



# Save Energy and Water Kit Program 2020-2021 Evaluation Report

**Duke Energy Carolinas and Duke Energy Progress Territories**

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**Principal authors:**

Keegan Skoretz, Consultant

Marlee Konikoff, Research Analyst

Greg Sidorov, Senior Consultant

Danielle Côté-Schiff Kolp, Senior Manager

Jason Hinsey, Managing Consultant

**Resource Innovations**  
719 Main Street, Suite A  
Half Moon Bay, CA 94019  
650.761.6456  
[resource-innovations.com](http://resource-innovations.com)

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# 1 Executive Summary

## 1.1 Program Summary

The Save Energy and Water Kit Program (SEWKP) is an energy efficiency program offered by Duke Energy that targets residential customers throughout the Carolinas (DEC) and Progress (DEP) territories who have not adopted energy-efficient water devices. Energy savings are achieved through installation of energy-efficient aerators, showerheads, and water heater pipe insulation wrap, all of which are provided to participants free of charge through an email or direct mail campaign. Participants also have the option to upgrade to either a wide or wand type efficient showerhead for a small cost.

## 1.2 Evaluation Objectives and Results

This report presents the results and findings of evaluation activities for the DEC and DEP SEWKP conducted by the Resource Innovations (RI) evaluation team for the program year of July 1, 2020 through June 30, 2021.

### 1.2.1 Impact Evaluation

The impact evaluation was divided into two tasks: first to determine gross savings (or impacts) and second to determine net savings. Gross impacts are energy and demand savings estimated at a participant’s home that are the direct result of the homeowner’s installation of the measures included in the SEWKP kit. Net impacts reflect the degree to which the gross savings are a result of the program efforts and funds.

Table 1-1, Table 1-2, and Table 1-3 present the summarized findings of the impact evaluation for the DEC jurisdiction. Note tables may not compute due to rounding.

**Table 1-1: DEC Energy Savings Per Kit**

Kit Size	Population	Reported (kWh)	Energy Realization Rate	Gross Verified (kWh)
Kit 1	23,208	327	104%	340
Kit 2	17,293	538	76%	408
<b>Program Total</b>	<b>40,501</b>	<b>417</b>	<b>89%</b>	<b>369</b>

**Table 1-2: DEC Demand Savings Per Kit**

Kit Size	Summer Demand (kW)			Winter Demand (kW)		
	Reported	Realization Rate	Gross Verified	Reported	Realization Rate	Gross Verified
Kit 1	0.038	74%	0.028	0.073	110%	0.080
Kit 2	0.067	50%	0.033	0.134	74%	0.099
<b>Program Total</b>	<b>0.050</b>	<b>60%</b>	<b>0.030</b>	<b>0.099</b>	<b>89%</b>	<b>0.088</b>

**Table 1-3: DEC Program Level Savings**

Measurement	Population	Reported	Realization Rate	Gross Verified	NTG	Net Verified
Energy (kWh)	40,501	16,877,494	89%	14,937,559	90.67%	13,544,149
Summer Demand (kW)		2,044	60%	1,226		1,112
Winter Demand (kW)		3,994	89%	3,573		3,239

The proportion of gross verified savings by measure type for the DEC jurisdiction are presented in Figure 1-1. Per unit energy and demand savings for DEC measures are presented in Table 1-4. Provided in Table 1-5 are the DEC program level free ridership and spillover results, along with the corresponding net-to-gross (NTG) ratio.

Figure 1-1: DEC Proportion of Program Verified Savings by Measure

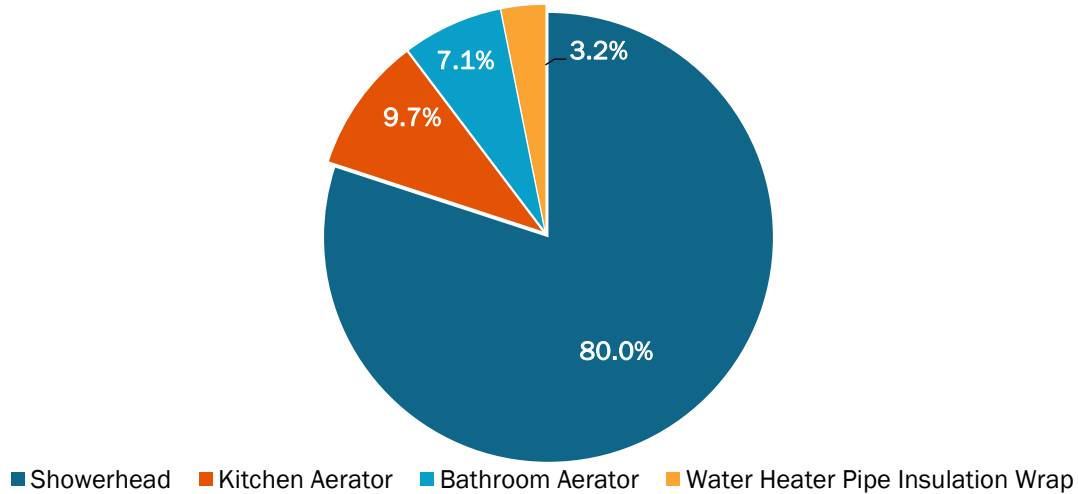


Table 1-4: DEC Reported and Gross Verified Impacts Per Unit

Measure	Reported Energy (kWh)	Gross Verified Energy (kWh)	Reported Summer Demand (kW)	Gross Verified Summer Demand (kW)	Reported Winter Demand (kW)	Gross Verified Winter Demand (kW)
Showerhead	212.3	199.3	0.0316	0.0146	0.0606	0.0525
Kitchen Aerator	50.2	41.5	0.0035	0.0055	0.0040	0.0063
Bathroom Aerator	15.5	15.3	0.0015	0.0021	0.0017	0.0024
Water Heater Pipe Insulation Wrap*	7.0	2.7	0.0008	0.0003	0.0008	0.0003

\* Savings for water heater pipe insulation wrap is a per linear foot measurement

**Table 1-5: DEC Net-To-Gross Effects, Applied To All Measures**

Measure	Free Ridership	Spillover	NTG Ratio
Showerhead	18.94%	9.62%	90.67%
Kitchen Aerator			
Bathroom Aerator			
Water Heater Pipe Insulation Wrap			

Table 1-6, Table 1-7, and Table 1-8 present the summarized findings of the impact evaluation for the DEP jurisdiction. Note tables may not compute due to rounding.

**Table 1-6: DEP Energy Savings Per Kit**

Kit Size	Population	Reported (kWh)	Energy Realization Rate	Gross Verified (kWh)
Kit 1	11,193	367	122%	447
Kit 2	9,843	601	94%	566
<b>Program Total</b>	<b>21,036</b>	<b>477</b>	<b>105%</b>	<b>503</b>



**Table 1-7: DEP Demand Savings per Kit**

Kit Size	Summer Demand (kW)			Winter Demand (kW)		
	Reported	Realization Rate	Gross Verified	Reported	Realization Rate	Gross Verified
Kit 1	0.045	87%	0.039	0.083	146%	0.121
Kit 2	0.078	65%	0.051	0.153	111%	0.170
<b>Program Total</b>	<b>0.060</b>	<b>74%</b>	<b>0.045</b>	<b>0.116</b>	<b>124%</b>	<b>0.144</b>

**Table 1-8: DEP Program Level Savings**

Measurement	Population	Reported	Realization Rate	Gross Verified	NTG	Net Savings
Energy (kWh)	21,036	10,027,035	105%	10,574,179	82.03%	8,674,399
Summer Demand (kW)		1,270	74%	937		768
Winter Demand (kW)		2,435	124%	3,026		2,482

The proportion of gross verified savings by measure type for the DEP jurisdiction are presented in Figure 1-2. Per unit energy and demand savings for DEP measures are presented in Table 1-9. Provided in Table 1-10 are the DEP program level free ridership and spillover results, along with the corresponding NTG ratio.

Figure 1-2: DEP Portion of Program Verified Savings by Measure

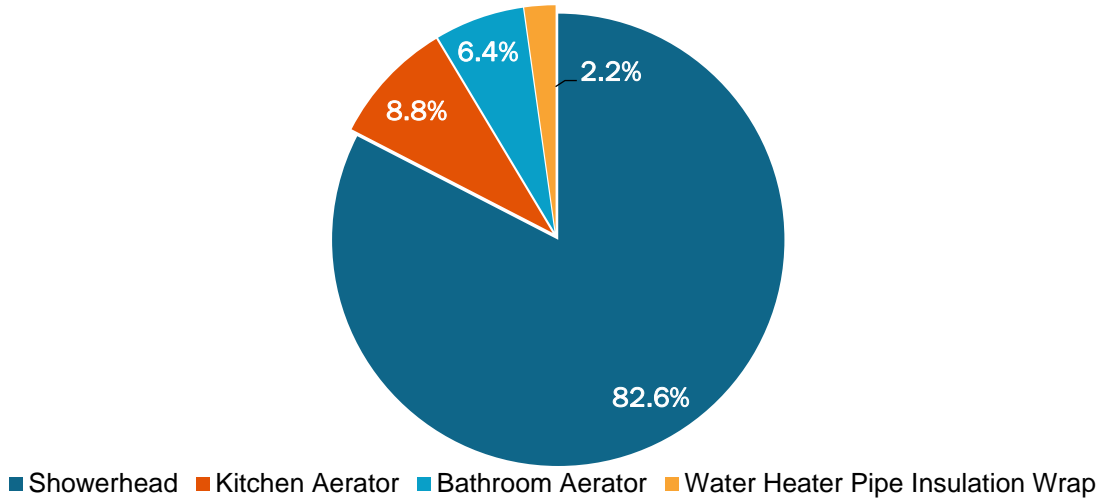


Table 1-9: DEP Reported and Gross Verified Impacts Per Unit

Measure	Reported Energy (kWh)	Gross Verified Energy (kWh)	Reported Summer Demand (kW)	Gross Verified Summer Demand (kW)	Reported Winter Demand (kW)	Gross Verified Winter Demand (kW)
Showerhead	243.9	280.3	0.0419	0.0242	0.0723	0.0869
Kitchen Aerator	57.3	52.6	0.0040	0.0079	0.0045	0.0090
Bathroom Aerator	20.9	19.0	0.0020	0.0028	0.0023	0.0032
Water Heater Pipe Insulation Wrap*	6.9	2.6	0.0008	0.0003	0.0008	0.0003

\* Savings for water heater pipe insulation wrap is a per linear foot measurement

**Table 1-10: DEP Net-To-Gross Effects, Applied To All Measures**

Measure	Free Ridership	Spillover	NTG Ratio
Showerhead	23.07%	5.10%	82.03%
Kitchen Aerator			
Bathroom Aerator			
Water Heater Pipe Insulation Wrap			

### 1.2.2 Process Evaluation

The process evaluation assessed opportunities for improving the program’s design and delivery in the DEC and DEP service territories. It specifically documented participant experiences by exploring participating household feedback and the extent to which the kits effectively motivate households to save energy.

The evaluation team conducted web surveys with households that received a kit (DEC n=176; DEP n=106). The team also conducted in-depth interviews with the Duke Program Team.

### Program Successes

The 2020-2021 DEP/DEC SEWKP evaluation found successes in the following areas:

**Most participants are satisfied with kit items and report high satisfaction with the overall program.** Less than 10% of participants in each jurisdiction reported dissatisfaction with any specific measure they installed, and the vast majority reported they were highly satisfied with the overall program (85% DEC; 76% DEP).

**Kit instructions are perceived as highly helpful among SEWKP participants.** Ninety-three percent of DEC participants and 94% of DEP participants said they read the instructional insert from their kit that offers detailed instructions on self-installing the measures, and most of them said the instructions were very helpful (82% DEC; 83% DEP). These paper instructions are likely sufficient for most participants, as most reported high satisfaction and few (about 10%) took advantage of how-to tutorial videos that came with the kit.

**The program influenced households to install kit measures.** Most participating households installed at least one measure from the kit (85% DEC; 86% DEP), and the vast majority of measures, once

installed, remained installed (87% DEC; 90% DEP). Participants were highly influenced by the program to install kit measures, as demonstrated by low “influence” free ridership rates. In addition, 39% of participants in each jurisdiction reported purchasing and installing additional energy efficiency measures since receiving their kit.

## Program Challenges

The 2020-2021 DEP/DEC SEWKP evaluation found challenges in the following areas:

**Water heater pipe insulation wrap is the least popular measure.** Water heater pipe insulation wrap was the least installed measure type, with just over one-quarter of participants (30% DEC; 27% DEP) reportedly installing it in each jurisdiction. Going forward, the program has changed the type of water heater pipe insulation wrap from a tape to a foam tube, which is expected to increase the ease of installation and raise installation rates.

**Low water pressure is a significant contributor to dissatisfaction and uninstalls.** Complaints of excessively low water pressure was the primary driver of dissatisfaction and uninstallation among a relatively small number of participants who were dissatisfied with or uninstalled any items.

**Increased penetration and saturation of measures included in the kits could contribute to lower installation rates in the future.** Among participants who had yet to install at least one measure and had no immediate plans to do so, participants most commonly reported that they already had the item installed.

## 1.3 Evaluation Conclusions and Recommendations

The evaluation findings led to the following conclusions and recommendations for the program.

**Conclusion 1: Electric water heater saturations among participants could improve.** Water heater fuel saturation has a significant impact on the program’s savings since it influences each measure’s savings. The current method to screen for water heaters with electric fuel is using AMI data and having customers select a checkbox on the Business Reply Card. This approach yielded saturations slightly lower than was found in the previous evaluation but generally consistent among the program’s previous two evaluations, with the average of approximately 80%.

**Recommendation:** In order to maximize the electric fuel saturation among participants, consider additional screening, such as asking potential participants for their water heating fuel type during registration. The Business Reply Card currently includes a checkbox where customers can select that they have electric water heating, however this checkbox option is missing on the online registration. While the online registration includes messaging stating that only those with electric water heating are eligible, having a checkbox to confirm that the customer has electric water heating would ensure that fewer people without electric water heating are registering for the program. The program team may also want to consider adding

a statement to the Business Reply Card that emphasizes that savings will only be realized if the customer has an electric water heater.

**Conclusion 2: The quantity of showerheads provided in kits do not align with showers in the recipient homes.** 21% of DEC and 26% of DEP Kit 2 recipients reported only having one shower in their home. In a similar vein, 83% of DEC and 73% of Kit 1 recipients reported having more than one shower in their home. The current approach for determining which households receive a second showerhead (Kit 2) is dependent upon home square footage data from a third party data supplier and a threshold of 1,500 square feet set by Duke Energy, where homes containing 1,500 or more square feet of living space receive Kit 2. While the current process to decide whether to send Kit 1 or Kit 2 is simple and does not require customer interaction, the process relies on a series of assumptions that have the effect of mismatching homes with kits.

**Recommendation:** As part of the enrollment process, consider asking participants how many showers are in their home and/or how many showerheads the participant intends to replace.

**Conclusion 3: Respondents who watched the tutorial videos found them to be very helpful.** 10% of DEC and 13% of DEP survey respondents reported watching the tutorial videos and 89% and 93%, for DEC and DEP respectively, found them to be highly helpful.

**Conclusion 4: There is variation in gross verified savings between showerhead types in the DEP territory.** The difference in gross verified savings is primarily caused by lower shower use among participants who received a wand or wide showerhead, as self reported through web surveys. This difference was not observed in the DEC territory.

**Recommendation:** Consider expanding research questions in future program evaluations to better understand any observed differences between participants who requested an upgraded showerhead and the remainder of the program population.

## 2 Introduction

### 2.1 Program Description

#### 2.1.1 Overview

The Save Energy and Water Kit Program (SEWKP) is an energy efficiency program offered by Duke Energy that targets residential customers throughout its Carolinas (DEC) and Progress (DEP) territories who have not adopted energy-efficient water devices. Energy savings are achieved through the installation of energy-efficient aerators, showerheads, and water heater pipe insulation wrap, all of which are provided to participants free of charge through an email or direct mail campaign. Participants also have the option to upgrade to either a wide or wand type efficient showerhead for a small cost.

#### 2.1.2 Energy Efficiency Kit Measures

Table 2-1 lists the kit contents included in the program. There are two kit sizes. The two kits are identical except for the quantity of showerheads included. Kit 1 includes one showerhead and Kit 2 includes two showerheads.

**Table 2-1: Kit Measures and Quantity**

Measure	Kit 1	Kit 2
Efficient Showerhead (1.5 gpm)	1	2
Bathroom Faucet Aerator (1.0 gpm)	2	2
Kitchen Faucet Aerator (1.0 gpm)	1	1
Water heater pipe insulation wrap (up to 5' of coverage)	1	1

### 2.2 Program Implementation

#### 2.2.1 Participant Identification and Recruitment

Duke Energy markets the program to single-family homeowners with electric water heaters who have not previously participated in SEWKP or any other programs with similar measures. Each home's energy consumption data is used to identify which homes likely have electric water heaters and should receive an invitation to participate. Further, Duke Energy assigns either Kit 1 or Kit 2 to each home based on household square footage data provided from a third party data supplier. Homes with less than 1,500 square feet of living space receive Kit 1 and homes with 1,500 or more square

feet of living space receive Kit 2. Customers receive either an email invitation to participate, if one is on file, or a business reply card (BRC) if an email is not on file. Email invitations provide a link for the customer to join the program while BRCs include a detachable reply form for customers to mail back (postage is pre-paid). Customers who enter the vanity URL printed on the BRC also have the option to enroll via the online platform. Alternatively, customers may also call a toll free number, provided in the email and BRC, to confirm eligibility and request their free kit. Energy Federation, Inc. (EFI) then ships the appropriate kit (1 or 2) to registered households.

## 2.2.2 Participation

The defined evaluation period was July 1, 2020 through June 30, 2021. During this time, the program recorded a total of 46,254 kit recipients in the DEC territory. Of the sampled participants, 12.4% stated they did not receive a kit; therefore, the DEC program population was reduced by 12.4% to 40,501 for the evaluation. The DEP program recorded a participant population of 22,624 during the evaluation timeframe. Of the sampled participants, 7.0% stated they did not receive a kit; therefore, the DEP program population was reduced by 7.0 % to 21,036 for this evaluation.

## 2.3 Key Research Objectives

The primary objective of the impact evaluation was to estimate the gross and net energy and demand savings resulting from program participation at both per kit and program level for each DEC and DEP territory. Key focus areas for the impact evaluation included the installation rate and resulting savings of each measure within the SEWKP kits.

The process evaluation objectives were to inform and assess opportunities for improving the design and delivery of SEWKP. The process evaluation also sought to assess kit recipient experiences by investigating the following:

- kit recipients' assessments of the program materials and SEWKP kits in terms of ease of use and quality of instructional content; and
- kit recipients' responses to the SEWKP kits and the extent to which the kits are effective in engaging families in energy and water conservation.

### 2.3.1 Impact

As part of evaluation planning, the evaluation team outlined the following activities to assess the impacts of the DEC and DEP SEWKP:

- quantify accurate and supportable energy (kWh) and demand (kW) savings for energy efficient measures implemented in participants' homes;
- assess the rate of free riders from the participants' perspective and determine spillover effects; and
- benchmark verified measure level energy impacts to applicable technical reference manual(s) and other Duke-similar programs in other jurisdictions.

### 2.3.2 Process

The process evaluation assessed opportunities for improving the design and delivery of the program in both DEC and DEP service territories. It specifically documented participant experiences by investigating participant responses to the energy efficiency kits and the extent to which the kits effectively motivate households to save energy and water.

The evaluation team assessed several elements of the program delivery and customer experience, including:

#### Motivation:

- What motivated participants to request and install the measures in the kit?
- In what ways, if any, did the program motivate participants to adopt new energy and water saving behaviors?

#### Program experience and satisfaction:

- How satisfied are participants with the overall program experience and kit items in terms of ease of use and measure quality?

#### Challenges and opportunities for improvement:

- Are there any inefficiencies or challenges with the delivery of the program?
- Are there any measures that have particularly low installation rates? If so, why?
- Are there any measures that have particularly high uninstallation rates? If so, why?

#### Participant household characteristics:

- What are demographic characteristics of those who received the kits?

## 2.4 Evaluation Overview

The evaluation team divided its approach into key tasks to meet the goals outlined:

**Task 1** – Develop an evaluation work plan to describe the tasks and processes that will be followed to complete the evaluation;

**Task 2** – Conduct a process review to determine how successfully the programs are being delivered to participants and to identify opportunities for improvement;



**Task 3** – Verify gross and net energy and peak demand savings resulting from the SEWKP through verification activities of a sample of 2020-2021 program participants.

The following two subsections provide a more detailed description of the impact and process evaluations.

### 2.4.1 Impact Evaluation

The impact evaluation was comprised of the following key steps, which are described in further detail in Section 3:

**Advanced Metering Infrastructure (AMI) data analysis:** Home-level AMI consumption data was analyzed to determine if savings due to the program could be discerned. The team’s false experiments indicated that savings were not discernable using an AMI data approach. Therefore, the evaluation team deferred to a savings analysis approach based on engineering algorithms.

**Participant surveys:** As part of a joint data collection effort with the process portion of the evaluation, the impact evaluation conducted a web-based survey of the participants. These surveys included questions pertaining to key savings parameters such as in-service rates and water heater fuel saturation. Table 2-2 and Table 2-3 below summarize the number of surveys completed.

**Estimate gross savings:** Data collected via participant surveys were used as inputs to engineering algorithms to calculate gross verified energy and demand savings for each measure. The ratio of verified (ex post) savings to reported (ex ante) savings within the sample produced the realization rate. The realization rate was then applied to the program population’s reported savings to yield program level gross verified savings estimates.

**Estimate net savings:** Net impacts are a reflection of the degree to which the gross savings are a result of the program efforts and incentives. The evaluation team estimated free-ridership and spillover based on self-report methods through surveys with program participants. The ratio of net verified savings to gross verified savings is the net-to-gross ratio, and applied as an adjustment factor to the reported savings.

### 2.4.2 Process Evaluation

Process evaluation examines and documents:

- Program operations
- Stakeholder satisfaction
- Opportunities to improve the efficiency and effectiveness of program delivery

To satisfy the EM&V objectives for this research effort, the evaluation team reviewed program documents and conducted web surveys with participating households who received a kit. The team also held an in-depth interview (IDI) with Duke Energy program staff. Table 2-2 (DEC) and Table 2-3 (DEP) provide a summary of the activities the evaluation team conducted as part of the SEWKP process and impact evaluations.

**Table 2-2: DEC SEWKP Summary of Evaluation Activities**

Target Group	Population	Sample	Confidence/ Precision	Method
<b>Impact Activities</b>				
DEC Participants	46,254	176	90% ± 6.2%	Web Survey
<b>Process Activities</b>				
DEC Participants	46,254	176	90% ± 6.2%	Web Survey
Duke Energy Program Staff	n/a	1	n/a	Telephone IDI

**Table 2-3: DEP SEWKP Summary of Evaluation Activities**

Target Group	Population	Sample	Confidence/ Precision	Method
<b>Impact Activities</b>				
DEP Participants	22,624	106	90% ± 7.9%	Web Survey
<b>Process Activities</b>				
DEP Participants	22,624	106	90% ± 7.9%	Web Survey
Duke Energy Program Staff	n/a	1	n/a	Telephone IDI

## 3 Impact Evaluation

### 3.1 Methodology

The evaluation team's impact analysis focused on the energy and demand savings attributable to the SEWKP for the period of July 2020 through June 2021. The evaluation was divided into two research areas: to determine gross savings and net savings (or impacts). Gross impacts are energy and demand savings estimated at a participant's home that are the direct result of the installation of a measure included in the program-provided kit. Net impacts reflect the degree to which the gross savings are a result of the program efforts and funds. The evaluation team verified energy and demand savings attributable to the program by conducting the following impact evaluation activities:

- Review of DEC and DEP participant database.
- Conduct false experiments to determine the feasibility of using an AMI data analysis methodology to estimate net verified savings.
- After determining the AMI data analysis approach to not be feasible, administer web-based surveys to participants.
- Estimate gross verified savings using primary data collected from participants and engineering savings algorithms.
- Compare the sample's reported savings to gross verified savings to calculate realization rate, then apply the realization rate to the program's total reported savings.
- Apply attribution survey data to estimate net-to-gross ratios and net-verified savings at the program level.

### 3.2 Billing Regression Analysis

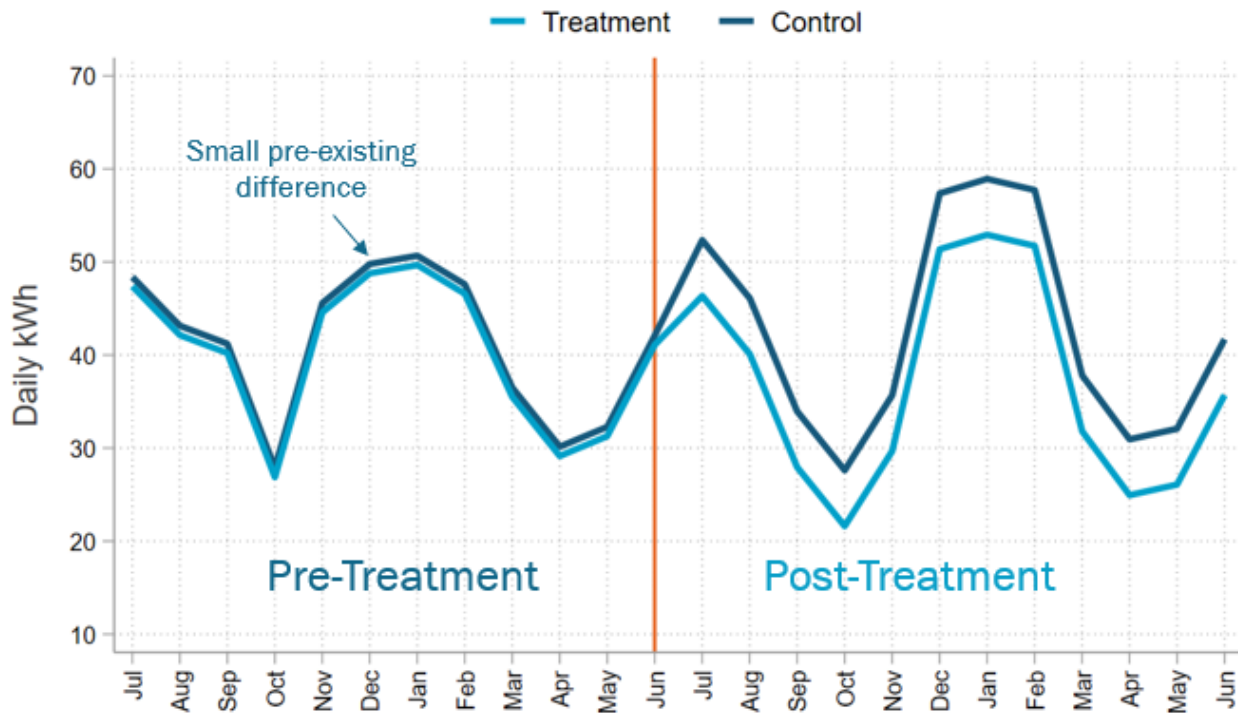
Prior to completing the engineering analysis, the evaluation team attempted to estimate energy savings using an AMI-based consumption analysis. The approach involves analyzing energy use patterns before and after participation in the SEWKP. After a thorough investigation, which is described in more detail below, we concluded that, absent a randomized control trial, consumption analysis is unable to reliably detect energy savings associated with the kit effort. When the expected change in household energy use is small, as with SEWKP, the only reliable way to estimate energy savings using consumption data analysis is through a randomized control trial (RCT) with large treatment and control groups and ample pre-and post-data. Absent a RCT, there is too much underlying variability contained in household-level consumption data to distinguish from the program's effect. Thus, the evaluation team's recommendation is to rely on the engineering analysis and findings as the source of the verified gross and net savings for the program. Below we discuss how we attempted to complete a consumption data analysis and how we ultimately determined such an analysis was not feasible.

To estimate energy savings with consumption data, it is necessary to estimate what energy consumption would have occurred in the absence of SEWKP – the counterfactual or baseline. To infer that the program led to energy savings, it is necessary to systematically eliminate plausible alternative explanations for differences in electricity use patterns.

The basic framework for the analysis is illustrated in Figure 3-1 and relies on both a control group and pre- and post-enrollment consumption data. The analysis is implemented using a difference-in-differences (DID) regression modeling technique by comparing program participants to a matched comparison group, and removes any pre-existing differences between the treatment and control groups. If the program’s kit leads to reductions in consumption, we should observe:

- A change in consumption for households that participated in the SEWKP, i.e. treatment group
- No similar change in consumption for the control group
- The timing of the change should coincide with the receipt/installation of kits

Figure 3-1: Framework for Billing Analysis with Comparison Groups (Illustrative Example)



The key indicator of program effects in Figure 3-1 is the change in consumption of the treatment group *relative to the control group* between the pre-treatment and post-treatment periods. Program savings is equal to the difference in usage between the treatment and control groups during the post-treatment period, less any pre-existing difference during the pre-treatment period. This

framework relies on equivalence between the treatment and control group in order to account for any preexistent differences in consumption and results in a net savings estimate. As such, careful selection of the control group is crucial for ensuring an accurate baseline.

While the SEWKP did not have a randomly assigned control group, the evaluation team did develop a comparison group to use in its analysis. However, there are several key challenges to producing reliable energy savings estimates using consumption analysis even with a reasonable control group. The two challenges that could not be addressed despite the use of a comparison group were the small effect size and selection bias. On a percentage basis, the expected energy savings from each kit were approximately 2% to 3% of annual household energy consumption, and therefore it proved difficult to isolate the impacts of the program from other potential explanations, including random chance. Second, households that signed up for the kit self-selected from their peers. Despite using a comparison group, it could only account for observable characteristics like pre-treatment energy use patterns. As a result, while the participant and comparison group may have had similar energy use patterns in the pre-treatment period, their energy use trajectories absent program participation were not necessarily the same due to unobservable and/or unmeasurable differences in the household.

From a practical standpoint, the use of consumption analysis as the primary evaluation approach poses a number of possible challenges.

- **Effect size** – on a percentage basis, expected impacts from the program are small and thus difficult to distinguish from the inherent “noise” in the billing data;
- **Timing of intervention** – changes in the mix of participants and/or the timing of individual measure installations can be confused with natural changes in energy use;
- **Self-selection** – customers who enroll in SEWKP are inherently different than customers who do not:
  - they likely have different water use technology, household occupancy, and/or water consumption needs that can yield different responses to program intervention(s);
  - in order to be effective, the kits rely on customers to correctly install the individual fixtures themselves.

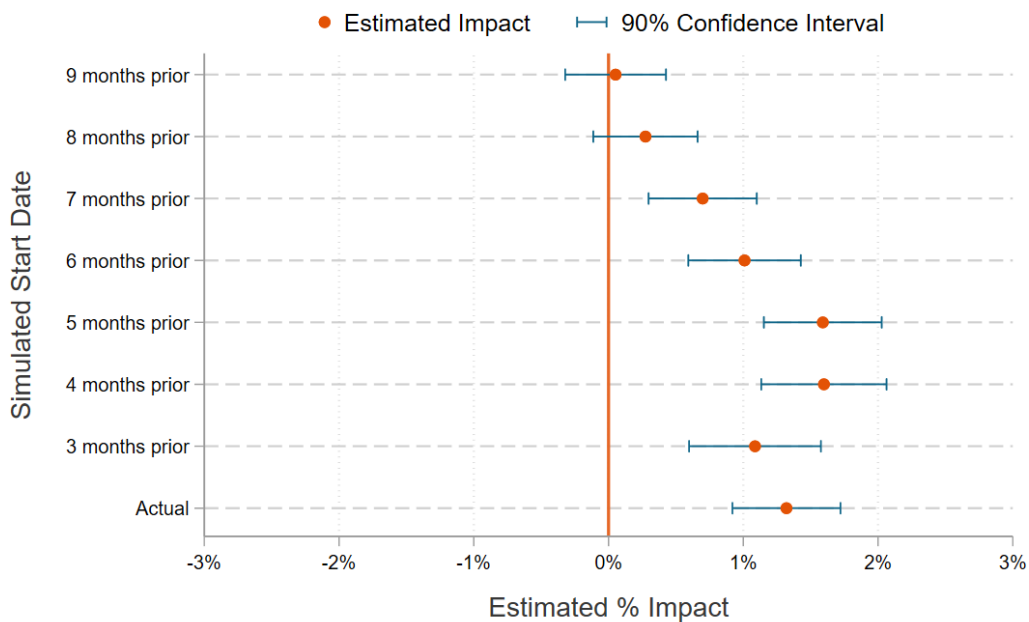
In order to assess if the analysis is capable of producing reliable results, we implemented a series of false experiments. The approach consisted of simulating fake enrollments prior to actual participation in the program and assessing if the models detected an effect when using data from the false “pre” period to estimate the counterfactual for the false “post” period. Because enrollment dates were fictitious and actual post periods were excluded, we knew impacts were actually zero and any estimated impacts were due to modeling error. The evaluation team used two years of pre-treatment data and each participant’s enrollment date was simulated to have occurred between three to nine months prior to actual participation, in increments of one month. The false experiments were implemented using a DID panel regression that made use of the matched comparison group.

Figure 3-2 shows the results from the DID false experiments. Rather than produce zero impacts, the models estimated that the simulated enrollments led to changes in energy use when in fact no

intervention had taken place. Moreover, the models incorrectly concluded that the erroneous impacts were statistically significant in several instances – an example of false precision. In other words, the model consistently estimated changes in energy consumption when impacts were in fact zero.

Furthermore, the results of the test using actual enrollment dates, depicted by the bottom line in Figure 3-2, indicates a slight *increase* in consumption among program participants relative to the control group. These results are roughly in line with the false timelines depicted in the other seven iterations (3 to 9 months prior). The takeaway is that, were an AMI consumption analysis used to estimate program savings, the results would show an increase in usage (i.e., negative savings) attributable to the program. Since we know that the program’s interventions do not increase energy consumption among its participants, our conclusion is not that the program does not yield savings, but rather that AMI data analysis is not the correct tool for estimating savings.

**Figure 3-2: False Experiments Results (Difference-in-Differences)**



When the expected savings of a program are very small, as they are with kit programs like SEWKP, the only reliable way to estimate energy savings using consumption analysis is through a randomized control trial (RCT). The most critical component of a well-designed RCT is to guarantee there are no differences between the treatment and control groups, other than the treatment of the program. This is a crucial step to ensure that the analysis is able to accurately estimate the counterfactual – or what would have happened absent the treatment. If inherent differences exist between the treatment group and control group, any changes in the post-treatment period could be due to these differences, rather than the treatment itself. In order to verify that effects are purely the result of the

treatment intervention, the two groups must be ostensibly identical in every way except for the intervention.

Guaranteeing homogeneity between treatment and control groups is not achievable with an opt-in enrollment method. The fact that one group of customers chose to enroll in the program while the other did not implies that some intrinsic difference between them does exist. These differences may include:

- Behavioral preferences or predispositions for energy and water efficiency measures;
- Information about the program that is not accessible to non-enrollees;
- Higher energy needs and therefore a greater incentive to curb their consumption.

Any of these characteristics are likely to contribute to consumption responses or patterns that cannot be attributable to the program intervention. A well-designed RCT includes randomly selected customers in the treatment and control groups, thereby ensuring that the analysis avoids adverse effects of selection bias and/or lurking confounding variables. Due to these variables, RCTs are impracticable for opt-in programs like SEWKP.

After a thorough investigation, we concluded that, absent a RCT, consumption analysis is unable to reliably detect energy savings resulting from participation in the program.

Low levels of savings relative to household consumption will remain a consistent issue for the SEWKP and will continue to inhibit the accuracy of results provided through a consumption analysis. The evaluation team's conclusion is not that there were no energy savings generated by the SEWKP, but rather that a consumption analysis was not the correct tool for estimating the small percentage of energy savings attributable to the program. Thus, the evaluation team's recommendation is to rely on the engineering analysis, which is supported by a regionally specific Technical Reference Manual and participant defined inputs that inform their use of the kit measures as the source of our verified gross and net savings for the programs.

### 3.3 Sampling Plan and Achievement

To provide representative results and meet program evaluation goals, a sampling plan was created to guide all evaluation activity. A random sample was created to target 90/10 confidence and precision at the program level assuming a coefficient of variation ( $C_v$ ) equal to 0.5.

After reviewing the program database, the evaluation team identified populations of 46,254 (DEC) and 22,624 (DEP) participants within the defined evaluation period. Based on this population, the evaluation team established sub-sample frames for web-based survey administration. Customers who were flagged as "do not contact" in the participation database were excluded from the sample frame. As illustrated in Table 3-1 below, the evaluation completed 176 (DEC) and 106 (DEP) surveys



among program participants between February 16 and February 28, 2022. This sample size resulted in a precision of  $\pm 6.2$  (DEC) and  $\pm 7.9$  (DEP) at a 90% confidence interval.

**Table 3-1: DEC-DEP Impact Sampling**

Territory	Population	Sample Size	Precision at 90% Confidence
DEC	46,254	176	$\pm 6.2\%$
DEP	22,624	106	$\pm 7.9\%$

## 3.4 Description of Analysis

### 3.4.1 Web-based surveys

The evaluation team performed web-based surveys to gather key pieces of information used in the savings calculations. Results of the completed surveys were used to inform our program-wide assumptions as detailed in Table 3-2.



**Table 3-2: Participant Data Collected and Used for Analysis**

Measure	Data Collected	Assumption
Showerhead	Units Installed	In-Service Rate
	Units Later Removed	
	Hot Water Fuel Type	% Electric DHW
	Frequency of Showers	Hot Water Consumption
	Duration of Showers	
Bathroom Faucet Aerator	Units Installed	In-Service Rate
	Units Later Removed	
Kitchen Faucet Aerator	Hot Water Fuel Type	% Electric DHW
	Residents per Home	Hot Water Consumption
Water Heater Pipe Insulation Wrap	Water Heater Pipe Insulation Wrap Used	In-Service Rate
	Water Heater Pipe Insulation Wrap Removed	
	Hot Water Fuel Type	% Electric DHW
	Length of Insulated Pipe	Pipe Length

### 3.4.2 In-Service Rate

The in-service rate (ISR) represents the ratio of equipment installed and operable to the total pieces of equipment distributed and eligible for installation. For example, if 15 surveys were completed for customers receiving one bathroom aerator each, and five customers reported to still have the aerator installed and operable, the ISR for this measure would be 5 out of 15, or 33%. In some instances, equipment was installed but may have been removed later due to homeowner preferences. In these cases the equipment is no longer operable and therefore contributes negatively to the ISR. In-service rates for each measure from all eligible survey respondents are detailed in Table 3-3.

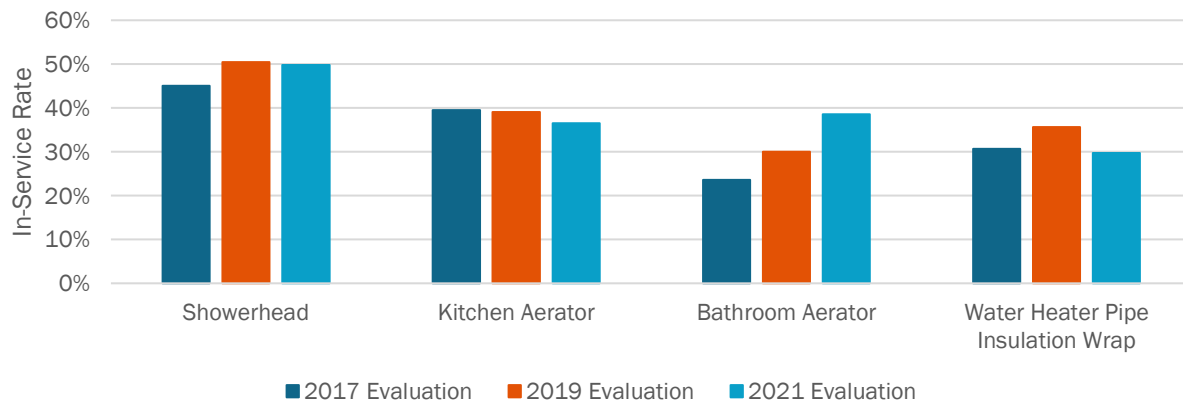
**Table 3-3: DEC and DEP SEWKP Sample In-Service Rates**

Jurisdiction	Measure	Unit 1	Unit 2	Total
DEC	Showerhead	60%	26%	50%
	Kitchen Aerator	37%		
	Bathroom Aerator	45%	32%	39%
	Water Heater Pipe Insulation Wrap*	30%		
DEP	Showerhead	63%	23%	52%
	Kitchen Aerator	45%		
	Bathroom Aerator	48%	37%	43%
	Water Heater Pipe Insulation Wrap*	27%		

\*Quantity of water heater pipe insulation wrap packages.

As Figure 3-3 shows, in-service rates for all measures in the Carolinas jurisdiction are greater than, or in-line with, the in-service rates found in previous evaluations.<sup>1,2</sup>

**Figure 3-3: DEC Historical Equipment In-Service Rates**



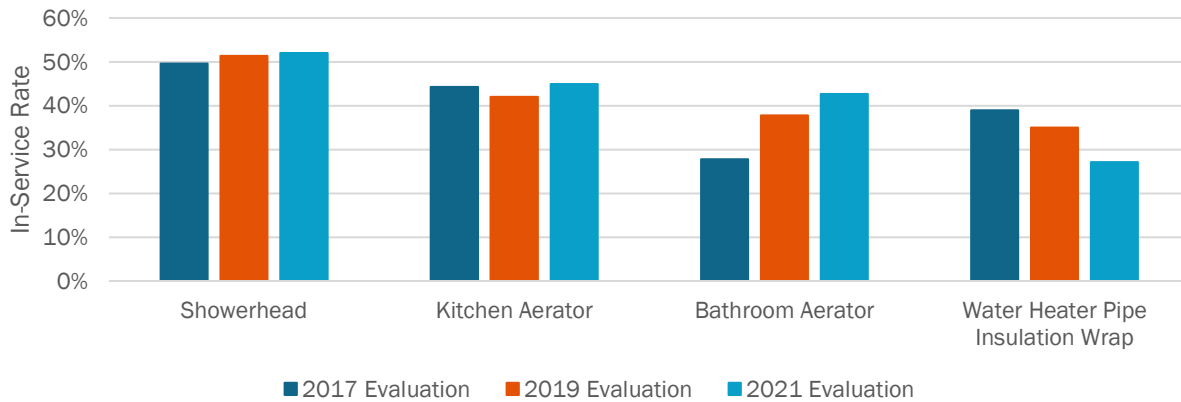
For the Progress jurisdiction (Figure 3-4) in-service rates for showerhead and kitchen aerator measures were found to be in-line with previous evaluations. The bathroom aerator measure

<sup>1</sup> Save Energy and Water Kits 2016 Program Year Evaluation Report, November 29, 2017

<sup>2</sup> Save Energy and Water Kits 2018 - 2019 Evaluation Report, April 23, 2020

continued to show an upward trend in in-service rates, while the water heater pipe insulation wrap measure in-service rate had decreased.<sup>3,4</sup>

Figure 3-4: DEP Historical Equipment In-Service Rates



### 3.4.3 Kit Measure Savings

The following section of this report provides a summary of the algorithms used to estimate energy and demand savings for each of the kit items. As much as possible, input parameters referenced program participant responses in the surveys. For inputs more technical in nature and which could not reliably be collected in participant surveys, the evaluation applied deemed values provided by the Mid-Atlantic TRM v10 for showerhead, kitchen aerator, and bathroom aerator measures, as well as deemed values from the Mid-Atlantic TRM v9 for the water heater pipe insulation wrap measure.<sup>5</sup>

Verified savings were calculated individually for each measure and participant, then those savings were averaged to derive the measure level savings presented in the remainder of this section and in Section 3.5.

Demand savings coincident factors (CF) for the summer and winter seasons were estimated to align with peak demand periods<sup>6</sup> for each jurisdiction using the study on residential domestic hot water use referenced by the Mid-Atlantic TRM.<sup>7</sup> This method considers the average hot water uses by fixture type (showerhead, faucet aerator) during the peak period along with the probability of the evaluated daily hours of use occurring within that time frame.

<sup>3</sup> Save Energy and Water Kits 2016 Program Year Evaluation Report, November 29, 2017

<sup>4</sup> Save Energy and Water Kits 2018 - 2019 Evaluation Report, April 23, 2020

<sup>5</sup> The water heater pipe insulation wrap measure is absent from Mid-Atlantic TRM v10, so v9 was used as an alternate source

<sup>6</sup> Both the Carolinas and Progress jurisdictions define their demand peaks as 4pm to 5pm during July (Summer) and 7am to 8am during January (Winter)

<sup>7</sup> Aquacraft, DeOreo and Mayer, *The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis*

### 3.4.3.1 Showerheads

The Save Energy and Water Kit contained either one or two efficient showerheads, with the quantity depending on the kit received. Kit 1 participants received one showerhead while those qualifying for Kit 2 received two showerheads.

The algorithm provided by the Mid-Atlantic TRM v10 determines average showerhead savings by calculating the total shower use in the home across all showerheads in the numerator and dividing by the number of showerheads per home in the denominator. The survey instrument developed for this evaluation collected data that is relevant to only the showerheads replaced through the program. This was done by asking survey respondents to indicate the average minutes per shower and average showers per week specifically for each showerhead that was retrofitted using fixtures provided by the program. Energy and demand savings algorithms provided by Mid-Atlantic TRM v10 were therefore modified to make use of the data collected in order to present a more accurate estimation of savings from this measure.

Equation 3-1 and Equation 3-2 below outline the algorithms utilized to estimate savings accrued by the showerhead measure. Algorithm input parameters for the 2021 evaluation are shown in Table 3-4. For comparison, Table 3-4 also presents the algorithm input parameters from the 2019 evaluation.

#### Equation 3-1: Showerhead Energy Savings Algorithm

$$\Delta kWh = ISR \times ELEC \times \frac{(GPM_{base} - GPM_{low}) \times \left(\frac{Avg. Time}{Shower}\right)_{SH\ 1,2} \times \left(\frac{Avg. Total Showers Taken}{Day}\right)_{SH\ 1,2} \times 365 \times 8.3 \frac{Btu}{gal \cdot ^\circ F} \times (T_{out} - T_{in})}{3412 \frac{Btu}{kWh} \times RE}$$

#### Equation 3-2: Showerhead Demand Savings Algorithm

$$\Delta kW = CF \times \frac{\Delta kWh}{HOU}$$

Where:

$$HOU = \frac{\left(\frac{Avg. Time}{Shower}\right)_{SH\ 1,2} \times \left(\frac{Avg. Total Showers Taken}{Day}\right)_{SH\ 1,2} \times 365}{60}$$

**Table 3-4: Inputs for Showerhead Savings Calculations**

Variable	Source	2021 Evaluation		2019 Evaluation	
		DEC	DEP	DEC	DEP
ISR (all)	Participant Survey	50%	52%	50%	51%
ISR (SH 1)	Participant Survey	60%	63%	56%	57%
ISR (SH 2)	Participant Survey	26%	23%	34%	37%
ELEC	Participant Survey	76%	85%	88%	89%
GPM <sub>base</sub>	Federal code maximum	2.5		2.5	
GPM <sub>low</sub>	Program provided equipment	1.5		1.5	
Time	Participant Survey	10.7	11.3	9.1	9.8
SPD <sub>Total</sub> *	Participant Survey	1.19	1.43		
PH	Participant Survey			2.60	2.71
SPD <sub>Person</sub>	Participant Survey			0.66	0.64
SH	Participant Survey			1.34	1.42
365	Days per year	365		365	
T <sub>out</sub>	Mid-Atlantic TRM v10	105		105	
T <sub>in</sub>	Mid-Atlantic TRM v10	60.9		60.9	
RE	Mid-Atlantic TRM v10	0.98		0.98	
Summer CF	Mid-Atlantic TRM v10, adjusted	0.0066	0.0084	0.0060	0.0062
Winter CF	Mid-Atlantic TRM v10, adjusted	0.0237	0.0301	0.0216	0.0222

\*SPD<sub>Total</sub> was directly collected in surveys during the 2021 evaluation through asking participants to respond specifically about the showerhead(s) replaced through the program. In the 2019 evaluation, SPD<sub>Total</sub> was calculated using a more general approach, collecting PH (people per home), SPD<sub>Person</sub> (showers taken per day per person in all showers in the home), and SH (quantity of showers in the home).

As Table 3-4 shows, the TRM deemed input parameters did not change between the two evaluations. Similarly, the overall in-service rate remained fairly constant at about 50%; however, the spread between in-service rates for the first and second showerhead grew in the 2021 evaluation. Also, as mentioned previously, the electric water heater fuel saturation was found to be lower in the 2021 evaluation than in the 2019 evaluation.

The number of showerheads provided to each participant is dependent on the size of the kit received; with Kit 1 providing a single showerhead and Kit 2 providing two showerheads. Since the evaluation demonstrated that equipment in-service rates drop as additional items are provided (i.e., a second showerhead) it is important to show the difference in estimated savings between the first and second showerhead provided to a participant. Savings presented in Table 3-5 are the average of participant level verified savings of each showerhead within each “Item” category (i.e., Showerhead 1, Showerhead 2, or All Showerheads).

**Table 3-5: Showerhead Verified Savings Per Unit**

Jurisdiction	Item	Program Population	Energy (kWh)	Summer Demand (kW)	Winter Demand (kW)
DEC	Showerhead 1	40,501	256.0	0.0187	0.0671
	Showerhead 2	17,293	67.9	0.0052	0.0188
	All Showerheads	57,794	199.3	0.0146	0.0525
DEP	Showerhead 1	21,036	356.7	0.0300	0.1076
	Showerhead 2	9,843	83.8	0.0094	0.0339
	All Showerheads	30,879	280.3	0.0242	0.0869

Participants had the option to upgrade their showerhead to a wand or wide showerhead for a fee prior to April of 2021. From April 2021 onwards, participants had the option to upgrade to a wand showerhead for a fee, or receive a new standard (wide) showerhead at no additional cost. The evaluation team investigated the impacts of three categories of showerhead to inform program design decisions. These categories are:

1. Standard showerheads issued before April 2021.
2. Wand/Wide showerheads, including all wand showerheads issued during the evaluation period as well as wide showerheads issued before April 2021. This captures all showerheads for which an additional fee was required.
3. Post April 2021 showerheads, including wide showerheads issued during or after April 2021 which were provided at no additional cost to participants. These were issued in place of standard showerheads, and were tracked as either standard or wide showerheads in the program database.

The algorithms used to determine gross verified savings were applied consistently to all showerheads, regardless of showerhead type. However, a review of DEC and DEP measure level savings showed that there is significant variation in gross verified savings depending on showerhead type. In order to identify the source of this variation, an investigation was done by isolating the survey responses of participants who indicated that they have an electric water heater and comparing responses by showerhead type. Table 3-6, Table 3-7 and Table 3-8 present the results of this investigation, where Table 3-6 presents results for participants with standard showerheads, Table 3-7 presents results for participants that paid for wand or wide showerheads, and Table 3-8 presents results for participants who received a wide or standard showerhead during or after April 2021 for which no fee was paid. Showerhead type detail is shown for illustrative purposes, and only aggregate measure-level data are used for program-level savings.

**Table 3-6: Inputs for Standard Showerhead Savings Calculations**

Variable	Source	2021 Evaluation	
		DEC	DEP
ISR (all)	Participant Survey	58%	50%
ISR (SH 1)	Participant Survey	66%	62%
ISR (SH 2)	Participant Survey	37%	22%
ELEC	Participant Survey	68%	89%
GPM <sub>base</sub>	Federal code maximum	2.5	
GPM <sub>low</sub>	Program provided equipment	1.5	
Time	Participant Survey	10.8	12.9
SPD <sub>Total</sub>	Participant Survey	1.27	1.34
365	Days per year	365	
T <sub>out</sub>	Mid-Atlantic TRM v10	105	
T <sub>in</sub>	Mid-Atlantic TRM v10	60.9	
RE	Mid-Atlantic TRM v10	0.98	
Summer CF	Mid-Atlantic TRM v10, adjusted	0.0071	0.0089
Winter CF	Mid-Atlantic TRM v10, adjusted	0.0256	0.0301

**Table 3-7: Inputs for Wand/Wide Showerhead Savings Calculations**

Variable	Source	2021 Evaluation	
		DEC	DEP
ISR (all)	Participant Survey	40%	52%
ISR (SH 1)	Participant Survey	53%	58%
ISR (SH 2)	Participant Survey	13%	33%
ELEC	Participant Survey	88%	82%
GPM <sub>base</sub>	Federal code maximum	2.5	
GPM <sub>low</sub>	Program provided equipment	1.5	
Time	Participant Survey	11.2	8.8
SPD <sub>Total</sub>	Participant Survey	1.17	1.24
365	Days per year	365	
T <sub>out</sub>	Mid-Atlantic TRM v10	105	
T <sub>in</sub>	Mid-Atlantic TRM v10	60.9	
RE	Mid-Atlantic TRM v10	0.98	
Summer CF	Mid-Atlantic TRM v10, adjusted	0.0068	0.0057
Winter CF	Mid-Atlantic TRM v10, adjusted	0.0241	0.0319



**Table 3-8: Inputs for Post April 2021 Showerhead Savings Calculations**

Variable	Source	2021 Evaluation	
		DEC	DEP
ISR (all)	Participant Survey	43%	55%
ISR (SH 1)	Participant Survey	52%	69%
ISR (SH 2)	Participant Survey	21%	18%
ELEC	Participant Survey	79%	85%
GPM <sub>base</sub>	Federal code maximum	2.5	
GPM <sub>low</sub>	Program provided equipment	1.5	
Time	Participant Survey	10.4	10.7
SPD <sub>Total</sub>	Participant Survey	0.98	1.52
365	Days per year	365	
T <sub>out</sub>	Mid-Atlantic TRM v10	105	
T <sub>in</sub>	Mid-Atlantic TRM v10	60.9	
RE	Mid-Atlantic TRM v10	0.98	
Summer CF	Mid-Atlantic TRM v10, adjusted	0.0053	0.0084
Winter CF	Mid-Atlantic TRM v10, adjusted	0.0189	0.0204

As shown in Table 3-9, gross verified savings vary by showerhead type in the DEC territory. Standard showerheads in the DEC territory showed a higher in-service rate which contributed to higher savings per unit. Post April 2021 showerheads show the lowest savings per unit, which is primarily caused by a relatively low in-service rate, as well as the lowest self-reported average minutes per shower and showers per day among any category in the DEC territory.

Also as shown in Table 3-9, there is variation in gross verified showerhead savings in the DEP territory. The variation appears to be caused primarily by self-reported shower use. Standard showerheads show the largest per unit savings, while also showing the largest average minutes per shower. Wand/Wide showerheads shows the lowest per unit savings, attributed to the lowest average minutes per shower and shower per day.

Future research may be useful to better understand these observed differences between standard and wand/wide showerhead recipients. Savings shown in this table are illustrative only and were not used to determine program-level savings.

**Table 3-9: Standard Showerhead and Wand/Wide Showerhead Verified Savings Per Unit**

Jurisdiction	Item*	Energy (kWh)	Summer Demand (kW)	Winter Demand (kW)
DEC	Standard Showerhead	224.0	0.0150	0.0538
	Wand/Wide Showerhead	191.8	0.0157	0.0562
	Post April 2021 Standard (Wide)	164.0	0.0133	0.0478
DEP	Standard Showerhead	325.3	0.0248	0.0889
	Wand/Wide Showerhead	197.7	0.0220	0.0790
	Post April 2021 Standard (Wide)	264.6	0.0248	0.0889

\*Savings shown in this table were not used to determine program-level savings.

### 3.4.3.2 Faucet Aerators

The Save Energy and Water Kit contained one kitchen faucet aerator and two bathroom faucet aerators. Equation 3-3 and Equation 3-4 below outline the algorithms utilized to estimate savings accrued by the faucet aerator measures.

#### Equation 3-3: Faucet Aerator Energy Savings Algorithm

$$\Delta kWh = ISR \times ELEC \times \frac{(GPM_{base} \times Throttle_{base} - GPM_{low} \times Throttle_{low}) \times Time \times PH \times 365 \times DR \times 8.3 \times (T_{out} - T_{in})}{3412 \frac{Btu}{kWh} \times RE}$$

### Equation 3-4: Faucet Aerator Demand Savings Algorithm

$$\Delta kW = CF \times \frac{\Delta kWh}{HOU}$$

Where:

$$HOU = \frac{PH \times Time}{60} \times 365$$

The algorithm input parameters provided for kitchen and bathroom faucet aerators are shown in Table 3-10 and Table 3-12, respectively. As with Table 3-4 for showerheads measures, Table 3-10 and Table 3-12 present the algorithm input parameters from the 2019 evaluation as well for comparison. None of the TRM based input parameters in Table 3-10 changed between evaluations. In-service rates found in the 2021 evaluation generally stayed near those found in the 2019 evaluation, while participants per household dropped slightly between the 2019 and 2021 evaluations. The key parameter that changed between evaluations was the lower electric water heater fuel saturation.

Table 3-11 and Table 3-13 present the gross verified savings per measure for kitchen aerators and bathroom aerators, respectively.

**Table 3-10: Inputs for Kitchen Faucet Aerator Measures Savings Calculations**

Variable	Source	2021 Evaluation		2019 Evaluation	
		DEC	DEP	DEC	DEP
ISR	Participant Survey	37%	45%	39%	42%
ELEC	Participant Survey	76%	85%	88%	89%
GPM <sub>base</sub>	Federal code maximum	2.2		2.2	
GPM <sub>low</sub>	Program provided equipment	1.0		1.0	
Time	Mid-Atlantic TRM v10	4.5		4.5	
PH	Participant Survey	2.45	2.51	2.54	2.67
365	Days per year	365		365	
DR	Mid-Atlantic TRM v10	50%		50%	
T <sub>out</sub>	Mid-Atlantic TRM v10	93		93	
T <sub>in</sub>	Mid-Atlantic TRM v10	60.9		60.9	
RE	Mid-Atlantic TRM v10	0.98		0.98	
Throttle <sub>low</sub>	Mid-Atlantic TRM v10	95%		95%	
Throttle <sub>base</sub>	Mid-Atlantic TRM v10	83%		83%	
Summer CF	Mid-Atlantic TRM v10, adjusted	0.0093	0.0095	0.0048	0.0051
Winter CF	Mid-Atlantic TRM v10, adjusted	0.0106	0.0108	0.0055	0.0058

None of the TRM based input parameters in Table 3-10 changed between evaluations. In-service rates found in the 2021 evaluation generally stayed near those found in the 2019 evaluation, while participants per household dropped slightly between the 2019 and 2021 evaluations. The key parameter that changed between evaluations was the lower electric water heater fuel saturation.

**Table 3-11: Kitchen Faucet Aerator Verified Savings Per Unit**

Jurisdiction	Energy (kWh)	Summer Demand (kW)	Winter Demand (kW)
DEC	41.5	0.0055	0.0063
DEP	52.6	0.0079	0.0090

**Table 3-12: Inputs for Bathroom Faucet Aerator Measures Savings Calculations**

Variable	Source	2021 Evaluation		2019 Evaluation	
		DEC	DEP	DEC	DEP
ISR (all)	Participant Survey	39%	43%	30%	38%
ISR (1 <sup>st</sup> )	Participant Survey	45%	48%	42%	48%
ISR (2 <sup>nd</sup> )	Participant Survey	32%	37%	18%	27%
ELEC	Participant Survey	76%	85%	88%	89%
GPM <sub>base</sub>	Federal code maximum	2.2		2.2	
GPM <sub>low</sub>	Program provided equipment	1.0		1.0	
Time	Mid-Atlantic TRM v10	1.6		1.6	
PH	Participant Survey	2.45	2.51	2.63	2.78
365	Days per year	365		365	
DR	Mid-Atlantic TRM v10	70%		70%	
T <sub>out</sub>	Mid-Atlantic TRM v10	86		86	
T <sub>in</sub>	Mid-Atlantic TRM v10	60.9		60.9	
RE	Mid-Atlantic TRM v10	0.98		0.98	
Throttle low	Mid-Atlantic TRM v10	95%		95%	
Throttle base	Mid-Atlantic TRM v10	83%		83%	
Summer CF	Mid-Atlantic TRM v10, adjusted	0.0033	0.0034	0.0025	0.0026
Winter CF	Mid-Atlantic TRM v10, adjusted	0.0038	0.0039	0.0028	0.0030

In line with kitchen faucet aerators, all TRM based inputs in Table 3-12 for bathroom aerators remained the same from the 2019 evaluation. Overall in-service rates went up from the 2019 evaluation, which was largely driven by higher in-service rates of the second aerators.

Both Kit 1 and Kit 2 include two bathroom aerators. Similar to the showerhead measure, it is important to show the difference in estimated savings between the first and second bathroom faucet aerator in a kit since the evaluation demonstrated that equipment in-service rates drop as additional items are provided (i.e. a second aerator). Table 3-13 presents the average participant level verified aerator savings for each “Item” category (i.e. Bathroom Aerator 1, Bathroom Aerator 2, or All Bathroom Aerators).

**Table 3-13: Bathroom Faucet Aerator Verified Savings Per Unit**

Jurisdiction	Item	Energy (kWh)	Summer Demand (kW)	Winter Demand (kW)
DEC	Bathroom Aerator 1	17.9	0.0025	0.0028
	Bathroom Aerator 2	12.8	0.0018	0.0020
	All Bathroom Aerators	15.3	0.0021	0.0024
DEP	Bathroom Aerator 1	21.4	0.0031	0.0035
	Bathroom Aerator 2	16.7	0.0025	0.0028
	All Bathroom Aerators	19.0	0.0028	0.0032

### 3.4.3.3 Water Heater Pipe Insulation Wrap

All participants received a 15-foot roll of water heater pipe insulation wrap with their kit, which can insulate up to five linear feet of pipe. To estimate the impacts resulting from the installation of the water heater pipe insulation wrap measure, the evaluation team followed Equation 3-5 and Equation 3-6 presented below.

#### Equation 3-5: Water Heater Pipe Insulation Wrap Energy Savings Algorithm

$$\Delta kWh = ISR \times ELEC \times \frac{\left(\frac{1}{R_{ex}} - \frac{1}{R_{new}}\right) \times L \times C \times \Delta T \times 8,760}{\eta_{DHW} \times 3,413}$$

#### Equation 3-6: Water Heater Pipe Insulation Wrap Demand Savings Algorithm

$$\Delta kW = \frac{\Delta kWh}{8,760}$$

In the same format as showerheads and faucet aerators above, algorithm input parameters for both 2019 and 2021 evaluations are shown in Table 3-14.

**Table 3-14: Inputs for Water Heater Pipe Insulation Wrap Savings Calculations**

Variable	Source	2021 Evaluation		2019 Evaluation	
		DEC	DEP	DEC	DEP
ISR	Participant Survey	30%	27%	36%	35%
ELEC	Participant Survey	76%	85%	88%	89%
R <sub>ex</sub>	Mid-Atlantic TRM v9	1.00		1.00	
R <sub>new</sub>	Program provided equipment	3.00		3.00	
L	Participant Survey	2.90	2.77	5.01	4.78
C	Average O.D. of 1/2" and 3/4" pipe	0.196		0.196	
ΔT	Mid-Atlantic TRM v9	65		65	
8,760	Hours per Year	8,760		8,760	
ηDHW	Mid-Atlantic TRM v9	0.98		0.98	
3,413	BTU per kWh	3,413		3,413	

The primary difference between the 2021 and previous 2019 evaluation shown in Table 3-14 was the length of water heater pipe insulation wrap participants reported installing. The previous evaluation’s survey provided participants with broad range responses from which to select (i.e. “about three feet or less”, “about four to five feet”), then assigned a single value for each response range in the ensuing savings calculations. The 2021 evaluation improved the granularity of available responses to the participants, allowing respondents to select an integer of feet length installed (i.e. “1”, “2”, etc.), which in turn, provided more precise results. Table 3-15 shows the average of participant level verified savings.

**Table 3-15: Water Heater Pipe Insulation Wrap Savings, Verified Savings Per Linear Foot**

Jurisdiction	Energy (kWh)	Summer Demand (kW)	Winter Demand (kW)
DEC	2.7	0.0003	0.0003
DEP	2.6	0.0003	0.0003

### 3.5 Results

Measure level and kit-level energy savings values for DEC and DEP Save Energy and Water Kit Programs are detailed in the following charts and tables.

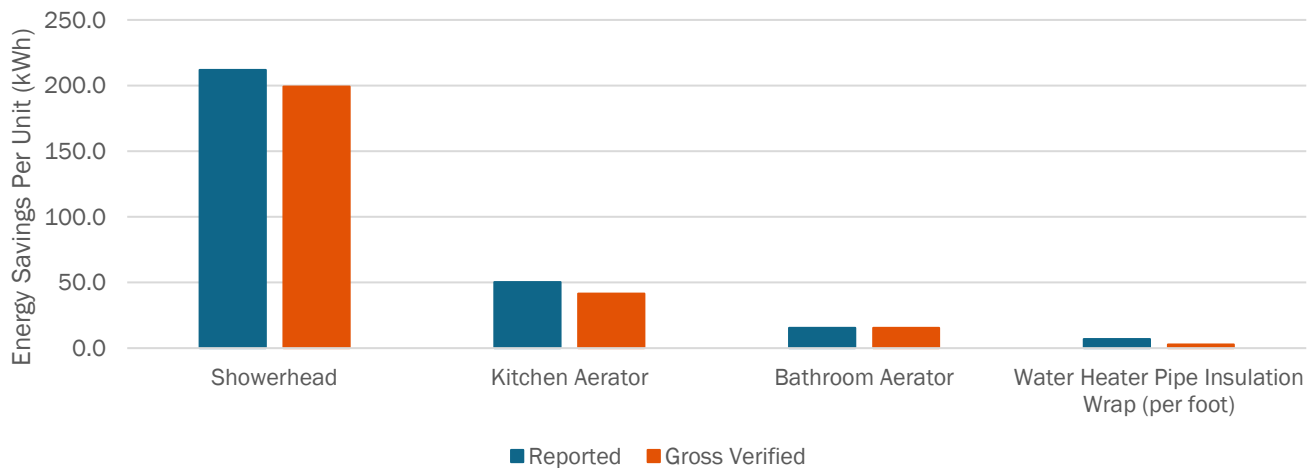
### 3.5.1 Duke Energy Carolinas

Participant survey responses in DEC led to energy savings adjustments with a program energy realization rate of 89%. Figure 3-5 and Table 3-16 graphically and numerically compare the reported and gross verified energy savings by measure. Similarly, Table 3-17 presents measure level reported and gross verified demand savings.

In general, gross verified energy savings agreed with reported energy savings, with a slight drop in verified savings across all measures (i.e. a slightly lower realization rate) due to a lower electrically fueled water heater saturation. Measure specific differences are discussed above in Section 3.4.

A low demand realization rate was observed for the showerhead measure. This is primarily due to a discrepancy in reported summer demand savings between standard showerheads and upgraded wand/wide showerheads. Reported summer demand savings for wand/wide showerheads were about four times larger than those for standard showerheads, while the verified savings methodology applied to each showerhead type was consistent.

Figure 3-5: DEC Gross Verified Energy Savings





**Table 3-16: DEC Measure Level Per Unit Reported and Gross Verified Energy Savings**

Measure	Reported (kWh)	Realization Rate	Gross Verified (kWh)
Showerhead	212.0	94%	199.3
Kitchen Aerator	50.2	83%	41.5
Bathroom Aerator	15.5	99%	15.3
Water Heater Pipe Insulation Wrap*	7.0	39%	2.7

\* Savings for water heater pipe insulation wrap is a per linear foot measurement

**Table 3-17: DEC Measure Level Per Unit Reported and Verified Demand Gross Savings**

Measure	Summer Peak Demand Savings (kW)			Winter Peak Demand Savings (kW)		
	Reported	Realization Rate	Gross Verified	Reported	Realization Rate	Gross Verified
Showerhead	0.0309	47%	0.0146	0.0607	88%	0.0525
Kitchen Aerator	0.0035	157%	0.0055	0.0040	156%	0.0063
Bathroom Aerator	0.0015	142%	0.0021	0.0017	142%	0.0024
Water Heater Pipe Insulation Wrap*	0.0008	39%	0.0003	0.0008	39%	0.0003

\* Savings for water heater pipe insulation wrap is a per linear foot measurement

Table 3-18 and Table 3-19 present energy and demand savings by kit type, respectively. Realization rates for Kit 2 were lower than Kit 1 primarily due to a lower in-service rate for the second showerhead included in each kit. Note summary tables may not compute due to rounding.

**Table 3-18: DEC Energy Savings per Kit**

Kit Size	Population	Reported (kWh)	Energy Realization Rate	Gross Verified (kWh)
Kit 1	23,208	327	104%	340
Kit 2	17,293	538	76%	408
<b>Program Total</b>	<b>40,501</b>	<b>417</b>	<b>89%</b>	<b>369</b>

**Table 3-19: DEC Demand Savings per Kit**

Kit Size	Summer Demand (kW)			Winter Demand (kW)		
	Reported	Realization Rate	Gross Verified	Reported	Realization Rate	Gross Verified
Kit 1	0.038	74%	0.028	0.073	110%	0.080
Kit 2	0.067	50%	0.033	0.134	74%	0.099
<b>Program Total</b>	<b>0.050</b>	<b>60%</b>	<b>0.030</b>	<b>0.099</b>	<b>89%</b>	<b>0.088</b>

Lastly, Table 3-20 presents the reported and gross verified energy and demand savings achieved by the program in the DEC territory during the evaluation period.

**Table 3-20: DEC Program Level Savings**

Measurement	Population	Reported	Realization Rate	Gross Verified
Energy (kWh)	40,501	16,877,494	89%	14,987,559
Summer Demand (kW)		2,043.7	60%	1,226.3
Winter Demand (kW)		3,994.1	89%	3,572.6

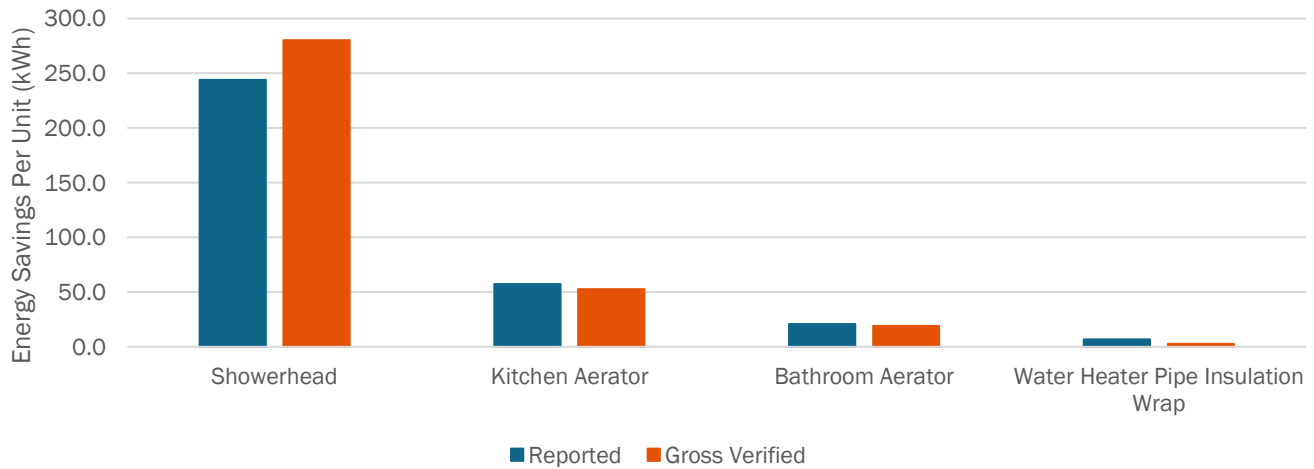
### 3.5.2 Duke Energy Progress

Participant survey responses in DEP led to energy savings adjustments with a program energy realization rate of 105%. Figure 3-6 and Table 3-21 graphically and numerically compare the reported and gross verified energy savings by measure. Similarly, Table 3-22 presents measure level reported and gross verified demand savings.

Similar to results in the DEC territory, in general, gross verified energy savings agreed with reported energy savings, with a slight drop in verified savings across all measures (i.e. a slightly lower realization rate) due to a lower electrically fueled water heater saturation than the previous evaluation had found. Measure specific differences are discussed above in Section 3.4.

Again similar to results in the DEC territory, a low demand realization rate was observed for the showerhead measure. This is primarily due to a discrepancy in reported summer demand savings between standard showerheads and wand/wide showerheads. Reported summer demand savings for wand/wide showerheads were about five times larger than those for standard showerheads, while the verified savings methodology applied to each showerhead type was consistent.

**Figure 3-6: DEP Gross Verified Energy Savings**



**Table 3-21: DEP Measure Level Per Unit Reported and Verified Gross Energy Savings**

Measure	Reported (kWh)	Realization Rate	Gross Verified (kWh)
Showerhead	243.9	115%	280.3
Kitchen Aerator	57.3	92%	52.6
Bathroom Aerator	20.9	91%	19.0
Water Heater Pipe Insulation Wrap*	6.9	38%	2.6

\* Savings for water heater pipe insulation wrap is a per linear foot measurement

**Table 3-22: DEP Measure Level Reported and Verified Demand Gross Savings**

Measure	Summer Peak Demand Savings (kW)			Winter Peak Demand Savings (kW)		
	Reported	Realization Rate	Gross Verified	Reported	Realization Rate	Gross Verified
Showerhead	0.0419	58%	0.0242	0.0723	120%	0.0869
Kitchen Aerator	0.0040	199%	0.0079	0.0045	201%	0.0090
Bathroom Aerator	0.0020	139%	0.0028	0.0023	137%	0.0032
Water Heater Pipe Insulation Wrap*	0.0008	38%	0.0003	0.0008	38%	0.0003

\* Savings for water heater pipe insulation wrap is a per linear foot measurement

Table 3-23 and Table 3-24 present energy and demand savings by kit type, respectively. Realization rates for Kit 2 were lower than Kit 1 primarily due to a lower in-service rate for the second showerhead included in each kit. Note summary tables may not compute due to rounding.

**Table 3-23: DEP Energy Savings per Kit**

Kit Size	Population	Reported (kWh)	Energy Realization Rate	Gross Verified (kWh)
Kit 1	11,193	367	122%	447
Kit 2	9,843	601	94%	566
<b>Program Total</b>	<b>21,036</b>	<b>477</b>	<b>105%</b>	<b>503</b>

**Table 3-24: DEP Demand Savings per Kit**

Kit Size	Summer Demand (kW)			Winter Demand (kW)		
	Reported	Realization Rate	Gross Verified	Reported	Realization Rate	Gross Verified
Kit 1	0.045	87%	0.039	0.083	146%	0.121
Kit 2	0.078	65%	0.051	0.153	111%	0.170
<b>Program Total</b>	<b>0.060</b>	<b>74%</b>	<b>0.045</b>	<b>0.116</b>	<b>124%</b>	<b>0.144</b>

Lastly, Table 3-25 presents the reported and gross verified energy and demand savings achieved by the program in the DEP territory during the evaluation period.

**Table 3-25: DEP Program Level Savings**

Measurement	Population	Reported	Realization Rate	Gross Verified
Energy (kWh)	21,036	10,027,035	105%	10,574,179
Summer Demand (kW)		1,270.3	74%	936.6
Winter Demand (kW)		2,435.2	124%	3,026.1

## 4 Net-To-Gross

The evaluation team used participant survey data to calculate a net-to-gross (NTG) ratio for SEWKP. NTG reflects the effects of free ridership (FR) and spillover (SO) on gross savings. Free ridership refers to the portion of energy savings that participants would have achieved in the absence of the program through their own initiatives and expenditures (U.S. DOE, 2014).<sup>8</sup> Spillover refers to the program-induced adoption of additional energy-saving measures by participants who did not receive financial incentives or technical assistance for the additional measures installed (U.S. DOE, 2014). The evaluation team used the following formula to calculate the NTG ratio:

$$NTG = 100\% - FR + SO$$

### 4.1 Free Ridership

Free ridership estimates how much the program influenced participants to install the energy-saving items included in the energy efficiency kit. Free ridership ranges from 0% to 100%, with 0% being no free ridership and 100% being total free ridership.

The evaluation team used participant survey data to estimate free ridership. The survey used several questions to identify items that a given participant installed and did not later uninstall; respondents were only asked free ridership questions about items that remained installed by the date of the survey.

The evaluation team's methodology for calculating free ridership consists of two components, free ridership change (FRC) and free ridership influence (FRI).

$$FR = 50\% \times FRC + 50\% \times FRI$$

#### 4.1.1 Free Ridership Change

FRC reflects what participants reported they would have done if the program had not provided the items in the kit. For each respondent, the survey assessed FRC for each measure that the respondent installed.

Specifically, the survey asked respondents which, if any, of the currently installed items they would have purchased and installed on their own within the next year if Duke Energy had not provided them. For respondents who installed more than one of a given measure (bathroom aerators or showerheads) that indicated they would have installed either of the multi-count measures on their

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<sup>8</sup>The U.S. Department of Energy (DOE) (2014). *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures. Chapter 23: Estimating Net Savings: Common Practices*

own, we asked them a follow up question that determined how many of the number installed through the program that they would have installed on their own.

For each participant and each measure, the evaluation team assigned one of the FRC values:

- Would not have installed the measure on their own – no free ridership
- Would have installed the measure on their own – full free ridership
- Did not know if they would have installed the measure on their own – partial free ridership

The program level free ridership change value was calculated to 35.1% for DEC and 44.5% for DEP.

#### 4.1.2 Free Ridership Influence

FRI assesses how much influence the program had on a participant’s decision to install (and keep installed) the items in the kit. The survey asked respondents to rate how much influence four program-related factors had on their respective decisions to install the measures, using a scale from 0 (“not at all influential”) to 10 (“extremely influential”). The program-related factors included:

- The fact that the items were free
- The fact that the items were mailed to their home
- Information provided by Duke Energy about how the items would save energy and water
- Other information or advertisements from Duke Energy, including its website

Asking respondents to separately rate the influence of each of the four above items on the decision to install each measure would have been overly burdensome. Therefore, while the survey assessed FRC for each measure type, it assessed collective FRI for all measures.

FRI is based on the highest-rated item in the FRI battery. The evaluation team assigned the following FRI scores, based on that rating (Table 4-1).

**Table 4-1: Free Ridership Influence Values**

Highest Influence Rating	FRI Value
0	100%
1	90%
2	80%
3	70%
4	60%
5	50%
6	40%
7	30%
8	20%
9	10%
10	0%

The program level free ridership influence value was calculated to 2.7% for DEC and 1.6% for DEP.

### 4.1.3 Total Free Ridership

The evaluation team calculated the total free ridership by measure by calculating the average between each measure’s change and influence score, then savings weighting each result with the evaluated per unit savings for each unit installed by respondents to derive the overall total.

The evaluation team then estimated overall program level free ridership by calculating a savings-weighted mean of the measure-specific FR scores. The program level free ridership calculated to 18.9% for DEC and 23.1% for DEP.

## 4.2 Spillover

Spillover estimates energy savings from additional energy improvements made by participants who are influenced by the program to do so and is used to adjust gross savings. The evaluation team used participant survey data to estimate spillover. The survey asked respondents to indicate what energy-saving measures they had implemented since participating in the program. The evaluation team then asked participants to rate the influence the program had on their decision to purchase



these additional energy-saving measures on a scale of 0 to 10, where 0 means “not at all influential” and 10 means “extremely influential.”

The evaluation team converted the ratings to a percentage representing the program-attributable percentage of the measure savings, from 0% to 100%. The team then applied the program-attributable percentage to the savings associated with each reported spillover measure to calculate the participant measure spillover (PMSO) for that measure. We defined the per-unit energy savings for the reported spillover measures based primarily on previous Duke Energy SmartSaver and other recent evaluations to be consistent across programs, which draw upon ENERGY STAR® calculators and algorithms and parameter assumptions listed in the Mid-Atlantic TRM v9 and v10.

Since Duke Energy offered program incentives for a variety of energy-saving measures throughout the evaluation period, we compared the list of customers reporting measures as spillover against participation records for other Duke Energy programs that offered the measure. To avoid double-counting savings for measures already claimed by another Duke Energy offering, we excluded savings from measures that appeared in another program’s tracking data from our estimation of spillover savings.

Participant measure spillover is calculated as follows:

$$PMSO = Deemed\ Measure\ Savings * Program\ Attributable\ Percentage$$

The evaluation team summed all PMSO savings values for each jurisdiction (Table 4-2 and Table 4-3).

**Table 4-2: DEC Sample PMSO, by Measure by Category**

Measure Category	Average Assigned Weight	Attributable Savings (kWh)
Thermostat	69%	576
Windows	33%	495
Insulation	34%	845
Sealing leaks	48%	751
Seal ducts	67%	876
LEDs	65%	3,073
Refrigerator	50%	115
<b>Total</b>		<b>6,731</b>

**Table 4-3: DEP Sample PMSO, by Measure by Category**

Measure Category	Average Assigned Weight	Attributable Savings (kWh)
Thermostat	50%	105
Windows	75%	371
Insulation	70%	323
Sealing leaks	69%	298
Sealed ducts	40%	350
LEDs	68%	1,621
Refrigerator	55%	51
Door weatherstripping	100%	23
<b>Total</b>		<b>3,141</b>

The evaluation team then calculated gross program savings associated with sampled participants by summing the products of each measure’s average per household savings and the total sample size (Table 4-4 and Table 4-5).

**Table 4-4: DEC Sample Gross Program Savings (n=176)**

Measure	Installed Count	Verified Sample Savings (kWh)
Showerhead	138	55,007
Kitchen Aerator	70	7,851
Bathroom Aerators	141	5,532
Water Heater Pipe Insulation Wrap	60	1,620
<b>Total</b>		<b>70,010</b>

**Table 4-5: DEP Sample Gross Program Savings (n=106)**

Measure	Installed Count	Verified Sample Savings (kWh)
Showerhead	92	50,901
Kitchen Aerator	53	6,195
Bathroom Aerators	82	3,623
Water Heater Pipe Insulation Wrap	31	836
<b>Total</b>		<b>61,555</b>

The evaluation team then divided the summed jurisdictional PMSO values by the sample’s gross program savings to calculate an estimated spillover percentage for the program:

$$Program\ SO = \frac{\sum PMSO}{\sum Sample\ Gross\ Program\ Savings}$$

$$DEC\ SO = \frac{6,731}{70,010} = 9.62\%$$

$$DEP\ SO = \frac{3,141}{61,555} = 5.10\%$$

These calculations produced a spillover estimate of 9.6% for the DEC program and 5.1% for the DEP program.

### 4.3 Net-to-Gross

Inserting the FR and SO estimates into the NTG formula (NTG = 1 - FR + SO) produces an NTG value of 91% for the DEC program and 82% for the DEP program (Table 4-6).

**Table 4-6: Net-To-Gross Results**

Jurisdiction	Free Ridership	Spillover	NTG
DEC	18.94%	9.62%	90.67%
DEP	23.07%	5.10%	82.03%

The evaluation team applied this NTG ratio to program-wide verified gross savings to calculate SEWKP kit net savings for the jurisdictions (Table 4-7 and Table 4-8).

**Table 4-7: DEC Program Level Savings**

Measurement	Population	Gross Verified	NTG Ratio	Net Verified
Energy (kWh)	40,501	14,937,559	90.67%	13,544,149
Summer Demand (kW)		1,226		1,112
Winter Demand (kW)		3,573		3,239

**Table 4-8: DEP Program Level Savings**

Measurement	Population	Gross Verified	NTG Ratio	Net Verified
Energy (kWh)	21,036	10,574,179	82.03%	8,674,399
Summer Demand (kW)		937		768
Winter Demand (kW)		3,026		2,482

## 5 Process Evaluation

### 5.1 Summary of Data Collection Activities

The process evaluation is based on an interview with program staff and surveys with households who requested the Save Energy & Water kit during the program year (Table 5-1).

**Table 5-1: Summary of Process Evaluation Data Collection Activities**

Target Group	Method	Sample Size	Confidence / Precision
Duke Energy program staff	Phone in-depth interview	1	N/A
Households	Web survey	DEC: 176	6.2%
		DEP: 106	7.9%

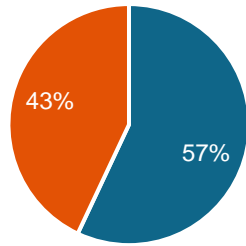
### 5.2 Process Evaluation Findings

#### *Kit Selection*

Just under half of the participants in each jurisdiction received a kit with two showerheads (Kit 2). According to the survey data, 57% of DEC respondents received Kit 1, and 43% of DEC respondents received Kit 2. The DEC survey respondents and population share proportions. The survey data and the population data were compared to determine whether our survey sample was representative of the broader population who received kits. In the case of DEC respondents, the survey was representative of the broader population as demonstrated by the shared proportions across survey respondents and population data, as shown in Figure 5-1.

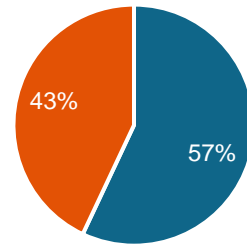
Figure 5-1: Proportion of Kit 1 Versus Kit 2 in Population and Sample - DEC

DEC Total Population



■ Kit 1 ■ Kit 2

DEC Survey Sample

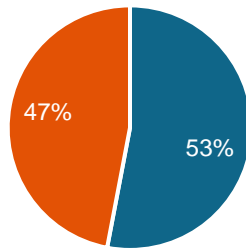


■ Kit 1 ■ Kit 2

For DEC, the survey and population proportions are similar but not an exact match. Fifty-seven percent of DEC respondents received Kit 1, whereas 53% of the population received Kit 1 (Figure 5-2).

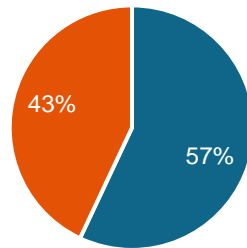
Figure 5-2: Proportion of Kit 1 Versus Kit 2 in Population and Sample - DEP

DEP Total Population



■ Kit 1 ■ Kit 2

DEP Survey Sample

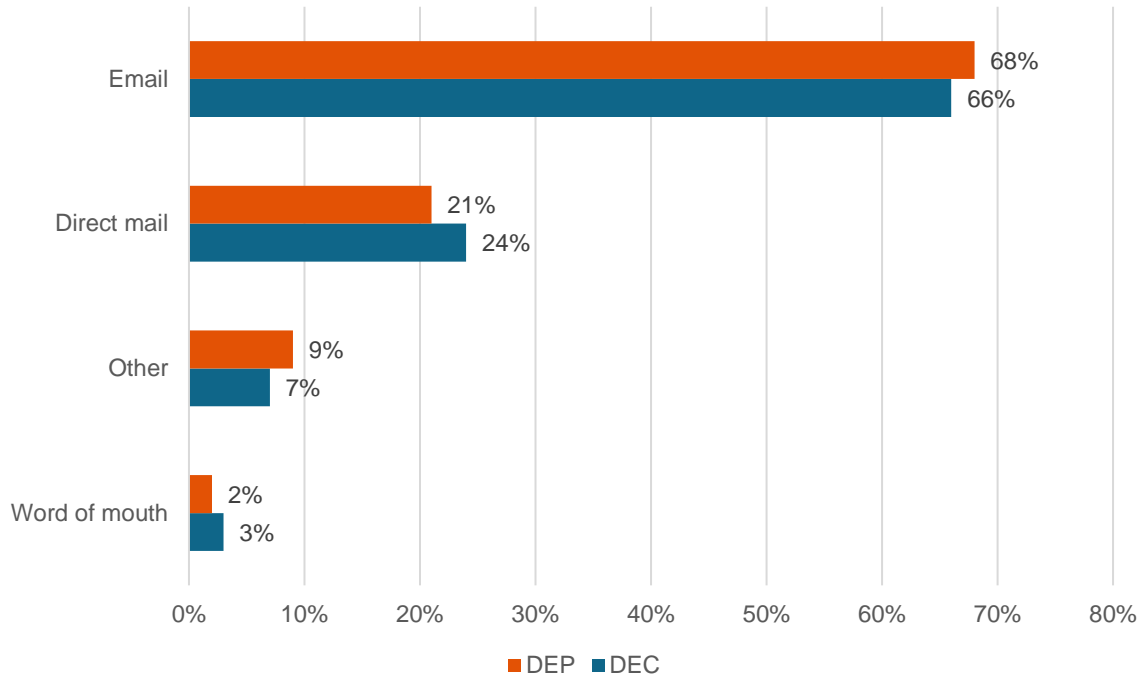


■ Kit 1 ■ Kit 2

### Learning about the Program

Participants mainly learned about the program through email (68% of DEP participants; 66% of DEC participants), and fewer participants learned about the program through direct mail (21% of DEP participants; 24% of DEC participants) as seen in Figure 5-3. Participants also reported learning about the program by word-of-mouth (2% of DEP participants; 3% of DEC participants), however they would not be able to participate without an invitation from Duke Energy.

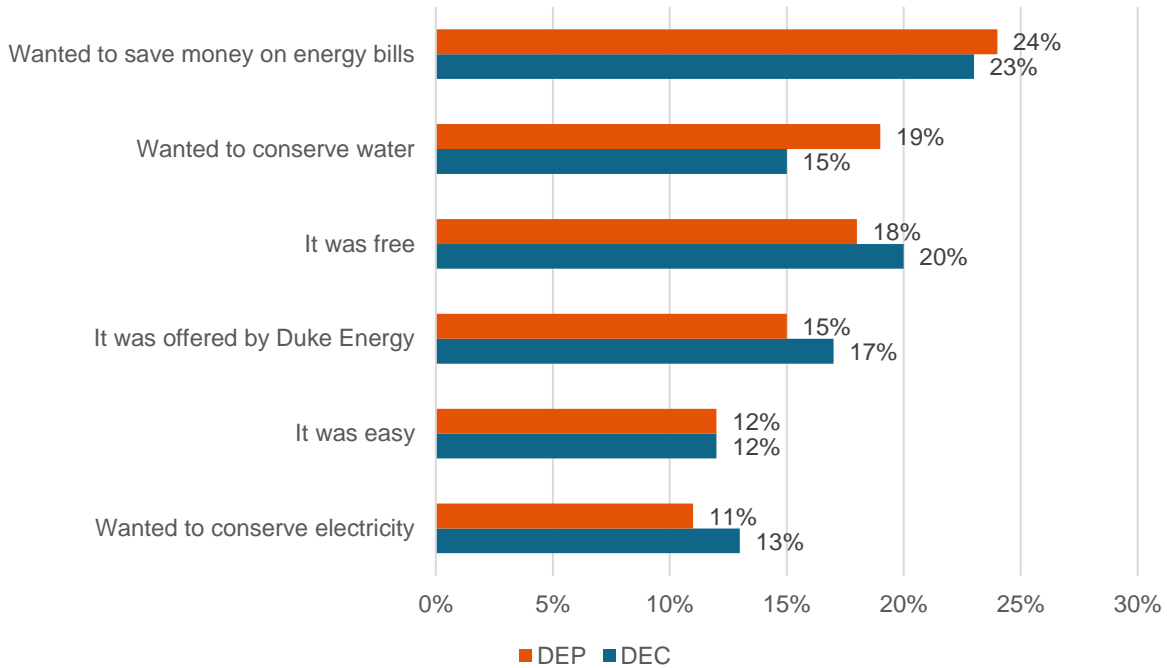
Figure 5-3: How Participants Learned About The Program



**Motivation to Request Kits**

Figure 5-4 shows participants were mainly motivated to request a free kit to save money on their energy bills (24% of DEP respondents; 23% of DEC respondents). Other motivations to request free kits included wanting to conserve water (19% of DEP respondents; 15% of DEC respondents), because the kit was free (18% of DEP respondents; 20% of DEC respondents), and that the kit was offered by Duke Energy (15% of DEP respondents; 17% of DEC respondents).

Figure 5-4: Customer Motivation To Participate Request a Kit

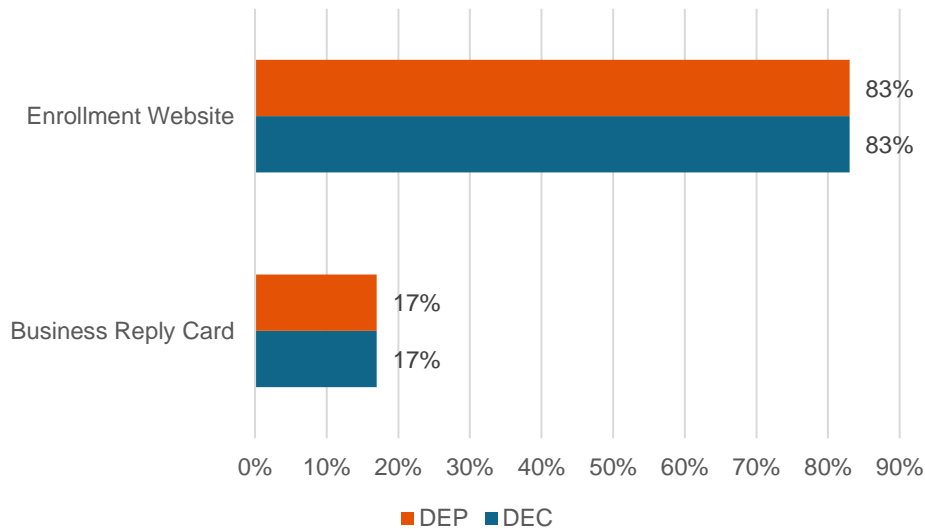


**Invitations to Participate**

The SEWKP program is invite-only, meaning that program staff from Duke Energy must send out invitations to eligible participants to participate in the program. The program staff utilize direct mail and email to invite potential participants. The direct mail is a Business Reply Card (BRC) with pre-paid postage for participants to request a kit through the program implementer. The email communication leads participants to the enrollment website to request their free kit. Eighty-three percent of survey respondents in both jurisdictions came through the enrollment website, as seen in Figure 5-5, and almost all respondents (98%) reported that the website functioned properly. Only 17% of respondents in both jurisdictions came through the BRC.



Figure 5-5: Enrollment Method Reported by Survey Respondents



Duke Energy program staff reported that the take rate from direct mail invitations was 3.4%, which exceeds the average take rate of about 1% for other Duke Energy direct mail programs. The take rate for email invitations was reported to be 2.1%. This is slightly above the average take rate of about 1-2% for other Duke Energy email programs.

**Participant Installation and Uninstallation Rates**

Most kit recipients (86% of DEP participants; 85% of DEC participants) installed at least one measure from the kit. Over two-thirds of the kit recipients (71% of DEP participants; 68% of DEC participants) initially installed at least one showerhead. Eleven percent of both those DEP and DEC respondents later uninstalled at least one showerhead (Table 5-2). About half the respondents initially installed the kitchen faucet aerator (50% of DEP respondents; 42% of DEC respondents). Ten percent of those DEP respondents, and 12% of those DEC respondents later uninstalled the kitchen faucet aerator. Less than half of both DEC and DEP respondents initially installed at least one bathroom faucet aerator (48% of DEP respondents; 48% of DEC respondents). Nine percent of those DEC respondents who had installed a bathroom faucet aerator later uninstalled the measure, while no respondents in DEP reported later uninstalling at least one bathroom faucet aerator. A smaller proportion of respondents in both jurisdictions reported having installed the water heater pipe insulation wrap (21% of DEP respondents; 30% of DEC respondents). Water heater pipe insulation wrap has the lowest uninstallation rate where nobody reported removing the measure in the DEP region, and only 2% of respondents in DEC who installed water heater pipe insulation wrap reported removing it. In most cases, across both jurisdictions, respondents said they uninstalled these water saving measures because they did not like how they worked.

**Table 5-2: Percent of Participants that Later Uninstalled Measures\***

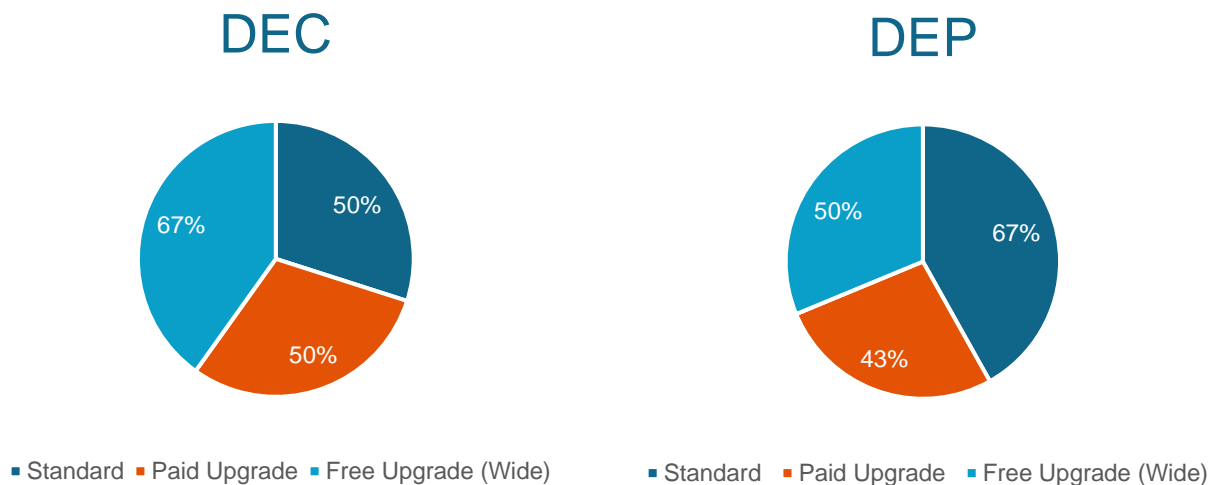
Measure	DEC	DEP
Showerhead[s]	11%	11%
Kitchen faucet aerator	12%	10%
Bathroom faucet aerator	9%	0%
Water heater pipe insulation wrap	2%	0%

\*Of participants who initially installed a given measure.

Of the DEP respondents who received Kit 2, 66% installed at least one showerhead, while 34% installed both showerheads. Of the DEC respondents who received Kit 2, 51% installed at least one showerhead, while 49% installed both showerheads.

As mentioned, the showerhead options changed during the current evaluation period. To obtain a more thorough understanding of installations and uninstalls of the showerheads, these rates were evaluated by showerhead and upgrade type. Of the showerheads that were uninstalled, the highest proportion of free upgraded wide showerheads were uninstalled in DEC territory, whereas the DEP territory had the highest proportion of standard showerheads uninstalled. Figure 5-6 shows the proportion of showerheads uninstalled in each territory by type. The main reason for uninstalls, regardless of territory and regardless of showerhead type, was that the participant did not like how the showerhead worked.

**Figure 5-6: Showerheads Uninstalled by Type**

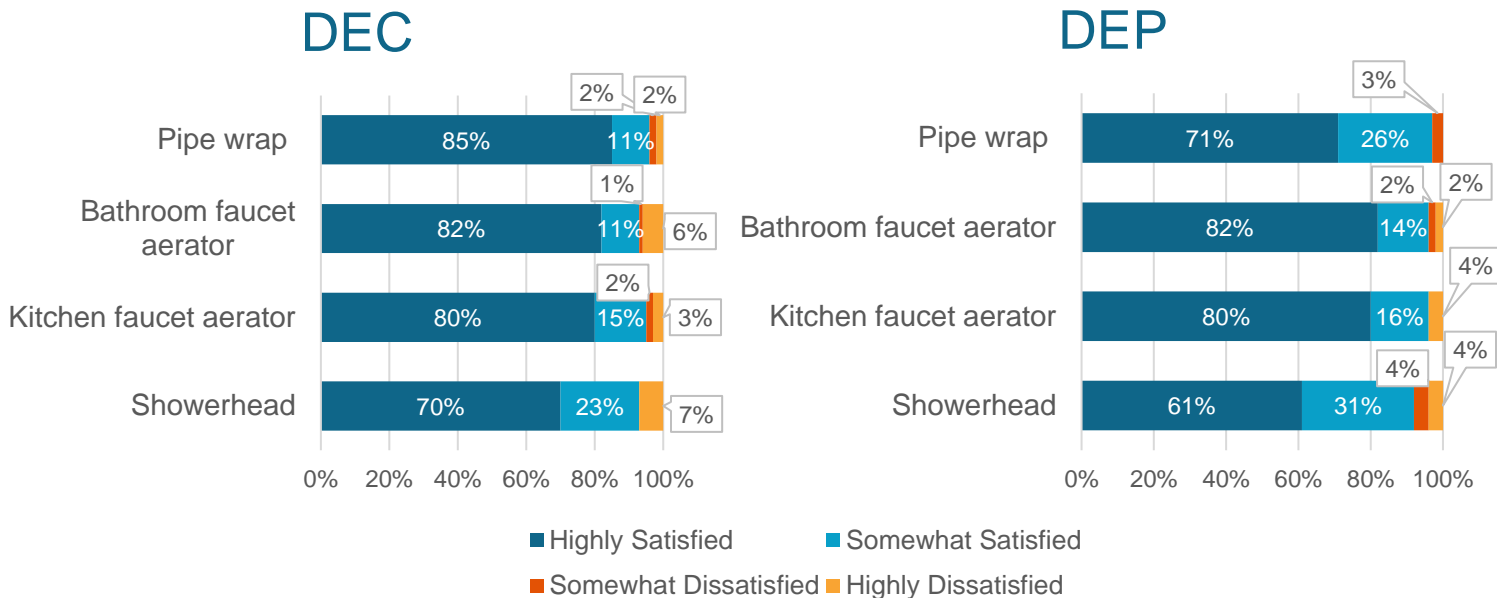


Of the respondents who did not install all measure types, 43% of DEP respondents and 38% of DEC respondents said they plan to install at least one of the items they had not yet installed. Across both jurisdictions, respondents who indicated they do not plan to install one or more of the measures typically said they would not install the remaining items because they “already have the item,” or they “haven’t gotten around to it.”

**Measure Satisfaction**

Nearly all kit recipients reported moderate to high satisfaction with the items they installed from their kit (Figure 5-7). Levels of satisfaction with the measures installed was similar across both DEC and DEP. To best gauge the experience with the measures, we asked respondents to rate their satisfaction with all measures they installed, including those they later uninstalled. Respondents were generally most highly satisfied with the bathroom faucet aerator and were least highly satisfied with the showerhead in general. Open-ended comments revealed that those customers who were dissatisfied with water-saving measures most often pointed to low water pressure or issues with water flow as the reason for dissatisfaction.

**Figure 5-7: Participant Satisfaction with Installed Measures\***

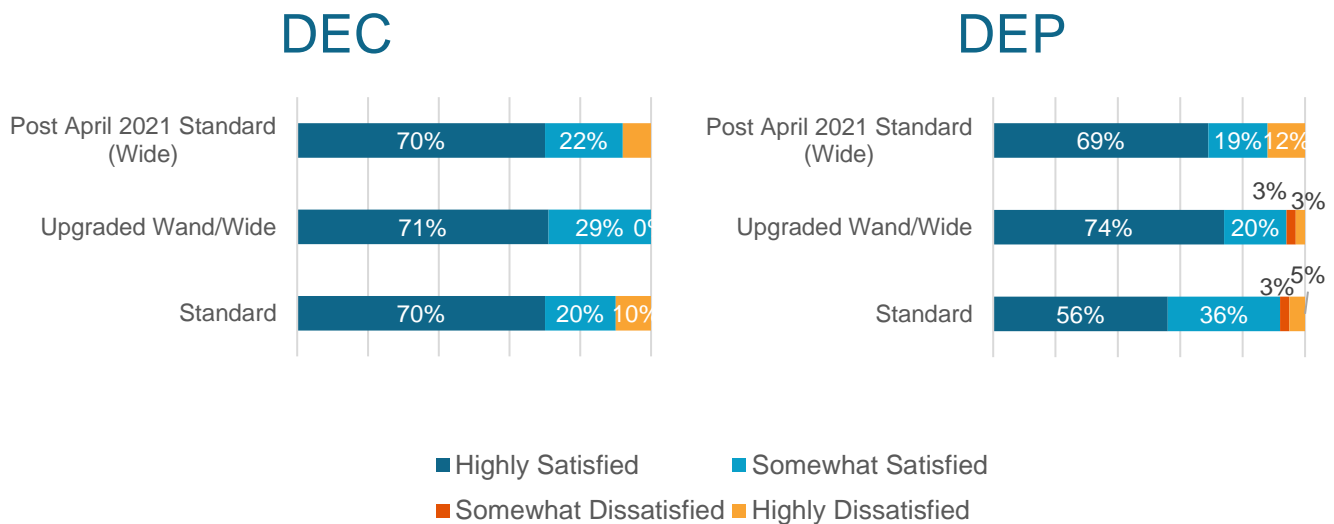


\* Respondents rated their satisfaction with the measures on a scale ranging from 0 (“very dissatisfied”) to 10 (“very satisfied”). Dissatisfied indicates 0-4 ratings, moderately satisfied indicates 5-7 ratings, and highly satisfied indicates 8-10 ratings.

As mentioned, the showerhead options changed during the current evaluation period. To get a more thorough understanding of participant satisfaction with the showerhead measure, satisfaction with the showerhead was then assessed in the following three ways: 1) standard showerheads issued before April 2021; 2) All showerheads for which an additional fee was required; and 3) Post April

2021 showerheads, including standard/wide showerheads during or after April 2021 which were provided at no extra cost. Figure 5-8 shows respondent satisfaction by showerhead type. In general, there was the highest dissatisfaction with the standard showerheads when compared to the upgraded showerheads, regardless of whether the respondent paid for the upgrade or got the upgrade for free. Further, we saw the highest overall satisfaction from respondents who paid for the upgraded showerhead. While the upgraded showerheads had the lowest ISR of all the showerhead measures, we find that when participants do install the upgraded showerhead, they do tend to be highly satisfied. The marketing for the program may want to focus on highlighting the upgraded showerhead to drive a higher ISR, and thus higher satisfaction.

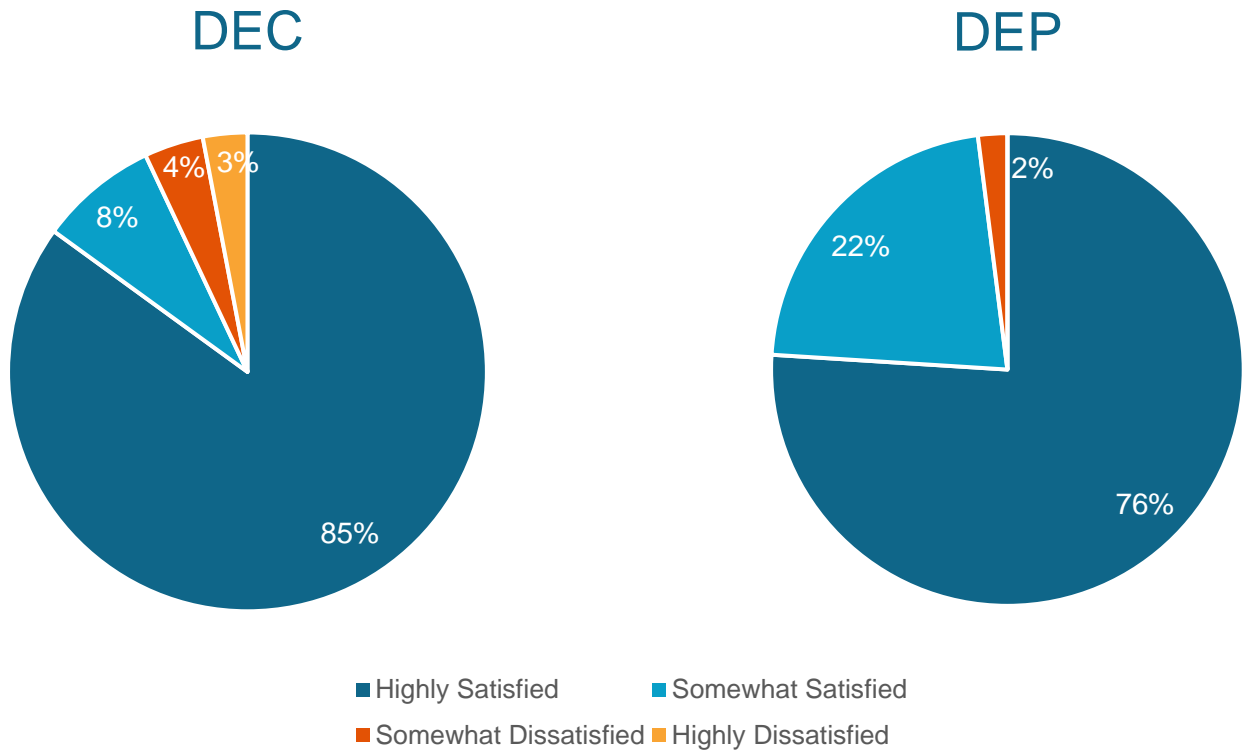
Figure 5-8: Showerhead Satisfaction by Showerhead Type



**Program Satisfaction**

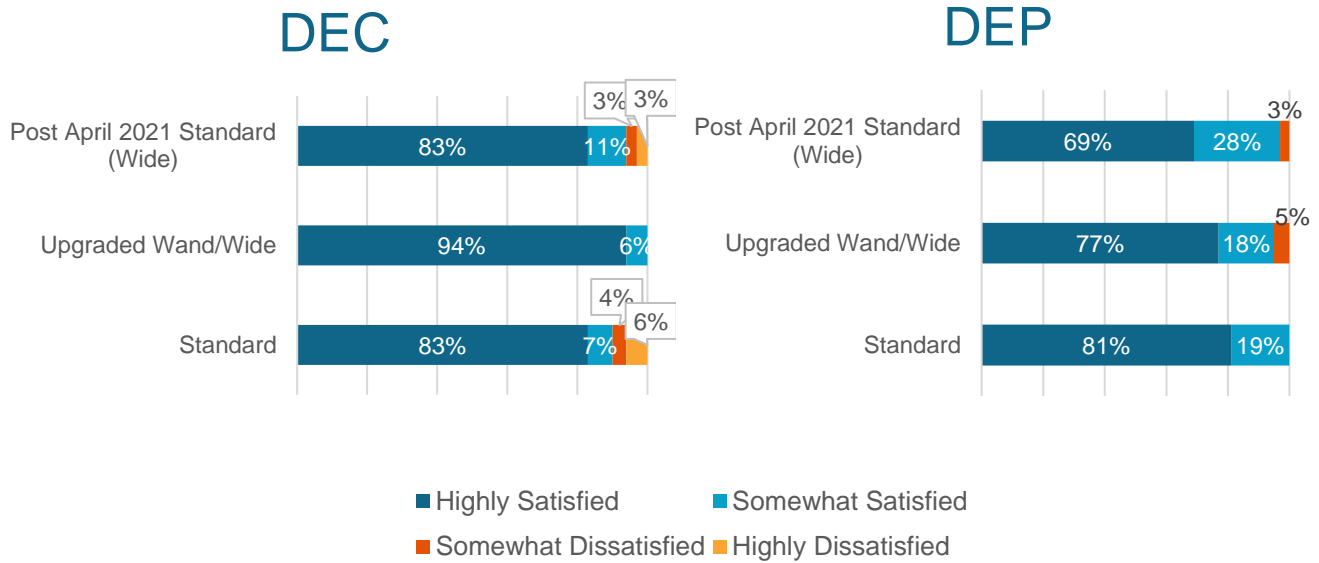
Overall, most kit recipients were highly satisfied with the program. More participants (85%) in the DEC region were highly satisfied with the program, when compared to DEP respondents (76%). It is not clear why satisfaction differs across regions.

Figure 5-9: Participant Program Satisfaction



Overall, most kit recipients were highly satisfied with the program regardless of the showerhead type that they received. The highest program satisfaction reported in the DEC region was among participants who received a paid upgrade showerhead. In the DEP region, the highest program satisfaction was reported among participants who received a standard showerhead. It is not clear why satisfaction with the program overall differs by showerhead type across regions. Figure 5-10 shows the program satisfaction ratings by showerhead type.

Figure 5-10: Program Satisfaction by Showerhead Type



**Kit Instructional Materials**

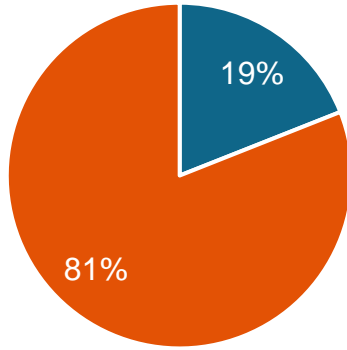
In addition to energy-saving measures, the Save Energy and Water Kit includes a detailed instructional booklet that provides information on how to install the provided measures. The vast majority of respondents (94% of DEP respondents; 93% of DEC respondents) said they read the booklet, and most of them (83% of DEP respondents; 82% of DEC respondents) found it highly helpful. Duke Energy also provided instructional how-to videos to show participants how to install kit measures. Only 13% of DEP participants and 10% of DEC participants watched the how-to tutorial videos. However, of those participants who watched the how-to tutorial videos, 93% of DEP participants and 89% of DEC participants found them highly helpful.

**Showerhead Upgrade Option**

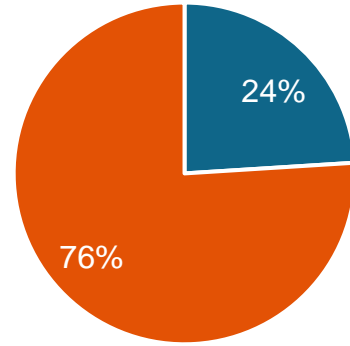
According to the population data, 19% of DEC participants paid a fee to upgrade the showerhead in the kit. The survey data is slightly different, showing that 24% of DEC respondents paid a fee to upgrade the showerhead in the kit. It is important to check survey and population proportions to ensure proportional representation.

Figure 5-11: Percent of DEC Population and Sample With Upgraded Showerheads

### DEC Total Population



### DEC Survey Sample

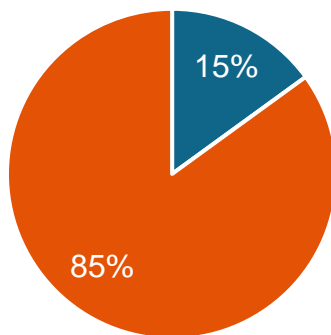


■ Upgraded ■ Did Not Upgrade

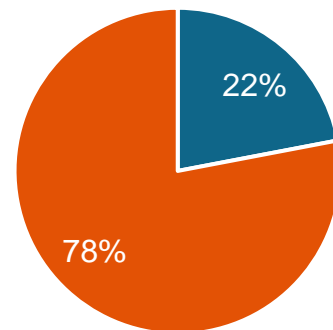
According to the population data, 15% of DEP respondents paid a fee to upgrade the showerhead in the kit. The survey data is slightly different, showing that 22% of DEP respondents paid a fee to upgrade the showerhead in the kit.

Figure 5-12: Percent of DEP Population and Sample With Upgraded Showerheads

### DEP Total Population



### DEP Survey Sample



■ Upgraded ■ Did Not Upgrade

Regardless of jurisdiction, the most common reasons for upgrading the showerhead were wanting to conserve water (37% of DEC respondents; 36% of DEP respondents), wanting to save money on their energy bill (17% of DEC respondents; 22% of DEP respondents), and the fact that the option was

offered by Duke Energy (14% of DEC respondents; 16% of DEP respondents). These reasons were also the most commonly reported regardless of whether the participant paid for the upgraded showerhead or received the upgraded showerhead at no cost.

There was no statistically significant relationship between whether the showerhead was upgraded and satisfaction with the program overall.



## 6 Conclusions and Recommendations

The evaluation findings led to the following conclusions and recommendations for the program.

**Conclusion 1: Electric water heater saturations among participants could improve.** Water heater fuel saturation has a significant impact on the program's savings since it influences each measure's savings. The current method to screen for water heaters with electric fuel is using AMI data and having customers select a checkbox on the Business Reply Card. This approach yielded saturations slightly lower than was found in the previous evaluation but generally consistent among the program's previous two evaluations, with the average of approximately 80%.

**Recommendation:** In order to maximize the electric fuel saturation among participants, consider additional screening, such as asking potential participants for their fuel type during registration. The Business Reply Card currently includes a checkbox where customers can select that they have electric water heating, however this checkbox option is missing on the online registration. While the online registration includes messaging stating that only those with electric water heating are eligible, having a checkbox to confirm that the customer has electric water heating would ensure that fewer people without electric water heating are registering for the program.

**Conclusion 2: The quantity of showerheads provided in kits do not align with showers in the recipient homes.** 21% of DEC and 26% of DEP Kit 2 recipients reported only having one shower in their home. In a similar vein, 83% of DEC and 73% of Kit 1 recipients reported having more than one shower in their home. The current approach for determining which households receive a second showerhead (Kit 2) is dependent upon home square footage data from a third party data supplier and a threshold of 1,500 square feet set by Duke Energy, where homes containing 1,500 or more square feet of living space receive Kit 2. While the current process to decide whether to send Kit 1 or Kit 2 is simple and does not require customer interaction, the process relies on a series of assumptions that have the effect of mismatching homes with kits.

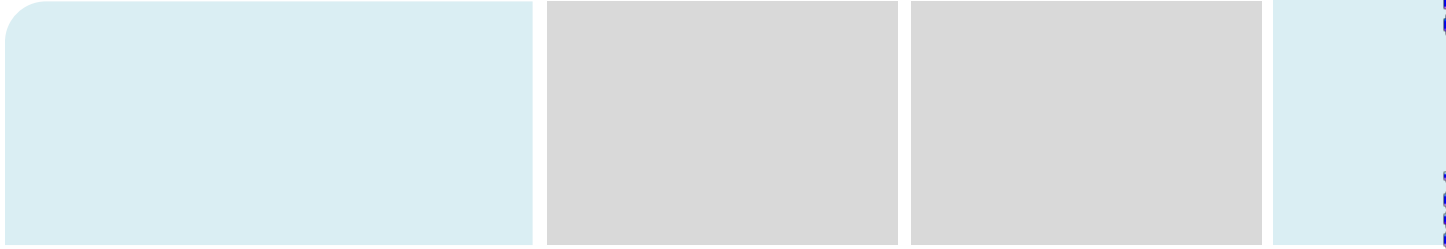
**Recommendation:** As part of the enrollment process, consider asking participants how many showers are in their home and/or how many showerheads the participant intends to replace.

**Conclusion 3: Respondents who watched the tutorial videos found them to be very helpful.** 10% of DEC and 13% of DEP survey respondents reported watching the tutorial videos and 89% and 93%, for DEC and DEP respectively, found them to be highly helpful.

**Conclusion 4: There is variation in gross verified savings between showerhead types in the DEP territory.** The difference in verified savings is primarily caused by lower shower use among participants who received a wand or wide showerhead, as self reported through web surveys. This difference was not observed in the DEC territory.

**Recommendation:** Consider expanding research questions in future program evaluations to better understand any observed differences between participants who requested an upgraded showerhead and the remainder of the program population.

# Appendix A Summary Form



## Description of program

The Duke Energy Save Energy and Water Kit Program (SEWKP) is an energy efficiency program that offers energy efficient water fixtures and water heater pipe insulation wrap to residential customers. The program is designed to reach customers who have not adopted energy efficient water devices. The kits are provided to residents through a Direct Mail Campaign, allowing eligible customers to request to have the items shipped directly to their homes, free of charge.

Date	June 10, 2022
Region(s)	Carolinas and Progress
Evaluation Period	July 1, 2020 - June 30, 2021
Annual Gross MWh Savings	DEC: 14,938 DEP: 10,574
Per Kit Gross kWh Savings	DEC: 369 DEP: 503
Annual Gross MW Savings	DEC: 1.23 (summer), 3.57 (winter) DEP: 0.94 (summer), 3.03 (winter)
Net-to-Gross Ratio	DEC: 90.67% DEP: 82.03%
Process Evaluation	Yes
Previous Evaluation(s)	2016-2017, 2018-2019

## Evaluation Methodology

### Impact Evaluation Activities

Web surveys (DEC n=176, DEP n=106) and analysis of 4 unique measures

### Impact Evaluation Findings

Realization rates:

- DEC: 89% (energy); 60% (summer demand); 89% for (winter demand)
- DEP: 105% (energy); 74% (summer demand); 124% for (winter demand)

### Process Evaluation Activities

Web surveys (DEC n=176, DEP n=106)  
 1 interview with program staff

### Process Evaluation Findings

- The SEWKP influences participants to install kit measures and adopt new behaviors.
- Participants are generally satisfied with kit items and report high satisfaction with overall program.
- Kit size assignment algorithm is fairly accurate, but may benefit from customer input.
- Low water pressure is the leading contributor to dissatisfaction with water-saving items among a relatively small number of participants.
- Instructional literature and videos are found to be helpful.
- Electric water heater proportions were lower this cycle than in previous.

## Appendix B Measure Impact Results

**Table B-1: DEC Per Unit Verified Impacts by Measure – Key Measure Parameters**

Measure Category	Gross Energy Savings (kWh)	Gross Summer Demand (kW)	Gross Winter Demand (kW)	Energy Realization Rate	Free Ridership	Spillover	Net to Gross Ratio
Showerhead	199.3	0.0146	0.0525	94%	18.94%	9.62%	90.67%
Kitchen Faucet Aerator	41.5	0.0055	0.0063	83%			
Bathroom Faucet Aerator	15.3	0.0021	0.0024	99%			
Water Heater Pipe Insulation Wrap*	2.7	0.0003	0.0003	39%			

\* Savings for water heater pipe insulation wrap is a per linear foot measurement

**Table B-2: DEP Per Unit Verified Impacts by Measure – Key Measure Parameters**

Measure Category	Gross Energy Savings (kWh)	Gross Summer Demand (kW)	Gross Winter Demand (kW)	Energy Realization Rate	Free Ridership	Spillover	Net to Gross Ratio
Showerhead	280.3	0.0242	0.0869	115%	23.07%	5.10%	82.03%
Kitchen Faucet Aerator	52.6	0.0079	0.0090	92%			
Bathroom Faucet Aerator	19.0	0.0028	0.0032	91%			
Water Heater Pipe Insulation Wrap*	2.6	0.0003	0.0003	38%			

\* Savings for water heater pipe insulation wrap is a per linear foot measurement



DSMore%20table%  
20DEC\_DEP%20SEW

## Appendix C Program Performance Metrics

This appendix provides key program performance metrics, or PPIs. See Chapter 5 for the underlying results and more detailed findings.

Figure C-1: DEC Program Experience PPIs

Program experience & satisfaction PPIs	Participants	
	%	n
Overall satisfaction with program	85%	155
Usefulness of kit instructions	82%	166
<i>Satisfaction with kit measures</i>		
Showerhead	70%	127
Kitchen faucet aerator	80%	76
Bathroom faucet aerator	82%	87
Water heater pipe insulation wrap	85%	65
<b>Program influence on behavior PPIs</b>		
Installed at least one kit measure	85%	196
Most common measure installed: <i>showerhead</i>	68%	367
Respondents reporting program attributable spillover	10%	196
<b>Challenges and opportunities for improvement PPIs</b>		
Measure with lowest installation rate: water heater pipe insulation wrap	30%	367
Measure with highest uninstallation rate: showerhead	11%	33
Measure with highest dissatisfaction: showerhead	7%	127

Figure C-2: DEC Participant Demographics



Ownership Status	
Own	83%
Rent	17%



Household Size	
One to two	65%
Three	17%
Four	11%
Five +	7%



Education	
High school or less	21%
Some college	23%
Bachelor's degree	29%
Graduate degree	27%



Income	
<\$30k	21%
\$30k to <\$60k	38%
\$60k to <\$75k	12%
\$75k to <\$100k	17%
\$100k+	11%

Note: Refusals and “don’t know” responses are not shown.

Figure C-3: DEC Participant Household Characteristics



Housing Type	
Detached	74%
Attached	10%
Mobile	14%
Apartment or condo	1%
Duplex or triplex	1%



Water Heater Fuel Type	
Electric	76%
Natural Gas	21%
Other	2%



Home Square Feet	
Less than 1,000	11%
1,000-1,499	34%
1,500-1,999	27%
2,000-2,999	22%
3,000+	6%



Number of Showers	
1	21%
2	64%
3	12%
4+	3%



Number of Kitchen Faucets	
1	93%
2	5%
3+	2%



Number of Bathroom Faucets	
1-2	49%
3-4	41%
5+	10%

Figure C-4: DEP Program Experience PPIs

	Participants	
	%	n
<b>Program experience &amp; satisfaction PPIs</b>		
Overall satisfaction with program	76%	101
Usefulness of kit instructions	83%	101
<i>Satisfaction with kit measures</i>		
Showerhead	61%	80
Kitchen faucet aerator	80%	58
Bathroom faucet aerator	82%	54
Water heater pipe insulation wrap	71%	33
<b>Program influence on behavior PPIs</b>		
Installed at least one kit measure	86%	117
Most common measure installed: <i>showerhead</i>	71	225
Respondents reporting program attributable spillover	5%	117
<b>Challenges and opportunities for improvement PPIs</b>		
Measure with lowest installation rate: water heater pipe insulation wrap	21	225
Measure with highest uninstallation rate: showerhead	11%	16
Measure with highest dissatisfaction: showerhead	4%	80



Figure C-5: DEP Participant Demographics



Ownership Status	
Own	78%
Rent	22%



Household Size	
One to two	68%
Three	11%
Four	12%
Five +	10%



Education	
High school or less	15%
Some college	33%
Bachelor's degree	28%
Graduate degree	24%



Income	
<\$30k	22%
\$30k to <\$60k	40%
\$60k to <\$75k	10%
\$75k to <\$100k	15%
\$100k+	13%

Note: Refusals and “don’t know” responses are not shown.

Figure C-6: DEP Participant Household Characteristics



Housing Type	
Detached	74%
Attached	4%
Mobile	16%
Apartment or condo	2%
Duplex or triplex	5%



Water Heater Fuel Type	
Electric	85%
Natural Gas	9%
Other	6%



Home Square Feet	
Less than 1,000	11%
1,000-1,499	33%
1,500-1,999	28%
2,000-2,999	22%
3,000+	6%



Number of Showers	
1	24%
2	58%
3	15%
4+	3%



Number of Kitchen Faucets	
1	96%
2	4%
3+	0%



Number of Bathroom Faucets	
1-2	49%
3-4	41%
5+	10%

Note: Refusals and “don’t know” responses are not shown.

# Appendix D Interview and Survey Instruments

## Program Staff In-Depth Interview Guide

### Introduction

Today, we'll be discussing your role in the Water Kit offering during the 2020 program year (July 2020 to June 2021). We would like to learn about your experiences in administering this offering during this specific time period.

Your comments are confidential. If I ask about areas you are not familiar with, please feel free to tell me and we will move on.

I would like to record this interview for my note-taking purposes. Do I have your permission?

### Roles & Responsibilities

First please describe your role at Duke Energy as well as your role in the Water Kit offering. How long have you been in this role?

### Program Delivery

Next, I'd like to learn more about how this offering was delivered since your involvement. If any elements of implementation are different in program year 2020 than in the past, please let me know.

How does Duke Energy target households to participate in this offering? Does this vary by jurisdiction?

[IF NEEDED:]

What marketing and outreach activities did Duke Energy conduct in the 2020 program year?

In program year 2020, what proportion of participants requested a kit among those targeted by the direct mail campaign? Are you satisfied with this response rate? If not, why not?

In program year 2020, what proportion of participants requested a kit among those targeted by the email campaign? Are you satisfied with this response rate? If not, why not?

In terms of marketing, what is planned for program year 2021?

Do you have a customer facing website for the program? What does it entail? Who hosts/manages the website - Duke or the implementer?

What feedback, if any, did you receive from kit recipients as to why they decided to request a kit? Please describe the kit distribution process for program year 2020, including the responsibilities of your implementers/vendors, from the receipt of kit request forms to mailing the kits.

[IF NEEDED:]

Can the enrollment form be submitted online?

Who checks whether customers who submitted the enrollment form are eligible for the program? What is the eligibility criteria?

How do you identify customers who have electric water heating? [Interviewer: Prior evaluation states that customers with electric water heating are eligible for this program.]

Who tracks kit processing and distribution?

What energy saving educational materials are included in the kit and/or online?

Can you tell us what you know about what proportion of households who sent in a kit survey form were ineligible to receive a kit in program year 2020 in each jurisdiction? What are the most common reasons as to why customers are ineligible?

What type of feedback have you received from kit recipients about the measures/products in the kit? [IF ANY ISSUES REPORTED:] How have you addressed any issues?

### Program Goals

In the 2020 program year, what were Duke Energy targets in terms of:

Number of water kits distributed in Carolinas, Progress, and Indiana.

Number of kits distributed by customer segments – if applicable.

Cost of distributing the kits. [Probe: Does this vary by jurisdiction?]

Anything else?

How were those non-energy targets set, and by whom?

Compared to the previous program years, have these targets been the same or have they changed? [If changed:] How and why have they changed?

Were/are you on track to meet program year 2020 targets regarding quantity and cost of kits? [If not on track, probe why not on track and how far behind are they in meeting their targets.]

Number of water kits distributed in each jurisdiction

Number of kits distributed by customer segments – if applicable

Cost of distributing the kits

Anything else?

What are the energy savings targets for each jurisdiction? [Probe: are these gross or net goals?] Did Duke meet the 2020 program year savings targets in Carolinas, Progress, and Indiana? If not, why not?

Was the program implementer aware of these energy and/or non-energy targets?

Does the offering have any process or non-impact goals? (Probe: low-income, renter, or non-English speaking population targeting, increased kit recipient knowledge of how to save energy, etc.)

[IF YES:]

What are they?  
How are these goals established?  
How are they measured?

## Communication

Can you describe how your implementer communicated about the program with Duke Energy? Who did you communicate with, how often, and what about? Did this vary by jurisdiction?

How often did you or the implementer have to resolve an issue with kits? What types of issues came up? What could be done to address these challenges?

Can you describe how your vendors communicate about the program with Duke Energy? Who do you communicate with, how often, and what about? Does this vary by jurisdiction?

How often do vendors have to resolve an issue with kits? What types of issues came up? What could be done to address these challenges?

## Data Tracking of Kits

Let's talk about the kits a little bit.

Were there any changes to the items in the kits for the 2020 year? Any upcoming changes for 2021 program year? Are these changes for all jurisdictions?

We heard that customers must complete a short survey/form to receive a kit. Would it be possible to see this survey/form?

What type of demographic data do you collect from households that request kits? Which demographic segments are the most likely to request kits? Does this vary by jurisdiction?

From the moment a customer requests a kit, how long does it take to receive a kit? Does this time frame meet your expectation, as set forth by the implmeneter? Does it vary by jurisdiction?

Can you tell us how your vendor reports the number of kits sent out to customers to Duke Energy? Is there information on kit distribution that you need but are not getting? What?

## Wrap Up

We are almost done. I have a few more questions.

Has Covid-19 impacted the SEWKP offering during the 2020 program year? If so, how? Have these effects persisted in the 2021 program year?

What would you say are the greatest strengths of the SEWKP offering?

What would you say is the biggest challenge in administering this offering?

How can this offering be improved?

27. Is there anything else about the offering that we have not discussed that you feel should be mentioned?

What would you like to learn from this program evaluation?

### Closing

Those are all of my questions. Thank you very much for your time.

## Implementer Staff In-Depth Interview Guide

### Introduction

[Note: Resource Innovations staff will schedule calls ahead of time through email contact.]

We are conducting an evaluation of Duke Energy Save Energy and Water Kit offering for the 2020 program year (July 2020 to June 2021). Because your organization is involved with this offering as an implementer, we would like to get your perspective to help guide us in our efforts. We would like to learn about your experiences in implementing this offering during this specific time period.

Your comments are confidential. If I ask you about areas you are not familiar with, please feel free to tell me and we will move on.

I would like to record this interview for my note-taking purposes. Do I have your permission?

[If needed:] Our conversation is designed to take 30-60 minutes, depending on how much you have to say.

### Roles & Responsibilities

- Q1. Can you describe your role in the Water Kit offering? How long have you been in this role?
- Q2. Can you describe your processes? (From receipt of kit forms to sending kits.)
- Q3. We have been told that your organization processes kit submission forms for the Duke Energy SEWKP offering. Do you provide any other services to Duke Energy?
1. Do you provide these other services in the Progress, Carolinas, and Indiana jurisdictions where this program is offered?

### Program Goals

- Q4. In jurisdictions where you are providing water kit services to Duke Energy, for the evaluation time period (July 2020 – June 2021) do you know what Duke's targets are in terms of:
1. Number of water kits distributed
  2. Cost of the kits
  3. Education goals
  4. Anything else?
- Q5. Do you know if Duke Energy is on track to achieve those targets? If so, how do you know?

### Data Tracking of Kits and Eligibility

Q6. Based on what we heard, households must complete a short survey/form to receive a kit. Do you track the information that is on the survey form in a database? If so, what exactly do you track?

1. Do you track the same information for each jurisdiction?
2. How do you report this information to Duke Energy?
3. [If not addressed:] Do you maintain a dashboard that tracks number of kits and possibly other information? If so, can you send us a screen shot of that dashboard so we can see what is tracked?
4. Could you provide us with one of the forms so we can see what participants are filling out?

Q7. Can you describe the eligibility requirement(s) regarding who is eligible to receive the kit? Does eligibility criteria vary by jurisdiction?

Q8. Can you tell us what proportion of households who sent in a kit survey form were ineligible to receive a kit in program year 2020 in each jurisdiction? What are the most common reasons as to why customers are ineligible?

Q9. From the moment households request a kit, do you know how long it takes to receive a kit? Is this time frame typical in terms of how long it takes to receive a kit? [IF NOT TYPICAL, PROBE to get more information on this topic.]

Q10. During the evaluation time period, did you encounter any challenges with processing of the kit forms? [Probe about missing information or other errors.] [If challenges, ask:] What could be done to address these challenges? Any suggestions on how to change the form? Are some of these challenges more prevalent in certain jurisdictions? If so, why?

Q11. How many forms, on average, do you process per week/month or annually?

Q12. [If not addressed:] What demographic data do you collect from households that request the kits? Which demographic segments are more likely to request the kits? Does this vary by jurisdiction?

## Communication

Q13. Can you describe how you communicate with Duke Energy about the kit form submissions or anything else? Who do you communicate with and how often?

Q14. Have there been any challenges in your interactions with Duke Energy? If so, what were they? How did you address them? Were they resolved? If not, what do you think might resolve them?

## Wrap Up

I have only a couple more questions left.

Q15. Do you feel Covid-19 impacted the SEWKP offering in the 2020 program year? If so, how?



Q16. What would you say is the biggest challenge in processing kit submission forms and distributing kits? What could be done to improve this process?

Q17. What would you say are the greatest strengths of the SEWK offering?

Q18. What would you say is the biggest challenge of this offering?

Q19. How can this offering be improved?

Q20. Is there anything else about the program that we have not discussed that you feel should be mentioned?

### Closing

Those are all of my questions. Thank you very much for your time.

## Participant Survey

### Introduction/ Screening

[READ IF MODE=PHONE]

Q1. Hi, I'm \_\_\_\_\_, calling on behalf of Duke Energy. We are calling about the Save Energy and Water Kit you received from Duke Energy between the time period of July 2020 and June 2021. This kit included faucet aerators, one or two showerheads, and water heater pipe insulation wrap that can help you save water and energy in your home. Do you recall receiving this kit?

1. Yes
2. No [If no: Can I speak with someone who may know something about this kit?]
98. Don't know [If DK: Can I speak with someone who may know something about this kit?]  
[INTERVIEWER INSTRUCTIONS: If no adults are able to speak about the kit, thank and terminate.]

Q2. [DISPLAY IF MODE=WEB]

We are conducting surveys about the Save Energy and Water Kit you received from Duke Energy between the time period of July 2020 and June 2021. This kit included faucet aerators, one or two showerheads, and water heater pipe insulation wrap that can help you save water and energy in your home.

Do you recall receiving this kit?

1. Yes
2. No [TERMINATE]
98. Don't know [TERMINATE]

[Display if Q2=1] Q2\_B. Please take a few minutes to provide valuable feedback on your Water Kit. The first 100 respondents who complete the survey will receive a **\$5 digital gift card**.

### Motivation and Collateral

Q3. How did you learn about the Save Energy and Water Kit offering?

1. Direct (paper) mail
2. Email
3. Word of mouth: Friend, family, colleague, etc.
4. Other; please specify: [OPEN-ENDED RESPONSE]
98. Don't know/Don't remember

Q4. What motivated you to request a free Save Energy and Water Kit from Duke Energy?

[MULTIPLE RESPONSE]

1. Wanted to conserve electricity
2. Wanted to conserve water
3. Wanted to save money on my energy bill
4. It was free
5. It was easy

6. It was offered by Duke Energy
7. Other – please specify: [OPEN-ENDED RESPONSE]
98. Don't know [EXCLUSIVE ANSWER]

Q4a. Did you choose to upgrade your showerhead for a fee?

1. Yes, I purchased the upgrade [Go to question Q4a]
2. No, I did not purchase an upgrade [Skip Q4b]
3. I don't know [Skip Q4b]

Q4b. What motivated you to purchase the upgraded showerhead? [MULTIPLE RESPONSE]

1. Wanted to conserve electricity
2. Wanted to conserve water
3. Wanted to save money on my energy bill
4. It was easy
5. It was offered by Duke Energy
6. Other – please specify: [OPEN-ENDED RESPONSE]
7. I don't know [EXCLUSIVE ANSWER]

Q5. Did you read the included instructions on how to install the items that came in the kit?

1. Yes
2. No
98. Don't remember

[ASK IF Q5 = 1]

Q6. On a scale from 0 to 10, where 0 is not at all helpful and 10 is very helpful, how helpful were the instructions on how to install the items that came in the kit?

0. Not at all helpful
- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
10. Very helpful
98. Don't know

[ASK IF Q6<5]

Q27. What might have made the instructions more helpful?

[RECORD VERBATIM ANSWER]

Q8. Did you watch any of Duke Energy's online how-to videos on how to install the items that came in the kit?

1. Yes
2. No
98. Don't remember

[ASK IF Q8 = 1]

Q9. On a scale from 0 to 10, where 0 is not at all helpful and 10 is very helpful, how helpful were Duke Energy's online how-to videos on how to install the items that came in the kit?

0. Not at all helpful
- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
10. Very helpful
98. Don't know

[ASK IF Q9<7]

Q30. What might have made the instructional videos more helpful?

[RECORD VERBATIM ANSWER]

Q11. Did you order the kit through the website or using the paper post-card?

1. Enrollment website
2. Paper post-card

[ASK IF Q11=1]

Q11a. Did the Save Energy and Water Kit enrollment website function properly?

1. Yes
2. No
98. Don't know/Don't remember

[ASK IF Q11a=2]

Q12. What issues did you experience with the enrollment website?

[Open ended response]

## Assessing Measure Installation

[DISPLAY IF KIT\_SIZE=SMALL]

We'd like to ask you about the energy and water saving items included in your kit. The kit contained a showerhead, two bathroom faucet aerators, one kitchen faucet aerator, and water heater pipe insulation wrap.

[DISPLAY IF KIT\_SIZE=MEDIUM]

We'd like to ask you about the energy and water saving items included in your kit. The kit contained two showerheads, two bathroom faucet aerators, one kitchen faucet aerator, and water heater pipe insulation wrap.

Q13. Have you or anyone else **installed** any of those items in your home, even if they were taken out later? *[Phone Interviewer: Throughout interview, remind respondent as needed to report whether someone else in the home installed or uninstalled any items]*

[SINGLE RESPONSE]

1. Yes
2. No [→ Q25]
98. Don't know [→ TERMINATE]

[ASK IF Q13 = 1]

Q14. Which of the items did you **install**, even if they were taken out later? Please select all that apply.

[MULTIPLE RESPONSE]

*[Interviewer: Record each response, then prompt with the list items.]*

Item:
a. Showerhead
b. Kitchen faucet aerator
c. Bathroom faucet aerators
d. Water heater pipe insulation wrap
e. I don't remember which items were installed [→ TERMINATE]

[ASK IF Q14A = 1 AND KIT\_SIZE=MEDIUM]

Q15. Your kit contained two showerheads. Did you **install** one or both of the showerheads in the kit, even if one or both were taken out later?

[SINGLE RESPONSE]

1. I installed both
2. I only installed one showerhead

98. Don't know

[IF Q15=2] Q15a. Why did you not install the second showerhead?

[ASK IF Q14C = 1]

Q16. How many of the bathroom faucet aerators from the kit did you **install** in your home, even if one or more were taken out later?

[SINGLE RESPONSE]

- 1. One
- 2. Two
- 98. Don't know

[IF Q16=1] Q16a. Why did you not install the second aerator?

[ASK IF Q14D = 1]

Q17. Did you **install** all of the pipe insulation that was included with the kit?

[SINGLE RESPONSE]

- 1. Yes
- 2. No
- 98. Don't know

[ASK IF Q17 IS DISPLAYED]

Q18. About how many feet of the pipe extruding from your water heater did you wrap with the insulation that **came in the kit**? Please go over to your water heater if you need to check.

[SINGLE RESPONSE]

- 1. 0 ft – I did not install any pipe wrap
- 2. 1 ft
- 3. 2 ft
- 4. 3 ft
- 5. 4 ft
- 6. 5 ft
- 7. More than 5 ft. Please specify:
- 98. Don't know

[ASK IF ANY PART OF Q14 = 1]

Q19. On a scale from 0 to 10, where 0 is not at all satisfied and 10 is very satisfied, overall how satisfied are you with the item[s] you **installed**?

Please use a 0 to 10 scale, where 0 is very dissatisfied and 10 is very satisfied. How satisfied are you with...

DISPLAY IF	Item	Rating
------------	------	--------

Q14a = 1	a. Showerhead	0-10 with DK
Q14b = 1	b. Kitchen faucet aerator	0-10 with DK
Q14c = 1	c. Bathroom faucet aerators	0-10 with DK
Q14d = 1	d. Water heater pipe insulation wrap	0-10 with DK
All	e. The program overall	0-10 with DK

[ASK IF ANY ITEMS IN Q19<5]

Q19a. Can you please explain any dissatisfaction you had with [DISPLAY ALL ITEMS IN Q19 THAT ARE <5]?

[OPEN END: RECORD VERBATIM]

[ASK IF Q19 < 5]

Q19e. In your opinion, what can Duke Energy do to improve your satisfaction with the Save Energy and Water Kit offering?

1. [Verbatim]
98. Don't know
99. Refused

[ASK IF ANY PART OF Q14 = 1]

Q20. Have you (or anyone in your home) **uninstalled** any of the items from the kit that you had previously installed?

[SINGLE RESPONSE]

1. Yes
2. No
98. Don't know

[ASK IF Q20 = 1]

Q21. Which of the items did you **uninstall**?

*[Interviewer: Record the response, then prompt with the list items.]*

[MULTIPLE RESPONSE]

1. [DISPLAY IF Q142a = 1] Showerhead[s]
2. [DISPLAY IF Q142b = 1] Kitchen faucet aerator
3. [DISPLAY IF Q142c = 1] Bathroom faucet aerators
4. [DISPLAY IF Q142d = 1] Water heater pipe insulation wrap
98. Don't know [EXCLUSIVE ANSWER]

[ASK IF Q21.1 = 1 AND Q16 = 1]

Q22. Did you uninstall one or both of the showerheads you had previously installed?

[SINGLE RESPONSE]

1. I uninstalled both
2. I only uninstalled one of the showerheads

98. Don't know

[ASK IF Q22.3 = 1 AND Q16 = 2-4]

Q23. How many bathroom faucet aerators did you uninstall?

[SINGLE RESPONSE]

- 1. One [DISPLAY IF Q14 = 1-4]
- 2. Two [DISPLAY IF Q14 = 2-4]
- 98. Don't know

[ASK IF ANY OF Q22.1-4 IS SELECTED]

Q24. Why were those items uninstalled?

[READ IF MODE=PHONE] Let's start with...

[Interviewer: Read each item]

[MULTIPLE RESPONSE]

	Item	Reason
DISPLAY ONLY THOSE 1-6 ITEMS THAT WERE SELECTED IN Q21	a. Showerhead	1. It was broken 2. I didn't like how it worked 3. I didn't like how it looked, or 96. Some other reason (specify: _____) 98. Don't know
	b. Kitchen faucet aerator	Repeat reason options
	c. Bathroom faucet aerator	Repeat reason options
	d. Water heater pipe insulation wrap	Repeat reason options

[ASK IF ANY ITEMS NOT SELECTED IN Q14, OR Q13 = 2]

Q25. You said you haven't installed the following items. Which of the following do you plan to install in the next three months?

[Interviewer: Record the response, then prompt with the list items.]

[MULTIPLE RESPONSE] [DISPLAY ALL IF Q13 = 2]

- 1. [DISPLAY IF NOT SELECTED IN Q14] Showerhead
- 2. [DISPLAY IF NOT SELECTED IN Q14] Kitchen faucet aerator
- 3. [DISPLAY IF NOT SELECTED IN Q14] Bathroom faucet aerators
- 4. [DISPLAY IF NOT SELECTED IN Q14] Water heater pipe insulation wrap
- 5. I'm not planning on installing any of these in the next three months [EXCLUSIVE ANSWER]
- 98. Don't know [EXCLUSIVE ANSWER]

[ASK IF ANY 1-6 OPTIONS WERE NOT SELECTED IN Q25 OR Q25=5,98]



Q26. What's preventing you from installing those items? Let's start with....  
 [Interviewer: Read items]

[MULTIPLE RESPONSE]

DISPLAY IF	Item	Reason
Q25.1 was not selected OR Q25=5,98 selected	a. Showerhead	Use multiple response options below
Q25.2 was not selected OR Q25=5,98 selected	b. Kitchen faucet aerator	Use multiple response options below
Q25.3 was not selected OR Q25=5,98 selected	c. Bathroom faucet aerators	Use multiple response options below
Q25.4 was not selected OR Q25=5,98 selected	d. Water heater pipe insulation wrap	Use multiple response options below

[MULTIPLE RESPONSE OPTIONS FOR Q26]

[PHONE CALLERS: DO NOT READ, CODE VERBATIM RESPONSES]

1. Didn't know what it was
2. Tried it, didn't fit [DOES NOT DISPLAY FOR PIPE WRAP]
3. Tried it, didn't work as intended
4. Haven't gotten around to it
5. Already have [measure name] installed [DOES NOT DISPLAY FOR PIPE WRAP]
6. Takes too much time to install it/No time/Too busy
7. Too difficult to install, don't know how to do it
8. Too difficult to install, can't physically do it
9. Don't have the tools I need
10. Don't like how it looks
11. Don't have the items any longer (threw away, gave away)
- [96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know [EXCLUSIVE ANSWER]

[ASK IF Q14B = KITCHEN FAUCET AERATOR AND Q21 KITCHEN FAUCET AERATOR OPTION WAS NOT SELECTED AND Q25B = 1]

Q28. The efficient kitchen faucet aerator from the kit has three settings to adjust the flow of water. Prior to today, were you aware of this feature?

1. Yes – I'm aware of the adjustable flow feature
2. No – I did not know that the kitchen faucet aerator had an adjustable flow feature

[ASK IF Q28 = 1 AND Q14B = KITCHEN FAUCET AERATOR AND Q25B = 1]

Q28a. Have you ever adjusted the flow setting on your kitchen faucet aerator?

1. Yes
2. No

3. I don't know

[ASK IF Q28a = 1]

Q29. What flow setting is the kitchen faucet aerator currently set at? Please go over to your kitchen sink if you need to check.

1. 0.5 GPM (lowest flow setting – “soaping mode”)
2. 1.0 GPM (middle flow setting – “eco friendly mode”)
3. 1.5 GPM (highest flow setting – “power rinse mode”)
98. Don't Know

[ASK IF Q29 = 1, 2 or 3]

Q30. How often do you use that flow setting?

1. Not very often
2. About half the time
3. Most of the time
4. All the time
98. Don't Know

[ASK If Q30 = 1 or 2]

Q31. What flow setting do you use most regularly?

1. 0.5 GPM (lowest flow setting – “soaping mode”)
2. 1.0 GPM (middle flow setting – “eco friendly mode”)
3. 1.5 GPM (highest flow setting – “power rinse mode”)
98. Don't Know

[ASK IF Q14a = 1 AND AT LEAST ONE SHOWERHEAD STILL INSTALLED]

Q32. [For those that have installed ONLY one showerhead] Thinking about the showerhead you installed, how many showers per week are taken in this shower (by all occupants)?

1. [Allow integer response]

Q33. [For those that have installed ONLY one showerhead] Again, thinking specifically about the efficient showerhead you installed, what is the average shower length taken in this shower? Please provide your response in minutes.

1. [Allow numerical response]

[For respondents that installed two showerheads]

Q34. Thinking specifically about one of the showerheads you installed, how many showers per week are taken in this shower (by all occupants)?

1. [Allow integer response]

Q35. For this same efficient showerhead, what is the average shower length taken in this shower?  
Please provide your response in minutes.

1. [Allow numerical response]

Q36. Now, thinking about the SECOND showerhead you installed, how many showers per week are taken in this shower (by all occupants)?

1. [Allow integer response]

Q37. For this second efficient showerhead, what is the average shower length taken in this shower?  
Please provide your response in minutes.

1. [Allow numerical response]

### Net To Gross

[IF ANY PART OF Q14 = 1]

Q38. If you had not received the free efficiency items in the kit, would you have purchased and installed any of these same items within the next year?

1. Yes
2. No [Skip to Q42]
98. Don't know

[If Q38 = 1]

Q39. What items would you have purchased and installed within the next year?

[MULTIPLE RESPONSES]

1. [IF Q14a] Energy-efficient showerhead[s]
2. [IF Q14B = 1 AND Q21.2 NOT SELECTED] Energy-efficient kitchen faucet aerator
3. [IF AT LEAST ONE BATHROOM AERATOR IS STILL INSTALLED] Energy-efficient bathroom faucet aerator[s]
4. [IF Q14D = 1 AND Q21.4 NOT SELECTED] Water heater pipe insulation wrap
98. Don't know [EXCLUSIVE ANSWER]

[ASK IF Q39.1=1 AND TWO SHOWERHEADS ARE STILL INSTALLED]

Q40. If you had not received them in your free kit, how many energy-efficient showerheads would you have purchased and installed within the next year?

[SINGLE RESPONSE]

1. One
2. Two
98. Don't know

[ASK Q39.3=1 AND IF MORE THAN ONE BATHROOM AERATOR IS STILL INSTALLED]

Q41. If you had not received them in your free kit, how many energy-efficient bathroom aerators would you have purchased and installed within the next year?

[SINGLE RESPONSE]

1. One
2. Two
98. Don't know

[IF Q38 WAS DISPLAYED]

Q42. Now, thinking about the energy and water savings items that were provided in the kit - using a scale from 0 to 10, where 0 means “not at all influential” and 10 means “extremely influential,” how influential were the following factors on your decision to install the items from the kit? How influential was...

*[Interviewer: If respondent says “Not applicable - I didn’t get/use that,” then follow up with: “So would you say it was “not at all influential?” and probe to code]*

[MATRIX QUESTION: SCALE]

Elements	Responses
The fact that the items were free	0-10 scale with DK
The fact that the items were mailed to your house	0-10 scale with DK
Information provided by Duke Energy about how the items would save energy and water	0-10 scale with DK
Other general information or advertisements from Duke Energy about energy efficiency	0-10 scale with DK

Q43. Since receiving your kit from Duke Energy, have you purchased any other products or services to help save energy in your home?

1. Yes
2. No [skip to Q47]
98. Don't know [skip to Q47]

[If 43= 1]

What **products** have you purchased and installed to help save energy in your home? [MULTIPLE RESPONSE]

Q44.

1. Installed energy efficient appliances [Specify: ]
2. Installed efficient heating or cooling equipment,
3. Installed a Smart Thermostat
4. Installed efficient windows
5. Added insulation

6. Sealed air leaks in windows, walls, or doors
7. Sealed or insulated ducts
8. Installed LEDs
9. Installed an energy efficient water heater
10. None – no other actions taken
96. Other, please specify: \_\_\_\_\_

[ASK IF Q44 = 1-9, 96]

Q45. Did you get a rebate from Duke Energy or another organization for any of those products or services? If so, which ones? [SHOW ONLY RESPONSES FROM Q44]

1. Yes
2. No
98. Don't know

[ASK IF ANY ITEM IN Q46 WAS SELECTED AND Q45=NO]

Q46. On a scale of 0 to 10, where 0 means “not at all influential” and 10 means “extremely influential”, how much influence did the free Save Energy and Water Kit Program have on your decision to purchase and install the [EQUIPMENT SELECTED in Q44 and answered NO on Q45] Offer 0-10 scale, and DK

## Demographics

Lastly, we have some basic demographic questions for you. Please be assured that your responses are confidential and are for statistical purposes only.

Q47. Which of the following types of housing units would you say best describes your home? [SINGLE RESPONSE]

1. Single-family detached
2. Single-family attached (such as a townhouse or condo)
3. Duplex, triplex or four-plex
4. Apartment or condominium with 5 units or more
5. Manufactured or mobile home
6. Other \_\_\_\_\_
98. Don't know
99. Prefer not to say

Q48. Does your house get its water from a well or from a municipal source? [SINGLE RESPONSE]

1. Well
2. Municipal source (also known as “city water”)
98. Don't know

Q49. How many showers are in your home? Please include both stand-up showers and bathtubs with showerheads. [SINGLE RESPONSE]

1. One
2. Two
3. Three
4. Four
5. Five or more
98. Don't know

Q50. How many bathroom sink faucets are in your home? (Keep in mind that some bathrooms may have multiple bathroom sink faucets in them.) [SINGLE RESPONSE]

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
98. Don't know

Q51. How many kitchen faucets are in your home? [SINGLE RESPONSE]

1. One
2. Two
3. Three
4. Four or more
98. Don't know

Q52. What fuel type does your water heater use?

1. Electric
2. Natural Gas
3. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know

Q53. How many square feet of living space are there in your residence, including bathrooms, foyers and hallways (exclude garages, unfinished basements, and unheated porches)? [SINGLE RESPONSE]

1. Less than 500 square feet
2. 500 to under 1,000 square feet
3. 1,000 to under 1,500 square feet
4. 1,500 to under 2,000 square feet
5. 2,000 to under 2,500 square feet
6. 2,500 to under 3,000 square feet
7. Greater than 3,000 square feet
98. Don't know
99. Prefer not to say

Q54. Do you or members of your household own your home, or do you rent it? [SINGLE RESPONSE]

1. Own / buying
2. Rent / lease
3. Occupy rent-free
98. Don't know
99. Prefer not to say

Q55. Including yourself, how many people currently live in your home year-round? [SINGLE RESPONSE]

1. I live by myself
2. Two people
3. Three people
4. Four people
5. Five people
6. Six people
7. Seven people
8. Eight or more people
98. Don't know
99. Prefer not to say

Q56. What was your total annual household income for 2020, before taxes? [SINGLE RESPONSE]

1. Under \$20,000
2. \$20,000 to under \$30,000
3. \$30,000 to under \$40,000
4. \$40,000 to under \$50,000
5. \$50,000 to under \$60,000
6. \$60,000 to under \$75,000
7. \$75,000 to under \$100,000
8. \$100,000 to under \$150,000
9. \$150,000 to under \$200,000
10. \$200,000 or more
98. Don't know
99. Prefer not to say

Q57. What is the highest level of education achieved among someone living year-round in your household? [SINGLE RESPONSE]

1. Less than high school
2. Some high school
3. High school graduate or equivalent (such as GED)
4. Trade or technical school
5. Some college (including Associate degree)
6. College degree (Bachelor's degree)
7. Some graduate school
8. Graduate degree, professional degree
9. Doctorate
98. Don't know

99. Prefer not to say

**Closing:**

You have reached the end of our questions!

On behalf of Duke Energy, thank you for your time in completing this survey.

Have a great day!



## Appendix E Participant Demographics by State

Home type	DEC				DEP			
	NC (%)	NC (n)	SC (%)	SC (n)	NC (%)	NC (n)	SC (%)	SC (n)
Single-family detached	76%	88	65%	39	73%	64	80%	12
Single-family attached	9%	11	10%	6	5%	4	0%	0
Duplex, triplex, four-plex	1%	1	2%	1	3%	3	13%	2
Apartment or condo 5 units or more	1%	1	2%	1	2%	2	0%	0
Manufactured or mobile home	11%	13	18%	11	17%	15	7%	1
Other	1%	1	2%	1	0%	0	0%	0
Don't know	1%	1	2%	1	0%	0	0%	0
Home size	NC (%)	NC (n)	SC (%)	SC (n)	NC (%)	NC (n)	SC (%)	SC (n)
Less than 500 square feet	0%	0	2%	1	0%	0	0%	0
500 to under 1,000 square feet	10%	11	11%	6	10%	8	18%	2
1,000 to under 1,500 square feet	35%	37	33%	18	34%	27	27%	3
1,500 to under 2,000 square feet	23%	25	33%	18	27%	21	36%	4
2,000 to under 2,500 square feet	16%	17	9%	5	16%	13	9%	1
2,500 to under 3,000 square feet	7%	8	9%	5	6%	5	9%	1
Greater than 3,000 square feet	8%	9	2%	1	6%	5	0%	0
Ownership Status	NC (%)	NC (n)	SC (%)	SC (n)	NC (%)	NC (n)	SC (%)	SC (n)
Own / buying	78%	89	83%	50	78%	70	63%	10
Rent / lease	18%	21	12%	7	19%	17	31%	5
Occupy rent-free	0%	0	0%	0	0%	0	0%	0
Don't know	0%	0	0%	0	0%	0	6%	1
Prefer not to say	4%	4	5%	3	3%	3	0%	0
Water Heater Fuel Type	NC (%)	NC (n)	SC (%)	SC (n)	NC (%)	NC (n)	SC (%)	SC (n)
Electric	77%	88	76%	44	85%	75	86%	12
Natural Gas	19%	22	24%	14	8%	7	14%	2
Other	4%	4	0%	0	7%	6	0%	0
Household Size	NC (%)	NC (n)	SC (%)	SC (n)	NC (%)	NC (n)	SC (%)	SC (n)
I live by myself	16%	18	17%	10	16%	14	44%	7
Two people	47%	54	42%	25	51%	46	13%	2
Three people	18%	20	13%	8	11%	10	6%	1
Four people	8%	9	15%	9	8%	7	31%	5
Five people	4%	5	5%	3	4%	4	6%	1
Six people	1%	1	2%	1	3%	3	0%	0
Seven people	0%	0	2%	1	0%	0	0%	0
Eight or more people	0%	0	0%	0	2%	2	0%	0

Participant Demographics by State

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	DEC				DEP			
Prefer not to say	6%	7	5%	3	4%	4	0%	0
<b>Household Income</b>	<b>NC (%)</b>	<b>NC (n)</b>	<b>SC (%)</b>	<b>SC (n)</b>	<b>NC (%)</b>	<b>NC (n)</b>	<b>SC (%)</b>	<b>SC (n)</b>
Under \$20,000	7%	6	8%	3	14%	9	8%	1
20 to under \$30,000	12%	10	18%	7	8%	5	17%	2
30 to under \$40,000	9%	7	13%	5	11%	7	17%	2
40 to under \$50,000	10%	8	23%	9	15%	10	17%	2
50 to under \$60,000	15%	12	13%	5	12%	8	17%	2
60 to under \$75,000	13%	11	10%	4	11%	7	8%	1
75 to under \$100,000	20%	16	13%	5	15%	10	17%	2
100 to under \$150,000	9%	7	3%	1	8%	5	0%	0
150 to under \$200,000	4%	3	3%	1	5%	3	0%	0
\$200,000 or more	2%	2	3%	1	3%	2	0%	0
<b>Education Level</b>	<b>NC (%)</b>	<b>NC (n)</b>	<b>SC (%)</b>	<b>SC (n)</b>	<b>NC (%)</b>	<b>NC (n)</b>	<b>SC (%)</b>	<b>SC (n)</b>
Less than high school	1%	1	0%	0	1%	1	0%	0
Some high school	2%	2	2%	1	1%	1	0%	0
High school graduate or equivalent (such as GED)	13%	15	25%	15	13%	12	7%	1
Trade or technical school	4%	5	7%	4	6%	5	7%	1
Some college (including Associate degree)	15%	17	20%	12	24%	22	27%	4
College degree (Bachelor's degree)	34%	39	14%	8	24%	22	33%	5
Some graduate school	4%	5	5%	3	6%	5	0%	0
Graduate degree, professional degree	17%	19	17%	10	16%	14	7%	1
Doctorate	5%	6	2%	1	2%	2	7%	1
Prefer not to say	4%	5	8%	5	7%	6	13%	2

## Appendix F Participant Responses by State

Measurement	Carolinas		Progress	
	NC	SC	NC	SC
Survey Responses	113	56	87	14
Kit 1	76	21	52	8
Kit 2	37	35	35	6
Average Occupants per Home	2.36	2.61	2.54	2.29
Electric Water Heater %	77%	75%	85%	86%
<b>Showerheads</b>				
Provided	137	82	108	17
Installed	79	46	64	8
Removed	7	9	6	1
Installed %	58%	56%	59%	47%
Removed %	9%	20%	9%	13%
In-Service Rate	53%	45%	54%	41%
Shower per Day (per person)	0.53	0.52	0.70	0.46
Minutes per Shower	10.6	11.1	11.0	15.0
Showerheads per Home	1.81	1.67	1.69	1.33
<b>Kitchen Faucet Aerator</b>				
Provided	105	51	84	14
Installed	47	18	42	7
Removed	4	4	3	2
Installed %	45%	35%	50%	50%
Removed %	9%	22%	7%	29%
In-Service Rate	41%	27%	46%	36%
<b>Bathroom Faucet Aerator</b>				
Provided	208	106	164	26
Installed	90	44	72	9
Removed	6	7	0	0
Installed %	43%	42%	44%	35%
Removed %	7%	16%	0%	0%
In-Service Rate	40%	35%	44%	35%
<b>Water Heater Pipe Insulation Wrap</b>				
Provided	108	50	82	14
Installed	33	15	23	3
Removed	1	0	0	0
Installed %	31%	30%	28%	21%

## Participant Responses by State

Measurement	Carolinas		Progress	
	NC	SC	NC	SC
Removed %	3%	0%	0%	0%
In-Service Rate	30%	30%	28%	21%
Average Length Installed	3.1	2.7	2.9	1.7

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