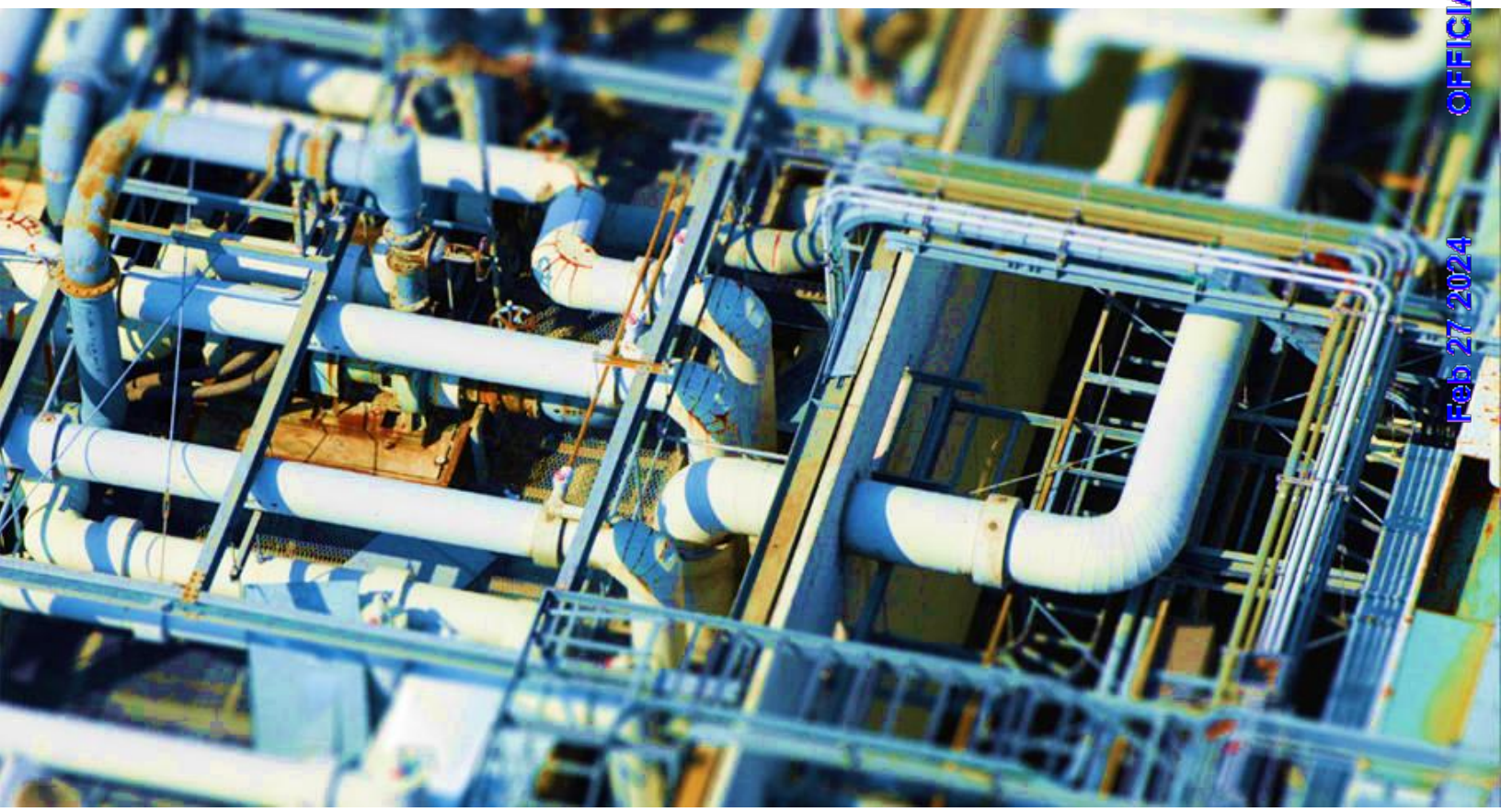

2020 – 2021 Smart $aver® Non-Residential Custom Program Evaluation Report

Submitted to Duke Energy Carolina / Duke Energy Progress in partnership with Tetra Tech

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1. Executive Summary

1.1. Program Summary

Duke Energy's Non-Residential Smart $aver® Custom Incentive Program (NR Custom) offers financial assistance to qualifying commercial, industrial, and institutional customers in the Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP) service territory to enhance their ability to adopt and install cost-effective electrical energy efficiency projects.

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

The program engages numerous Duke Energy team members to support the program, including large account managers, business energy advisors (BEAs), energy efficiency engineers, and trade ally outreach representatives. Willdan is Duke Energy's authorized vendor for the New Construction Energy Efficiency Design Assistance (NCEEDA) portion of the Smart $aver program. Willdan acts as a client liaison with Duke Energy and discusses project technical issues with Duke Energy's energy efficiency engineers.

1.2. Evaluation Objectives and High-Level Findings

This report presents the results and findings of evaluation activities for Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP) NR Custom program conducted by the evaluation team, collectively Resource Innovations Inc. and their subcontracting partner, Tetra Tech, for the period of January 1, 2020 through December 31, 2021.

1.2.1. Impact Evaluation Objectives

The overarching goals for the NR Custom impact evaluation were to:

- Quantify accurate and supportable energy impacts (kWh) and summer and winter demand (kW) savings for energy efficient measures and equipment implemented in the participants' facilities.
- Assess the rate of free riders from the customer and contractor perspective.
- Determine spillover effects from customer and contractor perspective.
- Consider and verify measure installation vintage aligned with measure baseline definitions, i.e., early replacement, burnout on failure, etc.

Evaluation activities included in-depth reviews and verification of a representative sample of projects including virtual or phone interviews with program participants; collecting trend, utility consumption

data, and building automation system/energy management system (BAS/EMS) data, and engineering analyses to estimate gross and net savings for all implemented measures attributed to the NR Custom Program.

1.2.1.1. Process Evaluation Objectives

Process evaluations are designed to support continuous program improvement by identifying successful program elements that can be expanded upon and underperforming/inefficient processes that could be holding back program performance. The process evaluation for the NR Custom Program sought to:

- Assess how participant characteristics compare to segments targeted for the program,
- Assess the sources of customer engagement and most effective marketing source,
- Assess the influence the program has on customers' decisions to install energy-efficient (EE) measures,
- Assess persistence of program engagement with participants, and
- Assess satisfaction with the program and its components, including suggestions for program changes.

To meet these objectives, the evaluation team conducted interviews with key program staff, reviewed program documentation, interviewed third-party vendors, and utilized telephone surveys to ask program participants and trade allies about their experiences with the program.

1.2.2. High Level Findings

1.2.2.1. Gross Impact Evaluation Key Findings - DEC

The impact evaluation results indicate the program's internal processes for project review, savings estimation, and installation verification are producing quality estimates of project impacts. Energy realization rates exceed 100% for three strata (Lighting Small, Non-lighting Small and Non-lighting - Large). The energy realization rate for the Lighting-Large was 97.96%. The overall realization rate for winter peak demand was greater than 100% at the program level whereas for summer peak demand it was 99.96%. Findings from the gross impact evaluation are summarized in Table 1-1, Table 1-2, and Table 1-3.

Table 1-1 DEC Program Reported and Verified Gross Energy Impacts

Measure Category	Strata	Gross Reported Energy Savings (kWh)	Gross Verified Energy Savings (kWh)	Realization Rate (%)
Lighting	Small (<195MWh)	8,960,106	9,055,976	101.07%
	Large (≥195 MWh)	9,758,356	9,559,722	97.96%
Non-lighting	Small (<328 MWh)	14,585,062	14,685,200	100.69%
	Large (≥328 MWh)	24,751,467	26,273,632	106.15%
Total		**58,054,991**	**59,574,530**	**102.12%**

Table 1-2 DEC Program Reported and Verified Gross Summer Peak Demand Impacts

Measure Category	Strata	Gross Reported Summer Demand Savings (kW)	Gross Verified Summer Demand Savings (kW)	Realization Rate (%)
Lighting	Small (<195MWh)	2,461	1,421	57.72%
	Large (≥195 MWh)	1,451	1,245	85.82%
Non-lighting	Small (<328 MWh)	3,519	3,450	98.03%
	Large (≥328 MWh)	5,228	5,755	110.09%
Total		**12,659**	**11,871**	**99.96%**

Table 1-3 DEC Program Reported and Verified Gross Winter Peak Demand Impacts

Measure Category	Strata	Gross Reported Winter Demand Savings (kW)	Gross Verified Winter Demand Savings (kW)	Realization Rate (%)
Lighting	Small (<195MWh)	408	414	101.65%
	Large (≥195 MWh)	1,297	1,260	97.15%
Non-lighting	Small (<328 MWh)	2,091	2,218	106.08%
	Large (≥328 MWh)	3,679	3,750	101.92%
Total		**7,475**	**7,642**	**101.06%**

1.2.2.2. Gross Impact Evaluation Key Findings - DEP

Like the DEC results, the impact evaluation results for DEP indicate the program's internal processes for project review, savings estimation, and installation verification are producing quality estimates of project impacts. Energy realization rates exceed 100% for the two strata (Lighting Small and Non-

lighting - Small). The energy realization rate for the Lighting Large strata was 83.28% and Non-Lighting Large strata was 97.46%. Realization rates for summer and winter peak demand were greater than 100% at the program level. Findings from the DEP gross impact evaluation are summarized in Table 1-4, Table 1-5, and Table 1-6.

Table 1-4 DEP Program Reported and Verified Gross Energy Impacts

Measure Category	Strata	Gross Reported Energy Savings (kWh)	Gross Verified Energy Savings (kWh)	Realization Rate (%)
Lighting	Small (<44MWh)	3,711,848	4,044,374	108.96%
	Large (≥44 MWh)	2,455,237	2,044,664	83.28%
Non-lighting	Small (<301 MWh)	7,579,735	8,807,126	116.19%
	Large (≥301 MWh)	13,890,436	13,537,381	97.46%
Total		**27,637,255**	**28,433,545**	**99.85%**

Table 1-5 DEP Program Reported and Verified Gross Summer Peak Demand Impacts

Measure Category	Strata	Gross Reported Summer Demand Savings (kW)	Gross Verified Summer Demand Savings (kW)	Realization Rate (%)
Lighting	Small (<44 MWh)	727	778	106.92%
	Large (≥44 MWh)	348	354	101.52%
Non-lighting	Small (<301MWh)	2,031	2,059	101.39%
	Large (≥301 MWh)	3,550	3,880	109.30%
Total		**6,656**	**7,070**	**107.48%**

Table 1-6 DEP Program Reported and Verified Gross Winter Peak Demand Impacts

Measure Category	Strata	Gross Reported Winter Demand Savings (kW)	Gross Verified Winter Demand Savings (kW)	Realization Rate (%)
Lighting	Small (<44 MWh)	166	394	237.07%
	Large (≥44 MWh)	199	233	117.48%
Non-lighting	Small (<301 MWh)	681	1,047	153.78%
	Large (≥301 MWh)	5,096	5,837	114.54%
Total		**6,141**	**7,511**	**116.30%**

1.2.2.3. Net Impact Evaluation Key Findings

Duke Energy staff have a thorough process for evaluating applications. This process includes denying projects if customers already purchased equipment or, in the case of new construction, are not open to modeled options. The net impact evaluation results show that over 82% of the program's energy savings are attributable to the program's activities. Program influence was high; a large portion of the free-ridership stemmed from the Intention score. Customers reported they planned to complete the same project and would have paid the additional incentive amount to complete the efficiency project or said the project would have been largely or moderately the same without the program. Findings from the net impact evaluation are summarized in Table 1-7.

Table 1-7 Net-to-Gross Evaluation Results

Net-to-Gross Component	Rate
Free-ridership	20.90%
Net of Free-ridership	79.10%
Program-influenced Participant Spillover	0.19%
Program-influenced Nonparticipant Spillover	3.44%
Net-to-Gross	82.73%
Gross Verified Savings (kWh)	88,008,075
Net Verified Savings (kWh)	72,809,080

1.2.2.4. Process Evaluation Key Findings

The Duke Energy Program staff continue their consistent outreach and communication with both customers and contractors to market the Custom program. Outreach from multiple Duke Energy sources, including staff, has influence on customers completing projects, but contractors remain the primary source of program awareness. The Custom application processing procedures are thorough, and the application process is highly rated by participants.

Additional high-level findings include the following:

- Although overall participation is declining, the number of NCEEDA projects has been increasing with more focus on early outreach to new construction trade allies.
- Saving money is the primary reason for customer participation in the Custom program, followed closely by the program incentive and energy savings. Contractors also rate the program as highly influential in their project recommendations. Most awareness comes from contractors, Duke Energy representatives, and previous program experience.
- Application documentation and tracking are in place with opportunities for some minor improvements.
- Contractor satisfaction is highest with the type or variety of projects eligible and Duke Energy staff interaction, with lower ratings for the amount of program paperwork. A few would like faster processing and a simpler process. But many appreciate the ability to use the incentive as a sales tool.
- Overall participant program satisfaction remains high. Contractor technical assistance received high satisfaction scores, underscoring the critical role they plan. Participants found high value in communication and technical assistance from the program and the materials describing the program. The value of the incentive compared to the total project cost decreased slightly from last evaluation.

1.3. Evaluation Conclusions and Recommendations

Based on evaluation activities and findings, the evaluation team concluded the following and provides several recommendations for program improvement.

1.3.1. Impact Recommendations

Conclusion 1: The evaluation team saw strong evidence the Duke Energy Program team continues to conduct detailed reviews of the project applications, has quality control checks, and revises measure parameters to refine savings estimates. Engineering reviews by AESC provides an additional level of quality control that helps to minimize most calculation errors or instances of over-claimed energy or demand savings. The strata-level realization rates indicate that an appropriate level of rigor is being applied to lighting projects and most non-lighting projects. With the increase in new-construction projects population, it is important to develop templates and methodology to reduce errors while calculating peak demand savings.

One area that may require additional attention is in the calculation of summer and winter peak demand savings for new construction projects. The evaluation team reviewed eight new construction projects that have summer or winter peak demand savings calculated incorrectly. Out of the eight projects, one project used an average of four hours whereas the other seven projects used hourly demand estimates from the new construction models that were one hour off the defined peak hour. This resulted in either higher or lower verified peak demand savings.

Recommendation 1a: Continue the level of rigor being applied to projects as it goes through the NR Custom application process while considering the following conclusions and recommendations.

Recommendation 1b: For new construction projects, improve methodologiesused to calculate winter and summer peak demand savings to be consistent with Duke's peak demand periods definition and guidelines provided in the latest NCEEDA protocol for Carolinas. In the event that the peak period definitions cannot be applied, clearly state assumptions and provide reasoning before finalizing the project.

Conclusion 2: Of the parameters needed to calculate project energy and demand savings, operating schedules, annual hours of use, and/or seasonal operations were more often verified to be different than the those used to calculate reported savings. For example, in the summer months of June, July, and August, the ex-ante model for some school projects did not account for any building usage, whereas on-site visits confirmed that some of the school buildings were consistently operational throughout the summer. Applicants are asked to provide the operating schedules as part of the application process andthese should be reviewed and confirmed with building operators or business staff, not trade allies, as they will have the best insights into what the schedule will be for each installed fixture.

Recommendation 2: Improve the level of detail collected in the application on the hours of operation by verifying building schedules with facilities management staff versus the trade ally or program applicant. Collect data from the Building Management System (BMS) to verify building operations if this data is available. Examples of detailed data to collect could include working schedules, peak occupancy periods, holidays observed, seasonal vacancies, control types (occupancy, day-light sensors etc.), and scheduled downtime. Incorporate these schedule details into the calculation of the annual hours of use, annual energy savings and peak demand savings.

Conclusion 3: The Duke Energy NCEEDA protocol defines how savings from new, high-performance buildings shall be modeled and estimated. Assumptions on how the building is expected to be occupied and used are also required but do not always match how the new buildings are actually used or occupied. This can lead to the modeled consumption and savings not matching the actual consumption and savings. Duke Energy has begun implementing calibration requirements for certain NCEEDA projects as part of its 2022-2023 NR Custom program.

Recommendation 3a: The following are recommended guidelines to calibrate new construction models with the appropriate and minimal amount of post consumption data. These guidelines are

referenced from the Uniform Methods Project Protocol[1] and expanded on based on the Evaluation Team's experience:

Post construction consumption data should sufficiently characterize a building's energy use, so modelers can extrapolate reliable annual energy-use values.

- Consumption data used for the calibration should cover time periods when the end uses included in the building's model are active (e.g., heating, cooling, lighting, etc.). The shoulder months of March, April, October, and November can effectively cover these periods.
- Consumption data during time periods that include end uses not included in the model (e.g., construction activities, tenant end uses, etc.) complicate the calibration effort and should be avoided, if possible.

Post construction consumption data should sufficiently capture expected seasonal variations in building operations.

- Consumption data for schools, resorts/hotels, sporting arenas and other building types that have seasonal changes to their occupancy and use should cover periods of both full and partial utilization.

- Building occupancy and operating conditions must be known for the period of post consumption data being used.
  - Model inputs should be verified from and adjusted to match how the building is being used during the periods the post construction consumption data was collected.
  - If occupancy is less than expected during the short period when the post construction consumption data is collected then the model should be calibrated to that level of occupancy. Once the model is shown to be calibrated to that level of occupancy, the modeled occupancy can be returned to nominal values to estimate savings.

Building occupancy and operating conditions must remain stable for the duration of post construction consumption data used for calibration.

- Consumption data during times periods when the building is being commissioned or when tenants are changing should be avoided.

Recommendation 3b: The evaluation team continues to recommend applying a tiered approach to requiring modeled calibrations that depends on the amount of estimated savings and/or incentives. For example, the implementer can start by using 3 months of appropriate post construction consumption data, and if the NMBE and CVRMSE are within reasonable bounds (i.e. error bounds can be set be Duke Energy team or consistent with ASHRAE 14 standards) the project can proceed, and if the data falls outside the error bounds, more data would need to be collected in an incremental manner (3, 6, and 9 months). Additionally, large projects (for example, savings greater

[1] Chapter 15: Commercial New Construction Evaluation Protocol. The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures (https://www.nrel.gov/docs/fy17osti/68571.pdf)

than 1 GWh) start with collecting 6 months of post construction consumption data. We understand that the new post-project validation guidelines have been published in 2023. The evaluator will review these new guidelines in the next evaluation cycle.

Recommendation 3c: Verify and document the utility meter numbers and service accounts that will be serving the newly constructed building and/or renovations during the design and building process so the appropriate post construction consumption data may be easily located. Also, this will ensure correct utility data is used for the calibration of the model.

1.3.2. Process Recommendations

Conclusion 4: The NTG ratio reflects a high level of program influence. Custom program free-ridership continues to be driven by respondents indicating their intention to implement energy-efficient projects in the absence of the program. While the influence of the Custom program was calculated at 2.0%, which is a very high level of influence, the intention was calculated at 17.2%, resulting in a free-ridership score of 20.9%. With the increase in new construction projects, we looked at free-ridership by project type, resulting in retrofit projects at 10.4% and new construction at 30.2%. Duke Energy screens for early commitment to equipment with Question E of the preapproval application form and Willdan has their own screening process to manage the impact they can have on new construction designs. Benchmarking of other programs shows that many Custom program NTG ratios were between 70% and 85%. The Duke Energy Custom program NTG falls within that grouping for both the retrofit and new construction projects. Most other program administrators deliver commercial new construction as a separate program, but many contain more than one rebate or incentive option (such as prescriptive and various levels of assistance).

Recommendation 4a: Duke Energy should continue the strong screening practices for both retrofit and new construction projects to keep free-ridership low. For retrofit projects in general and new construction projects once they make it to preapproval, Duke Energy should continue to use Question E and others to screen for commitment to equipment before an incentive offer is made to the customer.

Recommendation 4b: Willdan should continue its screening prior to preapproval as well. The evaluation team believes the addition of the questions and screening process are helping Willdan manage which customer projects best fit the program. However, Willdan should review and refine the response categories to their incentive impact questions that took effect in 2020 to better reflect the questions asked. For instance, for the question “Are you requesting Design Assistance services to: Allow the Project to pursue improved energy efficiency?” the current response categories are Very, Somewhat, and No. The response categories should be a Yes/No, or the question should be adjusted to flow better with the current response categories.

Recommendation 4c: Duke Energy should track the 3rd party design firm (architect, engineer, etc) contact in the participant tracking data to facilitate analysis of participation trends. These design firms can be a continued source of outreach to communicate program changes. Currently only the

implementer, Willdan, is listed as the contractor in the participant tracking data. The evaluation team understands that Duke Energy's new tracking system may include this additional information.

Conclusion 5: Even though the proportion of new construction projects has increased, overall participation in the Smart $aver Custom program continues to decline, driven by a decline in retrofit projects. The COVID-19 pandemic has impacted supply chains and construction timelines. Business planning has been disrupted, and some energy efficiency projects become less important than keeping businesses running. Additional adjustments to the Custom program, like moving more lighting projects to the Prescriptive program, and shifting projects with uncertain energy savings to the new Performance path, also contribute to decreases in Custom participation and savings. There are also indications from survey comments that customers carefully consider the value of the incentive against the cost to opt into the efficiency rider before applying for a program incentive.

Recommendation 5a: Consider more direct marketing to potential retrofit customers to increase awareness of the Custom incentives and encourage early engagement with the program. Current materials are well-designed and direct customers to the website with additional supporting information. However, it is unclear how widespread awareness is across customers and contractors regarding custom retrofit incentive opportunities.

Recommendation 5b: To better understand how the retrofit and new construction components of the program are operating, Duke Energy could either split the components into separate programs, as many other utilities have done, or they can maintain the current joint program. If Duke Energy maintains the joint program, they should break the components out separately during evaluation reporting.

Conclusion 6: The preapproval process is screening out ineligible projects, but small improvements in tracking and documentation could help program staff understand participation barriers. While the tracking of project application status was much cleaner in 2020 and 2021 than in 2018 and 2019, there were still inconsistencies in tracking and coding of applications. For instance, a high use of "Other" as a reason a project was closed for not being cost effective can hinder review of reasons applications are not resulting in completed projects. The ability to efficiently review the application database for barriers could help Duke Energy retain more projects or address consistent barriers. The evaluation team is aware that Duke Energy is working on a new tracking system that may address these issues, as well those suggestions listed below.

Recommendation 6a: With the continued shift of projects from Custom to Prescriptive, try to consistently record projects shifted to Prescriptive using the same category under Custom Closed Reason. Some of the prescriptive incentives showed up as their own category under the Custom Closed Reason, while others showed up as a reason in the Processor Notes when the Custom Closed Reason was listed as Customer/TA Request. These could be more consistently coded using the Shifted to Prescriptive code.

Recommendation 6b: Create another Custom Closed Reason for Not Cost Effective in the application tracking database. Most of the applications rejected because the project was not cost effective were

listed as “Other” under Custom Closed Reason, with Processor Notes on who rejected the case for not being cost effective. While the information in the Processor Notes field is very helpful, it would be easier to track an important reason such as lack of cost effectiveness as its own category under Custom Closed Reason.

Recommendation 6c: Record the reason customers or trade allies request closing of applications. Cases where a customer or trade ally requested that an application is cancelled are recorded as Customer/TA request. These cases did not include a reason for the request to close the application, but most included a MSG-#### reference to the application documentation. That MSG-#### reference matches to an email or note saved in each set of application documentation. Those reasons could be captured in Processor Notes for quicker review as applications are processed to identify any issues the program staff can address.

Recommendation 6d: In addition, Duke Energy could add a flag to the application processing file to indicate if a project is retrofit or new construction to facilitate internal and external review of reasons projects are not making it to completion. This flag would allow for further analysis by Duke Energy or the evaluator of reasons projects did not complete by project type.

Conclusion 7: The current application processing overview provided to the evaluation team adequately documented the process from submittal of an application to technical review. However, the remainder of the process from any requests for information to the offer letter, and post installation review is not included.

Recommendation 7: Expand the application processing overview documentation to cover the entire review process from start to finish. Detailed steps can be documented separately and referenced in the overview document. The remainder of the process overview may be documented elsewhere, but one comprehensive document is advised to provide guidance when program staffing changes occur.

2. Program Description and Participation

2.1. Program Description

Duke Energy's Non-Residential Smart $aver® Custom Incentives program (NR Custom) offers financial assistance to qualifying commercial, industrial and institutional customers in the Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP) service territory to enhance their ability to adopt and install cost-effective electrical energy efficiency projects. Historically, DEC was a one-year opt-in period for the calendar year, and customers have a window to opt-in and opt-out. DEP customers could opt-in at any time. When customers received an incentive, they were considered opted in for three years.

The Program is designed to meet the needs of Duke Energy's (the company's) non-residential customers with electrical energy saving projects involving more complicated or alternative technologies, or those measures not covered by the non-residential Smart $aver Prescriptive Program. The intent of the Program is to encourage the implementation of energy efficiency projects that would not otherwise be completed without the company's technical or financial assistance. The program requires pre-approval prior to the project implementation. Proposed energy efficiency measures may be eligible for customer incentives if they clearly reduce electrical consumption and/or demand. As part of the preapproval process, the Duke Energy team conducts thorough reviews of applications, rejecting applications that do not meet the program requirements.

The two approaches for applying for incentives for this program are Classic Custom and Custom-to-Go. The difference between the two approaches focuses on the method by which energy savings are calculated. The documents required as part of the application process vary slightly.

The custom applications forms are located on the company's website under the Smart $aver® Incentives (Business and Large Business tabs). The application forms are offered in Microsoft Word (doc) and Adobe (pdf) format with the designated worksheet in Microsoft Excel format for projects saving more than 700,000 kWh annually. Customers can utilize provided calculation tools (Custom-to-Go, now Smart $aver Tools) for projects savings less than 700,000 kWh annually or submit worksheets in another format if preferred. Customers or their vendors submit the forms with supporting documentation. Forms are designed for multiple projects and multiple locations. Custom incentive application (doc or pdf) is submitted with one or more of the following worksheets:

Classic Custom approach (>700,000 kWh or no applicable Custom-to-Go calculator)

- Lighting worksheet (Excel)
- Variable Speed Drive (VFD) worksheet (Excel)
- Compressed Air worksheet (Excel)
- Energy Management System (EMS) worksheet (Excel)
- General worksheet (Excel), to be used for projects not addressed by or not easily submitted using one of the other worksheets

Custom-to-Go Calculators, now Smart $aver Tools (<700,000 kWh and applicable Custom-to-Go calculator)

- Lighting
- HVAC
- Compressed Air
- Fan
- Pump

The Company contracts with Alternative Energy Systems Consulting (AESC) to perform the technical review of applications. Duke Energy contractors process applications as well as train and provide technical support to the Trade Ally (TA) network. All other analysis is performed internally at Duke Energy, including DSMore runs for every custom measure that is recorded by the program to ensure the project's cost effectiveness prior to implementation.

2.2. Participation Review

A key step in the evaluation activities included reviewing the program tracking data to ensure the necessary information to track the program and conduct evaluation activities was available. Duke Energy program staff use the tracking data to document customers who participated in the program, the details of the equipment being installed, and the project's savings. Once the application is received, this information is passed to AESC, the technical review vendor. AESC verifies the accuracy of the savings calculations and provides Duke Energy with verification in a systematic format. Duke Energy engineers also review the application information to verify savings calculations.

The evaluation team utilized this same data to select samples for impact and process evaluation activities and to analyze the types of projects in the population and identify changes that may be forming trends. For the purposes of this report a project is defined as all measures of a similar type (lighting or non-lighting) installed at a single location and associated with a unique enrollment ID.

Two themes heard during interviews with Duke Energy staff were 1) overall participation was declining, and 2) NCEEDA participation was increasing. Data supporting these themes as well as an analysis of the projects in the Classic and Custom-to-Go approaches are presented in the following sections for both DEC and DEP.

2.2.1. Participation Summary- DEC

DEC program tracking data for both retrofit projects and new construction projects between 2016 and 2021 is presented in Table 2-1.

Table 2-1 DEC NR Custom Historical Program Participation Summary

Year	Retrofit Projects		New Construction Projects		Total Annual Projects	Annual Change
	Annual Count	Annual Percent	Annual Count	Annual Percent		
2016	186	100%	0	0%	186	
2017	147	99%	1	1%	148	-20%
2018	265	95%	13	5%	278	88%
2019	227	90%	24	10%	251	-10%
2020	115	76%	36	24%	151	-40%
2021	127	64%	70	36%	197	30%

The total DEC 2020-2021 population of 348 projects represent 66% of the 529 projects completed during the 2018-2019 NR Custom program years. Although, the 2020-2021 population was comparable with the number of projects completed in 2016-2017 program years. The annual change in participation from 2017 to 2018 increased 88%. Whereas participation slightly decreased by 10% in 2019 and decreased another 40% in 2020. The COVID-19 pandemic and supply chain disruptions are factors that likely contributed to these recent decreases, and the program participation noticed recovery from 2020 to 2021 with a 30% increase in annual participation.

Another trend observed is the increase in the proportion of new construction projects after 2019; with 24% in 2020 and 36% in 2021. It should be noted the increase in the proportion of new construction projects and the increase in the portion of savings from these projects is not only due to an increase in the number from these projects but also because the number of projects from retrofit projects is not increasing as fast.

Table 2-2 summarizes program participation and reported energy savings for the evaluation period of January 2020 through December 2021. There was a total of 348 projects completed during the evaluation period. These 348 projects collectively accounted for a total of 558 unique database line items. Database line items typically represent single-measure projects, or an individual measure implemented as part of a multi-measure project.

Table 2-2 DEC NR Custom Program Participation and Reported Energy Summary

Category & Strata		Database Line Items		Projects		Reported Energy (kWh) Savings	
		Custom-To-Go	Classic	Custom-To-Go	Classic	Custom-To-Go	Classic
Lighting	Small (<195 MWh)	47	321	31	167	1,993,561	6,966,545
	Large (≥195 MWh)	14	32	6	7	2,583,872	7,174,484
Non-lighting	Small (<328 MWh)	11	89	11	85	1,584,769	13,000,293
	Large (≥328 MWh)	-	44	0	41	-	24,751,467
Total		**72**	**486**	**48**	**300**	**6,162,202**	**51,892,789**
Grand Total		**558**		**348**		**58,054,991**	

Table 2-3 outlines the reported peak summer and winter demand (kW) for the evaluation period.

Table 2-3 DEC NR Custom Program Reported Peak Demand Savings Summary

Category & Strata		Project		Reported Peak Summer Demand (kW) Savings		Reported Peak Winter Demand (kW) Savings	
		Custom-To-Go	Classic	Custom-To-Go	Classic	Custom-To-Go	Classic
Lighting	Small (<195 MWh)	31	167	482	1,980	332	76
	Large (≥195 MWh)	6	7	584	867	499	798
Non-lighting	Small (<328 MWh)	11	85	132	3,387	108	1,983
	Large (≥328 MWh)	0	41	-	5,228	-	3,679
Total		**48**	**300**	**1,198**	**11,461**	**938**	**6,536**
Grand Total		**348**		**12,659**		**7,475**	

Figure 2-1, Figure 2-2, and Figure 2-3 summarize the distribution of reported energy (kWh) and peak demand (kW) savings at the program level by technology category. There has been a significant increase in the portion of savings from the Whole Building category. For example, in 2018-19 the Whole Building was 6.9% of the total energy savings whereas in 2020-21 it was 60% as shown in Figure 2-1. This is due to the participation dynamics described above.

Figure 2-1 Distribution of Reported Energy Savings from DEC NR Custom Program Projects by Technology

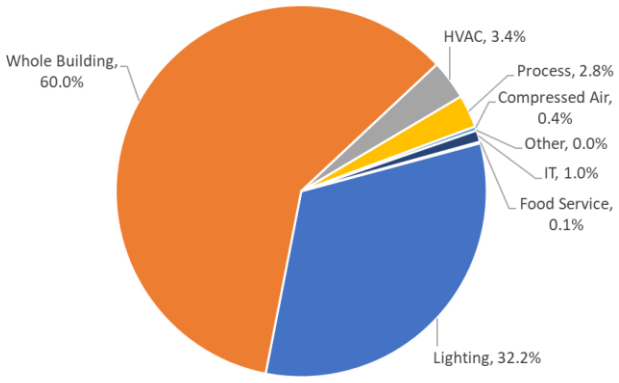


Figure 2-2 Distribution of Reported Summer Peak Demand Savings from DEC NR Custom Projects by Technology

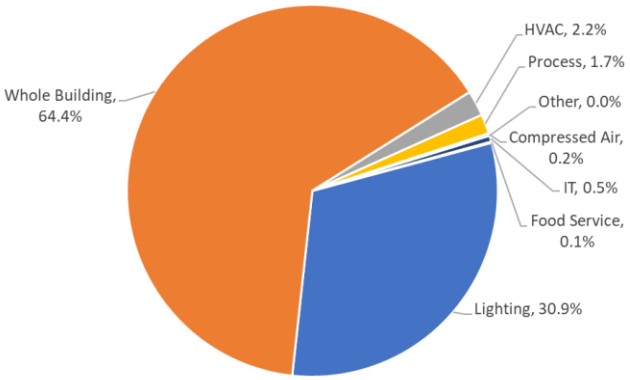
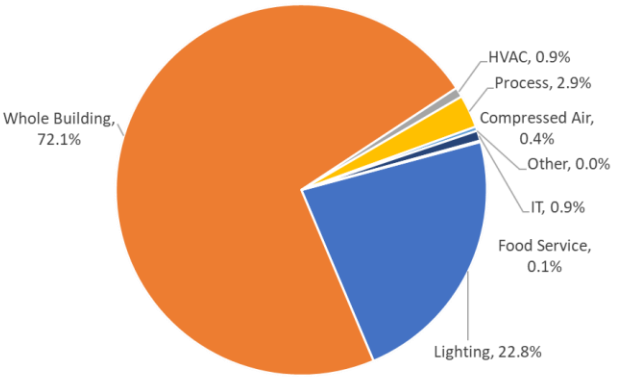


Figure 2-3 Distribution of Reported Winter Peak Demand Savings (kW) from DEC NR Custom Projects by Technology



2.2.2. Participation Summary- DEP

DEP program tracking data for both retrofit projects and new construction projects between 2016 and 2021 is presented in Table 2-4.

Table 2-4 DEP NR Custom Historical Program Participation Summary

Year	Retrofit Projects		New Construction Projects		Total Annual Projects	Annual Change
	Annual Count	Annual Percent	Annual Count	Annual Count		
2016	48	100%	0	0%	48	
2017	67	97%	2	3%	69	44%
2018	179	98%	4	2%	183	165%
2019	90	83%	19	17%	109	-40%
2020	92	72%	36	28%	128	17%
2021	101	76%	32	24%	133	4%

The total DEP 2020-2021 population of 261 projects represents 89% of the 292 projects completed during the 2018-2019 NR Custom program years. The annual change in participation from 2018 to 2019 decreased 40%, but participation increased by 17% in 2020, and another 4% in 2021.

The proportion of new construction projects after 2019 increased from 17% to 28% in 2020 and then 24% in 2021. This represents a smaller increase in the proportion of DEP new construction projects than in DEC but, like DEC, the proportion of energy savings from new construction projects has increased significantly since 2019.

Table 2-5 summarizes program participation and reported energy savings for the evaluation period of January 2020 through December 2021. There was a total of 261 projects completed during the evaluation period. These 261 projects collectively accounted for a total of 403 unique database line items. Database line items typically represent single-measure projects or an individual measure implemented as part of a multi-measure project.

Table 2-5 DEP NR Custom Program Participation and Reported Energy Summary

Category & Strata		Database Line Items		Projects		Reported Energy (kWh) Savings	
		Custom-To-Go	Classic	Custom-To-Go	Classic	Custom-To-Go	Classic
Lighting	Small (<44 MWh)	11	244	6	147	175,534	3,536,314
	Large (≥44 MWh)	15	36	8	17	1,340,060	1,115,177
Non-lighting	Small (<301 MWh)	11	51	11	47	1,515,264	6,064,471
	Large (≥301 MWh)	1	34	1	24	340,705	13,549,731
Total		**38**	**365**	**26**	**235**	**3,371,563**	**24,265,692**
Grand Total		**403**		**261**		**27,637,255**	

Table 2-6 outlines the reported peak summer and winter demand (kW) for the evaluation period.

Table 2-6 DEP NR Custom Program Reported Peak Demand Savings Summary

Category & Strata		Project		Reported Peak Summer Demand (kW) Savings		Reported Peak Winter Demand (kW) Savings	
		Custom-To-Go	Classic	Custom-To-Go	Classic	Custom-To-Go	Classic
Lighting	Small (<44 MWh)	6	147	18	710	11	155
	Large (≥44 MWh)	8	17	171	177	148	50
Non-lighting	Small (<301 MWh)	11	47	77	1,954	80	600
	Large (≥301 MWh)	1	24	12	3,539	4	5,092
Total		**26**	**235**	**277**	**6,379**	**243**	**5,898**
Grand Total		**261**		**6,656**		**6,141**	

Figure 2-4, Figure 2-5, and Figure 2-6 summarize the distribution of reported energy (kWh) and peak demand (kW) savings at the program level by technology category. There has been a significant increase in the portion of savings from the Whole Building category. For example, in 2018-19 the Whole Building was 20.6% of the total energy savings whereas in 2020-21 it was 70.9% as shown in Figure 2-4. This is due to the average size of the new construction project increasing and the average size of retrofit projects decreasing. The average energy savings of new construction projects was 240,002 kWh/project in the 2018-2019 population and 288,236 kWh/project in the 2020-2021 population. The average energy savings of retrofit projects was 78,989 kWh/project in the 2018-2019 population and 41,643 kWh/project in the 2020-2021 population.

Figure 2-4 Distribution of Reported Energy Savings from DEP NR Custom Program Projects by Technology

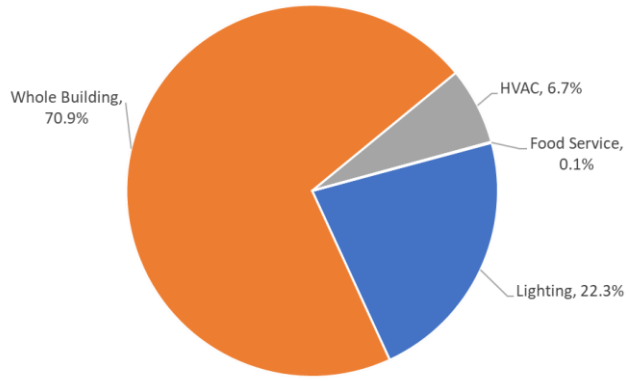


Figure 2-5 Distribution of Reported Summer Peak Demand Savings from DEP NR Custom Projects by Technology

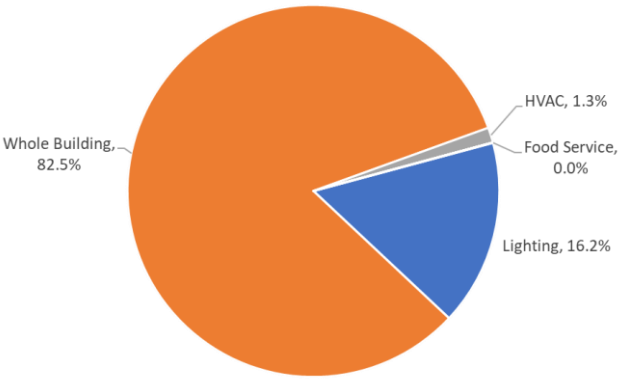
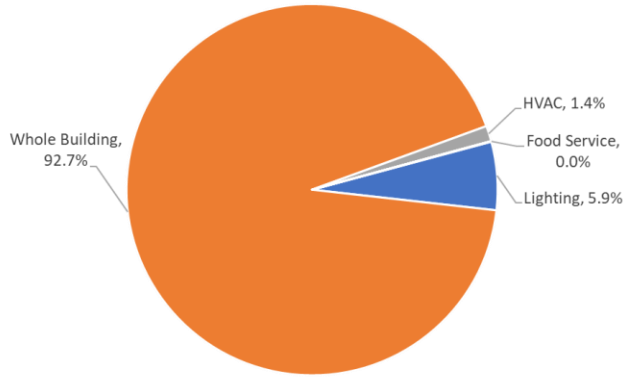


Figure 2-6 Distribution of Reported Winter Peak Demand Savings (kW) from DEP NR Custom Projects by Technology



3. Key Research Objectives

3.1. Gross Impact

The impact evaluation processes followed standard industry protocols and definitions, where applicable, and include the Department of Energy Uniform Methods Protocol, as an example. The overarching goals for the NR Custom impact evaluation were to:

- Quantify accurate and supportable energy impacts (kWh) and summer and winter demand (kW) savings for energy efficient measures and equipment implemented in participants' facilities.
- Assess the rate of free riders from the customer and contractor perspective.
- Determine spillover effects from the customer and contractor perspective.
- Consider and verify measure installation vintage aligned with measure baseline definitions, i.e. early replacement, burnout on failure, etc.

3.2. Net Impact

The goal of the net impact evaluation was to estimate the overall energy impacts that are attributable to the program. This estimate comprises two components: free-ridership and spillover.

Free-ridership estimates what proportion of the program's savings would have happened in the absence of the program. Free-ridership considers the customers' plans before engaging in the program and the various influences the program can have on the customer, such as incentives, the application process, and other interactions with the program staff, contractors, and marketing materials.

Spillover estimates additional energy savings for efficiency projects completed without receiving a program incentive but were influenced by the program in some other way. Spillover was captured from participants (participant spillover) and contractors (for nonparticipant spillover).

Net program results are calculated through a net-to-gross ratio, as shown in Equation 1.

Equation 1 Net Program Savings

$$\text{Net Program Savings} = \text{Net-to-gross (\%)} \times \text{Gross Verified Savings}$$

The DOE's Uniform Methods Project for Determining Energy Efficiency Program Savings can be found at http://www1.eere.energy.gov/office_eere/de_ump.html.

3.3. Process

The evaluation team collected data from a variety of sources to address the researchable questions identified at the beginning of the study. Table 3-1 contains the list of research objectives and the data sources used to investigate each one.

Table 3-1 Process Evaluation Research Questions and Activities

Preliminary Research Questions	Document Review	Interviews with Key Contacts	Participant Survey	Trade Ally Survey
How is the program promoted? What role do Duke Energy account representatives (i.e., account executives, business energy advisors, energy efficiency engineers and trade ally outreach representatives) play in helping customers identify and complete projects? Are contractors or vendors identifying potential projects?	✓	✓	✓	✓
Understand participant experience. What steps are involved in identifying and scoping projects and obtaining pre-approval? What issues emerge during the process? How are these addressed		✓	✓	✓
Why do potential projects drop out? Are there opportunities to make the process simpler or more streamlined while maintaining robust quality control (QC)?		✓		✓
Is the uptake of custom vs. custom-to-go projects as expected? How do the projects and/or the customer experience differ between the two participation paths?	✓	✓	✓	✓
What is the customer's decision-making process regarding energy efficiency upgrades or equipment? How influential were various aspects of the program in their decision? How influential was the contractor they worked with?	✓		✓	✓
What impact has the pandemic had on their business and the decision to install energy efficient equipment? Did they receive any other funding (manufacturer, federal pandemic assistance, etc)? How did changes in their process, schedules, etc, affect their ability to move forward with a project? How did the supply chain impact the equipment you selected? How did the supply chain impact the equipment you recommend?			✓	✓

4. Impact Evaluation

4.1. Impact Methodology

The primary determinants of impact evaluation costs are the sample size and the level of rigor employed in collecting the data used in the impact analysis. The accuracy of the study findings is in turn dependent on these parameters. Techniques used to conduct the evaluation measurement and verification (EM&V) activities and to meet the goals for this evaluation include measure level data collection, utility billing analysis, telephone surveys, documentation review, best practice review, and interviews with implementation staff, trade allies, program participants, and general business customers.

The evaluation team's impact analysis focused on the energy and demand savings attributable to the NR Custom Program for the period of January 2020 through December 2021. A variety of techniques were used to develop independent assessments of gross and net energy savings for each sampled project. In order to estimate gross energy savings, all sampled custom projects received a desk review; project specific data collection, measurement and/or verification; and custom data analysis of savings. Data collection involved a combination of several activities, including: verifying equipment installation and operation; interviewing site contacts; and collecting building automation system/energy management system (BAS/EMS) data. The level of rigor conducted for the data analysis reflected the level of project documentation available prior to the evaluation (such as the data collected from existing metering and monitoring equipment), the uncertainty of the savings estimate, the magnitude of the project savings and the ability to collect additional data from the program participants. Figure 4-1 provides a high-level process flow diagram of all impact evaluation activities and brief summary of each step in the process is provided below.

Figure 4-1 Flow Diagram of Impact Evaluation Activities

The evaluation team verified energy and demand savings attributable to the program by conducting the following high-level impact evaluation activities:

Sample: Conduct review of NR Custom Program participant database and draw representative sample of projects.

Soft Recruit: Attempt to reach all sampled participants by phone or email, prior to conducting an in-depth review of project documentation or developing a site-specific measurement and verification plan (SSMVP), to inform participants of the ongoing evaluation and request permission to conduct data collection for the analysis of savings. Nothing would be formally scheduled during this call.

Document Review: Review all project documentation available for those sites successfully recruited.

Develop SSMVP: Develop a plan that provides a general overview of the implemented measures, reported benefits and costs, proposed level of rigor, measurement & verification (M&V) equipment, and key data to be gathered. The Duke Energy team reviews and approves all SSMVP. The purpose of the Duke Energy team reviews were to verify that all measures were included in the plan, reported energy and demand savings were accurate, and proposed M&V approaches were appropriate.

Data Collection: Verify equipment installation and operation; interview site contacts; and collect building automation system/energy management system (BAS/EMS) data.

Analysis: Estimate gross verified energy and demand savings for sampled measures and projects using data collected.

Measurement & Verification Report: Compare gross-verified energy and demand savings to program-reported values to determine project-level realization rates and summarize findings for each sampled site in the M&V report. The Duke Energy team reviews and approves all M&V reports. The purpose of the Duke Energy team reviews were to verify that all measures were included in the plan, reported energy and demand savings were accurate, and proposed M&V approaches were appropriate.

Gross Verified Savings: Summarize project-level results to stratum-level for determining program-level realization rates and verified gross energy and demand savings.

Net Verified Savings: Apply attribution survey data to estimate net-to-gross ratios and net-verified savings at the program level.

The following sections provide more details on the specific considerations made and methods used for the major evaluation activities.

4.1.1. Sampling

The gross and net verified savings estimates presented in this report were determined through the observation of key measure parameters among a sample of projects from the program population. A census evaluation would have involved surveying, measuring, or otherwise evaluating the entire population of projects. Although a census approach would eliminate any sampling uncertainty, when used effectively, the results from a sample of projects can be extrapolated to provide a reasonable and cost effective estimate of the population parameters.

The most important sampling objective was representativeness – that is projects selected in the evaluation sample were representative of the population and would produce unbiased estimates of population parameters. In order to obtain a representative sample the characteristics of the program population must be reviewed and understood. A participation database extract was requested and received that contained only projects with a Vendor Update Timestamp between January 2020 and December 2021. This database extract represented the program population for program years 2020 and 2021. The program participation database informed many of the evaluation activities including sample design, project-level savings review, and estimating program-level gross verified savings.

4.1.1.1. Stratification

The evaluation team used sample stratification with ratio estimation techniques for the NR Custom Program. Stratification is a departure from simple random sampling, where each sampling unit (customer/project/incentive/measure) has an identical likelihood of being selected in the sample. Stratified random sampling refers to the designation of two or more sub-groups (strata) from within a program population prior to the sample selection process.

The evaluation team felt that stratification was advantageous and utilized it in the sample design for a variety of reasons:

- Increased precision of the within-stratum variability was expected to be small compared to the variability of the population as a whole. Stratification in this case allows for increased precision and smaller total sample sizes.
- It enabled the evaluation team to ensure that a minimum number of units within a particular stratum were verified.
- Two different characteristics of a project were used to define which strata a project would be in, the type of measures implemented and the relative amount of reported energy savings.

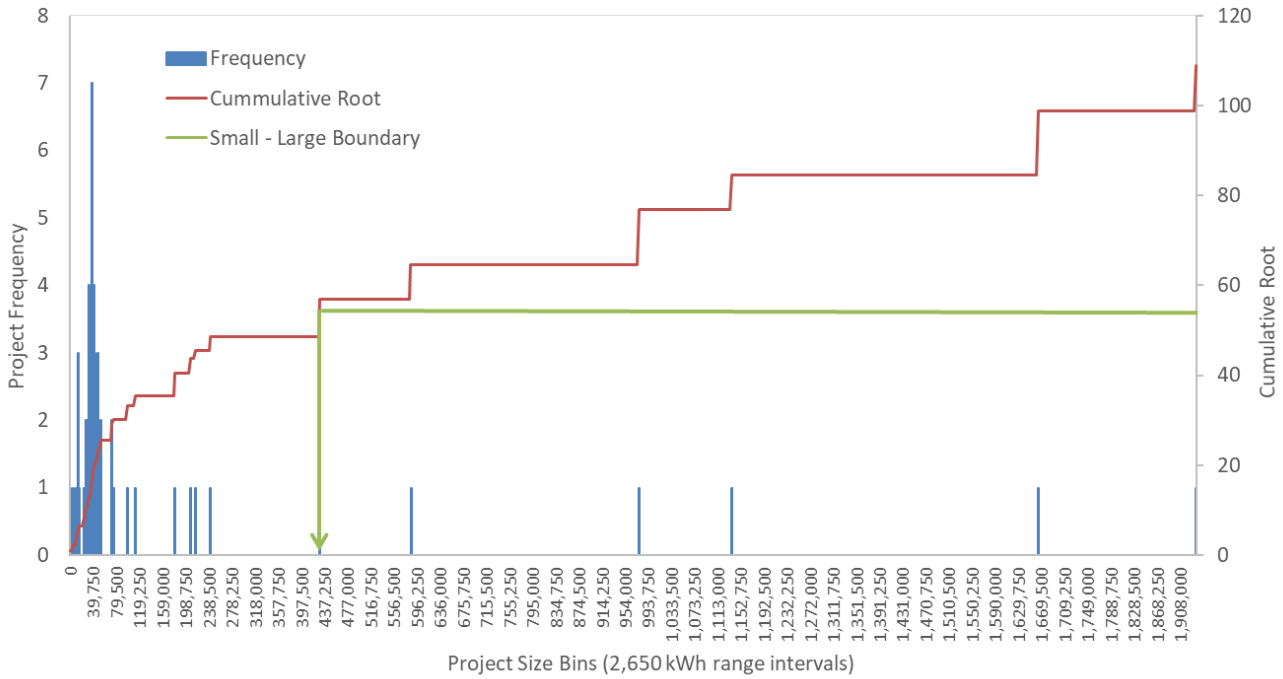
The evaluation team stratified the participant population by technology category (lighting vs. non-lighting) and relative amount of reported savings (kWh) to ensure the evaluated sample represented the population and in order to achieve higher statistical precision by reducing the variability within the sample. A project is defined as all lighting or non-lighting measures implemented during the evaluation period at a single address.

In order to then stratify by the amount of savings the evaluation team first defined a project as all like technology categories (lighting or non-lighting) implemented under a single application that were installed at the same address. The amount of reported savings for all measures in each project were then added together.

The Dalenius-Hodges method was used to define the optimal strata boundary between a "small" project and a "large" project. This method is the most common method of boundary determination for stratification by project size. An illustration of this method of presented in Figure 4-2Figure 4-2 for the DEI Lighting strata. The method uses the number of projects in specified project-size bins (frequency) along with the number of empty bins between each occupied bin (length) to assess the distribution of total strata savings. The cumulative square root of the product of the frequency and length is then used to determine the optimal strata boundaries.

For the NR Custom evaluation, two sub-strata (small and large) are needed so the mid-point of the cumulative indicated which project size (kWh) would define the boundary between a small project and a large lighting project.

Figure 4-2 Dalenius-Hodges Boundary Design for DEI 2020-2021 Lighting Projects



Using this method, the evaluation team determined a savings threshold of 195 MWh for DEC large lighting projects and 328 MWh for DEC large Non-Lighting projects. Savings threshold for DEP projects were determined to be 44 MWh for large lighting projects and 301 MWh for large Non-Lighting projects. All projects with savings less than these thresholds would be considered small projects.

4.1.1.2. Targeted Sample Size

With the population stratified, the impact samples were then drawn randomly from each stratum. The total number of sample projects drawn targeted a 90/10 confidence precision based on the total participation counts for the evaluation period and assuming an error ration (Cv) of 0.5. The distribution of the total sample across the four sub strata was determined using the number of projects in each stratum, the amount of savings in each stratum and the historical Cv values of the same strata from the 2018 - 2019 NC Custom evaluation. Our stratification approach and targeted sample sizes are summarized in Table 4-1 for DEC and in Table 4-2 for DEP.

Table 4-1 NR Custom DEC Stratified Sampling Plan - Targeted

Strata	Population	Pop Reported Savings (kWh)	Targeted Sample Size
L-Small (<195 MWh)	198	8,960,106	11
L-Large (≥195 MWh)	13	9,758,356	8
NL-Small (<328 MWh)	96	14,585,062	19
NL-Large (≥328 MWh)	41	24,751,467	18
Total	**348**	**58,054,991**	**57**

Table 4-2 NR Custom DEP Stratified Sampling Plan - Targeted

Strata	Population	Pop Reported Savings (kWh)	Targeted Sample Size
L-Small (<44 MWh)	153	3,711,848	9
L-Large (≥44 MWh)	25	2,455,237	5
NL-Small (<301 MWh)	58	7,579,735	22
NL-Large (≥301 MWh)	25	13,890,436	18
Total	**261**	**27,637,255**	**54**

4.1.2. Data Collection

Once a sample of projects was selected for each territory, the impact team requested detailed project documentation for each project and conducted a review of the information. This information was used to formulate any initial questions about the project that could be answered during the initial communications with the participants.

While reviewing project documentation, the evaluation team also verified whether parameters such as reported energy and demand savings, energy conservation measure (ECM) quantities, and measure descriptions matched those indicated in the tracking database. Any identified discrepancies between the two sources were then identified in the SSMVP and later resolved based on feedback provided by the Duke Energy program team.

As outlined in prior sections, the gross impact evaluation process began with a thorough review of project documentation. This information was provided upon formal request. Documents commonly provided by the program team include:

- Smart $aver Incentive Calculation workbooks
- DSMore Summary workbooks
- Custom Incentive Application Forms
- Contractor Proposals
- Detailed project narratives
- Product specifications and invoices
- Customer utility data (monthly billing history)
- Incentive payment request forms
- Email correspondence between members of the program management team and participants

Other documents commonly provided on lighting project include:

- Smart $aver Custom Incentive Program Lighting Calculators
- Specification sheets for retrofit lighting systems

Other documents commonly provided for non-lighting projects include:

- Customer submitted energy and demand savings calculations
- Detailed reports developed by third-party engineering consultants
- Building energy simulation model output files

After reviewing all program-supplied project documentation the evaluation team engineer assigned to each project then developed a SSMVP for each unique premise. These were developed in order to create a standardized, rigorous process for the verification of project claims. Each SSMVP was specifically tailored to verify the equipment that was installed and measures that were implemented per the provided project documentation. The SSMVP also identified baseline assumptions for verification with on-site personnel in order to validate ex-ante, forecasted savings estimates.

Each SSMVP also identified the specific parameters to be verified and gathered for each measure. These plans followed guidelines set forth in multiple Department of Energy Uniform Methods Project (DOE UMP) proto including:

- Chapter 2: Commercial and Industrial Lighting Evaluation Protocol

- Chapter 8: Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol
- Chapter 14: Chiller Evaluation Protocol
- Chapter 15: Commercial New Construction Evaluation Protocol
- Chapter 18: Variable Frequency Drive Evaluation Protocol
- Chapter 19: HVAC Controls (DDC/EMS/BAS) Evaluation Protocol
- Chapter 22: Compressed Air Evaluation Protocols

The plans also identified a preferred and one or two alternate analysis approaches (level of rigor) along with the critical data to be gathered for each. Table 4-3 provides a few examples of the data points typically gathered for several of the more commonly encountered ECMs.

Table 4-3 Key Data Points Gathered for Commonly Encountered ECMs

Measure Name	Baseline or Retrofit
Interior Lighting Retrofits	Quantity of existing fixtures Fixture type of existing fixtures Quantity of retrofit fixtures Fixture type of retrofit fixtures Existing fixture controls, if any New fixture controls, if any Typical schedule and hours of operation Space set point temperature Type of heating and cooling equipment/specifications
HVAC Control/EMS	Determine baseline setpoints and schedules through customer interviews Determine post-retrofit setpoints and schedules through central BAS Obtain any available trend data Verify occupancy and equipment schedules Gather nameplate information from primary heating and cooling systems
Variable Speed Drive on Pump	Determine baseline method of pump control Determine conditions that dictate the speed of the VSD Determine whether loads modulate or are fairly constant If loads modulate, determine load profile (% load bins) Nameplate information from pump Nameplate information from VSD Gather any available trend data Perform spot power measurements (kW) of pump while running under normal operating conditions
VSD Air Compressor	Determine baseline method of control Gather information on baseline air compressor system (kW/CFM, hp, CFM output, system type, etc.) Determine how loads vary daily, weekly, seasonally, annually for VSD compressor Nameplate information from new air compressor Gather any operational parameters displayed on control panels Gather any available trend data from central controls system Determine whether compressor serves central plant with multiple compressors or is stand-alone. If part of multi-compressor plant determine role and sequences of operation (primary, secondary, trim, etc.)

Once completed, each SSMVP was then submitted to the Duke Energy EM&V Team for review and approval. Upon approval from Duke Energy data collection activities were then scheduled with the participant. Engineers verified that measures were appropriately implemented in accordance with the SSMVP developed for the site. Engineers would request copies of equipment specifications and sequences of operation, as appropriate. Any available historic trend data (when available) was also obtained from existing HVAC control and central plant sequencing control systems.

4.1.3. Project Level Analyses

A variety of analysis approaches were utilized for the impact evaluation. The approach applied was decided based upon the methods used by the participant, trade ally, or program in generating the ex-ante savings estimates, the availability of information, and the extent of interactive effects. An overview of each analysis approach applied is provided in Sections 4.1.3.1 through 4.1.3.3.

4.1.3.1. Basic Rigor: Simple Engineer Model (SEM) with On-site Measurement

Consistent with IPMVP Option A (Partially Measured Retrofit Isolation), this approach was used for the majority of lighting, custom process, and compressed air measures. This method uses engineering calculations, along with site measurements of a limited number of important parameters, to verify the savings resulting from specific measures. This was the most prevalent level of rigor applied for this evaluation.

4.1.3.2. Basic Rigor: Simple Engineer Model (SEM) with Verification Only

This approach is very similar to SEM with On-site Measurement, but without direct measurement of key parameters. This approach is generally applied to measures that are not conducive to direct measurement such as outdoor lighting or building envelope improvements but during this evaluation the restrictions on travel and health guidelines associated with the Covid-19 pandemic limited the evaluation team's ability to conduct many on-site activities. To adapt to these limitations the evaluation team used virtual site visit technology to allow engineers to directly observe the ECMs while being virtually escorted through the facilities by a site contact.

4.1.3.3. Enhanced Rigor: Billing Analysis

Consistent with IPMVP Option C (Whole Building), this approach was used for projects involving multiple HVAC control measures with interactive effects, when final ex ante building simulation models could not be obtained from the trade ally. It was also used for large industrial custom process measures involving equipment that could not be de-energized to accommodate installation of data logging equipment. This approach was only applied on projects where the reported gross energy savings exceeded 10% of annual energy consumption. This approach entailed a pre- and post-retrofit comparison of weather-normalized whole facility energy consumption. This approach adhered to guidelines set forth in the Department of Energy Uniform Methods Project Protocols for HVAC Controls (Chapter 19) and Whole-Building Retrofit with Consumption Data Analysis Evaluation Protocol (Chapter 8).

4.1.3.4. Enhanced Rigor: Whole Building Simulation

Consistent with IPMVP Option D (Calibrated Simulation), this analysis approach was used and is dependent on the evaluation team being able to obtain a complete set of the electronic files for the building energy simulation model developed by the Willdan Group, Inc. to estimate ex-ante energy savings and verification of the as-built conditions.

The evaluation process entailed reviewing the inputs of the model(s) to verify baseline and post-installation conditions are specified correctly and modeled consumption was within ASHRAE criteria. The evaluation team leveraged any available post trend data from the building control system (BAS) or utility consumption data to inform and verify the calibration of the model. Resource Innovations adhered to guidelines set forth in the Department of Energy Uniform Methods Project Protocols for Commercial New Construction (Chapter 15) when conducting this analysis.

4.1.3.5. Peak Period Definition

Demand savings were evaluated based on the definition of the peak period provided by Duke Energy, as summarized Table 4-4.

Table 4-4 Definition of Peak Demand Periods

	Summer	Winter
Month	July	January
Hour	4pm-5pm	7am-8am

4.1.3.6. Interactive Effects

How energy-efficiency projects change the energy use of other equipment, not associated directly with the projects themselves, should be a consideration in estimating the energy efficiency program benefits. These interactive energy changes can be challenging to quantify but should be accounted for whenever possible.

Interactive energy changes come in a number of forms and affect different fuel types. A measure that directly saves electricity may cause another building system to consume less energy. Alternatively, a measure that directly saves electricity could cause another building system to consume more energy. Sometimes, a single project can have both positive and negative interactive effects on other systems. For example, upgrading to energy efficient lighting reduces the electricity that a participant uses on lighting; the associated reduction in waste heat reduces the burden on the cooling system in the summer – but increases the burden on the heating system in the winter.

The net change in energy use for a building should be quantified and attributed to the project as an increase or decrease in savings. Calculating this net change for lighting projects depends on the several factors which include:

- the type and efficiency of heating and cooling equipment,
- the number of hours the lights operate
- the physical configuration of fixtures being replaced and installed, and
- the wattages of the fixture being replaced and installed

To calculate the net interactive savings the evaluation team used a method consistent with the algorithms outlined in Chapter 2 of the Uniform Methods Project (Commercial and Industrial Lighting Evaluation Protocol). This method defines interactive cooling and heating energy savings for interior lighting and is detailed in Equation 2.

Equation 2 Interactive Cooling Energy Savings for Interior Lighting

$$Interactive\ kWh\ Savings_{Cooling} = kWh_{Lighting\ Savings} \times IF_{kWh,Cooling}$$

Where:

kWh Lighting Savings = *savings associated with the lighting measure*

IF kWh, Cooling = *Interactive cooling factor*

The interactive cooling factor is the ratio of cooling energy reduction per unit of lighting energy reduction. This is a dimensionless ratio calculated using Equation 3.

Equation 3 Interactive Cooling Factor

$$IF_{kWh,Cooling} = \frac{(SHG_{base} - SHG_{efficient})}{1000 \times EER}$$

Where:

SHG base = *sensible heat gain associated with the operation of the base lighting equipment during the cooling season*

SHG efficient = *sensible heat gain associated with the operation of the efficient lighting equipment during the cooling season*

EER = *Energy Efficiency Ratio of the facilities HVAC equipment*

The sensible heat gain represents the thermal energy added to the conditioned space by the lights. It is calculated using parameters that are specific to the lighting load, hours of use, and the fixture's space fraction. The space fraction accounts for how much of thermal energy from the lamp enters the conditioned space.

Equations to calculate the interactive heating penalty, the additional heating required due to more efficient lighting, are very similar to Equation 2 and Equation 3. Instead of the EER value a Coefficient of Performance (COP) is used.

4.1.4. Measurement & Verification Reports

Once a savings analysis was complete all findings from on-site verification and each project-level savings analysis was summarized in a standalone Measurement and Verification Report. Each report contained the full contents of the original SSMVP as well as a section summarizing the data collection activities, the chosen approach for quantifying energy savings, the verified energy and demand savings, and commentary on reasons for differences between the reported and verified savings values. Each individual M&V Report was then submitted to the Duke Energy EM&V Team for review, comment, and approval. The 44 individual M&V Reports developed as part of this evaluation were provided under separate cover.

4.1.5. Program Level Gross Verified Estimation

The evaluation team used a ratio estimation technique for this evaluation. This technique assumes that the ratio of the sum of the verified savings estimates to the sum of the reported savings estimates within the sample is representative of the program as a whole. This ratio is referred to as the realization rate and is calculated using Equation 4.

Equation 4 Realization Rate

$$Realization\ Rate = \frac{\sum_i^n Verified\ Savings}{\sum_i^n Reported\ Savings}$$

Where n is the number of projects in the evaluation sample. The realization rate is then applied to the claimed savings of each project in the population to calculate gross verified savings.

4.1.5.1. Presentation of Uncertainty

There is an inherent risk, or uncertainty, that accompanies sampling, because the projects selected in the evaluation sample may not be representative of the program population as a whole with respect to the parameters of interest. As the proportion of projects in the program population that are sampled increases, the amount of sampling uncertainty in the findings decreases. The amount of variability in the sample also affects the amount of uncertainty introduced by sampling. A small sample drawn from a homogeneous population will provide a more reliable estimate of the true

population characteristics than a small sample drawn from a heterogeneous population. Variability is expressed using an error ratio for programs that use ratio estimation.

When ratio estimation is utilized, standard deviations will vary for each project in the population. The error ratio is an expression of this variability and is analogous to the coefficient of variation, Cv, for simple random sampling.

Equation 5 provides the formula for estimating error ratio.

Equation 5 Error Ratio

$$Error\ Ratio = \frac{\sum_{i=1}^{N} \sigma_i}{\sum_{i=1}^{N} \mu_i}$$

Equation 6 shows the formula used to calculate the required sample size for each evaluation sample, based on the desired level of confidence and precision. Notice that the Error Ratio term is in the numerator, so required sample size will increase as the level of variability increases.

Equation 6 Required Sample Size

$$n_0 = \left(\frac{z * Error\ Ratio}{P}\right)^2$$

Where:

n_0 = *Required sample size before adjusting for a finite population*

z = *Constant based on the desired level of confidence (equal to 1.645 for 90% confidence two-tailed test)*

P = *Desired relative precision*

The sample size formula shown in Equation 6 assumes that the population of the program is infinite and that the sample being drawn is reasonably large. In practice, this assumption is not always met. For sampling purposes, any population greater than approximately 7,000 may be considered infinite for the purposes of sampling. For smaller, or finite, populations, (such as the Duke Energy Indiana NR Custom participant population) a finite population correction is warranted. This adjustment accounts for the extra precision that is gained when the sampled projects make up more than about 5% of the program savings. Equation 7 calculates the required sample size for a finite population.

Equation 7 Finite Population Correction

$$n^* = \frac{N * n_0}{N + n_0}$$

Where:

n^* = *Required sample size for a finite population*

N = *Size of the population*

n_0 = *Required sample size before adjusting for a finite population*

Verified savings estimates always represent the point estimate of total savings, or the midpoint of the confidence interval around the verified savings estimate for the program. Equation 8 shows the formula used to calculate the margin of error for a parameter estimate.

Equation 8 Error Bound of the Savings Estimate

$$Error\ Bound = SE * z$$

Where:

SE = *The standard error of the population parameter of interest (proportion of realization rate, total energy savings, etc.) This formula will differ according to the sampling technique utilized.*

z = *Constant based on the desired level of confidence (equal to 1.645 for 90% confidence two-tailed test)*

The 90% confidence level is a widely accepted industry standard for reporting uncertainty in evaluation findings. The confidence levels and precision values presented in this report are at the 90% confidence level. The z statistic constant associated with 90% confidence is 1.645.

When evaluators or regulators use the term “90/10”, the 10 refers to the relative precision of the estimate. The formula for relative precision shown in Equation 9 and is how actual strata and program level relative precision achieved is calculated.

Equation 9 Relative Precision of the Savings Estimate

$$Relative\ Precision_{Verified\ Savings} = \frac{Error\ Bound_{(kWh\ or\ kW)}}{Verified\ Impact_{(kWh\ or\ kW)}}$$

4.2. Impact Evaluation Analysis and Findings - DEC

4.2.1. DEC Achieved Sample Size

As mentioned in Section 4.1.1.2, the initial impact sample sizes targeted a 90/10 confidence precision based on the project counts assuming a Coefficient of Variation (Cv) of 0.5 and the distribution of the total sample across the four sub strata was determined using the number of projects in each strata, the amount of savings in each strata and the historical Cv values of the same strata from the 2018 - 2019 NR Custom evaluation. Due to challenges with site visits scheduling, incomplete utility data, and model issues, the evaluation team was only able to complete analyses on 16 of the 19 NL-Small sample projects and 14 of the 18 NL-Large sample projects. Our achieved sample sizes are summarized in Table 4-5.

Table 4-5 DEC NR Custom Stratified Sampling - Achieved

Strata	Population	Targeted Sample Size	Achieved Sample Size
L-Small (<195 MWh)	198	11	11
L-Large (≥195 MWh)	13	8	8
NL-Small (<328 MWh)	96	19	16
NL-Large (≥328 MWh)	41	18	14
Total	**348**	**57**	**49**

The evaluation team was able to achieve stratum-level sample targets for both the L-Small and L-Large strata. The targeted sample size for the non-lighting strata were not achieved due to participants not responding or not being willing to be included in the evaluation. As will be shown in the next section, the evaluation sample was still able to achieve the targeted 10% precision at the 90% confidence level since the Cv of the evaluated projects was lower than the Cv values used to determine the target sample size.

4.2.2. DEC Gross Verified Impacts

Table 4-6, Table 4-7 and Table 4-8 summarize gross impact results for energy (kWh), summer peak demand (kW), and winter peak demand (kW). Detailed results for each sampled project are provided in the standalone M&V Reports.

Table 4-6 DEC Gross Verified Energy Savings (kWh) by Stratum

Stratum	Gross Reported Energy Savings (kWh)	Gross Verified Energy Savings (kWh)	Realization Rate (%)	Relative Precision @ 90% Confidence
L-Small (<195 MWh)	8,960,106	9,055,976	101.07%	6.5%
L-Large (≥195 MWh)	9,758,356	9,559,722	97.96%	1.7%
NL-Small (<328 MWh)	14,585,062	14,685,200	100.69%	6.4%
NL-Large (≥328 MWh)	24,751,467	26,273,632	106.15%	9.1%
Program Total	**58,054,991**	**59,574,530**	**102.12%**	**4.9%**

Table 4-7 DEC Gross Verified Summer Peak Demand Savings (kW) by Stratum

Stratum	Gross Reported Summer Demand Savings (kW)	Gross Verified Summer Demand Savings (kW)	Realization Rate (%)	Relative Precision @ 90% Confidence
L-Small (<195 MWh)	2,461	1,421	57.72%	51.4%
L-Large (≥195 MWh)	1,451	1,245	85.82%	13.0%
NL-Small (<328 MWh)	3,519	3,450	98.03%	7.0%
NL-Large (≥328 MWh)	5,228	5,755	110.09%	6.3%
Program Total	**12,659**	**11,871**	**99.96%**	**6.1%**

Table 4-8 DEC Gross Verified Winter Peak Demand Savings (kW) by Stratum

Stratum	Gross Reported Winter Demand Savings (kW)	Gross Verified Winter Demand Savings (kW)	Realization Rate (%)	Relative Precision @ 90% Confidence
L-Small (<195 MWh)	408	414	101.65%	46.8%
L-Large (≥195 MWh)	1,297	1,260	97.15%	11.4%
NL-Small (<328 MWh)	2,091	2,218	106.08%	5.3%
NL-Large (≥328 MWh)	3,679	3,750	101.92%	12.9%
Program Total	**7,475**	**7,642**	**101.06%**	**8.8%**

The program was able to achieve realization rates greater than 100% for energy and winter peak demand, whereas for summer peak demand, the realization rate was 99.96% due to various factors depending on the type of measures. These factors are described below for each of the strata.

4.2.2.1. DEC Small Lighting Projects

Eleven Lighting-Small projects were evaluated from the 2020-2021 DEC NR Custom population. These projects achieved 101.07% verified energy savings, 57.72% verified summer peak demand savings and 101.65% verified winter peak demand savings. The overall low summer peak demand realization rate was affected by three projects involving exterior lighting controlled by the day-light sensors that turned the lights on after the peak hour, and one project that was found to have no operational hours during summer months. In all four of these cases the reported summer peak demand savings were overestimated. These findings during ex-post analysis resulted in lower verified savings for the Lighting-Small stratum. The factors that caused variation in the energy realization rates include differences between the reported hours of use (HOU) and the verified HOU; and the inclusion of interactive effects.

Lighting-Small projects included verified HOU that were both higher and lower than reported HOU. Overall, the differences between verified and reported HOU resulted in a decrease in verified savings. Interactive effects consistently increase verified savings but only occur in indoor, conditioned spaces.

4.2.2.2. DEC Large Lighting Projects

Eight Lighting-Large projects were evaluated from the 2020-2021 DEC NR Custom population. The Lighting-Large sample projects achieved 97.96% verified energy savings, 85.82% verified summer peak demand savings and 97.15% verified winter peak demand savings. Like the Lighting-Small stratum, the inclusion of interactive effects into the verified savings was the main contributing factor to the higher verified savings in two of the eight projects.

One Lighting-Large project that caused the largest variation in the overall energy realization rate used incorrect fixture wattages for the reported savings calculations. Some differences between the reported hours of use (HOU) and the HOU verified with the participants were found that led to an overall reduced energy realization rate.

4.2.2.3. DEC Small Non-lighting Projects

Sixteen Non-lighting-Small projects were evaluated from the 2020-2021 DEC NR Custom population. The Non-lighting-Small sample projects achieved 100.69% verified energy savings, 98.03% verified summer peak demand savings and 106.08% verified winter peak demand savings.

Of the sixteen evaluated projects, ten were new construction projects. Eight out of ten projects required their model to be calibrated to actual consumption data which resulted in the differences between reported and verified savings. The evaluation team had the benefit of having more than twelve months of post construction consumption data and was able to calibrate the models and adjust the savings accordingly. One new construction project in this stratum reported incorrect

demand savings calculations that led to a low project-level summer peak realization rate of 44%. For two school projects, ex-ante models assumed no summer operation that caused variations in energy and summer peak demand savings.

The Non-lighting-Small sample included six projects that were not new construction projects. These included three food service, two HVAC, and one compressed air project that achieved a combined realization rate of 96%. One of the three food service project had lower realization rate due to variation in the equipment specs and temperature setpoint settings.

4.2.2.4. DEC Large Non-lighting Projects

Fourteen Non-lighting-Large projects were evaluated from the 2020-2021 DEC NR Custom population. The Non-lighting-Large sample projects achieved 106.15% verified energy savings, 110.09% verified summer peak demand savings and 101.92% verified winter peak demand savings.

All the sampled projects were new construction projects and, like the Non-lighting-Small strata, all projects except one required their models to be calibrated. Most of the adjustments made to the models were to occupancy and operational schedules, not to the equipment specifications. The energy realization rate ranged between 59% and 174% for these fourteen new construction projects. One new construction project reported incorrect demand savings calculations that led to a low project-level winter peak realization rate of 47%. For multiple school projects, ex-ante models assumed no summer operation that caused variations in energy and summer peak demand savings. Three projects noted increased hours of use compared to the ex-ante consideration.

Table 4-9 presents a summary of the contributing factors to the low realization rates, the individual project realization rates and the portion of the total reported savings of the sampled projects.

Table 4-9 Summary of Significant Contributions to Strata Realization Rates

Strata	Project Type	Contributing Factor(s)	Project Realization Rate	Percent of Sample Reported Savings
Lighting-Small	Retrofit project for interior and exterior lighting fixtures	Reduced hour of use	85%	11%
Lighting-Small	Retrofit project for interior lighting fixtures	Increased hour of use Interactive effects	120%	8%
Lighting-Large	Retrofit project for interior high-bay lighting fixtures	Incorrect wattage used for baseline fixture	88%	11%
Lighting-Large	New Construction project for outdoor pole mounted fixtures	Interactive effects	102%	6%
Non-Lighting Small	New construction of a school facility	Adjustments required to calibrate the simulation model to a lower actual consumption data resulted in revised savings	76%	5%
Non-Lighting Small	New construction of a healthcare facility	Adjustments required to calibrate the simulation model to high actual consumption data resulted in revised savings	135%	9%
Non-Lighting Large	New construction of a school facility	Adjustments required to calibrate the simulation model to actual consumption data resulted in revised savings Original model considered no operation for school during June, July but billing data shows steady energy consumption during summer months	72%	7%
Non-Lighting Large	New construction of a healthcare facility	Adjustments required to calibrate the simulation model to a high actual consumption data resulted in revised savings Ex-ante considered 12 hours HVAC operation compared to 24 hours found during ex-post site visits.	174%	6%

4.2.3. DEC Custom-to-Go vs. Custom Classic

This section provides a comparison of projects that used the Custom-to-Go worksheets and those that used the Classic Custom (Classic) worksheets. The following criteria determines which worksheet is used for NR Custom projects:

- Non-lighting projects with more than 700,000 annual kWh savings must use the appropriate Classic Custom worksheet.
- All lighting projects as well as other projects with less than 700,000 annual kWh savings may use the optional Custom-to-Go worksheets.

Error! Reference source not found. presents the gross reported energy savings by worksheet and m easure type. The majority (89%) of gross reported energy savings are submitted through Classic worksheets.

Table 4-10 DEC Gross Reported Energy Savings by Worksheet Type

Worksheet Type	Measure Type	Gross Reported Energy Savings (kWh)	Percent of Program
Classic	Lighting	14,141,029	24%
	Non-lighting	37,751,760	65%
Custom-to-Go	Lighting	4,577,432	8%
	Non-lighting	1,584,769	3%
Program Total		**58,054,991**	

The average energy savings of projects using the Classic worksheets is 88,713 kWh for Lighting and 287,127 kWh for Non-lighting. Since these averages are well below the thresholds, most participants are choosing the classic worksheets regardless of if they have the option to use the Custom-to-Go worksheets.

Making up 68% of the total program savings, non-lighting measures contributed the most savings to the program. Figure 4-3 **Error! Reference source not found.**shows the distribution of gross reported e nergy savings for classic custom projects broken down by technology category. Whole building measures, most often from new construction projects make up the majority of these non-lighting savings. Figure 4-4 shows the distribution of gross reported energy savings for Custom-to-Go projects.

Figure 4-3 Distribution of DEC Reported Energy Savings for Classic Custom Projects by Technology Category

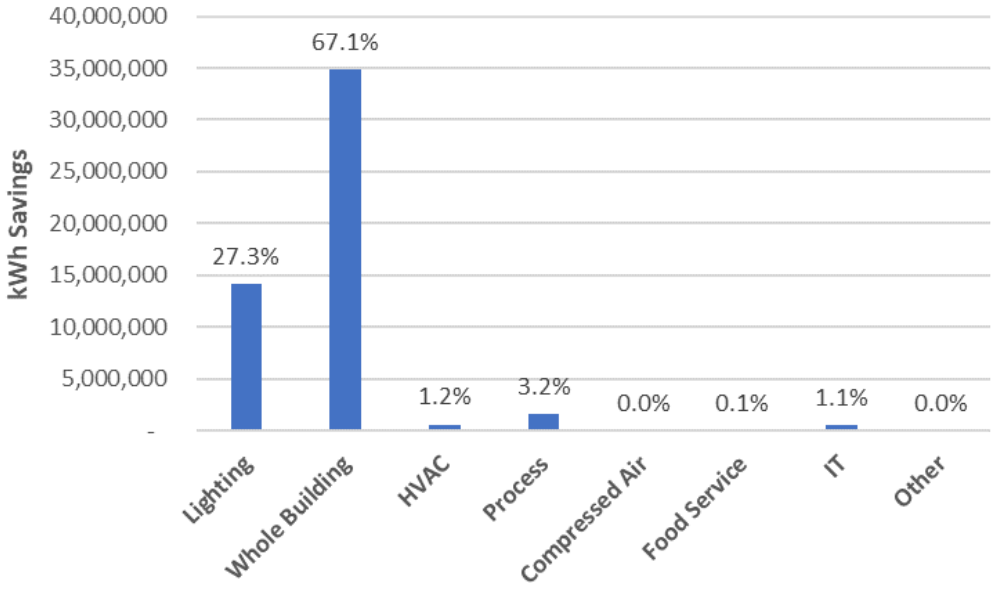


Figure 4-4 Distribution of DEC Reported Energy Savings for Custom-to-Go Projects by Technology Category

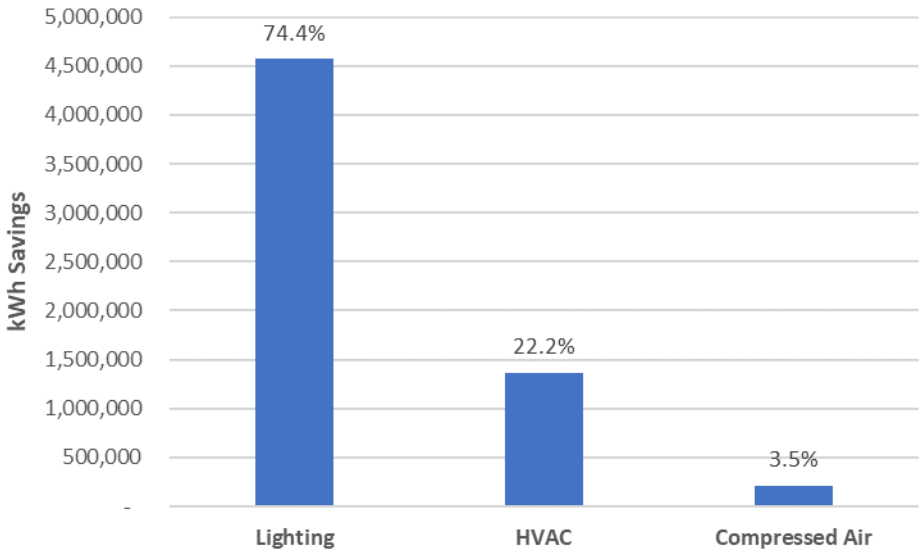


Table 4-11 **Error! Reference source not found.**indicates the reported and verified energy (kWh) s avings stratified by technology category (lighting vs. non-lighting) and participation track (Classic vs. Custom-to-Go) for the evaluated sample. The impact evaluation sampling did not stratify for the attribute. These realization rates were not used to estimate the program level verified savings. They are presented here to show any differences between the worksheet types.

Table 4-11 Comparison of Strata-Level DEC Realization Rates - Classic vs. Custom-to-Go

Track	Measure Category	Population	Sample	Sample Reported (kWh)	Sample Verified (kWh)	Realization Rate (%)
Classic	Lighting	174	13	6,110,054	6,062,695	103.7%
	Non-lighting	126	26	10,049,913	10,580,762	104.6%
	Total	**300**	**39**	**16,159,967**	**16,643,457**	**104.3%**
Custom-to-Go	Lighting	37	6	1,328,102	1,240,192	91.1%
	Non-lighting	11	4	429,415	413,128	96.2%
	Total	**48**	**10**	**1,757,518**	**1,653,319**	**92.4%**

4.3. Impact Evaluation Analysis and Findings - DEP

4.3.1. DEP Achieved Sample Size

As mentioned in Section 4.1.1.2, the initial impact sample sizes targeted a 90/10 confidence precision based on the project counts assuming a Coefficient of Variation (Cv) of 0.5 and the distribution of the total sample across the four sub strata was determined using the number of projects in each strata, the amount of savings in each strata and the historical Cv values of the same strata from the 2018 - 2019 NR Custom evaluation. Because of the relatively small size of the NL-Large population, and challenges with site visits scheduling, incomplete utility data, and model issues, the evaluation team was only able to complete analyses on 16 of the 22 NL-Small sample projects and 15 of the 18 NL-Large sample projects. Our achieved sample sizes are summarized in Table 4-12.

Table 4-12 DEP NR Custom Stratified Sampling - Achieved

Strata	Population	Targeted Sample Size	Achieved Sample Size
L-Small (<44 MWh)	153	9	9
L-Large (≥44 MWh)	25	5	5
NL-Small (<301 MWh)	58	22	16
NL-Large (≥301 MWh)	25	18	15
Program Total	**261**	**54**	**45**

The evaluation team was able to achieve stratum-level sample targets for both the L-Small and L-Large strata. As will be shown in the next section, the evaluation sample was still able to achieve the targeted 10% precision at the 90% confidence level since the Cv of the evaluated projects was lower than the Cv values used to determine the target sample size.

Table 4-6, Table 4-14 and Table 4-15 summarize gross impact results for energy (kWh), summer demand (kW), and winter demand (kW). Detailed results for each sampled project are provided in the standalone M&V Reports.

Table 4-13 DEP Gross Verified Energy Savings (kWh) by Stratum

Stratum	Gross Reported Energy Savings (kWh)	Gross Verified Energy Savings (kWh)	Realization Rate (%)	Relative Precision @ 90% Confidence
L-Small (<44 MWh)	3,711,848	4,044,374	108.96%	5.2%
L-Large (≥44 MWh)	2,455,237	2,044,664	83.28%	17.3%
NL-Small (<301 MWh)	7,579,735	8,807,126	116.19%	6.6%
NL-Large (≥301 MWh)	13,890,436	13,537,381	97.46%	4.1%
Program Total	**27,637,255**	**28,433,545**	**99.85%**	**4.5%**

Table 4-14 DEP Gross Verified Summer Peak Demand Savings (kW) by Stratum

Stratum	Gross Reported Summer Demand Savings (kW)	Gross Verified Summer Demand Savings (kW)	Realization Rate (%)	Relative Precision @ 90% Confidence
L-Small (<44 MWh)	727	778	106.92%	2.9%
L-Large (≥44 MWh)	348	354	101.52%	2.4%
NL-Small (<301 MWh)	2,031	2,059	101.39%	7.2%
NL-Large (≥301 MWh)	3,550	3,880	109.30%	20.6%
Program Total	**6,656**	**7,070**	**107.48%**	**22.4%**

Table 4-15 DEP Gross Verified Winter Peak Demand Savings (kW) by Stratum

Stratum	Gross Reported Winter Demand Savings (kW)	Gross Verified Winter Demand Savings (kW)	Realization Rate (%)	Relative Precision @ 90% Confidence
L-Small (<44 MWh)	166	394	237.07%	92.2%
L-Large (≥44 MWh)	199	233	117.48%	32.5%
NL-Small (<301 MWh)	681	1,047	153.78%	68.8%
NL-Large (≥301 MWh)	5,096	5,837	114.54%	12.6%
Program Total	**6,141**	**7,511**	**116.30%**	**16.8%**

The program achieved an overall energy realization rate of 99.85%. L-small and NL-small achieved more energy savings than reported, balancing out the verified L-large and NL-large savings, which achieved less energy savings than reported. For summer and winter peak demand savings, the program was able to achieve realization rates greater than 100% These factors are described below for each of the strata.

4.3.1.1. DEP Small Lighting Projects

Nine Lighting-Small projects were evaluated from the 2020-2021 DEP NR Custom population. These projects achieved 108.96% verified energy savings, 106.92% verified summer peak demand savings and 237.07% verified winter peak demand savings. Ex-post site visits verified that two retail store projects were operating during the winter peak period resulting in higher winter peak demand savings. The factors that caused variation in the energy realization rates include differences between the reported hours of use (HOU) and the verified HOU; and the inclusion of interactive effects.

Lighting-Small projects had included verified HOU that were both higher and lower than reported HOU. Overall, the differences between verified and reported HOU resulted in an increase in verified savings. Interactive effects consistently increase verified savings but only occur in indoor, conditioned spaces.

4.3.1.2. DEP Large Lighting Projects

Five Lighting-Large projects were evaluated from the 2020-2021 DEP NR Custom population. The Lighting-Large sample projects achieved 83.28% verified energy savings, 101.52% verified summer peak demand savings and 117.48% verified winter peak demand savings. Like the Lighting-Small stratum, variation in the realization rates include differences between the reported hours of use (HOU) and the verified HOU; and the inclusion of interactive effects.

One large project, representing 64% of the Lighting-Large sample savings, noted a significant drop in the verified hours of use due to differences in schedules noted in ex-post verification compared to

the reported hours which resulted in a realization rate of 71%. On the other hand, interactive effects consistently increase verified savings but only occur in indoor, conditioned spaces.

4.3.1.3. DEP Small Non-lighting Projects

Sixteen Non-lighting-Small projects were evaluated from the 2020-2021 DEP NR Custom population. The Non-lighting-Small sample projects achieved 116.19% verified energy savings, 101.39% verified summer peak demand savings and 153.78% verified winter peak demand savings. One office building project noted a significant increase in winter demand savings after the model was calibrated to match the actual consumption data.

Of the sixteen sampled projects, twelve projects in the strata were new construction projects. Their energy realization rate ranged between 95% and 172%. Eleven out of twelve projects required their model to be calibrated to actual consumption data which resulted in the differences between reported and verified savings. The evaluation team had the benefit of having more than twelve months of post construction consumption data and was able to calibrate the models and adjust the savings accordingly. Four new construction projects had included verified operational hours that were different from the reported savings. Overall, the differences resulted in an increase in verified savings.

The Non-lighting-Small sample included four projects that were not new construction projects. These included two food service and two HVAC projects that achieved a combined realization rate of 103%.

4.3.1.4. DEP Large Non-lighting Projects

Fifteen Non-lighting-Large projects were evaluated from the 2020-2021 NR Custom population. The Non-lighting-Large sample projects achieved 97.46% verified energy savings, 109.30% verified summer peak demand savings and 114.54% verified winter peak demand savings.

All the evaluated projects were new construction projects and, like the Non-lighting-Small strata, all fifteen projects required their models to be calibrated. Most of the adjustments made to the models were to the HVAC operational schedules and temperature setpoints, not to the equipment specifications. The energy realization rate ranged between 67% and 152%. For multiple school projects, ex-ante model assumed no summer operation that caused variations in energy and summer peak demand savings. Three projects noted increased hours of use compared to the ex-ante consideration. One office and two school new construction projects reported incorrect peak demand savings.

Table 4-16 presents a summary of the contributing factors to the low realization rates, the individual project realization rates and the portion of the total reported savings of the sampled projects.

Table 4-16 Summary of Significant Contributions to DEP Strata Realization Rates

Strata	Project Type	Contributing Factor(s)	Project Realization Rate	Percent of Sample Reported Savings
Lighting-Small	Retrofit project for interior and exterior lighting fixtures	Increased hour of use Interactive effects	124%	16%
Lighting-Large	Retrofit project for interior lighting fixtures in retail outlet	Increased hour of use Interactive effects	123%	5%
Lighting-Large	Retrofit project for interior high-bay lighting fixtures	Reduced hour of use	71%	64%
Non-Lighting Small	New construction of a healthcare facility	Adjustments required to calibrate the simulation model to high actual consumption data resulted in revised savings Increased hour of use	172%	7%
Non-Lighting Small	New construction of an office complex	Adjustments required to calibrate the simulation model to high actual consumption data resulted in revised savings Increased hour of use	128%	10%
Non-Lighting Large	New construction of a school facility	Adjustments required to calibrate the simulation model to actual consumption data resulted in revised savings Original model considered no operation for school during June, July but billing data shows steady energy consumption during summer months	152%	5%
Non-Lighting Large	New construction of a community college	Adjustments required to calibrate the simulation model to actual consumption data resulted in revised savings Original model considered no operation for school during June, July but billing data shows steady energy consumption during summer months	67%	5%

4.3.2. DEP Custom-to-Go vs. Custom Classic

This section provides a comparison of projects that used the Custom-to-Go worksheets and those that used the Classic Custom (Classic) worksheets. The following criteria determines which worksheet is used for NR Custom projects:

- Non-lighting projects with more than 700,000 annual kWh savings must use the appropriate Classic Custom worksheet.
- All lighting projects as well as other projects with less than 700,000 annual kWh savings may use the optional Custom-to-Go worksheets.

Table 4-17 presents the gross reported energy savings by worksheet and measure type. The majority (88%) of gross reported energy savings are submitted through Classic worksheets.

Table 4-17 Gross Reported Energy Savings by Worksheet Type

Worksheet Type	Measure Type	Gross Reported Energy Savings (kWh)	Percent of Program
Classic	Lighting	4,651,491	17%
	Non-lighting	19,614,201	71%
Custom-to-Go	Lighting	1,515,594	5%
	Non-lighting	1,855,969	7%
Program Total		**27,637,255**	

The average energy savings of projects using the Classic worksheets is 34,646 kWh for Lighting and 258,676 kWh for Non-lighting. Since these averages are well below the thresholds, most participants are choosing the classic worksheets regardless of if they have the option to use the Custom-to-Go worksheets.

Making up 78% of the total program savings, non-lighting measures contributed the most savings to the program. Figure 4-5 Distribution of DEP Reported Energy Savings for Classic Custom Projects by Technology Category shows the distribution of gross reported energy savings for classic custom projects broken down by technology category. Whole building measures, most often from new construction projects make up the majority of these non-lighting savings. Figure 4-6 shows the distribution of gross reported energy savings for Custom-to-Go projects.

Figure 4-5 Distribution of DEP Reported Energy Savings for Classic Custom Projects by Technology Category

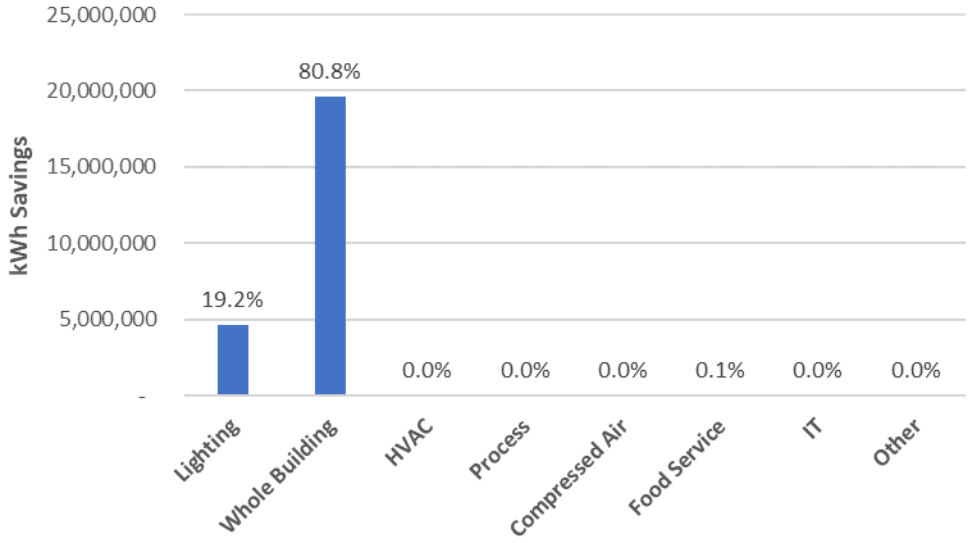


Figure 4-6 Distribution of DEP Reported Energy Savings for Custom-to-Go Projects by Technology Category

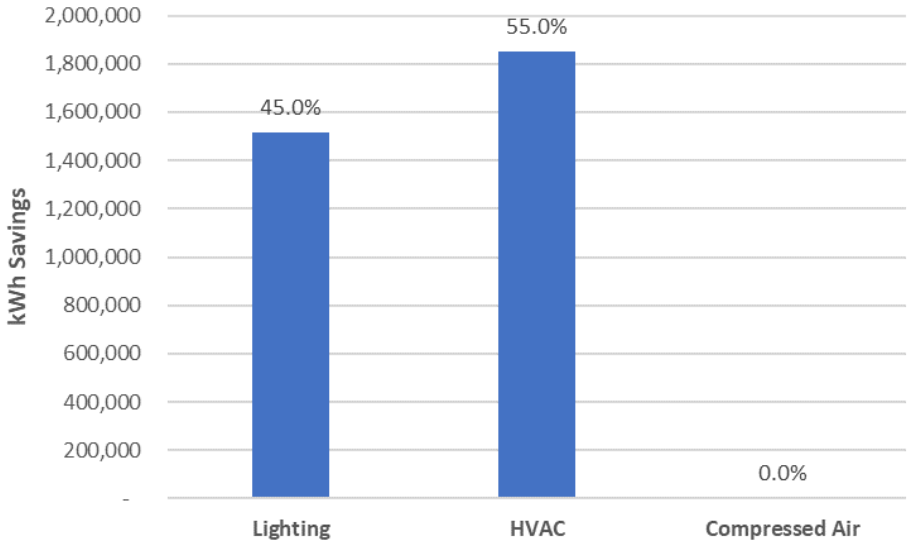


Table 4-18 indicates the reported and verified energy (kWh) savings stratified by technology category (lighting vs. non-lighting) and participation track (Classic vs. Custom-to-Go) for the evaluated sample. The impact evaluation sampling did not stratify for the attribute. These realization rates were not used to estimate the program level verified savings. They are presented here to show any differences between the worksheet types.

Table 4-18 Comparison of Strata-Level Realization Rates - Classic vs. Custom-to-Go

Track	Measure Category	Population	Sample	Sample Reported (kWh)	Sample Verified (kWh)	Realization Rate (%)
Classic	Lighting	164	12	388,074	431,297	110.2%
	Non-lighting	71	27	10,718,278	10,776,289	102.7%
	Total	**235**	**39**	**11,106,352**	**11,207,585**	**104.1%**
Custom-to-Go	Lighting	14	2	918,693	715,434	68.9%
	Non-lighting	12	3	1,397,786	1,479,744	98.4%
	Total	**26**	**5**	**2,316,479**	**2,195,178**	**85.1%**

4.4. High Level Impact Findings

4.4.1. Continue High Quality Reviews

The evaluation team saw strong evidence that the Duke Energy NR Custom program team conducts detailed reviews of the project applications, quality control checks and revises measure parameters based on their engineering judgement and input from the participants or trade allies. Engineering reviews by AESC provides an additional level of quality control that helps to minimize most calculation errors or instances of over-claimed energy or demand savings. The strata-level realization rates indicate that an appropriate level of rigor is being applied to lighting projects and most non-lighting projects that are not being implemented using the NCEEDA protocol. The level of rigor being applied to each project as it goes through the application process of the NR Custom Program is resulting in accurate estimates of energy and demand savings.

There is one area that may require additional attention. The evaluation team reviewed eight new construction projects that have summer or winter peak demand savings calculated incorrectly. Out of the eight projects, one project used an average of four hours whereas the other eight projects used hourly demand estimates from the new construction models that were one hour off the defined peak hour. This resulted in either higher or lower verified peak demand savings.

4.4.2. Operational Schedules

Of the parameters needed to calculate lighting and non-lighting project savings, verified operating schedules, or annual hours of use, were more often found to be different than what was used to calculate reported savings. Participants and/or trade allies are asked to provide the operating

schedules as part of the application process and have the best insights into what the schedule will be for each installed fixture.

For lighting projects, there were two main types of differences between the operating scheduled reported on the application and the schedules the evaluation team verified with the participants. The first was that the installed fixture were found to be operating on different weekly operating schedules than captured on the applications. The second type of difference was the number of holidays accounted for in the verified savings. Other types of differences were caused by the inaccurate estimates of operating hours when lighting controls, such as day-light sensors and timers for the exterior lights, were installed.

For projects where trade allies or third parties are estimating the operating schedules, these differences may be due to generalizations or assumptions made for the operating schedules across different project types. Differences in operating schedules were also seen due to schedules varying by different days of the week where the application indicated the lights operating the same each day of the week. For school facilities, verified summer operating hours were found to be different from the reported hours. For multiple projects, verified annual hours of use were also found to be different than the reported hours for projects involving the replacement of HVAC equipment.

The Duke Energy Classic lighting worksheet does have fields where a typical weekday, Saturday and Sunday schedule may be entered. The weeks of use in a year is also able to be entered. The evaluation team saw evidence that these fields are not always used and variations in the schedule that was provided by the participant created different savings. Consistent use of these worksheet fields to capture the lighting schedule would help reduce these differences.

Neither the Classic lighting worksheet nor the Custom-to-go worksheet ask specifically about specific observed holidays, only the total number of weeks of use per year is requested. Asking how many days a year the lights or HVAC equipment are not operating due to holiday closures and incorporating this information into the calculation of operating hours would help minimize these differences.

4.4.3. Calibration of new construction models

There were 27 projects in DEC and 28 projects in DEP in the 2020-2021 non-lighting samples that were implemented using the NCEEDA protocol. This protocol defines how savings from new, high-performance buildings that are built above code requirements shall be modeled and estimated. The goal of NCEEDA is to provide timely information on a wide range of energy efficient design options early enough in design process so that those options may be assessed, selected and implemented into the final design. NCEEDA in Duke Energy's Indiana Service Territory uses ASHRAE Standard 90.1-2007 as the baseline code for commercial buildings and multifamily buildings greater than three stories. Specifically, NCEEDA uses the methodology of Appendix G with modifications listed in the protocol for the determination of custom savings.

The models of the new buildings are developed using these standards and protocol; simulation software, design specifications and construction drawings; and site visits. The program team is doing

a very good job at matching the models to the as-built conditions of the new buildings. The evaluation team found very few instances where an energy saving strategy was not implemented as it was specified in the model.

Assumptions on how the building is expected to be occupied and used are also required to be specified in the models and general values of the necessary parameters are provided by the standards and protocols. ASHRAE standards, professional judgement and information from participants are used to inform what values to use. These general occupancy and scheduling parameters do not always match how the new buildings are used or occupied and can lead to modeled consumption levels and patterns that differ from the new building's actual consumption levels and patterns.

Chapter 15 of the Uniform Methods Project (UMP), Commercial New Construction Evaluation Protocol, describes methods to quantify the uncertainty of the models used to estimate the reported savings. The evaluation team had access to additional post construction utility billing data that was not available during the development of the models. This data was used to determine the normalized mean bias error (NMBE) and the coefficient of variation of the root mean square error (CV_{RMSE}) between the modeled consumption of the new building and the actual monthly consumption of the new building. The UMP references ASHRAE 2002 acceptable tolerances for uncertainty in calibrated building models using monthly consumption data as ±5% NMBE and ±15% CVRSME.

The evaluation team found that the modeled consumption was outside of these tolerances for all seventeen projects in the sample. Adjustments were made to the models until modeled and actual consumption were within the ASHRAE tolerances. These revised models were then used to calculate the verified energy savings. The energy realization rates for these projects ranged between 68% and 256%. The overall energy realization rate for the new construction projects in the sample was 99.5%. The wide range of these results show a high level of uncertainty even though the overall realization rate is close to 100%.

Calibrating models with sufficient post construction data prior to finalizing the saving estimates and incentives level would help validate the models and reduce the level of uncertainty savings in the estimates. The 2018-2019 NR Custom evaluation included a recommendation to incorporate post construction calibrations as part of project measurement and verification (M&V) practices and Duke Energy has begun implementing these requirements for certain NCEEDA projects as part of its 2022-2023 NR Custom program. The evaluation team encourages this practice to continue but also acknowledges the technical challenges these calibrations pose.

The evaluation team recommends that Duke Energy continue to incorporate post construction calibration requirements for NCEEDA project that uses the ASHRAE 14 tolerances to assess the level of uncertainty in the new construction models and, if necessary, make adjustments to the model in order to get the uncertainty within the tolerances and/or minimize the uncertainty as much as possible.

The calibrations completed as part of the program M&V need to be complete in a timely manner else risk delaying the payment of incentives, harming program satisfaction and discouraging participation. The program M&V calibrations will therefore be pressured to limit the amount of post consumption data needed as much as possible.

The amount of post construction data needed to calibrate a model varies based on the type of building and the occupancy. Buildings with predictable or consistent consumption may only require as little as three to four months. Other buildings with variable loads and seasonal variability may require twelve months or more.

5. Net-to-Gross

5.1. Methodology

The evaluation team based the net-to-gross evaluation on customer self-report surveys, as described in the Uniform Methods Project, Chapter 23: Estimating Net Savings: Common Practices.[2] The survey was designed based on established methodologies outlined in the Pennsylvania Evaluation Framework.[3] This methodology was modified based on discussions with Duke Energy staff before data collection to include additional questions to better understand and incorporate the program's impact on customers' decisions. The adjusted methodology has been used in prior phases of Duke Energy evaluations to allow for comparisons across program years. Further adjustments were made for new construction projects to reflect the design of the program. The implementer works with customers early in the design phase of the project to drive customers into more efficient designs. The implementer further screens out customers who are not interested in or willing to make design changes.

Net-to-gross analysis for this program involved two calculations: free-ridership and spillover. The results of these calculations are combined to produce the program-level net-to-gross ratio as follows in Equation 10 and Equation 11:

[2] https://energy.gov/sites/prod/files/2015/02/f19/UMPChapter23-estimating-net-savings_0.pdf, Section 3.2.
[3] http://www.puc.state.pa.us/Electric/pdf/Act129/SWE_PhaseIII-Evaluation_Framework082516.pdf, Appendix B.

Equation 10 Net-to-Gross Equation

$$NTG_p = (1 - FR_p) + PSO_p + NPSO_p$$

Where:

NTG_p = *the program-level net-to-gross ratio*

FR_p = *the program-level free-ridership ratio*

PSO_p = *the program-level participant spillover ratio.*

$NPSO_p$ = *the program-level nonparticipant spillover ratio.*

The program net verified energy savings are calculated by multiplying the program net-to-gross ratio by the gross verified energy savings resulting from the impact evaluation activities described in Section 4.

Equation 11 Net Verified Energy Savings

$$kWh_{nv} = kWh_{gv} \times NTG_p$$

Where:

kWh_{nv} = *the net-verified kWh savings*

kWh_{gv} = *the gross-verified kWh savings*

NTG_p = *the program-level net-to-gross ratio*

The calculations of the program-level free-ridership and spillover ratios are detailed in the following sections.

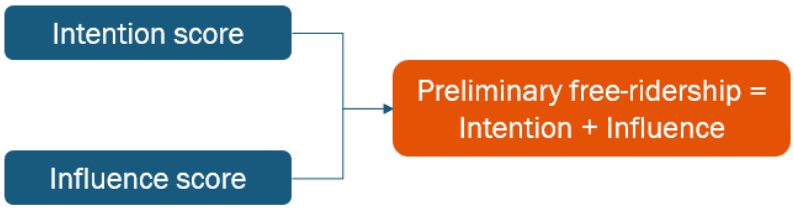
5.1.1. Free-Ridership

As mentioned above, free-ridership estimates what proportion of the program's savings would have happened in the absence of the program. Free-ridership considers the customers' plans before engaging in the program and the various influences the program can have on the customer, such as incentives and interactions with the program staff, contractors, and marketing materials.

The evaluation calculated free-ridership for each survey respondent based on their answers to a series of questions. These questions collected information on the customers' intention before interacting with the program and its influence on changing those intentions. Each component (intention and influence) has a value ranging from zero to 50 and is then combined for a preliminary free-ridership score ranging from 0 to 100. A free-ridership value of 0 indicates that a customer

would not have installed the energy-efficient equipment without the program, whereas a free-ridership value of 100 indicates that a customer would have done the same project on their own, at the same time in the absence of the program.

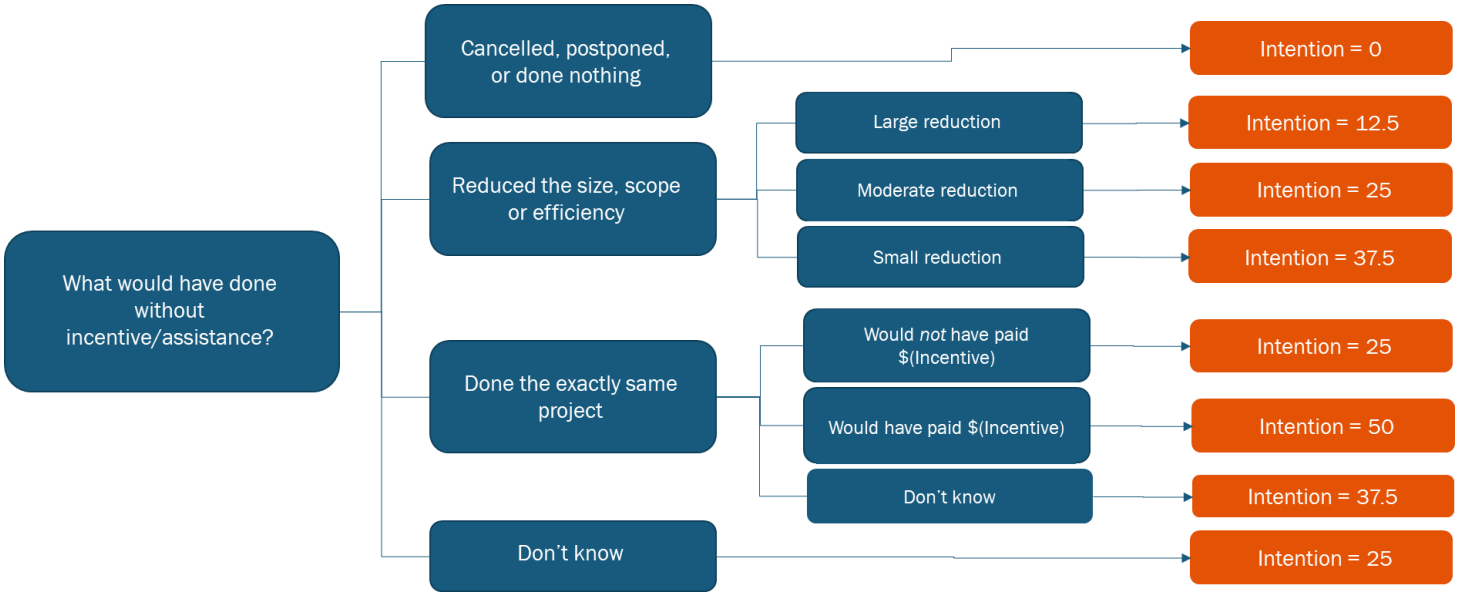
Figure 5-1 Preliminary Free-ridership Calculation



5.1.1.1. Intention

The intention score seeks to capture what most likely would have happened without the program assistance. The program assistance includes not just the incentive but any assistance from items such as audits, technical assistance, and program staff. Survey respondents were asked how the project would have changed if the incentive were not available. These responses were slightly different between retrofit and new construction respondents. Retrofit responses were scored on a scale from 0 to 50, as shown in Figure 5-2.

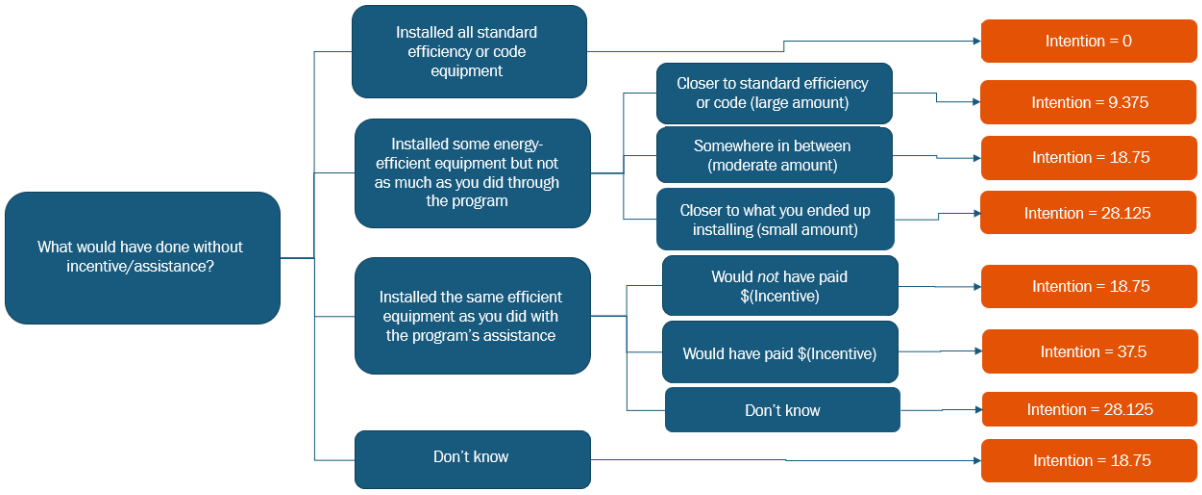
Figure 5-2 Intention Score Flowchart – Retrofit



New construction responses were scored from 0 to 37.5, as shown in Figure 5-3. Unlike the custom retrofit projects, the delivery model for new construction projects requires substantial input from the program implementer. Capping the intent score at 37.5 for new construction reflects the retrofit score for similar customer types where the project would have been of similar scope with minor changes. We feel this is appropriate for the following reasons:

- To participate, customers must select one of the design bundles modeled by Willdan, all of which are varying levels above current building code. Willdan provides at least three bundles but has offered as many as nine bundles to participants.
- Willdan manages the customers participating in the program through a screening process after initial contact to identify customer level of interest and commitment to working with the program to improve their building design to include energy efficiency. Customers who cannot or are unwilling to adjust their design are not accepted into the program. In DEC and DEP territories, Willdan screened out over 200 projects, while accepting fewer than 200.[4]
- Willdan continues to monitor and assist participants through the design assistance and construction phases to ensure they will at least meet the savings modeled for their selected bundle. Willdan has removed customers from the program even after the design assistance phase if the customer decides they are unable to meet program requirements.

Figure 5-3 Intention Score Flowchart – New Construction



[4] More detail on the bundles and screening process, including counts of projects screened out versus participating, can be found in Section 6.2.2.

The initial question of the intention score asks respondents what they would have done without the program assistance. Respondents who indicated they would have canceled, postponed, or done nothing without the program get an immediate intention score of 0.

If the respondent indicated they would do a smaller or less efficient project, they were prompted to categorize it as a small, moderate, or large reduction in scope. This approach attempts to gather the respondent's best estimate of what would have happened without the program, or the counterfactual, recognizing that a precise estimate is not likely to be achieved. The question battery does not seek to follow-up with respondents to understand the exact change to scope or efficiency level to avoid response burden and reduce the risk of false precision.

Lastly, respondents who indicated they would have done the exact same project were asked if they would have paid the additional incentive amount. This question is added to give the program credit by reducing the intention score for customers who would not have had the funds to pay for the project on their own. The response options and scoring for retrofit projects are outlined in Table 5-1.

Table 5-1 Net-to-Gross Intention Score Methodology – Retrofit Projects

Response	Intention Score
Done nothing	0
Canceled or postponed the project	0
Done a smaller or less efficient project	Small = 37.5 Moderate = 25 Large = 12.5 Don't know = 25
Done exactly the same project	Would have paid = 50 Would not have paid = 25 Don't know = 37.5

A similar but slightly different set of questions were asked for new construction projects. The question and response options reflect that a project would have occurred but worked to understand how the project would have been different without the program. Responses were scaled on a 0 to 37.5 scale, as outlined in Table 5-2.

Table 5-2 Net-to-Gross Intention Score Methodology – New Construction Projects

Response	Intention Score
Installed all standard efficiency or code equipment	0
Installed some energy-efficient equipment, but not as much as you did through the program	Closer to standard efficiency or code = 9.375 Closer to what you ended up installing = 28.125 Somewhere in between = 18.75 Don't know = 18.75
Installed the same efficient equipment as you did with the program's assistance	Would have paid = 37.5 Would not have paid = 18.75 Don't know = 28.125
Don't know	18.75

5.1.1.2. Influence

To recognize the direct points of influence that the program has on customers' decisions, survey respondents were asked to rate the influence of several program aspects. The evaluation team worked with program staff during the survey design stage to identify all the ways program staff work with customers to include all components as part of the influence question. Together, the team included nine different aspects that could have been influential for customers, as outlined in the table below.

Table 5-3 Net-to-Gross Program Influence Aspects

Program Aspect
Incentive provided by Duke Energy
The support provided by your Duke Energy business energy advisor
Smart $aver marketing materials or webinars
Previous experience with the Smart $aver program
The technical support provided by Duke Energy engineer staff
The support provided by your Duke Energy account manager
The bundle options provided, including the design assistance, for your new construction project
The calculators provided by Duke Energy
Contractor or vendor recommendation

For each aspect, respondents were asked to rate the influence of the aspect where 10 was extremely influential, and 0 was not at all influential. The highest aspect rating for each customer was scored on a scale of 0 to 50, similar to the intention score. The rationale is that if any aspect of the program is highly influential on a customer's decision, the program overall was equally influential (see Table 5-4).

Table 5-4 Net-to-Gross Influence Score Methodology

Max FR4 rating	Influence Score
9-10	0
8	6.25
7	12.5
6	18.75
5	25
4	31.25
3	37.5
2	43.75
0-1	50

If a customer indicated their contractor as influential in the project, that is, providing an influence rating of a six or higher, the evaluation team attempted to contact the contractor.[5] We asked the contractor a similar question, asking about the influence the program had on the specific customer. These aspects are outlined in the table below.

Table 5-5 Net-to-Gross Influence Score Methodology – Influential Vendor

Program Aspect
The program incentive provided by Duke Energy
Your interactions with Duke Energy program staff, including technical assistance
The support from your Duke Energy trade ally outreach representative
The program marketing, training, or informational materials
Your firm's past involvement in Duke Energy's programs
The energy design assistance provided by Duke Energy

[5] The exception to this would be in situations where the customer indicated the implementer, Willdan, was most influential.

The scoring of the influential vendor influence score is shown below, where contractors used a scale from zero to ten where 0 was 'not at all influential,' and 10 was 'extremely influential.' The highest aspect rating for each contractor was scored on a scale of 0 to 50, similar to the customer score.

Table 5-6 Net-to-Gross Influence Score Methodology – Influential Vendor

Max FR4 rating	Influence Score
9-10	0
8	6.25
7	12.5
6	18.75
5	25
4	31.25
3	37.5
2	43.75
0-1	50

When a customer indicated a contractor was influential in doing the project, and the evaluation team could not complete a survey with the contractor, the customer's influence score was used. In cases where we completed the contractor survey, the methodology indicates to take the highest rating (or lowest influence score) from either the customer or the contractor.

5.1.1.3. Calculation Steps

The intention and final influence scores are added together to produce each respondent's preliminary free-ridership ratio using Equation 12.

Equation 12 Respondent Preliminary Free-ridership Ratio

$$FR_p = \frac{Intention + Influence}{100}$$

Where:

FR_p = *the preliminary free-ridership score.*

In 2020, the evaluation team incorporated consistency checks in the survey to follow-up when respondents gave inconsistent responses between the Intention and Influence scores. The

inconsistency was defined as one score (either Intention or Influence) being greater than or equal to 37.5 and the other score being less than or equal to 12.5. The evaluation team reviewed responses to an open-ended question asking respondents to describe the impact, if any, the Duke Energy assistance had on the decision to install the amount of energy-efficient equipment at the time they did.

If the response validated a higher free-ridership score, the preliminary free-ridership ratio is adjusted using the following calculation:

Equation 13 Consistency Checks Adjustment Supporting Higher Free-ridership

$$FR_{a1} = FR_p + (\frac{1 - FR_p}{2})$$

Where:

FR_a = *the adjusted free-ridership score.*

If the response validated a lower free-ridership score, the preliminary free-ridership ratio is adjusted using the following calculation:

Equation 14 Consistency Checks Adjustment Supporting Lower Free-ridership

$$FR_{a1} = \frac{FR_p}{2}$$

If the response is ambiguous, the preliminary score is not adjusted. There are also no adjustments if the Intention and Influence scores were consistent and in cases where we incorporated influential vendor responses.

A second adjustment further looks at the impact of the program and incentives. Two questions are reviewed to adjust the free-ridership score. The first question asks respondents if they learned about Duke Energy's assistance before or after selecting the specific type of equipment that received the incentive. Suppose the respondent indicated they had chosen the equipment before they heard about the incentive. In that case, the free-ridership score is adjusted upwards to reflect that the customer had already selected program-eligible equipment. This adjustment applies only to retrofit records. By design, for new construction projects, the bundles show the customer tradeoffs between efficiency, energy savings, incentive, and equipment costs and they select one of those bundles to move forward.

Equation 15 Respondent Final Free-ridership Ratio

$$FR_{a2} = FR_{a1} + \frac{1 - FR_{a1}}{2}$$

The second question asks respondents if their experiences with Duke Energy's program caused their organization to change its purchasing policies or energy-efficient equipment guidelines. If the organization indicated their policies had changed because of Duke Energy, their free-ridership score is adjusted downwards. This question was inadvertently removed from the survey and therefore not used to adjust the free-ridership score. The previous evaluation had five customers indicate they changed their policy because of Duke Energy resulting in less than one percent change in free-ridership.

Equation 16 Respondent Final Free-ridership Ratio

$$FR_{a3} = FR_{a2} * 50\ percent$$

The final participant free-ridership ratio is multiplied by that respondent's verified gross savings to result in free rider savings, or savings that would have occurred without the program. The program free-ridership ratio is the sum of free rider savings divided by the sum of verified gross savings as shown in Equation 17.

Equation 17 Program Free-ridership Ratio

$$FR_p = \frac{\sum(FR_i \times kWh_{gv})}{\sum kWh_{gv}}$$

5.1.2. Spillover

Spillover is an estimate of savings resulting from the installation of energy-efficient projects completed without a program incentive, but that still was influenced by the program. Participant spillover was calculated from program participants who reported additional installations. Nonparticipant spillover was calculated from talking with participating contractors about their sales of program-eligible equipment that did not receive Duke Energy incentives.

5.1.2.1. Participant Spillover

Participant spillover attributes savings to the program for equipment that participants installed without the incentive that was influenced by the program. For participant spillover, there are two components to arriving at these program-attributable savings.

First, the survey collects information on the type of energy-efficiency equipment installed but for which an incentive was not received. This is used to estimate energy savings by applying established calculation methodologies, often a technical reference manual.

Second, the survey asks the respondent to rate the program's influence on their decision to implement the project despite not receiving an incentive. That score is used to prorate the total project savings, recognizing that the program may not have been the only influence in the completion of the project. The result of this calculation is program-attributable participant spillover, shown in Equation 18:

Equation 18 Program-Attributable Participant Spillover

$$kWh_{apso} = kWh_{gso} \times Influence$$

Where:

kWh_{apso} is the program-attributable participant spillover savings

kWh_{gso} is the gross spillover savings

Influence is the value based on the respondent's rating of the program influence, as shown Table 5-7.

Table 5-7 Participant Spillover Program Influence Values

Reported Smart $aver Program Influence	Influence Value
0	0.0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.9
10	1.0
Don't know / Refused	Sector-level measure average

This number is divided by the total verified gross energy savings for the program to produce a program spillover ratio (Equation 19):

Equation 19 Program Participant Spillover Ratio

$$Program\ Participant\ SO\ Ratio = \frac{\sum kWh_{apso}}{kWh_{gv}}$$

5.1.2.2. Nonparticipant Spillover

Nonparticipant spillover attributes savings to the program for equipment contractors install for customers without a Duke Energy incentive that was influenced by the program. Nonparticipant spillover was captured from talking with contractors who participated in the program. Similar to participant spillover, contractor spillover was calculated from two components to arrive at program-attributable savings.

The survey first asked about the sales of program-eligible projects of the same type installed through the Smart $aver program that did not receive an incentive from Duke Energy. The number of projects was used as weighting so that contractors and project sizes were weighted equally.

Contractors were also asked to rate the program's influence on their sales of projects that did not receive an incentive from Duke Energy. That score was used to adjust the spillover amount to recognize the program's impact on their program-eligible sales. The result of this calculation is program-attributable nonparticipant spillover, shown in Equation 20:

Equation 20 Program-Attributable Nonparticipant Spillover

$$Nonparticipant\ SO = Sales \times Influence$$

Where:

Sales is the percent of sales of program-eligible equipment that did not receive an incentive are the program-attributable nonparticipant spillover projects.

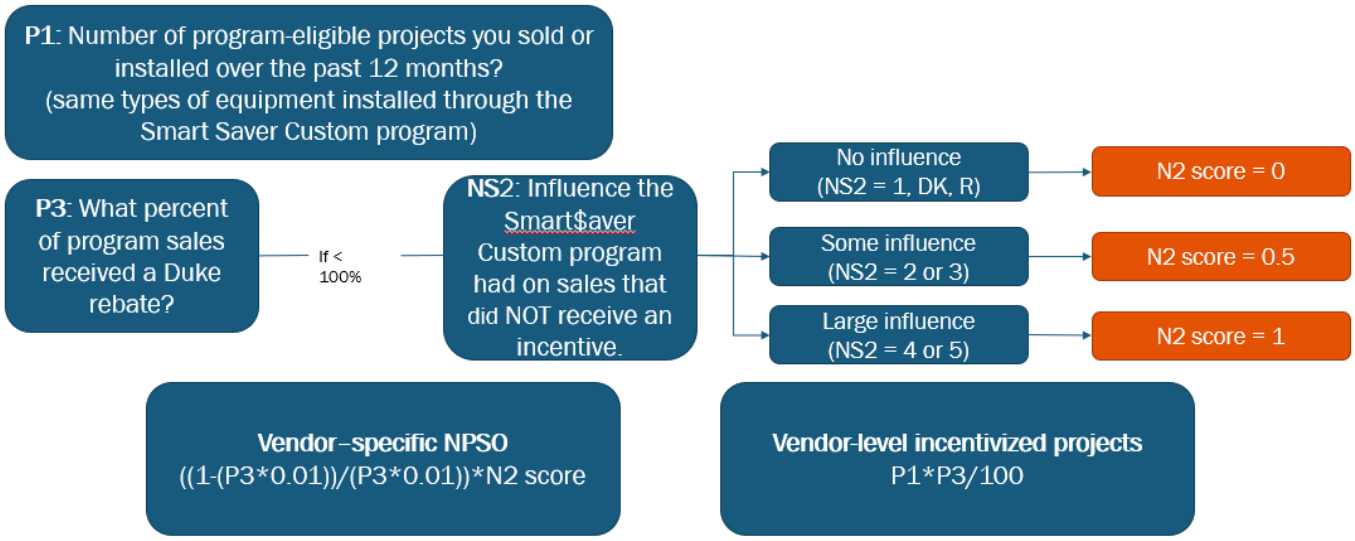
Influence is the value based on the respondent's rating of the program influence, as shown in Table 5-8.

Table 5-8 Nonparticipant Spillover Influence Values

Reported Smart $aver Program Influence	Influence Value
1	0.0
2	0.5
3	0.5
4	1.0
5	1.0
Don't know / Refused	0.0

A visual depiction is shown in the figure below.

Figure 5-4 Nonparticipant Spillover Flowchart



Each step in the calculation is outlined below.

Step 1: Calculate Vendor-level NS2Score

This score gives full credit to the program for vendors that reply to **NS2** with a four or a five on a 5-point scale (5=*extremely influential, 1=not influential*). Scores of two or three result in half credit to the program. No credit is given to the program if the vendor rated the program a 1 in its sales that did not receive an incentive or if they did not respond to this question.

If NS2 <= 1, then NS2Score = 0 (this includes vendors who did not respond to this question)

If NS2 = 2 or 3, then NS2Score = 0.5

If NS2 = 4 or 5, then NS2Score = 1

Step 2: Calculate Vendor-specific NPSO Ratio

For each vendor, this quantity is the ratio of projects outside the program to projects inside the program. This ratio is scaled by the NS2Score calculated above, giving credit to the program based on how influential the vendor indicated the program was. Generally, if a vendor reports that less than half (50 percent) of their sales received an incentive and if NS2Score is one, then NPSO Ratio will be larger than one. The upper limit is when a vendor reports that only one percent of their sales received an incentive ($P3 = 1$). In this case, the vendor reported 99 projects outside the program for every project that received an incentive, and therefore, the vendor-level NPSO Ratio could be as large as 99.

If P3 does not equal 0, then NPSO Ratio = $\left(\frac{100 - \text{P3}}{\text{P3}}\right) * NS2Score$

If P3 is zero, then NPSO Ratio = 0

As an example, a vendor reported that three percent of their sales in Duke Energy service territory involved an incentive ($P3 = 3$) and that the program influence on these projects was in the middle of the available options ($NS2 = 3$). The influence yields an NS2Score of 0.5, so any weight given to spillover from this vendor is cut in half. The reported value of $P3$ means that NPSO Ratio computes to $((100 - 3)/3) * 0.5 = 16.167$. The resulting NPSO Ratio for each program vendor represents that vendor's activity outside the program in relation to their activity in the program. This is then used in the final step to scale the reported number of projects ($P1$) and to split the projects proportionally into those that received an incentive and those that did not.

Step 3: Calculate Vendor-level Incentivized Projects

The next formula calculates the number of incentivized projects for each vendor, as follows:

If P1 > 0 and P3 > 0, then Incentivized Projects = $P1 * \frac{P3}{100}$

Else Incentivized Projects = 0

For example, if the vendor reported eight projects ($P1 = 8$) and three percent of their sales received an incentive through the program ($P3 = 3$) or $8 * 0.03 = 0.24$. This represents the number of projects the vendor claimed received an incentive.

Step 4: Calculate Vendor-level Unincentivized Projects Influenced by Program

The number of vendor projects influenced by the program that did not receive an incentive is calculated by multiplying the NSPO ratio by the number incentivized through the program.

Step 5: Calculate Program-level NPSO

The last step is to calculate the "weighted average" NPSO for the program, which is the average proportion of unincentivized projects across all responding contractors. This is calculated by taking the total number of unincentivized projects influenced by the program over the total number of projects incentivized through the program.

The weighted mean will be the ratio of the total number of inferred projects done in Duke Energy service territory that did not receive an incentive to the total number of projects in Duke Energy service territory that did receive an incentive.

5.2. Sampling

Tetra Tech received program tracking data for PY2020 and PY2021 for the Duke Energy Smart $aver Custom Program. The tracking data included a total of 961 records for the DEC and DEP territories. The tracking data was aggregated to the Sector, or measure-category level, summing incentive amounts and kWh savings, using the Unique Project ID variable. The detailed measure descriptions were retained for reference in the participant survey. After aggregation, the DEC and DEP sample frame included 618 measure-level records, all included in the study's sample. A total of 206 unique customer contacts were associated with the 618 projects included in the sample.

The table below reports the sample size and estimated completed surveys for the DEC and DEP territories. We assumed a response rate of 35% and therefore expected to complete a total of 217 surveys.

Table 5-9 Survey Sample Design by Measure Category

Measure Category	Original Tracking Data*	Number of Projects**	Estimated Completed Surveys***
Lighting	720	391	136
Whole Building	193	183	64
HVAC	26	26	9
Food Service	14	14	5
Process	5	2	1
IT	2	1	1
Compressed Air	1	1	1
Total	**961**	**618**	**217**

*Counts provided are the number of measures.

**The number of the unique customer contact totals 206.

***The number of estimated completed surveys assumes a 35% response rate when the quantity is greater than 4.

5.3. Net-to-Gross Analysis and Findings

The evaluation team conducted surveys with 68 customers who completed 162 different projects (55 new construction and 107 retrofit[6]) in DEC and DEP territories. In addition, we completed an interview with one third-party vendor who was able to talk to us about 200 projects aggregated into 6 unique strata, territory, and business combinations.

5.3.1. Intention

These responses resulted in an average, unweighted intention score of 14.4 (22.8 DEC and 9.1 DEP) and a weighted score of 17.2 (17.6 DEC and 16.4 DEP). These results are lower than the overall 2018-2019 evaluation (unweighted intention score of 30.7 and a weighted score of 27.7).

Retrofit customers reported that for over two-thirds of the projects (78 of 105 surveyed projects) they would have put off the work or canceled it entirely. Another 14 percent of the participants (15 of 105) would have reduced the scope or efficiency of the project, primarily making a large reduction. The remaining customers (12 of 105) said they planned to do the same project before learning about the Smart $aver Custom Program, and most of those customers said they would have paid the upgrade cost if the incentive were not available. The full distribution of responses is shown in Table 5-10.

These responses resulted in an average, unweighted intention score of 9.8 (23.0 DEC and 4.8 DEP) and a weighted score of 7.0 (5.7 DEC and 8.9 DEP).

[6] Three non-new construction cases were asked the new construction free-ridership questions and one new construction case got asked the non-new construction free-ridership question. As a result, the counts between the intention and influence questions will be different.

Table 5-10 What Would You Have Done Had You Not Received an Incentive (Intention) - Retrofit

Response	Score	Respondents
Done nothing	0	2
Canceled or postponed the project	0	76
Done a smaller or less efficient project	Large reduction = 12.5 Moderate reduction = 25 Small reduction = 37.5	15 Large reduction (10) Moderate reduction (2) Small reduction (3)
Done exactly the same project	Would have paid = 50 Would not have paid = 25 Don't know = 37.5	12 Would have paid (12) Would not have paid (0) Don't know (0)
Don't Know	25	0
Respondents (n)	**N/A**	**105**

Source: Customer Survey; FR1, FR2, FR3

New Construction customers reported that for about half of the projects (27 of 57 surveyed projects) they would have installed some energy efficient equipment, with most between what they received through the program and code (17 projects). For just over 40 percent of projects (25 of 57) they planned to do the same project before learning about the Smart $aver Custom Program, and most of those customers said they would have paid the upgrade cost if the incentive were not available. The remaining customers (5 projects) said they would have installed standard efficiency or code equipment. The full distribution of new construction responses is shown in Table 5-11.

These responses resulted in an average, unweighted intention score of 23.9 (22.6 DEC and 25.9 DEP) and a weighted score of 26.6 (26.3 DEC and 27.2 DEP).

Table 5-11 What Would You Have Done Had You Not Received an Incentive (Intention) – New Construction

Response	Score	Respondents
Installed all standard efficiency or code equipment	0	5
Installed some energy efficient equipment, but less	Large reduction = 9.375 Moderate reduction = 18.75 Small reduction =28.125	27 Closer to standard efficiency or code (7) Closer to what you ended up installing (3) Somewhere in between (17)
Installed the same efficient equipment	Would have paid = 37.5 Would not have paid = 18.75 Don't know = 28.125	25 Would have paid (22) Would not have paid (1) Don't know (2)
Don't Know	18.75	0
Respondents (n)	**N/A**	**57**

Source: Customer Survey; FR1NC, FR2NC, FR3

5.3.2. Influence

When asked to rate the influence of the program on their decision to complete the energy-efficiency project, 158 out of 162 customer respondents rated at least one program aspect a 7 or higher on a 0 to 10 scale, where 0 means "not at all influential" and 10 means "extremely influential."

The average unweighted influence score was 1.3 (3.0 DEC and 0.3 DEP), with a weighted score of 2.0 (2.7 DEC and 0.5 DEP), meaning the program had a great deal of influence on customers. These results were consistent with the 2018-2019 evaluation (average unweighted influence score was 1.1 and the weighted score was 0.8).

Table 5-12 Influence of the Highest Rated Program Factor

Response	Influence Score	Retrofit	New Construction	All Respondents
0-1	50.00	0	2	2
2	43.75	0	0	0
3	37.50	0	0	0
4	31.25	0	0	0
5	25.00	1	1	2
6	18.75	0	0	0
7	12.50	1	1	2
8	6.25	4	11	15
9-10	0.00	101	40	141
Don't know	25.00	0	0	0
Total	**N/A**	**107**	**55**	**162**

Source: Customer Survey; FR4

The program factors that were rated the highest most often from retrofit customers were the incentive and the recommendation of the contractor or vendor. This is consistent with the prior evaluation where the incentive was the highest rated factor followed by the contractor. The program factors with the highest mean rating by retrofit customers was the support of their account manager (mean of 9.3 from 4 respondents) followed by the incentive (mean of 9.1 from 107 respondents). The table below shows how often each program factor was rated the highest for retrofit customers. When multiple items were given the same highest rating, the evaluation team counted them in each factor.

Table 5-13 Program Factor with the Highest Influence Rating - Retrofit

Factor	Highest rating	Lowest rating	Mean	Times Factor was Selected as Highest Rated*	Respondents
The support provided by your Duke Energy account manager?	10	7	9.3	3	4
The incentive provided by Duke Energy?	10	0	9.1	78	107
The recommendation from your contractor or vendor?	10	0	9.0	75	105
The support provided by your Duke Energy business energy advisor?	10 8	9.0	2	4	
The previous experience with the SmartSaver program in selecting qualifying equipment?	10	7	8.4	18	90
The bundle options, including the design assistance provided for your new construction project?	10 5	8.0	1	3	
The technical support provided by Duke Energy engineer staff?	10 5	7.8	1	4	
The calculators provided by Duke Energy?	10	0	7.0	6	99
The SmartSaver marketing materials or webinars?	10	0	4.7	4	100

Source: Customer Survey; FR4A, FR4B, FR4C, FR4D, FR4E, FR4F, FR4G, FR4H, FR4I
* When multiple items were given the same highest rating, the evaluation team counted them in each factor.

The program factor that was rated the highest most often from new construction customers was the previous experience with the Smart $aver program in selecting qualifying equipment (mean of 8.2) followed by the recommendation of the contractor or vendor and the incentive (mean of 7.7 for both).

Table 5-14 below shows how often each program factor was rated the highest for new construction customers. Like retrofit, when multiple items were given the same highest rating, the evaluation team counted them in each factor.

Table 5-14 Program Factor with the Highest Influence Rating – New Construction

Factor	Highest rating	Lowest rating	Mean	Times Factor was Selected as Highest Rated*	Respondents
The previous experience with the SmartSaver program in selecting qualifying equipment?	10	3	8.2	12	29
The recommendation from your contractor or vendor?	10	0	7.7	17	49
The incentive provided by Duke Energy?	10	0	7.7	20	54
The bundle options, including the design assistance provided for your new construction project?	10	0	7.4	10	50
The calculators provided by Duke Energy?	10	0	6.7	4	35
The support provided by your Duke Energy business energy advisor?	10	1	6.0	1	8
The technical support provided by Duke Energy engineer staff?	8	0	5.9	7	13
The support provided by your Duke Energy account manager?	9	1	5.7	1	3
The SmartSaver marketing materials or webinars?	10	0	5.6	5	33

Source: Customer Survey; FR4A, FR4B, FR4C, FR4D, FR4E, FR4F, FR4G, FR4H, FR4I
* When multiple items were given the same highest rating, the evaluation team counted them in each factor.

There were 102 customers who reported the contractor as influential, and we were able to complete 85 of those surveys from 14 contractors. Contractors generally corroborated customer-reported influence. Just two customer records had their influence score adjusted due to the contractor reporting greater program influence than what was reported by the customer.

5.3.3. Adjustments

The analysis further adjusted participant free-ridership by reviewing responses if customers provided inconsistent Influence and Intention responses. A total of 47 records were flagged as being inconsistent. After the evaluation team reviewed the open-ended responses, 10 were identified as supporting a higher free-ridership, 9 supported a lower free-ridership, and 28 remained ambiguous.

Two final adjustments were made for 1) retrofit customers who found out about the program after selecting the equipment and 2) customers who had changed their policies because of any Duke Energy conversations. Seven retrofit respondents had their free-ridership score adjusted, noting they had already selected the equipment before learning about the program. No customers indicated they had revised their policies based on their experiences with Duke Energy programs or discussions with Duke Energy staff due to the question not being asked.

5.3.4. Free-ridership Results

The following table shows the progression of the free-ridership value based on each of these adjustments.

Table 5-15 Progression of Free-ridership Adjustments (weighted results)

Type	Preliminary FR Score	Contractor adjusted FR Score	FR Score after Consistency Checks	FR Score after Adjusting for when Customer Heard about Program
Retrofit	20.5%	7.1%	6.4%	10.4%
New Construction	30.2%	30.2%	30.2%	30.2%
Total	**25.6%**	**19.3%**	**18.9%**	**20.9%**

The evaluation team reviewed the data for customers who said they installed additional equipment without a program incentive to calculate participant spillover. If the customer indicated the program had some influence on the project, the team reviewed the project details to determine the amount of spillover attributable to the program.

5.3.5. Spillover

Fifteen of 66 customers indicated they installed equipment without an incentive, and 11 customers said the program had some influence (i.e., a rating of greater than 0). Of the 11 customers who said the program was influential, 8 customers were able to provide enough detail for the evaluation team to quantify savings for the project. The evaluation team calculated program attributable spillover based on the gross spillover savings identified multiplied by influence rating score for each of the 8 participants.

Table 5-16 Participant Spillover Savings

Territory	Program Attributable Spillover	Verified Gross Program Energy Savings	Participant Spillover
DEC	88,201	59,574,530	0.15%
DEP	77,017	28,433,545	0.27%
DEC/DEP	165,2189	88,008,075	0.19%

The evaluation team talked with 27 contractors involved in projects completed by participating customers to calculate nonparticipant spillover. These were limited to retrofit projects as the implementer in the tracking data was listed as the contractor for new construction projects. The

evaluation team talked to these contractors about program-qualifying sales that did not receive a Duke Energy incentive. The number of projects contractors reported completing in the Duke Energy service territory ranged from 0 to 300 (as reported by 23 contractors). Of those projects, contractors were asked what percent received a Duke Energy incentive. Fourteen of the 23 contractors reported 100% or all their projects received a Duke incentive. Of the remaining 9 contractors, percentages ranged from 1% to 80%. Three of the nine contractors indicated that the equipment that did not receive a Duke Energy incentive did not qualify.

Nonparticipant spillover was attributed to the program if contractors indicated their Duke Energy program knowledge was responsible for some or all their sales that did not receive Duke Energy incentives. Six contractors providing a rating of their influence as shown in the table below.

Table 5-17 Nonparticipant Spillover Influence Values

Reported Smart $aver Program Influence	Number of respondents	Influence Value
1	2	0.0
2	1	0.5
3	2	0.5
4	0	1.0
5	1	1.0
Don’t know / Refused	0	0.0

The result of the analysis found an overall nonparticipant spillover rate of 3.44% based on 581 program incentivized projects divided by 20 unincentivized projects that were influenced by the program.

5.3.6. Net-to-Gross Results

The resulting free-ridership, spillover, and net savings are shown in Table 5-18 below. With a free-ridership ratio of 20.90%, the resulting net of free-ridership ratio is 79.10%. When the net of free-ridership, participant spillover, and nonparticipant spillover ratios are combined, the program's outcome is a 82.73% net-to-gross ratio for the two territories combined.

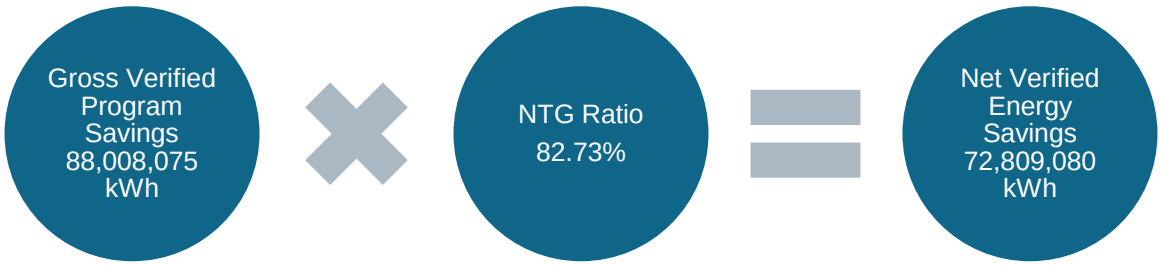
Table 5-18 Net-to-Gross Evaluation Results

Measurement	DEC**	DEP**	Combined (Carolinas)
Free-ridership (FR)	22.73%	16.62%	20.90%
Net of Free-ridership (1-FR)	77.27%	83.38%	79.10%
Program-influenced Participant Spillover (PSO)	0.19%	0.19	0.19%
Program-influenced Nonparticipant Spillover (NPSO)	3.44%	3.44%	3.44%
Net-to-Gross* (1-FR)+PSO+NPSO	**80.90%**	**86.98%**	**82.73%**

*Precision of ± 2.3% for free-ridership and ± 4.3% for spillover at the 90% confidence interval at the program level for the Combined (Carolinas)
**The NTG component numbers are reported for informational purposes only. Duke Energy is applying the Combined NTG value to Gross Verified Savings, as shown in the figure below.

The program net verified energy savings are calculated by multiplying the program net-to-gross ratio by the gross verified energy savings resulting from the impact evaluation activities described in Section 4.

Figure 5-5 Net Verified Program Savings Calculation



Net-to-gross was like the prior evaluation (82.73% compared to 83.12%). Comparisons across the evaluation years are shown in Table 5-19 below. The new construction projects in 2020-2021 were driving the program savings, which was different than the prior to evaluation cycles. The program team added additional adjustments to the FR calculation starting for the 2018 – 2019 evaluation, resulting in NAs in the table below.

Table 5-19 Free-ridership Comparison across Evaluations

Program Year	Number of Projects	Preliminary FR Score	FR Score after Consistency Checks	FR Score after Adjusting for when Customer Heard about Program
2020 – 2021	168	19.3%	18.9%	20.90%
2018 – 2019	236	28.5%	28.7%	30.9%

2015 – 2017	75	21.5%	NA	NA

We also reviewed results by measure type to look at the drivers of free-ridership. Lighting projects made up most of the program participation although savings for whole building (new construction) was slightly higher. Both the lighting and whole building measures were driving the results. Care should be used when reviewing some of these figures as the number of respondents is low for most measure categories.

The decrease in the free-ridership for the lighting measure category was likely a result of a couple of factors. First, Duke Energy expanded the types of projects that were eligible for prescriptive rebates, moving them out of the Custom program. Second, based on our previous evaluation, we found that the third-party vendors were highly involved in the national chain projects, so the evaluation team included their feedback in place of the customer. When third-party responses are included, lighting free-ridership is 8.2%, but it increases to 22.4% when responses for the chain accounts are excluded.

Table 5-20 Free-ridership Results by Measure Type

Measure	Gross (unverified) Population Savings (kWh)	Population Respondents (n)	Surveyed Savings (kWh)	Surveyed Respondents (n)	Free-ridership Ratio	2018-2019 Surveyed Respondents (n)	2018-2019 Free-ridership Ratio
Compressed Air	212,805	1	NA	NA	NA	1	75.0%
Food Service	91,363	14	NA	NA	NA	1	25.0%
HVAC	3,849,961	26	874,423	5	22.5%	23	9.7%
IT	582,051	1	NA	NA	NA	1	25.0%
Lighting	25,982,710	392	11,875,690	101	8.2%**	186	35.3%
Other	0	0	NA	NA	NA	N/A	N/A
Process	552,662	1	552,662	1	0.0%	4	48.9%
Whole Building	54,420,694	183	16,687,302	61	30.4%	20	21.3%
Total	**85,692,246**	**618**	**29,990,077**	**168**	**20.9%**	**236**	**30.0%**

* Includes an influential vendor for two chain accounts (regarding 200 sites) where we were unable to talk with the customers. These were aggregated into 6 unique strata, territory, and business combinations.
** Free ridership for lighting for the chain accounts was 0.3% and 22.4% for non-chain accounts.

In a review of the intention and influence scores that make up the free ridership, free ridership tends to be drive by intention. Respondents are indicating they were already thinking about doing a project. With the increase of whole building projects (new construction), the program is influential in the projects, as seen by the low influence scores in the Table 5-21. While customers are already indicating they were going to do a project or install energy efficient equipment, as seen by the high intention score, the program had high influence.

Table 5-21 Intention and Influence Results by Measure Type

Measure	Projects (n)	Intention	Influence
Compressed Air	NA	NA	NA
Food Service	NA	NA	NA
HVAC	5	22.5	0.0
Lighting	101*	3.8	0.1
Other	NA	NA	NA
Process	1	0.0	0.0
Whole Building	61	27.2	3.5

* Includes an influential vendor for two chain accounts (covering 200 sites) where we were unable to talk with the customers.

We also reviewed stratum results, which show similar results in that the lighting small stratum had the lowest free ridership. Free-ridership rates were highest among the large stratum, although the number of cases was low among the lighting large strata.

Table 5-22 Free-ridership Results by Stratum

Stratum	Gross (unverified) Population Savings (kWh)	Population Projects (n)	Surveyed Savings (kWh)	Surveyed Projects (n)	Free-ridership Ratio (%)	2018-2019 Surveyed Projects (n)	2018-2019 Free-ridership Ratio (%)
Lighting-Small	12,671,954	350	9,967,622	95	3.6%	164	40.8%
Lighting-Large	12,213,593	41	1,908,068	6	35.6%	22	28.4%
Non-lighting-Small	22,164,797	157	6,952,676	46	22.5%	40	30.9%
Non-lighting-Large	38,641,903	70	11,161,711	21	33.5%	10	22.0%

Stratum	Gross (unverified) Population Savings (kWh)	Population Projects (n)	Surveyed Savings (kWh)	Surveyed Projects (n)	Free-ridership Ratio (%)	2018-2019 Surveyed Projects (n)	2018-2019 Free-ridership Ratio (%)
Total	85,692,246	618	29,990,077	168	20.9%	236	30.0%

We reviewed the results by different elements to see if we could pinpoint any additional drivers. Appendix C shows the free-ridership scores by the different elements the evaluation team reviewed.

5.3.7. Benchmarking

To provide context to Duke Energy's NTG rates, the evaluation team conducted a secondary literature review, or benchmarking exercise, to examine NTG results for custom and new construction programs and measures for other utilities. This was not meant to be a comprehensive review of all custom and new construction programs but rather provide perspective on current NTG trends. Program design and delivery requirements may vary from the Duke Energy Custom program design and delivery.

The evaluation team reviewed publicly available reports from different jurisdictions, some of which use the same NTG methodology (i.e., PPL). The benchmarking exercise included 15 utilities, 12 with custom offerings, and 6 with new construction offerings. These utilities included the following: AES Indiana, Ameren, Black Hills Energy, Central Electric Power Association, ComEd, City of Palo Alto Utilities (CPAU), Focus on Energy, Mass Save, MidAmerican Energy, National Grid Rhode Island, NIPSCO, Oklahoma Gas and Electric Company, PPL, Vectren (now CenterPoint Energy), and Xcel Energy.

NTG ratios for custom commercial programs ranged from 35% (Central Electric Power Association) to 100% (Vectren). NTG ratios for new construction programs ranged from 38% (MidAmerican Energy) to 89% (Xcel Energy). Many Custom program NTG ratios were between 70% and 85%. The Duke Energy Custom program NTG falls within that grouping for both retrofit and new construction projects, While the peer utilities may have differences in the delivery, this provides a general comparison of similar programs.

Table 5-23 Commercial Program Benchmarking Summary

Category	NTG Ratio
Custom	35% – 100%
New Construction	38% – 89%

Specific Commercial New Construction program benchmarking resulted in three key findings:

- Most other program administrators deliver commercial new construction as a separate program, but many contain more than one rebate or incentive option.
- For some programs, participation is limited and there are only a handful of projects included in the evaluation, so NTG ratios are based on a few projects or benchmarked.
- Evaluation reports do not clearly indicate questions asked or calculations used to measure free-ridership for the design assistance delivery model.

While benchmarking of other Custom programs finds similar program designs, stand-alone commercial new construction programs can have a wide variety of delivery paths. Most commercial new construction programs we benchmarked consist of two to five paths. At a minimum, programs allow newly constructed buildings to apply for prescriptive rebates for energy-efficient equipment and provide a design assistance path. Others provide a wider array of options between prescriptive and modeled design assistance.

There are limitations to comparing benchmarked NTG values from other evaluations. In addition to the differences in program delivery, programs can serve limited customers and measurement procedures are not well-documented. Some evaluations are based on only two to six participants, which can lead to wide variation in results if there is even one outlier respondent. Other evaluations document the questions asked, but not how the questions were used in the calculation. Alternately, some document the calculation without including survey questions. Most evaluation reporting does not clearly delineate between prescriptive and design assistance NTG results where both are present.

Specific Nonparticipant Spillover benchmarking resulted in two key findings:

- There are very few benchmarked Commercial Custom program evaluations that include NPSO measurement. Most evaluations only measure participant free-ridership and spillover.
- Evaluation reports do not clearly indicate questions asked or calculations used to measure NPSO for comparison.

Although NPSO is only measured through a few evaluations, it can be an important part of a Custom program. NPSO represents the additional energy savings created by non-participating customers due to the influence that Custom programs have on contractor behavior. Duke Energy puts a significant amount of effort into building relationships with contractors through their Trade Ally Outreach Representatives. Those relationships, and the education that is provided, can impact the way contractors sell energy efficiency to customers, resulting in measurable NPSO.

6. Process Evaluation

6.1. Summary of Data Collection Activities

Process evaluation activities are designed to support continuous program improvement by identifying successful program elements that can be expanded or built upon and underperforming or inefficient program processes holding back program performance or participation. The data collection activities for the process evaluation of the NR Custom Program included a database review and interviews with key contacts involved in program operations, participating customers, and contractors who assisted customers with projects.

We interviewed a wide range of program staff for the 2018-2019 program evaluation. With little change to program design, and minor changes to program staffing, we conducted focused interviews for the 2020-2021 evaluation cycle to update our program information. These interviews included the new program manager, three energy efficiency engineers, and two application processors at Duke Energy. In addition, we interviewed AESC and Willdan for updates to their processes. Table 6-1 summarizes the process evaluation data collection activities for Duke Energy Carolinas and Duke Energy Progress.

Table 6-1 Summary of Process Evaluation Data Collection Activities

Activity	Completes
Duke Energy Staff	5 In-depth interviews
Implementation Staff	AESC and Willdan
Contractors	99 Telephone surveys with 28 unique contractors
Participants	162 Telephone surveys with participant projects (68 unique participant respondents)
Willdan Tracking Data Review and Analysis	176 Completed projects with savings and design team contacts. 233 Closed projects.
Application Processing Data Review and Analysis	111 Carolina records provided by Duke Energy, with status of why projects were rejected or closed. An application processing overview was also provided for review.

Using information learned during the staff interviews, the evaluation team developed data collection instruments designed to explore the research questions identified in Section 3 above.

6.1.1. Program Staff Interviews and Application Data Review

The evaluation team conducted five interviews in September and October 2022 with six Duke Energy's Smart $aver Custom Incentive program staff. To update our information on the program design and implementation practices, we talked with the program manager, three Energy Efficiency Engineers, and two application processers.

The program staff provided valuable feedback on operations, progress towards the program's stated (and unstated) goals and objectives, perceived barriers to program uptake, and modifications to any program components based on the previous program cycle and the rationale for those modifications. The information the team gathered assisted in designing the interview guides and surveys for customers and contractors.

Willdan is the firm that handles paperwork, modeling, technical assistance, and identification of measures as part of the program's new construction component. Willdan supports the NCEEDA effort, consulting on all types of systems (i.e., envelope, mechanical, lighting, water, process).

Alternative Energy Systems Consulting, Inc. (AESC) conducts the technical reviews for the program. All retrofit and new construction applications that are submitted are sent to AESC for two reviews: an initial review and a final review. After AESC's final review, large projects are forwarded to Duke Energy's Energy Efficiency Engineers for their review.

In addition to the staff interviews, the evaluation team reviewed the application screening process and the program tracking data to ensure necessary data and information was being collected to track program progress. Results from this review are presented in the next section (Section 6.2.5).

6.1.2. Contractor Interviews and Surveys

Contractors are important market actors, especially in large custom programs. For these programs to succeed, contractors must access and use calculation tools, navigate preapproval processes, and communicate the steps involved to project representatives.

The evaluation team selected all the implementation contractors associated with customer retrofit projects from the tracking database provided by Duke Energy. Any contractors in the list identified through the participant survey as "'influential vendors" were added or flagged for additional questions in the contractor survey. We also included third party vendors that work with national chain accounts in the contractor survey as influential vendors so we could quantify their responses and program influence on their projects. Willdan was listed as the contractor for all new construction projects.

General discussion topics in the survey included program awareness among customers, understanding of program guidelines and processes, interactions with customers, use of program incentives, and suggestions for improving the program. Influential vendors were also asked

questions about the specific projects if participating customers indicated the contractor influenced their decision to install energy-efficient equipment through the program.

To quantify the FR and SO from national chain stores, the evaluation team contacted management staff from identified third-party vendors. We spoke with them about decision-making contacts at the customer location and how their staff assists customers with project planning. As a result of these interviews, we added the third-party contacts to the influential vendor survey, with questions specific to their situation working with national chain accounts. We were able to complete one survey from a third-party vendor.

In February and March 2023, surveys were completed with 28 unique vendors. Overall, we completed surveys for 99 of the 139 projects sampled for the vendor survey – 85 of them were completed with Influential Vendors identified by customers and 14 were completed with non-influential vendors identified in the program tracking data.

The average survey length was 10 minutes, and the average number of telephone attempts was five. Table 6-2 outlines the contractor response rate for the evaluation.

Table 6-2 Contractor Response Rate

Disposition	Non-Influential Vendor Count	Influential Vendor Count	Overall
Sample	**37**	**102**	**139**
Residential line	0	0	0
Eligible Sample	**37**	**102**	**139**
Does not recall participating	0	0	0
Refusal	1	3	4
Incompletes (partial surveys)	0	0	0
Language barrier	0	0	0
Wrong number	3	2	5
Attempted but not completed	19	12	31
Completes (Projects)	**14**	**85***	**99**
Completes (Contractors)	**14**	**14****	**28**
Response rate (Projects)	**37.8%**	**83.3%**	**71.2%**

*An Influential Vendor for one customer responded regarding 66 sites.
**One of the influential vendors surveyed was a third-party vendor with two chain accounts.

6.1.3. Participant Surveys

Collecting survey data from program participants provides data suitable for quantitative analyses on participant characteristics and key aspects of the program. The evaluation team conducted a telephone survey with program participants, defined as customers who received an incentive through Duke Energy's Smart $aver Custom Incentive Program for PY2020 and PY2021. Surveys were conducted with program participants between December 6, 2022, and February 2, 2023. Surveys focused on customers' experience with the program, sources of awareness, decisions to install equipment, barriers to participation, satisfaction with various aspects of the program, and any program improvement suggestions. Surveys were completed for 162 of 618 projects completed through the program (68 unique respondents). It's worth noting that there were 249 chain-location cases – 49 had no knowledgeable contact after attempting them. Another 200 were not called for the participant survey as we confirmed the third-party vendor was most knowledgeable about the project. Table 6-3 outlines the participant response rate for the evaluation.

Table 6-3 Participant Response Rate

Disposition	DEC	DEP	Overall Carolinas
Sample	**352**	**266**	**618**
Residential line	0	0	0
Third-party vendor most knowledgeable*	108	92	200
Eligible Sample	**244**	**174**	**418**
Does not recall participating	11	4	15
Refusal	4	5	9
Incompletes (partial surveys)	1	0	1
Language barrier	0	0	0
Wrong number	8	0	8
Not completed	156	66	222
Completes (Projects)	**63**	**99****	**162**
Completes (Participants)	**47**	**21**	**68**
Response Rate (Complete/Starting Sample)	**25.88%**	**56.9%**	**38.8%**

*Cases listed under "Third-party vendor most knowledgeable" are chain accounts where there was no knowledgeable contact within the company. We called the third-party vendor and got their feedback on the program through the contractor survey.
**One customer accounted for 66 projects.

To achieve the 39% response rate, the evaluation team used a variety of methods to find a decision maker. These included the following:

- Sent emails to records with an email address, which were used to notify customers about the evaluation and request their response
- Conducted phone calls across different days and times during the field period. We averaged over ten phone attempts per sample point
- Coordinated with the impact evaluation team to share contact details
- Reviewed project file paperwork to identify additional staff that was part of the project to contact
- Emailed contacts to schedule appointments in addition to phone attempts to contact customers working remotely

6.2. Process Evaluation Findings

6.2.1. Program Staff

The program staff interviews helped the evaluation team understand how the program operates and design the interview guides and surveys for program participants and contractors. Some information from staff interviews has been used throughout the findings section to add context around respondent answers.

6.2.1.1. Roles and Relationships

Duke Energy enlists a wide range of staff to promote and deliver the Smart $aver program. In addition to the Program Manager, customers will work with Large Account Managers (LAMs) or Business Energy Advisors (BEAs) who get assistance from Energy Efficiency Engineers (EEEs). Trade allies (TAs), who are critical to the program delivery, get information and assistance from the Trade Ally Outreach Representatives. For new construction projects, Willdan works with both customers and design vendors to assist with project options.

Figure 6-1 Smart $aver Custom Program Delivery Support

6.2.1.2. Program Manager

The program manager has changed since the last evaluation. We interviewed the current program manager who has been with the program for four years. He reaffirmed the challenges of the Smart $aver Custom program, including a significant portion of the commercial load (mostly large customers) opting out of the energy efficiency rider and effects of the COVID-19 pandemic on project planning, business uncertainty, and supply chain challenges. These challenges have led to an overall decrease in program participation for 2020 and 2021, compared with much higher participation in 2018 and 2019.

The Program Manager also confirmed what we discovered during the participant tracking review; the new construction projects have been applying at higher rates. The proportion of new construction projects increased to 24% in 2020 and 36% in 2021 for DEC. The increase was not as pronounced for DEP (17% and 4% year over year). However, both are on track to continue increasing. This shift is also the result of a significant curtailment in existing building projects since the start of the COVID-19 pandemic as well as lighting saturation in the market.

The program is working to address the overall decrease in participation using a variety of strategies. One strategy has been to expand eligibility for more than just common areas in multi-family properties. The Program Manager reported success with over 200 multifamily buildings enrolling in the program. Another area of focus is outreach and messaging to customers. Program staff are working to be more proactive in outreach and discussing a wider range of benefits to the customer, including how projects can help meet sustainability and greenhouse gas reduction goals.

The Program Manager identified an area of potential confusion for customers interested in participating in energy efficiency programs. To meet a variety of customer needs, Duke Energy has

developed different paths for participation. Three paths are described on Duke Energy's website under Custom Incentives:

- **Classic Custom:** Customer choose this path if they have already calculated their project savings. Worksheets are available online for customers to summarize their savings information.
- **Custom-To-Go/Smart $aver:** Customers can use Duke Energy calculator tools to estimate their project savings. The Smart $aver Tools are available online. The lighting tool supports a mix of prescriptive and custom calculations.
- **Performance Path:** Customers are directed to use this path when there is a high degree of uncertainty in the traditional engineering calculations, including unknown building constraints, system constraints, or uncertain occupancy or production schedules. This method applies most often to retrofit projects and is tracked separately from the regular Custom projects that were part of this evaluation.

These different paths, along with the Fast Track option to shorten application review time, can create confusion for customers and trade allies. Program staff are working on a decision tree that will help staff and trade allies with customer conversations about participation. Duke Energy is working to communicate options more proactively with customers, in some cases offering free energy reviews or 15-minute consultations to start a dialogue with customers and simplify the process.

All Duke Energy staff, as well as Willdan, track their individual conversations with customers until the customer submits a pre-approval application. Once the pre-approval application is received, it makes its way through the process described in more detail in section 6.2.4. It starts with review by the Duke Energy Application Processors before a thorough review by AESC and Duke Energy engineers.

Although Fast Track applications, which require an extra fee for expediting the application review, continue to decline because Duke Energy has gotten the review process down to about four weeks, there are still customers who do not proceed with projects through the program due to the application timeframe. For instance, if a customer is looking to get a project done in six months, and the wait time for the equipment is already six months, they may not be able to wait the 20 days for Duke Energy to make them a Custom incentive offer. What customers do as a result varies, but it has an impact on program participation.

6.2.1.3. Large Account Managers

Large Account Managers (LAMs) are responsible for large commercial and industrial customer needs. Each LAM works with specific customer segments or types, such as hospitals, schools, manufacturing, government, grocery, etc. The number of customers assigned to each LAM varies, depending on several factors, but generally ranges from 20-100.

6.2.1.4. Business Energy Advisors

Duke Energy has a team of 10 Business Energy Advisors (BEAs) that cover the Carolinas and the Midwest. BEAs are regionally based and assist small and medium business customers assigned to

them based on usage levels. They work with a much larger group of customers than LAMs do, with each BEA assisting anywhere from 500 to 4,000 customers. BEAs characterize themselves as the liaison between the customer and Duke Energy.

BEAs can work with several hundred customers on a wide variety of topics, include energy efficiency. To assist customers, BEAs must understand and access information on customer energy use and demand patterns. They look for opportunities for each facility to improve energy use, decrease cost, decrease demand, and access utility rebate programs. When BEAs cannot answer customer questions, they may enlist the help of other Duke Energy staff - particularly Energy Efficiency Engineers. BEAs may also assist customers in identifying trade allies to implement their projects, although BEAs are careful to remain neutral when suggesting contractors.

6.2.1.5. Energy Efficiency Engineers

Energy Efficiency Engineers (EEEs) review Smart $aver custom projects that come through AESC before they go to offer or payment. If needed, EEEs will work with customers to develop projects before application when LAMs and BEAs ask for assistance. The EEEs may also respond to questions from Willdan for new construction projects and interact with Trade Ally Outreach Reps when trade allies need guidance. To get an update on how the program was operating for the current evaluation cycle, we talked with three of the EEEs who work with customers in the DEC and DEP territories.

Like the Program Manager, the Energy Efficiency Engineers confirm that participation was lower in 2020 and 2021 due to the COVID-19 pandemic, that many lighting projects are now prescriptive, and that large customers opting out is still affecting participation.

EEEs report that a significant percent of the total load is opted out. In the Carolinas, customers can opt out regardless of their size (DEP annually and DEC every three years). Typically, once customers have opted out, it is difficult to get them to opt back in. It is hard to make the math work for large customers, although Duke Energy staff will work with anyone interested to work the numbers to maximize their incentives by identifying projects they can undertake and compare against their opt-in cost. Either account managers or EEEs can help customers with the calculation.

One EEE described the COVID-19 impacts as two-fold; it affected their ability to promote energy efficiency with customers and how customers would launch projects. The EEE indicated the ability of the customer to get a project going was less of an issue than the outreach during COVID-19. The more significant challenge, generating customer interest, was a result of limited ability to meet customers face-to-face during the pandemic, distracted customers as they attempted to keep their businesses running during high uncertainty, and lower consumption as they cut shifts and closed. Although 2020 and 2021 were difficult for outreach activities, in-person communication has resumed in 2022.

As a follow-up to findings from the last evaluation cycle, we asked EEEs about the tracking of communications prior to customers submitting an incentive application. It is common for Duke Energy staff to discuss projects with customers and EEEs help customers determine what is required for projects to be eligible for incentives. EEEs report that this type of customer assistance has

increased in the past few years as they strive for more proactive communication. However, while Willdan systematically tracks interactions with each customer, Duke Energy engineers and other staff track their own individual communication with customers and there is no centralized tracking of communication before the customer or trade ally applies for a project.

6.2.1.6. Trade Ally Outreach Representatives

Trade Ally Outreach Representatives (TA Outreach Reps) work with trade allies on prescriptive and custom projects. They make sure trade allies understand program requirements, equipment eligibility and assist with the application process.

Multiple TA Outreach Reps are working with contractors to educate them on rebates and incentives. Each TA Outreach Rep is assigned to a geographic area. When trade allies have questions about what qualifies for the program or how to complete the application that the TA Outreach Reps cannot answer, they typically turn to EEEs to get the information they need.

There is a Trade Ally section on the Duke Energy website where trade allies can register for customers looking for trade allies. TA Outreach Reps review the program rules and forms with contractors who register for the Trade Ally Network and in the process build a relationship with those trade allies. If contractors want training on the Smart $aver tools, the TA Outreach Reps will take care of the training.

6.2.1.7. Staff Influence

Across the 163 projects and 68 customers, 27 respondents said they interacted with Duke Energy staff prior to submitting their application for preapproval. Those respondents were asked to rate the influence of Duke Energy staff on their decision to complete their project on a 0 to 10 scale, where 0 was ‘not at all influential’ and 10 was ‘extremely influential.’

On average, respondents with an account manager rated their influence 7.7. Similarly, the respondents with BEA experience rated their influence as a 7.0 on the decision to complete the project. The average influence rating was a bit lower from those who worked with Duke Energy engineering staff. The seventeen respondents provided ratings from 0 to 10, for an average influence score of 6.4.

Table 6-4 Influence of Duke Energy Staff

	Mean	Minimum	Max	Don't know	Respondents
Account manager	7.7	1	10	0	7
Business energy advisor	7.0	1	10	0	12
Engineer staff	6.4	0	10	0	17

Source: Participant Survey; FR4B, FR4G, FR4F

6.2.2. New Construction - NCEEDA

There is a collaborative effort between Willdan and Duke Energy to deliver the new construction projects. The two parties pass potential leads and project information between each other, so communication is frequent. Willdan shares reports with Duke Energy staff monthly, detailing the status of projects and the number of projects validated each month. Willdan tracks prospective clients internally to be able to follow up with them and will enter the information into the Duke Energy system once the application is ready for preapproval. Willdan handles paperwork, modeling, technical assistance, and identification of measures as part of the program's new construction component.

Project Screening

Prior to sending potential projects to Duke Energy for preapproval, Willdan conducts screening to understand the level of project team interest and commitment to the design assistance process for each customer. Willdan provided the evaluation team with a tracking spreadsheet of projects they had screened out at various stages including reasons such as: lack of customer commitment to the program process, customer was too far along in their planning, budget was too tight and customer was only building to code, or other reasons.

Projects screened out prior to the 2020-2021 participation timeframe were done through discussions with the customer regarding the project timeline and customer interest in evaluating design alternatives. Projects were usually in the early stages of schematic design or design development and prospects were reviewed with Duke Energy.

In November 2020, an online application for new construction projects was launched. It included mandatory questions for customers regarding the impact of potential incentives on their budget discussion, the role of the design assistance in the customer's decision to include or keep energy efficiency in their design, and some optional questions about their willingness to consider energy-saving alternatives in their design. A couple of examples of questions are listed below:

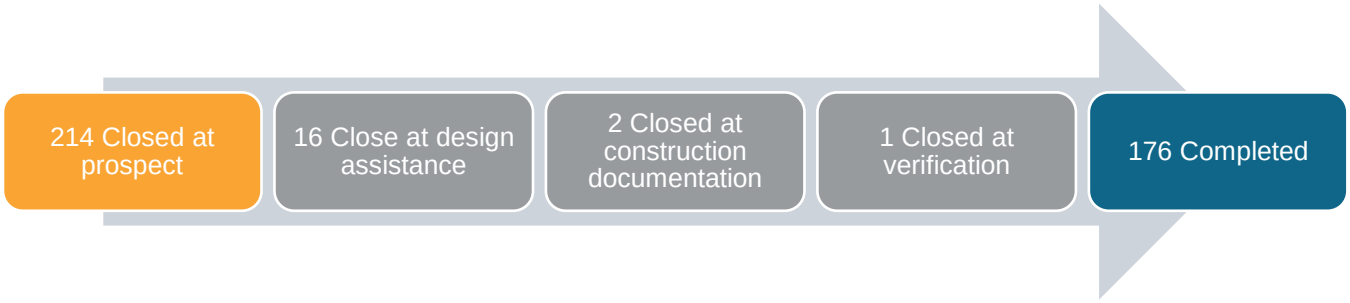
> Are you requesting Design Assistance services to allow the project to pursue improved energy efficiency? (Very, Somewhat, No)

Willingness to consider energy saving alternatives: Heating/cooling efficiencies (Very, Somewhat, No)

While the evaluation team believes the addition of the questions and screening process will help Willdan manage which customer projects best fit the program, we also believe that with some adjustments to the response categories for the screening questions, Willdan may be able to further understand and minimize intention and free-ridership. Given that these questions would not have impacted participation until the 2022-2023 timeframe, the evaluation will look at the data from these questions in the next evaluation phase.

The figure below shows the counts of closed projects in orange and gray and completed projects in blue as reported by Willdan for 2020-2021.[7] Closed projects are from an earlier timeframe that would have likely verified construction in the 2020-2021 timeframe. The prospect stage is early, before Willdan does modeling and sends the project to Duke Energy for preapproval. The quantity of projects screened out at the prospect stage (in orange), and the additional projects screened out after designs are presented (in gray), indicates commitment to serving customers that are open to design changes to meet program eligibility requirements and management of free-ridership.

Figure 6-2. Closed and Completed Project Counts from Willdan



As part of the review of Willdan's completed and closed projects, we looked at the types of businesses that were screened out and those that completed projects. General business types are shown in the figure below. Business types in the "Both" column had projects in both the closed and completed categories. A review of these projects indicates Willdan looks at each project independently for commitment to the modeling process.

[7] The reported data in Figure 6-2 is from Willdan's tracking data and may not match tracking data from Duke Energy.

Figure 6-3. General Business Types Closed and Completed by Willdan

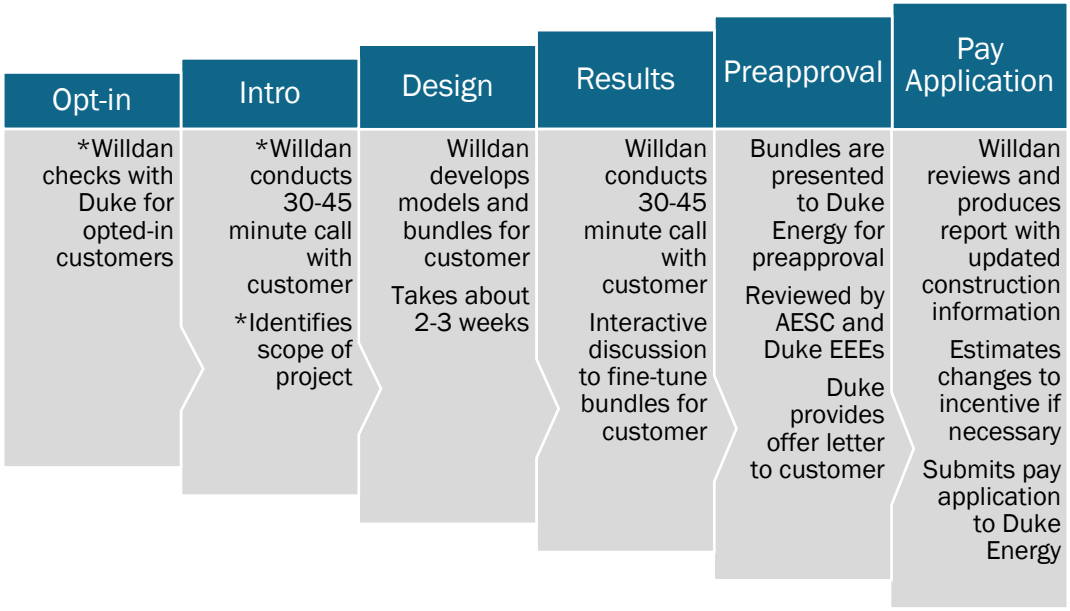
Closed	Both	Completed
• Grocery / Retail • Sports / Entertainment • Financial • Restaurant • Warehouse / Storage	• Municipal/Govt • Colleges • Primary Education • Office • Health Care • Hotel • Housing • Manufacturing	• Theatres • Convention Center

Post-screening Participation Process

Once Willdan determines the customer is a good fit for the program, they start by having a meeting with the customer and their team to identify scope, request documentation, and set goals for the project. After the initial meeting, Willdan works with customers to put a minimum of three design bundles together with different levels of energy efficiency. For some customers, Willdan will model an additional three to six bundles showing the overall design with one or two specific changes of interest to the design team.

A results meeting is scheduled with the customer to discuss the bundles where customers may modify the bundles and determine which option best fits their need and budget. The selected bundle is provided to the Duke Energy team for preapproval, which is reviewed by AESC and Duke Energy engineers. After the bundle is approved, the customer receives an offer letter. Willdan stays in contact with the customer throughout the construction process, advising on adjustments to ensure the customer can meet the selected bundle savings. Once a project is complete, Willdan verifies installation, gathers documentation, puts together reports, and submits applications to Duke Energy for the incentive.

Figure 6-4 NCEEDA Participation Process



Duke Energy staff feel that the NCEEDA offering has been successful and is becoming a larger part of the Custom program. They report a good working relationship with Willdan. This is confirmed by customers who rated their satisfaction with the design assistance highly at 8.7, using a scale of 0 to 10, where 0 is 'very dissatisfied' and 10 is 'very satisfied.'

We asked participant respondents what they found most helpful about design assistance. Below are some of their comments:

Suggestions for different fixtures and equipment.

They explained very well how we could achieve some of the different - like higher or lower - energy consumptions and savings. Without an architect we would not have seen such details.

Just handling the whole SmartSaver application process and verification.

Verification of life cycle costs, comparing models gave us the opportunity to fact check.

Fast turnaround time and getting suggestions on how to be a little more sustainable.

Analysis on cost saving on energy efficiency.

The cost saving and rebate.

Alternative ideas.

The payback math and the upfront vs payback modeling that they did.

Just the input and the timeliness, their expertise and responsiveness.

The specification of equipment.

Validation of our design.

Ensuring that we are getting the most out of the program, and having someone who is an expert to clarify and help get the incentive back.

They told us the 'why' and gave us some choices.

Pointing us in the right direction to energy saving items that we did not previously know of.

Having an understanding of where the compliance would be and what the program would be to achieve the savings.

The improvements to the energy efficiency of the design, it met the criteria we were looking for and helped us design a better building.

When asked what the program could have been done differently, respondents provided comments such as:

If there was a way to truly integrate the actual building we're building instead of a box model.

Better advertising. It's a great program. As a contractor and facility manager, I would love to be on an email list that helps me to understand which clients are eligible.

Savings from regional utility plants not captured.

Larger rebate.

More ads about the program.

Streamlining of the analysis.

Improve turnaround time.

Expand more to look at residential multifamily retail. That would be a huge help for us.

Even though Willdan did request the specs as early in the process as possible, had they forced me to pay attention sooner, I would have saved even more. Don't be shy about making the client evaluate their comments. We ran out of time to get the best equipment.

It's very lengthy, but I don't see how you could shorten it.

The SmartSaver program is great if they know how to utilize it. I think a lot of times the guys doing the work do not understand how to utilize the program.

6.2.3. Marketing and Outreach

Program staff use a variety of methods to reach out to customers, trade allies, architects, and engineers. They have used methods such as print materials, webinars, lunch and learns, emails, phone calls, and in-person visits. Duke Energy has designed and printed handouts for staff in the field to distribute to customers and trade allies. They mailed a postcard to communicate that programs were available and Duke Energy staff could help customers identify energy-efficient opportunities. Social media marketing was also reported to be an effective marketing tool.

Most LAMs and BEAs reach out directly to customers through email, phone calls, and in-person visits. TA Outreach Reps spend most of their time on in-person visits to recruit new trade allies and educate them on the program. The reps may drop off handouts or walk trade allies through the Smart $aver tools.

Willdan does most of the NCEEDA outreach; although they do get leads from LAMs, BEAs, and other Duke Energy sources. Willdan sees part of their role as educating the market and is marketing the program by building relationships with promoters such as architects and building organizations. To support this effort, Willdan has two full-time staff responsible for this outreach. They conduct outreach through sponsorship of different events, host lunch-and-learns, and speak at conferences. In early 2020, most conferences were canceled due to the COVID-19 pandemic but by later in the year, conferences attendance was virtual. Project timelines also shifted during the pandemic, as projects were delayed due to staffing constraints and delays in permitting. Willdan indicated that industrial customers were added in 2020, but there has been little activity with those customers. Most large customers tend to opt out of the program rider, making them ineligible for the program benefits. Willdan maintains that the pipeline is good and continues communications with architects and builders.

6.2.3.1. Participant Feedback

Traditional marketing channels, such as direct mail, account managers, ads on social media or other websites, and emails to a subset of customers by segment have been used to promote the program. The program also reaches out to builders and architects to support the new construction portion of the program. Trade Ally Outreach Representatives market the program directly to contractors, which Duke Energy staff indicates accounts for a significant percentage of projects.

When asked how they heard about the program, about one quarter of the program participant respondents (16 out of 65) listed their contractor or vendor as the primary source of awareness of the Smart $aver Custom program. This is consistent with the prior evaluation and with how the program was marketed. It is also a good sign, as participants reported contractors were influential in their decision to complete projects. Another quarter reported a Duke Energy representative as their primary source of awareness (16 out of 65) and previous program experience was also frequently mentioned.

Figure 6-5. Where Participants Heard About the Smart $aver Custom Program

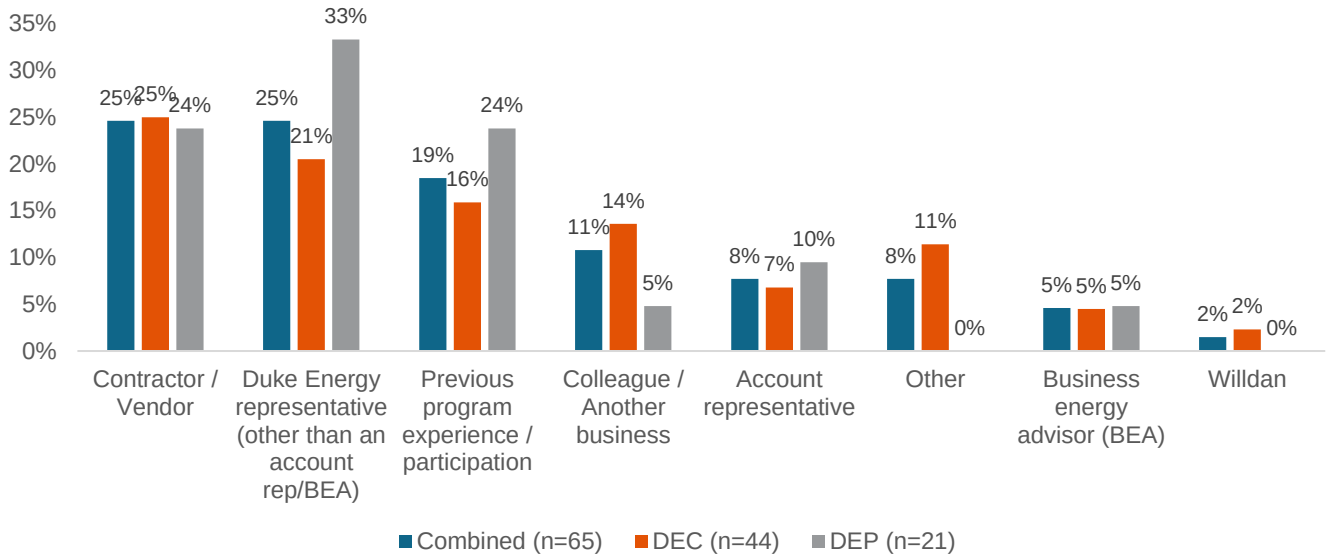


Table 6-5 shows the awareness sources for 64 respondents by retrofit and new construction projects. A Duke Energy representative (including Willdan) and previous participation are more common sources of program awareness for New Construction projects than Retrofit projects.

Table 6-5 Participant Source of Program Awareness

Source	Retrofit	New Construction	Overall
Contractor / Vendor / Architect	8	8	16
Duke Energy Representative	3	14	17
Duke Energy Account Representative	3	2	5
Duke Energy BEA	1	2	3
Previous Participation	3	9	12
Colleague / Another Business	5	2	7
Other	2	3	5

Source: Customer Survey; Q1
Don't know and refused responses are excluded

Program website materials note that the Smart $aver Custom incentives “can help you offset up-front costs and improve your bottom line.” This statement holds true when respondents were asked what made them decide to apply for Smart $aver custom incentives. Monetary savings and the

availability of the incentive were the most mentioned responses (49 and 34 respondents, respectively). Energy savings were the next most mentioned reason (30 respondents).

As a percent of responses, reasons for participating in the program were similar between retrofit and new construction participants, although, as expected, retrofit project participants were more likely to indicate the need for new equipment as a driver for program participation than new construction project participants (44% compared with 10%). New construction participants were more likely to suggest environmental concerns than retrofit participants (12.5% compared with 4%). Other reasons are included in Table 6-6.

Table 6-6 Reasons for Participating in Smart $aver Custom Incentive Program

Reason	Retrofit	New Construction	Overall
Save money	19	30	49
Incentive	14	20	34
Energy savings	11	19	30
Needed new equipment	11	4	15
Environmental concern	1	5	6
Following a recommendation	1	2	3
Better equipment for less	1	1	2
Respondents	**25**	**40**	**65**

Source: Customer Survey; Q6

6.2.4. Respondent Characteristics

As part of the evaluation, we spoke with a range of contractors and participants. This section summarizes contractor and participant respondent characteristics.

6.2.4.1. Contractors

The evaluation team surveyed 36 unique contractors, primarily associated with retrofit projects, who were involved in the installation of participating customer's projects during the evaluation period, including one third-party vendor.

We spoke with a mix of contractors from small businesses to large organizations, with responding contractors reporting having anywhere from one to 300 full-time employees with an average of 50. Half of the respondents (13 of 26) were smaller firms, with one to 10 full-time employees, seven had between 11 and 50, five had between 100 and 200, and one respondent reported 300 employees.

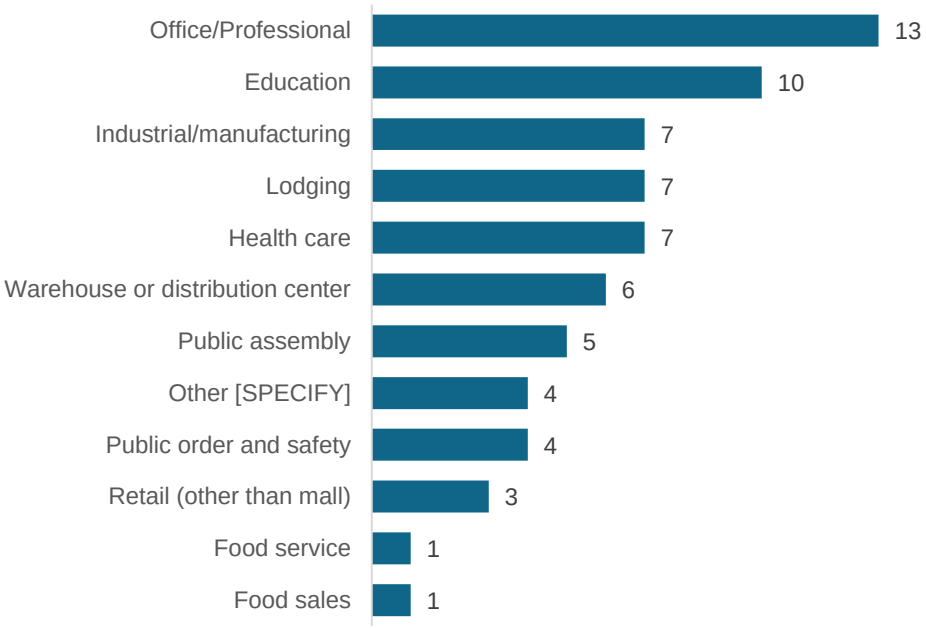
Most of the responding contractors (17 of 26) do not use part-time staff. Eight of the remaining nine respondents had nine or fewer part-time staff, the last one reporting 20.

6.2.4.2. Participants

Surveys were conducted with program participants or customers who received an incentive through the Smart $aver Custom Program. This section provides detailed findings from 68 unique customer respondents who completed the surveys.

Facility types varied across the 68 unique participant respondents. The most mentioned types of businesses were office/professional and education (13 and 10 respondents, respectively). Other common facility types included industrial/manufacturing, lodging, and health care (seven respondents each) and warehouse (six respondents). Figure 6-6 shows the business characteristics or respondents.

Figure 6-6 Smart $aver Custom Incentive Program Participant Characteristics

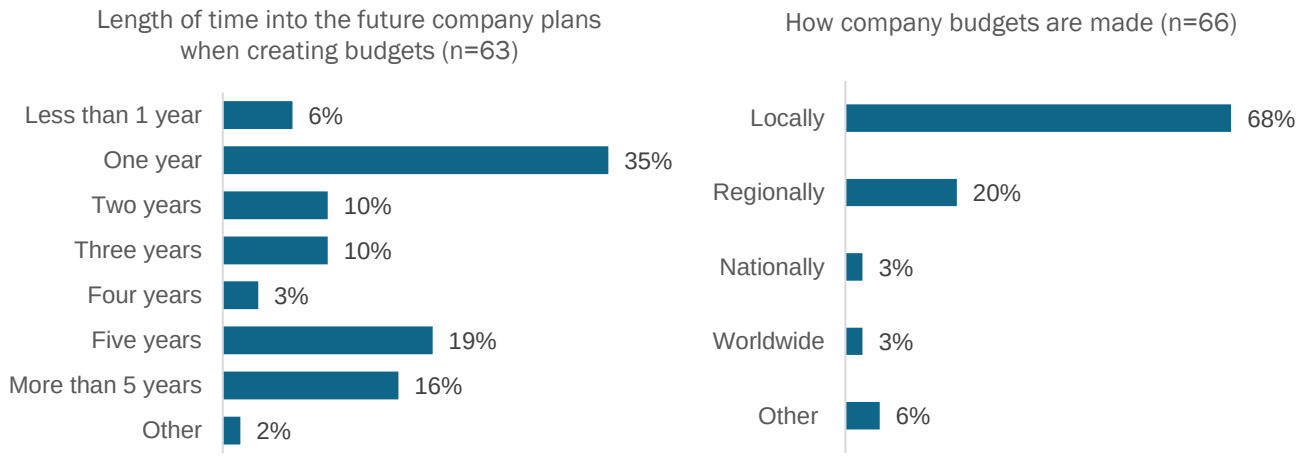


Source: Customer Survey; C1

When participants were asked how their companies make budget decisions, most respondents reported that decisions are made locally (35 respondents). Thirteen respondents said decisions are made regionally, two nationally, and two worldwide. When asked how far into the future their company plans, responses varied with 26 reporting one year or less, 14 between two and four years, and 22 said five years or more. Although retrofit and new construction respondents provided answers across all timeframes, new construction respondents (16) were more likely to answer “five

years" or "more than five years" than retrofit (6). Figure 6-7 shows the participant business planning responses.

Figure 6-7 Smart $aver Custom Incentive Program Participant Business Planning



Source: Customer Survey; C2, C3
Don't know and refused responses are excluded

6.2.5. Application Process

Once LAMs and BEAs get customers to the point of selecting equipment, they typically transition the project to a trade ally and the trade ally assists the customer with the application process. Duke Energy staff will help the customer complete the application, including getting an EEE involved to check eligibility and savings when the customer has questions beyond what the trade ally can resolve.

Most of the retrofit contractors we talked with (22 of 28) said they always complete the program application for their customers. Five contractors said they have withdrawn an application after submitting. Reasons included customers changing their mind about the project (2), the project did not meet the program requirements (1), and two said they have withdrawn an application for errors but submitted corrected forms.

According to Duke Energy program staff, the review process takes about four to six weeks. Duke Energy staff mentioned they have been meeting this turnaround time and typically exceed it. This is corroborated by the feedback provided by customer respondents, who were generally highly satisfied with the review process (Table 6-7). When asked about their satisfaction with various aspects of the application process, respondents rated their satisfaction highly, with mean scores of 8.4 or higher (using a 0 to 10 scale where 0 is 'very dissatisfied' and 10 is 'very satisfied'). When we look to see if there were any differences between customers who received design assistance for their new

construction projects and those who did not, we found similar satisfaction scores between the two types of customers, with retrofit customers rating the process slightly higher.

The lowest satisfaction score for an aspect of the application process was a three, which only one participant offered when asked about the process to fill out and submit their application. With the lower respondent count, one low rating can impact the mean rating and is not indicative of an issue with the application process overall.

Table 6-7 Satisfaction with Application Process

Application Aspects	Retrofit Mean	NC Mean	Overall Mean	Respondents
Duke Energy's processing and preapproval of your application	9.1	8.7	8.8	58
Process to fill out and submit your application	8.8	8.2	8.4	58

Source: Customer Survey; Q8, Q10
Don't know and refused responses are excluded

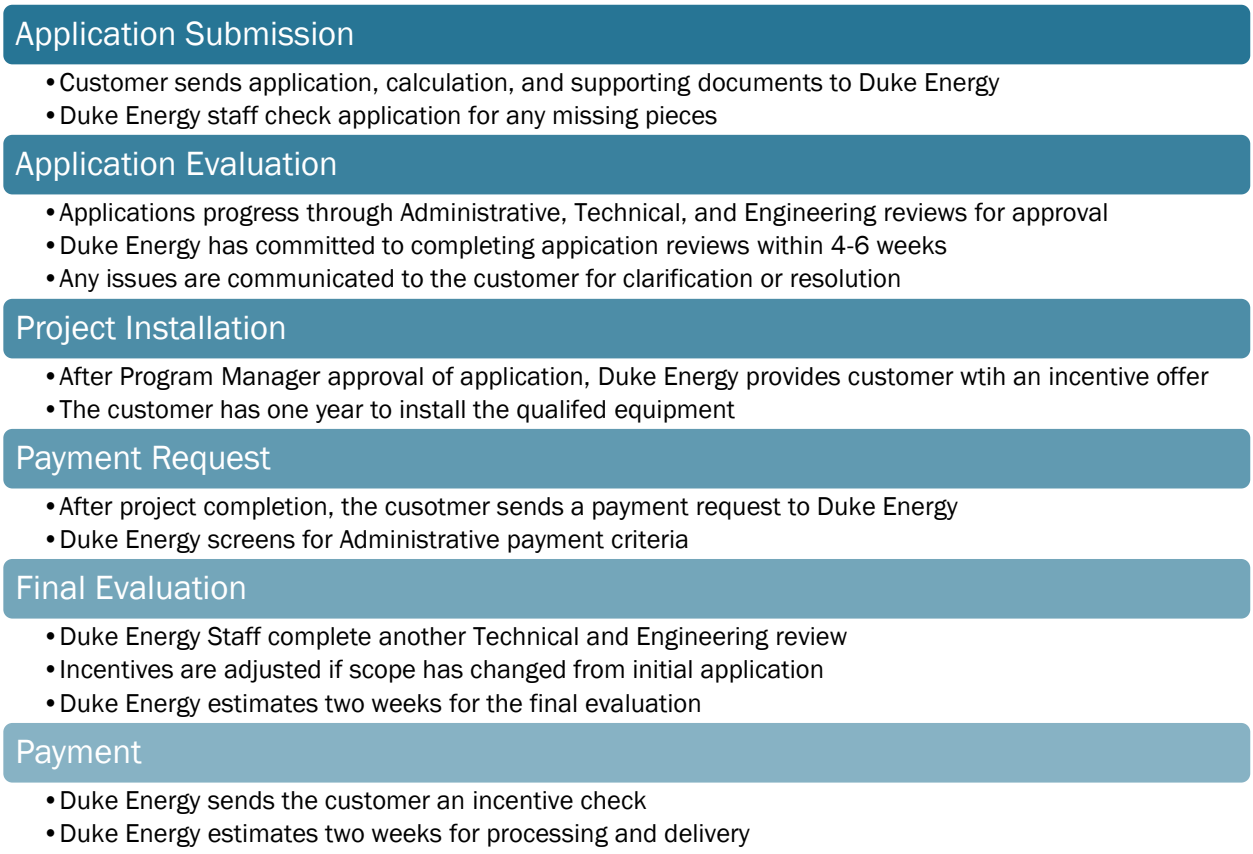
6.2.5.1. Application Review Process

The evaluation team reviewed the Duke Energy application process and found a thorough screening procedure in place as part of the pre-approval process. The Duke Energy team reviews applications to ensure the customer is opted into the efficiency rider, has not already purchased equipment or committed to the project, and meets the eligibility requirements outlined in their application.

Application processing staff provided the evaluation team with an overview document for the application review process. They also described having detailed documentation of each review step. The current application processing overview provides good documentation of the process from submittal of application to technical review. However, the remainder of the process from any requests for information to the offer letter, and post installation review is not included in the provided overview. It may be documented elsewhere, but one comprehensive document is advised to assist in the event of staffing changes.

As we heard from the program staff interviews, customers or trade allies initiate the application process, often with assistance from Duke Energy staff. The application then makes its way through the Duke Energy preapproval, installation, and payment stages that are shown in the figure below.

Figure 6-8 Smart $aver Customer Program Application Process



Alternative Energy Systems Consulting, Inc. (AESC) conducts the technical reviews for the program. All retrofit and new construction applications that are submitted are sent to AESC for two reviews: an initial review and a final review. In the initial review, the AESC team makes sure the necessary paperwork, such as spec sheets, cost sheets, calculations, are included with the application. Once the administrative pieces are verified, the application is further reviewed to make sure the claimed energy savings are realistic and will results in savings for Duke Energy. The AESC review is systematic, following a checklist for each technology, and done in a way that is repeatable to facilitate consistent reporting to Duke Energy. After AESC's review, large projects are forwarded to Duke Energy's Energy Efficiency Engineers for their review.

AESC communicates with Duke Energy's Energy Efficiency Engineers at least once a week to review open applications. AESC has goals related the number of days they must do the initial and final application reviews. AESC reported fewer application needing to be sent back to customers because of missing information. Improvements are attributed to calculation tools being available online, more repeat customers who are more familiar with the process, and smaller lighting projects going to the prescriptive program. AESC updates the calculators on a regular basis to reflect changes in things such as incentive amounts, measure life, and cost effectiveness rates. Additional improvements AESC suggested included additional outreach to customers and trade allies.

During the "Application Evaluation" stage, Duke Energy reviews the application for a host of items, including missing documentation, responses to application questions, and energy-saving calculations to determine incentive levels. To get a better perspective on how this screening process works, we asked Duke Energy staff to provide projects from the database that had not progressed through to payment and been closed out. The evaluation team received a data file with 111 applications from the DEC and DEP territories that were submitted but were not considered completed. During the previous evaluation cycle, there were approximately 900 applications in the reviewed application processing file, which confirms a substantial decrease in applications submitted.

As summarized in Table 6-8, the application review processes resulted in most of the cases screening out of the program for or not meeting cost effectiveness thresholds (n=24), early commitment (n=13), or qualifying for prescriptive incentives (13). Cases screened out for early commitment are identified through initial review of the application form response to Question E:

> *"A commitment includes but is not limited to signing a purchase order/contract, ordering equipment or starting construction. Have you made any commitment to your project? (Yes or No)"*

Table 6-8 Analysis of Incomplete Projects

Closed Reason	Count of cases
NC and SC Cases	**111**
Did not appear rejected (Contract approval, M&V Period, payment request received, approved for payment, ongoing)	**10**
Ineligible	**60**
Early commitment (Question E)	13
Does not meet eligibility requirements (e.g. not DLC listed)	4
Opted out	6
Outside Duke Energy territory	0
Payback too short / Not cost effective	24
Shifted to prescriptive incentive	13
Customer or TA request project close	**36**
Customer/TA request – NA	23
Customer/TA request – reason given	13
Customer nonresponse	**5**
No response to Request for Information	5
No response to Offer Letter	0

Ten of the cases were matched back with other applications or participants that may have completed projects through the program.

While the tracking of project application status was much cleaner in 2020 and 2021 than in 2018 and 2019, there were still inconsistencies in tracking and coding of applications. For instance:

- Some of the prescriptive incentives showed up as their own category under the Custom Closed Reason, while others showed up as a reason in the Processor Notes when the Custom Closed Reason was listed as Customer/TA Request. These could be more consistently coded using the Shifted to Prescriptive code.
- Eight projects have both a Stage and Status of "Paid" but also have a Custom Closed Reason of "Other," "Opted-out," "Early Commitment," or "Customer/TA Request." A few of them have notes on why they were not paid.
- Most of the applications rejected because the project was not cost effective were listed as "Other" under Custom Closed Reason, with Processor Notes on who rejected the case for not being cost effective. While the information in the Processor Notes field is helpful, it would be easier to track an important reason such as cost effectiveness as its own category under Custom Closed Reason.
- Cases where a customer or trade ally requested that an application is cancelled are recorded as Customer/TA request. These cases did not include a reason for the request to close the application. Duke Energy staff mentioned customers may let them know about the reason in their email or notification and there are references to "MSG-####" which refers back to numbered messages in the application documentation. This process does not allow for effective analysis of why projects do not move forward and may limit follow-up with customers. Those reasons could be captured in Processor Notes for quicker review as applications are processed to identify any issues the program staff can address.

In some cases, the Processor Notes provide a quick view of why a project did not move forward. For example:

> *TA confirmed project has not moved forward and it has been over a year since initially submitted. TA will help customer apply again if needed.*
>
> *Per MSG 299399: Please withdraw this custom application, we are going to utilize the SmartPath rebate program.*
>
> *Per email from TA, the customer will be using another fixture manufacturer to replace the 200w CFLs and the TA's design will not be used.*

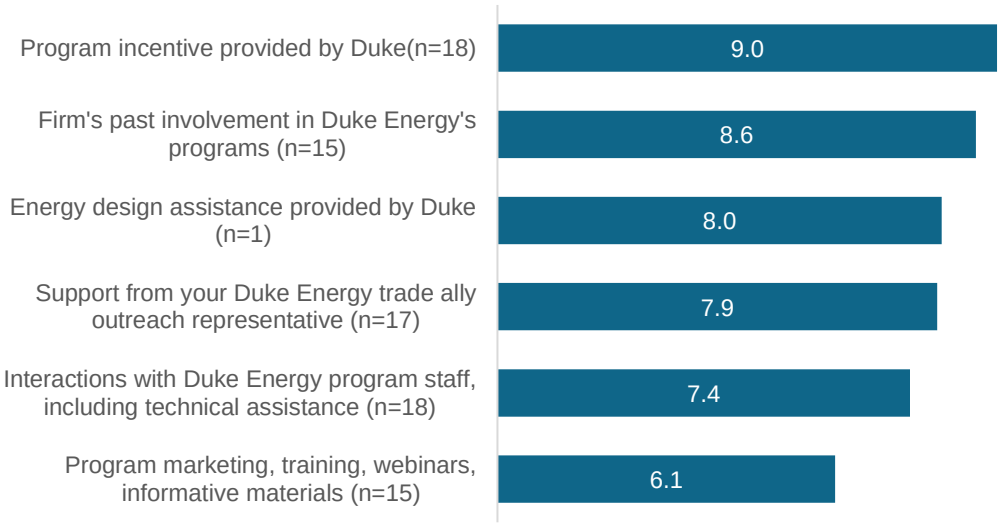
AESC feedback supports the results we saw through the application tracking review. They indicated the number of Request for Information cases have decreased, and the issues are more minor than what they have seen in the past. Application processing staff at Duke Energy indicated that the online portal process for application submittal has helped reduce the missing items that used to be a problem with paper submittals. Any applications coming from Willdan process smoothly, as they understand the requirements. Duke Energy staff send out three requests for information communications, after which the application is coded out as a Closed Lost.

AESC also felt that the review process was facilitated by more small lighting projects shifting to the Prescriptive program, and large complex custom projects shifting to the Performance Incentive option. While the shift in projects does not help the Custom program meet its targets, it can help improve the review time for the Custom applications.

6.2.6. Contractor Interaction with Customers

For the projects that went through the program, contractor respondents felt the program incentive provided by Duke Energy was the most influential factor on a customer's decision to complete their project. Respondents were asked to rate the influence of various factors on their recommendations to customers on a 0 to 10 scale, where 0 was 'not at all influential' and 10 was 'extremely influential.' As shown in Figure 6-9, the incentive received an average score of 9.0, while the second most influential factor was the firm's past involvement in Duke Energy's programs (8.6). These two factors were also rated the highest in the last evaluation.

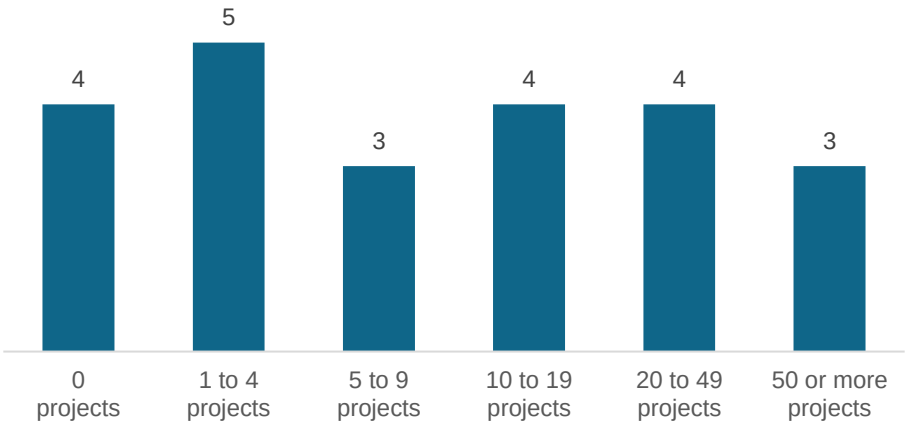
Figure 6-9 Influence of Program Components



Source: Contractor Survey; FR2
Don't know and refused responses are excluded

Figure 6-10 shows the number of similar projects sold within the last 12 months to Duke Energy nonresidential customers from contractors who participated in the program. Four contractor respondents indicated they had not completed any similar projects in the last 12 months. The rest of the responding contractors reported a wide range of project counts, with three indicating they had completed 50 or more projects.

Figure 6-10 Number of Similar Projects Completed in Last 12 Months



Source: Contractor Survey; P1
Don't know and refused responses are excluded

More than half of the contractor respondents (14 of 23) reported that all their high-efficiency projects like those done through the program received incentives through Duke Energy's program. Four said 50-99% of their projects received Duke Energy incentives, four said 10-49%, and one estimated under 10%. While not all the projects ultimately received Duke Energy incentives, 16 contractors indicated they discussed or offered the Duke Energy incentive as part of all their sales. Without the incentives, most respondents (17 of 23) felt their sales of the equipment would be lower, ranging from 3% lower to 100% lower.

Six respondents provided reasons for projects not utilizing Duke Energy rebates. Two indicated they had time constraints, with one specifically citing the payback period. Two other respondents said customers had been opted out of the program, and the last two reported that customers were not aware of the program.

We asked participating customers to describe how they selected the energy efficient equipment or project. Less than 20 percent of respondents said they did some research on efficiency and made their own choice. The other 80 percent worked with some combination of contractors, engineers, or Duke Energy staff to get recommendations and select their efficient equipment.

DEC respondents were more likely to say they had a contractor suggest various efficiency levels than DEP respondents. DEP respondents were more likely to say their contractor suggested one efficiency level or that their contractor selected the efficient equipment based on customer specifications.

Retrofit respondents were more likely to have their contractor suggest one efficiency level than New Construction respondents, which is expected. New Construction respondents were more likely to specifically call out help from Willdan and Duke Energy.

Table 6-9 How Participants Selected Their Energy Efficient Projects

Reason	Territory		Overall	Project Type	
	DEC	DEP		Retrofit	New Construction
We gave our specifications to a contractor who managed and made the equipment selection	21.3%	33.3%	**25.0%**	25.9%	26.8%
Our contractor suggested various efficiency levels and we chose one	29.8%	9.5%	**23.5%**	25.9%	26.8%
Our contractor suggested one efficiency level and we agreed	17.0%	23.8%	**19.1%**	25.9%	14.6%
We did some research on efficiency and made our own choice	19.1%	14.3%	**17.6%**	18.5%	17.1%
Willdan and engineers	6.4%	9.5%	**7.4%**	0.0%	7.3%
Something else [SPECIFY]	4.3%	4.8%	**4.4%**	3.7%	2.4%
We worked with Duke staff who recommended the specific efficiency	2.1%	4.8%	**2.9%**	0.0%	4.9%
Respondents	**47**	**21**	**65**	**27**	**41**

Source: Customer Survey; Q4a

Participant responses are similar to what we heard from interviewed contractors. A high proportion (16 of 26 contractors) said they offer customers multiple options including low, medium, and high efficiency equipment. Another seven said they recommend one option to customers, that tends to be high efficiency. Two said they recommend whatever equipment is currently in stock. In addition, 20 of 28 contactors said they incorporate the Smart $aver incentive before the customer selects their equipment and another six incorporate them after equipment is selected.

6.2.7. Program Satisfaction

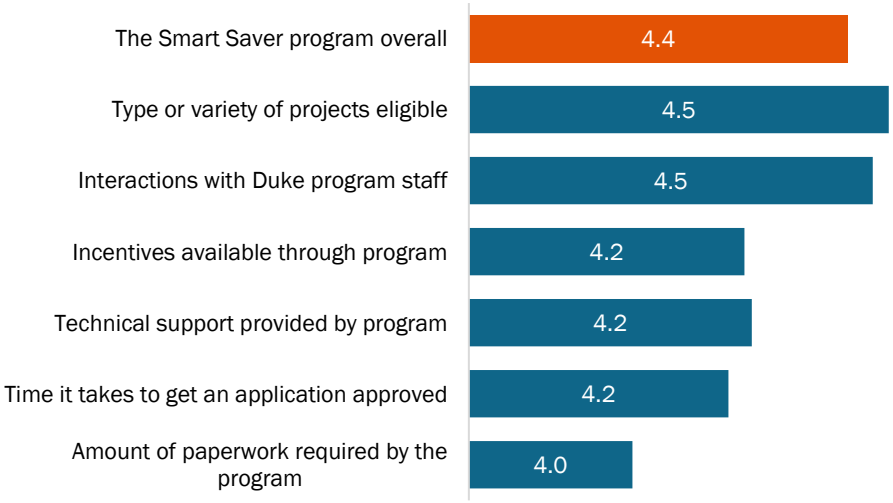
We talked with both contractors and participants about various aspects of their satisfaction with the Smart $aver Custom Incentive Program. Overall, contractors and participants are happy with their program experiences. Detailed results are described below.

6.2.7.1. Contractors

Contractor satisfaction remains high with the Smart $aver Custom Incentive program. Respondents were asked to rate their satisfaction on a 1 to 5 scale where 1 was ‘not at all satisfied’ and 5 was ‘very satisfied.’ On average, contractor respondents rated their overall satisfaction with the program 4.4 (consistent with the 4.3 in the last evaluation).

Contractors were also asked to rate their satisfaction using the same scale with different program components. Contractors were generally very satisfied with the program, with all the component mean scores higher than or equal to 4.0. As shown in Figure 6-11, two program components had the highest mean score of 4.5; the contractors' interactions with Duke Energy program staff (4.6 in prior evaluation) and the type or variety of projects eligible for the program (up slightly from 4.2). Like the past evaluations, the lowest rated item was the program's paperwork (4.0 compared to 3.7).

Figure 6-11 Mean Contractor Satisfaction Rating with Program Components (n=28)

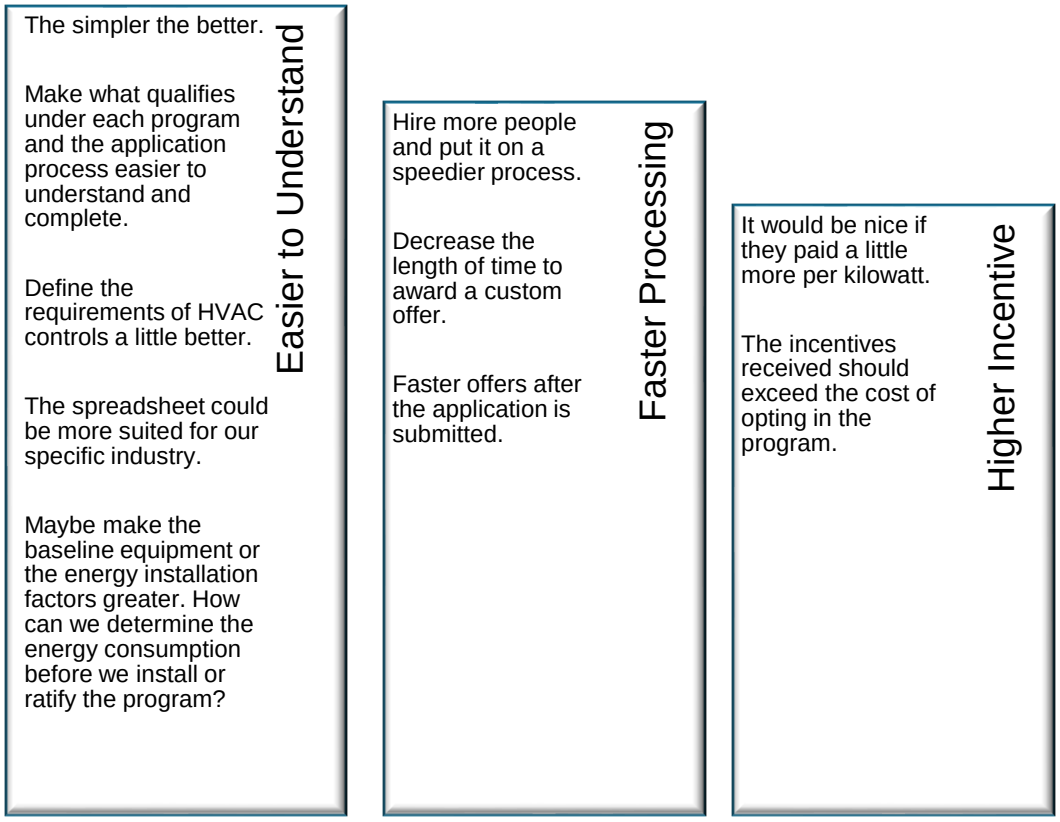


Source: Contractor Survey; S1, S3A, S3B, S3C, S3D, S3E, S3F
Don't know and refused responses are excluded

While there can be some confusion about the differences between the custom and prescriptive programs, most contractor respondents said they understood the differences between the two programs. Twenty-one of 28 contractors said it was "very easy" (14 respondents) or "somewhat easy" (7 respondents) to understand the differences in equipment eligibility between Duke Energy's Custom and Prescriptive programs. One respondent found it "neither easy nor difficult" and six respondents felt it was "somewhat difficult."

As far as improvements with the program, 15 of the 28 contractor respondents indicated they had no recommendations for program changes. This is almost 10 percent better than the last evaluation when 16 of the 36 contractors surveyed said they could not think of any improvements. For the remaining 13 respondents, one contractor suggested more efficiency and equipment options. Other suggestions included making the program easier to understand, faster application processing, and increasing incentives. Specific suggestions are summarized in Figure 6-12.

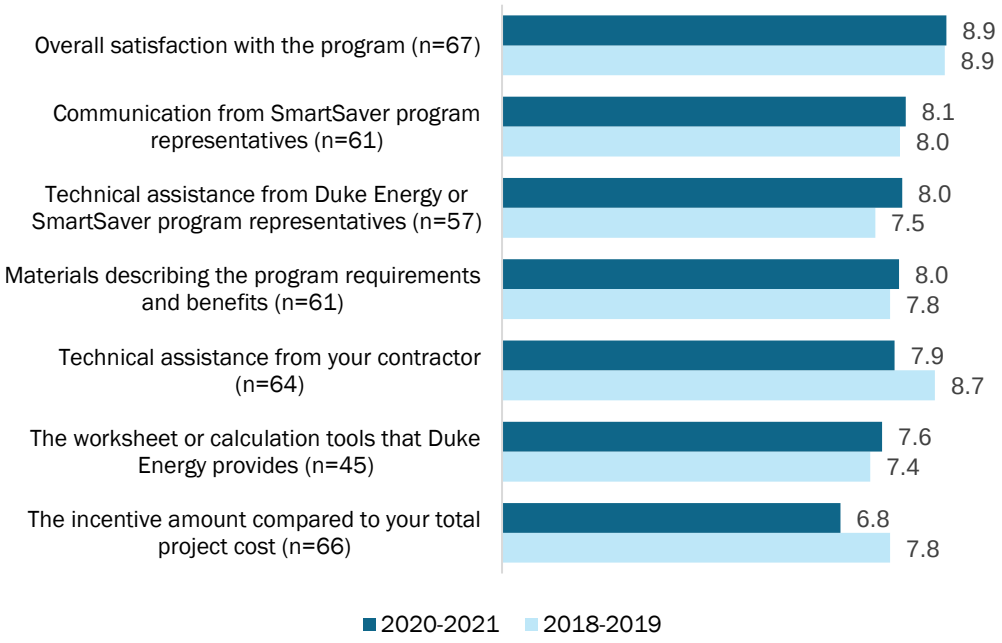
Figure 6-12. Contractor Suggestions for Program Improvements



6.2.7.2. Participants

Overall, program participants were satisfied with the Smart $aver Custom Incentive program. Respondents were asked to rate their overall experience with the program and with Duke Energy on a scale of 0 to 10, where 0 is 'very dissatisfied' and 10 is 'very satisfied.' Respondents were also asked to rate the value of different program components on a similar 0 to 10 scale where 0 is 'not at all valuable' and 10 is 'very valuable.' All program aspects were rated an average of 6.8 or higher. Respondents rated their overall satisfaction with the program highly (8.9 out of 10.0), consistent with the average rating from the prior evaluation (Figure 6-13).

Figure 6-13 Program Participant and Value of Program Aspects



Source: Customer Survey; SAT11, SAT5A, SAT5B, SAT5C, SAT5D, SATD5E, SAT5F
Don't know and refused responses are excluded
* Program aspects with the largest change in ratings since previous evaluation.
Counts are from the 2020-2021 evaluation.

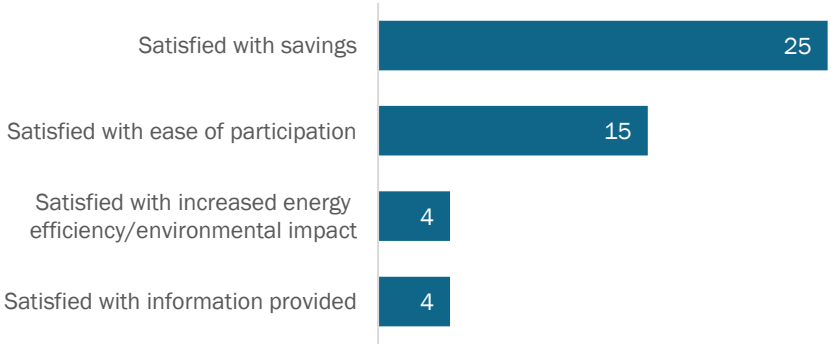
Average ratings for the value of most program aspects did not change much from last evaluation. Technical assistance from the contractor and the incentive amount were rated slightly lower during this evaluation cycle. Ratings were slightly lower from new construction participants compared with retrofit participants on the value of all aspects. However, there were no clear indicators or explanations in responses for why the ratings from new construction respondents were lower.

Table 6-10. Average Value Ratings by Project Type

	New Construction	Retrofit
Communication from SmartSaver program representatives	7.6	9.0
The worksheet or calculation tools that Duke Energy provides	6.9	8.8
Materials describing the program requirements and benefits	7.6	8.6
Technical assistance from Duke Energy or SmartSaver program representatives	7.8	8.4
Technical assistance from your contractor	7.5	8.4
The incentive amount compared to your total project cost	6.0	8.0

All respondents were asked about the reason for their overall program satisfaction. Many respondents stated the primary reason for their satisfaction was due to the savings (25 respondents), which included both project savings and incentives. Other reasons included include the ease of participation (15 respondents), the increased efficiency (4 respondents) and the information provided (4 respondents). These responses can be seen in Figure 6-14.

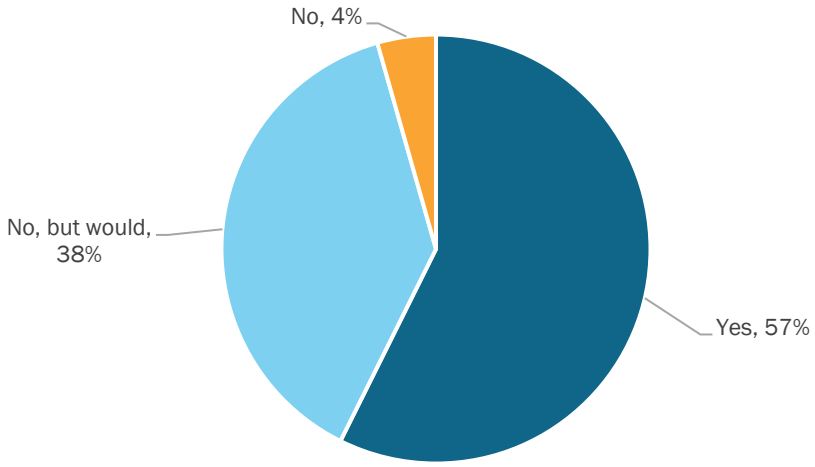
Figure 6-14 Reasons for Rating the Program Highly



Source: Customer Survey; SAT12

As another gauge of satisfaction, customers were asked if they had recommended the program to others. As shown in Figure 6-15, more than half of the participants have already recommended the program, which has increased since last evaluation (49 percent). Many others (38 percent), said they would recommend the program if given the opportunity. Only three participants said they would not recommend the program to others. So, apart from some satisfaction scores being lower than in prior years, participant respondents are very satisfied with the program, and they are encouraging others to use it. New construction participants have recommended the program at a higher rate than retrofit participants (63% compared with 48%), but all the retrofit participants would recommend the program. The four percent “No” in the graph are new construction respondents.

Figure 6-15 Have You Recommended the Program to Others?



Source: Customer Survey; SAT8, SAT9

Examples of comments from satisfied participants include:

It was a smooth and seamless program, which I like because I've got a lot going on. (Retrofit)

The rebate given was extremely valuable overall. The application process was a little tricky, but overall it's a good tool. We pay Duke a lot of money, so it's nice have that rebate and have some help with costs. (Retrofit)

The amount of money we saved. And we went from fluorescent lighting to LED. It was a lot better. It's savings over time, too, because you don't have to replace bulbs. (Retrofit)

Being in this particular affordable market - our budgets are exceptionally tight. Without these incentives there is no way we could have had the budget to provide more efficient items. (New Construction)

Having the incentive is great because it allows us to do more. The design assistance is a great gut check on what our designers have put forth for the building and help in the application process and not having to understand all the behind the scenes procedures is really valuable. (New Construction)

It gave me a leverage with the general contractor and the contractor in terms of the why we should do this or do that. I wouldn't have gotten the 14 grand, which was just the beginning. I'm saving every year I'm in the building. It's the long-term benefits. (New Construction)

It's been an excellent program, helped us achieve our energy reduction goals, and provided the rebates, helping us achieve our budgets and achieve our greenhouse gas reductions. (New Construction)

A few participants expressed concerns with program participation:

It's a lot of work to get a little bit of revenue. Our utility rates are affected by us accepting these incentives. They basically cancel each other out. Some projects it's really not worth applying for the incentive from Duke. (Retrofit)

Based on the amount of the incentives. A lot of them are not worth the paperwork. I work across the country, so I know how much incentives other states and other utilities are offering. Compared to what we are able to get in the south, a lot of times, it's not worth it to go through the program. (Retrofit)

It yielded very little and the cost was probably absorbed by what we had to pay the designer to interact with the program. (New Construction)

The final paperwork was burdensome. There was a lot of bureaucracy with the final paperwork before getting the check for $35,000. (New Construction)

Very detailed and long process. (New Construction)

When asked what they would change about the Smart $aver Custom Incentive program, 38 respondents indicated they would not change anything. The remaining 30 respondents provided the following suggestions: increase the incentive amount (7), include more types of equipment (6), improve initial application processing time (5), simplify the application process (5).

As far as how to simplify the process, one respondent mentioned the "*Direct communication with the program instead of the contractor*" while another said, "*The application terminology has to be explained by the consultant, and I would like to complete the application on my own.*"

7. Conclusions and Recommendations

7.1. Impact Evaluation

Conclusion 1: The evaluation team saw strong evidence the Duke Energy Program team continues to conduct detailed reviews of the project applications, has quality control checks, and revises measure parameters to refine savings estimates. Engineering reviews by AESC provides an additional level of quality control that helps to minimize most calculation errors or instances of over-claimed energy or demand savings. The strata-level realization rates indicate that an appropriate level of rigor is being applied to lighting projects and most non-lighting projects. With the increase in new-construction projects population, it is important to develop templates and methodology to reduce errors while calculating peak demand savings.

One area that may require additional attention is in the calculation of summer and winter peak demand savings for new construction projects. The evaluation team reviewed eight new construction projects that have summer or winter peak demand savings calculated incorrectly. Out of the eight projects, one project used an average of four hours whereas the other seven projects used hourly demand estimates from the new construction models that were one hour off the defined peak hour. This resulted in either higher or lower verified peak demand savings.

Recommendation 1a: Continue the level of rigor being applied to projects as it goes through the NR Custom application process while considering the following conclusions and recommendations.

Recommendation 1b: For new construction projects, improve methodologies used to calculate winter and summer peak demand savings to be consistent with Duke's peak demand periods definition and guidelines provided in the latest NCEEDA protocol for Carolinas. In the event that the peak period definitions cannot be applied, clearly state assumptions and provide reasoning before finalizing the project.

Conclusion 2: Of the parameters needed to calculate project energy and demand savings, operating schedules, annual hours of use, and/or seasonal operations were more often verified to be different than the those used to calculate reported savings. For example, in the summer months of June, July, and August, the ex-ante model for some school projects did not account for any building usage, whereas on-site visits confirmed that some of the school buildings were consistently operational throughout the summer. Applicants are asked to provide the operating schedules as part of the application process andthese should be reviewed and confirmed with building operators or business staff, not trade allies, as they will have the best insights into what the schedule will be for each installed fixture.

Recommendation 2: Improve the level of detail collected in the application on the hours of operation by verifying building schedules with facilities management staff versus the trade ally or program applicant. Collect data from the Building Management System (BMS) to verify building operations if this data is available. Examples of detailed data to collect could include working schedules, peak occupancy periods, holidays observed, seasonal vacancies, control types (occupancy, day-light

sensors etc.), and scheduled downtime. Incorporate these schedule details into the calculation of the annual hours of use, annual energy savings and peak demand savings. .

Conclusion 3: The Duke Energy NCEEDA protocol defines how savings from new, high-performance buildings shall be modeled and estimated. Assumptions on how the building is expected to be occupied and used are also required but do not always match how the new buildings are actually used or occupied. This can lead to the modeled consumption and savings not matching the actual consumption and savings. Duke Energy has begun implementing calibration requirements for certain NCEEDA projects as part of its 2022-2023 NR Custom program.

Recommendation 3a: The following are recommended guidelines to calibrate new construction models with the appropriate and minimal amount of post consumption data. These guidelines are referenced from the Uniform Methods Project Protocol[8] and expanded on based on the Evaluation Team's experience:

Post construction consumption data should sufficiently characterize a building's energy use, so modelers can extrapolate reliable annual energy-use values.

- Consumption data used for the calibration should cover time periods when the end uses included in the building's model are active (e.g., heating, cooling, lighting, etc.). The shoulder months of March, April, October, and November can effectively cover these periods.
- Consumption data during time periods that include end uses not included in the model (e.g., construction activities, tenant end uses, etc.) complicate the calibration effort and should be avoided, if possible.

Post construction consumption data should sufficiently capture expected seasonal variations in building operations.

- Consumption data for schools, resorts/hotels, sporting arenas and other building types that have seasonal changes to their occupancy and use should cover periods of both full and partial utilization.

- Building occupancy and operating conditions must be known for the period of post consumption data being used.
  - Model inputs should be verified from and adjusted to match how the building is being used during the periods the post construction consumption data was collected.
  - If occupancy is less than expected during the short period when the post construction consumption data is collected then the model should be calibrated to that level of occupancy. Once the model is shown to be calibrated to that level of occupancy, the modeled occupancy can be returned to nominal values to estimate savings.

Building occupancy and operating conditions must remain stable for the duration of post construction consumption data used for calibration.

[8] Chapter 15: Commercial New Construction Evaluation Protocol. The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures (https://www.nrel.gov/docs/fy17osti/68571.pdf)

- Consumption data during times periods when the building is being commissioned or when tenants are changing should be avoided.

Recommendation 3b: The evaluation team continues to recommend applying a tiered approach to requiring modeled calibrations that depends on the amount of estimated savings and/or incentives. For example, the implementer can start by using 3 months of appropriate post construction consumption data, and if the NMBE and CVRMSE are within reasonable bounds (i.e. error bounds can be set be Duke Energy team or consistent with ASHRAE 14 standards) the project can proceed, and if the data falls outside the error bounds, more data would need to be collected in an incremental manner (3, 6, and 9 months). Additionally, large projects (for example, savings greater than 1 GWh) start with collecting 6 months of post construction consumption data. We understand that the new post-project validation guidelines have been published in 2023. The evaluator will review these new guidelines in the next evaluation cycle.

Recommendation 3c: Verify and document the utility meter numbers and service accounts that will be serving the newly constructed building and/or renovations during the design and building process so the appropriate post construction consumption data may be easily located. Also, this will ensure correct utility data is used for the calibration of the model.

Recommendation 3c: Verify and document the utility meter numbers and service accounts that will be serving the new constructed building and/or renovations during the design and building process so the appropriate post construction consumption data may be easily located. Also, this will ensure correct utility data is used for the calibration of the model.

7.2. Process Recommendations

Conclusion 4: The NTG ratio reflects a high level of program influence. Custom program free-ridership continues to be driven by respondents indicating their intention to implement energy-efficient projects in the absence of the program. While the influence of the Custom program was calculated at 2.0%, which is a very high level of influence, the intention was calculated at 17.2%, resulting in a free-ridership score of 20.9%. With the increase in new construction projects, we looked at free-ridership by project type, resulting in retrofit projects at 10.4% and new construction at 30.2%. Duke Energy screens for early commitment to equipment with Question E of the preapproval application form and Willdan has their own screening process to manage the impact they can have on new construction designs. Benchmarking of other programs shows that many Custom program NTG ratios were between 70% and 85%. The Duke Energy Custom program NTG falls within that grouping for both the retrofit and new construction projects. Most other program administrators deliver commercial new construction as a separate program, but many contain more than one rebate or incentive option (such as prescriptive and various levels of assistance).

Recommendation 4a: Duke Energy should continue the strong screening practices for both retrofit and new construction projects to keep free-ridership low. For retrofit projects in general and new construction projects once they make it to preapproval, Duke Energy should continue to use

Question E and others to screen for commitment to equipment before an incentive offer is made to the customer.

Recommendation 4b: Willdan should continue its screening prior to preapproval as well. The evaluation team believes the addition of the questions and screening process are helping Willdan manage which customer projects best fit the program. However, Willdan should review and refine the response categories to their incentive impact questions that took effect in 2020 to better reflect the questions asked. For instance, for the question "Are you requesting Design Assistance services to: Allow the Project to pursue improved energy efficiency?" the current response categories are Very, Somewhat, and No. The response categories should be a Yes/No, or the question should be adjusted to flow better with the current response categories.

Recommendation 4c: Duke Energy should track the 3rd party design firm (architect, engineer, etc) contact in the participant tracking data to facilitate analysis of participation trends. These design firms can be a continued source of outreach to communicate program changes. Currently only the implementer, Willdan, is listed as the contractor in the participant tracking data. The evaluation team understands that Duke Energy's new tracking system may include this additional information.

Conclusion 5: Even though the proportion of new construction projects has increased, overall participation in the Smart $aver Custom program continues to decline, driven by a decline in retrofit projects. The COVID-19 pandemic has impacted supply chains and construction timelines. Business planning has been disrupted, and some energy efficiency projects become less important than keeping businesses running. Additional adjustments to the Custom program, like moving more lighting projects to the Prescriptive program, and shifting projects with uncertain energy savings to the new Performance path, also contribute to decreases in Custom participation and savings. There are also indications from survey comments that customers carefully consider the value of the incentive against the cost to opt into the efficiency rider before applying for a program incentive.

Recommendation 5a: Consider more direct marketing to potential retrofit customers to increase awareness of the Custom incentives and encourage early engagement with the program. Current materials are well-designed and direct customers to the website with additional supporting information. However, it is unclear how widespread awareness is across customers and contractors regarding custom retrofit incentive opportunities.

Recommendation 5b: To better understand how the retrofit and new construction components of the program are operating, Duke Energy could either split the components into separate programs, as many other utilities have done, or they can maintain the current joint program. If Duke Energy maintains the joint program, they should break the components out separately during evaluation reporting.

Conclusion 6: The preapproval process is screening out ineligible projects, but small improvements in tracking and documentation could help program staff understand participation barriers. While the tracking of project application status was much cleaner in 2020 and 2021 than in 2018 and 2019, there were still inconsistencies in tracking and coding of applications. For instance, a high use of

"Other" as a reason a project was closed for not being cost effective can hinder review of reasons applications are not resulting in completed projects. The ability to efficiently review the application database for barriers could help Duke Energy retain more projects or address consistent barriers. The evaluation team is aware that Duke Energy is working on a new tracking system that may address these issues, as well those suggestions listed below.

Recommendation 6a: With the continued shift of projects from Custom to Prescriptive, try to consistently record projects shifted to Prescriptive using the same category under Custom Closed Reason. Some of the prescriptive incentives showed up as their own category under the Custom Closed Reason, while others showed up as a reason in the Processor Notes when the Custom Closed Reason was listed as Customer/TA Request. These could be more consistently coded using the Shifted to Prescriptive code.

Recommendation 6b: Create another Custom Closed Reason for Not Cost Effective in the application tracking database. Most of the applications rejected because the project was not cost effective were listed as "Other" under Custom Closed Reason, with Processor Notes on who rejected the case for not being cost effective. While the information in the Processor Notes field is very helpful, it would be easier to track an important reason such as lack of cost effectiveness as its own category under Custom Closed Reason.

Recommendation 6c: Record the reason customers or trade allies request closing of applications. Cases where a customer or trade ally requested that an application is cancelled are recorded as Customer/TA request. These cases did not include a reason for the request to close the application, but most included a MSG-#### reference to the application documentation. That MSG-#### reference matches to an email or note saved in each set of application documentation. Those reasons could be captured in Processor Notes for quicker review as applications are processed to identify any issues the program staff can address.

Recommendation 6d: In addition, Duke Energy could add a flag to the application processing file to indicate if a project is retrofit or new construction to facilitate internal and external review of reasons projects are not making it to completion. This flag would allow for further analysis by Duke Energy or the evaluator of reasons projects did not complete by project type.

Conclusion 7: The current application processing overview provided to the evaluation team adequately documented the process from submittal of an application to technical review. However, the remainder of the process from any requests for information to the offer letter, and post installation review is not included.

Recommendation 7: Expand the application processing overview documentation to cover the entire review process from start to finish. Detailed steps can be documented separately and referenced in the overview document. The remainder of the process overview may be documented elsewhere, but one comprehensive document is advised to provide guidance when program staffing changes occur.

Appendix A Summary Forms

Duke Energy Carolinas Smart $aver NR Custom Program

Completed EMV Fact Sheet

Description of Program

Duke Energy's Non-Residential Smart $aver® Custom Incentive Program (NR Custom) offers financial assistance to qualifying commercial, industrial, and institutional customers in the Duke Energy Carolina (DEC) service territory to enhance their ability to adopt and install cost-effective electrical energy efficiency projects. The Program targets energy saving projects involving more complicated or alternative technologies, or those measures not covered by the non-residential Smart $aver Prescriptive Program. The intent of the program is to encourage the implementation of energy efficiency projects that would not otherwise be completed without the company's technical or financial assistance. The program requires pre-approval prior to the project implementation.

Summary		Strata	Verified Net Savings (kWh)
Region(s)	Carolina	L-Small (<195 MWh)	7,492,009
Evaluation Period	January 1, 2020 – Dec 31, 2021		
Annual kWh Net Savings	49,286,009	L-Large (≥195 MWh)	7,908,758
Coincident kW Net Impact - Summer	9,821		
Coincident kW Net Impact - Winter	6322	NL-Small (<328 MWh)	12,149,066
Net-to-Gross Rate (combined)	82.73%		
Process Evaluation	Yes	NL-Large ((≥328 MWh)	21,736,176

Evaluation Methodology

Impact Evaluation Activities

49 sample project analyses

Impact Evaluation Findings

Energy Realization Rate: 102.12%

Net-to-gross: 82.73%
(FR 17.2% intention and 2.0% influence)

Process Evaluation Activities

Program Staff; 5 interviews with program staff and 2 with implementation staff

Trade Allies; 99 telephone surveys from 28 contractors (coordinated with DEP)

Participants; 99 telephone surveys from 21 participants

Willdan and Duke Energy Application data review

Process Evaluation Findings

Program satisfaction is high, driven by the incentive and project savings.

The preapproval process is appropriately screening out ineligible projects.

COVID impacted contractors' business operations and sales

Duke Energy DEP Smart $aver NR Custom Program

Completed EMV Fact Sheet

Description of Program

Duke Energy's Non-Residential Smart $aver® Custom Incentive Program (NR Custom) offers financial assistance to qualifying commercial, industrial, and institutional customers in the Duke Energy Progress (DEP) service territory to enhance their ability to adopt and install cost-effective electrical energy efficiency projects. The Program targets energy saving projects involving more complicated or alternative technologies, or those measures not covered by the non-residential Smart $aver Prescriptive Program. The intent of the program is to encourage the implementation of energy efficiency projects that would not otherwise be completed without the company's technical or financial assistance. The program requires pre-approval prior to the project implementation.

Summary		Strata	Verified Net Savings (kWh)
Region(s)	Progress	L-Small (<44 MWh)	3,345,911
Evaluation Period	January 1, 2020 – Dec 31, 2021		
Annual kWh Net Savings	23,523,072	L-Large (≥44 MWh)	1,691,551
Coincident kW Net Impact - Summer	5849		
Coincident kW Net Impact - Winter	6213	NL-Small (<301 MWh)	7,286,135
Net-to-Gross Rate (combined)	82.73%		
Process Evaluation	Yes	NL-Large (≥301 MWh)	11,199,475

Evaluation Methodology

Impact Evaluation Activities

45 sample project analyses

Impact Evaluation Findings

Energy Realization Rate: 99.85%

Net-to-gross: 82.73%
(FR 17.2% intention and 2.0% influence)

Process Evaluation Activities

Program Staff; 5 interviews with program staff and 2 with implementation staff

Trade Allies; 99 telephone surveys from 28 contractors (coordinated with DEC)

Participants; 649 telephone surveys from 47 participants

Willdan and Duke Energy Application data review

Process Evaluation Findings

Program satisfaction is high, driven by the incentive and project savings.

The preapproval process is appropriately screening out ineligible projects.

Appendix B Verified and Net Impact Summary

Table B- 1 DEC - Verified Impacts per Project by Technology and Project Size

Stratum	Gross Verified Energy Savings per Project (kWh)	Gross Verified Summer Coincident Demand per Project (kW)	Gross Verified Winter Coincident Demand per Project (kW)	Free Ridership	Spillover PSO NPSO	Net to Gross Ratio
L-Small (<195 MWh)	45,737	2.09	7.18	20.90%	0.19% 3.44%	82.73%
L-Large (≥195 MWh)	735,363	96.92	95.77			
NL-Small (<328 MWh)	152,971	23.10	35.94			
NL-Large (≥328 MWh)	640,820	91.47	140.38			

Table B- 2 DEP - Verified Impacts per Project by Technology and Project Size

Stratum	Gross Verified Energy Savings per Project (kWh)	Gross Verified Summer Coincident Demand per Project (kW)	Gross Verified Winter Coincident Demand per Project (kW)	Free Ridership	Spillover PSO NPSO	Net to Gross Ratio
L-Small (<44 MWh)	26,434	2.57	5.08	20.90%	0.19% 3.44%	82.73%
L-Large (≥44 MWh)	81,787	9.34	14.14			
NL-Small (<301 MWh)	151,847	18.04	35.50			
NL-Large (≥301 MWh)	541,495	233.47	155.21			

Appendix C NTG Detail Table

Category	Response	n	Surveyed Savings	Verified Surveyed Savings*	Intention (weighted)	Influence (weighted)	Preliminary Free-ridership (weighted)	Free-ridership after adjustments (weighted)
Overall	Free-ridership	168	29,990,077	30,418,091	17.25	2.01	25.55%	20.90%
Work with Duke Energy staff prior to submitting application for preapproval (BG1)	Yes	27	8,611,301	9,012,619	21.67	3.92	25.59%	24.80%
	No	36	8,120,159	8,534,849	24.43	2.50	26.99%	31.15%
Formal requirements for purchasing equipment (BG3)	Yes	35	9,440,402	9,837,949	23.69	1.23	24.97%	27.79%
	No	27	5,887,386	6,212,439	21.06	6.38	27.58%	27.56%
Business type (C1)	Office/Professional	13	4,325,618	4,596,587	27.71	4.17	31.88%	31.88%
	Health care	7	3,398,503	3,619,943	34.96	2.01	36.97%	35.26%
	Lodging	7	1,612,592	1,709,797	23.36	0.86	24.22%	24.22%
	Public order and safety	4	518,818	564,160	12.91	0.00	12.91%	12.91%
	Industrial/manufacturing	7	1,639,670	1,641,022	18.47	12.50	31.50%	51.37%
	Other	4	432,687	460,823	14.70	3.04	18.96%	22.59%
	Warehouse or distribution center	6	2,142,411	2,181,159	5.05	0.00	5.05%	5.39%
	Food sales	1	15,365	15,529	37.50	0.00	37.50%	37.50%
	Food service	1	207,822	209,256	37.50	0.00	37.50%	37.50%
	Retail (other than mall)	3	196,635	203,452	34.00	0.00	34.00%	17.00%
	Education	10	1,970,296	2,033,345	24.67	2.87	27.54%	28.61%
	Public assembly	5	1,205,170	1,272,117	4.68	0.76	5.44%	5.44%

NTG Detail Table

Category	Response	n	Surveyed Savings	Verified Surveyed Savings*	Intention (weighted)	Influence (weighted)	Preliminary Free-ridership (weighted)	Free-ridership after adjustments (weighted)
Where budget decision are made (C2)	Locally	45	9,963,215	10,487,411	20.76	1.54	22.43%	24.20%
	Regionally	13	4,555,712	4,734,341	20.20	4.44	24.64%	23.98%
	Nationally	2	324,462	326,701	34.13	0.00	34.13%	34.13%
	Worldwide	2	413,654	409,278	24.60	2.02	26.61%	56.25%
	Other	4	1,662,567	1,765,436	33.26	8.34	41.61%	41.61%
How far into the future company plan budgets and financial plans (C3)	Less than 1 year	4	1,085,837	1,146,077	29.82	0.00	31.07%	30.80%
	One year	22	5,120,271	5,400,290	23.49	1.10	24.59%	24.30%
	Two years	6	2,111,617	2,188,987	14.94	1.49	16.43%	17.61%
	Three years	6	1,257,109	1,272,776	8.64	1.10	9.74%	23.81%
	Four years	2	373,008	420,118	20.03	0.00	20.03%	20.03%
	Five years	12	3,484,510	3,615,634	18.14	2.37	20.51%	19.63%
	More than five years	10	2,825,353	2,970,002	35.54	4.96	40.50%	44.58%
	Other	1	336,226	356,904	18.75	50.00	68.75%	68.75%
Did the equipment replace any existing equipment or was it a new type of equipment that you did not have (E2)	Replaced existing equipment	21	2,883,193	2,930,331	13.04	0.56	13.90%	27.17%
	New equipment	4	1,407,137	1,422,193	8.06	0.00	8.06%	4.03%
Condition of old equipment (E4)	Operating with no performance issues	6	336,197	343,781	13.02	0.00	13.02%	21.77%
	Operating but in need of repair	13	1,858,414	1,872,149	13.80	0.87	15.14%	34.31%
	No longer operating (broken, did not work)	1	135,920	157,925	50.00	0.00	50.00%	50.00%

NTG Detail Table

Category	Response	n	Surveyed Savings	Verified Surveyed Savings*	Intention (weighted)	Influence (weighted)	Preliminary Free-ridership (weighted)	Free-ridership after adjustments (weighted)
Influence of the incentive provided by Duke Energy (0-10) (FR4)	Not at all influential	4	957,979	949,002	39.24	0.87	40.11%	40.11%
	1	1	336,226	356,904	18.75	50.00	68.75%	68.75%
	2	1	2,891	2,922	50.00	25.00	75.00%	75.00%
	3	1	72,737	73,239	37.50	6.25	43.75%	21.88%
	5	11	3,300,431	3,526,452	36.85	9.00	46.01%	46.17%
	6	1	72,491	84,227	0.00	0.00	0.00%	0.00%
	7	20	2,940,642	3,030,365	24.50	1.09	25.59%	36.16%
	8	15	2,379,671	2,493,550	22.02	2.21	24.58%	25.26%
	9	9	2,525,093	2,651,168	9.35	0.00	9.35%	18.96%
	Extremely influential	98	9,664,879	10,238,951	20.89	0.00	20.89%	19.68%
Measure type (from sample)	HVAC	5	874,423	930,583	22.51	0.00	22.51%	22.51%
	Lighting	101	11,875,690	12,125,153	3.80	0.07	19.86%	8.20%
	Process	1	552,662	556,475	0.00	0.00	0.00%	0.00%
	Whole Building	61	16,687,302	17,702,682	27.23	3.51	30.74%	30.45%
Lighting (from sample)	Lighting	101	11,875,690	12,125,153	3.80	0.07	19.86%	8.20%
	Non-Lighting	67	18,114,387	19,189,740	26.21	3.24	29.45%	29.18%
New Construction project (from sample)	Non-New Construction	113	14,040,800	14,445,942	6.98	0.14	20.55%	10.40%
	New Construction	55	15,949,277	16,868,951	26.57	3.62	30.18%	30.18%
Previous program participation (Q5)	Yes	30	7,581,406	8,016,123	24.72	1.94	26.77%	25.73%

NTG Detail Table

Category	Response	n	Surveyed Savings	Verified Surveyed Savings*	Intention (weighted)	Influence (weighted)	Preliminary Free-ridership (weighted)	Free-ridership after adjustments (weighted)
	No	35	9,394,912	9,788,554	21.22	4.01	25.28%	28.95%
Strata (from sample)	Lighting Large	6	1,908,068	1,762,762	5.28	0.00	13.75%	35.56%
	Lighting Small	95	9,967,622	10,362,391	3.55	0.09	20.90%	3.55%
	Non-lighting Large	21	11,161,711	11,704,651	29.06	4.39	33.46%	33.46%
	Non-lighting Small	46	6,952,676	7,485,089	21.74	1.44	23.18%	22.48%
Third-party (identified using email addresses)	No	147	19,828,151	20,854,470	23.47	2.25	25.76%	26.90%
	Yes	6	7,604,199	7,774,360	0.25	0.00	25.00%	0.25%
	Unknown	15	2,557,727	2,686,063	21.48	6.04	27.73%	35.89%

*Savings incorporate the stratum-level realization rate with the exception of the overall category that uses the program-level realization rate

Appendix D Participant Survey

Duke Energy
Nonresidential Smart $aver Custom Program
Free-ridership, Spillover and Process Survey

2020 and 2021 Program Participants

Objective

This survey instrument will be used for computer-assisted telephone interviews (CATI) with participating customers in Duke Energy's Smart $aver Custom Incentives program to support the net-to-gross and process evaluations of the programs.

Customers will be asked about their program experience and the impact the program had on their decision to do the project.

Sample Variables

CASEID Unique case identification number

PROJECT_ID Participation ID number

COMPANY_NAME Name of company that participated

CONTACT_NAME Primary customer contact name

PHONE Phone number of primary contact

ADDRESS The address of the site where the measure was installed
CITY
STATE
ZIP

EMAIL Customer contact email address

MEAS Summary of project measure implemented
1 lighting
2 process equipment
3 compressed air

	4	HVAC
	5	food service equipment
	6	whole building (new construction)
	7	IT equipment
	8	other
MEAS_TXT		Sting version of measure
MEASTYPE		Type of measure sampled
MEASDESC		Detailed description of measure
NC		Flag for new construction project
	1	New construction
	0	Not new construction
YEAR		The year the measure was completed and paid (2020 or 2021)
INCENTIVE		The amount of the incentive paid for the measure
ThirdParty		Flag that customer worked with third-party contractor
	1	Did not work with a third-party
	2	Worked with a third-party
	3	unknown
STRATA		Strata used for sampling
	Lighting Large	
	Lighting Small	
	Nonlighting Large	
	Nonlighting Small	
STRATUM		
	NC	Duke Energy North Carolina
	SC	Duke Energy South Carolina
	IN	Indiana
	PN	Progress North Carolina
	PS	Progress South Carolina
Territory		
	DEC	Duke Energy Carolinas
	DEP	Duke Energy Progress
	DEI	Duke Energy Indiana
ANL_KWH		Total Annual kWh Gross w/o losses pre RR

ANL_PRJ_KWH Total Project Annual kWh Gross w/o losses pre RR

MULTFLAG Indicator if a customer contact, phone number or address appears multiple times
MULTID Unique ID associated with the multiple
MULTQTY Number of records associated with the multiple
PRIMARYCASE Primary case for the multiple group

VEND_COMPANY Vendor company
VEND_CONTACT Vendor contact name
VEND_PHONE Vendor phone number
VEND_PHONEXT Vendor phone number extension
VEND_PHONE2 Vendor alternative phone number
VEND_EMAIL Vendor email address

III_PIV

REP
MEAS_PROJ [SET EQUAL TO MEAS] Wording MEAS to refer to the project done
1 lighting project
2 process equipment project
3 compressed air project
4 HVAC project
5 food service equipment project
6 whole building (new construction) project
7 IT equipment project
8 "other" project

MEAS_EQUIP [SET EQUAL TO MEAS] Wording MEAS to refer to the piece of energy efficient equipment installed
1 lighting equipment
2 process equipment
3 compressed air equipment
4 HVAC equipment
5 food service equipment
6 whole building (new construction) equipment
7 IT equipment
8 "other" equipment

Introduction and Screening

INTRO Hello, my name is _____, and I am calling on behalf of Duke Energy.

May I speak with <CONTACT_NAME>?

01 Yes
02 No

SCREENER1 I'm calling from Tetra Tech, an independent research firm. We were hired by Duke Energy to talk with some of their customers about their participation in the SmartSaver Custom Incentive Program.

Our records indicate that you participated in Duke Energy's SmartSaver Custom Incentive Program that included a/an <MEAS_PROJ> in <YEAR> for <COMPANY_NAME> at <ADDRESS> in <CITY>.

Were you involved in the decision to complete the <MEAS_PROJ> as an employee of <COMPANY_NAME>?

01	Yes, I'm able to answer	
02	Yes, we participated but information is incorrect [SPECIFY]	
03	No, I'm not able to answer	[SKIP TO OTHER_R]
04	No, I don't recall participating	[THANK AND TERMINATE 82]
05	No, I'm a contractor [Ask for customer contact information / Do DA.] [SKIP BACK TO INTRO for DA]	
88	Don't know	[SKIP TO OTHER_R]
99	Refusal	[THANK AND TERMINATE 91]

MULTCHK [ASK IF MULTFLAG=1] [INTERVIEWER: Is this the first case of a multiple?

01	Yes, first case	
02	No, subsequent case	[SKIP TO NEXT SECTION]

PREAMBLE Great, thank you.

I'd like to assure you that I'm not selling anything, I would just like to ask your opinion about this program.

Your responses will be kept confidential and your name will not be revealed to anyone. For quality and training purposes, this call will be recorded.

01	Continue	[SKIP TO NEXT SECTION]

OTHER_R Is it possible that someone else at <COMPANY_NAME> would be more familiar with the program or the project that was completed?

01	Yes, there's somebody else [RECORD CONTACT INFO]	
02	No, nobody knowledgeable [THANK AND TERMINATE 81]	
03	No, I only signed for the project / Vendor handled it all	[SKIP TO VEND_CONT]
88	Don't know	[THANK AND TERMINATE 81]
99	Refusal	[THANK AND TERMINATE 91]

AVAILABLE_R May I please speak with that person?

01	Yes, currently available	[SKIP TO INT01]
02	Yes, but R is not currently available	[SET UP CALLBACK]
03	No	[THANK AND TERMINATE 91]
03	We have not participated	[THANK AND TERMINATE 82]
88	Don't know	[THANK AND TERMINATE 81]
99	Refusal	[THANK AND TERMINATE 91]

VEND_CONT Is the vendor you worked with the most knowledgeable about the decision to do the project?

01	Yes	[SKIP TO V1 and collect information]
02	No, there is no one else knowledgeable about the project	[THANK AND TERMINATE 81]
88	Don't know	[THANK AND TERMINATE 81]
99	Refusal	[THANK AND TERMINATE 91]

Program Awareness and Marketing

C_MULTSKIP1 [SKIP TO MEASCHK IF MULTCHK=02]

Q1 How did you first hear about the SmartSaver Custom Incentive Program?

01	Account representative
02	Business energy advisor (BEA)
03	Contractor / Vendor
04	Email from Duke Energy
05	Mail from Duke Energy
06	Colleague / Another business
07	Conference / Trade Show / Expo
08	Duke Energy website
09	Duke Energy representative (other than an account rep / BEA)
10	Previous program experience / participation

11 Willdan
12 Other [SPECIFY]
88 Don't know
99 Refused

Q6 What made you decide to apply to the SmartSaver program? [SELECT ALL THAT APPLY]

01 To save money
02 An incentive was available
03 For energy savings
04 Needed new equipment
05 Following a recommendation
06 Better equipment for less
07 Environmental concerns
08 Other [SPECIFY]
88 Don't know
99 Refused

Q5 Prior to your <MEAS_PROJ> in <YEAR>, had you participated in the SmartSaver program before?

01 Yes
02 No
88 Don't know

Application Process

Q8 As far as the application process, using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied", how satisfied are you with the process to fill out and submit your application?

00 Very dissatisfied
01
02
03
04
05
06
07
08
09
10 Very satisfied

77 Was not part of the application process [SKIP TO Q4a]
88 Don't know
99 Refused

Q10 Using the same scale [IF NEEDED: "of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied"], how satisfied are you with Duke Energy's processing and preapproval of your application?

00 Very dissatisfied
01
02
03
04
05
06
07
08
09
10 Very satisfied
77 Was not part of the application process [SKIP TO Q4a]
88 Don't know
99 Refused

Q13 After submitting your initial application for preapproval, did you have any interaction or discussion with Duke Energy staff about your project?

01 Yes [SPECIFY: What was the topic of that interaction or discussion? (e.g., incomplete application, eligibility of equipment, expected incentive accounts)]
02 No
77 Was not part of the application process
88 Don't know

Q4a Which of the following best describes how your organization selected the new high efficiency equipment for the <MEAS_PROJ>? [READ LIST]
[Rotate options 1 through 5]

01 We did some research on <MEAS_EQUIP> efficiency and made our own choice
02 We worked with a contractor who suggested one <MEAS_EQUIP> efficiency level, and we agreed
03 We worked with a contractor who suggested various <MEAS_EQUIP> efficiency levels, and we chose one
04 We worked with Duke staff who recommended the specific <MEAS_EQUIP> efficiency

05 We gave our specifications to a contractor who managed and made the equipment selection
06 Something else [SPECIFY]
88 Don't know

New Construction Questions

C_NCQ_SKIP1 [SKIP TO NEXT SECTION IF NC=0]

Q19 As part of the new construction project, you received some level of design assistance from Duke Energy or Willdan.

Using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied", how satisfied are you with the energy design assistance you received through the Smart Saver program as part of your new construction project?

00 Very dissatisfied
01
02
03
04
05
06
07
08
09
10 Very satisfied
88 Don't know
99 Refused

Q20 What was most helpful about the energy design assistance you received?

[RECORD RESPONSE VERBATIM]
88 Don't know

Q21 What suggestions do you have for improving the energy design assistance?

[RECORD RESPONSE VERBATIM]
77 None
88 Don't know

Equipment Questions

C_EQ_SKIP1 [SKIP TO NEXT SECTION IF NC=1]

E1 Was the high efficiency <MEAS_EQUIP> installed as part of a new construction project?

01	Yes	[SKIP TO NEXT SECTION]
02	No	
88	Don't know	
99	Refused	

E2 Did the high efficiency <MEAS_EQUIP> you installed replace any existing <MEAS_EQUIP> or was it a new type of equipment that you did not have before?

01	Replaced existing equipment	
02	New equipment	[SKIP TO NEXT SECTION]
88	Don't know	[SKIP TO NEXT SECTION]
99	Refused	[SKIP TO NEXT SECTION]

E3 About how many years old was your existing <MEAS_EQUIP>?

__	Years [0-75]
88	Don't know

E4 What condition was your existing <MEAS_EQUIP> when you decided to purchase a new one? [READ LIST]

01	Operating with no performance issues
02	Operating but in need of repair
03	No longer operating (broken, did not work)
88	[DO NOT READ] Don't know
99	[DO NOT READ] Refused

E5 [ASK IF E4=01,02] Why did you decide to replace your old equipment?

[RECORD RESPONSE VERBATIM]
88 Don't know

Background

BG1 Did you work with anyone from Duke Energy or the SmartSaver program prior to submitting your application for preapproval?

01	Yes	
02	No	[SKIP TO NEXT SECTION]
88	Don't know	[SKIP TO NEXT SECTION]

BG1a How did the Duke Energy program staff assist you with the project? Did they… [READ LIST] [SELECT ALL THAT APPLY]

01	Connect you with a trade ally
02	Identify potential projects to pursue
03	Identify specific equipment efficiency to install
04	Estimate project financial impacts, including incentives, energy bill savings, or payback
05	Respond to questions about participating in the program, including equipment eligibility or the application process
06	Assist you with anything else [SPECIFY]
88	[DO NOT READ] Don't know
99	[DO NOT READ] Refused

BG1b Which of the following Duke Energy program staff or representatives assisted you with the project? [READ LIST] [SELECT ALL THAT APPLY]

01	Large Account Manager
02	Business Energy Advisor
03	Energy Efficiency Engineer
04	Trade ally outreach representative
05	Willdan staff (for new construction design assistance)
06	Other [SPECIFY]
88	[DO NOT READ] Don't know
99	[DO NOT READ] Refused

BG2 Using a scale of 0 to 10, where 0 is "not at all valuable" and 10 is "very valuable", how valuable was Duke Energy's program staff and representatives in the <MEAS_PROJ>?

00	Not at all valuable
01	
02	
03	
04	
05	
06	

07
08
09
10 Very valuable
88 Don't know
99 Refused

BG2a [ASK IF BG2=00,01,02,03,04] What could staff have done differently?

[RECORD RESPONSE VERBATIM]
88 Don't know

Net-to-Gross

MEASCHK [ASK IF MULTCHK = 02 ELSE SKIP TO FR0]
[INTERVIEWER QUESTION: Is this case's MEAS variable the same as a previous case's MEAS variable?]

01 Yes; Duplicate measure
02 No, New measure [SKIP TO FR0]

DECISIONCHK[ASK IF MEASCHK=01] Now, thinking about the <MEAS_PROJ> at <ADDRESS> in <CITY>, was the decision making process the same or different from the previous <MEAS_PROJ> we discussed?

01 Same decision making process [SPECIFY the record number of which case you're duplicating] [SKIP TO INT99]
02 Different decision making process

FR0 According to our records, you received an incentive of $<INCENTIVE> from Duke Energy to complete your <MEAS_PROJ>.

[IF NC=1 or BG1b=01,02,03,05 or BG1a=01,02,03,04,05,06 SHOW "As part of that project..."]
[IF NC=1 SHOW "you received energy design assistance"]
[IF BG1b=01,02,03 SHOW "you worked with Duke Energy staff"]
[IF BG1b=05 SHOW "you worked with Willdan staff"]
[IF BG1a=01 SHOW "program staff connected you with a trade ally"]
[IF BG1a=02 SHOW "program staff helped you identify potential projects to pursue"]
[IF BG1a=03 SHOW "program staff helped you identify specific equipment efficiency to install"]

[IF BG1a=04 SHOW "program staff helped you estimate project financial impacts, including incentives, energy bill savings, or payback"]
[IF BG1a=05 SHOW "program staff responded to questions about participating in the program, including equipment eligibility or the application process"]
[IF BG1a=06 SHOW "program staff helped you by <BG1A:06:O>"]

01 Continue

FN1 [ASK IF Q5=02,88] Did you learn about this assistance from Duke Energy for this project BEFORE or AFTER you selected the specific type of <MEAS_EQUIP> for which you received the incentive?

01 Before
02 After
88 Don't know
99 Refused

FN2 [ASK IF FN1=02] Just to confirm, you found out about the assistance available through Duke Energy's SmartSaver program after you had already decided to implement the energy efficiency <MEAS_PROJ>?

01 Yes, after
02 No, before
03 Other [SPECIFY: When did you find out about the assistance?]
88 Don't know
99 Refused

FR1 [SKIP TO FR1NC IF NC=1] Which of the following is most likely what you would have done for your <MEAS_PROJ> if you had not received this assistance from Duke Energy? [READ LIST]

01 Canceled or postponed the project at least one year
02 Reduced the size, scope, or efficiency of the project
03 Done exactly the same project
04 Done nothing
88 [DO NOT READ] Don't know
99 [DO NOT READ] Refused

FR2 [ASK IF FR1=02] By how much would you have reduced the size, scope, or efficiency of the project? Would you say a small amount, a moderate amount, or a large amount?

01 Small amount

02 Moderate amount
03 Large amount
88 Don't know

FR1NC [SKIP TO FR3 IF NC=0] Which of the following is most likely what you would have installed if you had not received this assistance from Duke Energy? [READ LIST]

01 Installed all standard efficiency or code equipment
02 Installed some energy-efficient equipment, but not as much as you did through the program
03 Installed the same efficient equipment as you did with the program's assistance
88 [DO NOT READ] Don't know
99 [DO NOT READ] Refused

FR2NC [ASK IF FR1NC=02] Without the Duke Energy design assistance and incentive, would the energy-using equipment in your building have been closer to standard efficiency or code, closer to what you ended up installing, or somewhere in between?

01 Closer to standard efficiency or code
02 Closer to what you ended up installing
03 Somewhere in between
88 [DO NOT READ] Don't know

FR3 [ASK IF FR1=03 OR FR1NC=03] Would your business have paid the additional $<INCENTIVE> to complete the project on your own?

01 Yes
02 No
88 Don't know

CC2 [ASK IF FR3=01] Where would the additional $<INCENTIVE> have come from if you had not received the incentive from Duke Energy?

Would the funds have come from another project, capital budget, another source, or were the funds already allocated?

01 Funds would have come from another project
02 Capital budget
03 Another source [SPECIFY – what source]
04 Funds were already allocated
88 [DO NOT READ] Don't know

99 [DO NOT READ] Refused

CC3 [ASK IF FR1=01,02,04,88,99 or FR1NC=01,02,88,99] In your own words, how would your project have been different without the program's assistance?

[RECORD RESPONSE VERBATIM]
88 Don't know

FR4 On a scale of 0 to 10, with 0 being "not at all influential" and 10 being "extremely influential", how would you rate the influence of the following factors on your decision to complete the <MEAS_PROJ>? [RANDOMIZE ORDER]

FOR FR4a through FR4i:
00 Not at all influential
01
02
03
04
05
06
07
08
09
10 Extremely influential
77 Not applicable
88 Don't know
99 Refused

FR4a the incentive provided by Duke Energy?
FR4b [ASK IF BG1A=02] the support provided by your Duke Energy business energy advisor?
FR4c the SmartSaver marketing materials or webinars?
FR4d [SKIP IF Q5=02] the previous experience with the SmartSaver program in selecting qualifying equipment?
FR4e the recommendation from your contractor or vendor?
FR4f [ASK IF BG1A=03] the technical support provided by Duke Energy engineer staff?
FR4g [ASK IF BG1A=01] the support provided by your Duke Energy account manager?
FR4h [ASK IF NC = 1] the bundle options, including the design assistance provided for your new construction project?
FR4i the calculators provided by Duke Energy?

FR401 Were there any other interactions you had with Duke Energy or SmartSaver program representatives that influenced your decision to complete the energy efficient <MEAS_PROJ>?

01 Yes [SPECIFY: Please describe these interactions.]
02 No
88 Don't know
99 Refused

FR402 [ASK IF FR401=01] On a scale of 0 to 10, with 0 being "not at all influential" and 10 being "extremely influential", how would you rate the influence of that interaction on your decision to complete the <MEAS_PROJ>?

[IF NEEDED: The interaction described in previous question: <FR401:0>]

00 Not at all influential
01
02
03
04
05
06
07
08
09
10 Extremely influential
88 Don't know
99 Refused

C_CC4TXT1 [SET TO 1 IF FR3=01 and (FR4a=08,09,10 or FR4b=08,09,10 or FR4c=08,09,10 or FR4d=08,09,10 or FR4e=08,09,10 or FR4f=08,09,10 or FR4g=08,09,10 or FR4h=08,09,10 or FR4i=08,09,10 or FR402=08,09,10)
ELSE SET TO 0]

0
1

C_CC4TXT2 [SET TO 1 IF NC=0 and FR1=01,04 and not (FR4a=03,04,05,06,07,08,09,10 or FR4b=03,04,05,06,07,08,09,10 or FR4c=03,04,05,06,07,08,09,10 or FR4d=03,04,05,06,07,08,09,10 or FR4e=03,04,05,06,07,08,09,10 or FR4f=03,04,05,06,07,08,09,10 or FR4g=03,04,05,06,07,08,09,10 or FR4h=03,04,05,06,07,08,09,10 or FR4i=03,04,05,06,07,08,09,10 or FR402=03,04,05,06,07,08,09,10)

ELSE SET TO 0]

0
1

C_CC4TXT3 [SET TO 1 IF NC=1 and FR1NC=01 and not (FR4a=03,04,05,06,07,08,09,10 or FR4b=03,04,05,06,07,08,09,10 or FR4c=03,04,05,06,07,08,09,10 or FR4d=03,04,05,06,07,08,09,10 or FR4e=03,04,05,06,07,08,09,10 or FR4f=03,04,05,06,07,08,09,10 or FR4g=03,04,05,06,07,08,09,10 or FR4h=03,04,05,06,07,08,09,10 or FR4i=03,04,05,06,07,08,09,10 or FR402=03,04,05,06,07,08,09,10)
ELSE SET TO 0

0
1

CC4 [ASK IF C_CC4_TXT1=1 OR C_CC4TXT2=1 OR C_CC4TXT3=1]
[IF C_CC4TXT1=1 SHOW "Earlier in the interview you said you would have done the exact same project. But you also said...
<FR4 categories that are >7>
was influential in your decision to complete the <MEAS_PROJ>."]

[IF C_CC4TXT2 = 1 SHOW: "Earlier in the interview you said you would have cancelled or postponed the project. But you also said none of your contact with the program was influential in your decision to complete the <MEAS_PROJ>."]

[IF C_CC4TXT3 SHOW "Earlier in the interview you said you would have installed code equipment for your new construction project. But you also said none of your contact with the program was influential in your decision to complete the <MEAS_PROJ>."]

In your own words, please describe what impact, if any, all the assistance you received from Duke Energy had on your decision to install the amount of energy-efficient <MEAS_EQUIP> at the time you did?

[RECORD RESPONSE VERBATIM]
88 Don't know

Spillover

C_MULTSKIP2 [SKIP TO V1 IF MULTCHK=02]

SP1 Since your participation in the SmartSaver program, did you complete any additional energy efficiency projects at this facility or another facility served by Duke Energy that did not receive incentives through a Duke Energy program?

01	Yes	
02	No	[SKIP TO NEXT SECTION]
88	Don't know	[SKIP TO NEXT SECTION]
99	Refused	[SKIP TO NEXT SECTION]

SP2 What energy efficient products, equipment, or improvements did you install or implement? [SELECT ALL THAT APPLY]

01	Lighting	
02	Heating / Cooling	
03	Hot Water	
04	Appliances / Office	
05	Insulation	
06	Motor / Variable Frequency Drives (VFDs)	
07	Compressed Air	
08	Refrigeration	
09	Other1 [SPECIFY]	
10	Other2 [SPECIFY]	
88	Don't know	[SKIP TO NEXT SECTION]

SP5 On a scale of 0 to 10, with 0 meaning "not at all influential" and 10 meaning "extremely influential", how influential was your participation in the SmartSaver program on your decision to complete the additional energy efficiency projects?

00	Not at all influential	[SKIP TO NEXT SECTION]
01		
02		
03		
04		
05		
06		
07		
08		
09		
10	Extremely influential	
88	Don't know	
99	Refused	

[START ROSTER] [ASK SP3-SP4 FOR EACH MENTIONED IN SP2]

SP3 Can you describe the <SP2_EQUIP> equipment that did not receive a Duke Energy incentive?

[FOR EXAMPLE: What was the brand or model? Efficiency rating? Dimensions? or Capacity?]

[RECORD RESPONSE VERBATIM]

SP4 How many <SP2_EQUIP> units did you install?

___ [RECORD NUMBER OF UNITS] [0-800]
888 Don't know
999 Refused

[END ROSTER]

Satisfaction

SAT11 Considering all aspects of the program, using a scale of 0 to 10, where 0 is "very dissatisfied" and 10 is "very satisfied", how would you rate your overall satisfaction with the SmartSaver Custom Incentive program?

00 Very dissatisfied
01
02
03
04
05
06
07
08
09
10 Very satisfied
77 Not applicable
88 Don't know
99 Refused

SAT12 [SKIP IF SAT11=77,88,99] Why do you say that?

[RECORD RESPONSE VERBATIM]
88 Don't know

SAT5 Using a scale of 0 to 10, where 0 is "not at all valuable" and 10 is "very valuable", how valuable are the following SmartSaver program components to your organization? [RANDOMIZE ORDER]

FOR SAT5A through SAT5F
00 Not at all valuable
01
02
03
04
05
06
07
08
09
10 Very valuable
77 Not applicable
88 Don't know
99 Refused

SAT5a are materials describing the program requirements and benefits?
SAT5b is the communication from SmartSaver program representatives?
SAT5c is the technical assistance from Duke Energy or SmartSaver program representatives?
SAT5d is the technical assistance from your contractor or vendor?
SAT5e is the incentive amount compared to your total project cost?
SAT5f is the worksheet or calculation tools that Duke Energy provides?

SAT15 What did you like best about the SmartSaver Custom Incentive Program?

[RECORD RESPONSE VERBATIM]
88 Don't know

SAT1 What would you change about the SmartSaver Custom Incentive Program, if anything? [SELECT ALL THAT APPLY]

01 Would not change anything [PROGRAMMER NOTE: Make choice exclusive]
02 Remove pre-approval requirement
03 Improve initial processing time
04 Increase rebate amount
05 Cover more types of equipment [SPECIFY: Which types?)
06 Simplify application process [SPECIFY: What would you simplify?)
07 Other [SPECIFY]
88 Don't know

SAT2 [ASK IF SAT1=03] What would you consider to be a reasonable amount of time for processing the initial application?

01 [RECORD RESPONSE VERBATIM]
88 Don't know

SAT3 [ASK IF SAT1=04] What percent of the project's cost do you think would be reasonable for the SmartSaver program to pay?

___ [RECORD PERCENT] [0-100]
888 Don't know
999 Refused

SAT8 Have you recommended the SmartSaver Custom Incentive Program to anyone?

01 Yes [SKIP TO NEXT SECTION]
02 No
88 Don't know

SAT9 If provided the opportunity, would you recommend the SmartSaver Custom Incentive Program to anyone?

01 Yes
02 No
88 Don't know

Customer Characteristics

C1 What is the main business activity at <ADDRESS> in <CITY>?

01 Office/Professional
02 Warehouse or distribution center
03 Food sales
04 Food service
05 Retail (other than mall)
06 Mercantile (enclosed or strip malls)
07 Education
08 Religious worship
09 Public assembly

10 Health care
11 Lodging
12 Public order and safety
13 Industrial/manufacturing [SPECIFY]
14 Agricultural [SPECIFY]
15 Vacant (majority of floor space is unused)
16 Other [SPECIFY]
88 Don't know
99 Refused

C2 Are your company's budget decisions made locally, regionally, nationally, worldwide, or something else?

01 Locally
02 Regionally
03 Nationally
04 Worldwide
05 Other [SPECIFY]
88 Don't know

C3 When creating budgets and financial plans, how far into the future does your company plan?

00 Less than 1 year
01 One year
02 Two years
03 Three years
04 Four years
05 Five years
06 More than 5 years
07 Other [SPECIFY]
88 Don't know

BG3 Does your company have any formal requirements or informal guidelines for the purchase, replacement or maintenance of energy-using equipment?

01 Yes
02 No
88 Don't know
99 Refused

BG4 [ASK IF BG3 = 01] Which of the following best describes these requirements or guidelines? [READ LIST] [rotate responses 1-3]

01 Purchase energy efficient equipment regardless of cost
02 Purchase energy efficient equipment if it meets payback or return on investment criteria
03 Purchase standard efficiency equipment that meets code
04 Or something else [SPECIFY]
88 Don't know
99 Refused

BG5 [ASK IF BG4 = 02] What is your payback or return on investment criteria?

[RECORD RESPONSE VERBATIM]
88 Don't know
99 Refused

V1 [ASK IF FR4E = 07,08,09,10 OR VEND_CONT=01 OR INTRO=86 ELSE SKIP TO NEXT SECTION] Earlier, you indicated that the recommendation from a contractor, vendor, or supplier influenced your decision to implement the <MEAS_PROJ>.

Could you give me the contact information of the vendor you worked through?

[IF NOT(VEND_COMPANY is blank and VEND CONTACT is blank) SHOW "[INTERVIEWER NOTE: If R answers Don't know: Our records show that you worked with: Vendor Company: <VEND_COMPANY> Vendor Contact: <VEND_CONTACT>"]

01 Yes
02 No [SKIP TO NEXT SECTION]

V2 [IF C_VEND_MT=0 SHOW "[INTERVIEWER NOTE: For reference:<VEND_COMPANY><VEND_CONTACT><VEND_PHONE>"]

For V1_COMPANY through V1_EMAIL:
01 [RECORD RESPONSE VERBATIM]
88 Don't know

V2_COMP Vendor business name
V2_CITY Vendor city
V2_CONT Vendor contact name
V2_PHON Vendor contact phone number
V2_EMAIL Vendor email

V3 Which of the following assistance did your contractor or vendor provide? [SELECT ALL THAT APPLY]

Did the contractor assist with…

01 The design phase of the project
02 The selection of equipment to install
03 The completion of the rebate application
04 Any other part of the project [SPECIFY: Which part?]
88 [DO NOT READ] Don't know
99 [DO NOT READ] Refused

C_VEND_SKIP1 [IF VEND_CONT=01 OR INTRO=86 THANK AND TERMINATE 86]

Conclusion

C_MULTSKIP3 [SKIP TO INT99 IF MULTCHK=02]

C7 As part of our evaluation, we may need to contact you to discuss additional details about the use of the equipment installed.

Who should we contact if we have questions?

01 [RECORD RESPONSE VERBATIM: contact information: Name and Title]
77 Me / the R [SKIP TO VERIFY]
88 Don't know
99 Refused [SKIP TO VERIFY]

C8 And what is the best number to reach this person?

01 [RECORD RESPONSE VERBATIM: Phone number]
88 Don't know
99 Refused

VERIFY For verification purposes, may I please have your name?
[IF NEEDED: Contact name from sample as a reference:
<CONTACT_NAME>]

[RECORD RESPONSE VERBATIM]
99 Refused

INT99 [SKIP IF MULTCHK=02] [IF MULTFLAG=1 SHOW "[INTERVIEWER, If R has more surveys to complete read: Now I'd like to ask you a smaller selection of questions about another location we have on record for your firm." OTHERWISE READ: That completes the survey, thank you very much for your time.

CP Completed survey
-1 Partially completed surveys

INT98 [ASK IF MULTCHK=02] [INTERVIEWER, If R has more surveys to complete read: Now I'd like to ask you a smaller selection of questions about another location we have on record for your firm." OTHERWISE READ: That completes the survey, thank you very much for your time.

CM Completed survey
-1 Partially completed surveys

Appendix E Contractor Survey

Duke Energy
Nonresidential Smart $aver Custom Program
Influential Vendor, Contractor, and Third-party vendors
Free-ridership, Spillover and Process Survey

2020 and 2021 program participants

Objective

This survey instrument will be used for computer-assisted telephone interviews (CATI) with participating contractors and customer-identified influential vendors in Duke Energy's Smart $aver Custom Incentives program to support the net-to-gross and process evaluations of the programs.

The survey will ask third-party vendors (e.g., Budderfly, BidEnergy) about their influence on customer projects and about customer intent to support the net-to-gross calculations.

The survey will also ask contractors about their sales practices to identify any nonparticipant spillover.

Sample Variables

CASEID Contractor case identification number

VEND_COMPANY Contractor company name

VEND_CONTAC1 Contractor first contact name
VEND_PHONE1 First phone number of contractor first contact
VEND_PHON1EX First phone number extension of contractor first contact
VEND_PHONE2 Second phone number of contractor first contact
VEND_EMAIL1 Email address of contractor first contact

VEND_CONTAC2 Contractor second contact name
VEND_PHONE3 Phone number of contractor second contact
VEND_EMAIL3 Email address of contractor second contact

VEND_KWH kWh savings from the projects the contractor was connected to

NUMB_PROJECT Number of projects the contractor was connected to

V3P Flag that customer worked with third-party contractor
1 Third-party (i.e., Bid Energy)

0 Not a third party vendor

IV Flag if the contractor is an influential vendor
- 0 Not an influential vendor
- 1 Influential vendor (this includes V3P=1)
- 2 Influential vendor (newly identified from participating customer)

MULTFLAG
MULTID
PRIMARYCASE
MULTQTY

MEAS Summary of project measure implemented
- 1 lighting
- 2 process equipment
- 3 compressed air
- 4 HVAC
- 5 food service equipment
- 6 whole building (new construction)
- 7 IT equipment
- 8 other

MEASTYPE Detailed description of sampled project, including specific measures installed

CUST_CASEID Customer case identification number
CUST_MULTID Customer multiple identification number
CUST_COMPANY Customer company name
CUST_CONTACT Customer contact name
CUST_PHONE Customer phone number
CUST_EMAIL Customer email

CUST_ADDRESS The customer address of the site where the measure was installed
CUST_CITY
CUST_STATE
CUST_ZIP

YEAR Year customer participated

INSTALLDATE Installation date

NC Sampled project is a new construction project
- 1 New construction
- 0 Not new construction

Introduction

INTRO Hello, my name is _____, calling on behalf of Duke Energy. We are talking with design professionals and contractors participating in Duke Energy's SmartSaver energy efficiency programs for businesses. I'm not selling anything; I'd just like to ask you about your firm's recent experiences with this program.

[IF CONTACT NAME AVAILABLE May I speak with <VEND_CONTAC1>?]

[IF CONTACT NAME NOT AVAILABLE] or the person who would be most knowledgeable about your firm's involvement with Duke Energy's programs?

01 Yes
02 No, R not knowledgeable [OTHER_R]

FAQ [AS NEEDED]
Who is doing this study: Duke Energy has hired our firm to evaluate the program. As part of the evaluation, we're talking with customers and vendors that participated in the <PROGRAM> to understand their experiences with the program.

Why are you conducting this study: Studies like this will help Duke Energy to continuously improve their business energy efficiency programs.

Timing: This survey should take about 20 minutes. Is this a good time for us to speak with you? [IF NOT A GOOD TIME, SET UP CALL BACK APPOINTMENT OR OFFER TO LET THEM CALL US BACK AT 1-800-454-5070.]

Sales concern: This is not a sales call; we would simply like to learn about your organization's experiences with Duke Energy's energy efficiency programs. Your responses will be kept confidential. If you would like to talk with someone from Duke Energy about this study, feel free to call Drew Scatizzi at (321) 474-0470.

MULTCHK [ASK IF MULTFLAG=1] [INTERVIEWER QUESTION: Is this the first case of a multiple?

01 Yes, first case
02 No, subsequent case [SKIP TO NEXT SECTION]

PREAMBLE I'm with Tetra Tech, an independent research firm. We have been hired by Duke Energy to evaluate their programs.

I would like to assure you that your responses will be kept confidential and your name will not be revealed to anyone. For quality and training purposes, this call will be recorded.

01 Continue

Influential Vendor Screener (ask of influential vendors)

C_IV_SKIP1 [IF IV = 0 SKIP TO NEXT SECTION]
C_INFMULTSKP [IF MULTCHK=02 SKIP TO INF4]

INF1 Our records show that your firm [IF NC=1 SHOW "designed or scoped a new construction project" IF V3P=1 SHOW “consulted on a <MEAS> project” ELSE SHOW "specified, sold, or installed a <MEAS> project"] for <CUST_COMPANY> at <CUST_ADDRESS> in <CUST_CITY> around <INSTALLDATE> that qualified for a Duke Energy incentive.

Do you recall this project?

01	Yes, does recall	
02	No, does not recall	[SKIP TO OTHER_R1]
88	Don't know	[SKIP TO OTHER_R1]
99	Refused	[SKIP TO OTHER_R1]

INF4 [IF V3P=0 SHOW "<CUST_COMPANY> indicated that you were influential in their decision to implement the <MEAS> project through the program."]

Just to confirm, were you involved in the decision-making process at the design stage when the <MEAS> project was specified and agreed upon for this facility?

01	Yes	[SKIP TO NEXT SECTION]
02	No	[SKIP OTHER_R1]
88	Don’t know	[SKIP OTHER_R1]

OTHER_R1 Is there someone else at your firm who would be more familiar with this project?

01	Yes	[RECORD CONTACT INFO FOR CALL NOTES]
02	No	[SKIP TO C_CMULTSKP, PROGRAMMER NOTE: JUMP OVER C_IV_SKIP2]
88	Don't know	[SKIP TO C_CMULTSKP, PROGRAMMER NOTE: JUMP OVER C_IV_SKIP2]
99	Refused	[THANK AND TERMINATE 91]

AVAILABLE_R1 May I please speak with that person?

01	Yes, currently available	[SKIP TO INTRO]
02	Yes, but R is not currently available	[INT15 – CALLBACK]
03	No	[SKIP TO C_CMULTSKP, PROGRAMMER NOTE: JUMP OVER C_IV_SKIP2]
88	Don't know	[INT15 – CALLBACK]
99	Refused	[THANK AND TERMINATE 91]

Non-Influential Vendor Screener (ask of non-influential vendors)

C_IV_SKIP2 [IF IV≠0 SKIP TO NEXT SECTION]
C_CMULTSKP [IF MULTCHK=02 SKIP TO NEXT SECTION]

C1 Our records show that your firm [IF NC=1 SHOW "was involved in designing or specifying new construction projects" ELSE SHOW "specified, sold, or installed <MEAS>"] that qualified for incentives through Duke Energy's Smart Saver Custom program.

Is that correct?

01	Yes	
02	No	[THANK AND TERMINATE 82]
88	Don't know	[THANK AND TERMINATE 81]
99	Refused	[THANK AND TERMINATE 91]

C2 Are you the person who would be most knowledgeable about your firm's <MEAS> projects completed through Duke Energy's Smart Saver Custom program?

01	Yes	[SKIP TO NEXT SECTION]
02	No	
88	Don't know	

OTHER_R2 Is there someone else at your firm who would be more familiar with your firm's involvement in <MEAS> projects completed through Duke Energy's Smart Saver Custom program?

01	Yes	[RECORD CONTACT INFO FOR CALL NOTES]
02	No	[THANK AND TERMINATE 81]
03	No, our firm doesn't work with program	[THANK AND TERMINATE 82]
88	Don't know	[THANK AND TERMINATE 81]
99	Refused	[THANK AND TERMINATE 91]

AVAILABLER2 May I please speak with that person?

01	Yes, currently available	[SKIP TO INT01]
02	Yes, but R is not currently available	[INT15 – CALLBACK]
03	No	[THANK AND TERMINATE 91]
88	Don't know	[THANK AND TERMINATE 81]
99	Refused	[THANK AND TERMINATE 91]

Free-Ridership (ask only of Influential Vendors)

C_VFR_SKIP1 [IF INF4<>01 SKIP TO NEXT SECTION]

COMPANYCHK [ASK IF MULTCHK=02 ELSE SKIP TO VFR1] [INTERVIEWER QUESTION: Is this case's CUST_COMPANY variable of "<CUST_COMPANY>" the same as a previous case's CUST_COMPANY variable?]

01	Yes, Duplicate company	
02	No, New company	[SKIP TO VFR1]

DECISIONCHK [ASK IF COMPANYCHK=01] Now thinking about [IF V3P=1 SHOW "all the projects done for <CUST_COMPANY>" ELSE SHOW "the project at <CUST_ADDRESS> in <CUST_CITY>"], were the factors that influenced your recommendations to <CUST_COMPANY> the same or different from the previous project we just discussed?

01	Same decision making process [SPECIFY RECORD_NUMBER]	[SKIP TO INT99]
02	Different decision making process	

VFR1 [ASK IF V3P=1] Which of the following is most likely what <CUST_COMPANY> would have done for the <MEAS> project if they had not received this assistance from Duke Energy? [READ LIST]

01	Canceled or postponed the project at this location at least one year
02	Reduced the size, scope, or efficiency of the project at this location
03	Done exactly the same project at this location
04	Done nothing at this location
05	Shifted funds to another state
88	[DO NOT READ] Don't know
99	[DO NOT READ] Refused

VFR2 [ASK IF V3P=1 AND VFR1=02] By how much would they have reduced the size, scope, or efficiency of the project? Would you say a small amount, a moderate amount, or a large amount?

01 Small amount
02 Moderate amount
03 Large amount
88 Don't know

VFR3 [ASK V3P=1 AND VFR1=03] Would <CUST_COMPANY> have paid the additional cost covered by the Duke Energy incentive to complete the project on their own?

01 Yes
02 No
88 Don't know

VCC3 [ASK IF V3P=1] In your own words, how would <CUST_COMPANY>'s project have been different without the program's assistance?

[RECORD RESPONSE VERBATIM]
88 Don't know

FR2 On a scale of 0 to 10, with 0 being "not at all influential" and 10 being "extremely influential", how would you rate the influence of the following factors in your recommendations to <CUST_COMPANY> for this project? [RANDOMIZE QUESTIONS]

For FR2A through FR2E:
00 Not at all influential
01
02
03
04
05
06
07
08
09
10 Extremely influential
77 Not applicable
88 Don't know

99 Refused

FR2a the program incentive provided by Duke Energy?
FR2b your interactions with Duke Energy program staff, including technical assistance?
FR2c the support from your Duke Energy trade ally outreach representative?
FR2d the program marketing, training, webinars, or informational materials?
FR2e your firm's past involvement in Duke Energy's programs?
FR2f [ASK IF NC=1] the energy design assistance provided by Duke Energy?

FR4 Was the program incentive incorporated into your pricing estimate or proposal to <CUST_COMPANY> for the project?

01 Yes
02 No
88 Don't know
99 Refused

Program Influence on Sales of Qualifying Equipment (ask for Nonparticipant Spillover) (ask of all contractors)

C_MULT_SKIP[IF MULTCHK=02, SKIP TO INT99]
C_P_SKIP1 [IF V3P=1, SKIP TO NEXT SECTION]
C_P_SKIP2 [IF NC=1, SKIP TO NEXT SECTION]

P1 [IF INF4 = 01 SHOW: "Next,"] I'd like you to think about ALL of the program-eligible <MEAS> projects you sold or installed for Duke Energy's nonresidential customers over the past 12 months. I'd like to focus on projects where you installed the same types of <MEAS> that you installed through the Smart Saver Custom program.

Over the past 12 months, approximately how many of these <MEAS> projects have you sold or installed within the Duke Energy service territory?

___ [ENTER WHOLE NUMBER OF PROJECTS 0-5000]
0 None [SKIP TO PROGRAM USE SECTION]
8888 Don't know
9999 Refused

P2 Thinking about all of these <MEAS> sales, approximately what percentage do they make up of your total dollar sales of high-efficiency products in Duke Energy's territory?

[INTERVIEWER NOTE: We are referring to projects where you installed the same types of <MEAS> that you installed through the Smart Saver Custom program.]

___ [ENTER PERCENTAGE 0-100]
888 Don't know
999 Refused

P3 Now thinking about those sales, approximately what percentage of these <MEAS> sales or installations in Duke Energy's service territory involved an incentive through Duke Energy's program?

[INTERVIEWER NOTE: We are referring to projects where you installed the same types of <MEAS> that you installed through the Smart Saver Custom program.]

___ [ENTER PERCENTAGE 0-100]
888 Don't know
999 Refused

P10 What percentage of these <MEAS> sales or installations did you offer or talk about an incentive through Duke Energy's program?

___ [ENTER PERCENTAGE 0-100]
888 Don't know
999 Refused

P4 If the incentives or other assistance from Duke Energy's program were NOT available, do you think your company's overall sales of these types of <MEAS> would have been about the same, lower, or higher than what you sold in the past 12 months?

01 About the same
02 Lower
03 Higher
88 Don't know
99 Refused

P5 [ASK IF P4 = 02] By what percentage do you estimate your company's sales of these types of <MEAS> would have been lower if Duke Energy's program was NOT available?

[IF NEEDED: Your best estimate is okay]

___ [ENTER PERCENTAGE 1-100]

888 Don't know
999 Refused

Nonparticipant Spillover (ask of all contractors)

C_NS_SKIP1 [IF V3P=1, SKIP TO NEXT SECTION]
C_NS_SKIP2 [IF NC=1, SKIP TO NEXT SECTION]

NS1 [ASK IF P3 < 100 AND P3 <> 888 and P3<> 999 ELSE SKIP TO NEXT SECTION] Earlier you indicated that some of your <MEAS> sales did not involve an incentive through Duke Energy's program. Some qualifying projects may not receive incentives for one reason or another.

What are the main reasons why your firm or the customer did not pursue or receive an incentive for this program-eligible equipment?

01 [SPECIFY RESPONSE]
77 Equipment did not qualify [SKIP TO NEXT SECTION]
88 Don't know
99 Refused

NS2 On a scale of 1 to 5, where 1 is "not at all influential" and 5 is "extremely influential", how influential was Duke Energy Smart Saver Custom program on your sales of energy saving <MEAS> projects that did NOT receive an incentive?

01 Not at all influential
02
03
04
05 Extremely influential
88 Don't know
99 Refused

New Construction Program Influence and Spillover (ask for Nonparticipant Spillover) (ask of all contractors)

C_NCP_SKIP1 [IF NC<>1, SKIP TO NEXT SECTION]

ncP1 [IF INF4 = 01 SHOW: "Next,"] I'd like you to think about ALL of the program-eligible new construction whole building projects you worked on for Duke Energy's nonresidential customers over the past 12 months. I'd like to focus on the same types of buildings that you did through the Smart Saver Custom program.

Over the past 12 months, approximately how many of these new construction, whole building projects have you done within the Duke Energy service territory?

___ [ENTER WHOLE NUMBER OF PROJECTS 0-5000]
0 None [SKIP TO PROGRAM USE SECTION]
8888 Don't know
9999 Refused

ncP3 Now thinking about those projects, approximately what percentage of these new construction, whole building projects in Duke Energy's service territory involved an incentive through Duke Energy's program?

[INTERVIEWER NOTE: We are referring to the same type of projects that you did through the Smart Saver Custom program in 2020 or 2021.]

___ [ENTER PERCENTAGE 0-100]
888 Don't know
999 Refused

ncP10 What percentage of these new construction, whole building projects did you offer or talk about an incentive through Duke Energy's program?

___ [ENTER PERCENTAGE 0-100]
888 Don't know
999 Refused

ncP4 If the incentives or other assistance from Duke Energy's program were NOT available, do you think your company's overall sales of these types of new construction, whole building projects would have been about the same, lower, or higher than what you did in the past 12 months?

01 About the same
02 Lower
03 Higher
88 Don't know
99 Refused

ncP5 [ASK IF ncP4 = 02] By what percentage do you estimate your company's sales of these new construction, whole building projects would have been lower if Duke Energy's program was NOT available?

[IF NEEDED: Your best estimate is okay]

___ [ENTER PERCENTAGE 1-100]
888 Don't know
999 Refused

New Construction Nonparticipant Spillover (ask of all contractors)

C_NCNS_SKIP1 [IF NC<>1, SKIP TO NEXT SECTION]

ncNS1 [ASK IF ncP3 < 100 AND ncP3 <> 888 and ncP3<> 999 ELSE SKIP TO NEXT SECTION] Earlier you indicated that some of your new construction, whole building projects did not involve an incentive through Duke Energy's program. Some qualifying projects may not receive incentives for one reason or another.

What are the main reasons why your firm or the customer did not pursue or receive an incentive for this program-eligible project?

01 [SPECIFY RESPONSE]
55 Building did not qualify / Building built to code [SKIP TO NEXT SECTION]
77 Equipment did not qualify [SKIP TO NEXT SECTION]
88 Don't know
99 Refused

ncNS2 On a scale of 1 to 5, where 1 is "not at all influential" and 5 is "extremely influential", how influential was Duke Energy Smart Saver Custom program on your sales of new construction, whole building projects that did NOT receive an incentive?

01 Not at all influential
02
03
04
05 Extremely influential
88 Don't know
99 Refused

Program Use (ask of all contractors)

PU1 Which of the following best describes your business recommendation practices? [READ LIST] [rotate options 1 through 4]

01 We offer customers multiple options including low, medium and high efficiency equipment
02 We recommend one option to customers, that tends to be high-efficiency
03 We recommend one option to customers, that tends to be standard efficiency
04 We recommend whatever equipment is currently in stock
05 Something else [SPECIFY]
88 Don't know
99 Refused

PU2 Do you incorporate the Duke Energy incentive before or after the selection process?

01 Before
02 After
03 Depends [SPECIFY]
04 We do not incorporate utility incentives with pricing
88 Don't know
99 Refused

PU3 How often do you complete the incentive applications for your customers? Would you say ...? [READ LIST]

01 Never
02 Rarely (less than 10% of the time)
03 Occasionally (about 30%)
04 Frequently (about 70%)
05 Always
88 [DO NOT READ] Don't know
99 [DO NOT READ] Refused

PU4 [ASK IF PU3 <> 01 (never)] Have you ever withdrawn or cancelled an application?

01 Yes [SPECIFY: What were the reasons for that decision?]
02 No
88 Don't know
99 Refused

Program Satisfaction (ask of all contractors)

S1 Next, I'd like to ask you just a few questions about your satisfaction with Duke Energy's Smart Saver Custom Incentives program.

Using a scale of 1 to 5, where 1 is "not at all satisfied" and 5 is "very satisfied", how would you rate your satisfaction with Duke Energy's Smart Saver Custom Incentives program overall?

01 Not at all satisfied
02
03
04
05 Very satisfied
88 Don't know
99 Refused

S2 [ASK IF S1 = 01, 02] Why do you say that?

[RECORD RESPONSE VERBATIM]
88 Don't know

S3 On the same scale of 1 to 5, where 1 is "not at all satisfied" and 5 is "very satisfied", how would you rate your satisfaction with... (Select one for each) [RANDOMIZE QUESTIONS]

For S3A through S3F:
01 Not at all satisfied
02
03
04
05 Very satisfied
77 Not applicable
88 Don't know
99 Refused

S3a your interactions with Duke Energy program staff?
S3b the technical support provided by the program?
S3c the type or variety of projects or equipment eligible for the program?
S3d the incentives available through the program?
S3e the amount of paperwork required by the program?
S3f the time it takes to get an application approved?

S5 How easy or difficult is it to understand the differences in equipment eligibility between the custom and prescriptive programs? [READ LIST IF NEEDED]

01 Very easy
02 Somewhat easy
03 Neither easy nor difficult

04 Somewhat difficult
05 Very difficult
88 Don't know
99 Refused

S4 Do you have any recommendations for improvements regarding the custom program design or operations?

01 Yes [SPECIFY]
02 No
88 Don't know
99 Refused

Wrap-Up (ask of all contractors)

E1 [SKIP IF V3P=1] For classification purposes, approximately how many full time and part time staff does your firm employ at your location?

E1full ___ Full-time [0-750]
E1part ___ Part-time (includes seasonal employees) [0-750]
888 Don't know

INT99 [SKIP IF MULTCHK=2] Those are all the questions I have. I'd like to thank you for your time with this important study. Have a good day.

CP Completed
-1 Partially completed survey

INT98 [ASK IF MULTCHK=2] I'd like to thank you for your time with this important study. Have a good day.

CM Completed
-1 Partially completed survey