occ-4. **Notes**

____

The next set of questions are about your building's Central HVAC System.
(For each item, remind them) **According to our records your most common strategy for ________ was ________.**

1. **According to our records your most common strategy for <u>Chilled water temperature</u> control was ________.**

(If different interviewee ask)
1a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

1a.2 If no, ask: **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options
( ) **Constant**
( ) **Reset with outdoor air temperature**
( ) **Reset based on call for cooling**

( ) N/A
( ) Unknown
( ) Other _______________

1b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] Constant
[ ] Reset with outdoor air temperature
[ ] Reset based on call for cooling
[ ] Equipment changed to _______________
[ ] Unknown
[ ] N/A
[ ] Other _______________

1c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

Please make sure the question below is read in full at least once, when the influence question is asked the first time, for the first change they report.
(If either strategy or equipment had been changed.)

1d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influenced your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask
1e. **What was the primary influence on your decision to make this change?**

____

2. **According to our records your most common strategy for <u>Chiller availability schedule</u> control was ________.**

(If different interviewee ask)
2a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

2a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options

( ) **Available year-round**
( ) **Seasonal lock-out** *(indicate when available)* _______________
( ) N/A
( ) Unknown
( ) Other _______________

2b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Available year-round**
[ ] **Seasonal lock-out** *(indicate when available)* _______________
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

2c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
2d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
2e. **What was the primary influence on your decision to make this change? ____________**

3. **According to our records your most common strategy for <u>Condenser water temperature control strategy</u> control was ________.**

(If different interviewee ask)
3a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

3a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options
( ) **Constant**
( ) **Reset on outdoor wetbulb temperature**

( ) N/A
( ) Unknown
( ) Other ________________

3b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Constant**
[ ] **Reset on outdoor wetbulb temperature**
[ ] Equipment changed to ________________
[ ] N/A
[ ] Unknown
[ ] Other ________________

3c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
3d. There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
3e. **What was the primary influence on your decision to make this change? _____________**

4. **According to our records your most common strategy for <u>Hot water temperature control strategy</u> control was ________.**

(If different interviewee ask)
4a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

4a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options
( ) **Constant**
( ) Reset with outdoor air temperature
( ) Reset based on call for heating
( ) N/A
( ) Unknown

( ) Other _______________

4b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] **Constant**
[ ] **Reset with outdoor air temperature**
[ ] **Reset based on call for heating**
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

4c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
4d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
4e. **What was the primary influence on your decision to make this change?** ____________

4f. **Have you Installed new energy efficient chiller?**

( ) Yes
( ) No
( ) Don't know
( ) Not Applicable (NA)

4g. *If yes:*

( ) **Water cooled**
( ) Air cooled
( ) reciprocating compressor
( ) screw/scroll compressor
( ) centrifugal compressor
( ) VFD compressor capacity control
( ) Other _______________

4h. *if yes, ask both:*

Please provide the chiller size (tons) _______________
full-load efficiency (kW/ton) _______________

(If yes)
4i. **There may be several influences on your decision to make this change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influenced your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
4j. **What was the primary influence on your decision to make this change? ____________**

5. **According to our records your most common strategy for <u>Boiler availability schedule</u> control was ________.**

(If different interviewee ask)
5a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

5a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
( ) **Available year-round**
( ) **Seasonal lock-out** *(indicate when available)* _______________
( ) N/A
( ) Unknown
( ) Other _______________

5b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Available year-round**
[ ] **Seasonal lock-out** *(indicate when available)* _______________
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

5c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
5d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
5e. **What was the primary influence on your decision to make this change? ____________**

5f. **Have you Installed new energy efficient boiler?**
( ) Yes
( ) No
( ) Don't Know
( ) NA

5g. *if yes, read boiler types:*
( ) **hot water**
( ) steam
( ) modular
( ) condensing
( ) other _______________

5h. *if yes, ask both:*
Please provide the boiler size (hp or Million Btu/hr) _______________
efficiency (%) _______________

If yes, 5i. **There may be several influences on your decision to make this change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influenced your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
5j. **What was the primary influence on your decision to make this change? ____________**

6. **According to our records your most common strategy for <u>Hot water flow control</u> was ________.**

(If different interviewee ask)
6a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

6a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options.*

( ) **Constant flow**
( ) **Variable flow, constant speed (ride pump curve)**
( ) **Variable flow, variable speed (VFD)**
( ) N/A
( ) Unknown
( ) Other ______________

6b. **Have you changed to a different strategy or type of equipment? If so, what?** *(read the multiple-choice options for this item if changed)*

[ ] No Change
[ ] **Constant flow**
[ ] Variable flow, constant speed (ride pump curve)
[ ] Variable flow, variable speed (VFD)
[ ] Equipment changed to ______________
[ ] N/A
[ ] Unknown
[ ] Other ______________

6c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
6d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
6e. **What was the primary influence on your decision to make this change? ___________**

7. **According to our records your most common strategy for <u>Chilled water flow control</u> was ________.**

(If different interviewee ask)
7a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

7a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**

*and read the multiple choice options***.**

( ) **Constant flow**
( ) **Variable flow, constant speed (ride pump curve)**
( ) **Variable flow, variable speed (VFD)**
( ) N/A
( ) Unknown
( ) Other _______________

7b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] **Constant flow**
[ ] **Variable flow, constant speed (ride pump curve)**
[ ] **Variable flow, variable speed (VFD)**
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

7c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
7d.**There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
7e. **What was the primary influence on your decision to make this change? ____________**

8. **According to our records your most common strategy for <u>Condenser water flow control</u> was ________.**

(If different interviewee ask)
8a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

8a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**

( ) **Constant flow**
( ) **Variable flow, constant speed (ride pump curve)**
( ) **Variable flow, variable speed (VFD)**
( ) N/A
( ) Unknown
( ) Other _______________

8b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Constant flow**
[ ] **Variable flow, constant speed (ride pump curve)**
[ ] **Variable flow, variable speed (VFD)**
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

8c.1 **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
8d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
8e. **What was the primary influence on your decision to make this change? ____________**

9. **According to our records your most common strategy for <u>Cooling Tower fan control strategy</u> was ________.**

(If different interviewee ask)
9a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

9a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
( ) **Single speed fan**

( ) **Two speed fan**
( ) **Pony motor**
( ) **VFD fan**
( ) N/A
( ) Unknown
( ) Other ________________

9b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Single speed fan**
[ ] **Two speed fan**
[ ] **Pony motor**
[ ] **VFD fan**
[ ] Equipment changed to ________________
[ ] N/A
[ ] Unknown
[ ] Other ________________

9c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
9d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
9e. **What was the primary influence on your decision to make this change? _____________**

10. **According to our records your most common strategy for <u>Waterside economizer</u> was ________.**

(If different interviewee ask)
10a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

10a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.

( ) No
( ) Yes (indicate typical months of operation) _______________
( ) N/A
( ) Unknown
( ) Other _______________

10b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] Yes (indicate typical months of operation)
[ ] Equipment changed to _______________
[ ] Unknown
[ ] N/A
[ ] Other _______________

10c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
10d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
10e. **What was the primary influence on your decision to make this change? ____________**

11. **According to our records your most common strategy for <u>Air Handler operating schedule</u> was ________.**

(If different interviewee ask)
11a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

11a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options
( ) **On at all times**
( ) **Turn on/off within one hour of occupancy schedule**
( ) **Turn on/off within two hours of occupancy schedule**
( ) **Turn on/off with four hours of occupancy schedule**

( ) Other (*describe*) _______________
( ) N/A
( ) Unknown

11b. **Have you changed to a different strategy or type of equipment? If so, what**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **On at all times**
[ ] **Turn on/off within one hour of occupancy schedule**
[ ] **Turn on/off within two hours of occupancy schedule**
[ ] **Turn on/off with four hours of occupancy schedule**
[ ] Equipment changed to _______________
[ ] Other (*describe*) _______________
[ ] N/A
[ ] Unknown

11c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
11d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
11e. **What was the primary influence on your decision to make this change? ____________**

12. **According to our records your most common strategy for <u>Air handler types</u> was ________.**

(If different interviewee ask)
12a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

12a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
(check all that apply)
[ ] **Single duct**
[ ] **Dual duct**

[ ] **Multizone**
[ ] Other (*describe*) _______________
[ ] N/A
[ ] Unknown

12b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Single duct**
[ ] Dual duct
[ ] Multizone
[ ] Equipment changed to _______________
[ ] Unknown
[ ] N/A
[ ] Other (*describe*) _______________

12c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If equipment had been changed)
12d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
12e. **What was the primary influence on your decision to make this change? ____________**

13. **According to our records your most common strategy for <u>Air Handler Flow Control</u> was ________.**

(If different interviewee ask)
13a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

13a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
( ) **Constant Volume**
( ) **Variable Volume with variable inlet vane**
( ) **Variable Volume with variable pitch fan**

( ) **Variable Volume with variable speed drive**
( ) N/A
( ) Unknown
( ) Other _______________

13b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Constant Volume**
[ ] Variable Volume with variable inlet vane
[ ] Variable Volume with variable pitch fan
[ ] Variable Volume with variable speed drive
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

13c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
13d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
13e. **What was the primary influence on your decision to make this change? ____________**

14. **According to our records your most common strategy for <u>Air Flow control strategy</u>** was **________.**

(If different interviewee ask)
14a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

14a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
( ) **Duct static pressure**

( ) VAV box position
( ) N/A
( ) Unknown
( ) Other _______________

14b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Duct static pressure**
[ ] VAV box position
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

14c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
14d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
14e. **What was the primary influence on your decision to make this change? ____________**

15. **According to our records your most common strategy for <u>Supply air temperature control strategy</u> was ________.**

(If different interviewee ask)
15a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

15a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
( ) **Constant**
( ) Reset with outdoor air temperature
( ) Reset based on load
( ) N/A

( ) Unknown
( ) Other _______________

15b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Constant**
[ ] Reset with outdoor air temperature
[ ] Reset based on load
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

15c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
15d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
15e. **What was the primary influence on your decision to make this change? ____________**

16. **According to our records your most common strategy for <u>Static pressure control strategy</u> was ________.**

(If different interviewee ask)
16a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

16a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
( ) **Constant**
( ) Reset with cooling load
( ) N/A
( ) Unknown
( ) Other _______________

16b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] **Constant**
[ ] Reset with cooling load
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

16c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
16d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
16e. **What was the primary influence on your decision to make this change? ____________**

17. **According to our records your most common strategy for <u>Outdoor Air Economizer</u> was ________.**

(If different interviewee ask)
17a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

17a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.

( ) None
( ) **Temperature**
( ) Enthalpy
( ) CO2 (Demand Controlled Ventilation)
( ) N/A
( ) Unknown
( ) Other _______________

17b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] **None**
[ ] Temperature
[ ] Enthalpy
[ ] CO2 (Demand Controlled Ventilation)
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

17c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
17d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
17e. **What was the primary influence on your decision to make this change? ____________**

18. **According to our records your most common strategy for <u>Zone Level Reheat source</u> was ________.**

(If different interviewee ask)
18a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

18a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**

( ) **Hot Water**
( ) Electric resistance
( ) N/A
( ) Unknown
( ) Other _______________

18b. **Have you changed to a different strategy or type of equipment? If so, what?**

(read the multiple-choice options for this item if changed)

- [ ] No Change
- [ ] **Hot Water**
- **[ ] Electric resistance**
- [ ] Equipment changed to _______________
- [ ] N/A
- [ ] Unknown
- [ ] Other _______________

18c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

- ( ) No change
- ( ) Decreased frequency or number
- ( ) Increased frequency or number

(If either strategy or equipment had been changed)
18d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask
18e. **What was the primary influence on your decision to make this change? ____________**

The next set of questions are about your building's <u>Packaged HVAC Systems.</u>

19. **According to our records your most common type of <u>Packaged system</u> was ________.**

(If different interviewee ask)
19a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

- ( ) Yes
- ( ) No

19a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.

- [ ] **Packaged or split air conditioner with gas heat**
- **[ ] Packaged or split air conditioner with electric heat**
- **[ ] Packaged or split heat pump**
- **[ ] Water loop heat pump**
- [ ] N/A
- [ ] Unknown
- [ ] Other _______________

19b. **Have you changed to a different type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] **Packaged or split air conditioner with gas heat**
[ ] Packaged or split air conditioner with electric heat
[ ] Packaged or split heat pump
[ ] Water loop heat pump
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

19c. **If you are using the same type, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If equipment had been changed)
19d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
19e. **What was the primary influence on your decision to make this change? ____________**

20. **According to our records your most common strategy for <u>Unit operating schedule</u> was ________.**

(If different interviewee ask)
20a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

20a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.

( ) **On at all times**
( ) Turn on/off within one hour of occupancy schedule
( ) Turn on/off within two hours of occupancy schedule
( ) Turn on/off with four hours of occupancy schedule
( ) Other (*describe*) _______________
( ) N/A
( ) Unknown

20b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] **On at all times**
[ ] Turn on/off within one hour of occupancy schedule
[ ] Turn on/off within two hours of occupancy schedule
[ ] Turn on/off with four hours of occupancy schedule
[ ] Equipment changed to _______________
[ ] Other (*describe*) _______________
[ ] N/A
[ ] Unknown

20c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
20d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
20e. **What was the primary influence on your decision to make this change?**

____

21. **According to our records your most common strategy for <u>Air Flow Control</u> was ________.**

(If different interviewee ask)
21a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

21a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.

( ) **Constant Volume**
( ) Variable Volume with variable inlet vane
( ) Variable Volume with variable speed drive
( ) N/A
( ) Unknown

( ) Other _______________

21b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] **Constant Volume**
[ ] Variable Volume with variable inlet vane
[ ] Variable Volume with variable speed drive
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

21c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
21d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
21e. **What was the primary influence on your decision to make this change? ____________**

22. **According to our records your most common strategy for <u>Outdoor Air Economizer</u> was ________.**

(If different interviewee ask)
22a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

22a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**

( ) **None**
( ) Temperature
( ) Enthalpy
( ) CO2 (Demand Controlled Ventilation)
( ) N/A
( ) Unknown

( ) Other _______________

22b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)

[ ] No Change
[ ] **None**
[ ] Temperature
[ ] Enthalpy
[ ] CO2 (Demand Controlled Ventilation)
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

22c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
22d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
22e. **What was the primary influence on your decision to make this change? ____________**

22f. **Have you installed a New Energy Efficiency Packaged HVAC System?**

( ) Yes
( ) No
( ) Don't Know
( ) NA

22g. *if yes*

[ ] **Packaged or split air conditioner with gas heat**
[ ] Packaged or split air conditioner with electric heat
[ ] Packaged or split heat pump
[ ] Water loop heat pump
[ ] Other _______________

22h. *if yes, ask both:*

Please provide total installed tons _______________

efficiency _______ EER _______________

If yes
22i. **If yes, there may be several influences on your decision to make this change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influenced your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
22j. **What was the primary influence on your decision to make this change? ____________**

The next set of questions are about your building's <u>Space temperature controls.</u>
23. **According to our records your most common strategy for <u>Space temperature control type</u> was ________.**

(If different interviewee ask)
23a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
- ( ) Yes
- ( ) No

23a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
- ( ) **Local manual thermostat**
- **( ) Local programmable thermostat**
- **( ) Building Automation System**
- ( ) N/A
- ( ) Unknown
- ( ) Other _______________

23b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
- [ ] No Change
- [ ] **Local manual thermostat**
- **[ ] Local programmable thermostat**
- **[ ] Building Automation System**
- [ ] Equipment changed to _______________
- [ ] N/A
- [ ] Unknown
- [ ] Other _______________

23c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
- ( ) No change
- ( ) Decreased frequency or number

( ) Increased frequency or number

(If either strategy or equipment had been changed)
23d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
23e. **What was the primary influence on your decision to make this change? ____________**

24. **According to our records your most common strategy for Typical room temperature setpoints was ________.**

(If different interviewee ask)
24a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

24a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
Include both heating and cooling if applicable
[ ] **Heating: degrees F _______________**
[ ] Cooling: degrees F _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

24b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Heating: degrees F _______________**
[ ] Cooling: degrees F _______________
[ ] Equipment changed to _______________
[ ] Unknown
[ ] N/A
[ ] Other _______________

24c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
24d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
24e. **What was the primary influence on your decision to make this change? ____________**

25. **According to our records your most common strategy for <u>Unoccupied period setback</u> was ________.**

(If different interviewee ask)
25a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

25a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
( ) **None**
( ) less than 3 degrees F
( ) 3-5 degrees F
( ) More than 5 degrees F
( ) N/A
( ) Unknown
( ) Other ________________

25b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **None**
[ ] less than 3 degrees F
[ ] 3-5 degrees F
[ ] More than 5 degrees F
[ ] Equipment changed to ________________
[ ] N/A
[ ] Unknown
[ ] Other ________________

25c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
25d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
25e. **What was the primary influence on your decision to make this change? ____________**

The next set of questions are about your building's <u>Common Area Lighting.</u>
26. **According to our records your most common strategy for <u>Lighting on/off schedule in Common Areas</u> was ________.**

(If different interviewee ask)
26a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
- ( ) Yes
- ( ) No

26a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
- ( ) **Follows business occupancy**
- **( ) Runs extra hours for cleaning crew**
- **( ) Always on**
- ( ) N/A
- ( ) Unknown
- ( ) Other _______________

26b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
- [ ] No Change
- [ ] **Follows business occupancy**
- **[ ] Runs extra hours for cleaning crew**
- **[ ] Always on**
- [ ] Equipment changed to _______________
- [ ] N/A
- [ ] Unknown
- [ ] Other _______________

25c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
- ( ) No change
- ( ) Decreased frequency or number

( ) Increased frequency or number

(If either strategy or equipment had been changed)
26d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
26e. **What was the primary influence on your decision to make this change? ____________**

27. **According to our records your most common <u>Lighting type in Common Areas</u> was ________.**

(If different interviewee ask)
27a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

27a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options.*
( ) **Linear fluorescent (T-12, T-8, T-5)**
( ) Incandescent or halogen
( ) Metal Halide
( ) LED lamps or fixtures
( ) Other (*list*) _______________
( ) N/A
( ) Unknown

27b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Linear fluorescent (T-12, T-8, T-5)**
[ ] Incandescent or halogen
[ ] Metal Halide
[ ] LED lamps or fixtures
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other (*list*) _______________

27c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change

( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
27d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
27e. **What was the primary influence on your decision to make this change? ____________**

If answered "Linear Fluorescents", ask
27f. **Please indicate approximate percent of each lamp type**
T-12 _______________
T-8 _______________
T-5 _______________

28. **According to our records your most common strategy for <u>Lighting controls in Common Areas</u> was ________.**

(If different interviewee ask)
28a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

28a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
[ ] **Local manual control**
[ ] Automated lighting control system
[ ] Occupancy sensors (indicate where) _______________
[ ] Daylight dimming controls (indicate where) _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

28b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Local manual control**
[ ] Automated lighting control system
[ ] Occupancy sensors (indicate where) _______________
[ ] Daylight dimming controls (indicate where) _______________
[ ] Equipment changed to _______________

[ ] Unknown
[ ] N/A
[ ] Other _______________

28c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
28d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
28e. **What was the primary influence on your decision to make this change? ____________**

The next set of questions are about your building's <u>Lighting in leased or occupied spaces.</u>

29. **According to our records your most common strategy for <u>Lighting on/off schedule in leased or occupied spaces</u> was ________.**

(If different interviewee ask)
29a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

29a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options***.**
( ) **Follows business occupancy**
( ) Runs extra hours for cleaning crew
( ) Always on
( ) N/A
( ) Unknown
( ) Other _______________

29b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Follows business occupancy**
[ ] Runs extra hours for cleaning crew
[ ] Always on

[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

29c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

29d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
(If either strategy or equipment had been changed)
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
29e. **What was the primary influence on your decision to make this change? ____________**

30. **According to our records your most common strategy for Most common lighting type in leased or occupied spaces was ________.**

(If different interviewee ask)
30a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

30a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
( ) **Linear fluorescent (T-12, T-8, T-5)**
( ) Incandescent or halogen
( ) Metal Halide
( ) LED lamps or fixtures
( ) Energy Star task lighting
( ) Other *(list)* _______________
( ) N/A
( ) Unknown

30b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Linear fluorescent (T-12, T-8, T-5)**
[ ] Incandescent or halogen

[ ] Metal Halide
[ ] LED lamps or fixtures
[ ] Energy Star task lighting
[ ] Equipment changed to _______________
[ ] Other *(list)* _______________
[ ] N/A
[ ] Unknown

If answered "Linear Fluorescents", ask
30f. **Please indicate approximate percent of each lamp type**
T-12 _______________
T-8 _______________
T-5 _______________

30c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
30d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
30e. **What was the primary influence on your decision to make this change? ____________**

31. **According to our records your most common strategy for <u>Lighting controls in leased or occupied spaces</u> was ________.**

(If different interviewee ask)
31a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

31a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options.*
[ ] Local manual control
[ ] Automated lighting control system
[ ] Occupancy sensors (*indicate where***)** _______________
[ ] Daylight dimming controls (*indicate where***)** _______________

[ ] N/A
[ ] Unknown
[ ] Other _______________

31b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Local manual control**
[ ] Automated lighting control system
[ ] Occupancy sensors (*indicate where***)** _______________
[ ] Daylight dimming controls (*indicate where***)** _______________
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

31c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
31d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
31e. **What was the primary influence on your decision to make this change? ____________**

The next set of questions are about your building's <u>Lighting in non-rented non-leased non-common areas (parking, mechanical, maintenance spaces, etc.).</u>

32. **According to our records your most common strategy for <u>Lighting on/off schedule</u> was ________.**

(If different interviewee ask)
32a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

32a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**

( ) **Typically off**
( ) Typically follows business occupancy
( ) Runs extra hours for cleaning crew
( ) Typically on 24/7
( ) N/A
( ) Unknown
( ) Other _______________

32b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] **Typically off**
[ ] Typically follows business occupancy
[ ] Runs extra hours for cleaning crew
[ ] Typically on 24/7
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

32c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
32d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
32e. **What was the primary influence on your decision to make this change? ____________**

33. **According to our records your most common strategy for <u>Most common lighting type in non-rented non-leased non-common areas (parking, mechanical, maintenance spaces, etc.).</u> was ________.**

(If different interviewee ask)
33a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

33a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options***.**

( ) **Linear fluorescent (T-12, T-8, T-5)**
( ) Incandescent or halogen
( ) Metal Halide
( ) LED lamps or fixtures
( ) High or low pressure sodium
( ) Other *(list)* _______________
( ) N/A
( ) Unknown

33b. **Have you changed to a different strategy or type of equipment? If so, what?** *(read the multiple-choice options for this item if changed)*

[ ] No Change
[ ] **Linear fluorescent (T-12, T-8, T-5)**
[ ] Incandescent or halogen
[ ] Metal Halide
[ ] LED lamps or fixtures
[ ] High or low pressure sodium
[ ] Equipment changed to _______________
[ ] Other *(list)* _______________
[ ] N/A
[ ] Unknown

If answered "Linear Fluorescents", ask
33f. **Please indicate approximate percent of each lamp type**

T-12 _______________
T-8 _______________
T-5 _______________

33c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

33d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
(If either strategy or equipment had been changed)
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
33e. **What was the primary influence on your decision to make this change? ____________**

34. **According to our records your most common strategy for <u>Lighting controls in non-rented non-leased non-common areas (parking, mechanical, maintenance spaces, etc.)</u>. was ________.**

(If different interviewee ask)
34a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

34a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
and read the multiple choice options.
[ ] Local manual control
[ ] Automated lighting control system
[ ] Occupancy sensors (*indicate where***) _______________**
[ ] Daylight dimming controls (*indicate where***) _______________**
[ ] N/A
[ ] Unknown
[ ] Other _______________

34b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] Local manual control
[ ] Automated lighting control system
[ ] Occupancy sensors (*indicate where***) _______________**
[ ] Daylight dimming controls (*indicate where***) _______________**
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

34c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
34d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
What was the primary influence on your decision to make this change? ____________

The next set of questions are about your building's Outdoor and building façade lighting.

35. **According to our records your most common strategy for Lighting on/off schedule for Outdoor and building façade lighting was ________.**

(If different interviewee ask)
35a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

35a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
( ) Always on during night time hours
( ) Turns off after a set time (*enter time***) _______________**
( ) N/A
( ) Unknown
( ) Other _______________

35b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] Always on during night time hours
[ ] Turns off after a set time *(enter time)* _______________
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

35c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

35d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
(If either strategy or equipment had been changed)
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:

35e. **What was the primary influence on your decision to make this change? ____________**

36. **According to our records your most common strategy for Most common lighting type for Outdoor and building façade lighting was ________.**

(If different interviewee ask)
36a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

36a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
( ) Incandescent
( ) Metal Halide
( ) High or low pressure sodium
( ) LED lamps or fixtures
( ) Other *(list)* _______________
( ) N/A
( ) Unknown

36b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] Incandescent
[ ] Metal Halide
[ ] High or low pressure sodium
[ ] LED lamps or fixtures
[ ] Equipment changed to _______________
[ ] Other *(list)* _______________
[ ] N/A
[ ] Unknown

36c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

36d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
(If either strategy or equipment had been changed)
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
36e. **What was the primary influence on your decision to make this change? ____________**

37. **According to our records your most common strategy for Lighting controls for Outdoor and building façade lighting was ________.**

(If different interviewee ask)
37a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

37a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
( ) Automated lighting control system
( ) Photocell control
( ) N/A
( ) Unknown
( ) Other _______________

37b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] Automated lighting control system
[ ] Photocell control
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

37c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

37d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
(If either strategy or equipment had been changed)
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
37e. **What was the primary influence on your decision to make this change? ____________**

38. **According to our records your most common strategy for Local plug-in space heaters was ________.**

(If different interviewee ask)
38a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

38a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
( ) Not commonly used
( ) Allowed at tenant discretion
( ) Tolerated but discouraged
( ) Not allowed
( ) N/A
( ) Unknown
( ) Other _______________

38b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] Not commonly used
[ ] Allowed at tenant discretion
[ ] Tolerated but discouraged
[ ] Not allowed
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

38c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
38d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
38e. **What was the primary influence on your decision to make this change? ____________**

39. **According to our records your most common strategy for <u>Building Cleaning Services - Cleaning Schedule</u> was ________.**

(If different interviewee ask)
39a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

39a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?**
*and read the multiple choice options***.**
Get both Cleaning Time (a or b) and Frequency (c)
[ ] Normal business hour cleaning
[ ] After hour cleaning (*indicate finish time including am/pm***)** _______________
[ ] Cleaning frequency (*times per week***)** _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

39b. **Have you changed to a different strategy or type of equipment? If so, what?**
(read the multiple-choice options for this item if changed)
[ ] No Change
[ ] Normal business hour cleaning
[ ] After hour cleaning (*indicate finish time including am/pm***)** _______________
[ ] Cleaning frequency (*times per week***)** _______________
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

39c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
39d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
39e. **What was the primary influence on your decision to make this change?** ____________

40. **According to our records your most common strategy for Building Cleaning Services - Lighting operation during cleaning was ________.**

(If different interviewee ask)
40a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

40a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options***.**
( ) Left on in all spaces during cleaning
( ) Switched on/off as spaces are cleaned
( ) N/A
( ) Unknown
( ) Other _______________

40b. **Have you changed to a different strategy or type of equipment? If so, what?**
[ ] No Change
[ ] Left on in all spaces during cleaning
[ ] Switched on/off as spaces are cleaned
[ ] Equipment changed to _______________
[ ] Unknown
[ ] N/A
[ ] Other _______________

40c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
40d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
40e. **What was the primary influence on your decision to make this change? ____________**

41. **According to our records your most common strategy for Desktop Computer Description was ________.**

(If different interviewee ask)
41a.1 **To your knowledge, was this accurate as of last Dec/Jan?**
( ) Yes
( ) No

41a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options***.**
( ) CRT monitor
( ) LED or LCD (flat screen) monitor
( ) Energy Star compliant
( ) N/A
( ) Unknown
( ) Other _______________

41b. **Have you changed to a different strategy or type of equipment? If so, what?**
[ ] No Change
[ ] CRT monitor
[ ] LED or LCD (flat screen) monitor
[ ] Energy Star compliant
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

41c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**
( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

(If either strategy or equipment had been changed)
41d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
41e. **What was the primary influence on your decision to make this change? ____________**

42. **According to our records your most common strategy for Desktop Computer Operation was ________.**

(If different interviewee ask)
42a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

42a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options***.**

( ) Left on all hours
( ) Turned off during unoccupied hours
( ) Energy Star features enabled
( ) N/A
( ) Unknown
( ) Other _______________

42b. **Have you changed to a different strategy or type of equipment? If so, what?**

[ ] No Change
[ ] Left on all hours
[ ] Turned off during unoccupied hours
[ ] Energy Star features enabled
[ ] Equipment changed to _______________
[ ] N/A
[ ] Unknown
[ ] Other _______________

42c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

( ) No change
( ) Decreased frequency or number
( ) Increased frequency or number

42d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
(If either strategy or equipment had been changed)
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
42e. **What was the primary influence on your decision to make this change? ____________**

43. **According to our records your most common strategy for Office Equipment Operation was ________.**

(If different interviewee ask)
43a.1 **To your knowledge, was this accurate as of last Dec/Jan?**

( ) Yes
( ) No

43a.2 *If no, ask:* **What was your most common strategy as of last Dec/Jan.?** *and read the multiple choice options***.**

- **( ) Left on all hours**
- **( ) Turned off during unoccupied hours**
- **( ) Energy Star features enabled**
- ( ) N/A
- ( ) Unknown
- ( ) Other ________________

43b. **Have you changed to a different strategy or type of equipment? If so, what?**

- [ ] No Change
- **[ ] Left on all hours**
- **[ ] Turned off during unoccupied hours**
- **[ ] Energy Star features enabled**
- **[ ] Equipment changed to ________________**
- [ ] N/A
- [ ] Unknown
- [ ] Other ________________

42c. **If you are using the same strategy, did you change the frequency with which it was used, or the number of places in the building in which it was used?**

- ( ) No change
- ( ) Decreased frequency or number
- ( ) Increased frequency or number

(If either strategy or equipment had been changed)
43d. **There may be several influences on your decision to make the change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influence your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
43e. **What was the primary influence on your decision to make this change? _____________**

43f. **Next, I would like to know if you replaced any existing office equipment, or if you added any new office equipment. Did you replace existing non-Energy Star Office Equipment or Appliance with Energy Star equipment?**

- **[ ] Energy Star Printer**
- **[ ] Energy Star Copier**
- **[ ] Energy Star Refrigerator**
- **[ ] Energy Star Water Cooler**
- [ ] Other ________________
- [ ] Don't Know

[ ] NA

If yes
43g. **There may be several influences on your decision to make this change, and we just want to know how much influence SEN actually had on your decision. Please rate on a scale of 0 to 10 the extent to which Smart Energy Now influenced your decision, where 0 indicates "Smart Energy Now had no influence at all" and 10 indicates "Smart Energy Now was the only influence?**
( ) 0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If rating is less than 8, please ask:
43h. **What was the primary influence on your decision to make this change? ____________**

43i. **Did you add new Office Equipment or Appliances?**
read all

[ ] Energy Star Printer
[ ] Non-Energy Star Printer
[ ] Energy Star Copier
[ ] Non-Energy Star Copier
[ ] Energy Star Refrigerator
[ ] Non-Energy Star Refrigerator
[ ] Energy Star Water Cooler
[ ] Non-Energy Star Water Cooler
[ ] Other
[ ] Don’t know
[ ] NA

44. **Thank you for taking this survey. Please provide any additional comments below:**
____

Appendix D: Site Reports

Site 1: [redacted] (SEN-67)

Prepared for:

Smart Energy Now
Duke Energy
North Carolina

Prepared by:

Architectural Energy Corporation
2540 Frontier Avenue, Suite 100
Boulder, Colorado 80301

Prepared In:

October 2013
v1.0

Introduction

This plan addresses M&V activities that were conducted for the Envision Charlotte Smart Energy Now (SEN) program.

These M&V activities were used to characterize savings for a variety of behavior-based measures that could have been implemented in this building. These savings estimates will be used, along with other impact evaluation data, to extrapolate savings for the entire population of buildings involved in the Envision Charlotte Smart Energy Now program.

Goals and Objectives

- Verify annual gross kWh/person savings
- Verify annual gross kWh/conditioned sqft savings
- Verify summer peak kW/person savings
- Verify summer peak kW/sqft savings

Project Contacts

Duke Energy Project Coordinator	[redacted]	[redacted]
AEC Contact	[redacted]	[redacted]
Customer Contacts	[redacted]	[redacted]

Site Locations/ECM's

Address	Conditioned Area
[redacted]	[redacted]

Data Products and Project Output

- Peak demand per person savings
- Utility coincident peak demand per person savings
- Annual Energy per person Savings

M&V Option

IPMVP Option A, D

M&V Implementation Schedule

- Collected on-site data during normal operating hours.
- Obtained and verified the current sequence of operations and/or operating schedule for HVAC, lighting, and other controlled equipment.
- Confirmed hours of operation, days per week, and holiday schedule.
- Deployed post-retrofit loggers to record amperage of plug receptacle panels, and [redacted] AHUs.
- Collected trend logs for the HVAC system in [redacted] portion of facility.

Field Data Points

During our initial visit and the installation visit we interviewed the facility staff and conducted a walkthrough of the facility. From the interview and our observations we found that the following ECMs were being followed by some of the occupants.

1. Actions in personal office space
   a. Computers
      i. Observed that computer monitors were off in workstations where employee was not at desk. Manually turn off computer when not in use
      ii. Manually turn off monitor when not in use

   b. Lighting
      i. In this facility the majority of each floor is open office space with cubicles, there are some private office spaces, and private meeting spaces.
      ii. WE found that the occupants had very little control of the lighting. We found that many private offices as well as conference spaces did not have local control of the lighting.
      iii. The Impact Survey indicates that occupancy sensors are being installed in the facility. However, we did not observe any sensors during our visits.

   c. HVAC
      i. The Baseline and Impact Survey indicate that the chiller plan that serves the [redacted] portion of the facility has a constant chilled water set point.
      ii. The surveys indicate that the AHUs [redacted] utilize supply air reset.
      iii. The [redacted] portion of the facility does not utilize a chiller plant.
      iv. The surveys indicate that the condenser water cooling temperature is reset based on outdoor temperature in both the [redacted] portions of the facility.
      v. The primary hot water loop in the [redacted] is set to a constant temperature. The secondary loops rest based on outdoor air temperature. Hot water is not utilized for heating in the [redacted] portion.
      vi. We did not observe personal space heaters during our visit.

   d. Equipment upgrade
      i. The computer monitors that we observed onsite were flat screen monitors.

Data Logging, Trending, and Modeling

To verify our findings from the site visits, Baseline Survey, and Impact Survey we collected supply and return air temperature trend data from the [redacted] portion of the facility. Installed current data loggers on a sample of plug receptacle panels in the [redacted] portions of the facility. We also installed current data loggers on the VFDs serving two AHUs in the [redacted].

Logger Type	Location Notes	Quantity Installed Within Facility
Current	[redacted] AHU VFDs	2
Current	[redacted] Plug Receptacle Panels	4

OS/ Lighting	[redacted] Conference Rooms	3

Data Accuracy

Measurement	Sensor	Accuracy	Notes
Current	Magnelab CT	±1%	> 10% of rating

Verification and Quality Control

- Compared logger data and spot measurements to nameplate values; identify out of range data
- Visually inspected logger data for consistent operation. Sort by day type and remove invalid data.
- Verified electrical voltage of equipment circuits.

Recording and Data Exchange Format

- Hobo logger binary files
- Excel spreadsheets
- Trend logs

Data Analysis

For the plug receptacle savings analysis we used the following approach:

- Use the standard calculation template for estimating pre and post demand and energy consumption that incorporates the methodology described below.
- From survey data calculate the actual pre and post fixture kW.
- Weight the time-series data according to connected load per control point. Methodology included in analysis worksheet.
- From time-series data determine the actual schedule of post operation.

$$\mathrm{LF(t)} = \frac{\sum_{i=1}^{N_{Logged}} \left(\mathrm{Current}_{\mathrm{ControlPoint}_i} * \mathrm{ScaleFactor}_i\right)}{\sum_{i=1}^{N_{Logged}} \mathrm{kWControlPoint}_i}$$

$$\mathrm{kW}_{\mathrm{Lighting}}(t) = \mathrm{LF(t)} * \sum_{i=1}^{N_{ControlPoints}} \mathrm{kWControlPoint}_i$$

Where

LF(t) = Lighting Load factor at time = t
$\mathrm{kWControlPoint}_i$ = connected load of control point *i*
$\mathrm{Current}_{\mathrm{ControlPoint}i}$ = logged current at control point *i* from time series data
$\mathrm{ScaleFactor}_i$ = Convert logged current to kW
N_{Logged} = population of logged control points
$N_{ControlPoints}$ = population of all control points

- Create separate schedules for weekdays and weekends using LF(t).

- Tabulate average operating hours by daytype (e.g. weekday and weekend).
- Extrapolate annual operating hours from the recorded hours of use by daytype.
- Generate the post load shape by plotting surveyed fixture kW against the actual schedule of post operation for each daytype.
- Calculate pre annual operating hours using the adjusted schedules by daytype and extrapolating to the full year.

$$kWh_{savings} = (kW_{Fixture} * OpHrs)_{PRE} - (N_{Fixtures} * kW_{Fixture} * OpHrs)_{Post}$$

Results

Table 9 below shows the building parameters that were used to determine savings presented in this section.

A prototypical simulation model was used to estimate the impact of a set of potential HVAC measures. The intention was to develop a simulation model that reasonably reflected the building. The model assumptions are listed below in Table 9. No attempt was made to model individual tenant spaces or detailed floor-by-floor zoning or differences in HVAC configurations. Rather, the model was designed to provide an overall indication of the savings potential of a select set of HVAC system energy savings measures.

Table 9. Simulation model assumptions

Characteristic	Value
Vintage	[redacted]
Size	[redacted] square feet
Number of floors	[redacted]
Wall construction and R-value	8in Concrete, R-10
Roof construction and R-value	Built-up roof, R-18
Glazing type	Double pane clear; Shading-coefficient = 0.81 U-value = 0.48
Lighting power density	Offices: 1.37 W/SF Dining: 1.0 W/SF Lobby: 1.52 W/SF
Plug load density	Offices: 0.7 W/SF Dining: 0.1 W/SF Lobby: 0.25 W/SF
Operating hours	Mon-Fri: 7am – 6pm Sat, Sun: unoccupied
HVAC system types	Four large VAV AHUs. One constant volume Multizone AHU, hot water reheat. Supply air reset base on OA temperature.
HVAC system size	Based on ASHRAE design day conditions, 10% oversizing assumed.
Chiller type	3 [redacted] Chillers (variable speed)
Chilled water system type	Variable volume 2-way control valves,
Chilled water system control	CHW Temp reset, 44-54 deg F setpoint
Boiler type	Electric
Hot water system type	Variable volume with 2 way control valves,
Hot water system control	HW Temp reset based on OA temp, 150-180 deg F setpoint
Thermostat setpoints	Occupied hours: 74 cooling, 71 heating Unoccupied hours: 76 cooling, 69 heating

Representatives of the companies occupying this building were requested to fill out surveys describing the range of energy saving activities that the company employees performed. At [redacted], a single company survey was received, representing [redacted] out of [redacted] building occupants, or about 37% of the total building occupancy. Table 10 summarizes the activities in this building.

The M&V field team, while visiting the building, found very few opportunities for the occupants to control overhead lighting, as it was controlled almost entirely by a central control system, as discussed in a later section of this report. The survey summary shown in Table 10 is in conflict with these findings, however, as the survey response shows very high occupant control of lighting. Since only one survey response was received for this building, and the respondent also reported for another building, with almost identical responses, it is more likely that the M&V findings are correct, and that the survey results below are not representative of this building.

Table 10. Occupant Survey Energy Savings Actions Summary (Respondent may have duplicated responses from another building)

Action	Participating Employees	% of Employees	% of Building Population
Participated in SEN program	[redacted]	10.0%	4.0%
Participated in any energy program	[redacted]	100.0%	39.8%
Use natural daylight	[redacted]	10.0%	4.0%
Use desk lamp or task lighting instead of overhead lighting	[redacted]	25.0%	10.0%
Manually turn off task lighting when leaving room	[redacted]	7.5%	3.0%
Manually turn off overhead lighting when leaving room	[redacted]	50.0%	19.9%
Manually turn off conference room lights when leaving room	[redacted]	5.0%	2.0%
Manually turn off lights to use natural daylight in conference rooms	[redacted]	2.5%	1.0%
Manually turn off lunch room lights when leaving room	[redacted]	2.5%	1.0%
Manually turn off lights to use natural daylight in lunchrooms	[redacted]	1.0%	0.4%
Manually turn off storage room lights when leaving room	[redacted]	7.5%	3.0%
Manually turn off break room lights when leaving room	[redacted]	2.5%	1.0%
Manually turn off lights to use natural daylight in break rooms	[redacted]	1.0%	0.4%
Replace standard monitor with Energy Star monitor	[redacted]	100.0%	39.8%
Energy Saving mode for computer	[redacted]	75.0%	29.9%
Manually turn off computer when not in use	[redacted]	5.0%	2.0%
Replace standard computer with laptop computer	[redacted]	50.0%	19.9%

Lighting and Plug Receptacle Potential Savings

The majority of the lighting in [redacted] is controlled by the BAS. We found very few instances where occupants had control of the fixtures. This included in office space as well as conference areas. The Baseline and Impact Surveys as well as our onsite interviews indicate that no significant changes had taken place regarding the lighting system. For this reason we did not meter the lighting panels at this location and we are not reporting lighting measure savings.

Since pre-program monitoring was not performed, it is not possible to report the actual program savings. To estimate the maximum potential savings that could have been realized under the SEN program, a baseline load shape was developed that assumed minimal occupant control of the plug load profile that roughly follows the same strategy. The tables below show the maximum potential energy and demand savings for plug measures.

Table 11. Total Potential Plug Energy Savings

End Use / Measure	Annual Savings (kWh)	Savings / SF (kWh/yr)	Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption
Plugs (includes HVAC interaction)	776,898	1.03	288.8	3.70%

Table 12. Potential Plug Coincident Peak Demand Savings

End Use / Measure	Coincident Peak Demand Savings (kW)	Coincident Peak Demand Savings (W/SF)	Coincident Peak Demand Savings (W/Person)	% Savings of Compass Coincident Peak Demand
Plugs (includes HVAC interaction)	13.7	0.02	5.09	0.5%

Table 13. Potential Plug Peak Demand Savings

End Use / Measure	Peak Demand Savings (kW)	Peak Demand Savings (W/SF)	Peak Demand Savings / Person (W/Person)	% Savings of Compass Peak Demand
Plugs (includes HVAC interaction)	130.93	0.17	48.67	2%

Figure 8 below shows the existing average plug loadshapes, the estimated maximum pre-program loadshape, and the maximum potential savings loadshape.

Figure 8. Plug Loadshape

Occupancy Sensor Potential Savings

As part of our metering effort we installed lighting and occupancy sensors. We used this data to estimate potential savings that could be realized if occupancy sensors were installed in conference rooms. The baseline lighting load shape was developed based off of the percent of time that the metered light fixtures were on. The potential lighting loadshape was developed based on the metered occupancy of the shared spaces. The potential savings loadshape is the difference between the two loadshapes. In the common spaces that were metered there was no weekend usage or occupancy.

To develop savings that could be achieved by installing occupancy sensors we observed the fixtures types and quantities in the metered conference rooms and estimated the connected load. Using the estimated connected load and the savings loadshapes we determined the potential savings for the metered spaces. Based on our site visit we estimated the area of the metered spaces, and the total area of conference spaces per floor and used those estimations to determine the amount of conference spaces in the building as a whole. From there we extrapolated our calculated savings for the metered spaces to estimate the potential energy and demand savings for the building as a whole.

Table 14. Potential Occupancy Sensor Energy Savings

End Use / Measure	Annual Savings (kWh)	Savings / SF (kWh/yr)	Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption
Occupancy Sensor (includes HVAC interaction)	56,242	0.07	20.9	0.27%

Table 15. Potential Occupancy Sensor Coincident Peak Demand Savings

End Use / Measure	Coincident Peak Demand Savings (kW)	Coincident Peak Demand Savings (W/SF)	Coincident Peak Demand Savings (W/Person)	% Savings of Compass Coincident Peak Demand
Occupancy Sensor (includes HVAC interaction)	19.8	0.03	7.37	0.7%

Table 16. Potential Occupancy Sensor Peak Demand Savings

End Use / Measure	Peak Demand Savings (kW)	Peak Demand Savings (W/SF)	Peak Demand Savings (W/Person)	% Savings of Compass Peak Demand
Occupancy Sensor (includes HVAC interaction)	26.13	0.03	9.72	0.5%

Figure 9 and Figure 10 below show the average lighting and occupancy loadshapes as well as the potential savings loadshape.

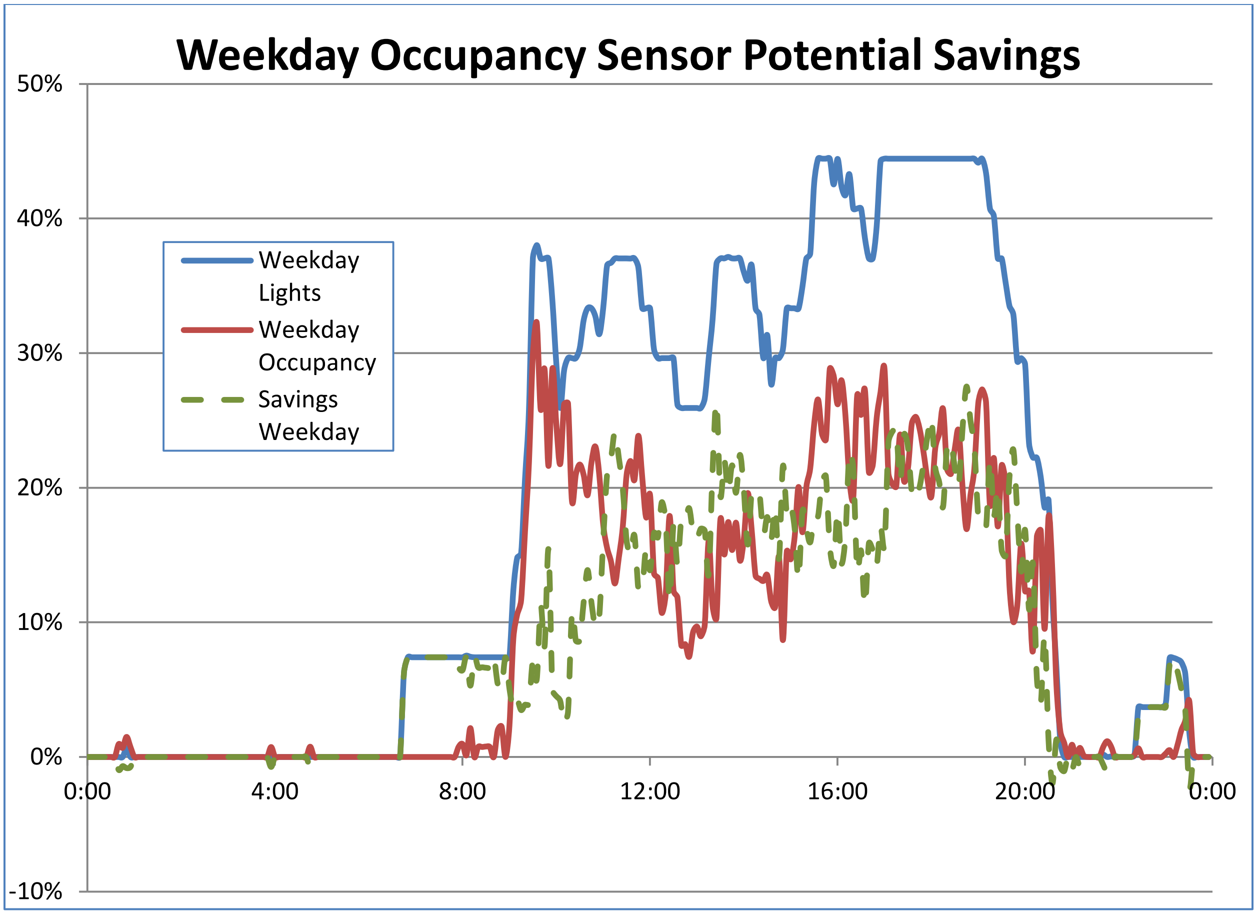

Figure 9. Weekday Occupancy Sensor Potential Savings

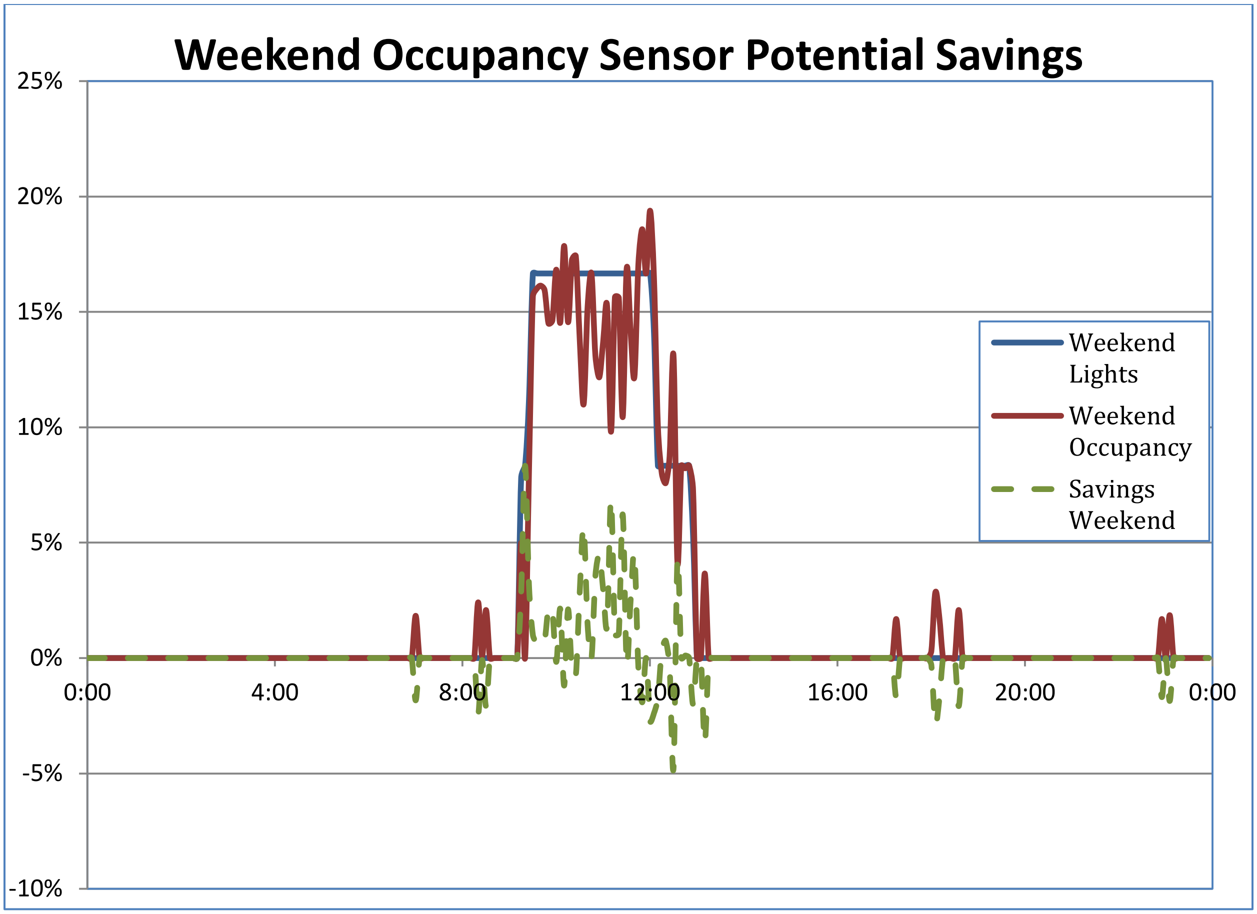

Figure 10. Weekend Occupancy Sensor Potential Savings

HVAC Savings

The [redacted] had the following HVAC ECM's implemented:

- Hot Water Reset – on secondary loops
- Supply Air Reset

To estimate the impacts of each of these ECMs as well as chilled water reset for buildings of similar size in the population, a simulation model was used to calculate the impacts of each of the HVAC ECMs in this building. The following tables list the impact of each ECM.

Table 17. Modeled Energy Savings For HVAC Measures

HVAC Measures	Annual Savings (kWh)	Savings / SF (kWh/yr)	Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption	% Savings of Model Results
CHW Reset	190,000	0.3	70.6	0.91%	1.46%
HW Reset	10,000	0.01	3.7	0.05%	0.08%
Supply Air Reset	2,300,000	3.0	847.6	10.87%	17.50%

Table 18. Modeled Coincident Peak Demand Savings For HVAC Measures

End Use / Measure	Coincident Peak Demand Savings (kW)	Coincident Peak Demand Savings (W/SF)	Coincident Peak Demand Savings (W/Person)	% Savings of Compass Coincident Peak Demand	% Savings of Model Results
CHW Reset	0.0	0.000	0.0	0.0%	0.00%
HW Reset	0	0.000	0.0	0.0%	0.00%
Supply Air Reset	-24	-0.032	-8.9	-0.9%	-0.74%

Table 19. Modeled Peak Demand Savings For HVAC Measures

End Use / Measure	Peak Demand Savings (kW)	Peak Demand Savings (W/SF)	Peak Demand Savings / Person (W/Person)	% Savings of Compass Peak Demand	% Savings of Model Results
CHW Reset	40.7	0.05	15.0	0.007	1%
HW Reset	-6.9	-0.01	-2.6	-0.001	0%
Supply Air Reset	1217.4	1.60	448.4	0.21	16%

Figure 11 and Figure 12 below show the schedule and loadshapes for the two primary AHUs located in the [redacted]. These AHUs have been equipped with VFDs prior to the SEN program.

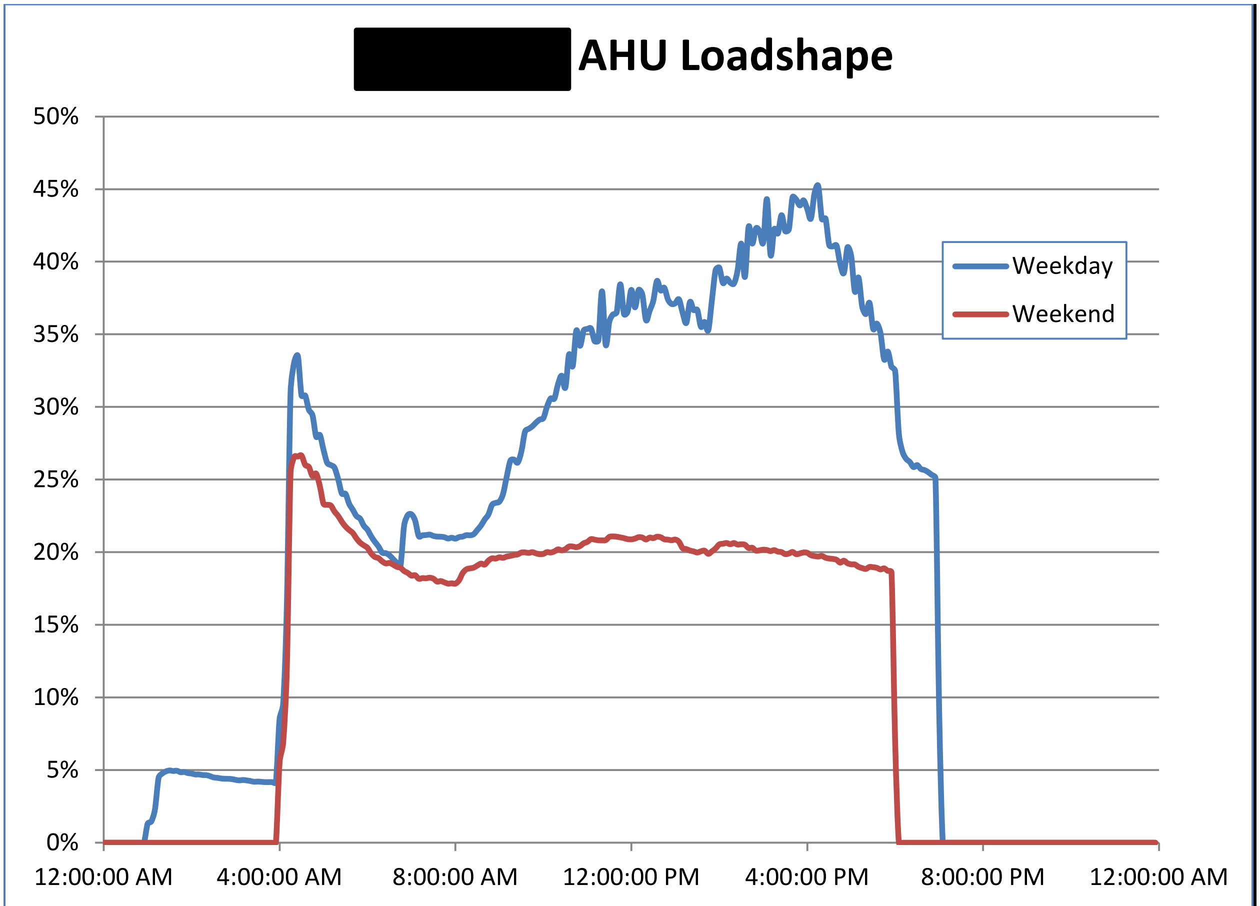

Figure 11. [redacted] AHU Loadshape

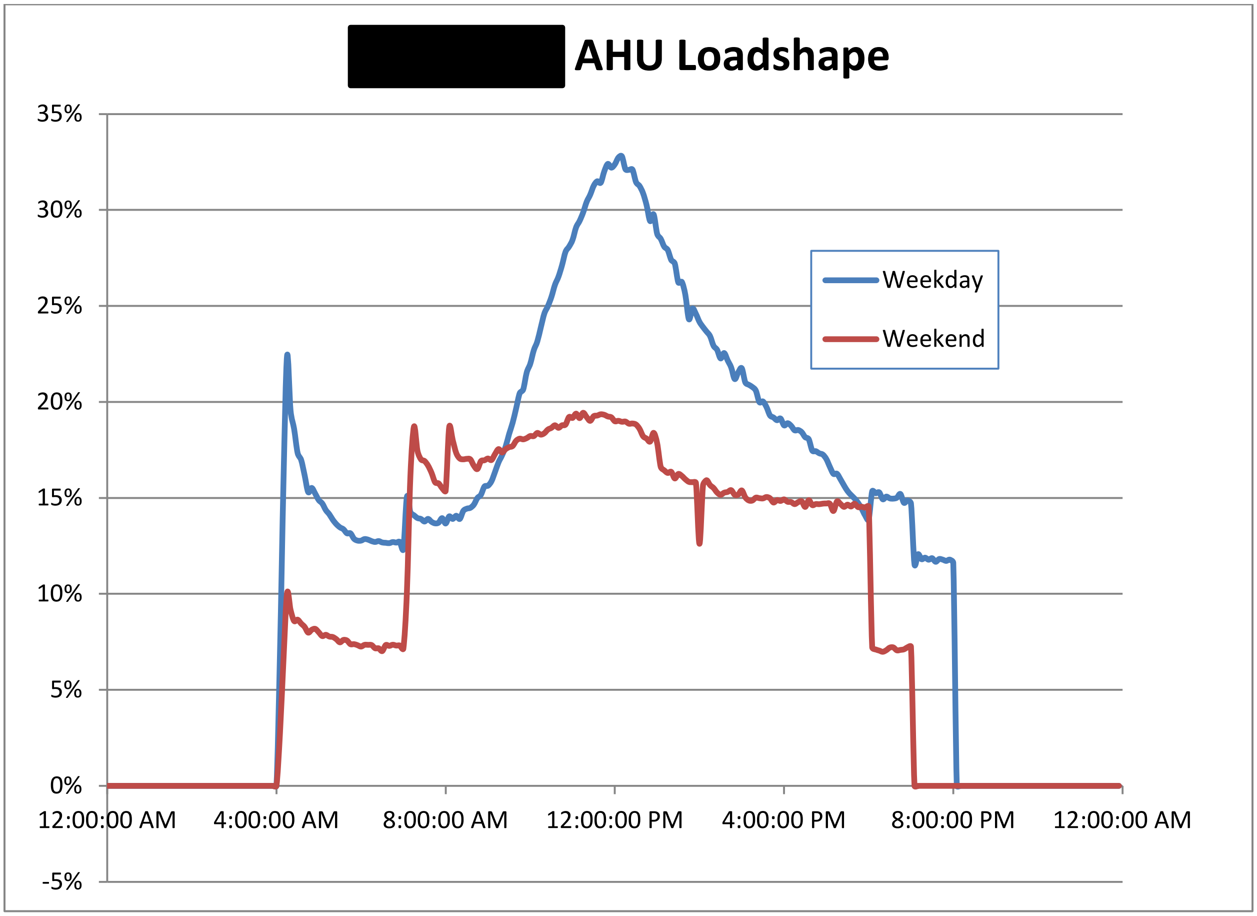

Figure 12. [redacted] **AHU Loadshape**

Site 2: [redacted] (SEN-07)

Prepared for:

Smart Energy Now
Duke Energy
North Carolina

Prepared by:

Architectural Energy Corporation
2540 Frontier Avenue, Suite 100
Boulder, Colorado 80301

Prepared In:

November 2013
v1.1

Introduction

This report addresses M&V activities for the Envision Charlotte Smart Energy Now (SEN) program.

These M&V activities were used to characterize savings for a variety of behavior-based measures that may have been implemented in this building. These savings estimates have been used to estimate the savings that were achieved in this building, and also, along with other impact evaluation data, to extrapolate savings for the entire population of buildings involved in the Envision Charlotte Smart Energy Now program.

Goals and Objectives

- Verify annual gross kWh/person savings
- Verify annual gross kWh/conditioned sqft savings
- Verify summer peak kW/person savings
- Verify summer peak kW/sqft savings

Project Contacts

Duke Energy Project Coordinator	[redacted]	[redacted]
AEC Contact	[redacted]	[redacted]
Customer Contact	[redacted]	[redacted]

Site Locations/ECM's

Address	Conditioned Area
[redacted]	[redacted]

Data Products and Project Output

- Peak demand per person savings
- Utility coincident peak demand per person savings
- Annual Energy per person Savings

M&V Option

IPMVP Option A, D

M&V Implementation Schedule

- Collected on-site data during normal operating hours.
- Obtained and verified the post-retrofit sequence of operations and/or operating schedule for HVAC, lighting, and other controlled equipment. Confirmed hours of operation, days per week, and holiday schedule. Determined if there is systematic variability on certain days of the week.

- Deployed post-retrofit loggers and trend logs to record amperage/status on the lighting and plug panels post-retrofit load shapes and energy consumption, and variables associated with HVAC equipment such as setpoint schedules, AHU temperatures, and so forth.
- Evaluated the energy savings of the retrofit measures.

Field Data Points

Survey data –

- Determined if any of the following ECM's are being followed:

1. Possible actions in personal office space
   a. Computer
      i. Set computer to energy saving mode (e.g. display and/or computer will automatically sleep after a period of inactivity)
      ii. Manually turn off computer when not in use
      iii. Manually turn off monitor when not in use

   These were evaluated through one or more of the following methods:
   - Panel-level monitoring of 115V panels.
   - Interviews with IT representatives to discuss global computer settings
   - Walkthroughs to observe computer / monitor status.

   b. Lighting
      i. Use desk lamp or task lighting instead of lighting entire workspace with overhead lights.
      ii. Manually turn off desk lamp or task lighting when leaving the room
      iii. Manually turn off desk lamp or task lighting and use natural daylight
      iv. Manually turn off overhead light when leaving the room
      v. Manually turn off overhead light and use natural daylight

   These were evaluated through one or more of the following methods:
   - Panel-level monitoring of 277V panels.
   - Walkthroughs to observe lighting / occupancy status.
   - Combination occupancy / light loggers in common spaces, i.e., conference rooms, and offices, as appropriate.

   c. HVAC
      i. Set a thermostat to decrease energy-consumption (e.g. slightly less cool in the summer and slightly less warm in the winter).
      ii. Remove a personal space heater

   These were evaluated through the following methods:
   - Trend logging
   - Recording the zone setpoint schedules
   - Walkthroughs to look for space heaters, etc.

   d. Equipment upgrade
      i. Replace a standard desk lamp with an efficient (Energy Star) desk lamp
      ii. Replace a standard computer monitor with an efficient (Energy Star) monitor
      iii. Replace a standard desktop computer with a laptop computer

      These were evaluated through one or more of the following methods:
      - Walkthroughs to survey / observe existing equipment
      - Interview IT staff
      - Interview facilities staff

2. Possible actions in office common or shared spaces, such as conference rooms, lunchrooms, storage rooms, copy rooms, and so on.
   a. Lighting
      i. Manually turn off light when leaving the room
      ii. Manually turn off light to use natural daylight

   These were evaluated through one or more of the following methods:
   - Panel-level monitoring of 277V panels. (see lighting section above)
   - Walkthroughs to survey lighting / occupancy status.
   - Combination occupancy / light loggers in common spaces, i.e., conference rooms.

Data Logging/Trending

Installed data loggers on the following panels:

- Installed data loggers on [redacted] floor lighting panels
- Installed data loggers on [redacted] floor plug panels

Installed occupancy/lighting data loggers in the following areas:

- [redacted] Floor Open Office
- [redacted] Floor [redacted] Lobby
- [redacted] Floor [redacted] Room
- [redacted] Floor Back Office
- [redacted] Floor Lobby
- [redacted] Floor Copy Room
- [redacted] Floor Break Room
- [redacted] Floor [redacted]

One-time measurements:

Simultaneously measured the following variables on logged panels:

- kW, amps, volts, power factor

Logger Table

Energy Logger Pro	TRMS	20A CT	100A CT	150A CT	200A CT	Occupancy Sensors
6-7	16	2	7	10	4-5	10

Verification and Quality Control

- Compared logger data and spot measurements to nameplate values; identified out of range data
- Visually inspected logger data for consistent operation. Sorted by day type and removed invalid data.
- Verified electrical voltage of equipment circuits.

Recording and Data Exchange Format

- Hobo logger binary files
- Excel spreadsheets
- Trend logs

Data Analysis

Multiple analysis techniques were utilized to determine the data products and project output including:

- Excel Spreadsheets
- Whole Building Simulation Modeling
- Visual verification during survey

Lighting & plug load measures were evaluated through the use of post-measure (as monitored) load shapes, and estimated pre-program load shapes. Simulation models were used appropriate to the measure being evaluated.

Results

Lighting and plug load panels were monitored to determine the current consumption for these end uses. Since pre-program monitoring was not performed, it is not possible to report the actual savings. To estimate the maximum potential savings that could have been realized under the SEN program, a baseline load shape was developed that assumed minimal occupant control of lighting, and a plug load profile that roughly follows the same strategy.

There are no ECM's currently being implemented at this building. Lighting control is manual.

To estimate the impacts of HVAC ECMs for buildings of similar size in the population, a simulation model of this building was used to calculate the impacts of each of the HVAC ECMs listed below. The following tables list the impact of each ECM, normalized to conditioned area and to building population, as well as to the annual energy consumption as reported in the Compass website, and to the model baseline energy consumption, where the model baseline energy consumption is defined as the simulation model annual consumption with no HVAC measures.

Table 20. Building Characteristics

Building	Conditioned SF	Building Population	Annual Consumption (Compass) (kWh)
[redacted]	[redacted]	[redacted]	11,400,000

Table 21. [redacted] simulation model assumptions

Characteristic	Value
Vintage	[redacted]
Size	[redacted] square feet
Number of floors	[redacted]
Wall construction and R-value	6in concrete, R-10
Roof construction and R-value	Built-up roof, R-18
Glazing type	Single pane clear; Shading-coefficient = 1.00 U-value = 1.11
Lighting power density	Offices: 1.42 W/SF
Plug load density	Offices: 0.75 W/SF
Operating hours	Mon-Fri: 5am – 7pm Sat, Sun: 9am-5pm
HVAC system types	Four VAV AHUs. Hot water reheat. Constant Supply air temp.
HVAC system size	Based on ASHRAE design day conditions, 10% oversizing assumed.
Chiller type	Screw type chiller
Chilled water system type	Variable volume, 2-way control valves
Chilled water system control	Constant chilled water temp, 44 deg F setpoint
Boiler type	Electric
Hot water system type	Constant volume, 3-way control valves
Hot water system control	Constant HW temp, 180 deg F setpoint
Thermostat setpoints	Occupied hours: 76 cooling, 70 heating Unoccupied hours: 82 cooling, 64 heating

Representatives of the companies occupying this building were requested to fill out surveys describing the range of energy saving activities that the company employees performed. At [redacted], a single company survey was received, representing [redacted] out of [redacted] building occupants, or about 5.6% of the total building occupancy. Table 22 summarizes the activities in this building. Although this company represents a small fraction of the total building population, a relatively large percentage of the company occupants did participate in these measures.

Table 22. Occupant Survey Energy Savings Actions Summary

Action	Participating Employees	% of Employees
Shutting shades	[redacted]	50%
Use natural daylight	[redacted]	19%
Manually turn off conference room lights when leaving room	[redacted]	31%
Manually turn off lights to use natural daylight in conference rooms	[redacted]	38%

Manually turn off lights to use natural daylight in lunchrooms	■	63%
Manually turn off storage room lights when leaving room	■	100%
Manually turn off lights to use natural daylight in break rooms	■	63%
Energy Saving mode for computer	■	100%
Manually turn off computer when not in use	■	100%
Replace standard computer with laptop computer	■	94%

Table 23. Energy Savings Results

End Use / Measure	Annual Savings (kWh)	Savings / SF (kWh/yr)	Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption	% Savings of Model Results
Lighting (includes HVAC interaction)	642,975	1.0900	450.578	5.64%	
Plugs (includes HVAC interaction)	871,241	1.4770	610.540	7.64%	
HVAC					
CHW Reset	90,000	0.1526	63.069	0.79%	0.64%
HW Reset	0	0.0000	0.000	0.00%	0.00%
Supply Air Reset	2,198,600	3.7273	1,540.715	19.29%	15.57%

Table 24. Peak Demand Savings Results

End Use / Measure	Annual Savings (kW)	Savings / SF (W)	Savings / Person (W)	% Savings of Annual Compass Consumption	% Savings of Model Results
Lighting (includes HVAC interaction)	385	0.6523	269.639	12.49%	
Plugs (includes HVAC interaction)	162	0.2745	113.465	5.26%	
HVAC					
CHW Reset	1,459	2.4735	1,022.425	47.37%	27.50%
HW Reset	0	0.0000	0.000	0.00%	0.00%
Supply Air Reset	1,459	2.4735	1,022.425	47.37%	27.50%

Table 25. Coincident Peak Demand Savings Results

End Use / Measure	Annual Savings (kW)	Savings / SF (W)	Savings / Person (W)	% Savings of Annual Compass Consumption	% Savings of Model Results
Lighting (includes HVAC interaction)	46	0.0781	32.268	2.71%	
Plugs (includes HVAC interaction)	33	0.0561	23.189	1.95%	
HVAC					
CHW Reset	0	0.0000	0.000	0.00%	0.00%
HW Reset	0	0.0000	0.000	0.00%	0.00%
Supply Air Reset	-83	-0.1407	-58.164	-4.88%	-3.50%

A pre-program lighting load shape was developed to estimate how lighting may have been controlled prior to the program implementation. This pre-program lighting shape has been used to estimate the maximum savings that could be achieved by the program. Since the survey results indicate that for this company, most of the employees turned off lights when unneeded, these savings results may be representative.

Figure 13 below shows the average lighting load shapes during the monitoring period. The maximum achievable savings for this building is represented by the area between the pre/post weekday load shapes as well as the pre/post weekend load shapes. These savings are also represented by the savings load shapes located at the bottom of the figure.

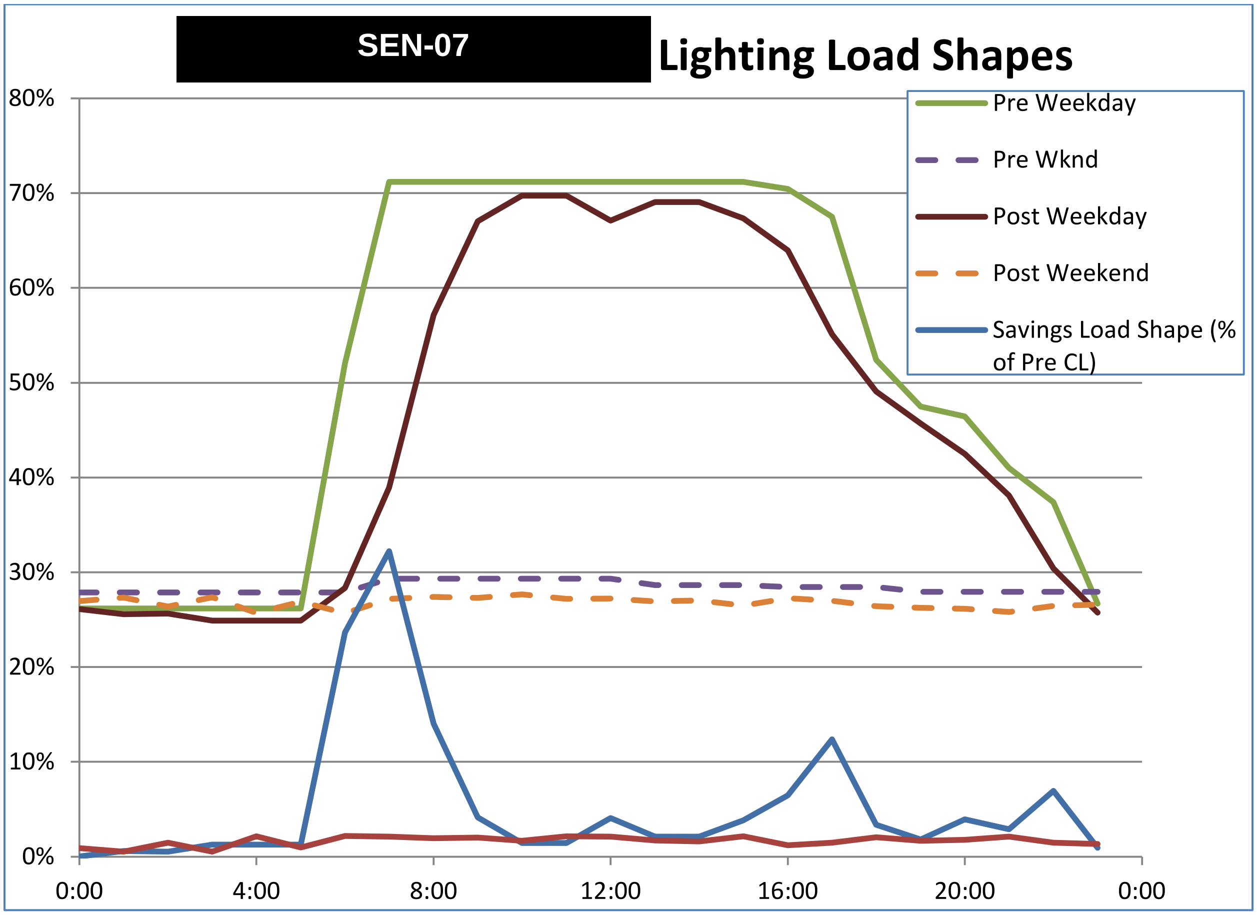

Figure 13. Lighting Load Shapes

Figure 14 below shows the average plug load shapes for during the monitoring period. Similar to Figure 13, the maximum achievable savings for this building is represented by the area between the pre/post weekday load shapes as well as the pre/post weekend load shapes. These savings are also represented by the savings load shapes located at the bottom of the figure.

Since all employees had, or converted to laptop computers during the program period, and that employees tended to turn off computers when they were not in use, these savings may also be representative.

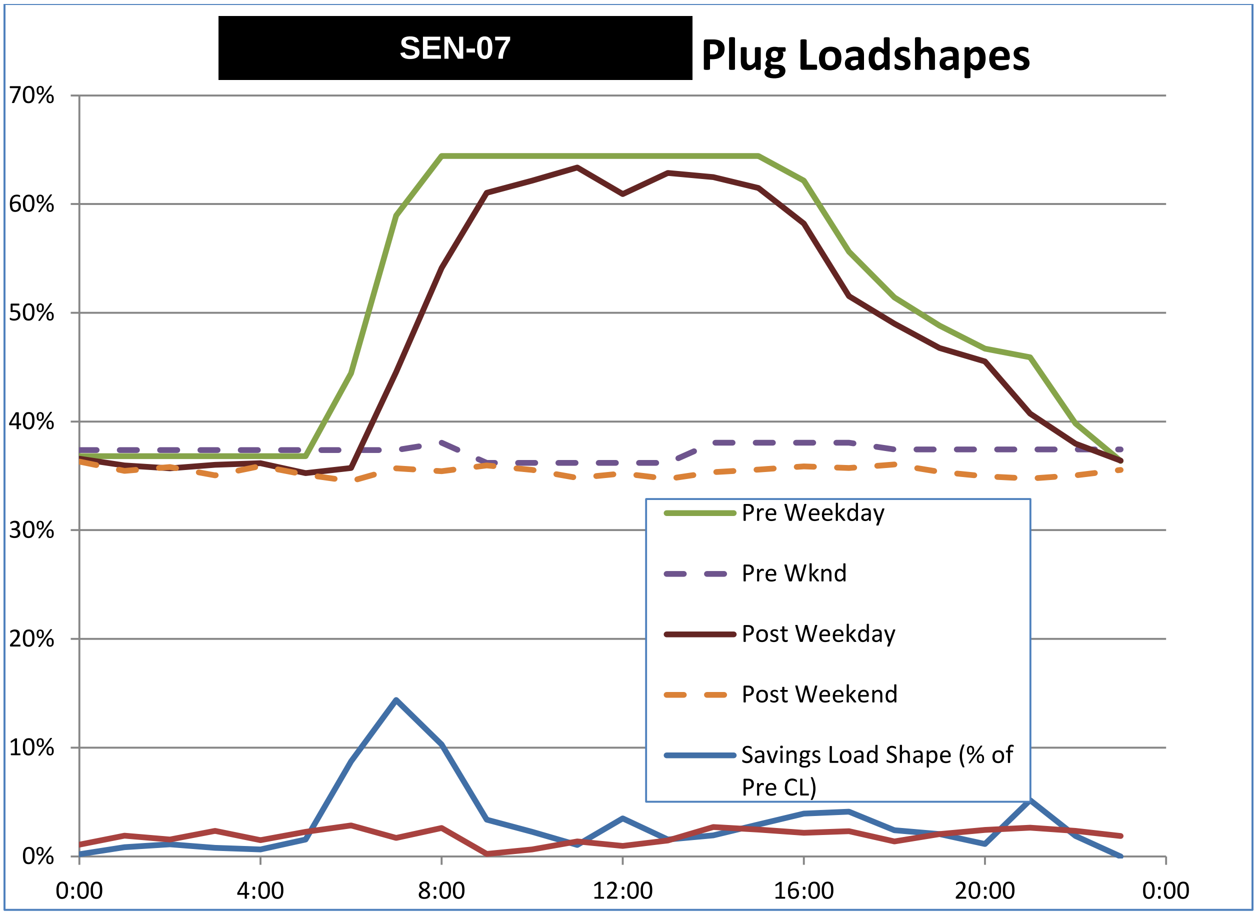

Figure 14. Plug Load Shapes

Combined lighting / motion sensor loggers were deployed in a variety of space types within the building. Figure 15 below shows the average occupancy and light level load shapes for several swing spaces including storage, conference, copy and break rooms during the monitoring period. The results from this logging show the potential lighting savings if occupancy sensor controls were installed. If occupancy sensors were installed in these areas, the light levels could be reduced to match the occupancy levels. On average, light levels could be reduced by 30% on the weekdays and 11% on weekends, as seen in Table 26. As with the lighting and plug load analyses above, this value is an estimate of the maximum savings potential that could result from occupancy sensor lighting control in common areas.

Table 26. Potential Lighting Reduction Savings

	Weekday	Weekend
Lighting Reduction	30%	11%

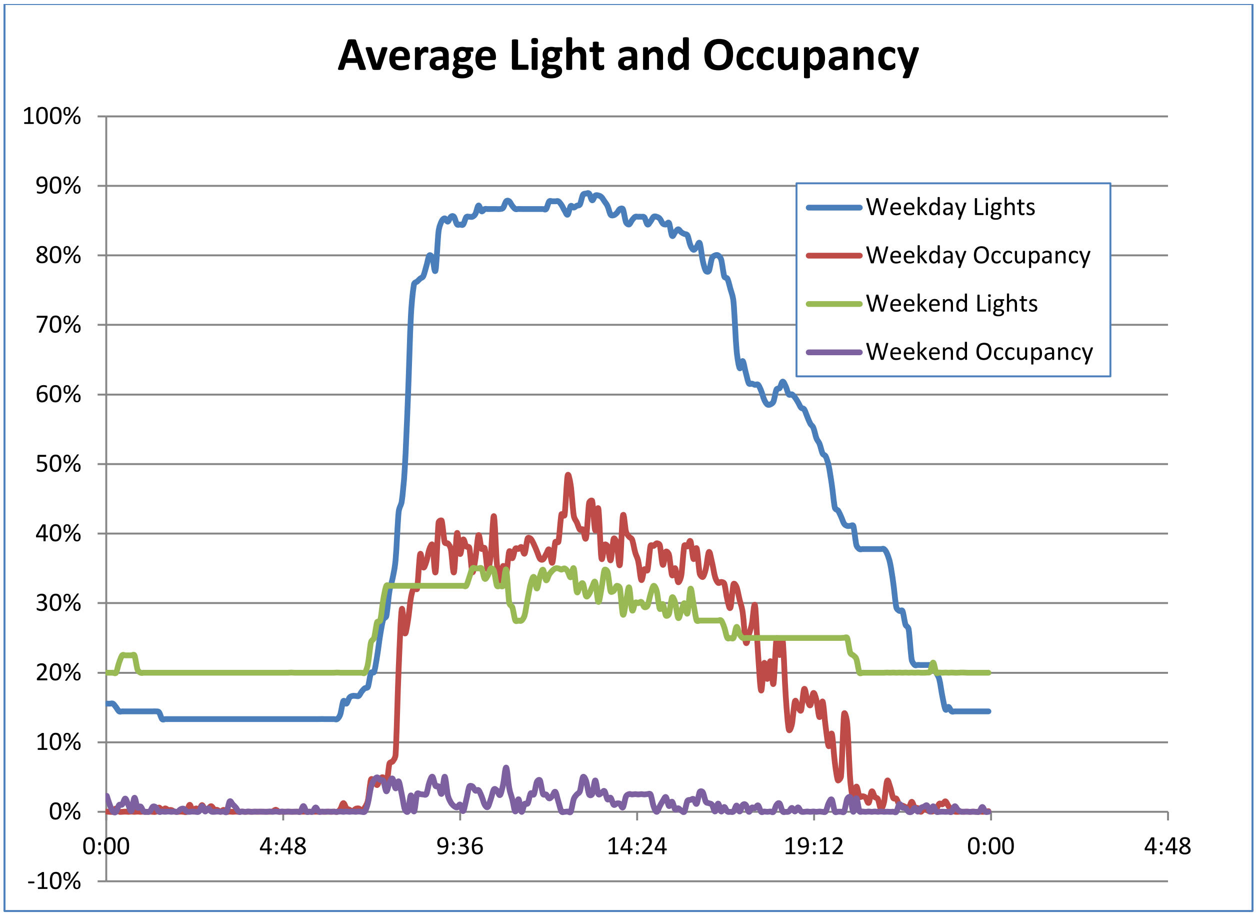

Figure 15. Occupancy & Light Level Sensor Load Shapes (Storage, Conference, Copy, and Break Rooms)

Site 3: [redacted] (SEN-08)

Prepared for:

Smart Energy Now
Duke Energy
North Carolina

Prepared by:

Architectural Energy Corporation
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Prepared In:

November 2013
v1.1

Introduction

This plan addresses M&V activities for the Envision Charlotte Smart Energy Now (SEN) program.

These M&V activities were used to characterize savings for a variety of behavior-based measures that may have been implemented in this building. These savings estimates will be used, along with other impact evaluation data, to extrapolate savings for the entire population of buildings involved in the Envision Charlotte Smart Energy Now program.

Goals and Objectives

- Verified annual gross kWh/person savings
- Verified summer peak kW/person savings

Project Contacts

Duke Energy Project Coordinator	[redacted]	[redacted]
AEC Contact	[redacted]	[redacted]
Customer Contact	[redacted]	[redacted]

Site Locations/ECM's

Address	Conditioned Area
[redacted]	[redacted]

Data Products and Project Output

- Peak demand per person savings
- Utility coincident peak demand per person savings
- Annual Energy per person savings.

M&V Option

IPMVP Option A, D

M&V Implementation Schedule

- Collected on-site data during normal operating hours.
- Obtained and verified the post-retrofit sequence of operations and/or operating schedule for HVAC, lighting, and other controlled equipment. Confirmed hours of operation, days per week, and holiday schedule. Determined if there is systematic variability on certain days of the week.
- Deployed post-retrofit loggers and trend logs to record amperage/status on the lighting and plug panels post-retrofit load shapes and energy consumption, and variables associated with HVAC equipment such as setpoint schedules and AHU temperatures.
- Evaluated the energy savings of the retrofit measures.

Field Data Points

Survey data

- Since measures are being normalized by the number of people affected by the measure, determined the number of occupants in affected zones.
- Determined if any of the following ECM's are being followed:

1. Possible actions in personal office space
    a. Computer
        i. Set computer to energy saving mode (e.g. display and/or computer will automatically sleep after a period of inactivity)
        ii. Manually turn off computer when not in use
        iii. Manually turn off monitor when not in use

    These were evaluated through one or more of the following methods:
    - Panel-level monitoring of 115V panels.
    - Interviews with IT representatives to discuss global computer settings
    - Walkthroughs to observe computer / monitor status.

    b. Lighting
        i. Use desk lamp or task lighting instead of lighting entire workspace with overhead lights.
        ii. Manually turn off desk lamp or task lighting when leaving the room
        iii. Manually turn off desk lamp or task lighting and use natural daylight
        iv. Manually turn off overhead light when leaving the room
        v. Manually turn off overhead light and use natural daylight

    These were evaluated through one or more of the following methods:
    - Panel-level monitoring of 115V panels.
    - Walkthroughs to observe lighting / occupancy status.
    - Combination occupancy / light loggers in common spaces, i.e., conference rooms, and offices, as appropriate.

    c. HVAC
        i. Set a thermostat to decrease energy-consumption (e.g. slightly less cool in the summer and slightly less warm in the winter).
        ii. Remove a personal space heater

    These were evaluated through one or more of the following methods:
    - Trend logging
    - Recording the zone setpoint schedules
    - Temperature loggers in the zones, i.e., near thermostats
    - Walkthroughs to look for space heaters, etc.

    d. Equipment upgrade

i. Replace a standard desk lamp with an efficient (Energy Star) desk lamp
ii. Replace a standard computer monitor with an efficient (Energy Star) monitor
iii. Replace a standard desktop computer with a laptop computer

These were evaluated through one or more of the following methods:

- Walkthroughs to survey / observe existing equipment
- Interview IT staff
- Interview facilities staff

2. Possible actions in office common or shared spaces, such as conference rooms, lunchrooms, storage rooms, copy rooms, and so on.
   a. Please indicate which types of common spaces (rooms) are affected (list).
   b. Lighting
      i. Manually turn off light when leaving the room
      ii. Manually turn off light to use natural daylight

   These were evaluated through one or more of the following methods:

   - Panel-level monitoring of 115V panels. (see lighting section above)
   - Walkthroughs to survey lighting / occupancy status.
   - Combination occupancy / light loggers in common spaces, i.e., conference rooms.

Data Logging/Trending

Trend HVAC points on the BAS was not possible as the BAS was off-line. Therefore, data loggers were installed on the following panels:

- Installed data loggers on lighting panels 4H, 4P2 and XX.
- Installed data loggers on plug panels 2L, 2P2 and 4L.
- Panel 4L also served a 40-ton AHU serving the main [redacted] floor.
- Panel 4P2 also served a 15-ton AHU serving the [redacted] floor mezzanine.
- Selected space temperatures.

Data loggers were configured for 5 minute instantaneous readings and were deployed for two weeks.

Logger Table

The following table indicates the quantities of data loggers and other instrumentation used.

Energy Logger Pro	TRMS Modules	CT's (20-400 A)	Space Temp / RH loggers	Lighting / Occupancy Sensors
5	11	16	2	8

Verification and Quality Control

- Compared logger data and spot measurements to nameplate values; identified out of range data

- Visually inspected logger data for consistent operation. Sorted by day type and removed invalid data.
- Verified electrical voltage of equipment circuits.

Recording and Data Exchange Format

- Hobo logger binary files
- Excel spreadsheets
- Trend logs

Data Analysis

A combination of analysis techniques will be utilized to determine the data products and project output including:

- Excel spreadsheets
- Whole building simulation modeling
- Billing analysis
- Visual verification during survey
- Occupant surveys

Lighting measures were evaluated through the use of estimated pre- and monitored post-measure load shapes. Other spreadsheet analyses or simulation models were used appropriate to the measure being evaluated.

Results

A prototypical simulation model was used to estimate the impact of a set of potential HVAC measures. The intention was to develop a simulation model that reasonably reflected the building. The model assumptions are listed below in Table 27. No attempt was made to model individual tenant spaces or detailed floor-by-floor zoning or differences in HVAC configurations. Rather, the model was designed to provide an overall indication of the savings potential of a select set of HVAC system energy savings measures.

Table 27. Simulation model assumptions

Characteristic	Value
Vintage	[redacted]
Size	[redacted] square feet
Number of floors	[redacted]
Wall construction and R-value	8in Concrete, R-10
Roof construction and R-value	Built-up roof, R-18
Glazing type	Double pane clear; Shading-coefficient = 0.81 U-value = 0.48
Lighting power density	Core Offices: 1.43 W/SF Perimeter Offices: 1.0 W/SF Lobby: 1.48 W/SF
Plug load density	Core Offices: 0.5 W/SF Perimeter Offices: 0.75 W/SF Lobby: 0.0 W/SF
Operating hours	Mon-Fri: 5am – 6pm Sat, Sun: 11am-1pm
HVAC system types	Eight AHUs. Variable Air Volume, hot water reheat.(5th floor has electric reheat) OA reset supply air temperature.
HVAC system size	Based on ASHRAE design day conditions, 10% oversizing assumed.
Chiller type	Water cooled screw chiller (constant speed)
Chilled water system type	Variable volume 2-way control valves,
Chilled water system control	Constant CHW Temp, 44 deg F setpoint
Boiler type	Hot water, 80% efficiency
Hot water system type	Constant volume with 3 way control valves,
Hot water system control	Constant HW Temp, 180 deg F setpoint
Thermostat setpoints	Occupied hours: 76 cooling, 70 heating Unoccupied hours: 82 cooling, 64 heating

Representatives of the companies occupying this building were requested to fill out surveys describing the range of energy saving activities that the company employees performed. In this building, a single survey was received, representing [redacted] building occupants. Table 28 summarizes the activities in this building.

The building population, as reported at the Compass website, is [redacted] occupants. This number is outdated, and for purposes of calculating the participation rate in this building, the building population will be assumed to be [redacted]. The building is being remodeled and is not at full occupancy.

The only reported energy savings activity for this building was to turn off storage room lights when it is unoccupied.

Table 28. Occupant Survey Energy Savings Actions Summary

Action	Participating Employees	% of Employees	% of Building Population
Manually turn off storage room lights when leaving room	[redacted]	100%	100%

Lighting and Plug Loads

Lighting and plug load panels were monitored to determine the current consumption for these end uses. Since pre-program monitoring was not performed, it is not possible to report the actual savings. To estimate the maximum potential savings that could have been realized under the SEN program, a baseline load shape was developed that assumed minimal occupant control of lighting, and a plug load profile that roughly follows the same strategy.

Figure 16 below shows the average lighting load shapes for [redacted] during the monitoring period. The maximum achievable savings for this building is represented by the area between the pre/post weekday load shapes as well as the pre/post weekend load shapes. These savings are also represented by the savings load shapes located at the bottom of the figure.

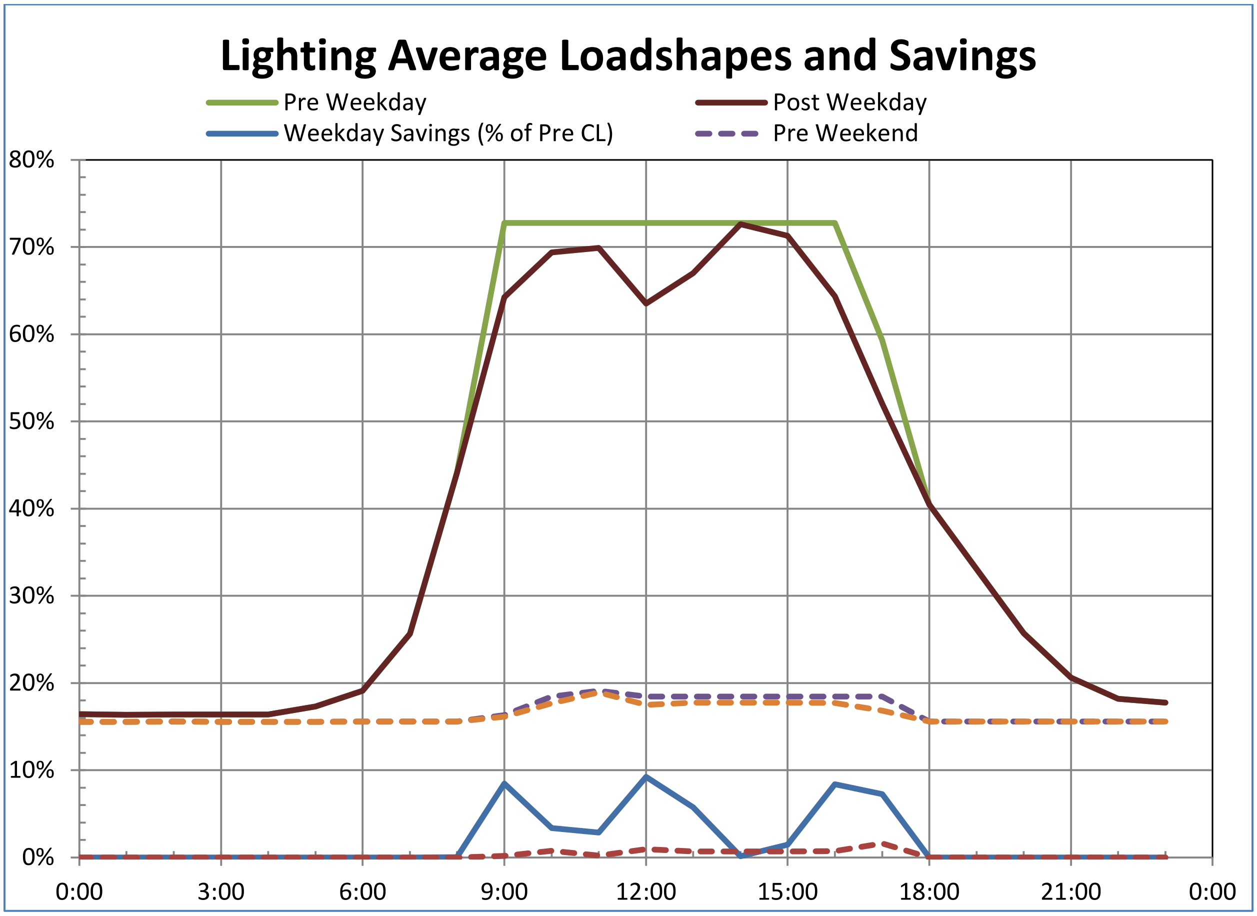

Figure 16. Lighting Load Shapes

Figure 17 below shows the average plug load shapes for [redacted] during the monitoring period. Like Figure 16, the maximum achievable savings for this building is represented by the area between the pre/post weekday load shapes as well as the pre/post weekend load shapes. These savings are also represented by the savings load shapes located at the bottom of the figure.

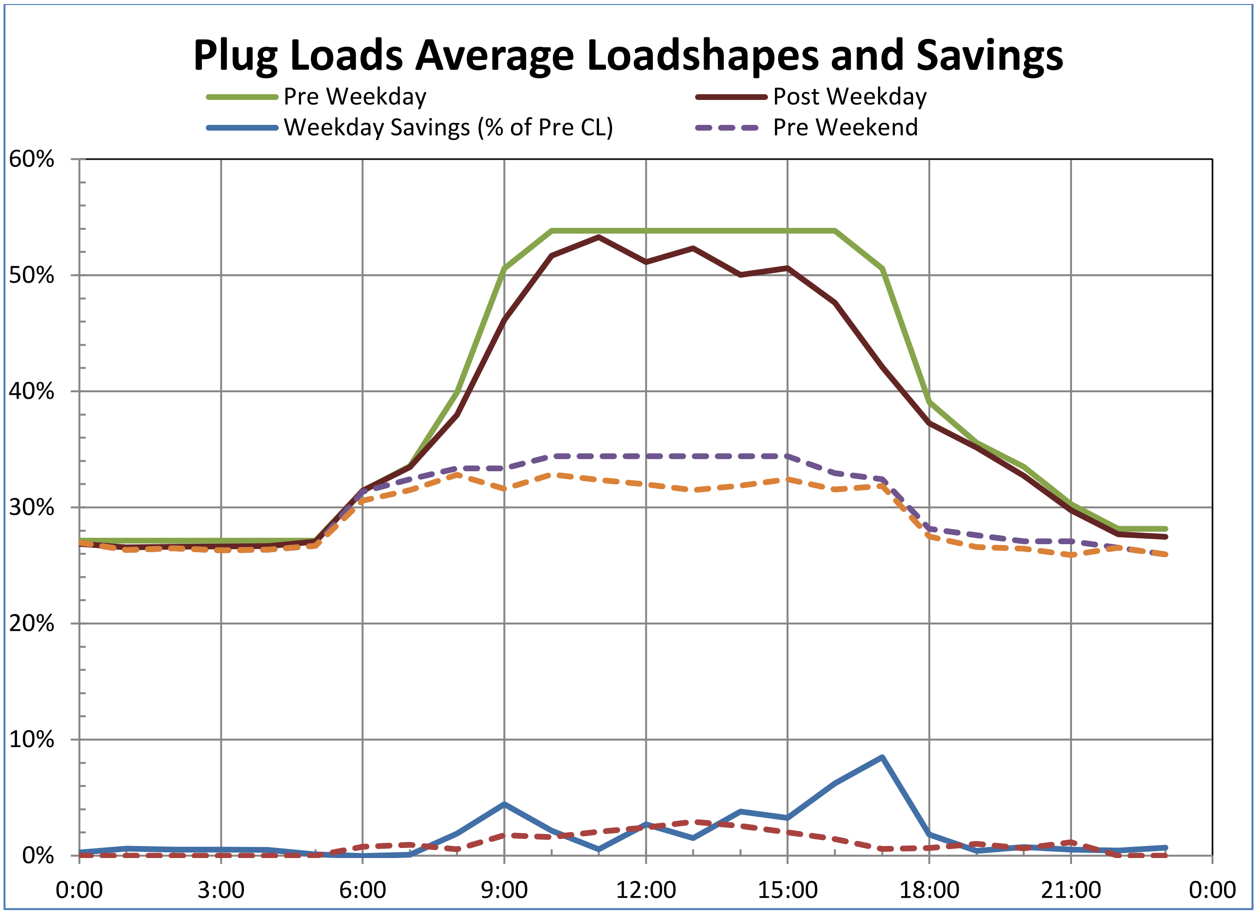

Figure 17. Plug Load Shapes

Figure 18 below shows the average occupancy and light level load shapes for the building. The chart is a composite of monitoring period data from office space, hallways and conference rooms. If occupancy sensors were installed in these areas, the light levels could be reduced to match the occupancy levels, especially overnight and on weekends.

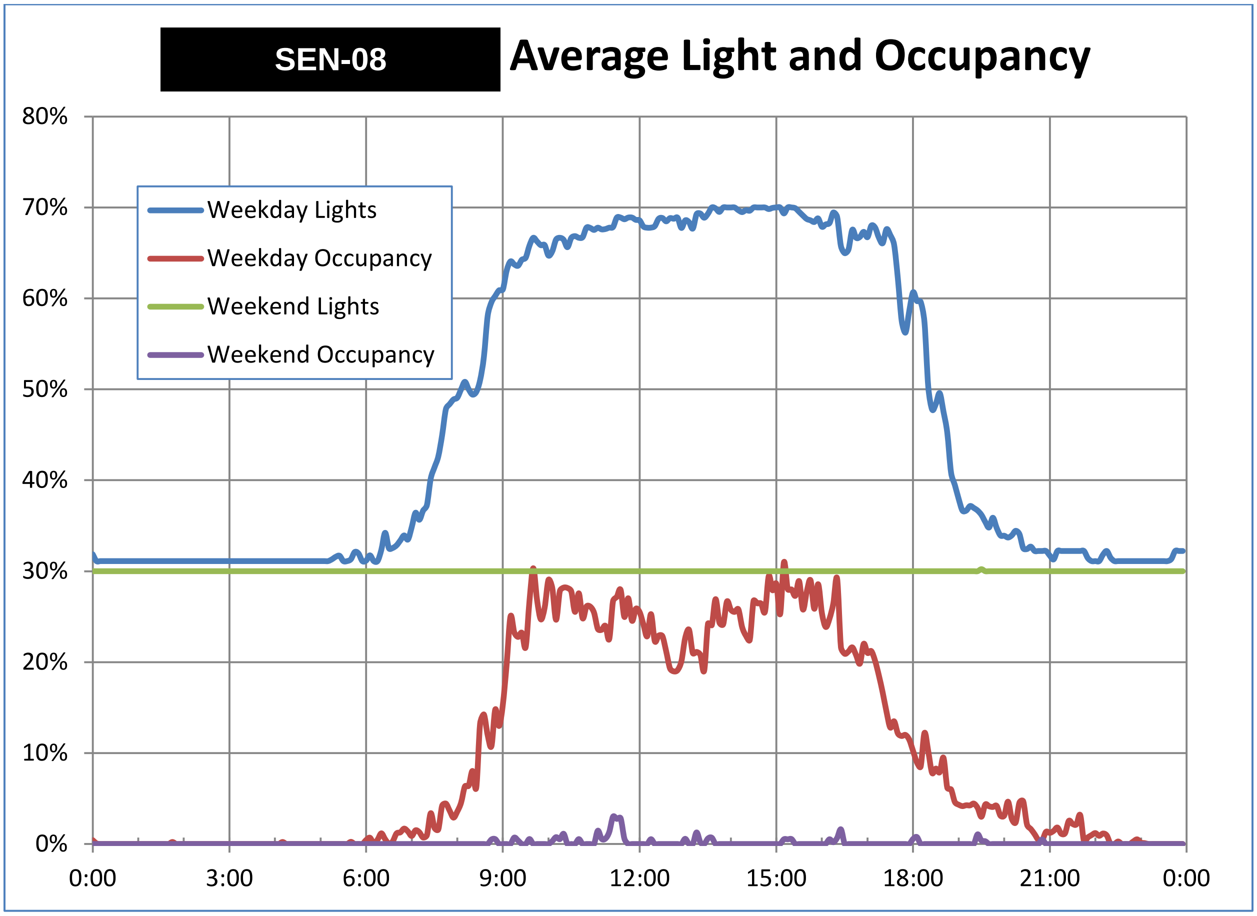

Figure 18. Occupancy & Light Level Sensor Load Shapes

HVAC

Each "Main" floor is served by a 40-ton air handling unit (AHU) and each mezzanine floor is served by a 15-ton AHU. All the AHU's are provided with chilled water for cooling from a central reciprocating 120-ton chiller. Heating is provided from a central boiler.

One main AHU fan and one mezzanine AHU fan were monitored to determine their schedules and for VFD behavior. Figure 19 below shows that the Main AHU ran all the time, even at night and on weekends when the building is unoccupied.

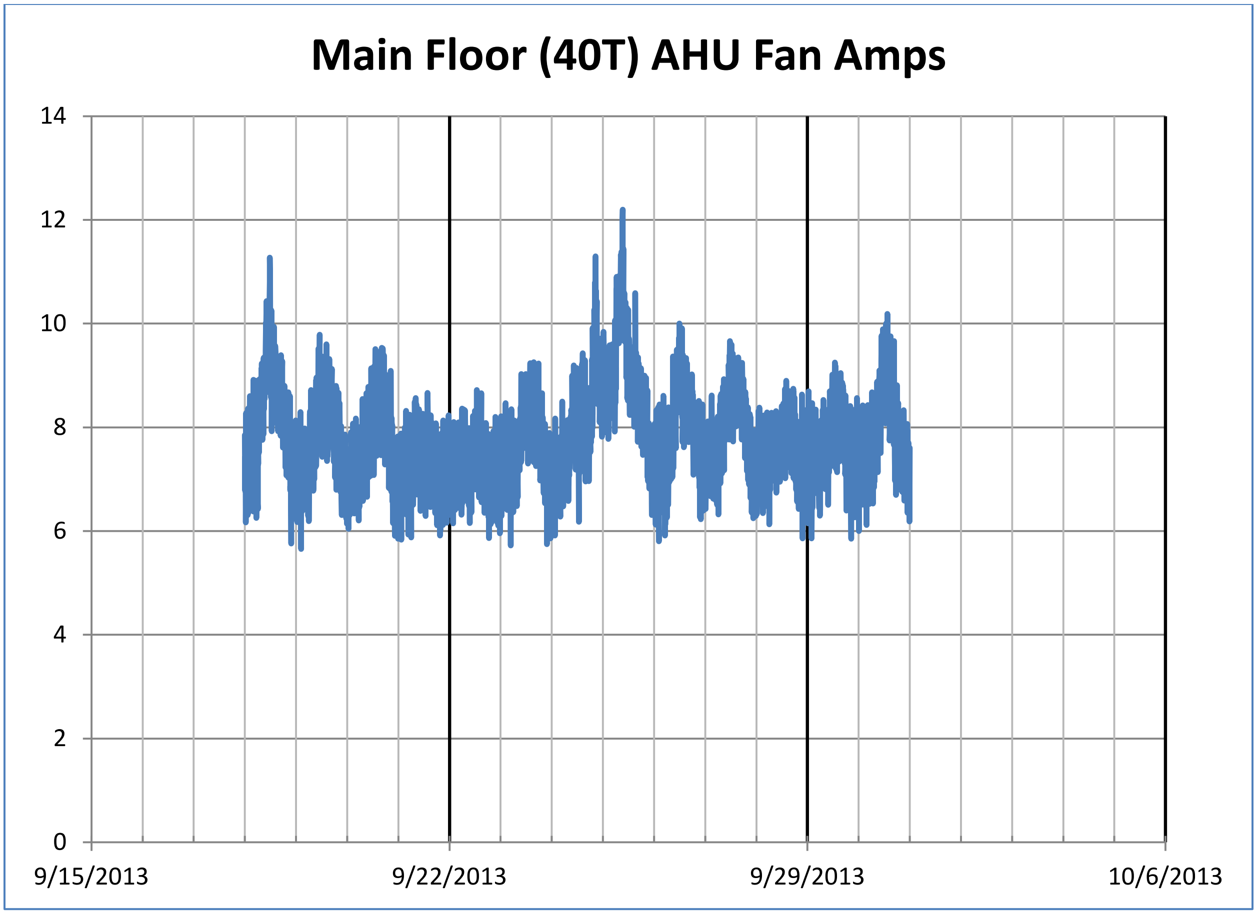

Figure 19. Main Floor AHU Fan Operation

The average HVAC load shapes for the Main AHU are presented in the next figure.

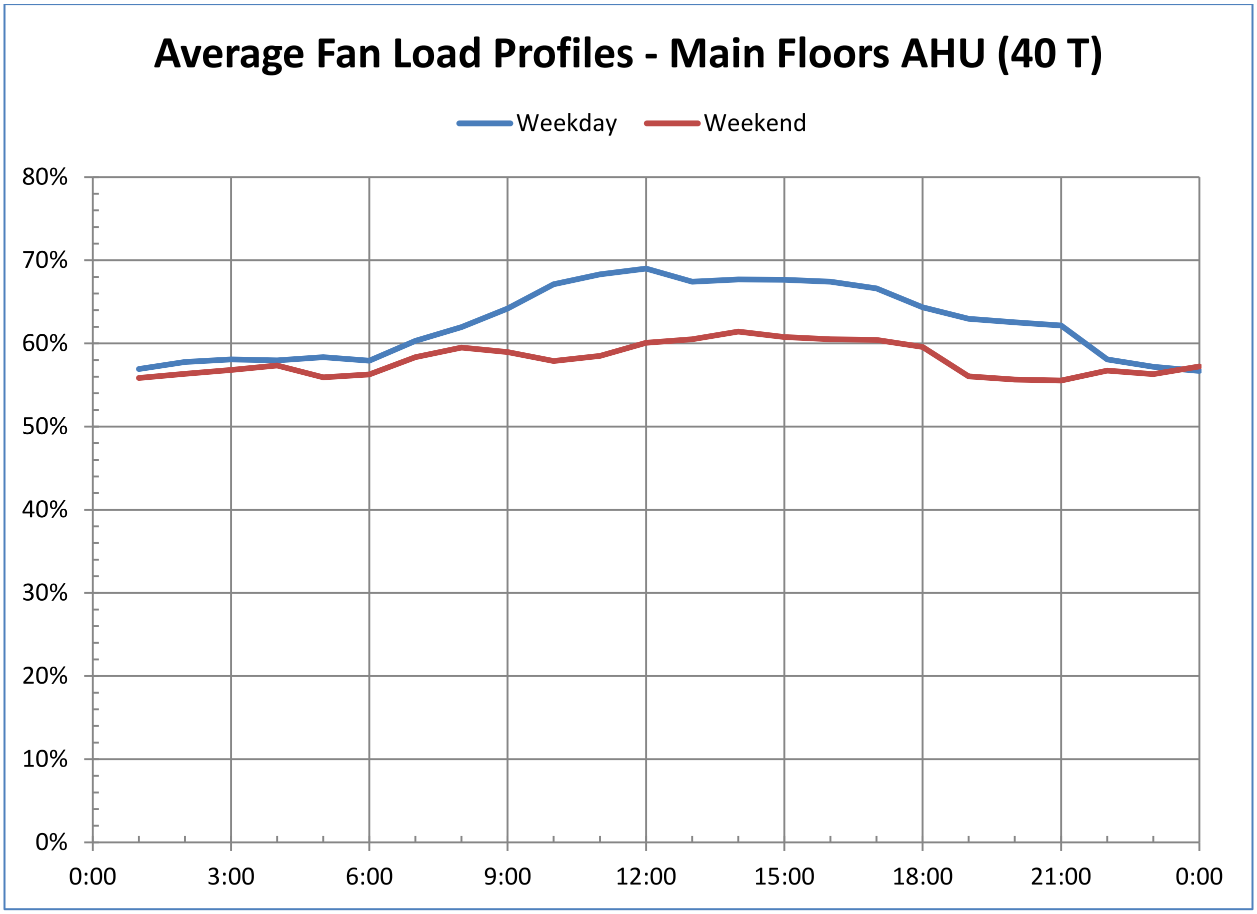

Figure 20. Main Floor AHU Fan Load Profiles

Figure 21 below shows that the Mezzanine AHU cycles off at night, but still operates on the weekends, even when the building is unoccupied.

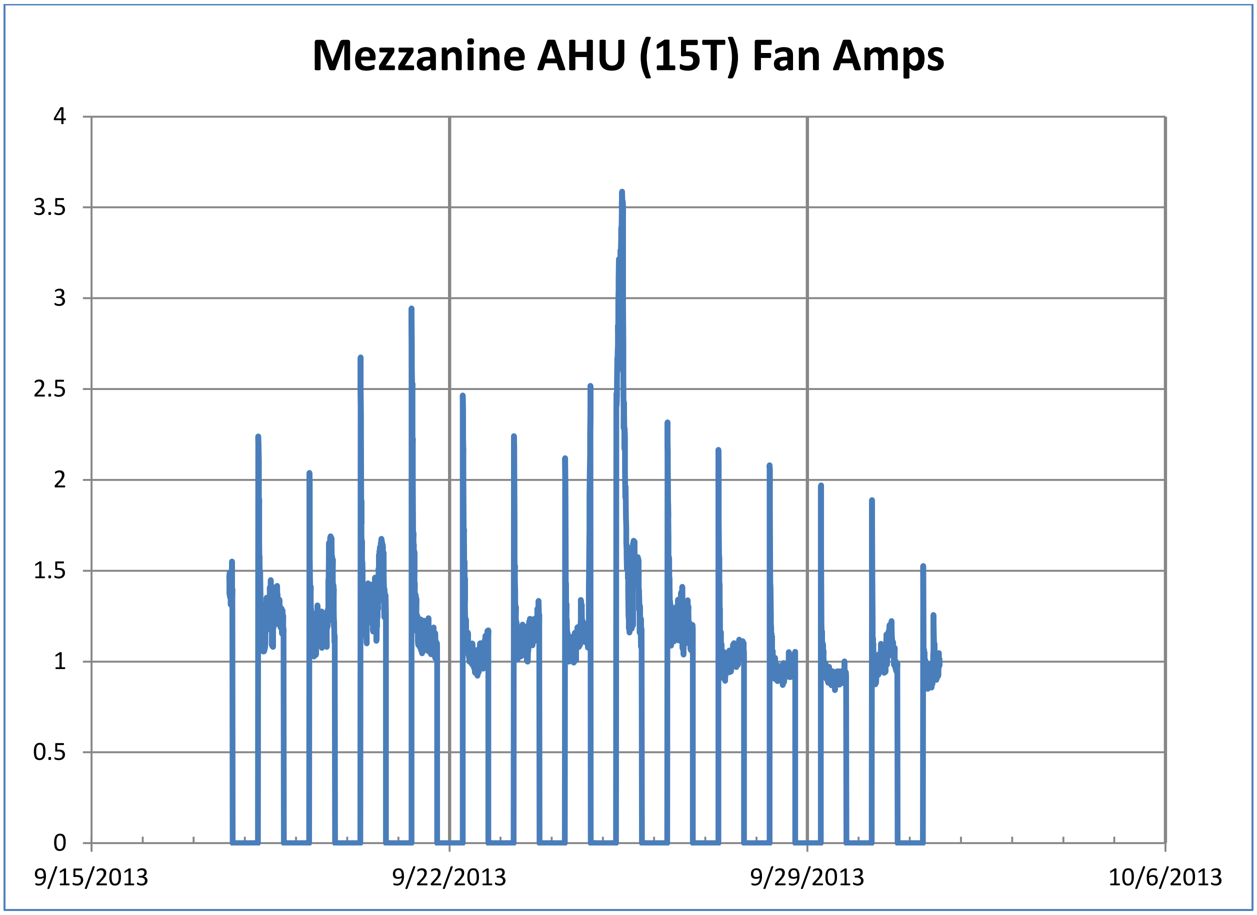

Figure 21. Mezzanine Floor AHU Fan Operation

The average HVAC load shapes for the Mezzanine AHU are presented in the next figure.

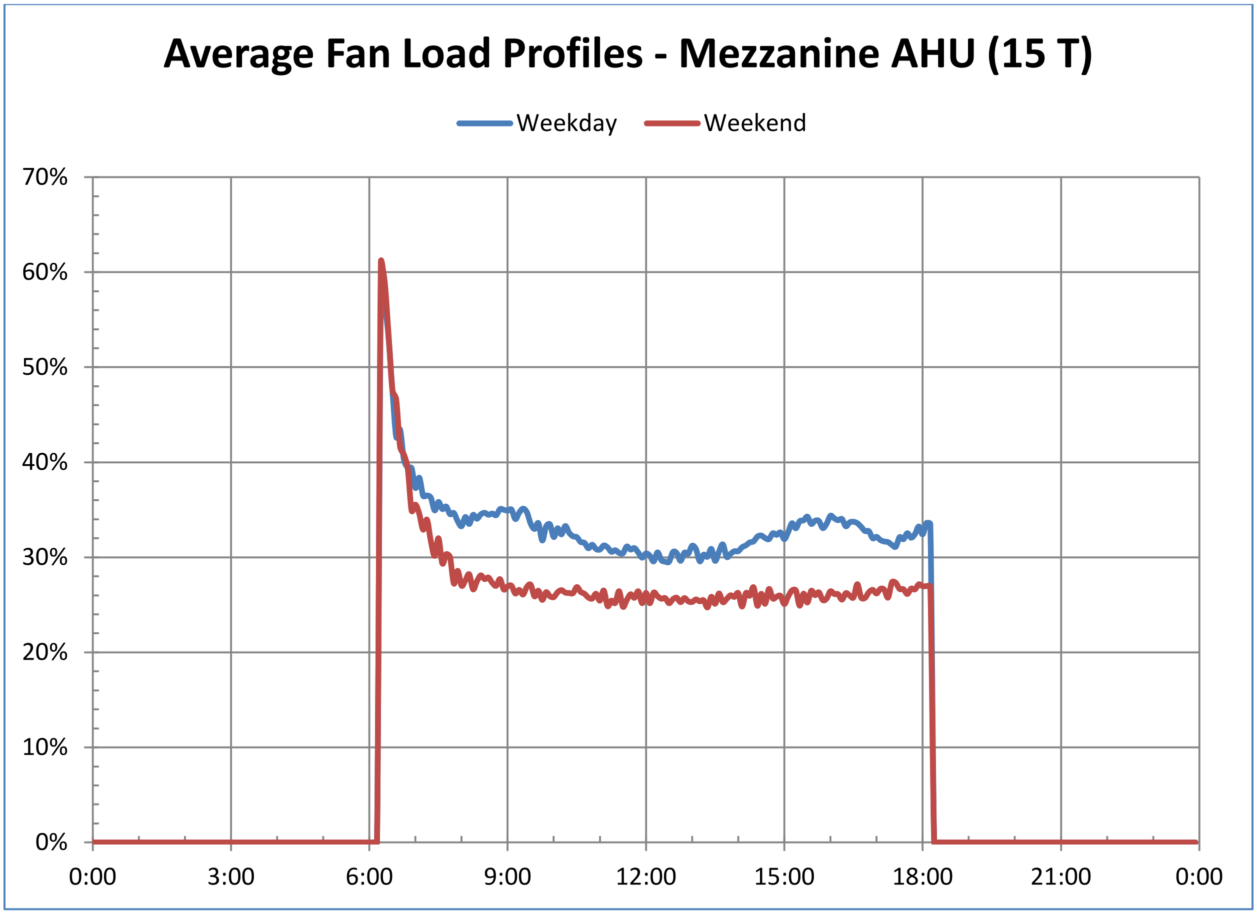

Figure 22. Mezzanine Floor AHU Fan Load Profiles

Because of the limited time period for this investigation, the weather was fairly consistent and no variation of fan energy with outside air temperature was observed.

Sample space temperatures and relative humidities are presented in the next two figures. The temperatures vary only about +/- 2 degrees from average in each case (with a one-day exception on the fourth floor), indicating little evidence of night or weekend setback.

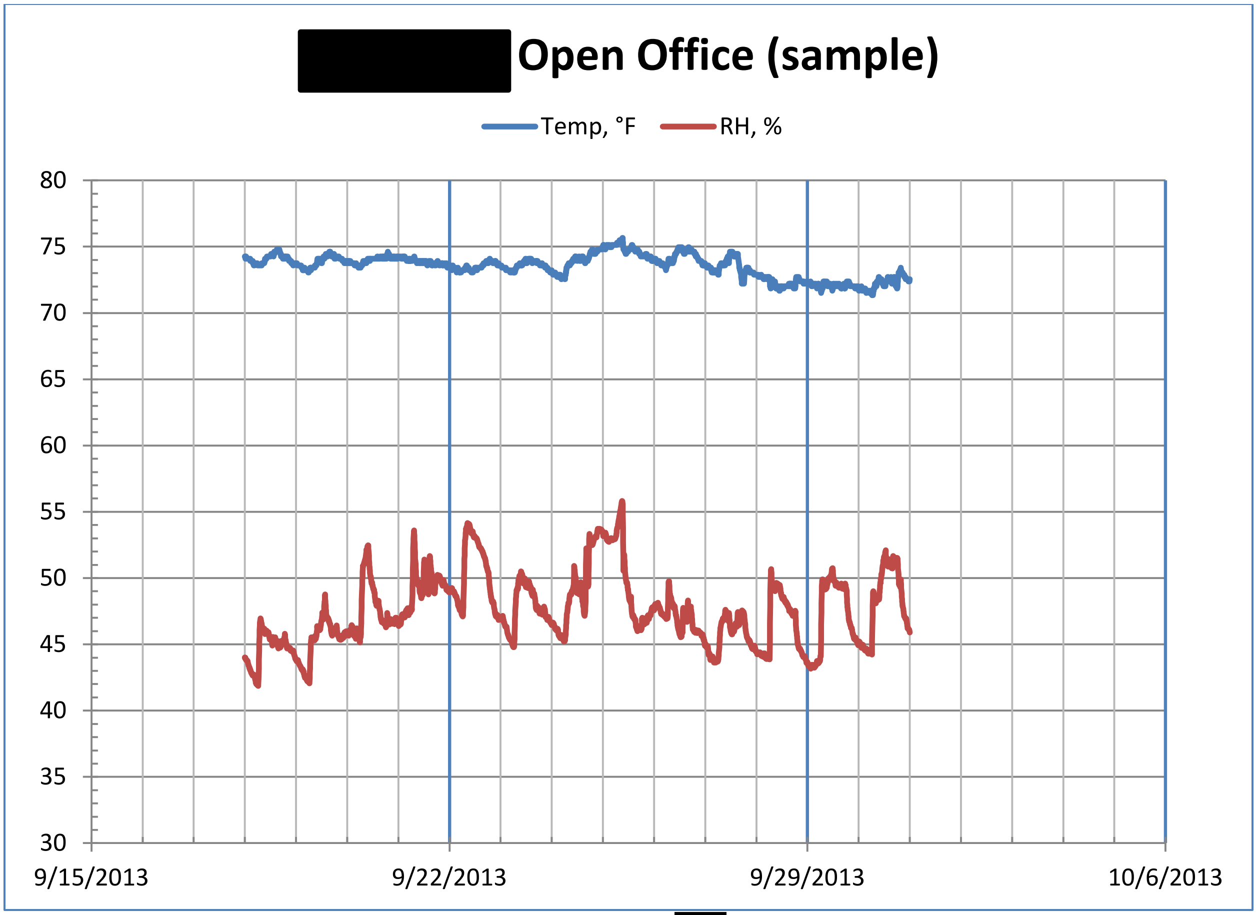

Figure 23. Typical Space Temperature History – [redacted] Floor

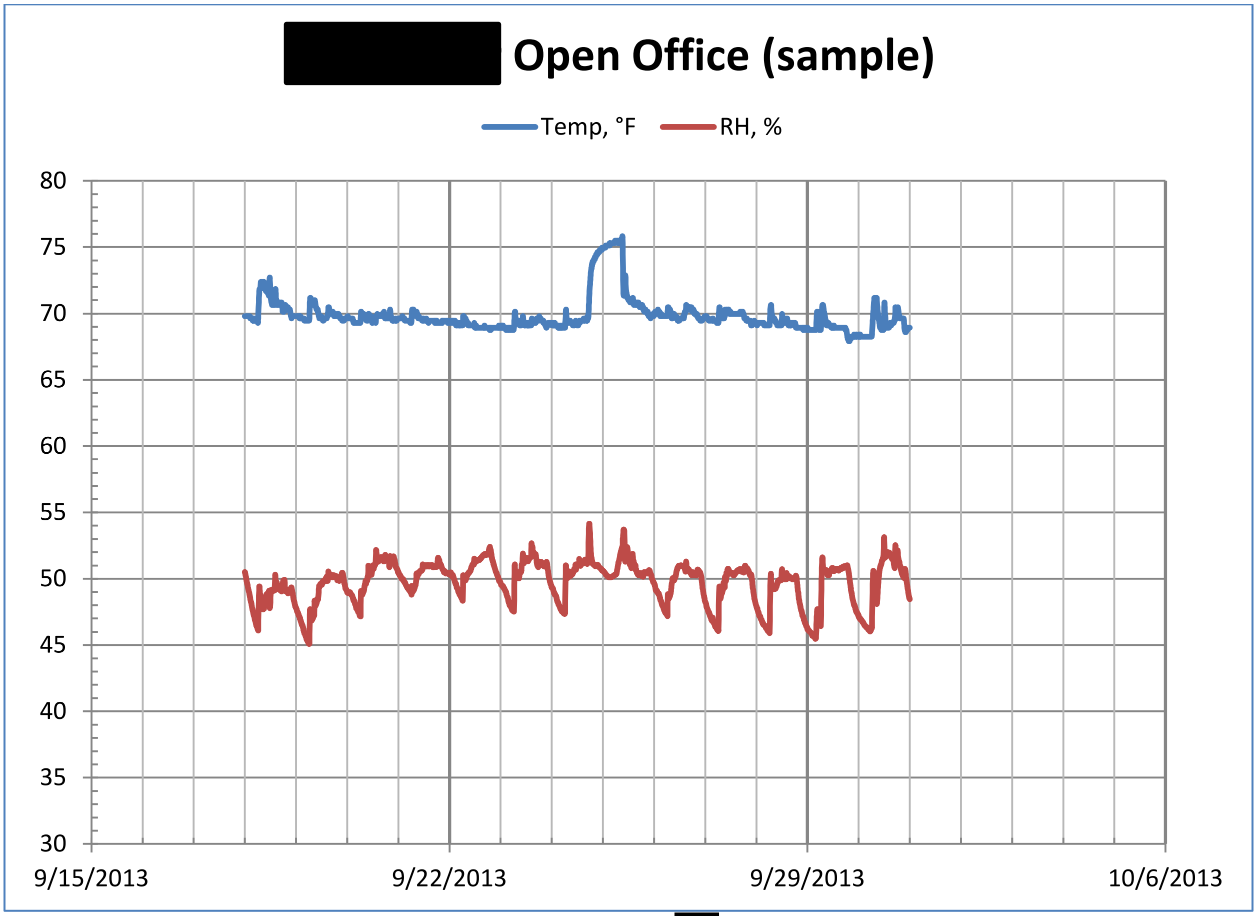

Figure 24. Typical Space Temperature History – [redacted] Floor

Savings Summary

[redacted] had the following HVAC ECM's already implemented:

- Supply air temperature reset based on load

The following HVAC ECM's are *not* implemented:

- Chilled water temperature reset with OA temperature
- Heating water temperature reset with OA temperature

To estimate the impacts of each of these ECMs for buildings of similar size in the population, a simulation model was used to calculate the impacts of each of the HVAC ECMs in this building. The following tables list the savings impact of each ECM, normalized to conditioned area and to building population, as well as to the annual energy consumption as reported in the Compass website, and to the model baseline energy consumption. The model baseline energy consumption is defined as the simulation model annual consumption with no HVAC measures.

The building population, as reported at the Compass website, is [redacted] occupants. That number may be accurate for the building in its present condition. The building is being remodeled and is only about half occupied. So as to not overstate the savings per occupant, the population has been increased to [redacted] occupants for the tables below.

Table 29. Building Information

Building	Conditioned SF	Building Population	Annual Consumption (Compass) (kWh)	Peak Demand (Compass) (kW)
[redacted]	[redacted]	[redacted]	1,344,300	177

Table 30. Energy Savings

End Use / Measure	Annual Savings (kWh)	Savings / SF (kWh/yr)	Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption	% Savings of Model Results
Lighting (includes HVAC interaction)	10,988	0.12	55	0.85%	
Plugs (includes HVAC interaction)	87,187	0.98	436	6.78%	
HVAC					
CHW Reset	40,000	0.45	200	3.1%	3.0%
HW Reset	0	0	0	0%	0%
Supply Air Reset	100,300	1.13	502	7.8%	7.5%

Table 31. Coincident Peak Demand Savings (kW)

End Use / Measure	Annual Savings (kW)	Savings / SF (W)	Savings / Person (W)	% Savings of Annual Compass Peak Demand	% Savings of Model Results
Lighting (includes HVAC interaction)	0.51	0.006	2.6	0.29%	
Plugs (includes HVAC interaction)	2.00	0.022	10.0	1.13%	
HVAC					
CHW Reset	0	0	0	0%	0%
HW Reset	0	0	0	0%	0%
Supply Air Reset	0	0	0	0%	0%

Table 32. Annual Peak Demand Savings (kW)

End Use / Measure	Annual Savings (kW)	Savings / SF (W)	Savings / Person (W)	% Savings of Annual Compass Peak Demand	% Savings of Model Results
Lighting (includes HVAC interaction)	3.28	0.037	32.8	0.59%	
Plugs (includes HVAC interaction)	5.24	0.059	52.4	0.95%	
HVAC					
CHW Reset	0	0	0	0%	0%
HW Reset	0	0	0	0%	0%
Supply Air Reset	0	0	0	0%	0%

Several other measures were reported as already implemented, but not as a result of the SEN program. These are:

- Heating water lockout above 52°F.
- New cooling towers
- Cooling tower fan VFD’s were installed, but not operational yet.
- Intent is to turn off AHUs within two hours of occupancy schedule (but at least one AHU operates 24/7).
- Variable speed AHU fans
- Some new VAV terminals
- Converting to 277 volt T-8 linear fluorescent lighting throughout (in progress)
- Limited use of occupancy sensors (1st and 2nd mezzanine restrooms)
- Desktop computers are Energy Star compliant.
- New rooftop solar photovoltaic array serves electric water heater

The building might possibly benefit from the following additional measure, which is not presently installed:

- Outdoor air economizers

Site 4: [redacted] (SEN-22)

Prepared for:

Smart Energy Now
Duke Energy
North Carolina

Prepared by:

Architectural Energy Corporation
2540 Frontier Avenue, Suite 100
Boulder, Colorado 80301

Prepared In:

November 2013

Introduction

This plan addresses M&V activities that were conducted for the Envision Charlotte Smart Energy Now (SEN) program.

These M&V activities were used to characterize savings for a variety of behavior-based measures that could have been implemented in this building. These savings estimates will be used, along with other impact evaluation data, to extrapolate savings for the entire population of buildings involved in the Envision Charlotte Smart Energy Now program.

Goals and Objectives

- Verify annual gross kWh/person savings
- Verify annual gross kWh/conditioned sqft savings
- Verify summer peak kW/person savings
- Verify summer peak kW/sqft savings

Project Contacts

Duke Energy Project Coordinator	[redacted]	[redacted]
AEC Contact	[redacted]	[redacted]
Customer Contact	[redacted]	[redacted]

Site Locations/ECM's

Address	Conditioned Area
[redacted]	[redacted] sqft

Data Products and Project Output

- Peak demand per person savings
- Utility coincident peak demand per person savings
- Annual Energy per person Savings

M&V Option

IPMVP Option A, D

M&V Implementation Schedule

- Collected on-site data during normal operating hours. Obtained and verified the current sequence of operations and operating schedules for HVAC, lighting, and plug loads.
- Confirmed hours of operation, days per week, and holiday schedule.
- Deployed post-retrofit loggers record amperage/status on the lighting and plug panels Collected trend logs for the HVAC system, lighting panels, and receptacle panels.

Field Data Points

During our initial visit and the installation visit we interviewed the facility staff and conducted a walkthrough of the facility. From the interview and our observations we found that the following ECMs were being followed by some of the occupants.

1. Actions in personal office space
   a. Computers
      i. Observed that computer monitors were off in workstations when employee was not at desk.
      ii. Baseline and Impact Survey indicated that Energy Star features are enabled on computers.
   b. Lighting
      i. In this facility each floor has an open office area with cubicles, private office spaces, and private meeting spaces.
      ii. We observed that all of the lights were on in the open office area and occupants did not have control of these fixtures.
      iii. In the private office spaces we found some occupants using the overhead lights and some occupants using task lighting. We observed that some occupant's task lighting was not illuminated while they were not at their work station as well as other occupants leaving task lighting on when they were not at their work station.
      iv. We observed several private offices that were occupied where the lights were tuned off and the occupant was utilizing ambient light.
      v. We also observed offices where the lights were on but the occupant was not present at the moment.
      vi. Facility staff interview indicated that the exterior lighting that was MH was retrofitted to LED fixtures, making all exterior fixtures LED.
   c. HVAC
      i. The facility staff and Baseline and Impact Survey indicated that the supply air temperature is reset based on outdoor air temperature and that temperature set point setback were in place for heating and cooling.
      ii. The Baseline and Impact Survey indicate that personal space heaters are not allowed in this facility. We did not observe any space heaters during our visits. To verify the indicated HVAC usage and behaviors we collected trend data for the supply, mixed, and return air handler temperatures for two AHUs. We also collected space temperatures at various VAVs throughout the facility.
   d. Equipment upgrade
      i. The computer monitors that we observed onsite were flat screen monitors. We did not see any CRT monitors onsite.
      ii. We observed both laptop and desktop computers onsite.

Data Logging/Trending

To verify our findings from the site visits, the Baseline Survey, and the Impact Survey, we collected trend data from the lighting and receptacle panels, the AHUs, and VAV boxes. We also installed occupancy and lighting loggers in office and shared spaces.

The below table details the loggers that were installed and the type of location.

Logger Type	Location Notes	Quantity Installed Within Facility
OS/ Lighting	Corridor	2
OS/ Lighting	Private office	3
OS/ Lighting	Conference Room	1

The next table details the trend data that was collected.

AHUs	Supply, return, and mixed air temperatures.
VAV	Space temperatures.
Lighting Panels	Energy consumption
Receptacle Panels	Energy consumption

Data Accuracy

Measurement	Sensor	Accuracy	Notes
Current	Magnelab CT	±1%	> 10% of rating

Verification and Quality Control

- Compare logger data and spot measurements to nameplate values; identify out of range data
- Visually inspect logger data for consistent operation. Sort by day type and remove invalid data.
- Verify electrical voltage of equipment circuits.

Recording and Data Exchange Format

- Hobo logger binary files
- Excel spreadsheets
- Trend logs

Data Analysis

From time-series data determine the actual schedule of post operation.

$$\mathrm{LF(t)} = \frac{\sum_{i=1}^{N_{Logged}} (\mathrm{kWTrend}_i)}{\sum_{i=1}^{N_{Logged}} \mathrm{kWControlPoint}_i}$$

$$\mathrm{kW_{Lighting}(t)} = \mathrm{LF(t)} * \sum_{i=1}^{N_{ControlPoints}} \mathrm{kWControlPoint}_i$$

Where

LF(t) = Lighting Load factor at time = t

$\mathrm{kWControlPoint}_i$ = connected load of control point i

$kWTrend_i$ = logged kW at control point i from trend data
N_{Logged} = population of logged control points
$N_{ControlPoints}$ = population of all control points

- Create separate schedules for weekdays and weekends using LF(t).
- Tabulate average operating hours by daytype (e.g. weekday and weekend).
- Extrapolate annual operating hours from the recorded hours of use by daytype.
- Generate the post load shape by plotting surveyed fixture kW against the actual schedule of post operation for each daytype.
- Calculate pre annual operating hours using the adjusted schedules by daytype and extrapolating to the full year.
- Calculate energy savings and compare to project application:

$$kWh_{savings} = (N_{Fixtures} * kW_{Fixture} * OpHrs)_{PRE} - (N_{Fixtures} * kW_{Fixture} * OpHrs)_{Post}$$

Results

Table 33 below shows the building parameters that were used to determine savings presented in this section.

Table 33. Building Parameters

Building	Conditioned SF	Building Population	Annual Compass Consumption (kWh)
[redacted]	[redacted]	[redacted]	6,298,955

A prototypical simulation model was used to estimate the impact of a set of potential HVAC measures. The intention was to develop a simulation model that reasonably reflected the building. The model assumptions are listed below in Table 34. No attempt was made to model individual tenant spaces or detailed floor-by-floor zoning or differences in HVAC configurations. Rather, the model was designed to provide an overall indication of the savings potential of a select set of HVAC system energy savings measures.

Table 34. Simulation model assumptions

Characteristic	Value
Vintage	[redacted]
Size	[redacted] square feet
Number of floors	[redacted]
Wall construction and R-value	6in Concrete, R-10
Roof construction and R-value	Built-up roof, R-18
Glazing type	Double pane clear; Shading-coefficient = 0.81 U-value = 0.48
Lighting power density	Offices: 1.1 W/SF Lobby: 1.1 W/SF Kitchen/Food: 1.27 W/SF Dining: 1.5 W/SF Mechanical: 1.5 W/SF
Plug load density	Offices: 0.5 W/SF Lobby: 0.5 W/SF Kitchen/Food: 0.77 W/SF Dining: 0.1 W/SF Mechanical: 0.1 W/SF
Operating hours	Mon-Fri: 5am – 11pm Sat, Sun: Unoccupied
HVAC system types	Four main AHUs. Dual Duct, constant volume. Constant supply air temperature.
HVAC system size	Based on ASHRAE design day conditions, 10% oversizing assumed.
Chiller type	Three water cooled 300 ton constant speed chillers
Chilled water system type	Variable volume 2-way control valves,
Chilled water system control	Constant CHW Temp, 44 deg F setpoint
Boiler type	Hot water, 80% efficiency
Hot water system type	Constant volume with 3 way control valves,
Hot water system control	Constant HW Temp, 180 deg F setpoint
Thermostat setpoints	Occupied hours: 76 cooling, 70 heating Unoccupied hours: 82 cooling, 64 heating

Representatives of the companies occupying this building were requested to fill out surveys describing the range of energy saving activities that the company employees performed. In this building, a single survey was received, representing [redacted] out of [redacted] building occupants, or about 27% of the total building occupancy. Table 35 summarizes the activities in this building.

Table 35. Occupant Survey Energy Savings Actions Summary

Action	Participating Employees	% of Employees	% of Building Population
Crab You're It	[redacted]	66.7%	14.0%
Adopt a light	[redacted]	66.7%	14.0%
Manually turn off conference room lights when leaving room	[redacted]	31.7%	6.7%
Manually turn off lunch room lights when leaving room	[redacted]	30.0%	6.3%
Manually turn off storage room lights when leaving room	[redacted]	33.0%	6.9%

Manually turn off copy / printer room lights when leaving room	[redacted]	30.0%	6.3%
Manually turn off break room lights when leaving room	[redacted]	31.7%	6.7%
Replace standard monitor with Energy Star monitor	[redacted]	100.0%	21.0%

Lighting and Plug Receptacle Potential Savings

The [redacted] has recently installed a metering system to meter the energy consumption of the lighting and receptacle panels. We were able to capture one month of trend data for the majority of the metered panels for analysis.

Since pre-program monitoring was not performed, it is not possible to report the actual program savings. To estimate the maximum potential savings that could have been realized under the SEN program, a baseline load shape was developed that assumed minimal occupant control of lighting, and a plug load profile that roughly follows the same strategy. The tables below show the maximum potential energy and demand savings for plug and light measures.

Table 36. Potential Lighting and Plug Energy Savings

End Use / Measure	Annual Energy Savings (kWh)	Energy Savings / SF (kWh/yr)	Energy Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption
Lighting (includes HVAC interaction)	287,625	0.73	261.5	4.57%
Plugs (includes HVAC interaction)	374,019	0.95	340.0	5.94%

Table 37. Potential Lighting and Plug Coincident Peak Demand Savings

End Use / Measure	Coincident Peak Demand Savings (kW)	Coincident Peak Demand Savings (W/SF)	Coincident Peak Demand Savings (W/Person)	% Savings of Compass Coincident Peak Demand
Lighting (includes HVAC interaction)	17	0.04	15.65	2%
Plugs (includes HVAC interaction)	54	0.14	49.51	5%

Table 38. Potential Lighting and Plug Peak Demand Savings

End Use / Measure	Peak Demand Savings (kW)	Peak Demand Savings (W/SF)	Peak Demand Savings (W/Person)	% Savings of Compass Peak Demand
Lighting (includes HVAC interaction)	136	0.35	123.4	8%
Plugs (includes HVAC interaction)	47	0.12	43.1	3%

Figure 25, Figure 26, and Figure 27 below show the existing average lighting loadshapes, the estimated maximum pre-program loadshape, and the maximum potential savings loadshape.

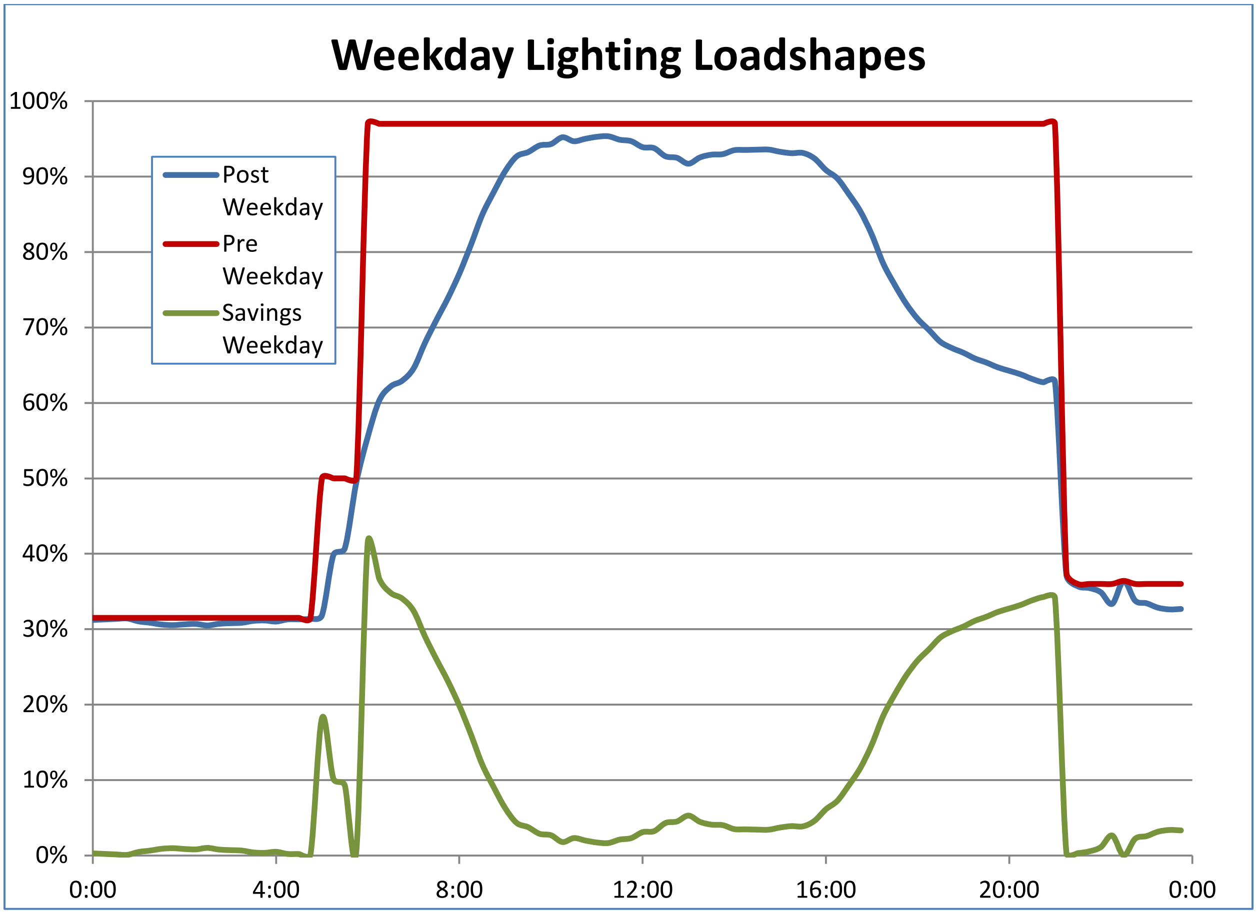

Figure 25. Weekday Lighting Loadshapes

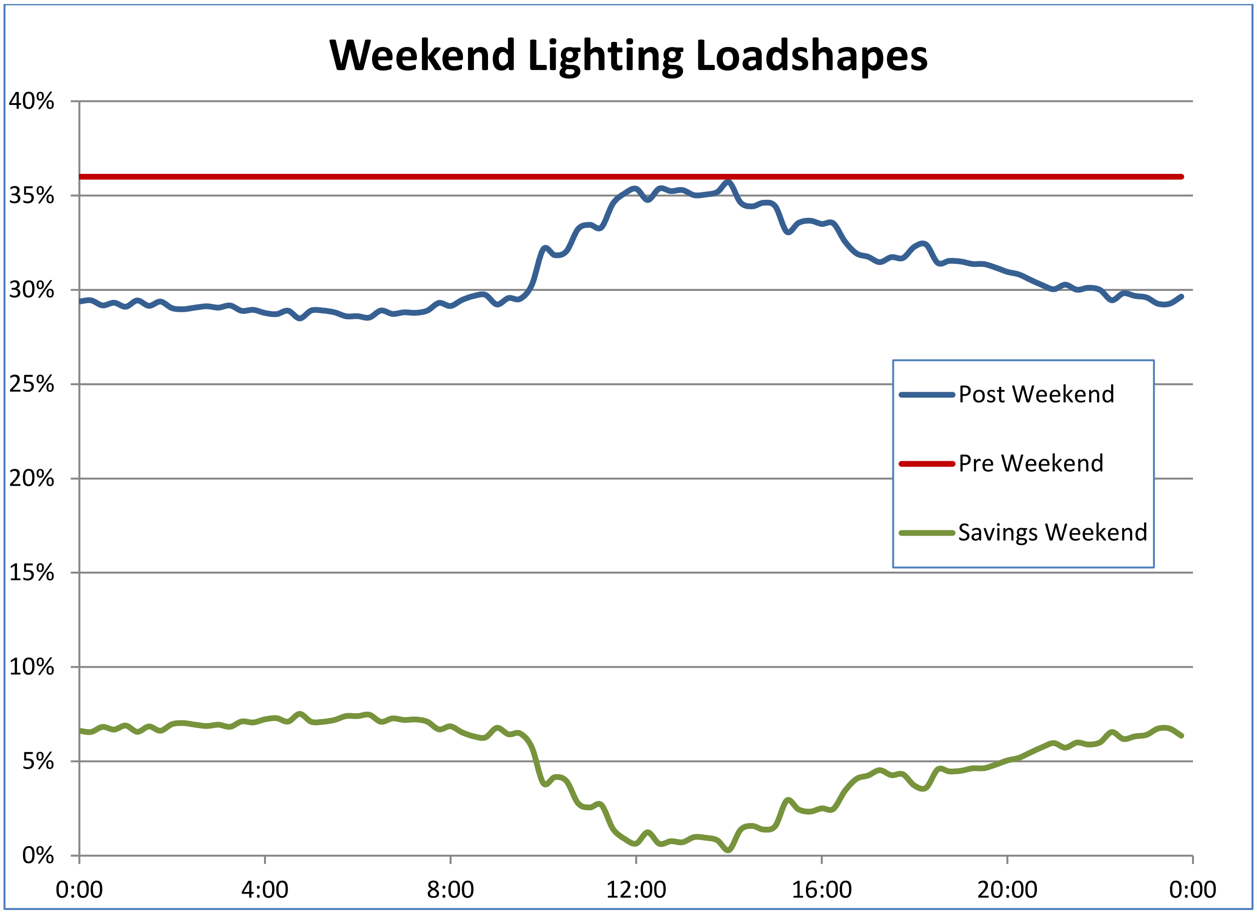

Figure 26. Weekend Lighting Loadshapes

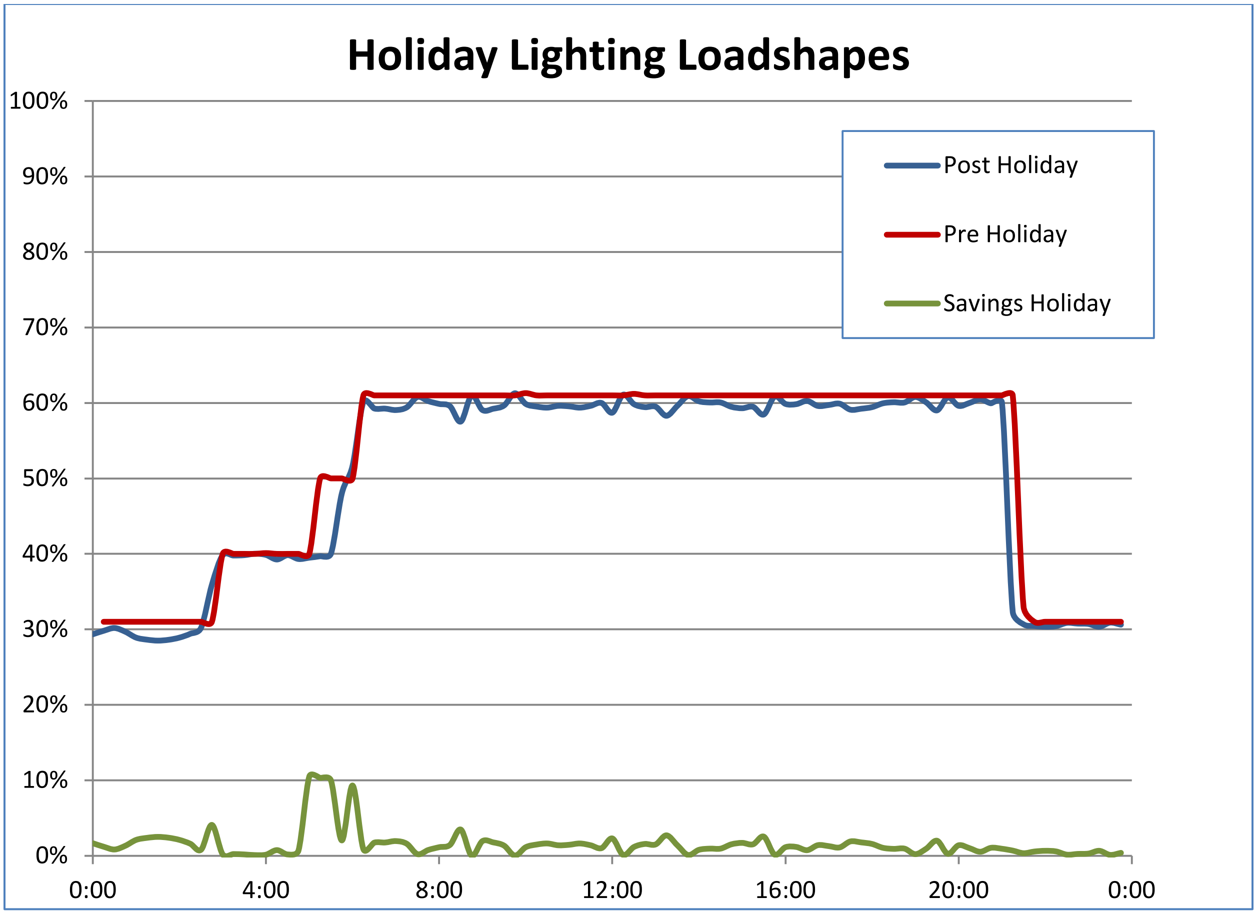

Figure 27. Holiday Lighting Loadshapes

Figure 28, Figure 29, and Figure 30 below show the current average plug receptacle loadshapes, the estimated maximum pre-program loadshape, and the maximum potential savings loadshape.

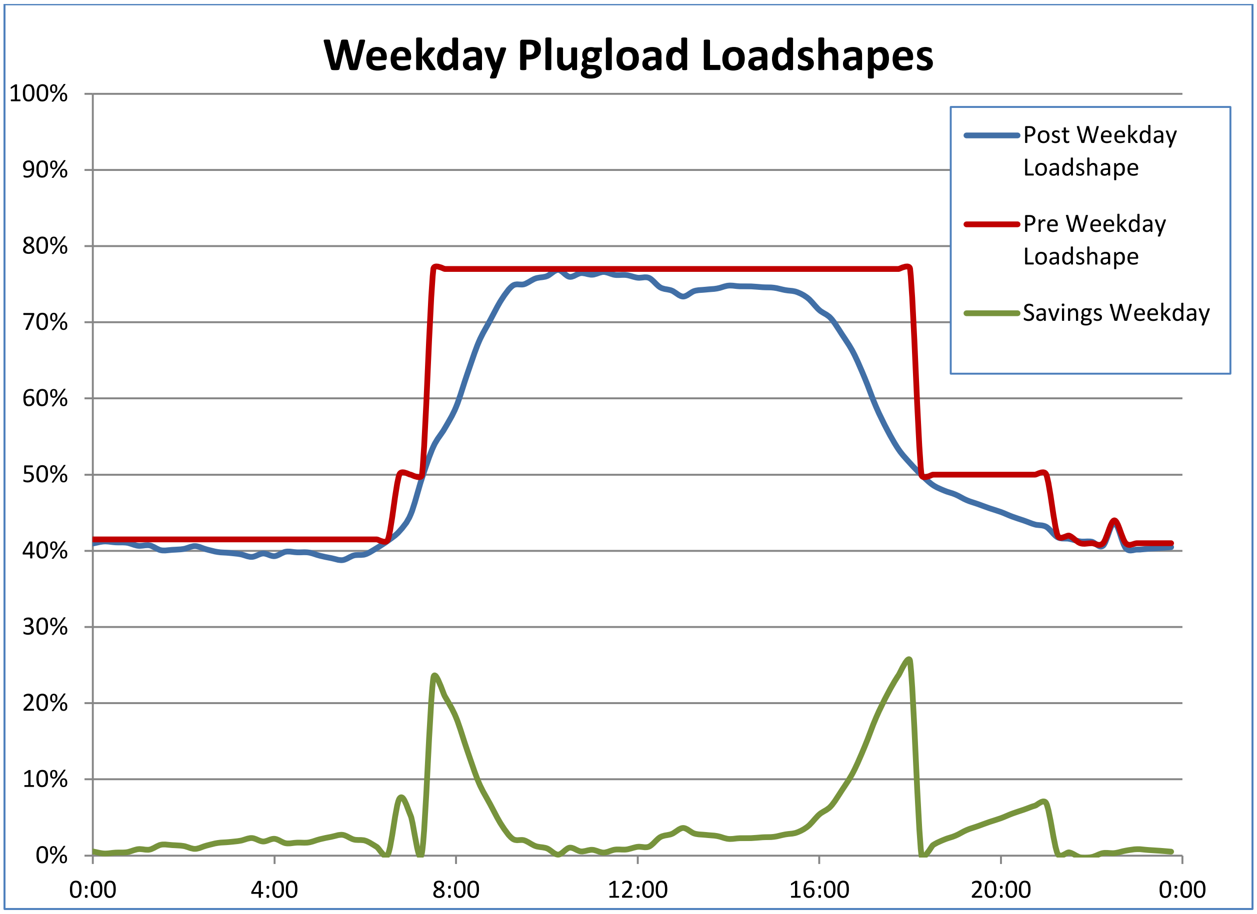

Figure 28. Weekday Plugload Loadshapes

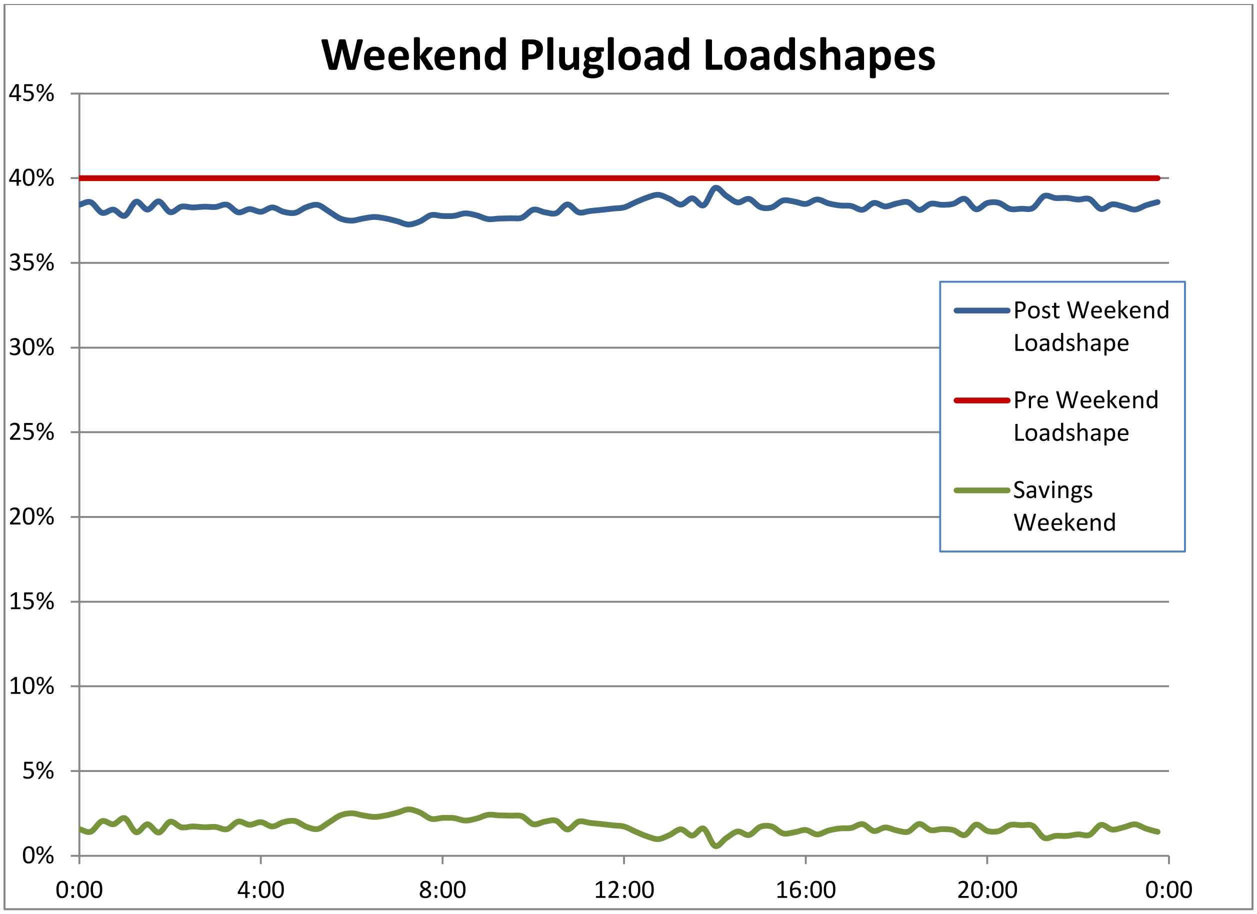

Figure 29. Weekend Plugload Loadshapes

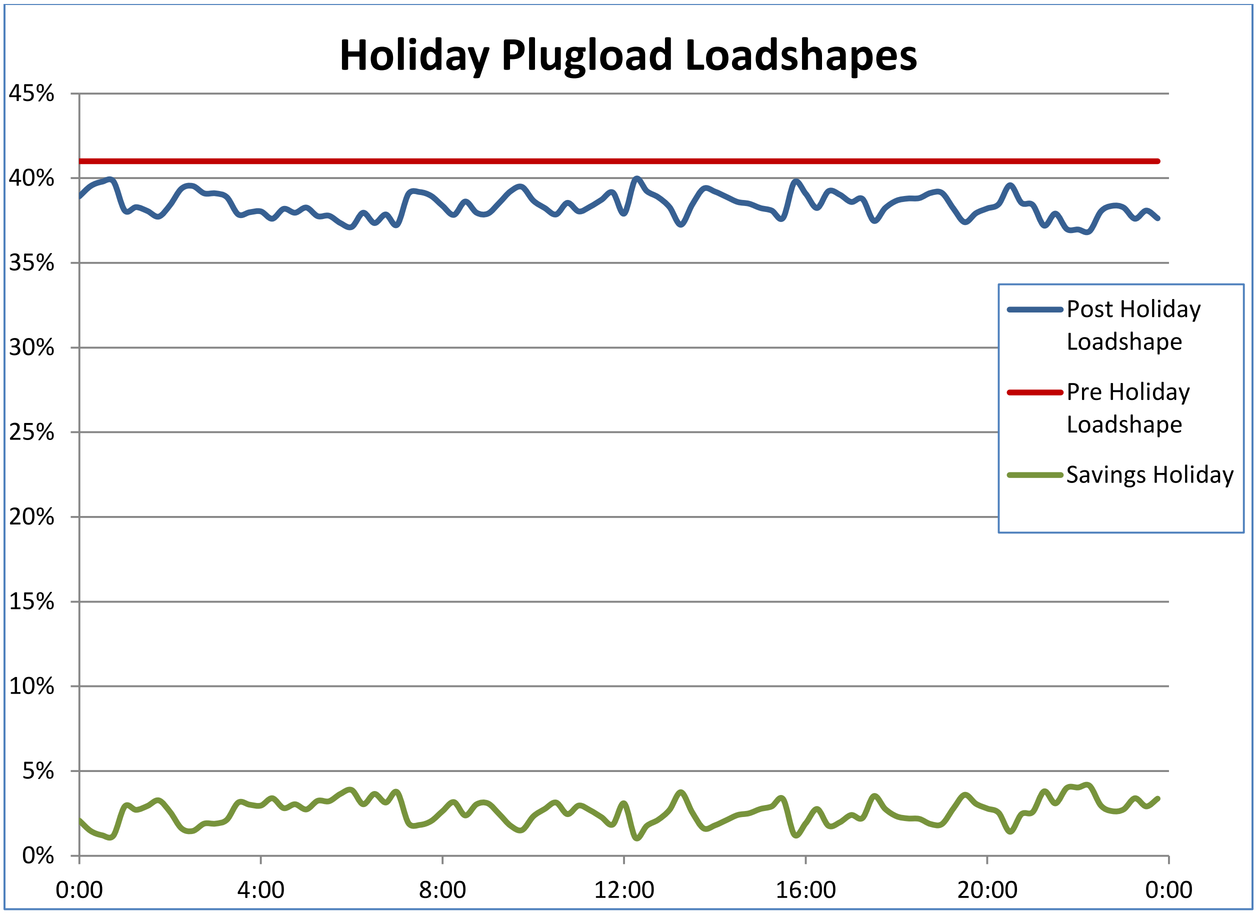

Figure 30. Holiday Plugload Loadshapes

Occupancy Sensor Potential Savings

As part of our metering effort we installed lighting and occupancy sensors. We used this data to estimate potential savings that could be realized if occupancy sensors were installed in conference rooms. The baseline lighting load shape was developed based off of the percent of time that the metered light fixtures were on. The potential lighting loadshape was developed based on the metered occupancy of the shared spaces. The potential savings loadshape is the difference between the two loadshapes. In the common spaces that were metered there was no weekend usage or occupancy. Figure 31 below shows the average lighting and occupancy loadshapes for the metered spaces.

To develop savings that could be achieved by installing occupancy sensors we observed the fixtures types and quantities in the metered conference rooms and estimated the connected load. Using the estimated connected load and the savings loadshapes we determined the potential savings for the metered spaces. Based on our site visit we estimated the area of the metered spaces, and the total area of conference spaces per floor and used those estimations to determine the amount of conference spaces in the building as a whole. From there we extrapolated our calculated savings for the metered spaces to estimate the potential energy and demand savings for the building as a whole.

Table 39. Potential Occupancy Sensor Energy Savings

End Use / Measure	Annual Energy Savings (kWh)	Energy Savings / SF (kWh/yr)	Energy Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption
Occupancy Sensors (includes HVAC interaction)	33,107	0.08	30.1	0.53%

Table 40. Potential Occupancy Sensor Coincident Peak Demand Savings

End Use / Measure	Coincident Peak Demand Savings (kW)	Coincident Peak Demand Savings (W/SF)	Coincident Peak Demand Savings (W/Person)	% Savings of Compass Coincident Peak Demand
Occupancy Sensors (includes HVAC interaction)	14.4	0.04	13.13	1.4%

Table 41. Potential Occupancy Sensor Peak Demand Savings

End Use / Measure	Peak Demand Savings (kW)	Peak Demand Savings (W/SF)	Peak Demand Savings (W/Person)	% Savings of Compass Peak Demand
Occupancy Sensors (includes HVAC interaction)	24	0.06	21.5	1.3%

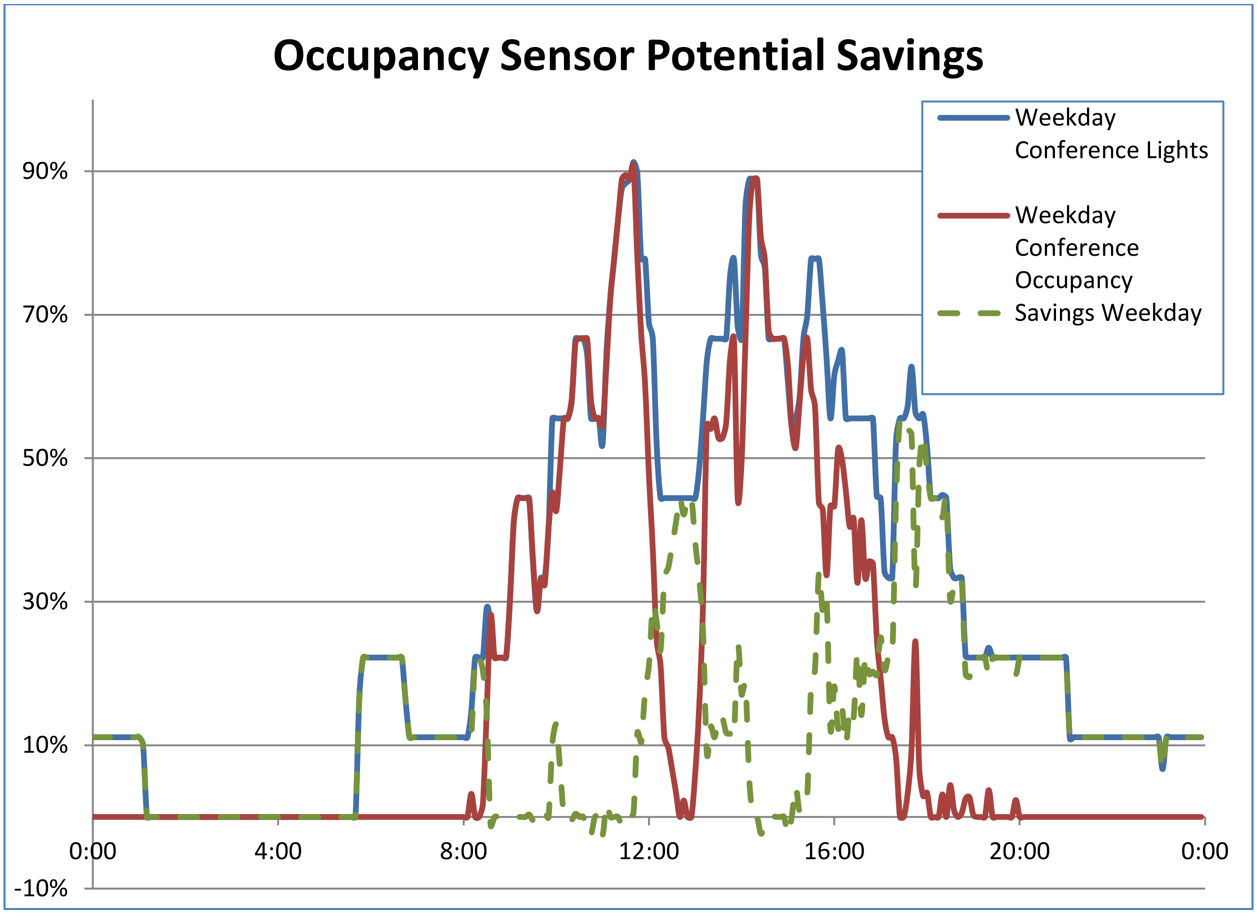

Figure 31. Occupancy Sensor Potential Savings

HVAC Savings

The [redacted] had the following HVAC ECM's implemented:

- Chilled Water Reset
- Hot Water Reset
- Supply Air Reset

To estimate the impacts of each of these ECMs for buildings of similar size in the population, a simulation model was used to calculate the impacts of each of the HVAC ECMs in this building. The following table lists the impact of each ECM. This facility uses gas boilers therefore there were no associated electric energy savings for the HW reset measure.

Table 42. Modeled Energy Savings for HVAC Measures

HVAC Measures	Annual Savings (kWh)	Savings / SF (kWh/yr)	Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption	% Savings of Model Results
CHW Reset	121,000	0.3	110	1.92%	1.09%

HW Reset	0	0.0	0	0.00%	0.00%
Supply Air Reset	1,045,000	2.7	950	16.59%	9.40%

HVAC Measures	Coincident Peak Demand Savings (kW)	Coincident Peak Demand Savings (W/SF)	Coincident Peak Demand Savings (W/Person)	% Savings of Compass Coincident Peak Demand	% Savings of Model Results
CHW Reset	0	0.0	0	0.00%	0.00%
HW Reset	0	0.0	0	0.00%	0.00%
Supply Air Reset	212	0.5	0	20.32%	8.43%

HVAC Measures	Peak Demand Savings (kW)	Peak Demand Savings (W/SF)	Peak Demand Savings / Person (W/Person)	% Savings of Compass Peak Demand	% Savings of Model Results
CHW Reset	0	0.0	0	0.00%	0.00%
HW Reset	0	0.0	0	0.00%	0.00%
Supply Air Reset	165	0.4	0	9.34%	6.33%

Site 5: [redacted] (SEN-19)

Prepared for:

Smart Energy Now
Duke Energy
North Carolina

Prepared by:

Architectural Energy Corporation
2540 Frontier Avenue, Suite 100
Boulder, Colorado 80301

Prepared In:

November 2013
v1.2

Introduction

This report addresses M&V activities for the Envision Charlotte Smart Energy Now (SEN) program.

These M&V activities were used to characterize savings for a variety of behavior-based measures that may have been implemented in this building. These savings estimates will be used, along with other impact evaluation data, to extrapolate savings for the entire population of buildings involved in the Envision Charlotte Smart Energy Now program.

Goals and Objectives

- Verify annual gross kWh/person savings
- Verify annual gross kWh/conditioned sqft savings
- Verify summer peak kW/person savings
- Verify summer peak kW/sqft savings

Project Contacts

Duke Energy Project Coordinator	[redacted]	[redacted]
AEC Contact	[redacted]	[redacted]
Customer Contact	[redacted]	[redacted]

Site Locations/ECM's

Address	Conditioned Area
[redacted]	[redacted]

Data Products and Project Output

- Peak demand per person savings
- Utility coincident peak demand per person savings
- Annual Energy per person Savings

M&V Option

IPMVP Option A, D

M&V Implementation Schedule

- Collected on-site data during normal operating hours.
- Obtained and verified the post-retrofit sequence of operations and/or operating schedule for HVAC, lighting, and other controlled equipment. Confirmed hours of operation, days per week, and holiday schedule. Determined if there is systematic variability on certain days of the week.
- Deployed post-retrofit loggers and trend logs to record amperage/status on the lighting and plug panels post-retrofit load shapes and energy consumption, and variables

associated with HVAC equipment such as setpoint schedules, AHU temperatures, and so forth.

- Evaluated the energy savings of the retrofit measures.

Field Data Points

Survey data –

- Determined if any of the following ECM's are being followed:

1. Possible actions in personal office space
    a. Computer
        i. Set computer to energy saving mode (e.g. display and/or computer will automatically sleep after a period of inactivity)
        ii. Manually turn off computer when not in use
        iii. Manually turn off monitor when not in use

    These were evaluated through one or more of the following methods:
    - Panel-level monitoring of 115V panels.
    - Interviews with IT representatives to discuss global computer settings
    - Walkthroughs to observe computer / monitor status.

    b. Lighting
        i. Use desk lamp or task lighting instead of lighting entire workspace with overhead lights.
        ii. Manually turn off desk lamp or task lighting when leaving the room
        iii. Manually turn off desk lamp or task lighting and use natural daylight
        iv. Manually turn off overhead light when leaving the room
        v. Manually turn off overhead light and use natural daylight

    These were evaluated through one or more of the following methods:
    - Panel-level monitoring of 277V panels.
    - Walkthroughs to observe lighting / occupancy status.
    - Combination occupancy / light loggers in common spaces, i.e., conference rooms, and offices, as appropriate.

    c. HVAC
        i. Set a thermostat to decrease energy-consumption (e.g. slightly less cool in the summer and slightly less warm in the winter).
        ii. Remove a personal space heater

    These were evaluated through the following methods:
    - Trend logging
    - Recording the zone setpoint schedules
    - Walkthroughs to look for space heaters, etc.

    d. Equipment upgrade
        i. Replace a standard desk lamp with an efficient (Energy Star) desk lamp

ii. Replace a standard computer monitor with an efficient (Energy Star) monitor
iii. Replace a standard desktop computer with a laptop computer

These were evaluated through one or more of the following methods:
- Walkthroughs to survey / observe existing equipment
- Interview IT staff
- Interview facilities staff

2. Possible actions in office common or shared spaces, such as conference rooms, lunchrooms, storage rooms, copy rooms, and so on.
   a. Lighting
      i. Manually turn off light when leaving the room
      ii. Manually turn off light to use natural daylight

   These were evaluated through one or more of the following methods:
   - Panel-level monitoring of 277V panels. (see lighting section above)
   - Walkthroughs to survey lighting / occupancy status.
   - Combination occupancy / light loggers in common spaces, i.e., conference rooms.

Data Logging/Trending

Installed data loggers on the following panels:
- Installed data loggers on 2D, 3B, 4&5D, 6B & 7D lighting panels
- Installed data loggers on 2D, 3B, 4&5D, 6B & 7D plug panels

One-time measurements:

Simultaneously measure the following variables on any loggers/trends that are deployed:
- kW, amps, volts, power factor

Logger Table

Energy Logger Pro	TRMS	20A CT	100A CT	150A CT	200A CT	Occupancy Sensors
6-7	16	2	7	10	4-5	10

Data Accuracy

Measurement	Sensor	Accuracy	Notes
Current	Magnelab CT	±1%	> 10% of rating

Verification and Quality Control

- Compared logger data and spot measurements to nameplate values; identified out of range data
- Visually inspected logger data for consistent operation. Sorted by day type and removed invalid data.
- Verified electrical voltage of equipment circuits.

Recording and Data Exchange Format

- Hobo logger binary files
- Excel spreadsheets
- Trend logs

Data Analysis

A combination of analysis techniques were utilized to determine the data products and project output including:

- Excel Spreadsheets
- Whole Building Simulation Modeling
- Visual verification during survey

Lighting measures were evaluated through the use of estimated pre and monitored post-measure load shapes. Other spreadsheet models, or simulation models, will be used appropriate to the measure being evaluated.

Results

Lighting and plug load panels were monitored to determine the current consumption for these end uses. Since pre-program monitoring was not performed, it is not possible to report the actual savings. To estimate the maximum potential savings that could have been realized under the SEN program, a baseline load shape was developed that assumed minimal occupant control of lighting, and a plug load profile that roughly follows the same strategy.

[redacted] had the following HVAC ECM's already implemented prior to the SEN program:

- Supply Air Temperature Reset

To estimate the impacts of each of these ECMs for buildings of similar size in the population, a simulation model was used to calculate the impacts of each of the HVAC ECMs in this building. The following tables list the impact of each ECM, normalized to conditioned area and to building population, as well as to the annual energy consumption as reported in the Compass website, and to the model baseline energy consumption, where the model baseline energy consumption is defined as the simulation model annual consumption with no HVAC measures. This building used DX cooling and electric heat, and so evaluating the impacts of HW and CHW reset are not applicable.

Table 43. Building Characteristics

Building	Conditioned SF	Building Population	Annual Consumption (Compass) (kWh)
[redacted]	[redacted]	[redacted]	7,421,800

A prototypical simulation model was used to estimate the impact of a set of potential HVAC measures. The intention was to develop a simulation model that reasonably reflected the building. The model assumptions are listed below in Table 44. No attempt was made to model individual tenant spaces or detailed floor-by-floor zoning or differences in HVAC configurations. Rather, the model was designed to provide an overall indication of the savings potential of a select set of HVAC system energy savings measures.

Table 44. Simulation model assumptions

Characteristic	Value
Vintage	[redacted]
Size	[redacted]
Number of floors	[redacted]
Wall construction and R-value	Brick exterior, R-10
Roof construction and R-value	Built-up roof, R-18
Glazing type	Double pane clear; Shading-coefficient = 0.81 U-value = 0.48
Lighting power density	Offices: 1.47 W/SF Mechanical: 1.0 W/SF Lobby: 1.52 W/SF
Plug load density	Offices: 0.75 W/SF Mechanical: 0.4 W/SF Lobby: 0.25 W/SF
Operating hours	Mon-Fri: 7am – 6pm Sat, Sun: unoccupied
HVAC system types	One VAV AHU.per floor. Fan powered boxes with electric reheat. Water cooled condensers. Supply air reset base on OA temperature.
HVAC system size	Based on ASHRAE design day conditions, 10% oversizing assumed.
Chiller type	N/A
Chilled water system type	N/A
Chilled water system control	N/A
Boiler type	N/A
Hot water system type	N/A
Hot water system control	N/A
Thermostat setpoints	Occupied hours: 76 cooling, 70 heating Unoccupied hours: 82 cooling, 64 heating

Table 45. Energy Savings Results

End Use / Measure	Annual Savings (kWh)	Savings / SF (kWh/yr)	Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption	% Savings of Model Results
Lighting (includes HVAC interaction)	232,133	0.3712	86.135	3.13%	
Plugs (includes HVAC interaction)	316,767	0.5066	117.539	4.27%	

HVAC					
Supply Air Reset	2,058,200	3.2914	763.711	27.73%	6.74%

Table 46. Peak kW Savings Results

End Use / Measure	Annual Savings (kW)	Savings / SF (W)	Savings / Person (W)	% Savings of Annual Compass Consumption	% Savings of Model Results
Lighting (includes HVAC interaction)	195	0.3111	72.183	3.98%	
Plugs (includes HVAC interaction)	115	0.1842	42.736	2.36%	
HVAC					
Supply Air Reset	878	1.4041	325.788	17.98%	16.95%

Table 47. Coincident Peak kW Savings Results

End Use / Measure	Annual Savings (kW)	Savings / SF (W)	Savings / Person (W)	% Savings of Annual Compass Consumption	% Savings of Model Results
Lighting (includes HVAC interaction)	2	0.0039	0.902	0.06%	
Plugs (includes HVAC interaction)	23	0.0363	8.433	0.58%	
HVAC					
Supply Air Reset	45	0.0720	16.698	1.14%	1.56%

A pre-program lighting load shape was developed to estimate how lighting may have been controlled prior to the program implementation. This pre-program lighting shape has been used to estimate the maximum savings that may have been achieved by the program.

Figure 32 below shows the average lighting load shapes during the monitoring period. The maximum achievable savings for this building is represented by the area between the pre/post weekday load shapes as well as the pre/post weekend load shapes. These savings are also represented by the savings load shapes located at the bottom of the figure.

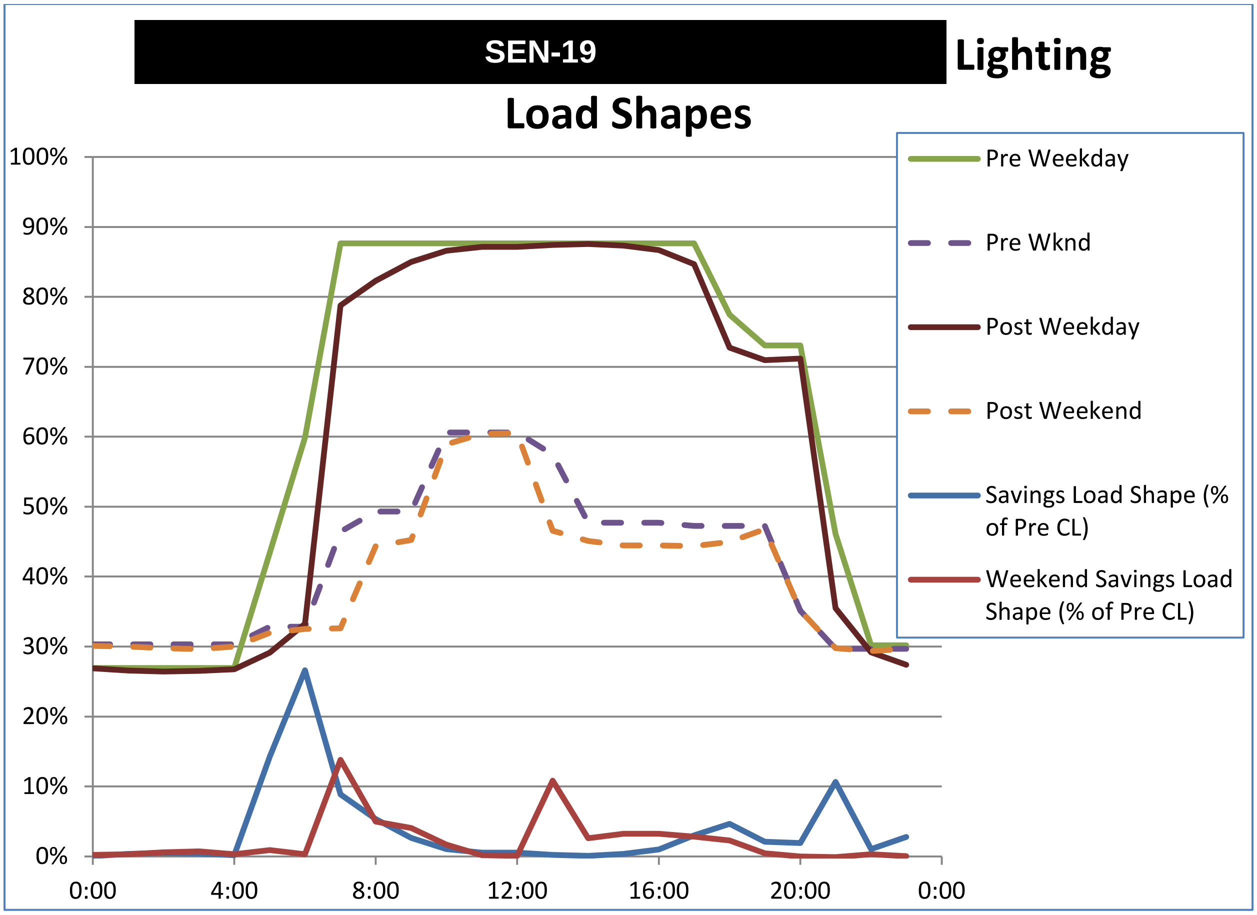

Figure 32. Lighting Load Shapes

Figure 33 below shows the average plug load shapes during the monitoring period. Similar to Figure 32, the maximum achievable savings for this building is represented by the area between the pre/post weekday load shapes as well as the pre/post weekend loadshapes. These savings are also represented by the savings load shapes located at the bottom of the figure.

Occupancy sensor loggers were installed in open office spaces for this building, but did not indicate that any savings could be achieved through occupancy sensor lighting control. Occupancy sensor lighting control in open office spaces is generally not feasible.

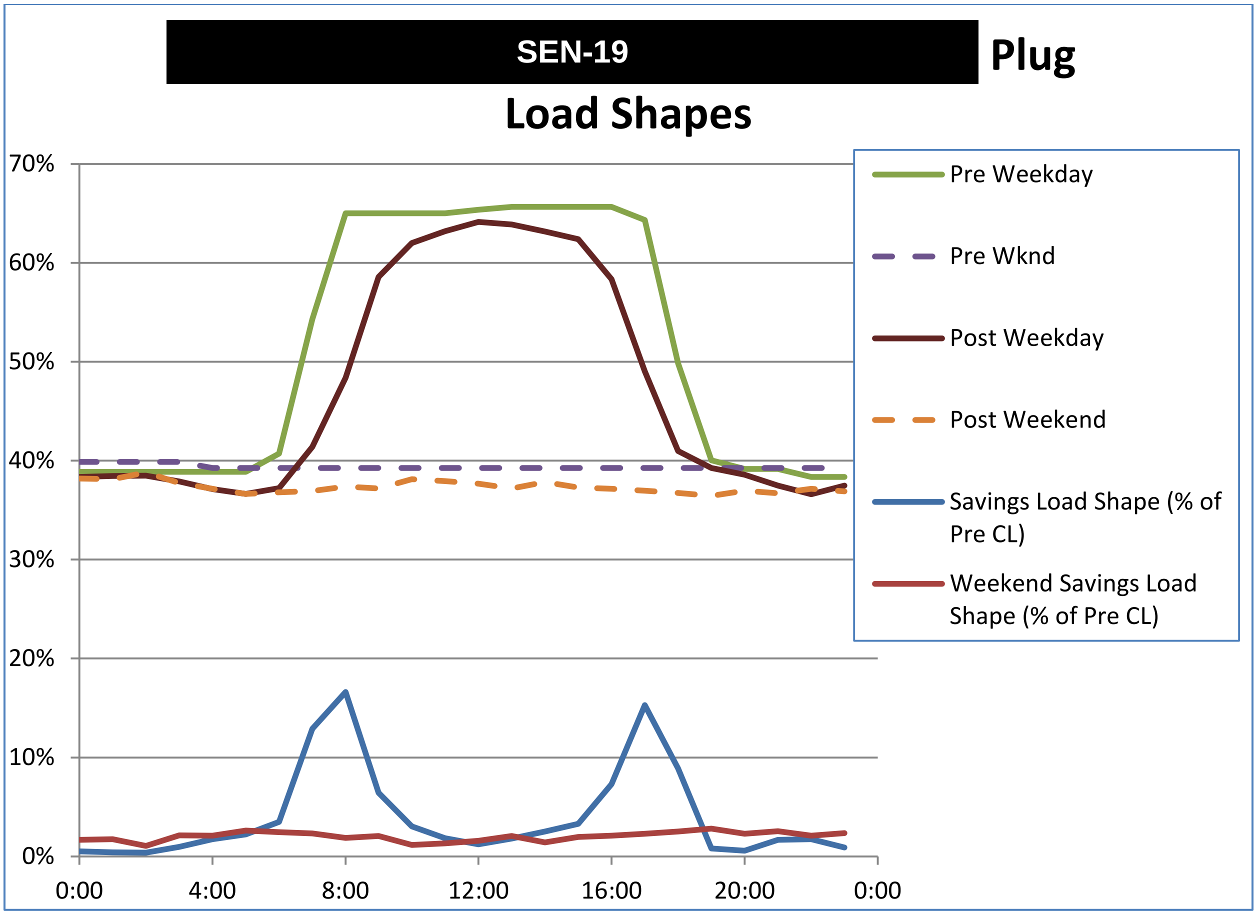

Figure 33. Plug Load Shapes

Site 6: [redacted] (SEN-41)

Prepared for:

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Duke Energy
North Carolina

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Prepared In:

November 2013
v1.2

Introduction

This report addresses M&V activities for the Envision Charlotte Smart Energy Now (SEN) program.

These M&V activities were used to characterize savings for a variety of behavior-based measures that may have been implemented in this building. These savings estimates will be used, along with other impact evaluation data, to extrapolate savings for the entire population of buildings involved in the Envision Charlotte Smart Energy Now program.

Goals and Objectives

- Verify annual gross kWh/person savings
- Verify annual gross kWh/conditioned sqft savings
- Verify summer peak kW/person savings
- Verify summer peak kW/sqft savings

Project Contacts

Duke Energy Project Coordinator	[redacted]	[redacted]
AEC Contact	[redacted]	[redacted]
Customer Contact	[redacted]	[redacted]

Site Locations/ECM's

Address	Conditioned Area
[redacted]	[redacted]

Data Products and Project Output

- Peak demand per person savings
- Utility coincident peak demand per person savings
- Annual Energy per person Savings

M&V Option

IPMVP Option A, D

M&V Implementation Schedule

- Collected on-site data during normal operating hours.
- Obtained and verified the post-retrofit sequence of operations and/or operating schedule for HVAC, lighting, and other controlled equipment. Confirmed hours of operation, days per week, and holiday schedule. Determined if there is systematic variability on certain days of the week.
- Deployed post-retrofit loggers and trend logs to record amperage/status on the lighting and plug panels post-retrofit load shapes and energy consumption, and variables

associated with HVAC equipment such as setpoint schedules, AHU temperatures, and so forth.

- Evaluated the energy savings of the retrofit measures.

Field Data Points

Survey data –

- Determined if any of the following ECM's are being followed:

1. Possible actions in personal office space
   a. Computer
      i. Set computer to energy saving mode (e.g. display and/or computer will automatically sleep after a period of inactivity)
      ii. Manually turn off computer when not in use
      iii. Manually turn off monitor when not in use

   These were evaluated through one or more of the following methods:
   - Panel-level monitoring of 115V panels.
   - Interviews with IT representatives to discuss global computer settings
   - Walkthroughs to observe computer / monitor status.

   b. Lighting
      i. Use desk lamp or task lighting instead of lighting entire workspace with overhead lights.
      ii. Manually turn off desk lamp or task lighting when leaving the room
      iii. Manually turn off desk lamp or task lighting and use natural daylight
      iv. Manually turn off overhead light when leaving the room
      v. Manually turn off overhead light and use natural daylight

   These were evaluated through one or more of the following methods:
   - Panel-level monitoring of 277V panels.
   - Walkthroughs to observe lighting / occupancy status.
   - Combination occupancy / light loggers in common spaces, i.e., conference rooms, and offices, as appropriate.

   c. HVAC
      i. Set a thermostat to decrease energy-consumption (e.g. slightly less cool in the summer and slightly less warm in the winter).
      ii. Remove a personal space heater

   These were evaluated through the following methods:
   - Trend logging
   - Recording the zone setpoint schedules
   - Walkthroughs to look for space heaters, etc.

   d. Equipment upgrade
      i. Replace a standard desk lamp with an efficient (Energy Star) desk lamp

ii. Replace a standard computer monitor with an efficient (Energy Star) monitor
iii. Replace a standard desktop computer with a laptop computer

These were evaluated through one or more of the following methods:

- Walkthroughs to survey / observe existing equipment
- Interview IT staff
- Interview facilities staff

2. Possible actions in office common or shared spaces, such as conference rooms, lunchrooms, storage rooms, copy rooms, and so on.
    a. Lighting
        i. Manually turn off light when leaving the room
        ii. Manually turn off light to use natural daylight

    These were evaluated through one or more of the following methods:
    - Panel-level monitoring of 277V panels. (see lighting section above)
    - Walkthroughs to survey lighting / occupancy status.
    - Combination occupancy / light loggers in common spaces, i.e., conference rooms.

Data Logging/Trending

The following data points were trended on the BAS:

- AHU-4, 5, 6, 7, & 8 (N &S) Supply Fan Speed
- AHU-4, 5, 6, 7, & 8 (N &S) Discharge Air Temperature
- AHU-4, 5, 6, 7, & 8 (N &S) Space Temperature Setpoint and selected space temperatures
- Light status on floors [redacted] & [redacted]

Installed data loggers on the following panels:

- Installed data loggers on 4N, 5S, 6N, 7S & 8N lighting panels
- Installed data loggers on 4N, 5S, 6N, 7S & 8N plug panels

One-time measurements:

The following variables were simultaneously measured on all loggers/trends that are deployed:

- kW, amps, volts, power factor

Logger Table

Energy Logger Pro	TRMS	20A CT	100A CT	150A CT	200A CT	Occupancy Sensors
6-7	16	2	7	10	4-5	10

Data Accuracy

Measurement	Sensor	Accuracy	Notes
Current	Magnelab CT	±1%	> 10% of rating

Verification and Quality Control

- Compared logger data and spot measurements to nameplate values; identified out of range data
- Visually inspected logger data for consistent operation. Sorted by day type and removed invalid data.
- Verified electrical voltage of equipment circuits.

Recording and Data Exchange Format

- Hobo logger binary files
- Excel spreadsheets
- Trend logs

Data Analysis

A combination of analysis techniques were utilized to determine the data products and project output including:

- Excel Spreadsheets
- Whole Building Simulation Modeling
- Visual verification during survey

Lighting measures will likely be evaluated through the use of pre and post-measure load shapes. Other spreadsheet models, or simulation models, will be used appropriate to the measure being evaluated.

Results

Lighting and plug load panels were monitored to determine the current consumption for these end uses. Since pre-program monitoring was not performed, it is not possible to report the actual savings. To estimate the maximum potential savings that could have been realized under the SEN program, a baseline load shape was developed that assumed minimal occupant control of lighting, and a plug load profile that roughly follows the same strategy.

[redacted] had the following HVAC ECM's already implemented:

- Supply Air Temperature Reset

To estimate the impacts of each of these ECMs for buildings of similar size in the population, a simulation model was used to calculate the impacts of each of the HVAC ECMs in this building. The following tables list the impact of each ECM, normalized to conditioned area and to building population, as well as to the annual energy consumption as reported in the Compass website, and to the model baseline energy consumption, where the model baseline energy consumption is defined as the simulation model annual consumption with no HVAC measures. This building used electric heat, and so evaluating the impacts of HW reset is not applicable.

Table 48. Building Characteristics

Building	Conditioned SF	Building Population	Annual Consumption (Compass) (kWh)
[redacted]	[redacted]	[redacted]	8,768,315

A prototypical simulation model was used to estimate the impact of a set of potential HVAC measures. The intention was to develop a simulation model that reasonably reflected the building. The model assumptions are listed below in Table 49. No attempt was made to model individual tenant spaces or detailed floor-by-floor zoning or differences in HVAC configurations. Rather, the model was designed to provide an overall indication of the savings potential of a select set of HVAC system energy savings measures.

Table 49. Simulation model assumptions

Characteristic	Value
Vintage	[redacted]
Size	[redacted]
Number of floors	[redacted]
Wall construction and R-value	6in concrete, R-10
Roof construction and R-value	Built-up roof, R-18
Glazing type	Double pane clear; Shading-coefficient = 0.81 U-value = 0.48
Lighting power density	Offices: 1.45 W/SF Lobby: 1.52 W/SF Mechanical: 0.92 W/SF
Plug load density	Offices: 0.75 W/SF Lobby: 0.75 W/SF Mechanical: 0.27 W/SF
Operating hours	Mon-Fri: 7am – 6pm Sat, Sun: unoccupied
HVAC system types	Two VAV AHUs per floor. Fan powered boxes with electric reheat. Supply air temp reset based on OAT.
HVAC system size	Based on ASHRAE design day conditions, 10% oversizing assumed.
Chiller type	Centrifugal chiller
Chilled water system type	Variable volume, 2-way control valves
Chilled water system control	Constant chilled water temp, 44deg F setpoint
Boiler type	N/A
Hot water system type	N/A
Hot water system control	N/A
Thermostat setpoints	Occupied hours: 76 cooling, 70 heating Unoccupied hours: 82 cooling, 64 heating

Table 50. kWh Savings Results

End Use / Measure	Annual Savings (kWh)	Savings / SF (kWh/yr)	Savings / Person (kWh/yr)	% Savings of Annual Compass Consumption	% Savings of Model Results
Lighting (includes HVAC interaction)	629,485	1.3340	332.709	7.18%	
Plugs (includes HVAC interaction)	82,848	0.1756	43.788	0.94%	
HVAC					
CHW Reset	111,600	0.2365	58.985	1.27%	1.52%
Supply Air Reset	1,875,600	3.9748	991.332	21.39%	25.57%

Table 51. Peak kW Savings Results

End Use / Measure	Annual Savings (kW)	Savings / SF (W)	Savings / Person (W)	% Savings of Annual Compass Demand	% Savings of Model Results
Lighting (includes HVAC interaction)	320	0.6787	169.275	15.16%	
Plugs (includes HVAC interaction)	70	0.1493	37.228	3.34%	
HVAC					
CHW Reset	11	0.0233	5.814	0.52%	0.30%
Supply Air Reset	579	1.2270	306.025	27.41%	15.96%

Table 52. Coincident Peak kW Savings Results

End Use / Measure	Annual Savings (kW)	Savings / SF (W)	Savings / Person (W)	% Savings of Annual Compass Demand	% Savings of Model Results
Lighting (includes HVAC interaction)	56	0.1179	29.408	3.45%	
Plugs (includes HVAC interaction)	10	0.0214	5.347	0.63%	
HVAC					
CHW Reset	-6	-0.0127	-3.171	-0.37%	-0.36%
Supply Air Reset	-4	-0.0085	-2.114	-0.25%	-0.24%

A pre-program lighting load shape was developed to estimate how lighting may have been controlled prior to the program implementation. This pre-program lighting shape has been used to estimate the maximum savings that may have been achieved by the program.

Figure 34 below shows the average lighting loadshapes during the monitoring period. The maximum achievable savings for this building is represented by the area between the pre/post weekday load shapes as well as the pre/post weekend loadshapes. These savings are also represented by the savings load shapes located at the bottom of the figure.

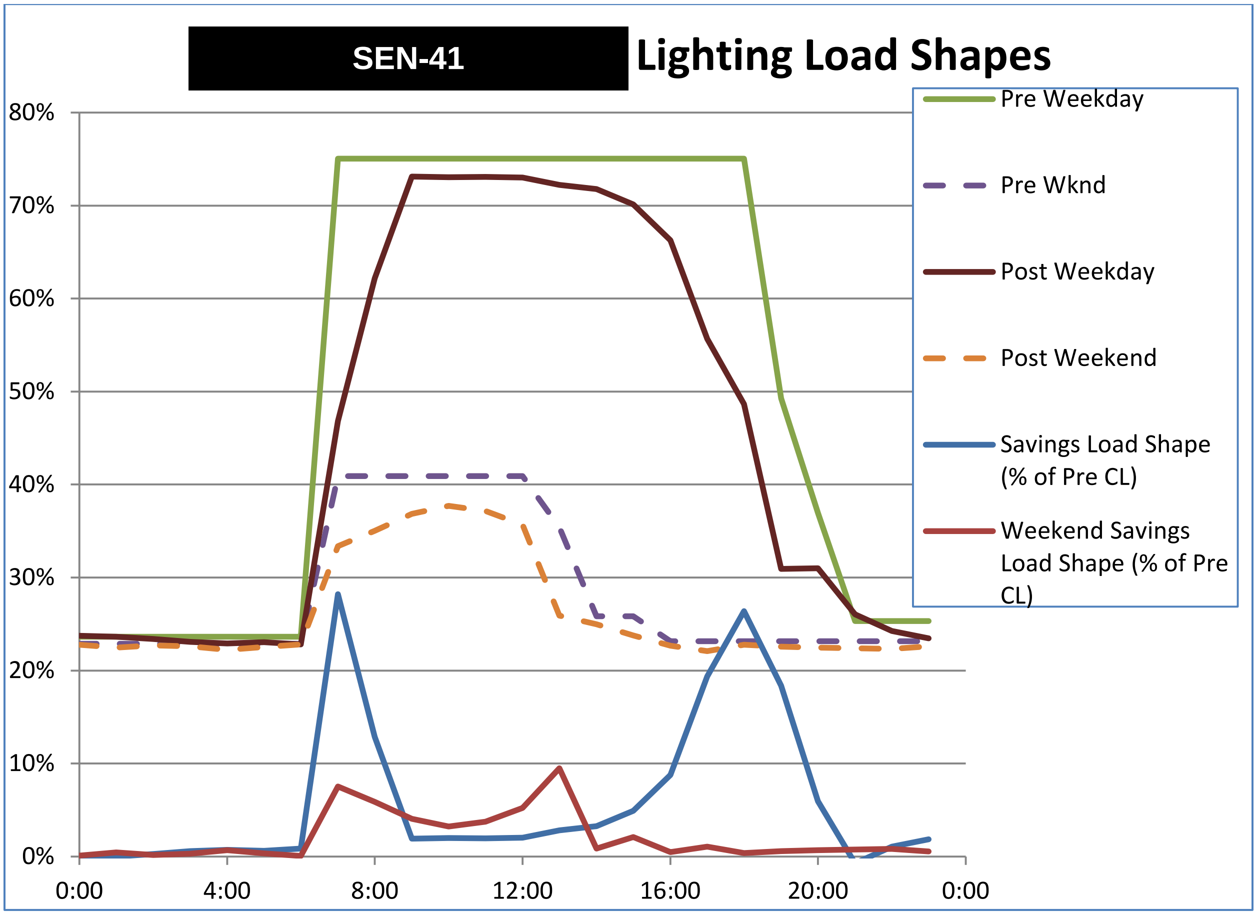

Figure 34. Lighting Load Shapes

Figure 35 below shows the average plug load shapes during the monitoring period. Similar to Figure 34, the maximum achievable savings for this building is represented by the area between the pre/post weekday load shapes as well as the pre/post weekend loadshapes. These savings are also represented by the savings load shapes located at the bottom of the figure.

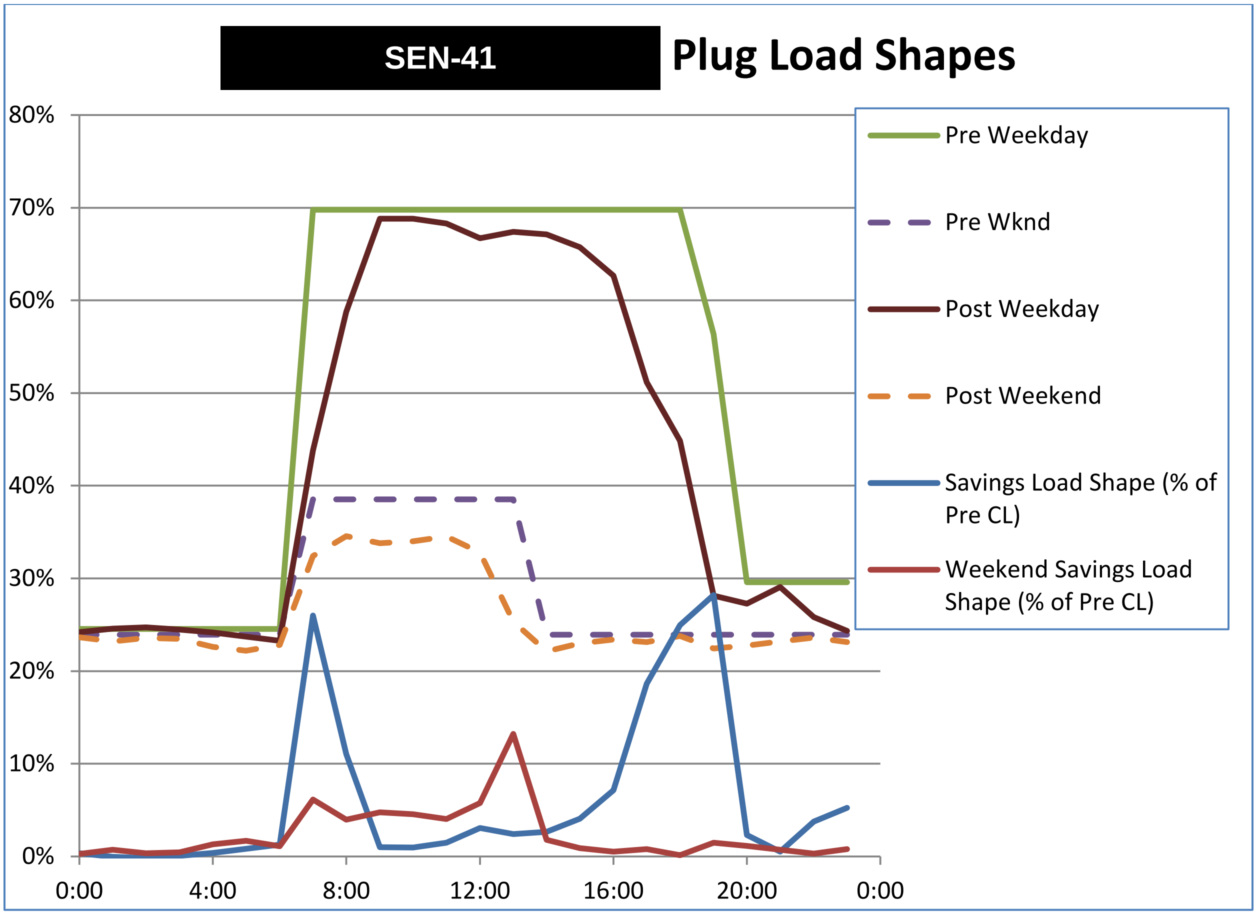

Figure 35. Plug Load Shapes

Appendix E: Engineering Estimates of Unit Energy Savings

Table 53. Engineering Estimates of Unit Energy Savings

Measure	Stratum	(kWh/SF-yr)	(kWh/ person-yr)
Replace Desk Lamp	1		60.00
	2		60.00
	3		60.00
	All		60.00
Change to Laptop	1		200.00
	2		200.00
	3		200.00
	All		200.00
Turn off Lighting in Workspace	1		263.04
	2		263.04
	3		277.87
	All		267.90
Replace Monitor	1		66.00
	2		66.00
	3		66.00
	All		66.00
Turn off lighting in Common areas	1		20.90
	2		20.90
	3		20.90
	All		20.90
Turn off Computers	1		288.80
	2		356.85
	3		198.88
	All		281.82
Supply Air Reset	1	3.00	
	2	3.50	
	3	3.20	
	All	3.23	
Setback/Setup	1	6.84	
	2	5.25	
	3	3.24	
	All	5.35	
Run fan 1 hour less	1	0.06	
	2	0.11	
	3	0.90	
	All	0.22	
VFD Cooling Tower fans	1	0.01	

Measure	Stratum	(kWh/SF-yr)	(kWh/ person-yr)
	2	0.24	
	3	0.70	
	All	0.25	

Appendix F: DSMore Table

Per Measure Impacts Summary for Smart Energy Now

Impacts → / Technology ↓	Product code	State	EM&V gross savings (kWh/unit)	EM&V gross kW (customer peak/unit)	EM&V gross kW (coincident peak/unit)	Unit of measure	EM&V gross savings less Smart$aver Participation (kWh/unit)	EM&V gross savings less Smart$aver Participation (Customer peak/unit)	EM&V gross savings less Smart$aver Participation (Coincident peak/unit)	Combined spillover less freeridership adjustment	EM&V net savings (kWh/unit)	EM&V net kW (customer peak/unit)	EM&V net kW (coincident peak/unit)	EM&V load shape (yes/no)	EUL (whole number)
SEN Greater than 100,000 sqft		NC	909,683	443.5	30.5	account	822,223	407.0	25.8	18%	674,222	333.7	21.2	no	3
SEN Less than 100,000 sqft		NC	16,259	2.6	2.1	account	9,912	1.6	1.3	18%	8,127	1.3	1.0	no	3
Program wide		**NC**	**616,129**	**298.6**	**21.2**	account	**555,320**	**273.8**	**17.8**	18%	**455,363**	**224.5**	**14.6**	**no**	**3**
SEN Greater than 100,000 sqft		NC	2.18	0.001062	0.000073	SF	1.97	0.000974	0.000062	18%	1.61	0.000799	0.000051	no	3
SEN Less than 100,000 sqft		NC	0.49	0.000078	0.000062	SF	0.30	0.000048	0.000038	18%	0.24	0.000039	0.000031	no	3
Program wide		**NC**	**2.11**	**0.001025**	**0.000073**	**SF**	**1.91**	**0.000939**	**0.000061**	18%	**1.56**	**0.000770**	**0.000050**	**no**	**3**

Notes:
1. Technology names should match the DSMore naming convention.
2. Energy impacts are average per installed unit for each DSMore technology and unit description (measure/ton/sq.ft., etc.)
3. Any analysis using a control group (such as billing analysis with a control group) does not need a freeridership adjustment (it is already in the analysis via the control group adjustment)
4. EM&V load shape: “no” if using standard DSMore load shape for technology units, “yes” if an evaluation-provided load shape should be used for DSMore.

Final Report

Process and Impact Evaluation of Duke Energy's Residential Appliance Recycling Program (ARP) in the Carolina System

Prepared for
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April 25, 2014

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TABLE OF CONTENTS

Executive Summary

Key Findings

This section presents the key findings and recommendations identified through the evaluation of the Carolina System Residential Appliance Recycling Program. Table 1 presents the estimated overall ex post energy impacts from the engineering analysis. A billing analysis[1] was also performed, however official program savings is derived from the engineering analysis as this is the industry standard approach. The USDOE Uniform Evaluation Protocols (UMP) recommends against using a billing analysis, or any other whole-house approach, for appliance recycling program savings estimation because the magnitude of expected savings – given total household energy consumption and changes in consumption unrelated to the program – could result in a less certain estimate than could be obtained from an end-use specific approach.

Table 1. Estimated Overall Impacts

Net Savings	Refrigerators	Freezers
Annual Savings Per Participant Per Year		
kWh	512	410
kW	0.0731	0.0489

All official impact results are net savings and are based on the outcome of the engineering analysis and the net assessment approach as described in the *Sixteen Path Direct Net Analysis Approach* section. This 16-path approach is consistent with the newly released USDOE UMP because it provides a direct-net assessment approach by assessing the way in which the program impacts energy use in the homes of participants and non-participants. As USDOE points out in their UMP, these programs change the way the appliance market operates and provides savings beyond the home of the participant that are typically missed in evaluations that only focus on the participant's home. The 16-path analysis approach developed by TecMarket Works expands on the USDOE UMP approach by allowing the consumers of evaluation results to see the program's effects or lack of effects on all of the market operations channels that can be impacted by these types of programs.

Significant Impact Evaluation Findings: Billing Analysis

A gross energy impact billing analysis was conducted to estimate the energy savings from the Appliance Recycling Program (ARP). The billing analysis relies upon a statistical analysis of actual customer-billed electricity consumption before and after participation in ARP. The use of a billing analysis approach allows the evaluation to use the energy consumption records of all participants, rather than only those associated with a limited sample logger study.

The estimated gross impacts are presented in the "Billing Analysis" section of the report. A summary of the results is shown in Table 2.

Table 2. Billing Analysis Estimated Gross Impacts

	95% Confidence Interval

[1] The billing analysis was performed per North Carolina Utilities Commission Order E-7, Sub 1005

	Lower Bound	Estimate	Upper Bound
Per Participant Annual kWh Savings: Overall	562	742	923
Per Participant Annual kWh Savings: Refrigerator	451	658	864
Per Participant Annual kWh Savings: Freezer	526	894	1,262

Significant Impact Evaluation Findings: Engineering Analysis

The estimated net impacts are presented in the "Engineering Analysis" section of the report. A summary of the results is shown in Table 3.

Table 3. Engineering Analysis Estimated Impacts

Estimate	Gross Savings		Net Savings	
	kWh	kW	kWh	kW
Per Participant Annual kWh Savings: Overall	930	0.1275	485	0.0664
Per Participant Annual kWh Savings: Refrigerator	952	0.1359	512	0.0731
Per Participant Annual kWh Savings: Freezer	869	0.1035	410	0.0489

- The average secondary refrigerator has an in-service rate of 81.4% (9.77 months out of 12). The weighted average in-service rate for all refrigerators is 88.8%. The average freezer has an in-service rate of 89.6%.
    - o See Table 13 on page 27.
- The average annual kWh consumption of a replacement refrigerator or a replacement freezer is 503 kWh.
    - o See Table 16 on page 31.
- Five (15.6%) out of the 32 units recycled through the program that, in the absence of the program, would have been picked up by a dealer or donated were reported to be in saleable condition and would likely have ended up on the secondary market.
    - o See paragraph under Table 16 on page 31.
- Net to gross ratios for refrigerators and freezers are 53.8% and 47.2% respectively.
    - o See *Net to Gross Analysis* on page 36.

Significant Process Evaluation Findings

From the Management Interviews

- The program employs a multi-pronged marketing strategy that combines Duke Energy customer communications (bill inserts, emails, website and OLS promotions), with paid advertising (print, broadcast, and digital), and creative public relations events staged for the public and the news media.
    - o See section titled "Marketing" on page 41.

- Each marketing activity is tracked and measured for effectiveness. Every caller to the call center is asked how they heard about the program, while digital marketing uses unique URLs and Google Analytics to track web traffic. Bill inserts represent the most popular source for both calls and website visits.
  - See section titled "Scheduling and Customer Inquiries" on starting on page 45.

- Customers can make an appointment for collection via phone or internet. Appointments placed via the call center outnumber web appointments by approximately three to one. No operational challenges were reported with either method. A Duke Energy-JACO review of cancellations showed that customers sometimes enrolled by internet and then placed a phone call to enroll as well.
  - See section titled "Scheduling and Customer Inquiries" on starting on page 45.

- The program had an overall cancellation rate of 23.0% in North Carolina and 22.8% in South Carolina during 2012 and 22.8% in North Carolina and an 18.9% rate in South Carolina during 2013. TecMarket Works identifies these cancellation rates as an area for additional investigation to determine reasons for them and to categorize them into those for corrective action and those that are not truly cancellations, such as the deletions of duplicate customer enrollments. This may help to improve program performance since the marketing and scheduling teams have already effectively executed their assigned roles and obtained the customers' commitment to program participation.
  - See section titled "Scheduling and Customer Inquiries" on starting on page 45.

- No challenges or issues with refrigerator or freezer collection were reported.
  - See section titled "Appliance Collection" on page 50.

- Duke Energy never comes into legal possession of the units. All dismantling and recycling activities are specific to JACO and meet or exceed state and federal laws, as well as the more stringent RAD program guidelines.
  - See section titled "Dismantling and Recycling" on page 52.

- The financial incentive levels for the program are currently set at $30 per unit for Carolina System customers. JACO processes and mails most checks within two to four weeks, which is less than the contracted six week time frame. No challenges or issues were reported with incentive processing or accounting.
  - See section titled "Incentive Payments" on page 53.

- All parties report clear and regular communication, smooth functioning, and collaborative teamwork in the accomplishment of shared goals.
  - See section titled "Management Coordination and Communication" on page 56.

- The program did not meet its goal for 2012. In its first months of operation in North Carolina the program recycled 950 refrigerators and 356 freezers for a total of 1,306 units, toward an initial goal of 3,000 units. This represents 44% of goal. In that same time period in South Carolina, the program collected 724 refrigerators and 165 freezers for a total of 544 units, toward an initial goal of 872 units. This represents 62% of goal.

  - See section titled "Program Goals and Participation" on page 16.

- Between January 1 and November 22, 2013, performance in North Carolina stood at 5,019 refrigerators and 1,826 freezers for a total of 6,845 units or 49% of goal. In South Carolina, 2013 year to date performance was 1,254 refrigerators and 518 freezers for a total of 1,772 units or 43% of goal.
  - See section titled "Program Goals and Participation" on page 16.

- Overall since inception the program has collected 8,151 units in North Carolina and 2,316 units in South Carolina, for a total of 10,467 units throughout the Carolina System.
  - See section titled "Program Goals and Participation" on page 16.

- While noting the opportunity for incremental improvements in call center processing, the availability of appointments, and cancellation rates, TecMarket Works considers low performance against goals to be largely attributable to the current incentive level of $30 per unit and the initial harvest rate projections upon which the program's annual goals are based.
  - See section titled "Incentive Payments" on page 53.

- A Market Potential Study (MPS) conducted in 2006 was used as the basis for projections regarding annual collections and establishing the incentive level for the program. The targets based on this older MPS may not have been as appropriate as those of a newer study, by the time of the actual launch.
  - See section titled "Program Goals and Participation" on page 16.

- Raising incentive amounts from $30 to $40 or $50 per unit has been shown to increase participation and help the program to reach its targeted goals. A controlled test of incentive amounts among 240,000 Duke Energy customers in North Carolina and South Carolina conducted during September of 2013 demonstrated that higher incentive levels of $40 and $50 result in increased participation levels and greater energy savings associated with the additional units collected. These findings should be considered and compared with the costs of increasing the marketing spend per unit in order to reach goals. However, as refrigerators become more efficient and savings levels erode, it will be important to set levels that keep a careful eye on cost effectiveness.
  - See section titled "Incentive Payments" on page 53.

- Although collection numbers lag behind projected goals, overall program administration and daily operations appear to be strategically well-considered, carefully timed and coordinated, and effectively executed.
  - See section titled "Evaluation" on page 57.

From the New and Used Appliance Dealer Interviews

For more details on the findings below see section titled "Appliance Dealer Interview Results" beginning on page 60.

- New and used appliance dealers are generally reluctant to discuss their sales volume and business practices, thereby making it difficult to quantify for this evaluation the number of used units sold annually.
- Knowledge of the program among new and used appliance dealers is modest, with more used dealers indicating awareness than new dealers.
- Market volume of used units is down markedly from years past. Duke Energy's Appliance Recycling Program is contributing to this decline, but the dealers we spoke with cited other factors as being more significant, including business decisions by major retailers, the federal government's Cash-for-Clunkers appliance recycling effort, and the price of scrap metal.
- The paucity of used units is adversely affecting smaller dealers who rely on individual people with spare units to obtain stock they can resell. Dealers who sell units that are less than five years old and dealers who purchase used appliances in bulk from wholesalers and auctions appear to better able to withstand market changes.
- Demand for used refrigerators and freezers remains strong. The dealers we spoke with reported that while some customers will opt to purchase new units when used ones are unavailable, most of their customers are financially unwilling or unable to purchase new units due to price sensitivity or other factors such as creditworthiness. This ensures that the demand for used units remains high.
- With strong demand and low inventories, the market for used refrigerators is supply constrained, meaning there are not enough used units to meet demand. All appliance dealers we surveyed agreed that they are able to sell every used unit that they obtain, and those who only sell used units indicated that they could sell more units if they could obtain them.
- With used unit supplies down and costs for replacement parts high, sales prices for used units are rising. But the price increases are not proportionate to the differential between supply and demand, since many dealers do not feel their customers will tolerate the higher sticker prices. As a result used dealer profit margins are being squeezed.
- The perceived effect of the program on appliance dealer businesses appears to be correlated with their business model. The more reliant the dealers are upon obtaining older units from individual people, the more adversely the program is thought to be impacting their businesses. Regardless of business model, no used appliance dealers felt the program was good for their business.
- According to the used appliance dealers we spoke with, landlords may account for up to half of their annual sales of used refrigerators and freezers. While in years past a single appliance dealer used to be able to supply one landlord with all or most of the units desired, landlords now need to visit several dealers in order to obtain enough used units to meet their needs.

- Overall the program appears to be having little to no effect on new unit sales. One retailer indicated that its salespeople sometimes mention the program as a way for customers to lower the final purchase price of a new unit.

From the Customer Surveys

- TecMarket Works surveyed 160 customers in the Carolinas system (99 in North Carolina and 61 in South Carolina) who recycled 82 refrigerators and 91 freezers (including thirteen customers who recycled two units apiece). Thirty-seven (45.1% of 82) of the recycled refrigerators were being used as the main refrigerator in the household, while 45 (54.9% of 82) of the recycled refrigerators were secondary or "spare" units.
- The largest number of recycled freezers (30.8% or 28 out of 91) and spare refrigerators (40.0% or 18 out of 45) were kept in the garage, closely followed by units stored in the basement (26.4% or 24 out of 91 freezers and 28.9% or 13 out of 45 spare refrigerators). Including main refrigerators (kept in or near the kitchen), only 61.0% (50 out of 82) of recycled refrigerators are kept in a room that is heated in winter, and only 58.5% (48 out of 82) are kept in a room that is cooled in the summer. Only 42.9% (39 out of 91) of the recycled freezers were kept in a room that was heated in winter or cooled in summer.
- The average age of recycled freezers was 26.7 years, older than the average age of recycled primary refrigerators (18.0 years) or secondary refrigerators (22.7 years). The majority of recycled units were kept plugged in and running year-round (100% of 37 primary refrigerators, 77.8% of 45 secondary refrigerators, and 90.1% of 91 freezers). While 69.2% (63 out of 91) of recycled freezers were described as being in good physical condition, only 50.0% (41 out of 82) of recycled refrigerators were described as being in good physical condition.
- Most participants learned about Duke Energy's Appliance Recycling program from inserts with their monthly bills (68.8% or 110 out of 160 respondents), with another 24.2% (24 out of 99) of North Carolina customers and 34.4% (21 out of 61) of South Carolina customers mentioning mass media advertising.
- The most-mentioned main reason for customers getting rid of a refrigerator was that it was not working properly (23.8% or 19 out of 80), followed by it being a spare unit that was not used much (22.5% or 18 out of 80) and wanting a unit with more modern features (21.3% or 17 out of 80). For freezers, the top reason was that the unit was a spare that was not used much (41.4% or 36 out of 87) and the next most-mentioned main reasons were that the unit was not working properly (13.8% or 12 out of 87) and wanting to save energy (10.3% or 9 out of 87).
- When asked why they chose to dispose of their old units through the Appliance Recycling program from Duke Energy, the main reason given by customers was the convenience of home pick-up (40.0% or 64 out of 160), followed by the cash incentive (24.4% or 39 out of 160) and disposing of the unit in a way that was good for the environment (13.8% or 22 out of 160). Customers who recycled multiple units were even more likely to cite the convenience of home pick-up as their main reason for participating (61.5% or 8 out of 13).

- Surveyed customers were asked if the incentive and the program information had any influence on their decision to participate in this program; 74.4% (119 out of 160) indicated that the incentive was an influence for them, and 66.9% (107 out of 160) indicated that the program information was an influence.
- Two-thirds of surveyed customers (65.6% 105 out of 160) signed up for the program by telephone, and 15.6% (25 out of 160) signed up online. Most of the remaining customers either did not sign up themselves (someone else in the household did), or else cannot recall how they signed up. Among those who signed up by telephone, only 3.8% (4 out of 105) had to place more than one call. Among all surveyed participants, only one (0.6% of 160) said they were not able to schedule a convenient pick-up time, only five (3.1% of 160) said they did not receive a confirmation call prior to pick-up, and only three (1.9% of 160) reported that the collection team did not arrive on time.
- More than three-quarters of customers surveyed (79.4% or 127 out of 160) correctly recalled that the incentive for the program is $30 per unit recycled. All but ten (6.3% of 160) of the remaining customers guessed an amount within $10 of the correct amount, and 4.4% (7 out of 160) could not recall. Only four surveyed customers (2.5% of 160) donated their incentive to the Duke Energy winter heating assistance program, while the vast majority (96.9% or 155 out of 160) kept the cash. The median length of time between appliance pick-up and receipt of the incentive payment was between two and three weeks; only two participants (1.3% of 160) waited for 6 weeks or longer, although eight (5.0% of 160) reported that they had not yet received payment (four of these eight customers had been waiting for three weeks or less at the time of this survey).
- All primary refrigerators recycled by surveyed customers (100% of 37 units) were replaced (since almost every home has at least one refrigerator, this is expected). Fewer than half of recycled freezers (37.4% or 34 out of 91) have been replaced, and only 26.7% (12 out of 45) of secondary refrigerators were replaced. Another seven customers (4.4% of 160) still intend to purchase replacement units in the next 12 months (for four secondary refrigerators and three freezers). Most replacements (81.9% or 68 out of 83 replacement units) were purchased new, with 14.5% (12 out of 83) being purchased used and 3.6% (3 out of 83) being replaced with another unit moved from somewhere else in the home.
- Most replacement freezers (67.6% or 23 out of 34) were acquired before the old unit was recycled, as were most primary refrigerators (73.0% or 27 out of 37) and secondary refrigerators (58.3% or 7 out of 12).
- More replacement freezers were smaller (38.2% or 13 out of 34) or the same size (38.2% or 13 out of 34) rather than larger (23.5% or 8 out of 34) than the recycled units that they replaced. A plurality of refrigerators were replaced with units that are larger than the recycled units (48.6% or 18 out of 37 primary refrigerators, and 41.7% or 5 out of 12 secondary fridges), and only a few were replaced with units smaller than those that were recycled (13.5% or 5 out of 37 primary refrigerators and 25.0% or 3 out of 12 secondary refrigerators). However, most respondents were unable to state the exact cubic footage of their new units.

- If the Duke Energy Appliance Recycling program had not been available, the most likely outcomes for recycled refrigerators would be taking them to the dump (20.0% or 16 out of 80 customers recycling refrigerators), keeping them (18.8% or 15 out of 80), or giving them away for free (17.5% or 14 out of 80). The most likely outcomes for freezers in the absence of the program would be taking them to the dump (27.6% or 24 out of 87 customers who recycled freezers), giving them away (24.1% or 21 out of 87) or keeping them (12.6% or 11 out of 87). In total, only 30.0% (24 out of 80) of refrigerator recyclers and 34.5% (30 out of 87) of freezer recyclers would have disposed of the units in a way that would ensure they are not used again in the future (taken it to a dump, paid someone else to take it to a dump, or left it on the curb for garbage pick-up).
- About a third of customers would have had their units removed at a later time (or not at all) in the absence of the recycling program (35.0% or 28 out of 80 who recycled refrigerators, 35.6% or 31 out of 87 for those who recycled freezers). Fewer than one in ten would have done it sooner without the program (5.0% or 4 out of 80 for refrigerators, 8.0% or 7 out of 87 for freezers).
- Most customers who replaced or did not replace their recycled units would have done the same thing in the absence of the program. Among refrigerator recyclers, 3.8% (3 out of 80) did not replace their unit but say they would have without the program, and an equal number (3.8% or 3 out of 80) say they did replace their unit but would not have without the program. For freezers, one customer (1.1% of 87) did not replace but would have without the program, while two (2.3% of 87) did replace but would not have without the program.
- This program gets very high satisfaction ratings from participants: on a 10-point scale, the average rating for the program overall is 9.63, with the ratings for specific aspects of the program ranging from 9.25 up to 9.78. Overall satisfaction with Duke Energy is somewhat lower (but still high) at 8.84 using the same scale. Overall, 59.4% (95 out of 160) of surveyed customers said that participating in this program made them feel more favorable toward Duke Energy, while none (0% of 166) said it made them feel less favorable.
- Surveyed participants' favorite aspects of this program are the convenience of home pick-up (mentioned by 35.0% or 56 out of 160), the incentive payment (27.5% or 44 out of 160), getting rid of unwanted old units (20.6% or 33 out of 160) and environmentally responsible disposal (16.3% or 26 out of 160). Two-thirds of survey participants (68.1% or 109 out of 160) could not name a least favorite aspect of the program.
- Only 31.9% (51 out of 160) of surveyed program participants report that they have seen a reduction in their electric bills since they recycled their old appliances. There are no significant differences between customers who recycled a refrigerator, a freezer, or multiple units, or between customers in North and South Carolina.
- About a quarter of customers surveyed (26.9% or 43 out of 160) report having taken additional energy efficiency actions since participating in the Appliance Recycling program, and the average influence rating of the program on these actions is a moderate 5.8 on a 10-point scale. The most common action reported is switching to efficient light bulbs (7.5% or 12 out of 160).

Recommendations

- It seems logical that cancellation rates will diminish with a greater number of appointment time slots and with shorter time intervals between customer calls and pick up dates. However, that will remain an indirect effect until more customers begin making appointments. Therefore, Duke Energy and JACO should also take multiple actions to increase program enrollments and direct steps to reduce cancellations wherever possible.
- Raising incentive amounts from $30 to $40 or $50 per unit will likely increase participation and help the program to reach its targeted goals. Duke Energy and JACO conducted an incentive level effectiveness study in North Carolina and South Carolina with 240,000 Duke Energy customers during September and October 2013 to assess participation levels at higher inventive levels. The study found a 230% increase in customer enrollments when the incentive was raise to a $50 over the current $30. These findings should be considered for their cost effectiveness as means of increasing program participation compared with the costs of increasing marketing spend per unit to make more people aware of the program and its benefits at lower incentive levels.
- Because landlords represent the largest group of appliance purchasers, consider developing an aspect of the program that targets property management companies to encourage their participation either with collections of individual refrigerators that require replacement or via large scale replacements at one time. Such a move could increase the energy savings of the program, while providing landlords with cash offsets to replace inefficient refrigerators, making their rental units more attractive to tenants.
- To better reach its goals the program team may also consider expanding eligibility beyond residential customers to other types of buildings, including schools, offices, and industrial locations.
- Duke Energy may be able to generate leads for the program by adding a question about secondary refrigerators and freezers to future customer surveys, such as the Home Energy House Call survey.
- Consider taking advantage of Duke Energy's internal customer satisfaction and net promoter scores to develop an initiative that encourages program participants to refer their families and friends.
- Arranging joint promotions with municipal and private recycling firms to promote environmentally appropriate recycling may be a way to increase awareness at fairly low cost.
- Stay abreast of market factors that may affect the cost effectiveness the program, including new and use appliance dealer practices, supply and demand for used units, price of materials recovered, changing appliance efficiency standards, Energy Star program changes, technology improvements, and environmental regulations. This would allow the program to better understand the program's total net impact and be able to assess when to change or terminate the program as recycled units become more and more efficient over time.
- Duke Energy's plan to launch a retailer-utility partnership with Sears in Indianapolis in the fourth quarter of 2013 may be effective in increasing collections. If demonstrated to

be effective in that service territory, a similar effort may be worthwhile in the Carolina System as well. Such a partnership will need to address the potential for reducing Duke Energy's net to gross ratio through the collection of non-working units.

In theory, the potential for such an arrangement exists among all new appliance dealers who collect older units, with the greatest opportunity lying in those companies that sell the largest number of units. Retailers who are already participating in the EPA's RAD program, such as Home Depot and Best Buy, may be ready partners for joint promotions and coordinated collections. While midsize companies that collect older units as a service to their customers may also represent possible partners. The program may be a more challenging "sell" at firms, such as Lowes, HH Gregg and others, which generate revenue from the used units that they collect.

- Duke Energy may also be able to increase its collection numbers by new appliance dealers with point of sale promotion materials to encourage them to mention the program to customers shopping for new units.
- As permitted under filing requirements, consider accepting units from and paying incentives to used appliance dealers who are willing to recycle working units via the program instead of reselling them.
- The market for used appliances is influenced by a wide number of factors and continues to change with time. Thus it may be helpful to plan a follow up study of the marketplace within a few years in order to understand and appreciate those changes are influencing customer expectations, willingness to participate, and satisfaction with the program.

Introduction

Summary Overview

This document presents the process and impact evaluation report for Duke Energy's Residential Appliance Recycling Program as it was administered in the Carolina System. The evaluation was conducted by TecMarket Works, BuildingMetrics, Integral Analytics, and Matthew Joyce, subcontractors to TecMarket Works.

Summary of the Process Evaluation

TecMarket Works performed a process evaluation comprised of management interviews, new and used appliance dealer interviews, and a survey of residential program participants to identify program implementation issues, assess customer responses and satisfaction levels, and examine the effects of the program on the sale of used and new refrigerators and freezers, as well as to look at appliance dealer policies for deliveries and removal.

Between May and November of 2013, TecMarket Works conducted interviews with managers and staff members at the leading firms involved in the implementation of this program, including Duke Energy, JACO Environmental, and Runyon, Saltzman and Einhorn.

TecMarket Works also spoke with used and new appliance dealers operating within the Duke Energy services territories in the Carolina System. Their businesses were found via an internet search and were interviewed by phone between July 28 and August 22, 2013.

TecMarket Works conducted a phone survey with a random sample of 160 participants from the Carolina System between September 5 and September 25, 2013 (who collectively recycled 82 refrigerators and 91 freezers, including thirteen participants who recycled multiple units).

Table 4. Process Evaluation Date Ranges

Evaluation Component	Sample Pull: Start Date of Participation	Sample Pull: End Date of EMV Sample	Dates of Data Collection
Management Interviews	N/A	N/A	Interviews conducted from 5/28/13 to 11/20/13
Dealer Interviews	N/A	N/A	Interviews conducted from 7/28/13 to 8/22/13
Participant Surveys	9/26/12	8/24/13	Surveys conducted from 9/5/13 to 9/25/13

Summary of the Impact Evaluation

The impact findings presented in this report were calculated using monthly billing data. A billing analysis was conducted within which a panel model specification was used that analyzed the monthly billed energy use across time and participants. The model included terms to control for the effect of weather on usage, the effect of impact from other Duke Energy offers, the effect of normal non-program induced energy use changes, as well as a complete set of monthly indicator variables to capture the effects of non-measureable factors that vary over time (such as economic conditions and season loads). This billing data was supplemented by an engineering analysis of impacts fed by appliance metering data and participant survey data as presented in Table 5 below.

Table 5. Impact Evaluation Date Ranges

Evaluation Component	Sample Pull: Start Date of Participation	Sample Pull: End Date of EMV Sample	Dates of Data Collection
Logger Study	3/22/13	8/20/13	September through November 2013
Engineering Estimates	9/10/12	2/12/13	September through November 2013
Billing Analysis	9/26/12	6/5/13	September through November 2013

Evaluation Objectives

This evaluation of Duke Energy's residential Appliance Recycling Program was conducted in an effort to determine the estimates of energy and demand savings from refrigerators and freezers removed and recycled by the program, operational effectiveness, market effect, and customer satisfaction. This evaluation pertains to the program as it was administered in the Carolina System.

Description and Purpose of Program

The purpose of Duke Energy's Appliance Recycling Program (ARP) is to target residential customers in order to preempt the continued use of still-cooling refrigerators and freezers. Working primary and secondary units are picked up for free from customer homes and taken to a central location where they are dismantled and recycled in an environmentally appropriate manner. To quality, units must be between 10-30 cubic feet. To encourage participation, the program offers customers a financial incentive of $30 per unit that is paid by check after dismantling of the unit has been confirmed. Customers are allowed to recycle up to two units per year.

Depending upon their model, age, and condition, older refrigerators and freezers can consume several times as much energy as newer, more efficient units. Thus the primary goal of the program is to remove working refrigerators and freezers from customer homes and keep them out of the secondary market to ensure they do not continue to draw upon the power grid. This reduces base load demand upon the electric system and thereby also helps in lowering peak load requirements. Secondary objectives of the program include educating customers about the energy saving and environmental benefits of recycling older units.

Program Goals and Participation

Program goals were set in conjunction with advice from an external consultancy that helped to determine an annual harvest rate for collecting used refrigerators and freezers. This was calculated based upon the number of active residential accounts, estimates of homeownership, demographics, and other factors within the Carolina System service territory. Harvest rate projections ramp up during the first three years of the program as shown in the table below.

Table 6. Appliance Recycling Harvest Rates

State		North Carolina	South Carolina
Total Residential Electric Service Accounts		1,831,410	451,076
2012	# of Units	5,259	1,577
	Harvest Rate	0.3%	0.3%
2013	# of Units	13,885	4,163
	Harvest Rate	0.8%	0.9%
2014	# of Units	15,900	4,769
	Harvest Rate	0.9%	1.1%

Because the program started in August of 2012, its initial year-end goals were prorated and used for calibration purposes for the first full year of the program. The program began with an initial goal of 3,000 units to be collected in North Carolina and 872 units in South Carolina by the end of 2012. Those projected goals were not reached by year end. Actual collections totaled 1,306 units (44% of goal) in North Carolina and 544 units (62% of goal) in South Carolina. The 2013 program goals are 13,875 units in North Carolina and 4,163 units in South Carolina. Between January 1 and November 22, 2013 the program had collected 6,845 units in North Carolina (49% of annual goal), and 1,772 units in South Carolina (43% of annual goal). When both time periods are combined, the first 12 months of program operations resulted in 48% of combined goal for

North Carolina and 46% of combined goal for South Carolina. Table 7 summarizes the program's performance to date.

Table 7. Program Performance Sept 1, 2012 - Nov 22, 2013

		Refrigerators			Freezers			Combined Units		
State	**Collection Period**	**Goal**	**Actual**	**% Goal**	**Goal**	**Actual**	**% Goal**	**Goal**	**Actual**	**% Goal**
NC	Sept 1 – Dec 31, 2012	2,400	950	40%	600	356	59%	3,000	1,306	44%
	Jan 1 – Nov 22, 2013	11,100	5,019	45%	2,775	1,826	66%	13,875	6,845	49%
	Combined	13,500	5,969	44%	3,375	2,182	65%	16,875	8,151	48%
SC	Sept 1 – Dec 31, 2012	724	379	52%	148	165	111%	872	544	62%
	Jan 1 – Nov 22, 2013	3,330	1,254	38%	833	518	62%	4,163	1,772	43%
	Combined	4,054	1,633	40%	981	683	70%	5,035	2,316	46%
Carolina System	YTD 2012	3,124	1,329	43%	748	521	70%	3,872	1,850	48%
	2013 YTD	14,430	6,273	43%	3,608	2,344	65%	18,038	8,617	48%
	Combined	17,554	7,602	43%	4,356	2,865	66%	21,910	10,467	48%

While this level of collections falls below the program's designated goals, TecMarket Works finds that the performance gap has reasonably less to do with marketing, call center practices, or collection handling—all of which appear to be generally strong—and more to do with the initially projected harvest rates, which were calculated by an external consultant in 2006 based upon an incentive level of $30 per unit. Despite the fact that the program did not begin collecting units until six years after that study was conducted, the harvest rates and incentive levels remained the same while the marketplace and economy continued to change. This appears to be one factor in the difference between projected and actual collection numbers. Other factors are discussed in more detail in the following management section.

Methodology

Overview of the Evaluation Approach

The process evaluation consists of three primary components: management interviews, interviews with new and used appliance dealers, and participant surveys.

The impact evaluation utilizes both a billing analysis and engineering estimates to estimate program energy savings.

Study Methodology

Engineering Estimates

For this analysis, field technicians installed meters in situ at each of 48 selected sites to monitor energy consumption, room temperature, and door openings. Daily average outdoor temperatures were gathered from a web-based historical weather database (weatherunderground.com), using weather data for the monitoring dates and city of residence for each participant. Annual energy usage was determined by multiplying the average hourly kWh from the power meter data by 8,760. To account for differences in temperature throughout the year, data from the temperature loggers was used to plot a regression line for each unit correlating average kWh with the average room and average outdoor temperature. The equation of the regression line was then applied to a typical meteorological year (TMY3 data) outdoor temperature data for each of six different weather stations: Charlotte, NC; Hickory, NC; Greensboro, NC; Raleigh, NC; Asheville, NC; Greenville, SC to provide weather normalized annual consumption. Units were then mapped to one of the sixteen paths based on participant survey responses to calculate average net savings per unit recycled (see Table 14 on page 29).

Billing Analysis

For this analysis, billing data was obtained for all participants in the program between October, 2012 and May, 2013. There were a total of 4,153 usable accounts after processing. A panel model specification was used that analyzed the monthly billed energy use across time and participants. The model included terms to control for the effect of weather on usage, the effect of impact from other Duke Energy offers, the effect of normal non-program induced energy use changes, as well as a complete set of monthly indicator variables to capture the effects of non-measureable factors that vary over time (such as economic conditions and season loads).

Management Interviews

TecMarket Works conducted interviews with the Duke Energy's product manager and with its customer marketing campaign manager. We also spoke with JACO's program manager, with its call center coordination manager, and with the account manager with Runyon, Saltzman, and Einhorn (RSE), the JACO subcontractor responsible for program marketing.

The interviews considered program design, execution, operations, staff and customer interactions, data tracking and transfer methods, and personal experiences in order to identify any implementation issues and discuss opportunities for improvement. Interview guides were used to ensure a full and complete battery of questions were addressed to the interview subjects.

Sample guides are shown in “Appendix F: Management Interview Instrument” and “Appendix G: Vendor Interview Instrument.”

Appliance Dealer Interviews
TecMarket Works conducted phone interviews with new and used appliance dealers to assess for refrigerators and freezers, their opinions of the program, and its effect on their businesses. Dealers included national retailers, regional chains, and local businesses. Conversations ranged from five minutes to more than 30 minutes. Interview guides are shown in Appendix H: Used Appliance Dealer Survey Instrument and Appendix I: New Appliance Dealer Survey Instrument.

Participant Surveys
This survey focused on customers who, according to program tracking records, recycled refrigerators and/or freezers through the Appliance Recycling program from Duke Energy. The survey was conducted by phone by TecMarket Works staff from a sample from a list[2] of 3,809 customers in North Carolina and 1,118 customers in South Carolina who recycled freezers and/or refrigerators, and 160 survey respondents (99 from North Carolina and 61 from South Carolina) completed the survey by telephone. The survey instrument can be found in “Appendix M: Participant Survey Instrument.”

Data collection methods, sample sizes, and sampling methodology

Engineering Estimates
This analysis uses a combination of in situ metering data and participant survey data. The survey was conducted by phone by TecMarket Works staff from a random sample from a list of 4,927 customers in the Carolinas who recycled freezers and/or refrigerators, and 160 survey respondents completed the survey by telephone. Metering participants were recruited over the phone, independent of the phone survey, from a list of upcoming scheduled appliance pickups. From a list of 740 customers, there were 48 sites recruited.

Billing Analysis
The billing analysis used consumption data from all complete data provided for ARP participants in the Carolinas (4,153 customers[3]) that participated between October 2012 and May, 2013.

Management Interviews
Interviews and follow up exchanges were conducted by phone with five staff members from Duke Energy, JACO, and RSE. Conversations ranged from half an hour to two and half hours. The interview instruments can be seen in “Appendix F: Management Interview Instrument” and “Appendix G: Vendor Interview Instrument.”

Appliance Dealer Interviews
Phone interviews were conducted with 22 new and used appliance dealers found via an internet search for businesses operating within Duke Energy’s designated service areas of the Carolina

[2] Duke Energy provided a list of 5,990 customer records for the Carolinas System (4,563 for North Carolina and 1,427 for South Carolina), of which 4,927 were contactable after removing missing phone numbers, “do not call” list customers and customers who had recently been surveyed about other Duke Energy programs.
[3] The number of customers for the billing analysis is different than the number of customers in the process evaluation. The data for the process analysis covers a longer time period as shown in Table 4 and Table 5.

System. Sample interview guides are provided in Appendix H: Used Appliance Dealer Survey Instrument and Appendix I: New Appliance Dealer Survey Instrument.

Participant Surveys

The survey was conducted by phone by TecMarket Works staff from a random sample from a list of 4,563 customers in North Carolina and 1,427 customers in South Carolina who recycled freezers and/or refrigerators, and 160 survey respondents completed the survey by telephone.

Number of completes and sample disposition for each data collection effort

Engineering Estimates

For the participant survey, from the sample list of 4,927 customers, 662 participants were called and 160 responded yielding a response rate of 24.2% (160 out of 662). For the in situ metering, from the sample list of 740 customers, all were called and 48 were recruited yielding a recruitment rate of 6.5% (48 out of 740).

Management Interviews

From May 28 to November 2013, TecMarket Works interviewed five program managers and vendors for this evaluation. This represents a completion rate of 100%.

Appliance Dealer Interviews

Between July 28 and August 22, 2013, TecMarket Works completed 22 Carolina System appliance dealer phone interviews. Appliance dealers were contacted a maximum of four times or until the contact resulted in a completed interview or a refusal to participate.

Participant Surveys

From the sample list of 4,927 customers, 662 participants were called between September 5 and 25, and a total of 160 telephone surveys were conducted yielding a response rate of 24.2% (160 out of 662).

Table 8. Summary of Data Collection Efforts

Data Collection Effort	State	# Available Contacts	# of Successful Contacts	Sample Rate
Management Interviews	NC, SC	5	5	100%
Dealer Interviews	NC	31	11	36%
	SC	27	11	41%
Participant Survey	NC, SC	4,927	160	3.2%

Description of baseline assumptions, methods and data sources

Savings are calculated by comparing the results of the in situ metering to the average annual usage of a replacement unit. The percentage of units being replaced, and the age of the replacement, was determined though the participant survey. The average annual consumption of both new and used units was calculated using the Energy Star Refrigerator Retirement Savings Calculator. The final average annual usage of a replacement unit for the program is the weighted average of these two values.