Description of measures and selection of methods by measure(s) or market(s)

To qualify for the ARP, a refrigerator or freezer must be between 10-30 cubic feet and in working condition. Both primary and secondary units were eligible.

Expected and achieved precision

Engineering Estimates

The expected precision of the engineering analysis was +/- 10% at 90% confidence. The achieved precision was +/-13.7% at 90% confidence. This is based on the mean energy savings and the standard deviation of the individual estimates compared to the mean. Achieved precision is less than planned as a result of a low sample size caused by recruiting difficulties and records being dropped from the sample due to bad data. Additionally, a wide range of unit consumption was observed in the metering study, resulting in a higher than expected coefficient of variation.

Billing Analysis

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

Participant Surveys

The survey sample methodology for the telephone survey had an expected precision of 90% +/- 6.4% and an achieved precision of 90% +/- 6.4%.

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

Engineering Estimates

This analysis relies on a short term metering study with a sample size of 43. All savings estimates are a product of the conditions observed in the sample. The sample was drawn at random and is assumed to be representative of all participating customers, but the response rate was very low, indicating the potential for self-selection bias. The monitoring occurred over a short-term period and was extrapolated to annual consumption using a regression model based on outdoor temperature. The potential for extrapolation error associated with the regression model exists for outdoor temperatures outside the range of the monitored data. A longer metering period and a larger sample size would better represent the full spectrum of variation in characteristics and circumstances and therefore provide a more accurate estimation of savings. Gross savings are based on broad market assumptions of the kWh consumption of the replacement unit, where survey data indicated the recycled unit was replaced by another unit. Customer specific data on replacement units was not available.

Billing Analysis

The specification of the model used in the billing analysis was designed specifically to avoid the potential of omitted variable bias by including monthly variables that capture any non-program effects that affect energy usage, as well as other Duke Energy offers. The model did not correct for self-selection bias because there is no reason to as long as the program remains voluntary.

Billing Analysis

This section of the report presents the results of a billing analysis conducted over the participants in the Carolinas ARP. For this analysis, billing data was obtained for all participants in the program between October 2012 and May, 2013. For ARP, there were a total of 4,153 usable accounts after processing. A panel model was used to determine program impacts, where the dependent variable was daily electricity consumption[4] from January, 2010 and May, 2013.

The estimated ARP savings obtained from the billing data analysis are presented below.

Table 9. Estimated Gross Impacts: Billing Analysis

	95% Confidence Interval		
	Lower Bound	Estimate	Upper Bound
Per Participant Annual kWh Savings: Overall	562	742	923
Per Participant Annual kWh Savings: Refrigerator	451	658	864
Per Participant Annual kWh Savings: Freezer	526	894	1,263

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

Note that the billing data analysis includes variables to capture effect of participation in other Duke Programs after participation in ARP. This is to explicitly control for any impact from other program participation. Specifically, the model contains variables that indicate the months since the customer participated in the CFL program (Free_CFL), Home Energy House Call (HEHC), Energy Efficiency for Schools (K12), Low-Income Weatherization (LowInc_Weath), Smart $aver (SmSvr_hvac), My Home Energy Report (MyHER), and Property Manager CFLs (Property_Mgr)[5].

For this analysis, data are available both across households (i.e., cross-sectional) and over time (i.e., time-series). With this type of data, known as "panel" data, it becomes possible to control, simultaneously, for differences across households as well as differences across periods in time through the use of a "fixed-effects" panel model specification. The approach does not include the program induced savings that are associated with short and longer term non-participant spillover or market effects. As a result, these savings should be considered conservative for an estimate actual achieved savings, but it also avoids inappropriately attributing energy savings from other actions to the ARP. The fixed-effect refers to the model specification aspect that differences across homes that do not vary over the estimation period (such as square footage, heating system, etc.) can be explained, in large part, by customer-specific intercept terms that capture the net change in consumption due to the program, controlling for other factors that do change with time (e.g., the weather). The model does control for what would have been done without the program within the participants' homes.

[4] Daily electricity consumption was calculated based on the monthly billed kWh divided by number of days in each billing cycle.

[5] Beginning in 2014, these programs are known as Energy Efficient Appliances and Devices; Residential Energy Assessments; Energy Education Program for Schools; Income-Qualified EE Products & Services, HVAC EE Products and Services, and Multi Family Energy Efficiency.

Because the consumption data in the panel model includes months before and after the removal of units picked up through the program, the period of program participation (or the participation window) may be defined specifically for each customer. This feature of the panel model allows for the trends associated with the pre-removal months of consumption to effectively act as the comparison group for post-participation months. In addition, this model specification, unlike annual pre/post-participation models such as annual change models, does not require a full year of post-participation data. Effectively, the participant becomes their own comparison group, thus eliminating the need for a non-participant comparison or control group. We know the exact month of participation in the program for each participant, and are able to construct customer specific models that measure the change in usage consumption immediately before and after the date of program participation, controlling for weather and customer characteristics.

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

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

$$y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it},$$

where:

- y_{it} = energy consumption for home *i* during month *t*
- α_I = constant term for site *i*
- ß = vector of coefficients
- x = vector of variables that represent factors causing changes in energy consumption for home *i* during month *t* (i.e., weather, time, and participation)
- ε = error term for home *i* during month *t.*

With this specification, the only information necessary for estimation is those factors that vary month to month for each customer, and that will affect energy use, which effectively are weather conditions and program participation. Other non-measurable factors can be captured through the use of monthly indicator variables (e.g., to capture the effect of potentially seasonal energy loads).

The effects of ARP are captured by including a variable which is equal to one for all months after the household participated in the program. The coefficient on this variable is the savings associated with the program. In order to account for differences in billing days, the usage was normalized by days in the billing cycle. The estimated electric model for ARP is presented in Table 10.

Table 10. Estimated Gross Savings Model – dependent variable is daily kWh usage, January 2010 through May 2013 (savings are negative).

Independent Variable	Coefficient (Daily kWh Savings)	t-value
AR participation	-2.03	-8.05
Sample Size	153,381 observations (4,135 homes)	
R-Squared	72%	

The complete estimate model, showing the weather and time factors, is presented in Appendix B: Estimated Model. The other two estimate models on refrigerator and freezer can be found in *Appendix C: Estimated Model – Refrigerator* and *Appendix D: Estimated Model – Freezer*.

These gross impact estimates were converted to net impacts using the approach as described in the "Sixteen Path Direct Net Analysis Approach". The net-to-gross ratio for refrigerators was 53.8% and 47.2% for freezers (see the "Net to Gross Analysis" section below).

These net to gross ratios are applied to the gross savings from the billing analysis to determine net savings as shown in Table 11. It is necessary to apply a net to gross adjustment to the results of a billing analysis when the effective useful lives of the technologies in question are sufficiently long so as their replacement would not be observed in the consumption data for the panel model. This data includes months before and after program participation, which, if a technology's Effective Useful Life (EUL) is short enough, will incorporate and account for behavioral trends associated with the pre-participation months of consumption.

Table 11. Billing Analysis Gross and Net Savings

	Gross Savings		Net Savings	
	Refrigerators	Freezers	Refrigerators	Freezers
kWh	658	894	365	416
kW	0.0940	0.1066	0.0505	0.0503

The billing analysis gives the estimated overall gross kWh savings per participant but is incapable of estimating coincident kW reduction. As a result, kW was calculated based upon the kWh savings and the kW/kWh ratio from the engineering analysis.

Engineering Analysis

This section presents the results of the refrigerator and freezer in-situ metering study of Duke Energy's Appliance Recycling Program in the Carolinas.

The metering study was conducted by TecMarket Works and included metering at 48 sites metered from March 22 to August 20, 2013. After data processing, there were a total of 43 units with usable data sets (32 refrigerators and 11 freezers). All units were evaluated in the participants' homes using: a "Watts up?" power meter installed directly to the refrigerator; two "Onset HOBO" temperature meters, one inside the refrigerator compartment (for refrigerator/freezer combinations) or inside the freezer box (for freezers), and one measuring the temperature of the air in the space immediately surrounding the refrigerator or freezer; and a "DENT SMARTlogger" time-of-use monitor to determine door openings. A summary of the results is shown in Table 12 below.

Table 12. Summary of Engineering Savings Estimates

Estimate	Gross Savings		Net Savings	
	kWh	kW	kWh	kW
Per Participant Annual kWh Savings: Overall	930	0.1275	485	0.0664
Per Participant Annual kWh Savings: Refrigerator	952	0.1359	512	0.0731
Per Participant Annual kWh Savings: Freezer	869	0.1035	410	0.0489

Power Meter Results

The average annual raw, unadjusted consumption, as measured by the "Watts up?" power meters, of a unit recycled through ARP, including both refrigerators and freezers, is 1,392 kWh. Refrigerators used more energy than freezers, 1,471 kWh compared to 1,162 kWh. As there were only two primary refrigerators in the metering sample, no meaningful comparison of primary versus secondary refrigerators is available. All freezers are considered secondary by default.

Weather Normalized Savings

The metering results, in their raw, unadjusted form, represent the energy consumption of the sampled units during the monitoring period, not for the entire year. To account for temperature differences throughout the year, the "Onset HOBO" temperature meters were used to establish a relationship between kWh and the temperature in the vicinity of the unit. Outdoor temperatures were researched in a historical weather database and found to have a strong correlation with energy consumption, since outdoor temperature affects indoor temperature in unconditioned spaces. This adjustment takes into account a waste heat factor for units in conditioned spaces.

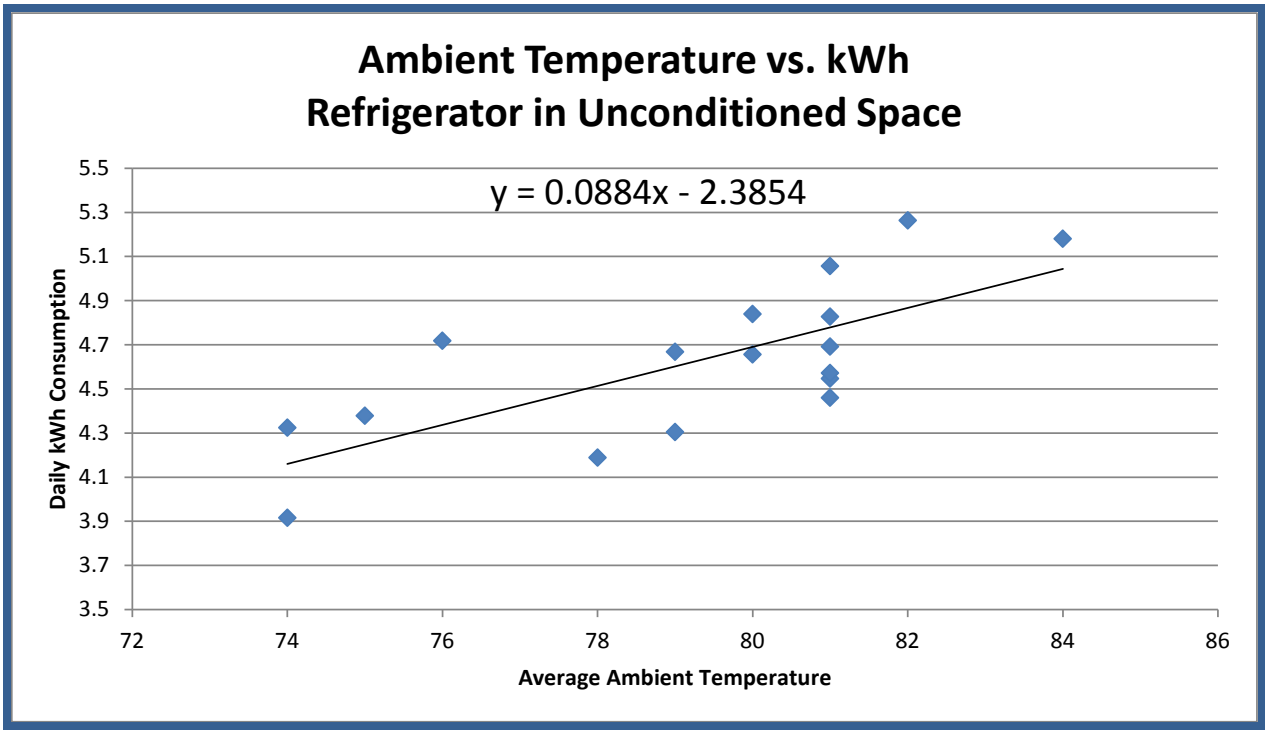


Figure 1. Ambient temperature vs. kWh: strong positive correlation; refrigerator in an unconditioned space

Figure 1 is an example of a unit whose consumption has a strong positive correlation with ambient temperature. That is, as temperature increases, so does kWh consumed. The unit represented in Figure 1 is a 21 year old 24 cubic foot secondary refrigerator located in an unconditioned garage. By contrast, Figure 2 shows the regression line for a unit that has a weak correlation with ambient temperature. The unit represented in Figure 2 is a 13 year old 18 cubic foot secondary refrigerator located in a conditioned basement.

As anticipated, units in unconditioned spaces exhibit a much stronger relationship with ambient temperature than do units in conditioned spaces. Despite large fluctuations in temperature (57 to 77 degrees) in Figure 2, kWh consumption remains level between 2.30 and 2.35 kWh per day. Compare this to the lesser temperature fluctuations (74 to 84 degrees) in Figure 1 and the resultant consumption ranges from 3.92 to 5.26 kWh per day.

The strong predictive nature of this relationship allows for straightforward extrapolation of the monitoring period to a full meteorological year using the equation of the regression line to estimate the average year's kWh consumption based on average daily temperatures from TMY3 data for the typical (long-term average) meteorological year. The average annual weather normalized consumption of a unit recycled through ARP, including both refrigerators and freezers, is 1,315 kWh. Refrigerators used more energy than freezers, 1,373 kWh compared to 1,155 kWh. The slopes and intercepts for each unit's regression line and the accompanying weather normalized annual kWh consumption estimate can be seen in Appendix E: Regression Table.

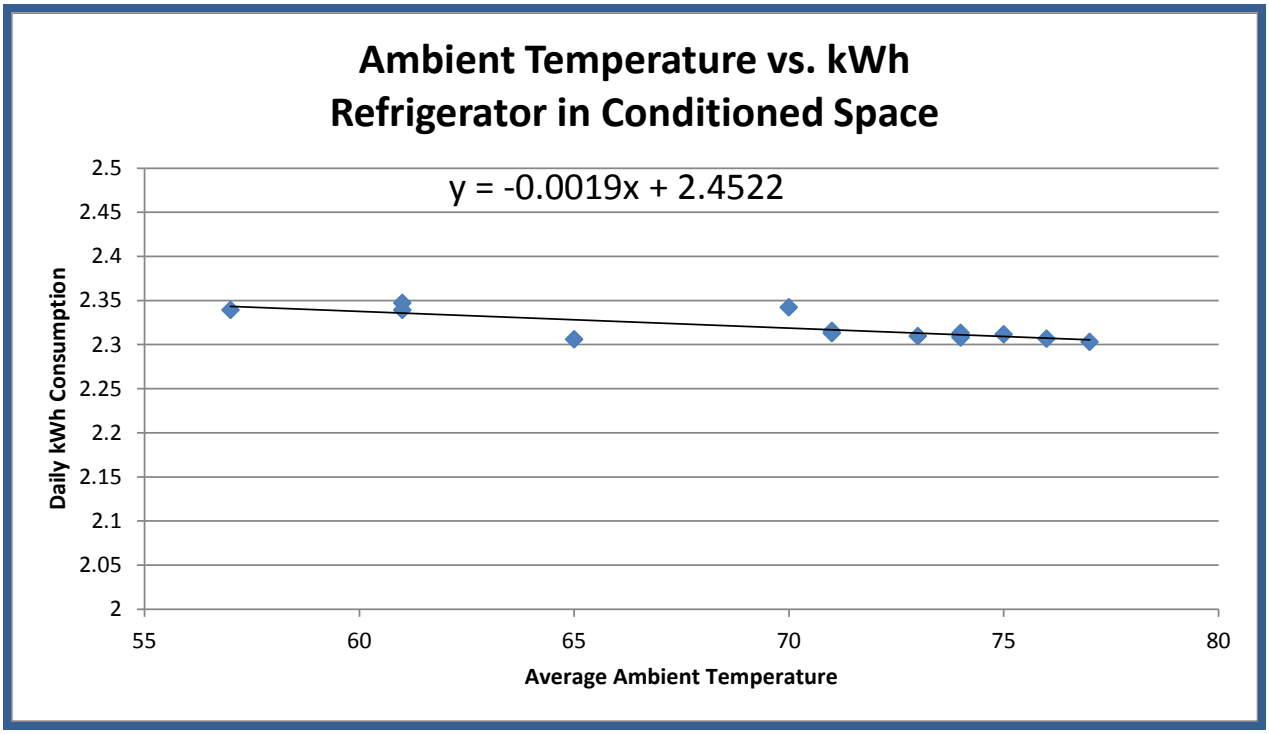


Figure 2. Ambient temperature vs. kWh: weak correlation; refrigerator in a conditioned space

In-Service Rate

The in-service rate is defined as the proportion of the year a given recycled appliance had been in use rather than unplugged. If recycling a secondary refrigerator or a freezer, respondents to the participant survey were asked to add up the time the unit in question was plugged in and running during the last 12 months. The average secondary refrigerator has an in-service rate of 81.4% (9.77 months out of 12). The weighted average in-service rate for all refrigerators is then 88.8%, assuming primary units are always in service and using the ratio of primary to secondary refrigerators from the total population as seen in Table 13. The average freezer has an in-service rate of 89.6%.

Table 13. Refrigerator and Freezer In-Service Rates

In-Service Rate	Refrigerator		Freezer
	Primary	Secondary	
Participation	934	1410	869
In-Service Months	12	9.77	10.75
In-Service Rate	88.8%		89.6%

These in-service rates function as an adjustment to gross savings. The average annual weather normalized consumption of a unit recycled through ARP after adjusting for the in-service rate,

including both refrigerators and freezers, is 1,171 kWh. Refrigerators used more energy than freezers, 1,220 kWh compared to 1,035 kWh, likely due to smaller size of the recycled freezers.

Sixteen Path Direct Net Analysis Approach

TecMarket Works has developed a set of sixteen paths as a net energy impact evaluation approach for appliance recycling programs. Each of the paths represents a particular course of action taken by a participant as it relates to a single recycled unit. This approach compares the outcome of the program to what would have happened in the absence of the program, where savings achieved is the delta of the two situations (what would have happened in the market without the program versus what happened in the market as a result of the program). This type of analysis is required for recycling programs because the program affects more than just the energy use of the participating homes. It affects both the new and used appliance stream by changing what is bought and sold in the new and used markets. Not all paths are affected by all appliance recycling programs. The paths that are changed are representative of a program on a specific market located within the geographical area served by that program.

Each of the sixteen paths is explained in detail in Table 14. These sixteen paths can be divided into four major categories according to what the participant would have done in the absence of the Appliance Recycling Program:

- Units that would have been kept in use by the household that recycled them (paths 1-4)
- Units that would have been sold or given to another household to be used (paths 5-8)
- Units that would have been taken off the grid and disposed of anyway without the program (paths 9-12)
- Units that would have gone to dealers or charities that accept used appliances (paths 13-16)

In the first two categories above, without the program the recycled unit would have remained on the grid either in the participant's household (if they kept it) or someone else's household (if they sold it or gave it away). In the third category of paths (disposal), the recycled unit would have been taken off the grid even without the program. The fourth category (dealers and charities) represents a combination of recycled units that would have returned to the grid through the secondary market and units that would have been disposed of anyway. When these types of organizations acquire used appliances, they resell the units that can be resold profitably, while those that cannot be resold are disposed of (through recycling and sometimes dismantling for spare parts) and do not return to the power grid. Since units that would have been taken off the grid without the program do not contribute to program savings, only the proportion of "resalable" recycled units that would have gone to dealers and charities contribute to program savings.

Each of these four categories of action is further subdivided into four paths based on whether the recycled unit was replaced, and the participants' intention to replace the unit (or not) before the program:

- Recycled unit was replaced but would not have been without the program,
- Recycled unit was replaced and would have been replaced anyway without the program
- Recycled unit was not replaced but would have been replaced without the program

- Recycled unit was not replaced and would not have been without the program.

The sixteen path analysis is a result of four absence-of-the-program outcomes multiplied by four replacing-the-recycled unit outcomes.

Table 14. Sixteen Paths Scenario Descriptions

Path number	Description of scenario	Energy savings calculation
1	Unit that was picked up by the program would have remained in use and not been replaced. With the program, the unit was recycled and replaced.	Savings from old unit removed less new unit induced by the program
2	Unit that was picked up by the program would have remained in use and also been replaced (the old primary unit would have been "demoted" to use as a secondary unit). With the program, the unit was recycled and replaced.	Savings from old unit removed
3	Unit that was picked up by the program would have remained in use and not been replaced. With the program, the unit was recycled and not replaced.	Savings from old unit removed
4	Unit that was picked up by the program would have remained in use and been replaced (the old primary unit would have been "demoted" to use as a secondary unit). With the program, the unit was recycled and not replaced. *For refrigerator recycling, this scenario only applies to a household that had at least two refrigerators before the program (because primary refrigerators are always replaced).*	Savings from old unit removed plus new unit not purchased
5	Unit that was picked up by the program would have been sold or given to someone else for continued use and not replaced. With the program, the unit was recycled and replaced.	Savings from old unit removed less new unit induced by the program
6	Unit that was picked up by the program would have been sold or given to someone else for continued use and replaced. With the program, the unit was recycled and replaced.	Savings from old unit removed
7	Unit that was picked up by the program would have been sold or given to someone else for continued use and not replaced. With the program, the unit was recycled and not replaced.	Savings from old unit removed
8	Unit that was picked up by the program would have been sold or given to someone else for continued use and replaced. With the program, the unit was recycled and not replaced.	Savings from old unit removed plus new unit not purchased
9	Unit that was picked up by the program would have been recycled anyway and not replaced. With the program, the unit was recycled and replaced.	Program induced a new purchase (negative savings)
10	Unit that was picked up by the program would have been recycled anyway and replaced. With the program, the unit was recycled and replaced.	No savings
11	Unit that was picked up by the program would have been recycled anyway and not replaced. With the program, the unit was recycled and not replaced.	No savings

12	Unit that was picked up by the program would have been recycled anyway and replaced. With the program, the unit was recycled and not replaced.	Savings from new unit not purchased
13	A portion* of units picked up by the program would have been sold or given to someone else for continued use and not replaced. With the program, the unit was recycled and replaced.	Portion* of savings from old unit removed less new unit induced by the program
14	A portion* of units picked up by the program would have been sold or given to someone else for continued use and replaced. With the program, the unit was recycled and replaced.	Portion* of savings from old unit removed
15	A portion* of units picked up by the program would have been sold or given to someone else for continued use and not replaced. With the program, the unit was recycled and not replaced.	Portion* of savings from old unit removed
16	A portion* of units picked up by the program would have been sold or given to someone else for continued use and replaced. With the program, the unit was recycled and not replaced.	Portion* of savings from old unit removed plus savings from new unit not purchased

* A portion of units that are picked up by dealers or accepted as donations by charities find their way to the secondary market for resale. Energy savings for these paths is based on the proportion of units that would be resold.

The sixteen paths approach requires, as inputs:

- Average annual kWh consumption of a recycled unit
- Average annual kWh consumption of a replacement unit (new and used)
- Percentage of dealer/donation units that are sold on the secondary market
- Count of units following each path

The average annual kWh consumption of a recycled unit is the value determined by the "Watts up?" power meters adjusted for weather and in-service rate. An estimate for the average annual kWh consumption of a replacement unit was calculated using the Energy Star Refrigerator Retirement Savings Calculator. This assumption is necessary because data on replacement units was not collected for the metering sample and was sparse for the participant survey (59% of respondents did not know cubic footage, but 75% were the same size or larger units). For refrigerators, the estimate is the simple average of the annual kWh for a 19-21.4 cubic foot top freezer model and a 21.5-24.4 cubic foot side by side model. For freezers, the average annual kWh consumption of a replacement unit is estimated as the simple average of the annual kWh for a below 16.5 cubic foot chest model and a 16.5-18.9 cubic foot upright model. These values are shown in Table 15.

Table 15. New and Used Replacement Refrigerators and Freezers kWh

Used Refrigerator	kWh	Used Freezer	kWh
19-21.4 ft^3 top freezer	537	Below 16.5 ft^3 chest	404
21.5-24.4 ft^3 side by side	713	16.5-18.9 ft^3 upright	747
AVERAGE	**625**	**AVERAGE**	**575.5**
New Refrigerator	**kWh**	**New Freezer**	**kWh**
19-21.4 ft^3 top freezer	404	Below 16.5 ft^3 chest	341

21.5-24.4 ft^3 side by side	540	16.5-18.9 ft^3 upright	639
AVERAGE	**472**	**AVERAGE**	**490**

In the participant survey, if a respondent indicated that the unit recycled through the program had since been replaced, they were asked if it was replaced with a new or a used unit. Of the 82 refrigerators and 91 freezers recycled, 49 refrigerators and 34 freezers were replaced, replacement rates of 60% and 37% respectively. Of the 49 refrigerators replacements, 39 (80%) were new units and 10 (20%) were used. Of the 34 freezer replacements, 29 (85%) were new and 5 (15%) were used. Table 16 shows how these ratios were used to calculate the weighted average kWh for replacement units.

Table 16. Weighted Average Replacement Refrigerator and Freezer kWh

Refrigerators	Percentage	kWh	Freezers	Percentage	kWh
Used Refrigerator	20%	625	Used Freezer	15%	575.5
New Refrigerator	80%	472	New Freezer	85%	490
WEIGHTED AVERAGE		**503**	**WEIGHTED AVERAGE**		**503**

The percentage of units that are either donated or picked up by new appliance dealers that are resold on the secondary market is assumed to be the percentage of units recycled through the program that are in saleable condition. In the Carolinas, a unit is considered saleable if it is no more than ten years old and in good working condition. This information is taken from the results of the participant survey, where respondents were asked to estimate the age of the unit and also to assess its condition. Only those customers who indicated that, in the absence of the program, their unit would have been either donated or picked up by a dealer were considered. Five (15.6%) out of 32 units were reported to be saleable.[6]

Finally, the weight for each path is determined by the proportion of the participant population following it. Which path a participant follows is determined by their responses to three questions in the participant survey:

1. What would you have done with the unit if ARP was not available?
2. Have you since replaced the unit that was recycled?
3. Would you have replaced the unit if ARP was not available?

Figure 3 and Figure 4 show the sixteen paths diagrams for freezers and refrigerators along with the savings associated with each and the proportion of the participant population following each. Note that although there are sixteen possible logical outcomes with this analysis approach, some of the sixteen paths are unlikely outcomes that may not occur in a survey with a relatively small sample size: for example, in the 2013 participant survey in the Carolina System, there were no

[6] Recycled units in saleable condition are newer than the average recycled unit, thus they consume less energy. When calculating consumption without the program, recycled units in saleable condition that would have been donated or picked up by dealers are assigned the kWh value corresponding to a used replacement unit (625 for refrigerators and 575.5 for freezers in the Carolinas System, as seen in Table 15) rather than the kWh values for "all recycled units".

responses corresponding to the paths numbered 4, 5, 8, 9 and 13 among the 80 participants who recycled refrigerators (see Figure 3).

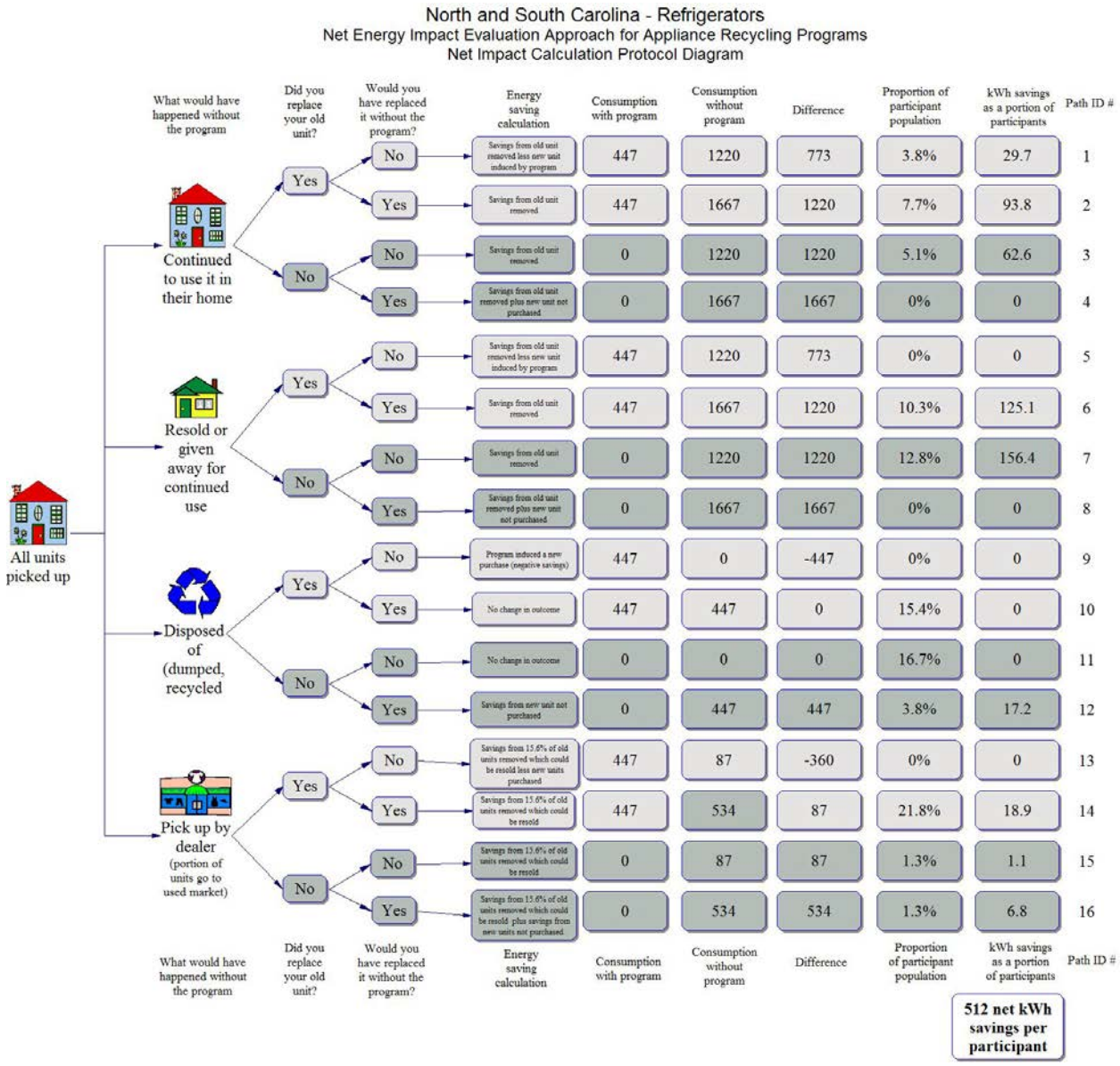


Figure 3. Sixteen Paths Analysis for Refrigerators

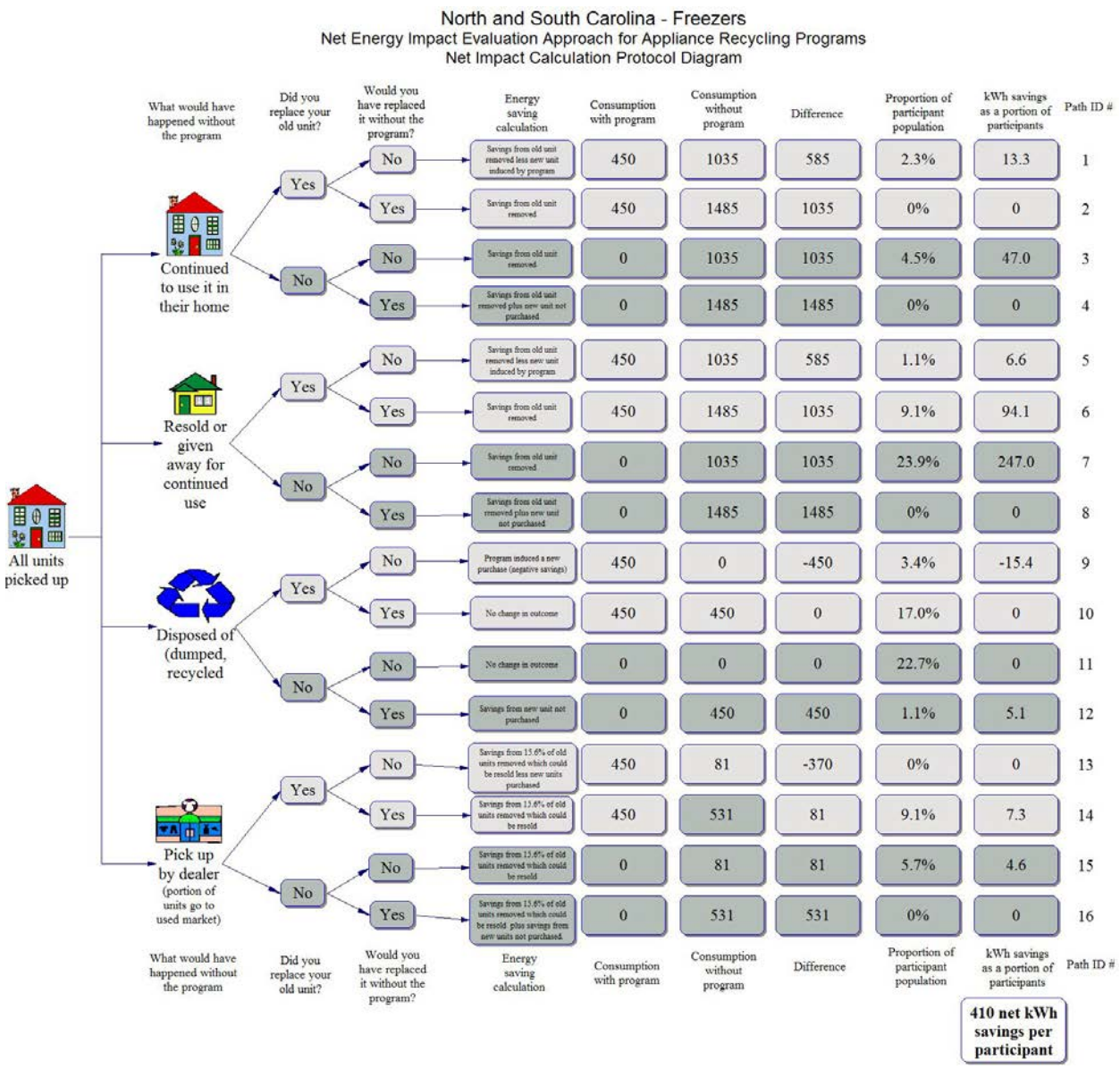


Figure 4. Sixteen Paths Analysis for Freezers Demand Reduction

The summer coincident peak demand savings is calculated using the regression lines comparing kWh to temperature and plugging in the highest average daily temperature for the corresponding weather station. A load shape adjustment factor[7] is used coincident with the hour beginning 3PM and ending at 4PM (1.029 for refrigerators and 1.026 for freezers).

$$kW = kWh/day(Tmax) / 24 \times LSAF$$

where:

[7] Daily load shape adjustment factor also based on Blasnik, Michael, "Measurement and Verification of Residential Refrigerator Energy Use, Final Report, 2003-2004 Metering Study", July 29, 2004 (p. 48, using a weighted average Existing And New Units Summer Profile for hour beginning 15)

Tmax = maximum daily average temperature for each weather city
kWh/day = daily consumption predicted from regression model
LSAF = load shape adjustment factor

ARP achieved gross coincident peak demand reduction of 0.1359 kW for refrigerators and 0.1035 kW for freezers. To compute net peak demand reduction, the net to gross ratios from the "Net to Gross Analysis" section are applied, yielding 0.0731 kW for refrigerators and 0.0489 kW for freezers.

Metered Unit Characteristics

In most cases, field technicians were able to determine the age, size, and location of the metered units. As seen in Table 17, there was a wide range of ages among the sampled units recycled through the program. The youngest unit was just six years old while the oldest was 42 years old. The average age of the sampled units was 23 years for refrigerators, 28 years for freezers, and 24 years overall for refrigerators and freezers combined. The sample matches up well with data from the overall participation database where the average refrigerator is 23.5 years old, the average freezer is 29.2 years old, and the combined average is 25.0 years old.

Table 17. Age of Units in Metering Study

Age	Refrigerator		Freezer	
	Count	Percent	Count	Percent
5 to 10 years	2	7%	1	10%
11 to 15 years	2	7%	1	10%
16 to 20 years	7	25%	1	10%
21 to 25 years	7	25%	1	10%
26 to 30 years	6	21%	0	0%
31 to 35 years	4	14%	3	30%
36 or more years	0	0%	3	30%
Average age	23 years		28 years	
Overall average	24 years			

Table 18 shows that the average size of a sampled unit was 21 cubic feet for refrigerators, 14 cubic feet for freezers, and 19 cubic feet overall for refrigerators and freezers combined. Sizes ranged from eight to 27 cubic feet. Note that eight cubic feet is below the minimum 10 cubic feet required for program eligibility. Nevertheless, since the unit was selected at random to be part of the metering study, it is assumed to be representative of other ineligible units recycled through the program. According to the EIA Residential Energy Consumption Survey (RECS) from 2009, the average refrigerator size was approximately 19 cubic feet and the average freezer size was about 17 cubic feet.

Table 18. Size of Units in Metering Study

Size	Refrigerator		Freezer	
	Count	Percent	Count	Percent
5 to 10 cubic feet	0	0%	2	20%
11 to 15 cubic feet	0	0%	6	60%

16 to 20 cubic feet	9	43%	1	10%
21 to 25 cubic feet	9	43%	1	10%
26 to 30 cubic feet	3	14%	0	0%
Average cubic feet	21 ft^3		14 ft^3	
Overall average	19 ft^3			

The majority (56%) of recycled units participating in the metering study were located in a garage. This includes 66% of refrigerators and 27% of freezers as shown in Table 19. The second most common location was in a basement, making up 21% of the total, including 16% of refrigerators and 36% of freezers. Overall, only seven (16%) units were located in a conditioned space. This is consistent with the low representation of primary units in the metering sample (2 out of 43) but skewed compared to the overall participation figures where 35% of units were in conditioned spaces and 36% of refrigerators were primary.

Table 19. Location of Units in Metering Study

Location	Refrigerator		Freezer	
	Count	Percent	Count	Percent
Basement	5	16%	4	36%
Garage	21	66%	3	27%
Kitchen	2	6%	0	0%
Laundry	0	0%	3	27%
Living Room	2	6%	0	0%
Outside	2	6%	0	0%
Pantry	0	0%	1	9%

Remaining Useful Life

The remaining useful life (RUL) of the recycled appliance is the period over which energy savings are realized. The US Department of Energy (DOE) developed a technical support document (TSD) in 2009 to establish a survival probability curve for appliances. Mortality trends for technologies tend to follow a Weibull distribution. This allows for a "time-to-failure" calculation and it provides a distribution for which the failure rate is proportional to a power of time, eliminating the need for estimating RUL as a function of a deemed EUL value.

In this TSD, the DOE fitted mortality data collected through the Residential Energy Consumption Survey (RECS) to a cumulative Weibull distribution of the form:

$$P(x) = e^{-\left(\frac{x-\theta}{\alpha}\right)^{\beta}} \text{ and } P(x) = 1 \; for \; x \leq \theta$$

Where:

$P(x)$ = probability that the appliance is still in use at age x

x = appliance age
α = scale parameter; corresponds to decay length in an exponential distribution
= 13.91
β = shape parameter; determines the way in which the failure rate changes through time
= 1.68
θ = delay parameter; allows for a delay before any failures occur
= 5

The delay parameter (θ) is included to account for equipment failure within the first five years of an appliance purchase. This is assumed to be the warranty period, wherein a unit would be replaced free of charge if it were to fail.

To calculate an RUL schedule from the survival probability curve, the integral values are normalized by the survival probability at each age resulting in the curves in Figure 5.[8] In this study, the average age of a recycled unit is 24 years, as seen in Table 17. This corresponds to a program wide average RUL of 6 years. This value appears in *Appendix O: DSMore Table* and functions as the EUL of program savings for cost effectiveness calculations.

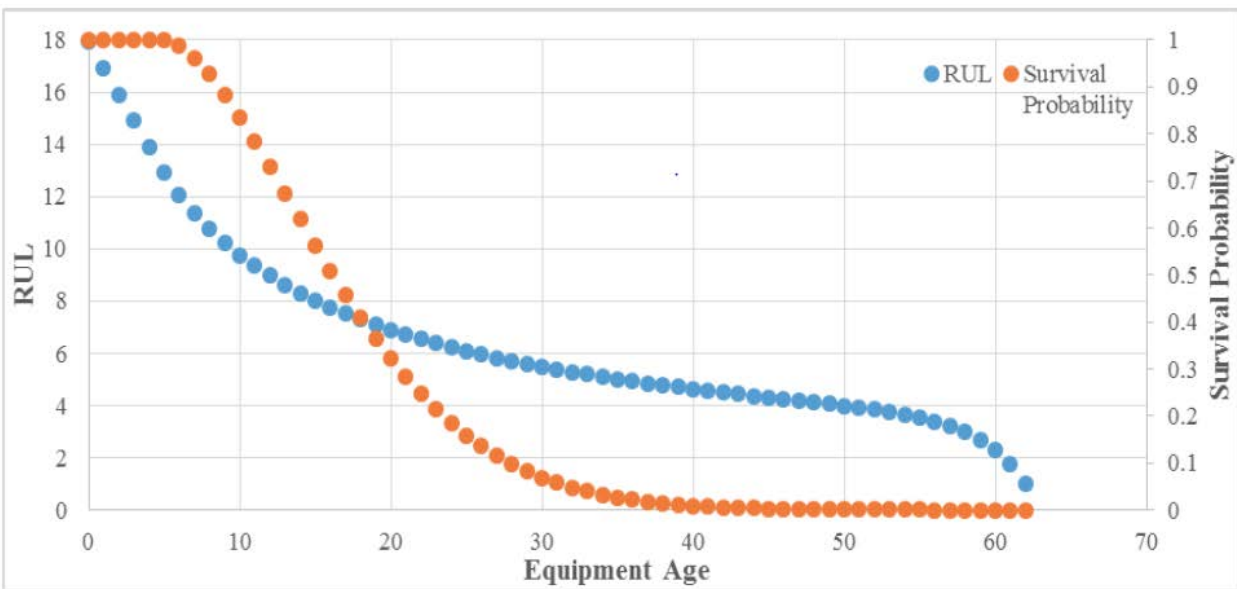


Figure 5. Survival Probability and RUL Curves

Net to Gross Analysis

The engineering analysis used the sixteen path market impact analysis approach to calculating net savings from raw consumption data. This approach is an enhanced (expanded) approach from USDOE's Uniform Practices Protocol for residential programs and allows program designers and managers to see the energy impacts associated with each market path for both new and used

[8] Mohit Singh-Chhabra, Ptarmigan Research and Angie Lee, Navigant Consulting, Inc. "Savings from Appliance Recycling Programs: Think Outside the Grid." 2013 International Energy Program Evaluation Conference, Chicago. Page 3.

units that are affected by the program and to more completely understand the energy effects of the program on the individual paths. Calculating gross savings is not necessary for this approach. An appropriate way to calculate gross savings would be to compare the average annual weather normalized and ISR adjusted kWh consumption of a unit recycled through the program (1,220 kWh for refrigerators and 1,035 kWh for freezers) to the average ISR adjusted wattage of a replacement unit (447 kWh for refrigerators and 450 kWh for freezers).

From the participant survey, 60% of refrigerators were replaced. Gross savings and the net to gross ratio for refrigerators can be calculated as follows:

Refrigerator Gross Savings = 1,220 * 0.4 + (1,220 – 447) * 0.6 = 952 kWh
Refrigerator NTGR = 512 / 952 = 53.8%

Where:

1,220 =	consumption of a recycled refrigerator
447 =	consumption of a replacement refrigerator
0.6 =	fraction of refrigerators replaced
0.4 =	fraction of refrigerators not replaced

From the participant survey, 37% of freezers were replaced. Gross savings and the net to gross ratio for freezers can be calculated as follows:

Freezer Gross Savings = 1,035 * 0.63 + (1,035 – 450) * 0.37 = 869 kWh
Freezer NTGR = 410 / 869 = 47.2%

Where:

1,035 =	consumption of a recycled freezer
450 =	consumption of a replacement freezer
0.63 =	fraction of freezers replaced
0.37 =	fraction of freezers not replaced

Reconciliation

Applying the net to gross ratios calculated in the *Net to Gross Analysis* section to the bounds of the confidence intervals from the billing analysis reveals that the net engineering estimate of refrigerator savings (512 kWh) falls just outside the 95% confidence interval for net refrigerator savings (253 to 485 kWh). The engineering estimate of freezer savings (410), however, is well within the 95% confidence interval associated with the net impacts from the billing analysis (253 to 608).

	95% Confidence Interval			
	Gross		Net	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Per Participant Annual kWh Savings: Refrigerator	451	864	253	485
Per Participant Annual kWh Savings: Freezer	526	1,263	253	608

The difference in refrigerator impact between the engineering and billing analyses can likely be attributed to the underrepresentation of primary units in the metering sample. Primary refrigerators make up approximately 40% of the total number of refrigerators recycled through the program, however, the random sample selected for the metering initiative includes just two (6%). Secondary refrigerators tend to be older and also use more energy than primary units. Further, it is assumed that all primary refrigerators must be replaced while only a portion of secondary units will be. Consequently, engineering impact estimates are skewed upward.

Management Interview Results

Brief Overview of Refrigerator Recycling

Utility-sponsored refrigerator recycling programs first arose in the 1970s along with early demand side management programs. In the ensuing decades, numerous utilities and public benefit programs have initiated collection efforts. Although the details of program design vary, the general purpose of the programs has consistently focused on reducing electric energy demand by removing less efficient refrigerators and freezers from residences and businesses.

What happens to the units after removing them from customer homes has changed over time. In some cases, units were simply sent to landfills. In others, working units were resold on the secondary market, dismantled and parted out, or sold for scrap metal. Such activities are now far less common as increasingly stringent environmental regulations have been enacted to ensure that refrigerants and other toxic elements are properly handled.

According to the U.S. Environmental Protection Agency (EPA), a typical refrigerator contains approximately 140 pounds of metal, 20 pounds of plastic, and 3 pounds of glass, most of which can be recycled and reused. Perhaps more importantly, a typical refrigerator may contain half a pound in refrigerants, another pound of CFC-laced foam insulation, PCPs, mercury containing components, and contaminated motor oils, as shown in Figure 6. As a result, measures for safe disposal and procedures for the legal transfer of custody of the units must now be included in program design. Duke Energy and its implementation partner JACO Environmental, exceed these requirements through voluntary participation in the EPA's Responsible Appliance Disposal (RAD) program.

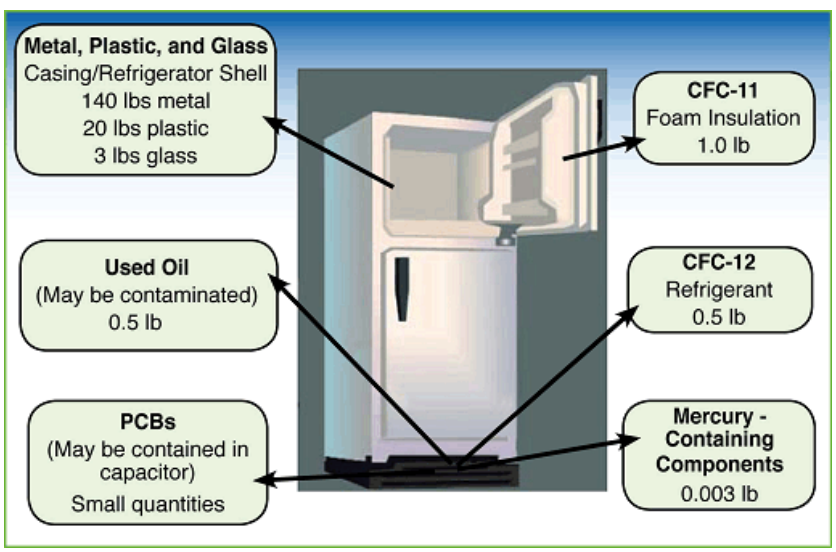


Figure 6. Constituent Elements within a Refrigerator (source US EPA) [9]

[9] US Department of Environmental Protection, Safe Disposal of Refrigerated Household Appliances: Frequently Asked Questions (FAQ), Washington, DC: Accessed on August 5, 2013, source: http://www.epa.gov/spdpublc/title6/608/disposal/household.html

Program Operations and Oversight

The Duke Energy Appliance Recycling Program is a turnkey refrigerator and recycling program provided by JACO Environmental of Bothell, WA. Duke Energy provides the overall administration of the program, including strategic guidance, vendor oversight, customer eligibility confirmation, utility-based marketing, website administration, incentive payment auditing, and overall quality assurance.

Meanwhile, day-to-day implementation is contracted to JACO, which handles all operational functions including: call center activities, scheduling, pick up and collection, environmentally appropriate dismantling and recycling, incentive payments, and quality assurance. JACO-provided marketing services for the program are subcontracted to Runyon, Saltzman, and Einhorn of Sacramento, CA.

After completing a successful RFP process, including a thorough review of JACO's operations and environmental protocols, Duke Energy and JACO signed their contract in January of 2012. The agreement calls for operations in North Carolina, South Carolina, Kentucky, Ohio, and Indiana. The Indiana program launched on May 25, 2012, making it the first service territory to begin collecting units. Formal operations in the Carolina system began on August 1, 2012 after regulatory approval in North Carolina and South Carolina. Ohio and Kentucky collections began on October 4, 2012.

Eligibility

While open to all Duke Energy residential customers in the Carolina System who wish to recycle their refrigerators and freezers, the program particularly targets homeowners who are empty-nesters, that is people whose children are grown and who are replacing or have replaced their approximately 20 year old units with new ones. The program attempts to preempt these customers from using their second units as backup coolers. It also seeks to intercept the older primary units from entering the used market or going directly to scrap dealers and landfills. Renters represent a smaller percentage of potential customers since they are less likely to own their refrigerators.

The program's customer eligibility, unit eligibility, and removal stipulations are shown below.

- Customer must have an active residential electric account with Duke Energy at the address where the pickup is to occur.
- The unit must meet the size requirement of 10 - 30 cubic feet.
- There is a limit of two units per customer address within a 12 month period. Any numeric combination of refrigerators or freezers is acceptable.
- An adult, 18 years of age or older, must be present to sign and release the unit at the time of the pickup.
- The unit must be emptied and defrosted.
- The unit must be plugged in and cooling on the day of the pickup.
- The unit must be disconnected from waterlines prior to the pickup crew's arrival.

- There must be a clear and safe removal path since crews cannot risk injury, move personal effects, modify the home (e.g.: remove doors or railings) to remove units.

Marketing

The Duke Energy and JACO used the interval between contract agreement and regulatory approval to prepare operational infrastructure, customer handling procedures, geographic maps, reporting tools, data transfer methods and security protocols. Such efforts helped ensure the program was prepared to enter the market as swiftly as possible. Nonetheless, because the program in the Carolina System launched during August of 2012, it started in middle of the high season and was ramping up its marketing efforts as the number of potential units available for collection was dropping from its peak. This meant that the program had relatively little time to build awareness and momentum before the number of potential units began to diminish with the onset of cooler weather. This was accounted for when planning to meet the 2012 collection goals, according to Duke Energy, JACO, and RSE.

Program marketing is coordinated between Duke Energy, JACO and RSE, which also provides marketing services for nearly 200 of JACO's utility clients in 25 states. Representatives from all three firms meet weekly and communicate regularly to plan strategies, coordinate efforts, review results, and make adjustments as necessary.

Once per year, RSE prepares a comprehensive marketing plan for each of Duke Energy's program service territories. The plan has three primary components: 1) utility marketing efforts; 2) paid media buys; and 3) earned media via public relations activities. Each of the three components consists of multiple marketing channels that are scheduled to overlap, reinforce, and sustain the annual marketing plan as it ramps up in the spring for the busy summer season, makes its push toward annual goals in the autumn, and goes into maintenance mode during the slower winter months.

Duke Energy's utility marketing efforts were similar for North Carolina and South Carolina. They consisted of one on-bill message, two email blasts to customers who've agreed to them, and four bill inserts. One of these activities occurred each month, while the program maintained a year round presence via the Duke Energy website and OLS promotions.

Media buys comprised television ads in the Charlotte, Greensboro, Raleigh-Durham, and Greenville designated market areas (DMAs). Newspaper ads ran twice weekly in the *Charlotte Observer, Greensboro News & Record, Winston Salem Journal, Burlington Times News, High Point Enterprise, Greenville News, and the Spartanburg Herald Journal*. Targeted digital ads included Google pay-per-click ads, Yahoo banners, Pandora internet radio ads, and ads on charlotteobserver.com and wsoctv.com. These geo-demographically targeted ads collectively generated approximately half a million impressions per week in high customer count, high participation zip codes.

RSE's creative team works closely with their marketing counterparts at Duke Energy to develop collateral and ads that tout the program's benefits, while also complying with the utility's specific branding requirements. Marketing messages use positive motivations by discussing benefits, and negative consequences by discussing results of non-action. Brief marketing

formats, such as web ads and bill inserts, focus on convenience (Free pick up), the incentive (Earn $30), and energy savings (Save $150 a year on energy). Longer marketing formats, such as emails and newspaper ads, also focus on the environmental attributes (Keep harmful materials out of landfills). Samples ads are shown in Appendix J: Marketing Samples.

The RSE team also generates a social media contact calendar and drafts two Twitter tweets and one Facebook message about refrigerator recycling for Duke Energy to send out via its social media accounts each month.

The earned media component of the marketing strategy utilizes press releases and interesting media events. The center piece of JACO's public relations component is a media and public demonstration event called Filet of Fridge at which a JACO spokesperson displays a partially deconstructed refrigerator along with samples of the various materials that are reclaimed during the recycling process, including metal, plastic, glass, foam, oils, and refrigerants. The events make interesting television topics, garnering mentions, brief segments, and even lengthier interviews on local and regional news programs. JACO plans at least one Filet of Fridge event per year in a media market in each of Duke Energy's service territories. For 2103, it was held at the Duke Energy Wenwood Operations Center in Greenville, SC on May 21, 2013. It generated media coverage by WSPA-TV, *Greenville Journal* and *Upstate Business Journal*. A sample of the components displayed is shown in Figure 7.

Figure 7. Filet of Fridge Recycling Samples

Another unique public relations event utilized by JACO is an outdoor "pop up" museum. Staged on June 4, 2013 at Center City's Wells Fargo Atrium, 301 South Tryon Street in Charlotte, the museum presented vintage refrigerators and freezers, equivalency messages, and recycling samples designed to encourage program participation to the news media and the general public. The Charlotte event drew media coverage by the *Charlotte Observer*, Qcitymetro.com, WBTV-TV, WCNC-TV and News 14 Carolina. Photos of the event can be seen in Appendix K: Earned Media Examples.

Duke Energy Website

The program's primary online presence is hosted on the Duke Energy website. The program is regularly promoted on the home page via a rotating ad with a direct link to the program's main

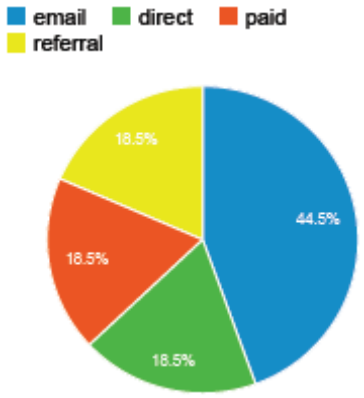
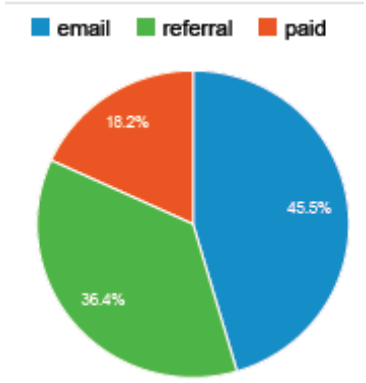
web page. It is also reachable within two clicks of the home page via standard website navigation. The program's main page is simple, with graphics and brief messages that replicate those seen in other marketing vehicles. The page offers four links for additional action. The first link takes web visitors to an online scheduling module, which is discussed under Scheduling below. The second link is to an embedded video of a humorous advertisement showing a refrigerator stealing money from a family. The third link leads to frequently asked questions that cover topics including: benefits of the program, how to find out if your appliance qualifies, how to schedule a pickup, what happens to old refrigerators, and incentive questions. The fourth link takes site visitors to an online appliance calculator that people can use to determine how much money and energy they will save by removing or replacing their old refrigerator.

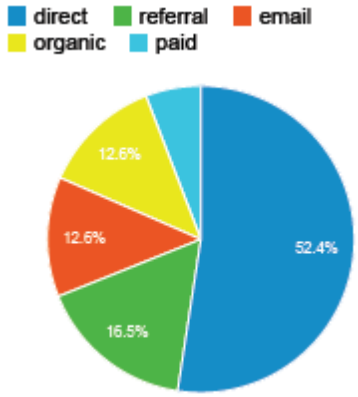
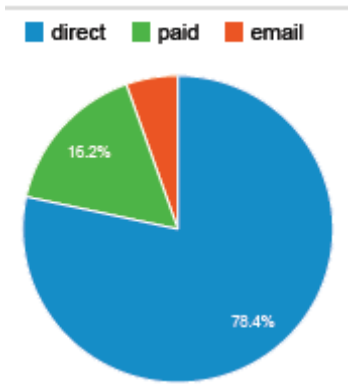
The Duke Energy marketing campaign manager uses Google Analytics to track all website traffic for the program, including the volume of visits, time on page, inbound sources of traffic, and exits to other destinations within the program or elsewhere on the Duke Energy website. Each month, inbound traffic is analyzed by referral source to assess the relative cost effectives of the program's various marketing efforts, including direct access, email links, social media. pay-per click ads, banner ads, Pandora ads, organic search engine sources, etc. Advertising expenditures and other resources are then adjusted as appropriate.

According to the web tracking data, visitors who came directly to the North Carolina website numbered 1,945 during 2012 and spent an average time on page of 1:00 minute. These numbers increased in 2013, with North Carolina customers making 18,384 web page visits for an average of 1:03 minutes on page. During 2012, email drove the largest amount of site visitors, representing nearly 45% of traffic. While in 2013, direct entry of the program URL became the primary driver, accounting for 52% of site traffic. The table below provides a graphic comparison of traffic sources.

South Carolina customers visited the program web page 792 times during 2012 with an average of 1:00 minute on page. In 2013 the site had 7,012 hits and an average time of 1:30 per visit. As with North Carolina, email was the primary source of traffic (46%) in 2012, while direct entry dominated in the second year, accounting for 78% of site visits between January 1 and July 31, 2013.

Table 20. Website Traffic Sources

NC Web Traffic Aug 1 to Dec 31 2012	SC Web Traffic Aug 1 to Dec 31 2012
	

NC Web Traffic Jan 1 to July 31, 2013	SC Web Traffic Jan 1 to July 31, 2013
	

Traffic was tracked by visits directly to the individual state's website. Visitors could have also come in from the state landing page where they could choose their state and then enter the website. That data is not included in the above analysis because it was not available at the time of this review. The traffic to the state landing pages would be additive to the above numbers.

Marketing Effectiveness

To track the effectiveness of the many marketing channels used by the program, RSE and Duke Energy use unique URLs for each promotion that refers people to the online program sign up process. In a similar fashion, to measure the effectiveness of each channel in driving participants to the call center, all callers are asked how they heard about the program. According to these measurements, bill inserts are the most effective marketing vehicle by far, drawing approximately two thirds of all program participants (Table 21). Word of mouth via friends and neighbors and television news and commercials are the next most significant sources of recruitment, although their contributions can be measured in single digit percentages as can the other marketing channels. As shown in the table below, television generated greater awareness in North Carolina (9.0%) than in South Carolina (5.8%). Such results correspond with the proportionally greater number of DMAs in North Carolina.

Table 21. How Participants Heard About the Program as of July 31, 2013

Tactic	% How Heard	
	NC	SC
Utility bill insert	61.1%	68.4%
Television advertising/news	9.0%	5.8%
Friend/neighbor	8.2%	8.1%
Utility company web site	5.4%	4.8%
Appliance retailer	4.4%	3.2%
Newspaper advertising	4.4%	3.2%
Web advertisement/search	4.2%	3.2%
Utility newsletter	1.4%	0.8%
Electric utility office	1.0%	1.0%

Magnet mailer	0.3%	0.3%
Repeat customer	0.3%	0.2%
Truck sign	0.3%	0.8%
Total	100%	100%

RSE compares these "how heard" metrics with overall weekly program enrollment numbers to better understand the effectiveness of each marketing channel and then adjusts marketing spend and mix as appropriate.

Scheduling and Customer Inquiries

Customers have two ways to make an appointment for collection of their units: via the call center or via a scheduling module on the Duke Energy website. According to JACO records, appointments placed via the call center outnumber web appointments by approximately three to one, as shown in Figure 8. Between program inception in August of 2012 and August 15, 2013, Carolina System customers placed a total of 8,333 pickup requests, of which 6,087 arrived via phone, compared to 2,291 via the web. More specifically, North Carolina customers placed a total of 6,398 orders, with 4,554 arriving by phone and 1,844 via the web. This compared to South Carolina customers who made 1,990 appointments, with 1,543 by phone and 447 via the web. Each ordering method is discussed separately below.

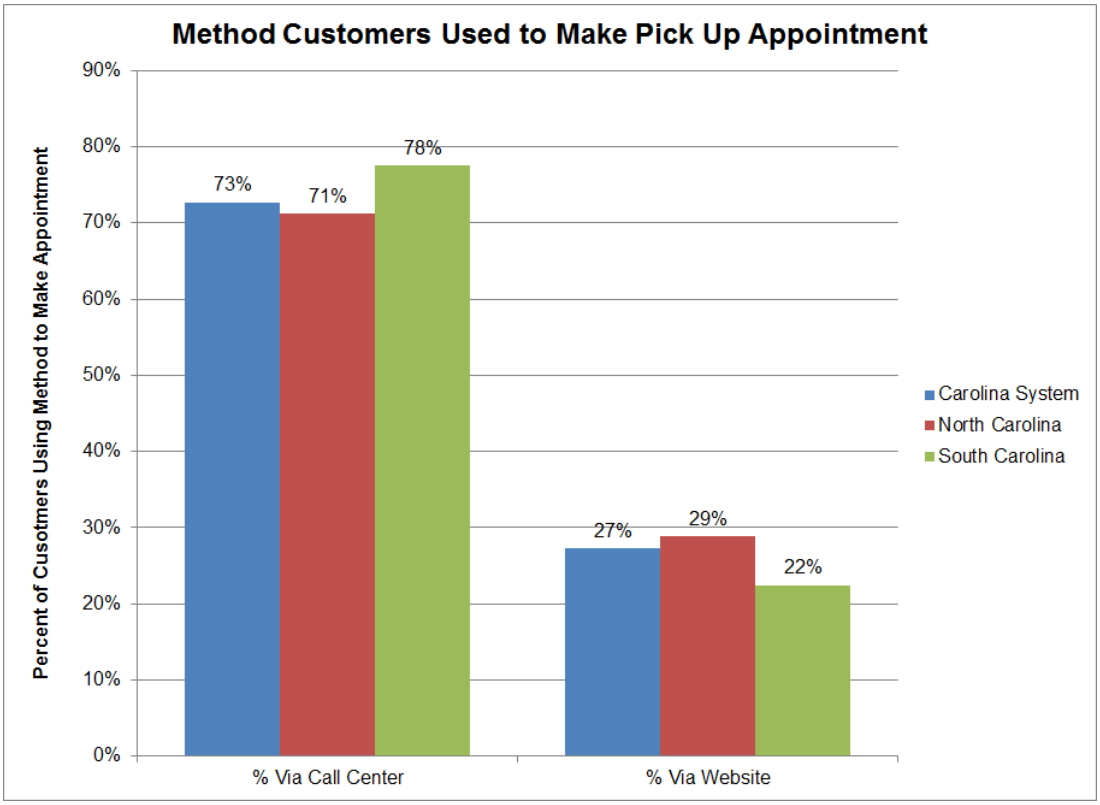


Figure 8. Customer Appointment Methods

Call Center

JACO's call center provides telephone support for Duke Energy's ARP operations in North Carolina, South Carolina, Kentucky, Ohio, and Indiana. [10] Customer appointments and questions are all routed through a single toll free phone to JACO's call center, which is staffed Monday through Friday from 7 am to 8 pm, and on Saturdays from 10 am to 5 pm. A brief intercept message welcomes callers to the Duke Energy Appliance Recycling Program and then asks them to press a specific number to specify their state for tracking purposes. Calls are then routed to the call center and answered by JACO's customer service representatives (CSRs) who follow specific scripts to greet the callers, answer questions, verify customer information, and schedule appointments for appliance collection.

The CSRs cross check the information provided by callers with an internet-accessible Duke Energy database to confirm their status as residential customers with open and active accounts. In the rare event the customer cannot be verified, the CSR refers the matter to JACO's verification department, which maintains a confirmation request list that is reviewed by the Duke Energy product manager. Once the customer's account has been verified, the CSRs use JACO's collections database to confirm unit eligibility requirements. They also review customer ownership of the appliance and discuss program guidelines, including Duke Energy's rule that incentive checks can only be made out and mailed to the name and address associated with the account. With all this clarified, scheduling begins based upon the zip code at the collection address.

JACO's service level agreements require that customers be offered at least one collection date within 14 days of the call. In many cases, JACO will have several dates available to provide customers with a choice of day of the week. Although some these additional options may be beyond the two week window. Because of the way that pick up routes are scheduled for cost-effectiveness, fewer dates tend to be possible for customers in outlying areas, while more options are possible for customers who live closer to the collection hubs since they can be a part of a greater number of routes. Nonetheless, JACO strives to offer all customers a number of options, including Saturday pick up, although not necessarily within the two week window. If customers can't make any available date, they can be placed on a waiting list and notified when new options become available. The waiting list is not for any specific day.

When customers select a date, they are initially told that their pick up will occur between 7 am and 7 pm on that day. Then 48 hours prior to the collection day, they will receive an automated phone call and email if provided by customer specifying a four hour time frame for the collection appointment to help them finalize the arrangements they need in order to be home when necessary. The call also reminds customers of size requirements, and that the unit must be plugged in, running, and disconnected from all waterlines. The four hour time slots cannot be provided earlier because JACO needs to know all the collection addresses on the given route and calculate the most efficient travel plan prior to informing customers of the specific time window. Because actual pick up times vary, drivers also call customers 30 minutes prior to arrival as a further courtesy to help ensure they are ready.

[10] Duke Energy Progress customers are served by a separate program not discussed in this evaluation.

JACO has a service level agreement to answer 80 percent of calls from Duke Energy customers within 20 seconds. During slow times its initial staffing was adequate to the call volume, but as the 2013 busy season ramped up the call center had challenges with this metric. To ensure it meets standards, the company added employees to the Duke Energy dedicated team. Performance has since improved. JACO now provides 15 CSRs, from among its staff of 60 representatives, plus supervisory staff and managers who can provide additional coverage if necessary. All Duke Energy dedicated CSRs receive additional training beyond JACO's basic requirements in order to ensure that the utility's specific protocols and scripts are followed.

Calls typically take between three and seven minutes to complete. JACO indicates that this is slightly longer than for other utility clients and can be attributed to Duke Energy's more rigorous call handling requirements. Approximately one in three phone calls to the call center end in a new customer appointment, according to the JACO call center spokesperson we interviewed. The purposes for the other calls include: cancelations, time window changes or questions, collection issues, general questions, and wrong numbers. The JACO representative indicated that Duke Energy's 1:3 appointment ratio is better than most other utility clients. She attributed the strong performance to Duke Energy's requirement for strict script adherence, which helps to ensure that important messages are clearly and consistently conveyed.

JACO's quality assurance practices are another factor. CSR calls are monitored regularly, at random, monthly, and quarterly intervals. The Duke Energy product manager also monitors live calls with JACO supervisors on a monthly basis. Calls are evaluated to ensure that CSRs follow scripts, collect all necessary information, answer questions, and provide effective customer service. Any problems are discussed with the employee and rapidly addressed, followed by monitoring to ensure the correction is in place.

Periodic training sessions and updates about program activities also help ensure that the call center remains appropriately informed. Despite these periodic updates, call center representatives indicate that they are still occasionally surprised by spikes in call volume. They request that JACO management, RSE, and Duke Energy strive to communicate more frequently and fully about planned marketing activities so that CSRs can be as fully ready as possible.

Scheduling via the Program Website

Customers can also make appointments for the program via Duke Energy's website. The internet scheduling tool is an embedded JACO web module that appears to the customer to be on the Duke Energy website. Scheduling works similarly to the call center, except that customers must enter all information themselves.

As with the call center, the first page of the scheduling module begins by asking for the customer zip code. This is what helps determine the dates available for collection. The first page also lists the requirements for program participation (see eligibility section above) and reasons why customers may want to participate. Page two presents customers with a choice of collection dates. One of which must be selected to continue. The program requirements are also reiterated on this page and a box must be checked to confirm that the rules are understood. This step helps in preventing future misunderstandings.

The third page of the module collects relevant customer data such as account information, service address, and information regarding the refrigerator. The fourth page provides a summary of information and offers an opportunity to return to editing or click to submit the request. The final page confirms the collection date and customer information. It also provides an ATO number, which is unique to the appliance. This ATO number is used for tracking the specific appliance during its presence throughout the collection and recycling process. Screenshots of the online scheduling process are provided in Appendix L: Online Scheduling Module.

One notable difference between the web scheduling module and the call center is that web customers receive a confirmed collection date without being formally validated as Duke Energy residential customers with active and open accounts. That validation happens later behind the scenes through JACO's verification department. If a customer is not eligible, someone from JACO contacts them to explain the situation and to collect additional information as necessary. Typically eligibility issues arise based on typos or confusion about account names and addresses. Although it is possible that someone may think they are a Duke Energy customer when they are not. In those cases, people are redirected to their appropriate utility.

One issue that arose early in the Duke Energy program was that customers would complete the online scheduling form but fail to click the submit button. Without clicking submit, none of the information is saved or sent to JACO. As a result, the customer would not receive a confirmation, but they would erroneously believe that they had made an appointment. Then later they would phone the call center to ask why the collection truck never arrived. To mitigate this problem JACO implemented clear language on the last page of the scheduling form and a pop up message warning customers that they must click the submit button. JACO indicates that these steps greatly reduced the number of such errors. An example of the updated language is shown in Appendix K: Earned Media Examples.

While this technological fix appears to have alleviated the issue regarding unfinished online scheduling, integration between the web scheduling module and appointments made the call center remains imperfect simply due to human nature. A joint Duke Energy-JACO review of cancellation rates indicates that some customers who successfully complete an online enrollment subsequently decide to phone the call center to make an appointment that way as well. This results in a double booking and necessitates a cancellation of the extra pick up request. While not problematic from a customer service or an operational point of view, the extra cancellations are reflected in the cancellation rates discussed below.

Cancellation Rates

According to tracking records provided by JACO, the program had an overall cancellation rate of 23.0% in North Carolina and 22.8% in South Carolina during 2012 and 22.8% in North Carolina and an 18.9% rate in South Carolina during 2013. Both JACO and Duke Energy felt that these rates were higher than desired and expressed a preference for rates in the low teens or less.

To better understand the overall cancellation rate, JACO records seven different reasons for pick up cancellations via its call center. An additional ten types of reasons are tracked for driver-reported cancellations as shown in the table below.

Table 22. Reasons for Customer Cancellation

	Code #	Code Name	Definition
DRIVER	40	Non-working unit	Non-working units are not qualified
	41	Non-qualifying size requirement	Unit does not qualify due to being too small or large
	42	Missed appointment, customer not home	Customer missed appointment
	43	Cancel customer request	Driver informed by customer at home or on phone to cancel; no reason
	44	Emergency cancelation	Crew cancels due to illness, personal issue.
	45	Unable to arrive due to road conditions	Crew cancels due to weather, construction or other road blockage
	46	Reschedule appointment with operator	Customer tells driver they want to re-schedule
	48	Crew couldn't locate customer home, called and no answer	Crew could not find & could not reach customer for directions
	50	Cancel no clear path for removal of unit	Unit access blocked by materials or structure.
	51	Cancel due to safety risk	Removal risks injury
CALL CENTER	90	Cancel admin	Order removed from system. This occurs for multiple reasons, although usually when an order is marked incorrect. This typically happens during the QA process when a manager decides to remove the customer for customer service reasons.
	91	Cancel decided to keep	Customer changes mind - decides to keep unit
	92	Cancel reschedule customer to new date	Customer cancels due to schedule conflict.
	93	Cancel unit quit working	Non-working units are not qualified
	94	Cancel sold or gave the unit away	Customer sells or gives away
	95	Customer unable to be rescheduled	Re-schedule dates do not work for customer
	99	Customer found to be ineligible	Customer was found to not have service with the participating utility

The most common reasons for cancellation are because the customer missed the appointment (#42), the customer decided to keep the unit (#91), and the customer sold or gave the unit away (#94). According to JACO, the Duke Energy program's cancellation rates in these areas are higher than they typically see for other utility clients.

JACO attributes these higher cancellation rates to the length of time that customers have between the day they make the appointment and the day the unit is actually collected. Having two or three weeks is enough time to 1) sell the unit on Craigslist for more than the incentive amount, 2) decide to give the unit away, 3) decide to keep it, or 4) have the desire to get rid of it fade in importance. "We're probably not going to keep them from changing their minds directly, but decreasing the time interval would help to improve those numbers," explained one JACO representative. But the time interval is a function of the number of trucks that JACO can cost-effectively roll, and that depends on the number of units available on the collection route. "So,

one way to lower the cancellation rate is to make the phone ring with a more attractive incentive. As we schedule more appointments, we roll more trucks, and have closer appointment dates available," he said. Duke Energy and JACO are exploring this and other possibilities as a means of decreasing their cancellation rates.

TecMarket Works identifies these cancellation rates as an important area for improved program performance; not least because the marketing and scheduling teams have already effectively executed their assigned roles and obtained the customers' commitment to program participation.

Appliance Collection

JACO locates its primary collection facilities in the most populous and centrally located areas that it serves. Its collection facilities for the Carolina System are located in Charlotte, NC. Collection routes are optimized for efficiency and are finalized 48 hours in advance so that JACO's automated dialing system can provide customers with their four hour time window.

Trucks typically collect between 20 and 30 units in a day, depending upon the number of stops, missed or cancelled appointments, size of the units, and the distances to be covered. Crews usually have between four and six stops within a four hour time window. They call the next home on the route when they are 30 minutes away in order to provide one final reminder. If they are less than 30 minutes away from the next home on the route, such as when two pick ups are in nearby neighborhoods, they call as soon as possible. If they call ahead and no one answers, they leave a voice mail and proceed to the house. If no one is home when they arrive, they wait 15 minutes and then leave a "Sorry we missed you" door hanger that provides the mobile phone number of the crew and invites the customer to phone them. Depending upon the route, it may or may not be possible to revisit the customer later the same day to complete the collection. The crew also takes a photo of the house to document their visit and calls their supervisor to report the missed appointment.

If crews happen to finish their time window early, they can call the first customer in the next time window to see if they're available early. Otherwise, they need to wait unit the time window opens. Once crews complete their time window, they call to update their location manager. They also inform their managers about delays. The location manager updates the call center twice daily to ensure that CSRs have updated information.

Collection Practices

Upon arrival, crew members introduce themselves and show their Duke Energy photo identification cards. They also confirm they're in the correct location and then ask the customer to lead them to the unit so they can assess the best way to remove it from the home. Once they reach the unit, they visually inspect it to confirm that it is plugged in and cooling, emptied and defrosted, and that any water lines have been disconnected.

Although program requirements specify that collection crews will not move or alter items in customers' homes, crews can remove the doors from refrigerators if necessary to transport the item outside. Normally, however, they prefer to take the unit outside before they begin cataloging and dismantling it.

When the unit is loaded on the truck, the crew uses a pocket PC to record the:

- Unique ATO tracking number,
- Refrigerator model number,
- Unit color,
- Unit type (top or bottom freezer, side by side, etc.),
- Unit's amperage (located on model info plate),
- Unit location,
- Whether the unit's location was in air conditioned space,
- Whether unit was used 12 months per year or periodically,
- Whether unit is to be replaced or not.

Next they write the ATO directly onto the unit, along with the date, their personal initials, and the program ID for Duke Energy. Then they attach a sticker with a bar code that is scanned by the pocket PC. Lastly, they take a photograph of the refrigerator. Once everything is entered into the system, they ask the customer to verify the information and sign the pocket PC.

This signature releases the refrigerator into the legal custody of JACO. As filed, the program allows customers 18 years or older to leave a signed note releasing the unit to JACO. This enables JACO crews to retrieve the unit if the customer cannot be home during the collection, but this method is rarely used since leaving the unit unattended outside the customer's home places it a risk of being stolen by roving scrap collectors.

When the paperwork is complete, the crew begins to dismantle the unit while still at the customer's home in order to demonstrate to the customer that it is indeed being rendered inoperative. To do that, the crew knocks a hole in the side of the refrigerator with a hammer, cuts the power cord and the door gasket, and physically breaks the thermostat control switch.

Once everything has been completed at the customer's home, the crew continues on to the next address on the route, gradually working their way back to the central JACO warehouse. In virtually all areas of North Carolina and South Carolina, the collection trucks return to their central location at the end of the day. The one exception is in the Raleigh area where the crew offloads the day's units into a large storage container at a secure facility. Then once every 7 to 14 days, when the larger containers are full, they are transported to the central warehouse in Charlotte for dismantling.

When the trucks arrive at the JACO central dismantling facility the units are offloaded, counted, and checked in to ensure that all are accounted for. First, the bar codes stickers on each unit are scanned. This calls up the digital photo of the unit so the technician can confirm the ATO numbers on the refrigerators and in the JACO computer system. The physical units are also cross checked with 1) the end-of-day reports generated by the pocket PCs and 2) the route update reports to ensure that final counts are accurate. For instance, if a crew sets out to collect 20 units in a day and only returns with 18, the remaining two items will show as customer-cancelled appointments. If discrepancies arise, the units are set aside and the technician goes back through the extensive documentation process to verify the chain of custody to find the error.

No challenges or issues with collection were reported by any of the parties we interviewed. Two people did, however, make similar suggestions for process improvement. While JACO makes every effort to pick up all scheduled units, in rural areas some houses may occasionally be difficult or impossible to reach in the collection trucks due to their large size relative to height limitations caused by tree branches, weight restrictions on small bridges, and narrowness of country lanes and driveways. Therefore, those we spoke with requested that additional language be added to the FAQs or program requirements to better manage customer expectations about the accessibility of their properties. While a minor change perhaps, it may nonetheless help to improve customer satisfaction with the program.

In an interesting augmentation to their residential collection practices, Duke Energy and JACO indicated that they were in the process of establishing a retail partnership with Sears stores in the greater Indianapolis area to begin during the fourth quarter of 2013. Under this partnership, when Sears representatives deliver new refrigerators and freezers they will collect qualifying used units from eligible customers and bring the units to a central secure collection point, from which JACO can retrieve the units. All tracking details regarding the units are to be collected as if JACO representatives had originally picked up the units from customers. No units yet had been retrieved by JACO as of the time of this evaluation in November of 2013. Nonetheless, TecMarket Works considers this an innovative addition to the overall program design. We encourage Duke Energy to monitor progress in Indiana and if the effort proves effective there to consider expansion of the Sears partnership into the utility's Carolina System territories.

Crew Training and Quality Assurance

Because program participation in the Appliance Recycling Program waxes with warm weather and wanes with cooler weather, a greater number of employees are needed during the busy season. JACO adjusts its staffing levels accordingly. Its drivers and navigators must pass background and motor vehicle record checks. New staffers receive several days of training with a manager to learn the specific tasks involved and to competently explain the particulars of the Duke Energy program when interacting with customers. New employees are then paired with a more experienced partner to ensure that protocols are clear and followed consistently. Senior JACO managers hold weekly webinars with the location managers for each region to discuss operations, policies, and safety practices. The location managers, in turn, meet with their crews to pass along the information.

As one of the nation's leading appliance recycling firms, JACO holds its collection crews to high standards. To confirm that quality is maintained, every few weeks the location managers secretly shadow their crews, driving behind them to ensure that they are following traffic laws, parking appropriately, wearing designated gear and ID badges, and walking to the door together. After three or four customers, the manager retraces the route to speak with customers about their experiences with the crew. Employees are scored and managers discuss any necessary improvements. Duke Energy maintains the option to participate in the quality control efforts, but has not felt the need to engage in such field inspections.

Dismantling and Recycling

All dismantling and recycling activities are specific to JACO and not the responsibility of Duke Energy. Nonetheless they are briefly documented here to demonstrate Duke Energy's

compliance with its voluntary participation in the U.S. Environmental Protection Agency's (EPA) Responsible Appliance Disposal (RAD) program.

Once units have been checked into the warehouse, the dismantling process begins. Doors are disconnected; hardware and glassware is removed; refrigerants are collected; oils are drained; sheet metal is peeled off; and insulating foam is stripped and bagged. In all, JACO's recycling process recovers up to 95% of all refrigerator components for reuse, and it ensures that 100% of hazardous components—including the refrigerants, PCBs, mercury, and other toxic elements—are properly broken down and disposed of. Most of the remaining 5% of elements are also put to good use. For instance, while the fiberglass insulation inside the doors can't be recycled, it is shredded and used as fluff material to provide an air gap between landfill layers to create avenues for methane to escape.

All of JACO's processes are conducted to meet or exceed state and federal laws, as well as the more stringent RAD program guidelines. Furthermore, the program is designed so that while the recycling effort is conducted under the auspices of Duke Energy, the utility actual never comes into legal possession of the units. The units—and more importantly their hazardous elements—remain in JACO's custody from the time the customer signs the release until the constituent components have been broken down, sold, or dispersed to their upstream or downstream destinations. JACO uses revenues received from these sales to reduce program costs for Duke Energy.

When all steps in the dismantling process have been completed, the warehouse technician confirms that the unit has been recycled on a pocket PC. This signals JACO and Duke Energy that all requirements have been met and the incentive check can be processed for the unit associated with that specific ATO number.

Incentive Payments

The financial incentive levels for the program are currently set at $30 per unit for North Carolina and South Carolina customers. JACO is contractually required to send payments to customers within four to six weeks. This is the timeframe mentioned in program's promotional materials, but, in practice, most checks are mailed within two to four weeks. JACO handles payment processing and includes incentive documentation in its monthly billing to Duke Energy, whose product manager reviews the monthly data, reconciles any discrepancies with JACO, and approves the invoice.

No challenges or issues were reported with incentive processing or accounting. However, all parties that we talked to indicated that the incentive amount may need to be raised in order to help the program meet its collection goals. At $30 per unit, Duke Energy's incentive amount is at the low end of the "typical" financial range; the higher end being $50 per unit.

TecMarket Works considers introducing the program with a $30 incentive level to be a fiscally prudent step because it captures "the low hanging fruit" of willing customers and establishes a baseline for customer response levels. Moreover, as the correlation between response rates and marketing effectiveness is clarified, it becomes possible to identify market barriers to

participation. However, the lower incentive amount also limits the number of people willing to part with their working refrigerators and freezers.

According to those we interviewed, the two most prevalent barriers to increasing customer participation appear to be financial. The first involves the cost of a customer's time. If a prospective customer is earning $10 per hour and the program requires them to miss four hours of work in order to be home to recycle the unit, then a $30 incentive will not cover the cost of their time. Thus even if they want to recycle the unit, it may not make financial sense to do so.

The second barrier involves a psychological hurdle arising because some prospective customers cannot or do not distinguish between replacement costs and operating costs. Even if they can afford to stay home to recycle the unit, they may be more likely to hold onto it because they reason that it costs them less to keep it than to buy a replacement should they decide they want one; this despite the fact that the program marketing copy tells them that getting rid of the unit could save them up to $150 per year.

For both barriers, the larger the financial incentive, the more enticing the offer will be.

Another advantage of increasing the incentive is the potential reduction of freeridership, since the larger payments shift the ratio away from those who would have recycled their units anyway toward those customers now participating because they will receive the compensation.

As Duke Energy and JACO are aware, successful program participation levels are reached when three factors come into alignment: appropriate customers, effective marketing, and a desirable offer being made (consisting of the incentive amount and other attributes, such as timing, free collection, etc.). As discussed in the earlier sections above, the program management team is currently targeting those customer segments most likely to be interested in recycling their appliances, and the team has implemented a coordinated, multi-pronged marketing effort that is demonstrably generating customer awareness. While these two factors can and should be enhanced, increased program enrollments will also depend upon the amount of the financial incentive. Therefore, as the team considers how to best achieve its annual harvest goals, they may do well to consider the relative cost effectiveness of increasing the marketing spend per unit in order to reach more customers and improve awareness versus increasing the incentive paid per unit to make the offer more attractive to people who are aware of the program.

To assess the effectiveness of increased incentive levels, Duke Energy conducted a controlled test of 240,000 North Carolina and South Carolina customers, who were to be sorted into three groups of 80,000 customers each. The first group received a $50 incentive. The second group received a $40 incentive; while the third group continued to receive the offer for a $30 incentive and thus serve as the control. All other aspects of the program remained consistent for all three groups. The program test applied to all collections for the month of September 2013. Analysis of the results demonstrated that compared to the $30 incentive control group which had 377 participants, the $40 incentive group drew an additional 612 participants with an associated 162% lift in response. The $50 incentive group performed even stronger with 867 more participants than the control group and an associated 230% lift compared to response rates in the control group. Such results demonstrate that with all other aspects of the program remaining

consistent, higher incentive levels can lead to greater participation rates and therefore increased energy savings associated with the additional units collected. With this in mind, TecMarket Works encourages Duke Energy to consider the applicability of these results in its Carolina Systems service territories and to take steps to adjust incentive levels there if deemed cost-effective and appropriate. In these decisions, JACO's experience with similar utility programs may provide guidance as well.

Quality Assurance

As discussed previously in this evaluation, the call center representatives and collection crews are subject to random and scheduled reviews for quality assurance. JACO managers provide similar inspections at their recycling facilities to ensure protocols are followed, to assess tracking of captured materials, and to confirm metrics for compliance with all regulations.

Because Duke Energy places considerable stock in the importance of customer experience, JACO collection crews provide each home they visit with a mail-in, 10-question survey to ascertain customer satisfaction. While response rates are low, feedback is positive. According to customer satisfaction figures collected by Duke Energy, 88% of customers rate their overall program satisfaction as equal to or greater than 8 on a scale of 1 to 10. Likewise, the program enjoys a net promoter score of 91 out of 100, with 93% of participants rating the program as 9 or 10, meaning that they would recommend it to their friends and family. Net promoter scores above 50 are considered strong.

When the program was first starting Duke Energy also conducted a call-back survey with the first 10 percent of customers to join the program. After these customers finished the program, JACO made outbound phone calls to ask them to provide feedback about what was working well and what needed improvement. A similar call-back process remains available if the mail-in surveys or other quality assurance measures reveal a volume of complaints or otherwise draw scrutiny.

Data Tracking and Reporting

As noted in the marketing section above, the team uses unique URLs and "how heard questions" to track marketing effectiveness. These metrics are then compared with the numbers of appointments and units collected to provide an overall picture of the program's effectiveness.

Equally important to Duke Energy is the customer's participation in the program. To manage this, JACO tracks all interactions from the date customers first make contact to the day their unit is collected to the day they cash their incentive payment.

Appliance tracking is similarly robust. Once an appointment is scheduled, JACO consistently tracks all activities based upon the associated unique ATO number, so it can report on the unit's status from before it comes into the company's possession until it has been fully dismantled into its constituent parts.

For reporting purposes, JACO's call handling metrics, scheduled appointments, cancellations, and collections are all automatically uploaded to an internet accessible database that can be accessed by Duke Energy managers at any time. This customer experience dashboard provides a

multitude of ways for viewing data and reporting metrics, ranging from call handling times and available dates for appointments to reasons for cancellations and uncashed incentive payments.

No problems with data tracking or reporting were identified. However, Duke Energy and JACO indicated their respective IT departments had experienced challenges in aligning their computer systems to ensure fully functional data transfer and displays. Such challenges are to be expected during program start up, and while they caused some delays, they did not result in concerns regarding data integrity.

At the time of this report, the IT teams were focused on improving the reporting system to resolve an issue that was causing cancellation metrics to appear worse than they actually were. Under the original system, each new customer appointment resulted in a unique ATO number. While appropriate for tracking the appliance, this meant that if a customer called to reschedule, then a new ATO would be issued, which in turn made reschedules appear as cancellations if tracked by the ATO number. A system correction was underway at the time of our interviews.

Management Coordination and Communication

Each week the Duke Energy product manager, JACO's program manager, and RSE's account manager meet to discuss marketing performance, operations, strategy, and tactical changes. Specialists and other parties from each firm participate as appropriate. All parties consider their business relationships to be strong and positive with effective communication and a shared sense of teamwork toward a common set of goals.

Duke Energy expressed appreciation for the turnkey nature of JACO's programs. The product manager characterized JACO as "highly knowledgeable, open, fair, professional, and easy to work with." Furthermore, he indicated that JACO was meeting its service level agreements, despite appliance collection levels being lower than targeted.

For its part, JACO and its subcontractors described their Duke Energy counterparts as "able to see the big picture and handle details," "willing to try out and fund promising ideas" and even "they're my golden client." And of Duke Energy's product manager in particular they stated, "He's so dedicated that he even works on resolving issues when he's on his day off."

Program Changes Interviewees Would Like to See

We asked those we interviewed to suggest the changes that they would like to see made to the program. While managers are generally satisfied with the program, they are continually looking for opportunities for improvement. Their suggestions are noted below.

Based upon their experiences with many utilities around the nation, all parties that we spoke with from JACO and RSE expressed that incentive levels will need to be increased in order to meet projected goals. Duke Energy representatives also felt this would probably be necessary, but waited on the outcome of the incentive level testing in the Carolina System prior to making that determination.

While no challenges or issues with refrigerator collection were reported, two people suggested that customer expectations may be better managed by adding language about collection trucks being limited by accessibility of their properties.

Although no problems with data tracking or reporting were identified, a methodological approach was causing cancellation metrics to appear worse than they actually were because customers who cancelled their initial appointment were assigned a new ATO number when they rescheduled, thus making the numbers appear to be referring to different customers rather than the same person. A correction was underway at the time of our interviews.

Evaluation and Recommendations

Evaluation

Overall Duke Energy's Appliance Recycling Program is a well-conceived and well- managed energy efficiency program. Its marketing implementation successfully combines Duke Energy customer communications with paid advertising and creative public relations events that are effectively generating customer awareness and sign-ups for the program. Aside from a temporary, minor slip in call center answering times, phone-based customer support and scheduling are operating smoothly. Likewise, unit collections and dismantling operations are also functioning well with no reported issues. Moreover, the program managers and implementation teams communicate regularly and collaborate effectively as they work toward shared goals.

Yet despite this laudable performance, the program lags in its projected pick up rates for the combined Carolina System, bringing in 1,850 units (48%) toward a combined goal of 3,872 in 2012 and a total of 8,617 units (48%) between January and November 22, 2013 toward a goal of 18,038 for the entire 2013 year.

A portion of this may be ascribed to higher than desired cancellation rates of 22.8% in North Carolina and 18.9% in South Carolina since each appointment cancellation diminishes the program's marketing and scheduling effectiveness. But this can account for a few hundred collections at most, and thus does not appear to be a primary driver.

A successful program operates optimally when it targets the most appropriate customers with a carefully design marketing message and a compelling offer. Since the program's targeting and marketing efforts are operating well, the most apparent area for change seems to be the financial incentive offered for each unit collected. At $30 per unit, the offer does not appear be high enough to compel customers to relinquish their still-working refrigerators and freezers. Therefore, the program may need to consider raising the incentive level.

TecMarket Works commends Duke Energy on its testing of different incentive levels with its Carolina System customers in September of 2013 and the promising lift in collection rates arising from the increased incentive amounts. We encourage the utility and JACO to carefully analyze the results of those tests, and weigh the merits of increasing the incentive level versus investing additional program dollars in improved targeting and increased marketing spend per unit.

These steps and the suggestions noted below may help to increase program collections. However, we also ask Duke Energy to reconsider its original harvest projections in light of the program's performance during the initial months of operation. It may be that current performance appears to be underperforming because the initial goals were overly optimistic or because they were based on outdated study projections by the time of the launch of the program.

With these thoughts in mind we offer the following recommendations for improvement.

Recommendations

- Based upon the results of the September test, it appears that raising incentive amounts from $30 to $40 or $50 per unit will increase participation and help the program to reach its targeted goals in terms of collections and associated energy savings. This should be studied and compared with the effectiveness of increasing marketing spend per unit to make a wider audience aware of the program and its benefits.
- It seems logical that cancellation rates will diminish with a greater number of appointment time slots and with shorter time intervals between customer calls and pick up dates. However, that will remain an indirect effect until more customers begin making appointments. Therefore, Duke Energy and JACO should also take multiple actions to increase program enrollments and direct steps to reduce cancellations wherever possible.
- One means of decreasing missed appointment could be to collect email addresses from customers when the appointment is scheduled and then send email reminders in addition to the reminder phone calls.
- Because landlords represent the largest group of appliance purchasers, consider developing an aspect of the program that targets property management companies to encourage their participation either with collections of individual refrigerators that require replacement or via large scale replacements at one time. Such a move could increase the energy savings of the program, while providing landlords with cash offsets to replace inefficient refrigerators, making their rental units more attractive to tenants.
- To better reach its goals the program team may also consider expanding eligibility beyond residential customers to other types of buildings, including schools, offices, and industrial locations. Such an expansion would of course need to comply with cost-effectiveness tests and regulatory filing requirements.
- Adding to the HEHC survey a question about secondary refrigerators and freezers may serve as a means for generating leads to the ARP program.
- Consider taking advantage of Duke Energy's internal customer satisfaction and net promoter scores to develop an initiative that encourages program participants to refer their families and friends.
- Arranging joint promotions with municipal and private recycling firms to promote environmentally appropriate recycling may be a way to increase awareness at fairly low cost.

- Stay abreast of market factors that may affect the program, including new and use appliance dealer practices, supply and demand for used units, price of materials recovered, changing appliance efficiency standards, Energy Star program changes, technology improvements, and environmental regulations.

Appliance Dealer Interview Results

This section presents the results from interviews with new and used appliance dealers in North Carolina and South Carolina. The instruments can be found in "Appendix H: Used Appliance Dealer Survey Instrument" and "Appendix I: New Appliance Dealer Survey Instrument."

Survey Overview

By removing 10,467 refrigerators and freezers from the market in the Carolina System during the first fifteen months since program inception, Duke Energy's Appliance Recycling Program is unquestionably reducing the number of used units that are connected to its power grid. However, the program represents only one of multiple factors that are affecting the number of used units for sale in the marketplace. To better understand the market in which the program is operating, TecMarket Works sought to interview dealers of new and used refrigerators and freezers about the state of the market, the ARP program, and its effect on their businesses. The objective was to contact as wide a survey sample population as possible, including: national or regional retail chains, companies with multiple locations, small dealers operating from storefronts and repair shops, and charitable groups that sell donated items.

Between July 31 and August 22, 2013, TecMarket Works completed telephone interviews with 56 owners or representatives from new and used appliance dealers selling to customers within Duke Energy's service territories in North Carolina, South Carolina, Kentucky, Ohio, and Indiana. Of those, 22 operated in the Carolina System. Conversations ranged from less than five minutes to more than 30 minutes. Interview guides are shown in Appendix H: Used Appliance Dealer Survey Instrument and Appendix I: New Appliance Dealer Survey Instrument.

The sample list for the survey was collected via a geographic-area-specific internet search using Google, Craigslist, Yelp, YellowPages.com, CitySearch.com and other web resources. Using readily identifiable contact information provided on the internet, we contacted approximately 10 new and used dealers operating in each of Duke Energy's service territories. We also contacted representatives from national and regional firms operating in multiple states, such as Home Depot, Lowes, Sears, Best Buy, and HH Gregg.

On the whole, the appliance dealers that we spoke were reluctant to provide numbers regarding their businesses, although they were more forthcoming regarding operations and their perceptions of the supply and demand for used appliances. As a result, the survey sample obtained did not lend itself to reliable quantitative analysis. The interviews do, however, provide an insightful qualitative look at the state of the market from their perspective. Overall remarks from these interviews are combined below to render a big picture view, while state-specific comments are provided to increase understanding about each individual territory. Nonetheless, it is important for the reader to note the relatively the small sample sizes in this study.

How National Market Actors Effect Local Used Refrigerator Markets

Across the United States, the majority of *new* refrigerators are sold via national department stores like Sears, home improvement centers such as Home Depot and Lowes, and mass

merchants like Best Buy and Costco. A smaller percentage are sold by regional companies like HH Gregg or by independent retailers who often operate a single location.[11]

Our market research revealed no national firms that are selling *used* refrigerators in retail stores. While these high volume national retailers do not directly sell used appliances, they nonetheless influence the market for used refrigerators and freezers because their delivery drivers (employees or subcontractors) frequently collect used units from customers at the time they drop off new units. In previous years, a sizeable number of these used units were collected and resold at wholesale prices to local used appliance dealers. This practice provided a steady supply to local dealers in order meet market demands for less expensive units.

In recent years the supply of used units for resale in local markets has diminished as the largest market actors have adopted new policies. Some national firms, including Sears, Best Buy, and Home Depot have joined the U.S. Environmental Protection Agency's Responsible Appliance Disposal (RAD) program, and thus follow specific guidelines for the dismantling and recycling of all units they collect. Another national firm, Lowes, has taken a more measured approach, recycling some units, donating some units to charity groups for individual resale, and bundling others for resale to U.S. wholesalers or in foreign markets. Collectively these individual corporate actions have cut the number of used units available for resale in local markets by between 50 to 85 percent, according to estimates among the smaller dealers that we spoke with.

Duke Energy's collection of more than 10,000 units has been a contributing factor to this decline. However, several appliance dealers we spoke with indicated that they had noticed a reduction in supply prior to 2009. This decline was accelerated in 2010 by the federally funded Cash for Clunkers appliance rebate program. Since that time, virtually all parties we spoke with agreed that supplies of used refrigerators and freezers have continually diminished.

How Local Dealers Obtain Used Appliances for Resale

As ready supplies of secondhand refrigerators and freezers have dwindled, used appliance dealers have adopted different business strategies for obtaining and reselling units:

- **Continue to buy used units from retailers who'll sell them, and then mark up the units for resale.** This option appeared to be available via new appliance stores that also sell used units directly to retail customers.
- **Buy from wholesalers.** Lowes and HH Gregg continue to sell the used units that they collect when they drop off new units at customers' homes. But these are only sold to a select few wholesalers. Those wholesalers in turn sell to smaller dealers.
- **Buy from appliance auctions.** These events are held on a periodic basis and offer dealers the opportunity to inspect and bid on a wide array of units, specifically selecting what they want, such as a stainless steel French door unit, or an Amana side-by-side with water dispenser. Some auctions provide a seven day warranty on their units to give

[11] US Department of Energy, New Opportunities Multiply Savings: Energy Star Refrigerator Market Profile, Washington, DC: US Department of Energy, December 2009., source: http://apps1.eere.energy.gov/states/pdfs/ref_market_profile.pdf

dealers time to inspect them thoroughly upon returning to their places of business. However, with fewer used units available in general, auctions are becoming somewhat less common.

- **Buy by the truckload**. Many used appliance dealers reported receiving sales calls from "guys out of state" offering to sell them a "grab bag truckload" of working and nonworking units. A dealer in North Carolina described the arrangement: "In the last three loads I paid $9500, $10,800, and $12,000 per truckload. A few in each load worked. About two thirds were repairable in the first and only about half in the other loads. The rest I use for parts or sell for scrap metal." While another dealer complained, "Their prices keep going up and my profits are going down as they try to pass off more of their junk on unsuspecting dealers." Reliable quality or not, this option is only available to businesses with sufficient capital and the resources to purchase and repair nonworking units.
- **Obtain more used units from individuals.** This was the most common strategy used among dealers we spoke with. It had three variations: charging people to pick up units, accepting or collecting units at no charge, and paying people for their working or nonworking units. Increasingly, people are recognizing the value of their used appliances and are charging accordingly. Craigslist.org was the most frequently cited source of individual transactions.
- **Shift revenue streams to focus less on sales of used units and more on repair services.** This was another common strategy, particularly among those dealers who indicated that their supplies of used units had been reduced by 80 percent or more. However, this option was not without its challenges since the price of used parts has also risen as fewer used units from which to draw upon have been available.
- **Switch to sales of new units.** A number of dealers indicated that they sold both new and used units. For them, shifting sales attention was fairly straightforward. However, this option appeared to be unattractive or unviable to the majority of dealers who only sold used units.
- **Buy from other used appliance dealers that are going out of business.** One business's demise is another's opportunity. More than one dealer we spoke with said he looked for others dealers who wanted to liquidate their stocks.

How Dealer Business Models Influence Perceived Effect of the Program

The choice of business model seemed to affect the level of impact that the changing market is having upon their businesses, and hence the perceived effect of Duke Energy's program as well. Those dealers who have direct supply contracts with Lowes or HH Gregg, with wholesalers who buy from these larger chains, and those dealers who have sufficient capital to buy in large quantities, generally continue to do well. While dealers who depend upon single purchases from individuals find fewer and fewer units available and thus consider Duke Energy's program to be having more of an effect on their business. Yet even among those dealers who buy predominantly from individuals, the impacts attributed to the program appear to vary based upon whether the dealers sell older, inexpensive units or more costly units that are only a few years old. The higher the prices these dealers pay for the units and sell them for, the less effect Duke Energy's ARP appears to have on their businesses. Conversely, smaller businesses are being

adversely affected by a variety of market factors, of which the Duke Energy program is one. These businesses find themselves facing a need for additional capital, a change in business model, or the prospect of going out of business. However, because customer demand for less-expensive used units remains high, the net effect appears to be that as the market continues to shift fewer companies will be selling used units in the future.

State Specific Dealer Comments

Among the 22 appliance dealers that we spoke with in North Carolina and South Carolina, half of them sold only used units. Among those that sold new units, the percentage of new unit sales to used unit sales varied from 20% new unit sales to 100% new units (no used appliance sales at all).

Effect on Dealer Businesses

Among the appliance dealers we talked with, 65% of respondents said were aware of the Duke Energy program. When it came to the program's impact on their businesses their responses ranged from: "It's cutting our throats" from a small used appliance dealer to "No real effect" from new appliance dealers. Not surprisingly, opinions varied depending upon the dealers' business models and how reliant they were on a steady stream of inexpensive used appliances from individuals in order to stock their stores. Quotes from the conversations are shown below.

- *It has reduced our business by 85-90%.*
- *It's cutting our throats. It has cut our business by 75%.*
- *Our business is down by 70%.*
- *They're putting me out of business. If this continues within two years I'll be gone. I just bought eight refrigerators off a guy who closed his doors last week. It's bad. Duke may mean well keeping things out of the landfill, but there are better ways to do things. People need inexpensive refrigerators and freezers. They can't afford new ones.*
- *So that's what going on. In the past few months we've had no used refrigerators to sell.*
- *ARP has had a huge impact. In last 18 months the number of used units available to be purchased from individuals has plummeted. We basically can't find units to be sold in the $200 range, but $500 plus units can still be found on Craigslist. Basically, it's driven up the price of used units. Since our costs are going up so are the prices we sell at. A typical refrigerator has gone from $179 to $229 in 18 months.*
- *I don't think there's a real effect. Other changes in the market are more significant. Overall there are fewer used units available than there used to be. You can't get units for free anymore so we buy used units from wholesalers now. This means that more people with moderate incomes can't afford new units since they don't have the cash or the good credit. It also means it's getting harder in business, but it's better business for those of us remaining if we are good business people.*
- *Yes, it has cut down on the number of units available from individuals, especially the free donations of units that people wanted to get rid of. It's also prompted wholesalers to raise their prices by $20-$30 per unit. So we've had to raise our prices too. We tried not to, but eventually we need to pass along the costs.*
- *Duke's program is the least of our worries. Biggest impact is not Duke, but policies by Lowes, Home Depot, HH Gregg, and others who recycle old units. They have teams that collect and track units to ensure that they are decommissioned.*

- *It's hurt us, but the big box stores are hurting us worse.*
- *I can't say. I don't think it is Duke. It's mostly companies like Lowes and others. We used to buy from them but now Lowes gives all their used units to Habitat for Humanity. They donate so many that Habitat can't sell them all. They just scrap the ones they don't sell. We tried to buy their extras but they wouldn't sell to us.*
- *I can't say how much it's hurting us as a thrift store. People will always make donations, but the number of people doing so is down. But a program like that will definitely squeeze small appliance businesses. It chokes their supply. We sell such a variety of things that the effect is less noticeable.*
- *It's not affecting us much. We buy from [wholesale] dealers so our supply seems pretty steady. But it might cut down on the number of units available from individuals.*
- *I don't think it affects us since we only sell new. But if there are fewer used units then there are fewer cheap units that people can afford to buy. In my 16 years of experience, I find that customers think about the purchase price and not the operating cost.*
- *It's had no impact. We buy mostly from wholesalers. When we buy from individuals we usually buy nicer units and pay people $150-$200 so it's no real contest with Duke's $30 haul away price.*
- *No effect. It's not a problem since we buy inoperable units and repair them.*
- *No impact. We only sell used units if they're repossessed. So Duke's program isn't a factor.*
- *I've only been in the job for weeks, but looking back in the computer system it shows little impact* [Note: She didn't say how far back in the records were checked]. *I think it's a good idea since it saves energy.*
- *No impact.*

These responses ran in close parallel with their observations about ARP's impact on the supply of used units. Those dealers who purchased from individuals noticed a scarcity of available units, while those who obtained theirs from other sources were less affected. Among those who were willing to cite numbers, the supply of used units seems to have diminished by between 75% and 100%, meaning for some stores three out of four units are no longer available for sale, while at others there is no remaining stock at all. Dealer comments are shown below:

- *Between Duke and the big box stores, they've pretty much dried up the number of refrigerators coming from individuals.*
- *You can't get used units hardly at all anymore. I used to sell 25-30 per month and keep that many on the floor. Now I have four.*
- *Overall, a few years ago we could sell five to 10 used units per week. Now it has been six weeks since any unit has even been available. There are just so few used units on the market.*
- *We used to get in four to six used units per week. Now get maybe one or two per week.*
- *There just aren't very many used units available anymore.*
- *I don't know the number, but there are many fewer units available.*
- *We mostly get used units from individuals, and they just are not available anymore.*
- *It's dramatically cut down on our supply of used units.*

- *Probably little impact since the people who donate are either unaware of ARP or would donate anyway.*
- *There are almost no more used units that we can pick up.*
- *Supply isn't a problem for us since we buy inoperable units and repair them.*
- *We only sell used units if they're repossessed. So Duke is not a factor in our used supply.*
- *We buy mostly from wholesalers so we're not affected.*
- *Since we buy from [wholesale] dealers our supply seems pretty steady.*
- *People will always make donations, but the number of people doing so is down. I can't say how much.*
- *No significant effect on our supply.*

Dealers of new appliances agreed the program was having little to no influence on new unit sales.

All used dealers that we spoke with agreed that demand for used refrigerators and freezers remains steady, while supplies dwindle. As a result, prices are rising. Some dealers indicated that their customers were unwilling or unable to pay the additional expenses. Yet overall, 86% of dealers indicated that they felt they could sell more used units if they were available. Their verbatim replies are shown below.

- *We're turning people away every day. Today I turned away three people before lunch who wanted to buy a refrigerator. And that's not unusual.*
- *Overall, demand for used units is higher than supply. It's gotten so that poor people are renting units since they can't afford to buy new ones.*
- *It's having no effect on demand. Poor people still need units they can afford.*
- *Demand is a strong as ever. But people are poor so I can't raise my prices. They can't afford to pay more. So my margins go down.*
- *Demand is the same, but our customers are not willing to pay more for used appliances. So small businesses like us are getting squeezed.*
- *Demand is the same, but supply is less. So prices are up. We used to pay $15-20 per unit. Now we need to pay $85-90, but we can't pass all the costs onto to customers since they can't pay the difference. We're selling used units at $189 and up.*
- *Demand is stronger than ever, since there aren't as many available.*
- *We can sell any used unit we have.*
- *It's driven up prices.*
- *There's plenty of demand for used units.*
- *We have steady demand.*
- *Demand is steady, but I think Duke's program has an indirect impact.*
- *Demand is about the same. (3)*
- *The program should drive demand up.*
- *I wouldn't know since we sell new units.*

Appliance Dealer Business Practices

Among the appliance dealers who sell used units, only two would only accept working units. The others accept units in a variety of conditions, ranging from needing minor hardware fixes to more

involved electrical and mechanical repairs. As may be expected in any business, the dealers must weigh the unit's purchase price and eventual sales price against the cost of used replacement parts and the amount of labor involved. While that arithmetic varies, dealers agreed that it was not economical to repair failed compressors or leaking refrigerant systems. Actual comments about the condition of units that they'll accept are shown below.

- *We only take working ones.*
- *We only accept working units, but sometimes nonworking ones are dropped off.*
- *Mostly the ones we get work. Some need repairs.*
- *A few work. Mostly we refurbish and sell them. We prefer models 10 years old or less, but we'll take older units if they're in good enough condition.*
- *We like them working, but we'll take them anyway we can and then fix them.*
- *We accept them even if they're not working. They can be fixed.*
- *Most units seem to need minor $10 parts and 15 minutes of refurbishing.*
- *We mostly only want them in working condition, but we will do minor repairs.*
- *We take them broken and repair them.*
- *We take broken units and fix what's necessary.*
- *We prefer gently used appliances.*
- *I like them to be working. But I usually take broken ones and repair them.*
- *We prefer working units, but we'll take broken units and fix them.*
- *Seems like they're mostly broken but repairable.*
- *Anything goes.*

While the actual repairs on any given unit naturally depend upon its condition, the steps that dealers take to prepare used units for sale are fairly consistent: They assess the working and ascetic condition of the unit, make necessary mechanical repairs, clean, disinfect, and occasionally kill any insects that might be in, on, or under the unit.

As business people, the dealers expressed consistent confidence that if they placed a unit on the sales floor then they could sell it. The primary reason for not selling units had to do with the cost of repairs prior to placing it up for sale. If the units could not be sold, dealers opted for one of three paths. The first is to save the unit for spare parts. Selection of this option tended to depend upon the dealer business model and upon the amount of warehouse space available for storing nonworking units. The second option is to sell the non-functioning unit for scrap metal. Dealers reported that nonworking units typically brought them $10-25 at current prices. The third option is to give the nonworking unit away, typically to scrap collectors willing to pick up the unit. No used appliance dealers we spoke with indicated that they recycled non-working units.

Among the new appliance dealers we spoke with all offered to collect old refrigerators and freezers when dropping off new appliances at customer homes. When asked what they did with the units that they'd collected, one resold the units, one gave the units away for scrap, and three national chain stores indicated the collected units were dismantled and recycled.

Evaluation and Recommendations

Evaluation

While new and used appliance dealers were reluctant to discuss the quantitative aspects of their businesses, they did offer well-informed insights into the state of the market for used refrigerators and freezers and varied opinions on the affect that the Duke Energy program was having on their businesses.

Drawing upon their collective feedback and supplemental research, TecMarket Works concludes that market volume for used refrigerators has been declining for a number of years due to a number of factors including the practices of national retailers, federal programs, and scrap metal prices. Having collected more than 10,000 used units in the Carolina System since starting in 2012, the Duke Energy program is helping to accelerate changes set in place by these other market forces.

Taken together, these myriad factors have served to greatly cut supplies of used refrigerators and freezers to the point that prices for used units and replacement parts are rising and customers who desire to purchase used units are being turned away. Despite this, the program appears to be having little or no noticeable effect on new unit sales.

With this in mind we suggest the following ideas to help increase program enrollments.

Recommendations

- Duke Energy may be able to increase its collections by exploring a retailer-utility partnership for recycling refrigerators and freezers at the time of new unit delivery, such as its new relationship with participating Sears stores in the greater Indianapolis area that launched in the fourth quarter of 2013. Details of such a partnership in the Carolina System would need to address the potential for reducing Duke Energy's net to gross ratio through the collection of non-working unit.

  In theory, the potential for such an arrangement exists among all new appliance dealers who collect older units, with the greatest opportunity lying in those companies that sell the largest number of units. Retailers who are already participating in the EPA's RAD program, such as Home Depot, and Best Buy may be ready partners for joint promotions and coordinated collections. While midsize companies that collect older units as a service to their customers may also represent possible partners. The program may be a more challenging "sell" at firms, such as Lowes, HH Gregg and others, which generate revenue from the used units that they collect.

- Duke Energy may also be able to increase its collection numbers by new appliance dealers with point of sale promotion materials to encourage them to mention the program to customers shopping for new units.

- Also consider accepting units from and paying incentives to used appliance dealers who are willing to recycle working units via the program instead of reselling them.

- The market for used appliances is influenced by a wide number of factors and continues to change with time. Thus it may be helpful to plan a follow up study of the marketplace

within a few years in order to understand and appreciate those changes are influencing customer expectations, willingness to participate, and satisfaction with the program.

Participant Survey Results

This survey focused on customers who, according to program tracking records, recycled a refrigerator and/or freezer through the Appliance Recycling program. Surveys with a total of 160 participants who recycled 82 refrigerators and 91 freezers (including thirteen participants who recycled multiple units) were completed via telephone by TecMarket Works' staff. The distribution of units recycled by survey respondents is shown in Table 23.

Table 23. Units Recycled by Surveyed Customers

Units	All survey respondents (N=160)	
	N	%
Recycled one refrigerator	71	44.4%
Recycled one freezer	76	47.5%
Recycled two refrigerators	2	1.3%
Recycled two freezers	4	2.5%
Recycled one refrigerator and one freezer	7	4.4%

Characteristics of Recycled Units: Refrigerators

Customers who recycled refrigerators were asked whether the unit(s) they recycled through the program were their primary (main) or secondary (spare) units. A little more than half of the refrigerators recycled by these customers were secondary or spare refrigerators, as seen in Table 24: out of 82 refrigerators recycled by survey respondents, 37 (45.1% of 82) were main units and 45 (54.9% of 82) were secondary units. There is no equivalent question about freezers, since all freezers are considered secondary units to the household refrigerator (i.e., almost every home has a refrigerator, and some have a stand-alone freezer in addition to the refrigerator, but it is assumed that no one has a freezer without a refrigerator).

Table 24. Use of Refrigerators Recycled by the Program

Units	All respondents who recycled refrigerators (N=80)		Number of units recycled	
	N	%	Main	Secondary
Main refrigerator (kitchen)	36	45.0%	36	0
Spare/secondary refrigerator (not in kitchen)	42	52.5%	0	42
Recycled primary and secondary refrigerator	1	1.3%	1	1
Recycled two secondary refrigerators	1	1.3%	0	2
		Totals:	37	45

As seen in Table 25, a plurality of 40.0% (18 out of 45) of the secondary refrigerators recycled by survey respondents were kept in the garage, while another 28.9% (13 out of 45) were kept in basements.

Table 25. Location of Secondary Refrigerators

Location	All recycled secondary refrigerators (N=45)
Garage	40.0%
Basement	28.9%
Utility room / storage area	6.7%

Porch/patio	4.4%
Laundry room	4.4%
Rental property	2.2%
Barn	2.2%
Other unique (listed below)	11.1%

Five respondents kept their spare refrigerators in unique locations, which are listed below.

- *Back hall*
- *Car port*
- *Extra room*
- *Game room*
- *Pool house*

As Table 26 indicates, a minority of secondary refrigerators are kept in rooms that are heated in the winter (28.9% or 13 out of 45) or cooled in the summer (26.7% or 12 out of 45). Assuming that all main refrigerators are kept in areas of the house that are heated and cooled[12] (in or by the kitchen), overall more than half of the refrigerators recycled by surveyed customers were kept in rooms that are heated (61.0% or 50 out of 82) and cooled (58.5% or 48 out of 82).

Table 26. Refrigerators Kept in Rooms that have Heating and Cooling

	Main refrigerators (N=37)	**Secondary refrigerators** (N=45)	**Total** (N=82)
Stored in a room that is heated in the winter	100.0%	28.9%	61.0%
Stored in a room that is cooled in the summer	97.3%[13]	26.7%	58.5%

Although survey respondents did not know the ages of about one recycled refrigerator in four (23.2% or 19 out of 82), at least a third of recycled units (32.9% or 27 out of 82) were 20 years old or older. Only ten respondents (12.2% of 82) recycled units that were less than 10 years old.

Recycled refrigerators that were used as spare or secondary units tend to be somewhat older: the mean age of recycled secondary units was 22.7 years, while the mean age of recycled primary units was 18.0 years (this difference is not statistically significant). Only 5.4% (2 out of 37) of the primary units recycled were 35 years or older, compared to 15.6% (7 out of 45) of the secondary units (this difference is significant at $p<.10$ using student's t-test).

[12] There was one surveyed customer who recycled a main refrigerator (1.3% or 1 out of 80) who does not have a cooling system for their home. All surveyed respondents have heating systems for their homes.
[13] One customer who recycled their main refrigerator does not have a home cooling system, thus only 97.3% (36 out of 37) of main refrigerators are kept in rooms that are cooled in the summer. All surveyed customers have home heating systems.

Table 27. Age of Recycled Refrigerators

Age of recycled refrigerator	Main refrigerators (N=37)	Secondary refrigerators (N=45)	Total (N=82)
Less than 10 years old	13.5%	11.1%	12.2%
10 years to 14 years old	21.6%	15.6%	18.3%
15 years to 19 years old	13.5%	13.3%	13.4%
20 years to 24 years old	13.5%	8.9%	11.0%
25 years to 34 years old	10.8%	11.1%	11.0%
35 years or older	5.4%	15.6%	11.0%
Don't know	21.6%	24.4%	23.2%

Secondary refrigerators recycled through this program have been used as secondary units for an average of 11.1 years, and the median length of time is ten years. The distribution of time being used as a spare refrigerator is shown in Table 28.

Table 28. Length of Time that Secondary Refrigerators have been Used as Spares

Length of time	All recycled secondary refrigerators (N=45)
Less than a year	6.7%
1 year up to 3 years	6.7%
3 years up to 6 years	15.6%
6 years up to 10 years	11.1%
10 years up to 15 years	17.8%
15 years up to 25 years	22.2%
25 years or more	6.7%
Don't know	13.3%

Table 29 shows that most (77.8% or 35 out of 45) secondary refrigerators were plugged in and running all of the time. Assuming that all main refrigerators are also plugged in and running all of the time, overall 87.8% (72 out of 82) of refrigerators recycled by surveyed customers were plugged in and running all of the time. Only one recycled refrigerator (1.2% of 82) was not plugged in and running before it was recycled.

Table 29. Refrigerator Usage

Refrigerator usage	Main refrigerators (N=37)	Secondary refrigerators (N=45)	Total (N=82)
Plugged in and running all the time	100.0%	77.8%	87.8%
For special occasions only	0.0%	13.3%	7.3%
During certain months of the year only	0.0%	6.7%	3.7%
Not plugged in and running	0.0%	2.2%	1.2%

Customers who said they used their spare refrigerators "for special occasions only" estimated that their units were plugged in and running for an average of about 1.5 months per year (ranging from "less than a month" up to 3 months). Among customers who said they used their spare refrigerator "during certain months of the year only", units were plugged in and running an average of 5.3 months during the past year (ranging from two to eight months). Among the nine spare refrigerators plugged in and running less than "all the time", only one (11.1% of 9) was

reported as mainly being used in the summer (four other units were being used primarily during "other times of the year (not summer)", three were used during "a mix of both summer and other times of the year", and one respondent is not sure how often their unit was used).

Table 30 indicates that exactly half (50.0% or 41 out of 82) of refrigerators recycled by surveyed program participants were in good working order. A little over a third of recycled units were working but in need of minor repairs (35.4% or 29 out of 82) and about one in eight were working but with significant performance problems (12.2% or 10 out of 82). Only one spare refrigerator recycled by a surveyed participant (1.2% of 82) was not in working order, although units are supposed to be functional in order to be recycled under this program. This represents a very small fraction of the units and does not appear to be a significant issue.

Even though they tend to be newer than secondary units (see Table 27), recycled refrigerators that were used as "main" kitchen units were more likely to have performance issues; only 40.5% (15 out of 37) of main units are described as being in good condition, compared to 57.8% (26 out of 45) of spare and secondary units (this difference is significant at $p<.10$ using student's t-test).

Table 30. Condition of Recycled Refrigerators

Condition of recycled refrigerator	Main refrigerators (N=37)	Secondary refrigerators (N=45)	Total (N=82)
Worked and was in good physical condition	40.5%	57.8%	50.0%
Worked but needed minor repairs	43.2%	28.9%	35.4%
Worked but had significant performance problems	16.2%	8.9%	12.2%
It did not work	0.0%	2.2%	1.2%
Don't know	0.0%	2.2%	1.2%

Characteristics of Recycled Units: Freezers

Most freezers recycled by surveyed customers were kept in either the garage (30.8% or 28 out of 91) or the basement (26.4% or 24 out of 91), as seen in Table 31.

Table 31. Location of Recycled Freezers

Location	All recycled freezers (N=91)
Garage	30.8%
Basement	26.4%
Utility / laundry room	9.9%
Porch / patio	7.7%
Outdoor shed / building	7.7%
Kitchen	6.6%
Workshop	2.2%
Unique locations (listed below)	8.8%

Eight respondents kept their freezers in unique locations, which are listed below.

- *Den*
- *Family room*

- *Insulated carport converted to an additional storage room*
- *Lower level, not basement*
- *Mudroom*
- *Passageway between kitchen and utility room*
- *Spare bedroom*
- *Washroom*

Table 32 indicates that a minority of recycled freezers were kept in rooms that were heated in the winter (42.9% or 39 out of 91) or cooled in the summer (also 42.9% or 39 out of 91).

Table 32. Freezers Kept in Rooms that have Heating and Cooling

	All recycled freezers (N=91)
Stored in a room that is heated in the winter	42.9%
Stored in a room that is cooled in the summer	42.9%

Nearly half of the freezers recycled by survey respondents (42.9% or 39 out of 91) were 25 years old or older. Only five respondents (5.5% of 91) recycled units that were less than 10 years old, as seen in Table 33.

The median age of freezers recycled by surveyed program participants is 25 years, and the mean age is 26.7 years; the mean age of all refrigerators recycled (main and secondary combined) is 20.5 years (this difference is significant at $p<.10$ using student's t-test).

Table 33. Age of Recycled Freezers

Age of recycled freezer	**All recycled freezers** (N=91)
Less than 10 years old	5.5%
10 to 14 years old	6.6%
15 to 19 years old	13.2%
20 to 24 years old	16.5%
25 to 34 years old	20.9%
35 years or older	22.0%
Don't know	15.4%

As seen in Table 34, the majority of freezers recycled by survey respondents were plugged in and running all of the time (90.1% or 82 out of 91), though 7.7% (7 out of 91) were not plugged in and running at all.

Table 34. Freezer Usage

Freezer Usage	All recycled freezers (N=91)
Plugged in and running all the time	90.1%
For special occasions only	2.2%
During certain months of the year only	0.0%
Not plugged in and running	7.7%
Don't know	0.0%

Among the two surveyed customers who used their freezers "for special occasions only", the average amount of usage for the recycled units was 1.5 months out of the past 12 months. Both ran their freezers sporadically throughout the entire year, rather than seasonally.

The majority of freezers recycled by surveyed program participants are described as being in good physical condition (69.2% or 63 out of 91), as seen in Table 35. Only eight freezers (8.8% of 91) were described as having significant performance problems, while one freezer (1.1% of 91) was non-functional.

Table 35. Condition of Recycled Freezers

Condition of recycled freezer	All recycled freezers (N=91)
Worked and was in good physical condition	69.2%
Worked but needed minor repairs	20.9%
Worked but had significant performance problems	8.8%
It did not work	1.1%
Don't know	0.0%

Program Awareness and Participation

All of the customers responding to the survey (100% of 160) recall participating in the Appliance Recycling program.

About two-thirds of customers surveyed (68.8% or 110 out of 160) first became aware of the Appliance Recycling program through an insert with their monthly bill. Advertising was mentioned by about a quarter of survey respondents (28.1% or 45 out of 160), and word-of-mouth from family, friends, neighbors and coworkers was mentioned by fewer than one respondent in ten (6.3% or 10 out of 160).

Customers who recycled one freezer are the most likely to have learned about the program from advertising (35.5% or 27 out of 76, significantly higher than those who recycled a refrigerator at $p<.05$ using student's t-test). Customers who recycled one refrigerator are more likely to mention recommendations from friends, family and neighbors (9.9% or 7 out of 71) and the Duke Energy website (7.0% or 5 out of 71) compared to those who recycled freezers (significant at $p<.05$ using student's t-test). Customers who recycled multiple units are the most likely to have learned about the program from a bill insert (92.3% or 12 out of 13, significantly higher than the other groups at $p<.05$ using student's t-test).

Table 36. Source of Awareness of the Appliance Recycling Program

Source of Awareness	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Insert with monthly bill	67.6%	65.8%	92.3%	68.8%
Advertisement on radio, TV or newspaper (listed below)	21.1%	35.5%	23.1%	28.1%
From a friend, family, neighbor, coworker	9.9%	3.9%	0.0%	6.3%
Saw info at Duke Energy website	7.0%	1.3%	0.0%	3.8%
From appliance dealer or retailer (listed below)	1.4%	1.3%	0.0%	1.3%
Email from Duke Energy	0.0%	1.3%	0.0%	0.6%
Some other way (listed below)	1.4%	6.6%	0.0%	3.8%
Don't know / not specified	1.4%	7.9%	0.0%	4.4%

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

Forty-five survey participants (28.1% of 160) mentioned advertising as the source of their awareness of the recycling program. These 45 responses are categorized and listed below; most reported that they learned about the program from television.

Television (N=27)

- *WSOC-TV channel 9 (Charlotte)* (N=2)
- *WXII-TV channel 12 (Winston-Salem)* (N=2)
- *WBTV-TV channel 3 (Charlotte)*
- *WYFF-TV channel 4 (Greenville)*
- *WFMY-TV channel 2 (Greensboro)*
- *Television news report (unspecified)*
- *Television advertisement (unspecified)* (N=5)
- *Television (unspecified)* (N=14)

Newspapers (N=13)

- *Charlotte Observer* (N=4)
- *Spartanburg Herald-Journal* (N=3)
- *Newton Observer*
- *The Franklin Press*
- *Greenville News*
- *Newspaper ad (unspecified)* (N=3)

Radio (N=1)

- *Radio*

Multiple sources (N=4)

- *Newspaper ads and TV* (N=2)
- *Anderson Independent newspaper and TV*
- *TV or radio, I can't remember.*

Two survey participants (1.3% of 160) mentioned appliance dealers or retailers. These two responses are listed below.

- *Lowes*
- *H.H. Gregg*

Six survey participants (3.8% of 160) named "other" sources of awareness. These six responses are listed below.

- *Something by itself in the mail (not included with the bill).*
- *I saw an advertisement for it along with my monthly electronic bill.*
- *I saw it at a retailer's website while doing online research on new freezers: maybe Plaza Appliance?*
- *I saw information about this program on my Home Energy Report (MyHER).*
- *Through the MyHER low-income program.*[14]
- *I know someone who works for Duke.*

Table 37 shows sources of awareness of the Appliance Recycling program by state. Customers in South Carolina are more likely to mention advertising (34.4% or 21 out of 61) and less likely to mention word-of-mouth from friends, family and neighbors (1.6% or 1 out of 61) compared to North Carolina customers (differences significant at p<.10 or better using student's t-test).

Table 37. Source of Awareness of the Appliance Recycling Program

Source of Awareness	North Carolina (N=99)	South Carolina (N=61)	Total (N=160)
Insert with monthly bill	69.7%	67.2%	68.8%
Advertisement on radio, TV or newspaper (listed below)	24.2%	34.4%	28.1%
From a friend, family, neighbor, coworker	9.1%	1.6%	6.3%
Saw info at Duke Energy website	4.0%	3.3%	3.8%
From appliance dealer or retailer (listed below)	2.0%	0.0%	1.3%
Email from Duke Energy	0.0%	1.6%	0.6%
Some other way (listed below)	2.0%	6.6%	3.8%
Don't know / not specified	4.0%	4.9%	4.4%

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

Customers' Reasons for Recycling Refrigerators

Figure 9 shows the reasons surveyed customers who participated in the Appliance Recycling program give for disposing of their refrigerators. Nearly a third (overall 30.0% or 24 out of 80) of participants mentioned that the unit they recycled was not working properly, and for about a

[14] This survey respondent said that they learned about Appliance Recycling from a low-income program. When asked which program, they identified My Home Energy Report (MyHER) although participation in the MyHER program is not based on income.

quarter of surveyed refrigerator recyclers (23.8% or 19 out of 80) this was the main reason for their participation in the program. Two more reasons were given by more than 20% of customers who recycled refrigerators: the unit was a spare that was not used much or at all (overall 31.3% or 25 out of 80) and wanting a newer unit with more modern features (26.3% or 21 out of 80). Wanting to save energy is the only other reason mentioned by more than 10% of respondents who recycled refrigerators (overall 17.5% or 14 out of 80). Only one customer mentioned the incentive money (1.3% of 80), and for this customer it was not the main reason why they recycled their refrigerator.

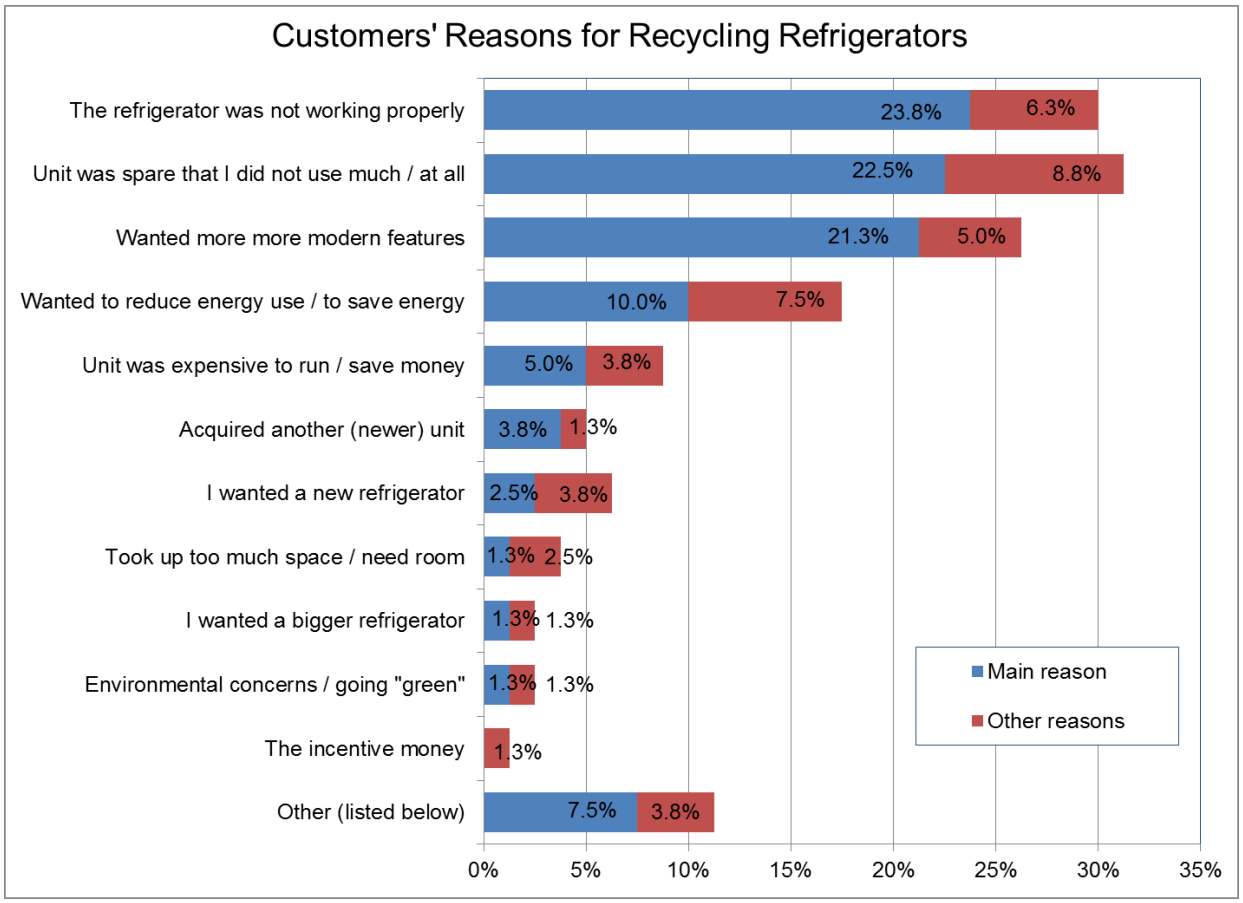


Figure 9. Customers' Reasons for Recycling Refrigerators (N=80)

Nine survey participants who recycled refrigerators named "other" reasons for participating in the program. These responses are listed below; most of these other reasons are aesthetic (matching colors with other appliances or rust spots).

<u>Main reasons (N=6)</u>

- *There was an odor couldn't get rid of after a three day power outage.*
- *We were matching our appliances in our newly purchased home.*
- *I needed a different color refrigerator. I wish I had my old refrigerator back.*
- *The refrigerator had rust spots on the door*
- *It had rust.*
- *I am moving to a nursing home.*

Other reasons (N=3)

- *There were growing rust spots on the outside of the refrigerator.*
- *We wanted our appliances to match.*
- *I wanted a different color.*

Figure 10 shows the reasons for disposing of freezers given by surveyed customers in the recycling program who recycled freezers. A majority (overall 55.2% or 48 out of 87) mentioned that the recycled freezer was a spare unit that was not used much or at all, and a plurality of 41.4% (36 out of 87) said this was the main reason. Three other reasons were given by more than 20% of survey participants who recycled freezers: wanting to save energy (overall 40.2% or 35 out of 87), wanting to save money (26.4% or 23 out of 87) and the unit was not working properly (20.7% or 18 out of 87).

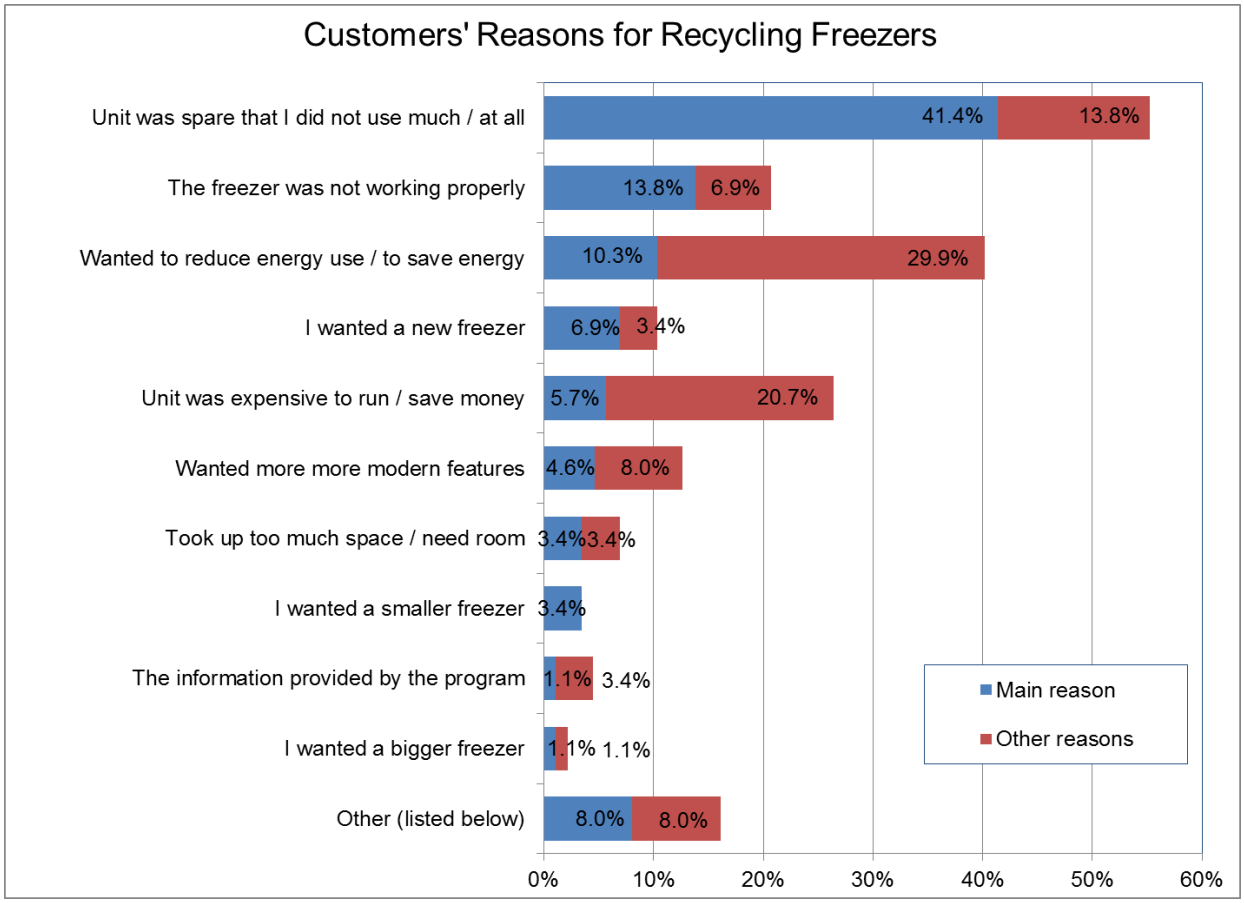


Figure 10. Customers' Reasons for Recycling Freezers (N=87)

Fourteen survey participants who recycled freezers named "other" reasons for participating in the program. These responses are listed below; the most common "other" reasons have to do with concerns that the unit would break down and its contents would be spoiled.

Main reasons (N=7)

- *I was afraid it was going to break down due to its age.*

- *Reliability concerns; I was worried that I would lose the contents if it failed on me.*
- *I was concerned with the possibility of failure and losing several hundred dollars' worth of frozen foods.*
- *I had a power outage and had to clean it out; I was concerned of contamination from spoiled meat.*
- *I wanted a smaller freezer after this one was accidentally left open and all the food spoiled.*
- *We are downsizing since we have no kids living with us anymore, and mobility concerns since the freezer was in the basement.*
- *We are moving and can't take it with us.*

Other reasons (N=7)

- *I disliked having to manually defrost the freezer.*
- *The upkeep and maintenance for defrosting was too much.*
- *The chest freezer was hard to reach down into to access the food stored at the bottom.*
- *I wanted to make sure the freezer wouldn't break down unexpectedly.*
- *I was worried that it would break down and ruin the contents.*
- *It was in an inconvenient location.*
- *We are downsizing.*

Customers' Reasons for Recycling Appliances through the Duke Energy Program

Table 38 shows the main reasons given by customers for recycling their units through the Duke Energy Appliance Recycling program rather than disposing of the units some other way. A plurality of 40.0% (64 out of 160) cited the convenience of home pick-up, and nearly a quarter (24.4% or 39 out of 160) mentioned the cash incentive. Another 13.8% (22 out of 160) mentioned proper appliance disposal that was environmentally friendly, and 9.4% (15 out of 160) did not know of any other options for disposal.

Customers who recycled multiple units through the program are more likely to mention the convenience of home pick-up (61.5% or 8 out of 13; significantly higher than customers who recycled one freezer or one refrigerator at p<.10 or better using student's t-test). Customers who recycled one freezer are more likely to mention mailings from Duke Energy (6.6% or 5 out of 76), and customers who recycled one refrigerator are more likely to mention free pick-up (4.2% or 3 out of 71; these differences are significant at p<.05 using student's t-test).

Table 38. Main Reasons for Recycling Through the Duke Energy Program

Reason	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
The convenience of the home pick-up	35.2%	40.8%	61.5%	40.0%
The cash incentive	28.2%	21.1%	23.1%	24.4%
Appliance was disposed of in a way that was good for the environment	16.9%	11.8%	7.7%	13.8%
Did not know of any other way / no other option	7.0%	11.8%	7.7%	9.4%
Information from mailings convinced me	0.0%	6.6%	0.0%	3.1%
Experience with Duke Energy: familiar, reliable,	2.8%	3.9%	0.0%	3.1%

trustworthy				
Pick-up was free	4.2%	0.0%	0.0%	1.9%
Recommended by friend/family/neighbor/coworker	0.0%	2.6%	0.0%	1.3%
Information from advertising or website convinced me	1.4%	0.0%	0.0%	0.6%
Timing / speed of pick-up	1.4%	0.0%	0.0%	0.6%
Other (listed after Figure 11)	2.8%	1.3%	0.0%	1.9%
Don't know	0.0%	0.0%	0.0%	0.0%

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

The other reasons (not including the "main reason") customers recycled their units through the Duke Energy program are shown in Table 39. The convenience of home pick-up (26.3% or 42 out of 160), cash incentive (19.4% or 31 out of 160) and disposing of the appliance in an environmentally-friendly way (16.3% or 26 out of 160) were the most-mentioned secondary reasons for participating in the program.

Customers who recycled one freezer were more likely to mention not knowing of any other disposal options (13.2% or 10 out of 76) compared to those who recycled one refrigerator or multiple units (differences significant at p<.10 or better using student's t-test). There are no other statistically significant differences in this table.

Table 39. Other Reasons for Recycling through the Duke Energy Program (Not Including Main Reason)

Reason	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
The convenience of the home pick-up	25.4%	26.3%	30.8%	26.3%
The cash incentive	18.3%	18.4%	30.8%	19.4%
Appliance was disposed of in a way that was good for the environment	12.7%	18.4%	23.1%	16.3%
Pick-up was free	5.6%	9.2%	15.4%	8.1%
Did not know of any other way / no other option	1.4%	13.2%	0.0%	6.9%
Experience with Duke Energy: familiar, reliable, trustworthy	0.0%	3.9%	0.0%	1.9%
Recommended by friend/family/neighbor/coworker	1.4%	0.0%	0.0%	0.6%
Information from mailings convinced me	0.0%	0.0%	0.0%	0.0%
Timing / speed of pick-up	0.0%	0.0%	0.0%	0.0%
Other (listed after Figure 11)	4.2%	5.3%	0.0%	4.4%

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

Figure 11 shows the combined main and secondary reasons why surveyed customers recycled their units through the Duke Energy program. Overall, about two-thirds of customers (66.3% or 106 out of 160) mentioned the convenience of home pick-up as a reason they participated in the Duke Energy program, and nearly half (43.8% or 70 out of 160) mentioned the cash incentive. Another 30.0% (48 out of 160) mentioned environmentally-friendly disposal, and 16.3% (26 out of 160) did not know of any other way to dispose of their units.

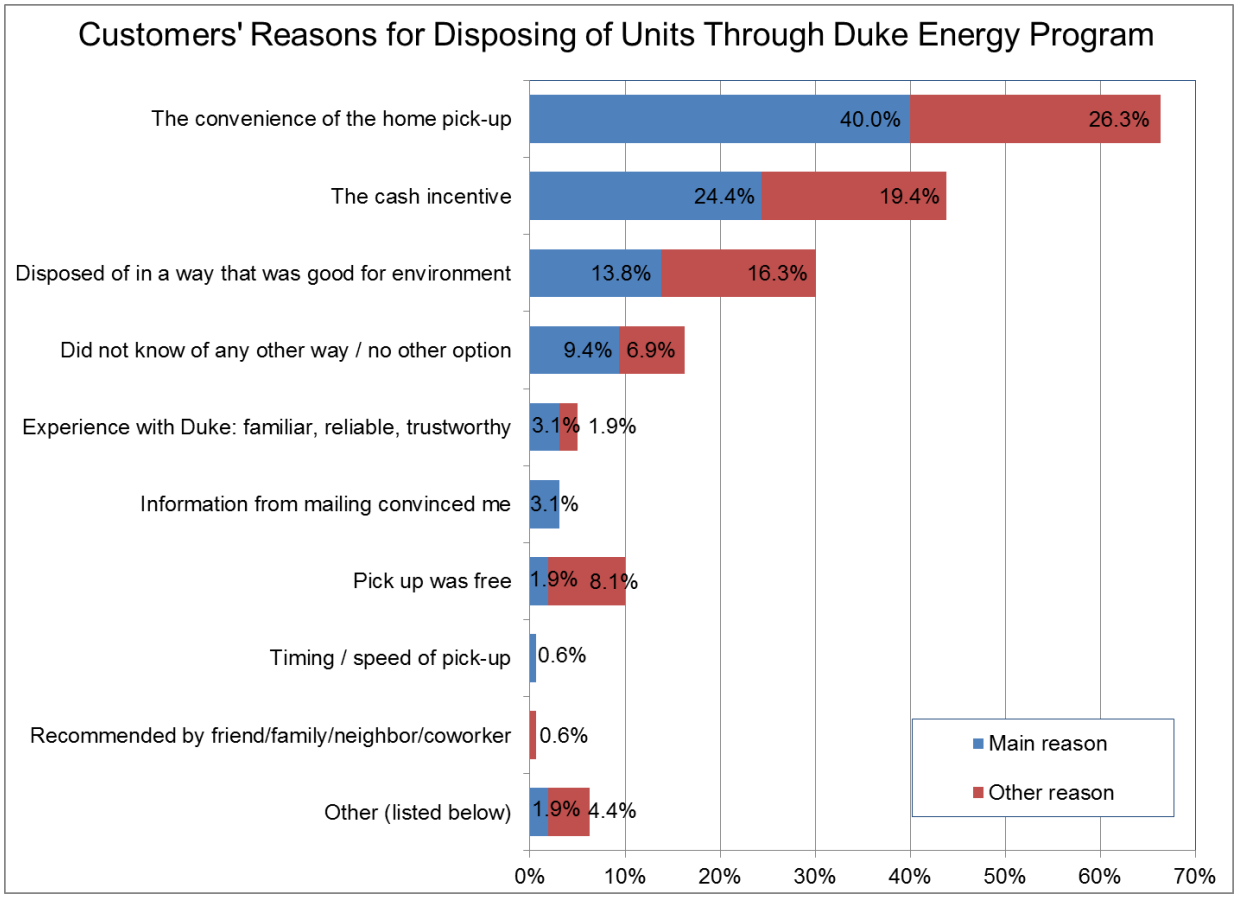


Figure 11. Customers' Reasons for Recycling Units through the Duke Energy Program (N=160)

Ten survey participants gave "other" reasons for recycling their units through the Duke Energy program. These responses are listed below.

Main reasons (N=3)

- *Because Duke Energy called me.*
- *Because they offered the service.*
- *We thought we were donating the freezer to someone who could use it.*

Other reasons (N=7)

- *Through the information I received, I was inspired to lower my energy bill by getting rid of the refrigerator.*
- *I knew that by recycling the old inefficient freezer, I'd be saving energy for the entire grid.*
- *I got to help someone else by donating the incentive money.*
- *I was under the assumption that it would be donated to a needy family.*
- *I figured Duke would do something useful with it.*
- *Goodwill, St. Vincent and Salvation Army would not take it.*
- *Nobody else wanted the freezer after it got damaged by the delivery crew.*

Customers were also asked if the incentive payment and the information provided explaining the program had any influence on their decision to participate. As seen in Figure 12, both the incentive (74.4% or 119 out of 160) and the information (66.9% or 107 out of 160) were an influence for most customers. Customers who recycled one refrigerator were more likely to report being influence by both incentives (84.5% or 60 out of 71) and program information (73.2% or 52 out of 71) compared to those who recycled one freezer or multiple units (all differences significant at p<.10 or better using student's t-test).

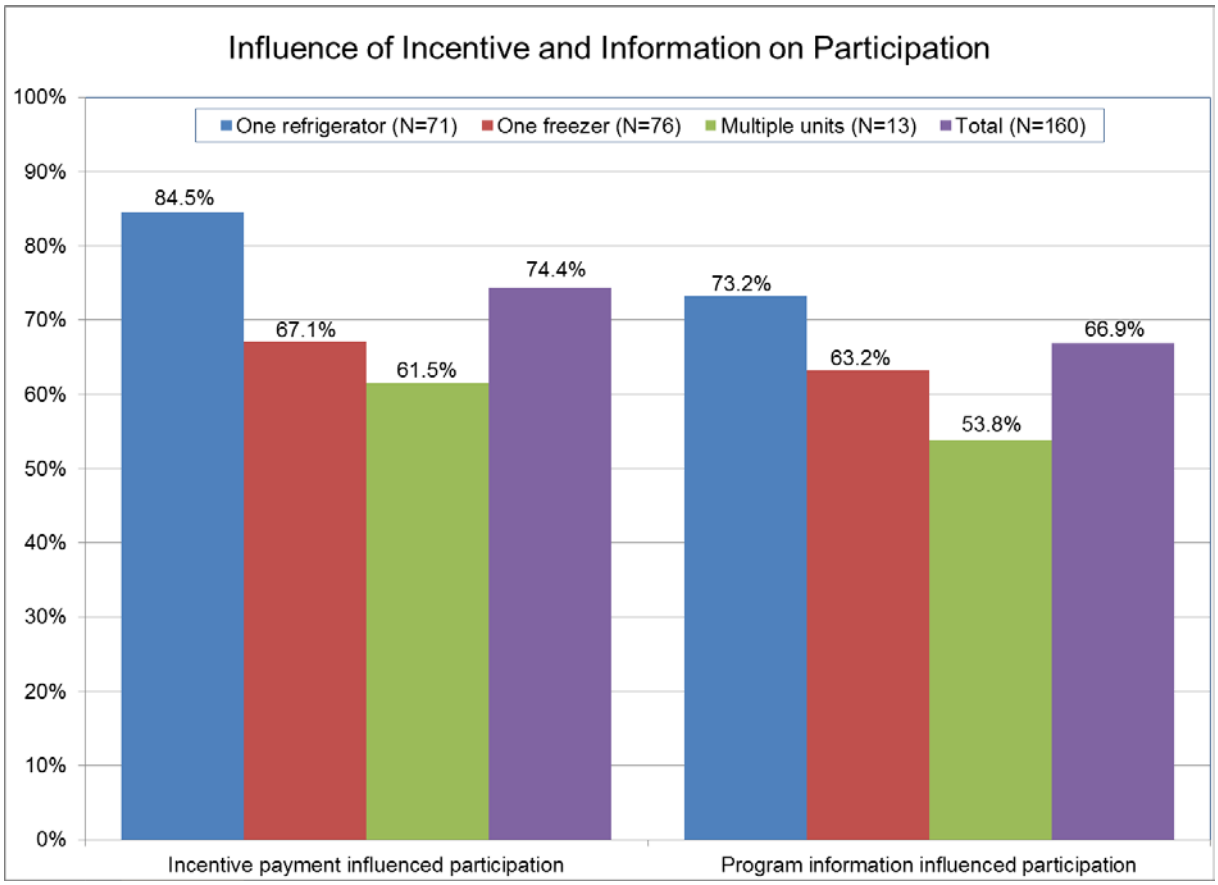


Figure 12. Influence of Incentive Payment and Program Information on Participation

Participation in the Program

Almost two-thirds of surveyed participants signed up for the program by telephone (65.6% or 105 out of 160) and 15.6% (25 out of 160) signed up online, while another 12.5% (20 out of 160) were signed up by someone else in their household.

Table 40. Methods of Signing Up for the Program

Who signed up and how	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Respondent signed up for program	**87.3%**	**85.5%**	**84.6%**	**86.3%**
Respondent signed up by telephone	62.0%	68.4%	69.2%	65.6%
Respondent signed up online	19.7%	11.8%	15.4%	15.6%

Respondent signed up by telephone while waiting for access to website	0.0%	1.3%	0.0%	0.6%
Respondent signed up but can't recall how	5.6%	3.9%	0.0%	4.4%
Someone else in the household signed up	**9.9%**	**14.5%**	**15.4%**	**12.5%**
Don't know	**2.8%**	**0.0%**	**0.0%**	**1.3%**

As seen in Table 41, only 3.8% (4 out of 105) of customers who signed up for the program by telephone had to call more than once to sign up.

Table 41. Signing Up for the Program by Telephone

Base: Respondents who signed up by telephone	**Recycled one refrigerator** (N=44)	**Recycled one freezer** (N=52)	**Recycled multiple units** (N=9)	**Total** (N=105)
Called one time	93.2%	96.2%	100.0%	95.2%
Called more than once	4.5%	3.8%	0.0%	3.8%
Don't know	2.3%	0.0%	0.0%	1.0%

The four surveyed customers who had to call more than once to sign up for the program were asked why they had to make more than one call. These responses are listed below.

- *When I called the first time I was told that the program needed to get up and running and that someone would call me back. No one called me back, so I called them back.*
- *It was my doing, because I had to go out of town when they came to pick up the freezer the first time.*
- *I needed to change the pick-up date.*
- *I called to get more information on the details of the pick-up.*

Overall, 96.9% (155 out of 160) of surveyed customers were able to schedule a convenient pick-up time, as shown in Table 42. Only one respondent (0.6% of 160) was unable to schedule a convenient pick-up time.

Table 42. Scheduling a Convenient Pick-Up Time

	Recycled one refrigerator (N=71)	**Recycled one freezer** (N=76)	**Recycled multiple units** (N=13)	**Total** (N=160)
Able to schedule convenient pick-up time	95.8%	97.4%	100.0%	96.9%
Not able to schedule convenient pick-up time	1.4%	0.0%	0.0%	0.6%
Don't know	2.8%	2.6%	0.0%	2.5%

According to Table 43, only 5.6% (9 out of 160) of survey participants scheduled pick-up dates that were more than one month from the date they signed up for the program, while about one respondent in eight (13.8% or 22 out of 160) was able to schedule a pick-up within a week of the date they signed up for the program. Most customers (64.4% or 103 out of 160) scheduled pick-ups for between one week and one month after the date they signed up, although about one in six (16.3% or 26 out of 160) could not recall the length of time between sign-up and appliance pick-

up. There are no statistically significant differences in schedule timing by the type of unit(s) recycled.

Table 43. Length of Time between Scheduling Appointment and Pick-Up

Time between scheduling and unit pick-up	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Less than 1 week	11.3%	17.1%	7.7%	13.8%
1 week up to 2 weeks	39.4%	40.8%	53.8%	41.3%
2 weeks up to 1 month	26.8%	18.4%	30.8%	23.1%
1 month up to 2 months	5.6%	3.9%	0.0%	4.4%
2 months or longer	0.0%	2.6%	0.0%	1.3%
Don't know	16.9%	17.1%	7.7%	16.3%

As seen in Table 44, only five survey respondents (3.1% of 160) said that they did not receive a confirmation call before pick-up. The vast majority (90.6% or 145 out of 160) did recall receiving a confirmation call, while 6.3% (10 out of 160) were not sure.

Table 44. Customers Receiving a Confirmation Call before Pick-Up

	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Received confirmation call before pick-up	91.5%	89.5%	92.3%	90.6%
Did not receive confirmation call before pick-up	2.8%	2.6%	7.7%	3.1%
Don't know	5.6%	7.9%	0.0%	6.3%

Table 45 shows that 96.9% (155 out of 160) of surveyed customers say that the collection team arrived on time to pick up their units for recycling. Only three respondents (1.9% of 160) said that the collection team was not on time, while the other 1.3% (2 out of 160) of survey respondents could not recall.

Table 45. Timeliness of Collection Team's Arrival

	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Collection team arrived on time	94.4%	98.7%	100.0%	96.9%
Collection team did not arrive on time	2.8%	1.3%	0.0%	1.9%
Don't know	2.8%	0.0%	0.0%	1.3%

Incentive Payments

Nearly four out of five customers surveyed (79.4% or 127 out of 160) recalled correctly that the incentive for this program is $30 per unit recycled, as seen in Table 46. Only 4.4% (7 out of 160) could not recall the amount, while most of the remaining survey respondents' recollections are within $10 of the actual incentive amount.

Table 46. Customers' Recall of Incentive Amount

Incentive per unit	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
$19 or less	1.4%	0.0%	0.0%	0.6%
$20 to $29	4.2%	3.9%	7.7%	4.4%
$30 (actual amount)	77.5%	78.9%	92.3%	79.4%
$31 to $39	4.2%	7.9%	0.0%	5.6%
$40 to $49	4.2%	1.3%	0.0%	2.5%
$50 to $59	2.8%	2.6%	0.0%	2.5%
$60 or more	0.0%	1.3%	0.0%	0.6%
Don't know	5.6%	3.9%	0.0%	4.4%

As shown in Table 47, only four survey respondents (2.5% of 160) said that they donated their incentive to the Duke Energy's winter heating assistance program. The vast majority of 96.9% (155 out of 160) took the incentive payment.

Table 47. Taking Payment or Donating the Program Incentive

	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Took payment for incentive	97.2%	96.1%	100.0%	96.9%
Donated incentive to Duke Energy's winter heating assistance program	1.4%	3.9%	0.0%	2.5%
Don't know	1.4%	0.0%	0.0%	0.6%

Table 48 indicates that only two surveyed customers (1.3% of 160) reported waiting 6 weeks or longer to receive their incentive payment, though eight (5.0% of 160) report that they are still waiting for their payment to arrive. About one customer in five (19.4% or 31 out of 160) was unable to answer this question; among respondents who were able to give a length of time, more received their checks in under three weeks (46.3% or 74 out of 160) than three weeks or longer (26.9% or 43 out of 160). The median length of time waiting for an incentive payment check to arrive is between two and three weeks.

Table 48. Length of Time to Receive Incentive Payment

Time from unit pick-up to receipt of incentive check	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Less than 1 week	1.4%	1.3%	7.7%	1.9%
1 week up to 2 weeks	15.5%	22.4%	30.8%	20.0%
2 weeks up to 3 weeks	29.6%	18.4%	30.8%	24.4%
3 weeks up to 4 weeks	15.5%	18.4%	15.4%	16.9%
4 weeks up to 5 weeks	5.6%	7.9%	7.7%	6.9%
5 weeks up to 6 weeks	0.0%	2.6%	7.7%	1.9%
6 weeks up to 7 weeks	0.0%	1.3%	0.0%	0.6%
Longer than 7 weeks	0.0%	1.3%	0.0%	0.6%
Have not received payment yet	9.9%	1.3%	0.0%	5.0%

Donated incentive (no payment to receive)	1.4%	3.9%	0.0%	2.5%
Don't know	21.1%	21.1%	0.0%	19.4%

The eight participants who have not yet received their incentive payments were asked how long it has been since their units were taken away for recycling. These responses are listed below; the average length of time they have been waiting is a little over four weeks, and half of them (4 out of 8) have been waiting for three weeks or less.

- *A little over two weeks* (N=2)
- *Two to three weeks*
- *Three weeks*
- *Four weeks* (N=2)
- *Five weeks*
- *Eleven weeks*

Replacing Recycled Units

TecMarket Works asked surveyed program participants if they have replaced the units they recycled, or if they are intending to replace the units in the next 12 months.

As seen in Figure 13, all main refrigerators which were recycled have already been replaced (100% or 37 out of 37). However, only 26.7% (12 out of 45) of secondary refrigerators have been replaced, and 37.4% (34 out of 91) of recycled freezers have been replaced. Out of the total of 82 refrigerators recycled by program participants, 59.8% (49 out of 82) have been replaced. There are also four customers who still plan to replace secondary refrigerators in the next 12 months (8.9% of 45), and three customers who plan to replace freezers in the next 12 months (3.3% of 91).

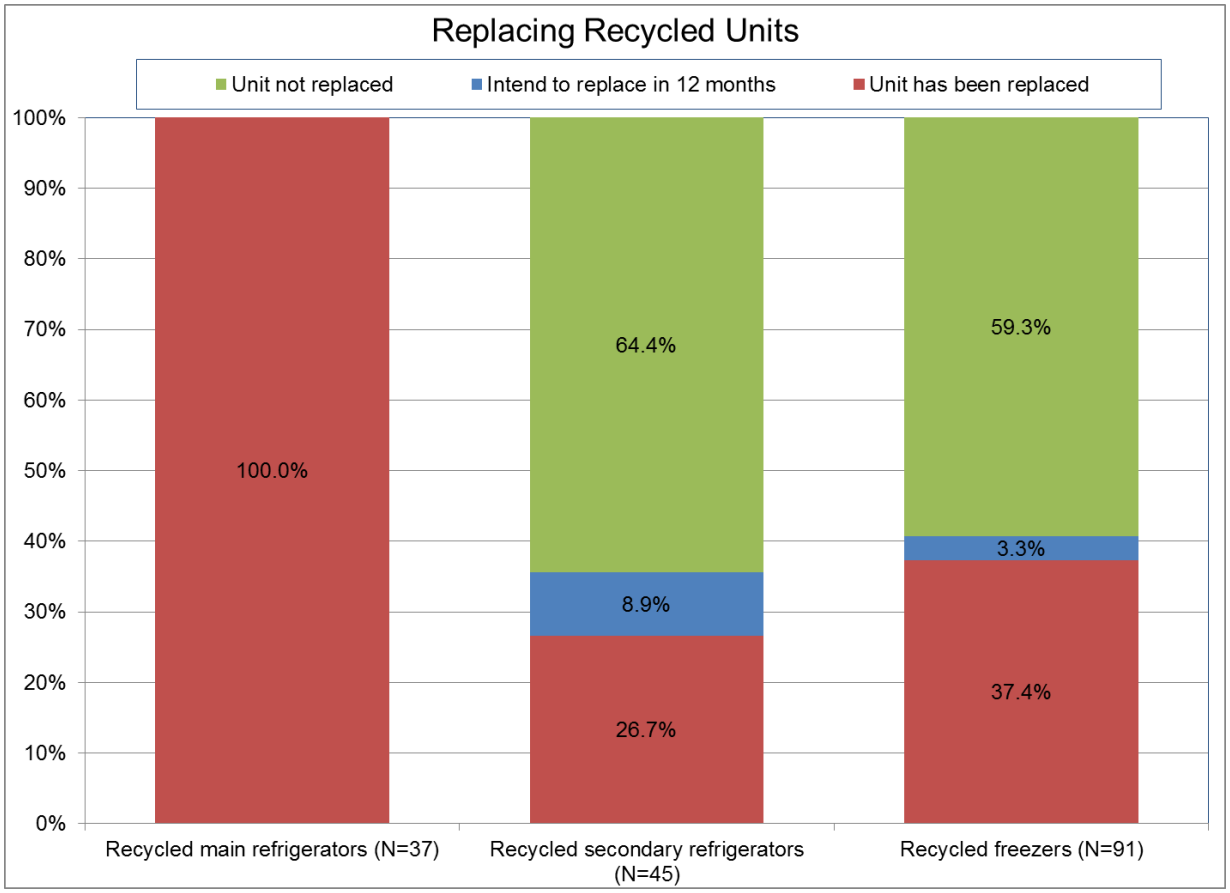


Figure 13. Replacing Recycled Units (N=173 recycled units)

Table 49 shows details about replacement units for recycled refrigerators and freezers. Overall, 81.9% (68 out of 83) of replaced units were replaced with refrigerators and freezers that were purchased new. A majority of 68.7% (57 out of 83) of replacement units were acquired before the old units were taken away.

The only statistically significant difference between groups is that spare refrigerators (16.7% or 2 out of 12) are more likely to be replaced by moving another unit from somewhere else in the home (significantly more likely than main refrigerators or freezers at $p<.05$ using student's t-test). Replacement with a unit moved from somewhere else in the home usually represents a scenario where a secondary refrigerator is recycled and replaced with the "demoted" old primary refrigerator, which in turn is replaced by a new unit.

Table 49. Source and Timing of Replacement Unit Acquisition

Base: replaced units	**Replaced main refrigerator** (N=37)	**Replaced secondary refrigerator** (N=12)	**Replaced freezer** (N=34)	**Total** (N=83)
Bought new replacement unit	81.1%	75.0%	85.3%	81.9%
Bought used replacement unit	18.9%	8.3%	11.8%	14.5%
Moved replacement unit from somewhere else in the home	0.0%	16.7%	2.9%	3.6%

Acquired replacement same day as recycling pick-up	8.1%	0.0%	5.9%	6.0%
Acquired replacement before recycling pick-up	73.0%	58.3%	67.6%	68.7%
Acquired replacement after recycling pick-up	16.2%	25.0%	23.5%	20.5%
Replacement was another unit already in the home	0.0%	16.7%	2.9%	3.6%
Don't know	2.7%	0.0%	0.0%	1.2%

Table 50 shows how long before or after the recycling pick-up date customers acquired their replacement units (for only those customers who purchased a replacement unit before or after the pick-up date). Most customers who replaced units before recycling their old units received the replacement unit less than two weeks before recycling pick-up (overall 80.7% or 46 out of 57).

Replacement units acquired after recycling pick-up are less common; most replacements for main refrigerators were replaced within two weeks after pick-up (83.3% or 5 out of 6), however most replacements for secondary refrigerators (66.7% or 2 out of 3) and freezers (62.5% or 5 out of 8) were replaced two weeks to two months after pick-up (these differences are significant at $p<.05$ using student's t-test).

Table 50. Timing of Replacement of Recycled Units

Base: replaced unit BEFORE recycling	**Replaced main refrigerator** (N=27)	**Replaced secondary refrigerator** (N=7)	**Replaced freezer** (N=23)	**Total** (N=57)
Replaced unit less than 2 weeks before recycling	85.2%	71.4%	78.3%	80.7%
Replaced unit 2 weeks to 2 months before recycling	3.7%	0.0%	13.0%	7.0%
Replaced unit 2 to 6 months before recycling	3.7%	28.6%	4.3%	7.0%
Replaced unit more than 6 months before recycling	7.4%	0.0%	4.3%	5.3%
Don't know how long before recycling	0.0%	0.0%	0.0%	0.0%
Base: replaced unit AFTER recycling	**Replaced main refrigerator** (N=6)	**Replaced secondary refrigerator** (N=3)	**Replaced freezer** (N=8)	**Total** (N=17)
Replaced unit less than 2 weeks after recycling	83.3%	0.0%	25.0%	41.2%
Replaced unit 2 weeks to 2 months after recycling	16.7%	66.7%	62.5%	47.1%
Replaced unit 2 to 6 months after recycling	0.0%	33.3%	0.0%	5.9%
Replaced unit more than 6 months after recycling	0.0%	0.0%	12.5%	5.9%
Don't know how long after recycling	0.0%	0.0%	0.0%	0.0%

Characteristics of Replacement Units

As shown in Table 51, the most popular style of replacement refrigerators are two-door models: a plurality of 43.2% (16 out of 37) of primary refrigerators were replaced with two-door units with side-by-side refrigeration and freezer compartments, while a plurality of secondary

refrigerators (41.7% or 5 out of 12) are two-door units with the freezer on top. All of the single-door replacement units replaced secondary refrigerators (16.7% or 2 out of 12 secondary refrigerators; different from primary refrigerators at p<.05 using student's t-test).

Only two of these replacement refrigerators are "manual defrost": one primary refrigerator replacement (2.7% of 37) and one secondary replacement (8.3% of 12). The vast majority of replacement refrigerators are "frost free": 94.6% (35 out of 37) of primary replacements and 91.7% (11 out of 12) secondary replacements.

Table 51. Replacement Refrigerator Type

Base: replaced refrigerator	**Replaced main refrigerator** (N=37)	**Replaced secondary refrigerator** (N=12)	**Total** (N=49)
Single door, freezer compartment inside	0.0%	16.7%	4.1%
Two doors, side by side	43.2%	25.0%	38.8%
Two doors, freezer on top	21.6%	41.7%	26.5%
Two doors, freezer on bottom	35.1%	16.7%	30.6%
Don't know	0.0%	0.0%	0.0%
Frost-free	94.6%	91.7%	93.9%
Manual defrost	2.7%	8.3%	4.1%
Don't know	2.7%	0.0%	2.0%

Table 52 indicates that about three-quarters of replacement freezers are upright models (73.5% or 25 out of 34), while most of the rest are chest freezers (23.5% or 8 out of 34). One customer (2.9% of 34) replaced their recycled freezer with a refrigerator. Six of these replacement freezers (17.6% of 34) are manual defrost, while 28 (82.4% of 34) are frost free.

Table 52. Replacement Freezer Type

Base: replaced freezer	**Replaced freezer** (N=34)
Chest freezer	23.5%
Upright freezer	73.5%
Refrigerator with a freezer section	2.9%
Frost-free	82.4%
Manual defrost	17.6%
Don't know	0.0%

About half of replacement units for recycled primary refrigerators are larger than the units they replaced (48.6% or 18 out of 37) while only 13.5% (5 out of 37) are smaller, as seen in Table 53. However, more replacement freezers are smaller (38.2% or 13 out of 34) than larger (23.5% or 8 out of 34) than the units they replaced. Compared to replacement freezers, main refrigerators are significantly more likely to be replaced with larger units and significantly less likely to be replaced with smaller units (both differences significant at p<.05 using student's t-test). Replacement secondary refrigerators are not significantly different from the other groups, in part due to the small sample size of twelve respondents.

Table 53. Relative Size of Replacement Units

Base: replaced units	Replaced main refrigerator (N=37)	Replaced secondary refrigerator (N=12)	Replaced freezer (N=34)	Total (N=83)
Replacement unit is larger	48.6%	41.7%	23.5%	37.3%
Replacement unit is the same size	37.8%	33.3%	38.2%	37.3%
Replacement unit is smaller	13.5%	25.0%	38.2%	25.3%
Don't know	0.0%	0.0%	0.0%	0.0%

Most customers who replaced recycled refrigerators or freezers do not know the cubic footage of their new units (overall 59.0% or 49 out of 83). Based on the responses of customers who were able to report a number for the cubic footage of their replacement units, main refrigerators were replaced with units that average 26.2 cubic feet, secondary units were replaced with models that average 15.6 cubic feet, and the average freezer replacement unit was 17.4 cubic feet. (Main refrigerator replacements are significantly larger than secondary refrigerator or freezer replacements at $p<.05$ using ANOVA.) The distribution of responses is shown in Table 54.

Table 54. Cubic Footage of Replacement Units

Base: replaced units	Replaced main refrigerator (N=37)	Replaced secondary refrigerator (N=12)	Replaced freezer (N=34)	Total (N=83)
Under 14 cubic feet	0.0%	0.0%	8.8%	3.6%
14 cubic feet up to 18 cubic feet	0.0%	33.3%	14.7%	10.8%
18 cubic feet up to 21 cubic feet	2.7%	0.0%	8.8%	4.8%
21 cubic feet up to 25 cubic feet	8.1%	0.0%	8.8%	7.2%
25 cubic feet or more	27.0%	0.0%	5.9%	14.5%
Don't know	62.2%	66.7%	52.9%	59.0%

Recall from Table 49 that 18.1% (15 out of 83) of replacement units were not acquired or purchased new. Table 55 shows the ages of previously-used units that replaced units recycled by the program (both units purchased or otherwise acquired used, and units moved from somewhere else in the home). All of the used replacement refrigerators (primary and secondary) for which respondents provided ages are less than ten years old, while replacement freezers are split between less than ten years old (40% of 5) and ten to fifteen years old (also 40% of 5). The average ages of used replacement units are 2.3 years for main refrigerators, 6 years for secondary refrigerators and 7.4 years for freezers.

Table 55. Age of Used Replacement Units

Base: replaced unit with used unit or unit moved from somewhere else in the home	Replaced main refrigerator (N=7)	Replaced secondary refrigerator (N=3)	Replaced freezer (N=5)	Total (N=15)
Replacement unit less than 10 years old	57.1%	100.0%	40.0%	60.0%
Replacement unit 10 up to 15 years old	0.0%	0.0%	40.0%	13.3%
Replacement unit 15 up to 20 years old	0.0%	0.0%	0.0%	0.0%
Replacement unit 20 to 25 years old	0.0%	0.0%	0.0%	0.0%
Replacement unit 25 years old or older	0.0%	0.0%	0.0%	0.0%
Don't know age of replacement unit	42.9%	0.0%	20.0%	26.7%

Intentions in the Absence of the Recycling Program

TecMarket Works asked participants what they would have done with their recycled units in the absence of the program; the results are shown in Table 56. For refrigerators, the most frequent response is "taken it to a dump or recycling center" (20.0% or 16 out of 80), followed by "kept it" (18.8% or 15 out of 80) and "given it away for free" (17.5% or 14 out of 80). For freezers, the top response is also "taken it to a dump or recycling center" (27.6% or 24 out of 87), followed by "given it away for free" (24.1% or 21 out of 87) and "kept it" (12.6% or 11 out of 87).

If the categories "taken it to a dump", "hired someone to take it to a dump" and "leave for curbside pickup" are combined into one category representing units that would have been taken off of the grid even without the program, then 30.0% (24 out of 80) of refrigerator recyclers and 34.5% (30 out of 87) of freezer recyclers were going to have their units removed from the grid anyway. Thus, most of the units recycled by the program may have remained in use after the program, either in the customers' household (if they kept it) or in another household (if they were going to sell or donate it to someone).

The only difference between customers who recycled refrigerators and those who recycled freezers which reaches the $p<.05$ level of significance (using student's t-test) is that refrigerator recyclers are more likely to say they would have had their old unit taken away by the dealer who delivered their replacement unit (15.0% or 12 out of 80).

Table 56. What Customers Would Have Done in the Absence of the Program

Recycled unit disposition without the program	Respondents who recycled refrigerators (N=80)	Respondents who recycled freezers (N=87)
Kept the old unit	18.8%	12.6%
Given it away for free	17.5%	24.1%
Sold it	3.8%	8.0%
Had it removed by the dealer that delivered replacement unit	15.0%	6.9%
Given it to a dealer that accepts used units (without buying a replacement)	0.0%	2.3%
Taken it to a dump or recycling center	20.0%	27.6%
Hired someone to take it to a dump or recycling center	8.8%	4.6%
Donated to a charity that accepts used appliances	8.8%	5.7%
Leave for curbside pickup on large item recycling day	1.3%	2.3%
Get rid of it some other way (listed below)	1.3%	2.3%
Don't know	5.0%	3.4%

Three customers gave responses that did not fit any of the categories above, which are listed below.

Recycled refrigerator (N=1)

- *Craigslist or Goodwill.*

Recycled freezer (N=2)

- *I would have sold it for scrap metal for about $10.*

- *'Curbside Christmas': if it's left at the curb, someone will pick it up within a few hours.*

Customers who would have kept their recycled units in the absence of the program were asked how these units would have been used if they had kept them. As seen in Table 57, 13.3% of these refrigerators (2 out of 15) would have been stored unplugged, and 45.5% (5 out of 11) of these freezers would also have been stored unplugged. Most of the refrigerators that would have been kept (73.3% or 11 out of 15) would have been used as secondary refrigerators at least part of the time.

Table 57. Use of Recycled Units if they had been Kept Instead of Recycled

Recycled unit use without the program	Respondents who recycled refrigerators but would have kept them without the program (N=15)	Respondents who recycled freezers but would have kept them without the program (N=11)
Stored it unplugged	13.3%	45.5%
Used it as a secondary refrigerator at least some of the time	73.3%	NA
Used it as my primary refrigerator or freezer	13.3%	45.5%
Don't know	0.0%	9.1%

Customers who would have kept using their old units without the program were asked how much they would have used them. All five of the freezer recyclers (100% of 5) who would have kept using their freezers would have had them plugged in and running "all of the time". Among the eleven refrigerator recyclers who would have continued using their old units as secondary refrigerators, ten (90.9% of 11) would have had them plugged in and running "all of the time", while one (9.1% of 11) would have used their old unit for "certain months of the year only" (specifying six months out of the year). The two refrigerator recyclers who would have kept using their old units as their main refrigerators would also have kept these units plugged in and running "all of the time".

Furthermore, customers that would have kept their old units in use without the program were asked how much longer they think they would be using them. Among the thirteen refrigerator recyclers who would have kept their units running, eight (61.5% of 13) would have kept them running "indefinitely", two (15.4% of 13) would have stopped using the old units within a year or two, and the other three (23.1% of 13) are not sure. Among the five freezer recyclers who would have kept their units running, four (80%) would have kept them running "indefinitely", while the other one (20%) would have kept it running for another year or two.

Customers who "don't know" what they would have done in the absence of the program were also asked "*assuming you had kept [your old unit], would it have been stored unplugged or would you have continued using it?*" Among the four refrigerator recyclers who don't know what they would have done in the absence of the program, two would have stored their units unplugged and two are not sure what they would have done. Among the three freezer recyclers who don't know what they would have done in the absence of the program, one would have stored their unit unplugged and the other two are not sure what they would have done if they had kept their old units.

Customers who would have sold their old units were asked how much they think they would receive for the sale and how they would sell it. These responses are listed below; though more freezer recyclers would have tried to sell their old units, most would have asked for less money than the refrigerator recyclers who would have tried to sell their old units (two of the three refrigerator recyclers would have asked for $100 or more compared to only one of the seven freezer recyclers who would have asked for that much.)

Recycled refrigerators (N=3)

- *$400 through Craigslist/Internet sale.*
- *$100 through word-of-mouth.*
- *$50 through Craigslist/Internet sale.*

Recycled freezers (N=7)

- *$150 through Craigslist/Internet sale.*
- *$75 through Craigslist/Internet or newspaper ad.*
- *$50 through newspaper ad.*
- *$40 to $50: "I was thinking about selling it; I would have offered it to some folks in the neighborhood for a garage sale. If there were no takers, I would have had the appliance company take it away.*
- *"As much as I could get: $25? $50?" through Craigslist/Internet sale.*
- *$20 through Craigslist/Internet or garage sale.*
- *Don't know how much through word-of-mouth.*

Customers who would have hired someone to haul their old unit away were asked how much they would be willing to pay for this service. These responses are listed below.

Recycled refrigerators (N=7)

- *$75*
- *$65*
- *"Under $50"*
- *$25* (N=2)
- *$0*
- *Don't know*

Recycled freezers (N=4)

- *$40*
- *$20*
- *Pay the city $15 to pick it up.*
- *Don't know*

Customers who would have given away or sold their old units were also asked if they had recipients (or buyers) in mind for these transactions.

- Among refrigerator recyclers, none of the three customers (0%) who were intending to sell their unit had a specific person in mind, though two out of fourteen (14.3%) of customers who were intending to give their unit away did have a specific person or organization in mind. These two recipients are listed below:
  - *A friend of the family*
  - *My church*
- The survey also included a question asking if respondents knew whether the person they would have given their old refrigerator to would have used it as a primary or secondary refrigerator. Of the two refrigerator recyclers who had a recipient in mind, one said their old refrigerator would have been used as a primary unit (the "*friend of the family*") and one said it would be used as a spare secondary unit ("*my church*").
- Among freezer recyclers, only one of the seven customers (14.3%) who were intending to sell their unit had a specific person in mind: "*our neighbors, a young couple, though I'm not sure they would want it*." Among the 21 freezer recyclers who would have given their old units away for free, six (28.6%) did have specific recipients in mind; these are listed below.
  - *A friend who would have used it for venison*
  - *A friend*
  - *Friend or family*
  - *My son*
  - *Family member*
  - *My church*

Survey participants were also asked about the timing of disposing of their old units if the Duke Energy Appliance Recycling program had not been available. Table 58 shows that at least a third of participants would have delayed disposing of their units: 35.0% (28 out of 80) of refrigerator recyclers would have waited, as would 35.6% (31 out of 87) of freezer recyclers. There are no statistically significant differences between refrigerator and freezer recyclers in response to this question.

Table 58. Timing of Unit Disposal in the Absence of the Program

Timing of recycled unit disposition without the program	Respondents who recycled refrigerators (N=80)	Respondents who recycled freezers (N=87)
Would have removed it sooner without the program	**5.0%**	**8.0%**
Would have removed it at the same time without the program	**41.3%**	**41.4%**
Would have removed it later without the program (total)	**35.0%**	**35.6%**
Up to a month later	6.3%	4.6%
More than one month up to six months later	6.3%	10.3%
Six months up to a year later	5.0%	5.7%
More than a year later	1.3%	3.4%
Would have kept it indefinitely / until it broke	5.0%	4.6%
Would have kept it, but unplugged	1.3%	0.0%
Not sure how much later	10.0%	6.9%
Don't know	**18.8%**	**14.9%**

Table 59 shows that three refrigerator recyclers (3.8% of 80) who did not replace their old units would have purchased replacements in the absence of the program, and the same number (3.8% or 3 out of 80) who did replace their old units would not have done so in the absence of the program. Only one freezer recycler (1.1% of 87) did not replace their unit but would have in the absence of the program, while two (2.3% of 87) did replace units but would not have done so in the absence of the program. However, a large majority of customers surveyed would have taken the same action (either purchasing a replacement or not) with or without the program; most customers who recycled refrigerators would replace recycled units (55.0% or 44 out of 80), and most who recycled freezers would not replace them (57.5% or 50 out of 87; significant differences between groups at p<.05 using student's t-test).

Table 59. Replacing Units in the Absence of the Program

Unit replacement without the program	Respondents who recycled refrigerators (N=80)	Respondents who recycled freezers (N=87)
Replaced unit, and would have replaced it without the program	55.0%	33.3%
Did not replace unit, but would have replaced it without the program	3.8%	1.1%
Replaced unit, but would not have replaced it without the program	3.8%	2.3%
Did not replace unit, and would not have replaced it without the program	35.0%	57.5%
Don't know if unit would have been replaced without the program	2.5%	5.7%

Program Satisfaction

TecMarket Works asked program participants to rate several specific aspects of the Duke Energy Appliance Recycling program on a 10-point scale, with "10" indicating very high satisfaction, and "1" indicating very low satisfaction. The average rating scores for all 160 surveyed participants are shown in Figure 14, along with average satisfaction ratings for the program overall and Duke Energy overall.

The Appliance Recycling program gets very high marks for satisfaction from surveyed customers: 9.63 for the program overall, as well as average scores higher than 9.6 for the collection team (9.78), telephone customer service representatives (9.67), and the sign-up and scheduling process (9.71). The size of the incentive payment (9.25) receives a somewhat lower satisfaction rating (significantly lower than the top four items in Figure 14 at p<.10 or better using student's t-test). However, average satisfaction scores over 9.0 still represent a very high level of customer satisfaction (even for the lowest rated aspect of the program shown in the chart below, 70.6% or 113 out of 160 customers surveyed rated the size of the incentive payment a "10 out of 10", the highest possible score).

Duke Energy received an overall mean satisfaction rating score of 8.84 from surveyed program participants, which is also a very high level of satisfaction, but lower than the 9.63 satisfaction for the Appliance Recycling program overall (significant at p<.05 using student's t-test). Just

over half of survey respondents (52.5% or 84 out of 160) rated their satisfaction with Duke Energy a "10 out of 10", the highest possible score.

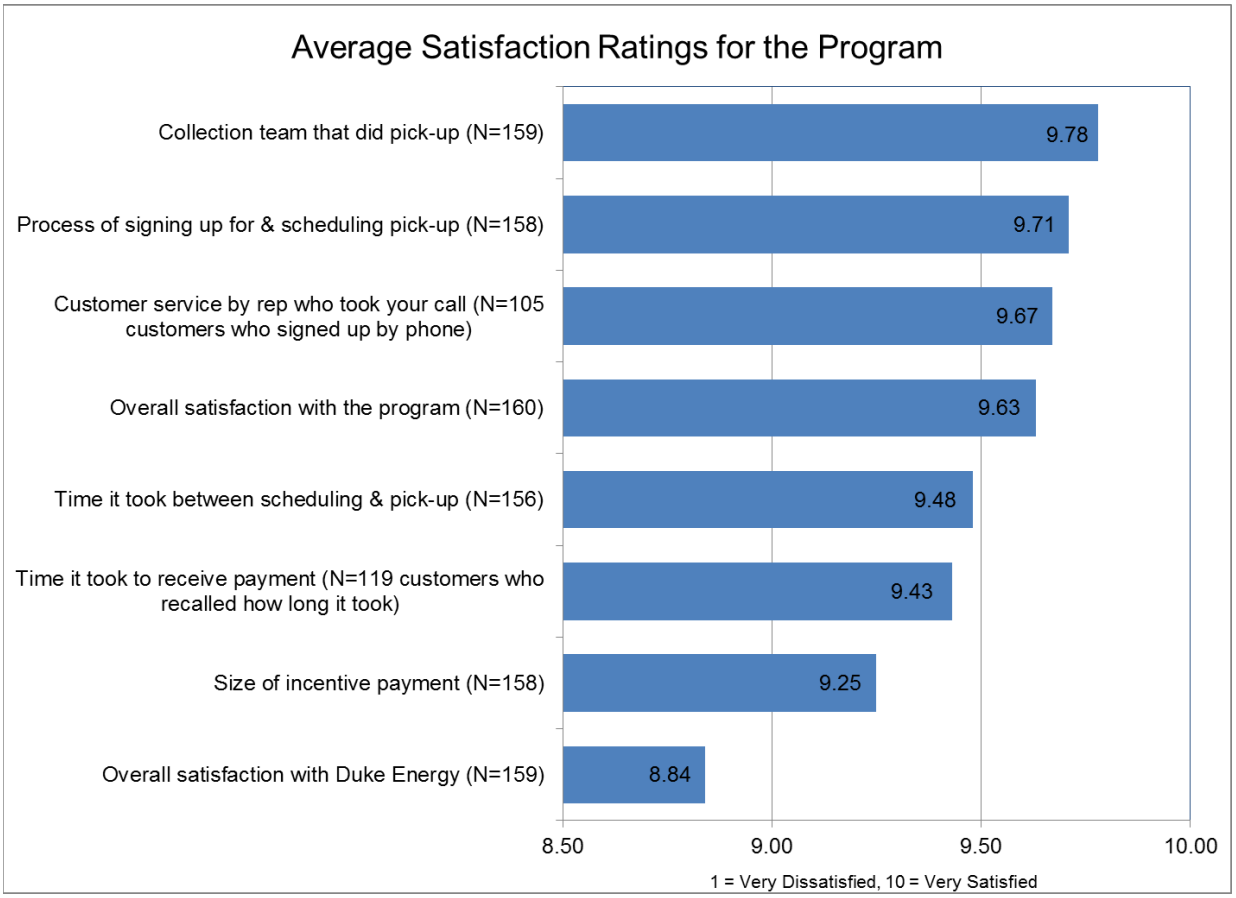


Figure 14. Average Satisfaction Ratings for the Appliance Recycling Program

Table 60 shows the average satisfaction ratings by unit(s) recycled. There is only one statistically significant difference by units recycled: customers who recycled multiple units are more satisfied with the time between scheduling and pick-up (9.92) compared to the other two groups (significant at p<.10 or better using student's t-test). There are no significant differences in satisfaction ratings between customers in North and South Carolina.

Table 60. Average Satisfaction Ratings by Unit(s) Recycled

Satisfaction ratings	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Collection team that did pick-up	9.73	9.86	9.62	9.78
Process of signing up for and scheduling pick-up	9.75	9.65	9.83	9.71
Customer service by representative who took your call (Total N=105 customers who signed up by phone)	9.73	9.56	10.00	9.67
Overall satisfaction with the program	9.66	9.58	9.69	9.63

Time it took between scheduling and pick-up	9.32	9.55	9.92	9.48
Time it took to receive payment (Total N=119 customers who recalled how long it took)	9.39	9.40	9.69	9.43
Size of incentive payment	9.27	9.18	9.62	9.25
Overall satisfaction with Duke Energy	8.94	8.83	8.31	8.84

Customers who gave satisfaction scores of "7" or lower on a 10-point scale were asked what could be done to improve the situation. These responses are listed below for each aspect of the program rated.

Two customers (1.3% of 160) gave satisfaction ratings of "7" or lower for the process of signing up and scheduling pick-up:

Recycled one refrigerator

- *It was hard to find on the Duke website: harder than it should be.*

Recycled one freezer

- *I would have preferred a more specific time for the pick-up; I found the time frame that was given to me was too broad. Also, since I wanted a Saturday pick up, I could not get my freezer picked up for nearly two months. I advise having more pick up teams available for Saturdays.*

Three customers (2.9% of 105 respondents who signed up by telephone) gave satisfaction ratings of "7" or lower for the customer service representative who took their call:

Recycled one refrigerator

- *The first time I called, he could have been more clear on who I needed to speak to and the details. The second time I called, the representative was much more helpful.*

Recycled one freezer

- *The customer service representative who took my call was very abrupt and rather rude to me when I called to ask about the service. They were rather short and didn't really give me an opportunity to ask questions about the program. The customer service representative should have been more patient and helpful.*
- *When I called the first time I was told that the program needed to get up and running and that someone would call me back. No one called me, so I called them back. It would have been better if someone would have called me back.*

Four customers (2.5% of 160) gave satisfaction ratings of "7" or lower for the collection team:

Recycled one refrigerator

- *Make sure the collection team listens to the customer. We had the pickup scheduled. We got a call saying that they were on their way to pick up the refrigerator, but they never showed up. When they had called my husband gave them directions. There happened to be a festival in our area so the directions my husband gave them led them around the festival because streets were blocked off. The collection team did not follow my*

husband's directions and instead used GPS. We then had to reschedule and, yet again, arrange to stay home to meet with the collection team.

- *They did a little damage to the paneling in my basement. They didn't seem very well versed in how to bring the refrigerator up the stairs.*

Recycled one freezer

- *The pick-up team needs to be more careful; they damaged my door, but the door was repaired at no cost to me.*

Recycled multiple units

- *The young man who came to pick up the appliances was so nervous that he tripped over the electrical cord reel and broke it, even though I had cleared a large space for ease of appliance removal.*

Nine customers (7.6% of 119 respondents who could recall how long it took to receive payment) gave satisfaction ratings of "7" or lower for time it took to receive payment:

Recycled one refrigerator

- *I haven't received my payment yet. I wasn't sure if it's the wrong address or some other reason for the delay. I'd like a letter saying why they haven't sent it and any reason why it may be delayed.*
- *Send the payment out within a few days.*
- *I would have liked to receive the payment sooner.*
- *Send the money sooner.*

Recycled one freezer

- *The check should have arrived sooner; we were depending on that money to buy food. I think that the check should have arrived in two weeks or less.*
- *The payment could arrive within one week after the unit gets picked up.*
- *The payment could have arrived sooner.*
- *The payment could have been processed sooner.*

Recycled multiple units

- *I thought it would be sooner; I thought it could take a few days to send out a check after the appliance was picked up, I can't see why it took about a month to get the check.*

Twelve customers (7.5% of 160) gave satisfaction ratings of "7" or lower for the time it took between scheduling and pick-up:

Recycled one refrigerator

- *We had the pickup scheduled. We got a call saying that they were on their way to pick up the refrigerator, but they never showed up. When they had called my husband gave them directions. There happened to be a festival in our area so the directions my husband gave them led them around the festival because streets were blocked off. The collection team*

did not follow my husband's directions and instead used GPS. We then had to reschedule and, yet again, arrange to stay home to meet with the collection team.

- *The time between the scheduling and actual pick up needs to quicker. I wanted a Saturday pick-up, which most other customers probably want as well because we work during the rest of the week. I could not get my freezer picked up for nearly two months because of the high demand of Saturday pick up. I advise having more pick-up teams available for Saturdays.*
- *I work 12-hour shifts at different times and I had a lot of trouble finding convenient times and days when this could be done. They didn't have any pick-ups available on my days off.*
- *There should be more appointments available online.*
- *It would be nice if there were more dates available for appliance pick-up*
- *I would have liked if it had been picked up a week or so earlier.*
- *I would have preferred the pickup to be within a week to 10 days.*
- *I wish it could have been sooner, like a week or less.*

Recycled one freezer

- *The time between the scheduling and actual pick-up needs to quicker. I wanted a Saturday pick-up, which most other customers probably want as well because we work during the rest of the week. I could not get my freezer picked up for nearly two months because of the high demand for Saturday pick-up. I advise having more pick up teams available for Saturdays.*
- *Duke could pick up appliances within two days of enrollment, because having appliances with closable lids sit around for any extended period of time is a safety issue.*
- *It could have been quicker.*
- *I thought it was too lengthy.*

Nineteen customers (11.9% of 160) gave satisfaction ratings of "7" or lower for the size of the incentive payment:

Recycled one refrigerator

- *Offer more money.* (N=2)
- *I am disappointed, in that after I participated in this they raised the payment to $40.*
- *I am living on social security so a larger incentive payment, say $50, would have been nice. I may have been able to sell the refrigerator for $100 or more.*
- *I think probably another $10 or $15 would have been better. It was not that old of a refrigerator.*
- *The refrigerator worked fine and only had minor problems, so more money could have been offered.*
- *Don't know.* (N=3)

Recycled one freezer

- *Offer more money.*
- *Duke could increase the amount of payment to $50.*

- *First, just after participating I see Duke is now offering $40, which I think is still less than the value of the item. I don't appreciate Duke making a profit off me in this way.*
- *I originally heard that the amount would be $50 instead of $35, but I was happy just to get the $35.*
- *I heard y'all have paid more for appliances. It would have been nice to get an extra $20.*
- *I was expecting more money for the freezer, at least $50 dollars.*
- *I was expecting that the payment would have been at least $50.*
- *Would have appreciated more money; we used it for buying the new freezer.*
- *The freezer was still usable, perhaps it should have been considered for reuse instead of recycling. The freezer probably would have been worth more money if it was fixed and sent to a needy family. If someone came to look at the freezer and appraised it, it probably would have been worth more than $30.*

Recycled multiple units

- *I heard that Georgia Power is offering more for recycling appliances; I think it is $45 per appliance, which is a better price than what Duke is offering.*

Only two customers (1.3% of 160) gave satisfaction ratings of "7" or lower for the Appliance Recycling Program overall:

Recycled one refrigerator

- *I haven't received my payment yet. I wasn't sure if it's the wrong address or some other reason for the delay. I'd like a letter they saying why they haven't sent it and any reason why it may be delayed.*
- *Improve the pick-up. Have the drivers be more responsible. We had the pickup scheduled. We got a call saying that they were on their way to pick up the refrigerator, but they never showed up. When they had called my husband gave them directions. There happened to be a festival in our area so the directions my husband gave them led them around the festival because streets were blocked off. The collection team did not follow my husband's directions and instead used GPS. We then had to reschedule and, yet again, arrange to stay home to meet with the collection team.*

Twenty-nine customers (18.1% of 160) gave satisfaction ratings of "7" or lower for Duke Energy overall; most of these customers' complaints are about rate increases and power outages.

Recycled one refrigerator

- *I have some energy problems in my area and have power blips about 25 to 30 times a year. They've done quality checks and talked to neighbors. There are no thunderstorms or anything. It'll be a perfectly sunny day and the power goes out and I have to do things like wait for the DVR to reset itself and reset all the clocks. It's definitely better than it used to be, but sometimes the power will go out for as long as a minute.*
- *We experience too many power outages. We have a lot of power outages and are very conservative about using energy and yet our rates keep going up. We have had engineers come out and explain, or rather give excuses, for the problems. Our underground lines are attached to above ground lines. The engineers said the above ground lines are probably the cause of the problems.*

- *We had another power company when we lived across town. Since getting Duke, we have more power outages.*
- *Too many power outages.*
- *Duke Energy needs more renewable energy to lower the rates to make it easier for people to afford it and to not damage the environment. It would be better for everybody.*
- *I think they charge too much. I also think, being that we are in the South, they should be doing more with solar energy.*
- *I don't like their management style, which seems disorganized. They have high pay for some employees but then don't pay everyone else enough. They seem to raise rates a lot when they should be lowering the payment for some of the upper echelon so everyone would be able to afford their electric bills.*
- *I think their prices fluctuate too much.*
- *They should lower their rates. Duke should adjust their rates according to income. I am living on social security.*
- *Lower the bills. We have not even been running the A/C and our bill still shot up. I like Duke otherwise.*
- *Lower the rates / stop increasing rates.* (N=3)
- *Don't know.*

Recycled one freezer

- *As a service provider, they're OK, but I think there are things they could do to improve and become a first-class utility.*
- *In Lancaster we cannot go talk to a Duke Energy representative in person like we used to, we must call over the phone. There is no longer a location where I can pay my bill at a Duke office, I now must pay at a service station in an unsafe neighborhood or send my payment by mail. I think it is unfair to the customers to not have the availability of speaking with somebody face to face about our energy service or account.*
- *When we have ice storms we stay without power for a long time, and I really don't see the reason for that. Duke Energy asks us to pay for upgrades on the power lines, they should pay that out of their own pocket, that is not something that the customers should have to carry the weight for. Duke does not understand how difficult it is for older people to pay for these extra costs.*
- *I have a lot of brown-outs, but they're just a quick flash. My thermostat resets itself to 82 after a brown-out which is hotter than I'd like the house. I don't understand why the thermostat is resetting itself. Sometimes the brown-out happens while I'm away and the house is too hot when I get back.*
- *Duke could do be more proactive about cutting trees near power lines, and also make attempts keep energy rates low.*
- *Lower the price of the energy bills; otherwise, I like Duke very much. Their response after the ice storm of 2002 was wonderful.*
- *All of the services that are provided through Duke are excellent. Our only issue with the company is the rate hikes, which are too often and too large. It's really hard on the poor people.*
- *I have no choice; Duke is the only game in town.*
- *Lower the rates / stop increasing rates.* (N=4)

Recycled multiple units

- *I think our bills are too high. Our bill keeps going up even though we changed to high efficiency appliances and gas. Other people in our area who are running on electric seem to pay about half of what I do. I called Duke to arrange for them to come out to see if there was a problem with my meter. They said that if they found out that there was not a problem with my meter that I would then be charged $70. Because I cannot risk having to pay $70, I have not had anyone from Duke inspect the meter.*
- *The rate increases are too high and there have been too many, especially as of recently. Having two rate increases in one year is excessive.*
- *Lower the rates / stop increasing rates.*

Effect of the Program on Customers' Perception of Duke Energy

Survey respondents were asked if participating in the program made them feel more or less favorably about Duke Energy, or if it made no difference. Table 61 indicates that most customers (overall 59.4% or 95 out of 160) feel more favorably about Duke Energy after the program, and none (0.0% of 160) feel less favorably.

Customers who recycled multiple units are the least likely to report that their perception of Duke Energy was improved by the program (38.5% or 5 out of 13; significantly less than customers who recycled one unit at p<.10 using student's t-test). There is also a statistically significant difference by state: Customers in South Carolina are more likely to say that their perception of Duke Energy has improved (67.2% or 41 out of 61) compared to North Carolina participants (54.5% or 54 out of 99; this difference is significant at p<.10 using student's t-test).

Table 61. Effect of Program Participation on Perception of Duke Energy

Perception of Duke Energy	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Participating in the program made me feel more favorable about Duke Energy	66.2%	56.6%	38.5%	59.4%
Participating in the program did not make me feel any different about Duke Energy	33.8%	43.4%	61.5%	40.6%
Participating in the program made me feel less favorable about Duke Energy	0.0%	0.0%	0.0%	0.0%
Don't know	0.0%	0.0%	0.0%	0.0%

Favorite and Least Favorite Aspects of the Program

Surveyed customers were asked about their favorite and least favorite aspects of participating in the Appliance Recycling program. Table 62 indicates that the overall most popular aspect of the program is the convenience of home pick-up (and not having to personally haul the unit away, mentioned by 35.0% or 56 out of 160), followed by the incentive payment (27.5% or 44 out of 160), getting rid of old units (20.6% or 33 out of 160) and that old units are being disposed of properly in a way that is good for the environment (16.3% or 26 out of 160).

Only one surveyed customer mentioned "saving energy" (0.6% of 160) as a favorite aspect of the program, and only one participant mentioned "saving money on energy bills" (0.6% of 160). However, recall from Figure 9 and Figure 10 that saving energy and saving money on bills were mentioned by many more customers as reasons why they wanted to dispose of their old refrigerators and freezers; while saving money and energy may be motivations for deciding to participate in the program, they are not viewed as primary program benefits by the customers afterwards.

There is only one difference in Table 62 that rises to the $p<.05$ level of statistical significance: Customers who recycled one freezer are more likely than those who recycled one refrigerator to cite ease of participation, sign-up and scheduling as a favorite aspect of the program (15.8% or 12 out of 76 compared to 7.0% or 5 out of 71).

Table 62. Customers' Favorite Thing about Participating in the Appliance Recycling Program

Favorite aspects of the program	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Convenience of home pick-up / not having to haul it myself	31.0%	36.8%	46.2%	35.0%
The incentive payment	32.4%	23.7%	23.1%	27.5%
Getting rid of old unit(s)	21.1%	22.4%	7.7%	20.6%
Proper unit disposal / recycling parts / good for environment	14.1%	18.4%	15.4%	16.3%
Ease of participation / sign-up and scheduling	7.0%	15.8%	7.7%	11.3%
Crew and customer reps were courteous / helpful / prompt / kind / etc.	5.6%	10.5%	15.4%	8.8%
No cost hauling & disposal	2.8%	1.3%	7.7%	2.5%
Timing / quick turnaround / conveniently scheduled	1.4%	2.6%	0.0%	1.9%
Getting a better new unit	1.4%	0.0%	7.7%	1.3%
Duke Energy's concern for customers	0.0%	2.6%	0.0%	1.3%
Saving energy	0.0%	1.3%	0.0%	0.6%
Saving money on energy bills	1.4%	0.0%	0.0%	0.6%
Other (listed below)	2.8%	2.6%	0.0%	2.5%
Don't know / not specified	4.2%	0.0%	0.0%	1.9%

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

Four survey respondents mentioned "other" favorite aspects of the program. These are listed below; two or three of these customers mentioned that their old units would be transferred to other people who can use them, although this is not the case (the Duke Energy Appliance Recycling Program does not transfer appliances to other households, it takes them off the grid and recycles them for parts and scrap materials).

Recycled one refrigerator

- *It gave somebody that needed a refrigerator a refrigerator without them having to pay for it.*

- *Knowing that the refrigerator could be used by someone.*

Recycled one freezer

- *My favorite thing was that the collection crew verified that our freezer qualified for the program.*
- *My favorite thing about the program was getting rid of a freezer that someone else might be able to make use of.*

Most surveyed program participants (68.1% or 109 out of 160) could not name a least favorite aspect of the program, and no least favorite aspect was mentioned by more than about 5% of surveyed participants. Customers' least favorite aspects of the program are shown in Table 63.

There are two significant differences between customers who recycled different types of units: Customers who recycled multiple units are the most likely to say they don't have a least favorite aspect of the program (85.4% or 11 out of 13; higher than 66.7% or 98 out of 147 for all other surveyed customers at p<.10 using student's t-test). The other difference is that customers who recycled a freezer (3.9% or 3 out of 76) were more likely to complain about having to move the unit for pick-up compared to those who recycled a refrigerator (0.0% or 0 out of 71; this difference is significant at p<.05 using student's t-test).

There are also two notable significant differences by state: South Carolina customers are more likely to complain that the payment is too small (9.8% or 6 out of 61, compared to 2.0% or 2 out of 99 in North Carolina), while North Carolina customers are more likely to complain about payments taking too long to arrive (6.1% or 6 out of 99, compared to 0.0% or 0 out of 61 for South Carolina; these differences are both significant at p<.05 using student's t-test).

Table 63. Least Favorite Things about Participating in the Appliance Recycling Program

Least favorite aspects of the program	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
Want faster pickup / pickup was delayed	7.0%	5.3%	0.0%	5.6%
Incentive payment is too small	4.2%	6.6%	0.0%	5.0%
Scheduling the pickup / had to schedule more than once / want more scheduling options	4.2%	5.3%	0.0%	4.4%
Misunderstanding about what would happen to recycled unit / feel bad about destroying a working unit	4.2%	3.9%	0.0%	3.8%
Waiting for payment / time to receive payment	5.6%	2.6%	0.0%	3.8%
Having to move unit for pickup	0.0%	3.9%	0.0%	1.9%
Having to clean / defrost unit for pickup	2.8%	1.3%	0.0%	1.9%
Unit had to be plugged in for pickup	1.4%	0.0%	0.0%	0.6%
Being without the old unit	1.4%	0.0%	0.0%	0.6%
Having to be present for pickup	1.4%	0.0%	0.0%	0.6%
Other (listed below)	7.0%	2.6%	15.4%	5.6%
Nothing / don't know	62.0%	71.1%	84.6%	68.1%

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

Nine customers (5.6% of 160) mentioned "other" aspects of the program as their least favorite; these responses are listed below.

Recycled one refrigerator

- *I was dissatisfied with the people not being well versed in how to remove the appliance. They caused damage to the paneling and had a hard time bringing it up the stairs.*
- *They scuffed my yard.*
- *Getting signed up was hard. It was hard to find on the Duke website.*
- *Trying to find the program online was really difficult, like trying to find the right website; then I had trouble finding out if it was available in my area.*
- *The waiting for the monitor to be placed on the refrigerator and then the waiting for them to come back and pick it up.*

Recycled one freezer

- *We didn't get the callback to confirm our pickup, but it really wasn't a problem.*
- *I could not keep my dog quiet when the pick-up team was here.*

Recycled multiple units

- *The young man who came to pick up the appliances was so nervous that he tripped over the electrical cord reel and broke it even though I had cleared a large space for ease of appliance removal.*
- *The distance the driver had to go just to pick up my appliances. I had three appliances to recycle but I could only do two at a time. I'm going to have to sign up to do the program again when I'm eligible.*

Customers Noticing a Reduction in Their Electric Bill after Removing Appliances

Survey participants were asked if they have noticed a reduction in their electric bills since their old units were recycled. As indicated in Figure 15, only about a third of customers (31.9% or 51 out of 160) did notice a reduction in electric bills, though another 21.9% (35 out of 160) are not sure if there bills have gone down or not. The percentage noticing a reduction was not significantly different depending on whether the customer recycled a refrigerator, a freezer or multiple units; there are not any significant differences between North and South Carolina either.

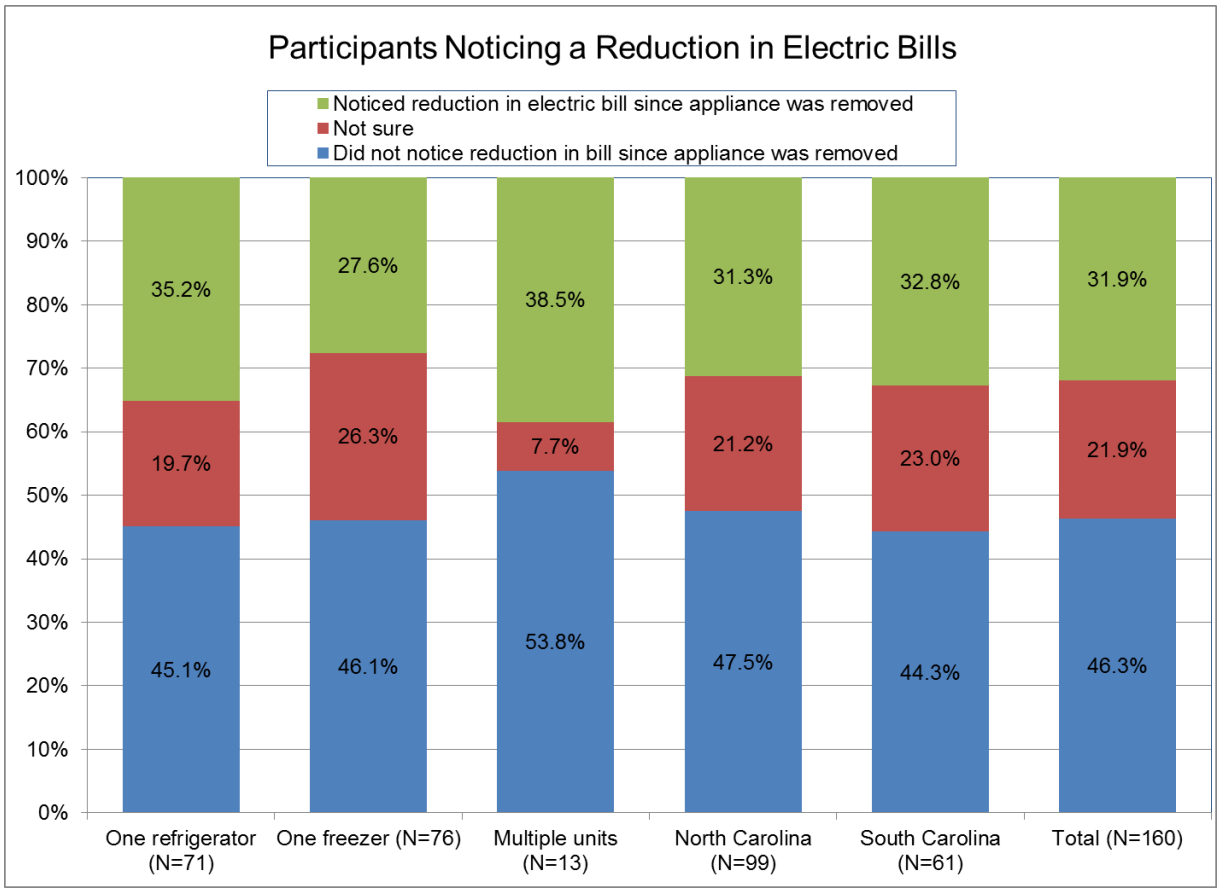


Figure 15. Participants Noticing a Reduction in Electric Bills since Their Old Appliance(s) Were Removed by Unit(s) Recycled and by State

Additional Energy Efficiency Actions since the Program

Surveyed program participants were asked, "*Based on your participation in the Duke Energy Appliance Recycling program, have you been inspired to take any additional actions to save energy?*", and also asked to rate the influence of the program on any actions taken.

Table 64 shows that the most common energy efficiency action taken since participating in the Appliance Recycling program is the installation of more efficient CFL and LED light bulbs (7.5% or 12 out of 160). Additionally, seven participants (4.4% of 160) mentioned joining MyHER or following tips from MyHER, four participants (2.5% of 160) have had a Home Energy House Call and one (0.6% out of 166) has joined Power Manager. There is also one participant (0.6% out of 166) who has unplugged another refrigerator or freezer. However, most participants (71.3% or 114 out of 160) report not having taken any additional energy efficiency actions. There are several statistically significant differences between customers who recycled different appliances; differences significant at p<.10 or better using student's t-test are marked in Table 64 with bold italic text.

Overall, the average influence of the program on actions taken after participation is 5.8 on a 10-point scale, were a "10" indicates the highest influence. The highest average influence rating of

the program is on unplugging additional refrigerators and freezers (10.0 for the one respondent who took this action), although the number of respondents who took any given action is very small so these influence ratings should be taken only as directional indicators.

Table 64. Energy Efficiency Actions Taken after Participating in the Program by Unit Recycled

Energy efficiency actions taken since the program	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)	Average Rating Influence of Program
Took additional actions (all actions combined)	23.9%	30.3%	23.1%	26.9%	5.8
Use efficient light bulbs	***4.2%***	***10.5%***	7.7%	7.5%	5.6
Upgrade appliances / Energy Star	5.6%	3.9%	7.7%	5.0%	5.6
Follow MyHER tips / joined MyHER	***0.0%***	***7.9%***	0.0%	3.8%	6.8
Upgrade windows / doors	2.8%	2.6%	0.0%	2.5%	7.0
Home Energy House Call	2.8%	2.6%	0.0%	2.5%	6.3
Heating & cooling decisions	1.4%	3.9%	0.0%	2.5%	5.8
Add insulation	***4.2%***	***0.0%***	0.0%	1.9%	4.3
Turn lights off	***0.0%***	***3.9%***	0.0%	1.9%	6.0
Upgrade HVAC system	1.4%	0.0%	0.0%	0.6%	1.0
Weather stripping / seal leaks	1.4%	0.0%	0.0%	0.6%	8.0
Unplug extra fridge / freezer	***0.0%***	***0.0%***	***7.7%***	0.6%	10.0
Joined Power Manager	0.0%	1.3%	0.0%	0.6%	6.0
Other (listed below)	4.2%	3.9%	0.0%	3.8%	5.8
Did not take additional actions	73.2%	68.4%	76.9%	71.3%	NA
Don't know / not specified	2.8%	1.3%	0.0%	1.9%	NA

Percentages total to more than 100% because participants could mention multiple actions.

Six surveyed participants (3.8% out of 160) mentioned "other" actions they have taken for energy efficiency. These responses are listed below.

Recycled one refrigerator

- *I am thinking about adding extra portable or wall heaters that are made of ceramic for my laundry room.*
- *I attended an energy program.*
- *We recently moved and have made efforts to use energy efficient things.*

Recycled one freezer

- *We are running fans to circulate air, and we open/close windows and doors to aid in heating/cooling.*
- *We had a new roof installed.*
- *Recycling.*

There are several significant differences between North and South Carolina in terms of additional energy efficiency actions taken. Customers in South Carolina are more likely to have taken additional actions (34.4% or 21 out of 61) compared to North Carolina customers (22.2% or 22 out of 99; significant at p<.05 using student's t-test). South Carolina respondents are particularly more likely to have installed more efficient light bulbs (14.8% or 9 out of 61), to have participated in Home Energy House Call (8.2% or 5 out of 61) and to mention receiving and following tips from Home Energy Reports (4.9% or 3 out of 61). All differences which are statistically significant at p<.10 or better using student's t-test are marked in Table 65 with bold italic text.

Table 65. Energy Efficiency Actions Taken after Participating in the Program by State

Energy efficiency actions taken since the program	North Carolina (N=99)	South Carolina (N=61)
Took additional actions (all actions combined)	***22.2%***	***34.4%***
Use efficient light bulbs	***3.0%***	***14.8%***
Upgrade appliances / Energy Star	6.1%	3.3%
Follow MyHER tips / joined MyHER	***1.0%***	***8.2%***
Upgrade windows / doors	2.0%	3.3%
Home Energy House Call	***1.0%***	***4.9%***
Heating & cooling decisions	2.0%	3.3%
Add insulation	***3.0%***	***0.0%***
Turn lights off	1.0%	3.3%
Upgrade HVAC system	1.0%	0.0%
Weather stripping / seal leaks	0.0%	1.6%
Unplug extra fridge / freezer	1.0%	0.0%
Joined Power Manager	1.0%	0.0%
Other	4.0%	3.3%
Did not take additional actions	74.7%	65.6%
Don't know / not specified	3.0%	0.0%

Percentages total to more than 100% because participants could mention multiple actions.

Participation in Other Duke Energy Programs

TecMarket Works asked Appliance Recycling program participants if they had participated in any other Duke Energy programs since recycling their appliances. As seen in Table 66, about one in five of these customers report participating in at least one additional program (20.6% or 33 out of 160). The most common are CFL giveaway programs (13.1% or 21 out of 160), Home Energy House Call (6.3% or 10 out of 160) and My Home Energy Report (2.1% or 5 out of 160).

Customers who recycled multiple units are more likely than others to have participated in the CFL program (23.1% or 3 out of 13), while customers who recycled one refrigerator are the most likely to have participated in Home Energy House Call (5.6% or 4 out of 71). Differences between groups which are statistically significant at p<.10 or better using student's t-test are marked in Table 66 with bold italic text.

Table 66. Self-Reported Participation in Other Duke Energy Programs by Units Recycled

Participation in other Duke Energy programs	Recycled one refrigerator (N=71)	Recycled one freezer (N=76)	Recycled multiple units (N=13)	Total (N=160)
CFL program	***9.9%***	14.5%	***23.1%***	13.1%
Home Energy House Call	2.8%	3.9%	0.0%	6.3%
My Home Energy Report	***5.6%***	***1.3%***	0.0%	3.1%
Power Manager	***0.0%***	***2.6%***	***7.7%***	1.9%
Other: "*Repair plan*"	1.4%	0.0%	0.0%	0.6%
Other: "*Water heater and water line repair plan*"	0.0%	1.3%	0.0%	0.6%
None of the above	***83.1%***	77.6%	***61.5%***	78.8%
Don't know	***0.0%***	***0.0%***	***7.7%***	0.6%

Percentages total to more than 100% because participants could mention multiple programs.

There are also some significant differences between participants in North and South Carolina. Customers in North Carolina are more likely to report participating in other Duke Energy programs (24.2% or 24 out of 99) than South Carolina customers (14.8% or 9 out of 61), though the only specific program North Carolinians are more likely to have participated in is Home Energy House Call (5.1% or 5 out of 99). Differences between states which are statistically significant at p<.10 or better using student's t-test are marked in Table 67 with bold italic text.

Table 67. Self-Reported Participation in Other Duke Energy Programs by State

Participation in other Duke Energy programs	North Carolina (N=99)	South Carolina (N=61)
CFL program	15.2%	9.8%
Home Energy House Call	2.0%	4.9%
My Home Energy Report	***5.1%***	***0.0%***
Power Manager	2.0%	1.6%
Other: "*Repair plan*"	1.0%	0.0%
Other: "*Water heater and water line repair plan*"	1.0%	0.0%
None of the above	***74.7%***	***85.2%***
Don't know	1.0%	0.0%

Percentages total to more than 100% because participants could mention multiple programs.

Appendix A: Counts of Participant for Billing Analysis

This appendix presents the counts of total participants in each month.

Month	Total Number of Participants
201210	24
201211	776
201212	1327
201301	1639
201302	1945
201303	2368
201304	2750
201305	3070

Appendix B: Estimated Model - Overall

```
        Bill_mo 201001 – 201305: monthly dummy variables
avg_temp                : average temperature
avg_humi                : average humidity
avg_wins                : average wind speed
Free_CFL                : control for participation in free CFL program
HEHC                    : control for participation in Home Energy House Call
K12                     : control for participation in EE for Schools
LowInc_Weath            : control for participation in Low Income Weatherization
SmSvr_HVAC              : control for participation in Smart $aver HVAC
Property_Mgr            : control for participation in Property Manager CFLs
MyHER                   : control for participation in My Home Energy Report (MyHER)
part                    : saving impact from ARP
part_ref                : saving impact from refrigerator
part_frz                : saving impact from freezer


                             Number of Observations Read      153381
                             Number of Observations Used      153381

Dependent Variable: kwhd

                                              Sum of
       Source                       DF        Squares     Mean Square    F Value    Pr > F

       Model                      4204    112463932.1         26751.6      91.96    <.0001

       Error                    149176     43393981.3           290.9

       Corrected Total          153380    155857913.5


                       R-Square     Coeff Var      Root MSE     kwhd Mean

                       0.721580      36.05972      17.05553      47.29801


       Source                       DF       Type I SS     Mean Square    F Value    Pr > F

       account_id                 4152    97094644.45        23385.03      80.39    <.0001
       bill_mo                      41    15186193.87       370394.97    1273.31    <.0001
       avg_temp                      1       20084.82        20084.82      69.05    <.0001
       avg_humi                      1        9503.27         9503.27      32.67    <.0001
       avg_wins                      1       73658.65        73658.65     253.22    <.0001
       Free_CFL                      1        1048.56         1048.56       3.60    0.0576
       HEHC                          1       13284.19        13284.19      45.67    <.0001
       K12                           1        1621.17         1621.17       5.57    0.0182
       LowInc_Weath                  1        5523.99         5523.99      18.99    <.0001
       SmSvr_HVAC                    1       29914.86        29914.86     102.84    <.0001
       Property_Mgr                  1          55.30           55.30       0.19    0.6628
       MyHER                         1        9550.76         9550.76      32.83    <.0001
       part                          1       18848.23        18848.23      64.79    <.0001


       Source                       DF     Type III SS     Mean Square    F Value    Pr > F

       bill_mo                      41    13291578.67       324184.85    1114.45    <.0001
       avg_temp                      1        9734.41         9734.41      33.46    <.0001
       avg_humi                      1        1924.09         1924.09       6.61    0.0101
       avg_wins                      1       74327.73        74327.73     255.52    <.0001
       Free_CFL                      1        1122.52         1122.52       3.86    0.0495
       HEHC                          1       11255.22        11255.22      38.69    <.0001
       K12                           1        1442.78         1442.78       4.96    0.0259
       LowInc_Weath                  1        5214.18         5214.18      17.92    <.0001
       SmSvr_HVAC                    1       29733.03        29733.03     102.21    <.0001
       Property_Mgr                  1          18.27           18.27       0.06    0.8021
       MyHER                         1        9732.16         9732.16      33.46    <.0001
       part                          1       18848.23        18848.23      64.79    <.0001
```

Parameter		Estimate		Standard Error	t Value	Pr > |t|
bill_mo	201001	26.62969971	B	5.86220631	4.54	<.0001
bill_mo	201002	23.42624301	B	5.85708550	4.00	<.0001
bill_mo	201003	17.81752966	B	5.85315580	3.04	0.0023
bill_mo	201004	2.77759087	B	5.83210098	0.48	0.6339
bill_mo	201005	2.59120437	B	5.82364063	0.44	0.6564
bill_mo	201006	16.83299911	B	5.81915916	2.89	0.0038
bill_mo	201007	33.55536204	B	5.82158492	5.76	<.0001
bill_mo	201008	35.31301561	B	5.82021850	6.07	<.0001
bill_mo	201009	25.87420868	B	5.82178659	4.44	<.0001
bill_mo	201010	8.08731129	B	5.82232819	1.39	0.1648
bill_mo	201011	2.55413723	B	5.83061909	0.44	0.6613
bill_mo	201012	15.61243882	B	5.84823112	2.67	0.0076
bill_mo	201101	28.57447353	B	5.86521449	4.87	<.0001
bill_mo	201102	21.97947825	B	5.85685379	3.75	0.0002
bill_mo	201103	6.19332289	B	5.83994653	1.06	0.2889
bill_mo	201104	1.12966071	B	5.83052742	0.19	0.8464
bill_mo	201105	0.36685546	B	5.82086088	0.06	0.9497

Parameter		95% Confidence Limits	
bill_mo	201001	15.13989324	38.11950618
bill_mo	201002	11.94647324	34.90601279
bill_mo	201003	6.34546201	29.28959731
bill_mo	201004	-8.65320975	14.20839149
bill_mo	201005	-8.82301414	14.00542288
bill_mo	201006	5.42756420	28.23843403
bill_mo	201007	22.14517269	44.96555139
bill_mo	201008	23.90550441	46.72052680
bill_mo	201009	14.46362406	37.28479331
bill_mo	201010	-3.32433485	19.49895743
bill_mo	201011	-8.87375892	13.98203338
bill_mo	201012	4.15002344	27.07485419
bill_mo	201101	17.07877110	40.07017596
bill_mo	201102	10.50016261	33.45879388
bill_mo	201103	-5.25285486	17.63950063
bill_mo	201104	-10.29805575	12.55737718
bill_mo	201105	-11.04191479	11.77562570

Parameter		Estimate		Standard Error	t Value	Pr > |t|
bill_mo	201106	17.96413032	B	5.82000821	3.09	0.0020
bill_mo	201107	27.52281693	B	5.81890329	4.73	<.0001
bill_mo	201108	34.84025373	B	5.81978076	5.99	<.0001
bill_mo	201109	21.12583596	B	5.81816935	3.63	0.0003
bill_mo	201110	3.51643957	B	5.81987575	0.60	0.5457
bill_mo	201111	2.56189798	B	5.82938829	0.44	0.6603
bill_mo	201112	8.48601855	B	5.83437524	1.45	0.1458
bill_mo	201201	14.40243282	B	5.84170352	2.47	0.0137
bill_mo	201202	12.93825793	B	5.84299820	2.21	0.0268
bill_mo	201203	6.96500652	B	5.83501458	1.19	0.2326
bill_mo	201204	-0.67883063	B	5.82371305	-0.12	0.9072
bill_mo	201205	1.68157969	B	5.82012938	0.29	0.7726
bill_mo	201206	10.07963786	B	5.81790595	1.73	0.0832
bill_mo	201207	25.11707877	B	5.81806662	4.32	<.0001
bill_mo	201208	28.02429979	B	5.81703499	4.82	<.0001
bill_mo	201209	17.17025141	B	5.81720883	2.95	0.0032
bill_mo	201210	4.05574330	B	5.82060086	0.70	0.4859
bill_mo	201211	2.87372563	B	5.82649169	0.49	0.6219
bill_mo	201212	10.35928483	B	5.83430485	1.78	0.0758
bill_mo	201301	15.22694344	B	5.83648022	2.61	0.0091
bill_mo	201302	15.93162891	B	5.84062263	2.73	0.0064
bill_mo	201303	14.00135770	B	5.84138681	2.40	0.0165
bill_mo	201304	6.10162284	B	5.83125582	1.05	0.2954
bill_mo	201305	-1.27383100	B	5.81559152	-0.22	0.8266
avg_temp		-0.10403299		0.01798381	-5.78	<.0001
avg_humi		-0.03308826		0.01286550	-2.57	0.0101
avg_wins		1.39913337		0.08752839	15.98	<.0001
Free_CFL		0.30195760		0.15371414	1.96	0.0495
HEHC		-3.56280292		0.57276970	-6.22	<.0001
K12		1.49880387		0.67299198	2.23	0.0259
LowInc_Weath		9.95797673		2.35203288	4.23	<.0001
SmSvr_HVAC		-4.71065542		0.46593681	-10.11	<.0001
Property_Mgr		0.93389578		3.72596543	0.25	0.8021
MyHER		-1.29251305		0.22345786	-5.78	<.0001
part		-2.03392051		0.25267599	-8.05	<.0001

Parameter		95% Confidence Limits	
bill_mo	201106	6.55703129	29.37122936
bill_mo	201107	16.11788351	38.92775035
bill_mo	201108	23.43360050	46.24690697

Parameter		95% Confidence Limits	
bill_mo	201109	9.72234106	32.52933086
bill_mo	201110	-7.89039984	14.92327899
bill_mo	201111	-8.86358582	13.98738178
bill_mo	201112	-2.94923958	19.92127668
bill_mo	201201	2.95281141	25.85205424
bill_mo	201202	1.48609898	24.39041689
bill_mo	201203	-4.47150470	18.40151774
bill_mo	201204	-12.09319107	10.73552982
bill_mo	201205	-9.72575683	13.08891622
bill_mo	201206	-1.32334078	21.48261651
bill_mo	201207	13.71378522	36.52037232
bill_mo	201208	16.62302821	39.42557137
bill_mo	201209	5.76863911	28.57186370
bill_mo	201210	-7.35251732	15.46400391
bill_mo	201211	-8.54608090	14.29353216
bill_mo	201212	-1.07583533	21.79440498
bill_mo	201301	3.78755960	26.66632729
bill_mo	201302	4.48412602	27.37913180
bill_mo	201303	2.55235704	25.45035836
bill_mo	201304	-5.32752128	17.53076697
bill_mo	201305	-12.67227341	10.12461141
avg_temp		-0.13928089	-0.06878509
avg_humi		-0.05830438	-0.00787213
avg_wins		1.22757947	1.57068726
Free_CFL		0.00068099	0.60323422
HEHC		-4.68542001	-2.44018584
K12		0.17975312	2.81785462
LowInc_Weath		5.34803959	14.56791387
SmSvr_HVAC		-5.62388220	-3.79742865
Property_Mgr		-6.36892152	8.23671307
MyHER		-1.73048595	-0.85454014
part		-2.52916037	-1.53868066

Appendix C: Estimated Model – Refrigerator

```
        Bill_mo 201001 – 201305: monthly dummy variables
avg_temp                : average temperature
avg_humi                : average humidity
avg_wins                : average wind speed
Free_CFL                : control for participation in free CFL program
HEHC                    : control for participation in Home Energy House Call
K12                     : control for participation in EE for Schools
LowInc_Weath            : control for participation in Low Income Weatherization
SmSvr_HVAC              : control for participation in Smart $aver HVAC
Property_Mgr            : control for participation in Property Manager CFLs
MyHER                   : control for participation in My Home Energy Report (MyHER)
part                    : saving impact from ARP
part_ref                : saving impact from refrigerator
part_frz                : saving impact from freezer


                              Number of Observations Read      111791
                              Number of Observations Used      111791

Dependent Variable: kwhd

                                                Sum of
        Source                      DF         Squares     Mean Square    F Value    Pr > F

        Model                     3235      77739135.9         24030.6      86.14    <.0001

        Error                   108555      30285334.2           279.0

        Corrected Total         111790     108024470.0


                         R-Square     Coeff Var      Root MSE     kwhd Mean

                         0.719644      35.93618      16.70288      46.47928


        Source                      DF       Type I SS     Mean Square    F Value    Pr > F

        account_id                3183     66810128.43        20989.67      75.24    <.0001
        bill_mo                     41     10812610.09       263722.20     945.29    <.0001
        avg_temp                     1        15161.95        15161.95      54.35    <.0001
        avg_humi                     1         8120.79         8120.79      29.11    <.0001
        avg_wins                     1        42669.00        42669.00     152.94    <.0001
        Free_CFL                     1          942.69          942.69       3.38    0.0660
        HEHC                         1         7763.53         7763.53      27.83    <.0001
        K12                          1          407.50          407.50       1.46    0.2268
        LowInc_Weath                 1         3558.92         3558.92      12.76    0.0004
        SmSvr_HVAC                   1        20846.58        20846.58      74.72    <.0001
        Property_Mgr                 1          479.58          479.58       1.72    0.1898
        MyHER                        1         5601.62         5601.62      20.08    <.0001
        part_REF                     1        10845.15        10845.15      38.87    <.0001


        Source                      DF     Type III SS     Mean Square    F Value    Pr > F

        bill_mo                     41     9453211.105      230566.125     826.44    <.0001
        avg_temp                     1        8189.603        8189.603      29.35    <.0001
        avg_humi                     1        2349.521        2349.521       8.42    0.0037
        avg_wins                     1       43127.415       43127.415     154.59    <.0001
        Free_CFL                     1         938.387         938.387       3.36    0.0667
        HEHC                         1        6388.868        6388.868      22.90    <.0001
        K12                          1         403.156         403.156       1.45    0.2293
        LowInc_Weath                 1        3339.284        3339.284      11.97    0.0005
        SmSvr_HVAC                   1       20693.363       20693.363      74.17    <.0001
        Property_Mgr                 1         382.365         382.365       1.37    0.2417
        MyHER                        1        5524.988        5524.988      19.80    <.0001
```

part_REF	1	10845.150	10845.150	38.87	<.0001

Parameter		Estimate	Standard Error	t Value	Pr > |t|
bill_mo	201001	20.19235877 B	7.73089005	2.61	0.0090
bill_mo	201002	17.03808972 B	7.72581562	2.21	0.0274
bill_mo	201003	11.25027787 B	7.72168620	1.46	0.1451
bill_mo	201004	-3.69751401 B	7.70083564	-0.48	0.6311
bill_mo	201005	-3.48999954 B	7.69259280	-0.45	0.6501
bill_mo	201006	10.73171186 B	7.68855435	1.40	0.1628
bill_mo	201007	27.10754488 B	7.69094149	3.52	0.0004
bill_mo	201008	28.82363708 B	7.68973024	3.75	0.0002
bill_mo	201009	19.29799325 B	7.69115000	2.51	0.0121
bill_mo	201010	1.86505185 B	7.69151566	0.24	0.8084
bill_mo	201011	-3.70611826 B	7.69966972	-0.48	0.6303
bill_mo	201012	9.35810766 B	7.71714508	1.21	0.2253
bill_mo	201101	22.29096704 B	7.73389868	2.88	0.0039
bill_mo	201102	15.52070051 B	7.72552673	2.01	0.0445
bill_mo	201103	-0.09252389 B	7.70852164	-0.01	0.9904
bill_mo	201104	-4.89440610 B	7.69929975	-0.64	0.5250
bill_mo	201105	-5.55415593 B	7.68994797	-0.72	0.4701

Parameter		95% Confidence Limits	
bill_mo	201001	5.03992376	35.34479378
bill_mo	201002	1.89560051	32.18057893
bill_mo	201003	-3.88411773	26.38467347
bill_mo	201004	-18.79104279	11.39601478
bill_mo	201005	-18.56737248	11.58737340
bill_mo	201006	-4.33774578	25.80116951
bill_mo	201007	12.03340847	42.18168129
bill_mo	201008	13.75187470	43.89539945
bill_mo	201009	4.22344818	34.37253833
bill_mo	201010	-13.21020992	16.94031362
bill_mo	201011	-18.79736186	11.38512534
bill_mo	201012	-5.76738740	24.48360271
bill_mo	201101	7.13263516	37.44929892
bill_mo	201102	0.37877753	30.66262350
bill_mo	201103	-15.20111714	15.01606936
bill_mo	201104	-19.98492457	10.19611237
bill_mo	201105	-20.62634505	9.51803318

Parameter		Estimate		Standard Error	t Value	Pr > |t|
bill_mo	201106	11.62769937	B	7.68939537	1.51	0.1305
bill_mo	201107	21.08902776	B	7.68827884	2.74	0.0061
bill_mo	201108	28.27485281	B	7.68917393	3.68	0.0002
bill_mo	201109	14.68523183	B	7.68744879	1.91	0.0561
bill_mo	201110	-2.63019366	B	7.68916438	-0.34	0.7323
bill_mo	201111	-3.69099810	B	7.69843748	-0.48	0.6316
bill_mo	201112	2.06878116	B	7.70341230	0.27	0.7883
bill_mo	201201	7.97198805	B	7.71063722	1.03	0.3012
bill_mo	201202	6.57484938	B	7.71189356	0.85	0.3939
bill_mo	201203	0.77801776	B	7.70392238	0.10	0.9196
bill_mo	201204	-6.88354353	B	7.69279049	-0.89	0.3709
bill_mo	201205	-4.43306619	B	7.68932921	-0.58	0.5643
bill_mo	201206	3.86412750	B	7.68730971	0.50	0.6152
bill_mo	201207	18.65178320	B	7.68752331	2.43	0.0153
bill_mo	201208	21.61515634	B	7.68678409	2.81	0.0049
bill_mo	201209	10.87323307	B	7.68693308	1.41	0.1572
bill_mo	201210	-2.13832458	B	7.69008818	-0.28	0.7810
bill_mo	201211	-3.40990450	B	7.69590407	-0.44	0.6577
bill_mo	201212	3.89349486	B	7.70399309	0.51	0.6133
bill_mo	201301	8.75014875	B	7.70628259	1.14	0.2562
bill_mo	201302	9.39302754	B	7.71031751	1.22	0.2231
bill_mo	201303	7.50700340	B	7.71074980	0.97	0.3303
bill_mo	201304	-0.37078241	B	7.70068141	-0.05	0.9616
bill_mo	201305	-7.28428094	B	7.68554147	-0.95	0.3432
avg_temp		-0.11168244		0.02061317	-5.42	<.0001
avg_humi		-0.04287448		0.01477408	-2.90	0.0037
avg_wins		1.24444626		0.10009000	12.43	<.0001
Free_CFL		0.32340423		0.17633807	1.83	0.0667
HEHC		-3.36224924		0.70260175	-4.79	<.0001
K12		0.92695475		0.77110497	1.20	0.2293
LowInc_Weath		8.25794949		2.38691434	3.46	0.0005
SmSvr_HVAC		-4.72285295		0.54837817	-8.61	<.0001
Property_Mgr		5.32953822		4.55241439	1.17	0.2417
MyHER		-1.14338025		0.25693088	-4.45	<.0001
part_REF		-1.80138288		0.28892127	-6.23	<.0001

Parameter		95% Confidence Limits	
bill_mo	201106	-3.44340666	26.69880541
bill_mo	201107	6.02011011	36.15794540
bill_mo	201108	13.20418080	43.34552483

Parameter		95% Confidence Limits	
bill_mo	201109	-0.38205893	29.75252258
bill_mo	201110	-17.70084695	12.44045964
bill_mo	201111	-18.77982653	11.39783033
bill_mo	201112	-13.02979786	17.16736018
bill_mo	201201	-7.14075170	23.08472779
bill_mo	201202	-8.54035278	21.69005155
bill_mo	201203	-14.32156100	15.87759651
bill_mo	201204	-21.96130395	8.19421689
bill_mo	201205	-19.50404254	10.63791017
bill_mo	201206	-11.20289067	18.93114567
bill_mo	201207	3.58434639	33.71922001
bill_mo	201208	6.54916839	36.68114430
bill_mo	201209	-4.19304691	25.93951305
bill_mo	201210	-17.21078852	12.93413935
bill_mo	201211	-18.49376750	11.67395849
bill_mo	201212	-11.20622248	18.99321221
bill_mo	201301	-6.35405598	23.85435349
bill_mo	201302	-5.71908559	24.50514067
bill_mo	201303	-7.60595700	22.61996381
bill_mo	201304	-15.46400891	14.72244409
bill_mo	201305	-22.34783337	7.77927150
avg_temp		-0.15208396	-0.07128092
avg_humi		-0.07183147	-0.01391749
avg_wins		1.04827127	1.44062125
Free_CFL		-0.02221589	0.66902436
HEHC		-4.73933873	-1.98515976
K12		-0.58440006	2.43830957
LowInc_Weath		3.57963119	12.93626780
SmSvr_HVAC		-5.79766639	-3.64803951
Property_Mgr		-3.59312952	14.25220596
MyHER		-1.64696114	-0.63979936
part_REF		-2.36766447	-1.23510128

Appendix D: Estimated Model – Freezer

```
        Bill_mo 201001 – 201305: monthly dummy variables
avg_temp                : average temperature
avg_humi                : average humidity
avg_wins                : average wind speed
Free_CFL                : control for participation in free CFL program
HEHC                    : control for participation in Home Energy House Call
K12                     : control for participation in EE for Schools
LowInc_Weath            : control for participation in Low Income Weatherization
SmSvr_HVAC              : control for participation in Smart $aver HVAC
Property_Mgr            : control for participation in Property Manager CFLs
MyHER                   : control for participation in My Home Energy Report (MyHER)
part                    : saving impact from ARP
part_ref                : saving impact from refrigerator
part_frz                : saving impact from freezer

                             Number of Observations Read       41590
                             Number of Observations Used       41590

Dependent Variable: kwhd
```

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1167	34463439.83	29531.65	91.17	<.0001
Error	40422	13093641.59	323.92		
Corrected Total	41589	47557081.42			

R-Square	Coeff Var	Root MSE	kwhd Mean
0.724675	36.36029	17.99788	49.49872

Source	DF	Type I SS	Mean Square	F Value	Pr > F
account_id	1115	30008153.98	26913.14	83.08	<.0001
bill_mo	41	4383593.80	106916.92	330.07	<.0001
avg_temp	1	4894.04	4894.04	15.11	0.0001
avg_humi	1	1553.73	1553.73	4.80	0.0285
avg_wins	1	33512.71	33512.71	103.46	<.0001
Free_CFL	1	160.57	160.57	0.50	0.4814
HEHC	1	5243.08	5243.08	16.19	<.0001
K12	1	1912.62	1912.62	5.90	0.0151
LowInc_Weath	1	3867.54	3867.54	11.94	0.0006
SmSvr_HVAC	1	8891.58	8891.58	27.45	<.0001
Property_Mgr	1	290.55	290.55	0.90	0.3436
MyHER	1	4039.79	4039.79	12.47	0.0004
part_FRZ	1	7325.83	7325.83	22.62	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
bill_mo	41	3847589.391	93843.644	289.71	<.0001
avg_temp	1	1575.071	1575.071	4.86	0.0275
avg_humi	1	27.113	27.113	0.08	0.7723
avg_wins	1	33873.672	33873.672	104.57	<.0001
Free_CFL	1	199.199	199.199	0.61	0.4329
HEHC	1	4716.577	4716.577	14.56	0.0001
K12	1	1504.201	1504.201	4.64	0.0312
LowInc_Weath	1	3802.633	3802.633	11.74	0.0006
SmSvr_HVAC	1	8869.845	8869.845	27.38	<.0001
Property_Mgr	1	371.233	371.233	1.15	0.2844
MyHER	1	4490.708	4490.708	13.86	0.0002
part_FRZ	1	7325.834	7325.834	22.62	<.0001

Parameter		Estimate		Standard Error	t Value	Pr > |t|
bill_mo	201001	34.71818051	B	9.27555705	3.74	0.0002
bill_mo	201002	31.37557977	B	9.26231114	3.39	0.0007
bill_mo	201003	26.22168834	B	9.25301786	2.83	0.0046
bill_mo	201004	10.90890719	B	9.19780018	1.19	0.2356
bill_mo	201005	9.63796266	B	9.17513151	1.05	0.2935
bill_mo	201006	23.92371739	B	9.16191419	2.61	0.0090
bill_mo	201007	41.53829977	B	9.16836545	4.53	<.0001
bill_mo	201008	43.40219328	B	9.16423226	4.74	<.0001
bill_mo	201009	34.22181222	B	9.16877531	3.73	0.0002
bill_mo	201010	15.50465693	B	9.17078377	1.69	0.0909
bill_mo	201011	10.12861347	B	9.19277943	1.10	0.2706
bill_mo	201012	23.20505403	B	9.23866623	2.51	0.0120
bill_mo	201101	36.26554976	B	9.28372645	3.91	<.0001
bill_mo	201102	30.10781458	B	9.26225957	3.25	0.0012
bill_mo	201103	13.81723721	B	9.21888544	1.50	0.1339
bill_mo	201104	8.03442836	B	9.19377311	0.87	0.3822
bill_mo	201105	6.98126383	B	9.16751625	0.76	0.4463

Parameter		95% Confidence Limits	
bill_mo	201001	16.53787838	52.89848264
bill_mo	201002	13.22123992	49.52991961
bill_mo	201003	8.08556354	44.35781314
bill_mo	201004	-7.11898970	28.93680409
bill_mo	201005	-8.34550314	27.62142845
bill_mo	201006	5.96615785	41.88127694
bill_mo	201007	23.56809560	59.50850394
bill_mo	201008	25.44009025	61.36429630
bill_mo	201009	16.25080472	52.19281972
bill_mo	201010	-2.47028720	33.47960107
bill_mo	201011	-7.88944265	28.14666958
bill_mo	201012	5.09705873	41.31304932
bill_mo	201101	18.06923542	54.46186409
bill_mo	201102	11.95357581	48.26205336
bill_mo	201103	-4.25198728	31.88646170
bill_mo	201104	-9.98557540	26.05443212
bill_mo	201105	-10.98727589	24.94980355

Parameter		Estimate		Standard Error	t Value	Pr > |t|
bill_mo	201106	25.69709920	B	9.16432428	2.80	0.0050
bill_mo	201107	35.47746451	B	9.16149531	3.87	0.0001
bill_mo	201108	43.14734461	B	9.16377897	4.71	<.0001
bill_mo	201109	29.12035588	B	9.16002478	3.18	0.0015
bill_mo	201110	10.73370604	B	9.16420679	1.17	0.2415
bill_mo	201111	10.11229812	B	9.18974075	1.10	0.2712
bill_mo	201112	16.48679018	B	9.20269209	1.79	0.0732
bill_mo	201201	22.44511060	B	9.22198383	2.43	0.0149
bill_mo	201202	20.80253483	B	9.22558313	2.25	0.0241
bill_mo	201203	14.33155313	B	9.20481660	1.56	0.1195
bill_mo	201204	6.71107030	B	9.17498690	0.73	0.4645
bill_mo	201205	8.81902247	B	9.16533468	0.96	0.3359
bill_mo	201206	17.47379148	B	9.15883208	1.91	0.0564
bill_mo	201207	33.17608229	B	9.15912685	3.62	0.0003
bill_mo	201208	35.93482597	B	9.15545339	3.92	<.0001
bill_mo	201209	24.81425532	B	9.15585653	2.71	0.0067
bill_mo	201210	11.38770299	B	9.16581735	1.24	0.2141
bill_mo	201211	10.45373677	B	9.18067931	1.14	0.2548
bill_mo	201212	18.42361157	B	9.19998900	2.00	0.0452
bill_mo	201301	23.31148424	B	9.20537771	2.53	0.0113
bill_mo	201302	24.15780115	B	9.21671493	2.62	0.0088
bill_mo	201303	22.06483592	B	9.22011611	2.39	0.0167
bill_mo	201304	14.06365989	B	9.19343175	1.53	0.1261
bill_mo	201305	5.33832299	B	9.15097697	0.58	0.5597
avg_temp		-0.08056397		0.03653525	-2.21	0.0275
avg_humi		-0.00752657		0.02601519	-0.29	0.7723
avg_wins		1.83036465		0.17898960	10.23	<.0001
Free_CFL		0.24466070		0.31199076	0.78	0.4329
HEHC		-3.83778944		1.00574756	-3.82	0.0001
K12		2.95406204		1.37084380	2.15	0.0312
LowInc_Weath		32.51988747		9.49135422	3.43	0.0006
SmSvr_HVAC		-4.64201107		0.88709365	-5.23	<.0001
Property_Mgr		-7.04323664		6.57916235	-1.07	0.2844
MyHER		-1.68060252		0.45136610	-3.72	0.0002
part_FRZ		-2.44966690		0.51510982	-4.76	<.0001

Parameter		95% Confidence Limits	
bill_mo	201106	7.73481582	43.65938259
bill_mo	201107	17.52072598	53.43420305
bill_mo	201108	25.18613004	61.10855917

Parameter		95% Confidence Limits	
bill_mo	201109	11.16649962	47.07421214
bill_mo	201110	-7.22834705	28.69575913
bill_mo	201111	-7.89980211	28.12439836
bill_mo	201112	-1.55069497	34.52427533
bill_mo	201201	4.36981319	40.52040801
bill_mo	201202	2.72018272	38.88488694
bill_mo	201203	-3.71009613	32.37320238
bill_mo	201204	-11.27211206	24.69425266
bill_mo	201205	-9.14524131	26.78328625
bill_mo	201206	-0.47772706	35.42531001
bill_mo	201207	15.22398599	51.12817859
bill_mo	201208	17.98992974	53.87972220
bill_mo	201209	6.86856892	42.75994172
bill_mo	201210	-6.57750683	29.35291281
bill_mo	201211	-7.54060285	28.44807639
bill_mo	201212	0.39142453	36.45579861
bill_mo	201301	5.26873522	41.35423327
bill_mo	201302	6.09283091	42.22277140
bill_mo	201303	3.99319930	40.13647254
bill_mo	201304	-3.95567480	32.08299458
bill_mo	201305	-12.59779935	23.27444534
avg_temp		-0.15217390	-0.00895404
avg_humi		-0.05851694	0.04346380
avg_wins		1.47954097	2.18118833
Free_CFL		-0.36684828	0.85616967
HEHC		-5.80907747	-1.86650140
K12		0.26717711	5.64094696
LowInc_Weath		13.91661799	51.12315695
SmSvr_HVAC		-6.38073474	-2.90328740
Property_Mgr		-19.93854402	5.85207074
MyHER		-2.56529031	-0.79591473
part_FRZ		-3.45929382	-1.44003997

Appendix E: Regression Table

Unit	Slope	Intercept	Raw Savings	Weather Normalized Savings	Change
1	0.0267	1.2928	1159	1058	-101
2	0.0230	2.3900	1493	1360	-133
3	-0.0019	2.4522	845	912	+67
4	0.0324	7.6892	3705	3525	-180
5	0.0022	1.9233	749	751	+2
6	0.0022	2.6996	1050	1035	-15
7	-0.0016	2.8602	998	908	-90
8	0.0153	3.1736	1594	1499	-95
9	0.0169	2.1603	1253	1129	-124
10	0.1216	-3.6143	1895	1132	-764
11	-0.0049	3.8947	1290	1414	+124
12	0.0458	-1.3499	821	560	-261
13	0.0016	7.4481	2763	2754	-9
14	0.0130	1.6478	811	950	+139
15	0.0533	-0.5380	1360	932	-428
16	0.0208	2.1960	1403	1253	-150
17	0.0884	-2.3854	1701	1053	-648
18	-0.0207	7.5219	2150	2296	+146
19	0.0369	-0.6130	478	576	+99
20	0.0624	-0.3541	1631	1220	-410
21	0.0024	2.7760	1080	1066	-15
22	0.0221	2.1895	1433	1289	-144
23	0.1124	-6.3380	897	318	-579
24	0.0498	1.0649	1469	1466	-2
25	-0.0833	9.5474	1647	1655	+8
26	0.0173	2.0480	1180	1128	-51
27	0.0288	2.0176	1448	1376	-72
28	0.0003	3.9503	1450	1449	-1
29	0.0177	0.9271	831	732	-99
30	0.0389	0.6464	1237	1077	-159
31	-0.0112	4.8575	1457	1630	+172
32	-0.0058	9.1973	3208	3240	+32
33	-0.2658	25.8848	2192	3823	+1631
34	0.0602	-0.0902	1663	1302	-361
35	0.0208	2.3540	1403	1300	-103
36	0.0191	1.2850	1017	893	-124
37	0.0724	-1.0901	1098	1209	+111
38	0.0421	1.6375	1788	1521	-267

39	-0.0015	2.9603	1041	1047	+7
40	0.0999	-4.1903	964	654	-311
41	0.0077	1.8131	867	828	-39
42	-0.0040	2.5793	831	856	+25
43	0.0074	0.8576	516	477	-39

Appendix F: Management Interview Instrument

Name: _____
Title: _____

We are conducting this interview to obtain your opinions about and experience with the [STATE NAME] Appliance Recycling Program. We'll talk about the Program and its objectives, your thoughts on improving the program and its participation rates, and the technologies the program covers. The interview will take about an hour to complete. May we begin?

PROGRAM DESCRIPTION

In your own words, please describe the [STATE NAME] Appliance Recycling Program.

Please discuss the history and development of the program.

Why appliance recycling? Why not just disposal? Why can't customers drop off appliances?

Why refrigerators and freezers? (high energy consumption, common second units, models prior to 1993, etc.) Are other appliances being considered, such as room air conditioners, kitchen and laundry appliances? If so, which ones? When might they be incorporated into the program? What factors will be used to make the determination?

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

What are the current program's objectives? That is, aside from the numerical goals what is the program trying to accomplish (save energy, improve CSAT, protect environment, etc)? In your opinion, which objectives do you think are being met or will be met? Have the objectives changed over time. If yes, how do you think they have changed??

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

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

What are the program requirements for participation? What are the customer eligibility requirements?

What are the appliance requirements for program participation? Why unit sizes of 10-30 cu ft? Why is size important? Why a limit of 2 units?

Does ARP apply to renters as well as homeowners? Why or why not?

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

PROGRAM MANAGEMENT AND OPERATIONS

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

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

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

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

PROGRAM IMPLEMENTATION

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

Describe process of hiring and integrating JACO. Is the JACO program turn key?

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

Please describe the ARP process from initial marketing, through appliance pick up and dismantling, to verification and incentive processing.

Why must unit be plugged in at time of pick up?

Please describe the incentive process. How was the $30 incentive amount determined? How long does it take for customers to get paid? In what form is the payment?

Please describe the JACO tracking and reporting system. Is it online? What reporting can you monitor and access? Pick ups, energy savings, program costs, emission impacts, call center volume, etc.

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

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

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

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

MARKET ASSESSMENT AND BARRIERS

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

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

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

CUSTOMER RESPONSE

What percent of people schedule online pick up versus call in?

Do you assess, track or measure customer reaction to the program? If so, how?

What is the call volume for the program? Please characterize the nature of the calls?

How is customer satisfaction addressed in this program?

What percentage of participants donate to the Helping Hand assistance program?

DATA COLLECTION AND ENERGY SAVINGS

How does Duke Energy track and attribute energy savings?

CLOSING SUGGESTIONS AND COMMENTS

Overall, what about the Appliance Recycling Program works well and why?

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

In what ways can the Appliance Recycling Program's operations be improved?

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

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

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

Appendix G: Vendor Interview Instrument

Name: _____
Title: _____

We are conducting this interview to obtain your opinions about and experience with the [STATE NAME] Appliance Recycling Program. We'll talk about the Program and its objectives, your thoughts on improving the program and its participation rates, and the technologies the program covers. The interview will take about an hour to complete. May we begin?

PROGRAM DESCRIPTION

In your own words, please describe the [STATE NAME] Appliance Recycling Program.

What is the history and relationship between JACO and Appliance Recycling Centers of America?

Why appliance recycling? Why not just disposal? Why can't customers drop off appliances?

Why refrigerators and freezers? (high energy consumption, common second units, models prior to 1993, etc.) Are other appliances being considered, such as room air conditioners, kitchen and laundry appliances? If so, which ones? When might they be incorporated into the program? What factors will be used to make the determination? Do you recycle other appliances for other utilities?

Please discuss the history and development of the program. When did you formally start the program with Duke? What dates did you start in each state?

What are the program's goals for 2012 and 2013 for each state? That is, what goals and metrics are you tasked with achieving (such as energy savings targets, numbers of new enrollments, numbers of units recycled, website visits, etc.)? How were these goals established? What is the current performance towards these targets?

What are the current program's objectives? That is, aside from the numerical goals what is the program trying to accomplish (save energy, improve CSAT, protect environment, etc)? In your opinion, which objectives do you think are being met or will be met? Have the objectives changed over time. If yes, how do you think they have changed??

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

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

What are the program requirements for participation? What are the customer eligibility requirements? Are you considering expanding to a wider audience?

What are the appliance requirements for program participation? Why unit sizes of 10-30 cu ft? Why is size important? Why a limit of 2 units? Why not built-ins, SubZeros?

Does ARP apply to renters as well as homeowners? Why or why not?

What are the requirements for the pick up location?

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

PROGRAM MANAGEMENT AND OPERATIONS

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

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

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

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

PROGRAM IMPLEMENTATION

Other than Duke Energy do you work with any other firms or organization to implement this program? Please describe their roles in the implementation of the program.

How is marketing handled? What is your relationship with Runion, Salzman, Einhorn? What marketing channels do you use? How are these coordinated? Tell me about your pop up museum, filet-a-frig, and other media events.

Help me to understand the mechanics of how the program operates. Walk me through the process by which a customer signs up for the program/requests an appointment. What info do you capture when the customer enrolls? What happens if the appointment time doesn't work for the customer? What happens if the customer can't be home?

Please describe the ARP process from initial marketing, through appliance pick up and dismantling, to verification and incentive processing.

What do you do while at the customer's house? Why must unit be plugged in at time of pick up?
Why do you start to dismantle the frig at the customer's house?

What does ATO stand for?

Can you describe the demanufacturing process for me? What are the environmental regulations and controls that go into this effort? Why are they important?

How is the program structured so that Duke Energy never actually takes ownership/possession of the appliance?

How are customer incentives handled? Please describe that process from start to finish.

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

Please describe your tracking and reporting system. Is it online? What sort of tracking and reporting do you do? How often and in what format? Tell me about the customer dashboard.

Please characterize your performance to date. What are your SLAs? How are you doing towards them? Any lapses since you started?

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

What is the business cycle of the program? Are there certain times of the year that are busier than others? When and why? How do you take this into consideration for marketing and implementation?

How does the way you run the program for Duke Energy differ from how you run it for other utility clients?

MARKET ASSESSMENT AND BARRIERS

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

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

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

CUSTOMER RESPONSE

What percent of people schedule online pick up versus call in?

Do you assess, track or measure customer reaction to the program? If so, how?

What is the call volume for the program? Please characterize the nature of the calls?

How is customer satisfaction addressed in this program?

CLOSING SUGGESTIONS AND COMMENTS

Overall, what about the Appliance Recycling Program works well and why?

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

In what ways can the Appliance Recycling Program's operations be improved?

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

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

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

Appendix H: Used Appliance Dealer Survey Instrument

INSTRUMENT

Respondent information

Name: _____ Title: _____

Address: _____ City: _____

Zip: _____ Phone: _____

Introduction

Hello. I am calling on behalf of Duke Energy, which sponsors the Appliance Recycling program that collects and recycles old operating refrigerators and freezers. We are trying to figure out how this program is affecting the market for used refrigerators and freezers. First, we want to ask your opinions of the program and the effects it may or may not be having on your business and the market for used units. Then, we want to ask you some questions to understand how the market for used units operates. The information you provide will be combined with information from others and summarized to describe how this market works. As we are doing the interview, please feel free to let me know if you are not comfortable with answering any of the questions I ask.

Respondent responsibilities

1. What are your primary responsibilities? *(Get respondent's title)*

Effect of Appliance Recycling- program on market

2. Are you aware of Duke Energy's Appliance Recycling program? *(Describe program to respondent if not aware. The Duke Energy Appliance Recycling program pays the utility's residential customers a rebate to have their working refrigerators and freezers picked up and removed from their homes to be recycled in an environmentally safe way.)*

3. What are your opinions of the Appliance Recycling program?

4. What effect does the program have on your business? Why? *(Carefully probe for whether or not these effects have already happened. If they have already happened, ask for examples. If they have not already happened, ask about how big they think the program would have to be and how long they think the program would have to run before it started to have an effect on their business.)*

5. What effect does the program have on the supply of used refrigerators? Why? *(As with Q4, carefully probe for whether or not these effects have already happened.)*

6. What effect does the program have on the demand for used refrigerators? Why? *(As with Q4, carefully probe for whether or not these effects have already happened.)*

Overview of operations

7. Please briefly describe how your business operates in the used refrigerator market. *(Obtain enough information to sketch flowchart)*

8. Do you also sell new refrigerators? What percent of the refrigerators you sell are new vs. used?

9. Considering the other businesses that you know of in STATE NAME that sell used refrigerators and freezers, how would you compare the number of units that your company sells compared to the number that they sell?
   - ☐ We sell more used units than the average company
   - ☐ We sell about the same number as other companies.
   - ☐ We sell fewer used units than the average company
   - ☐ Don't know/Not Sure

Acquisition process

10. Describe the ways in which you locate and obtain used refrigerators? Has this changed in the last year? If so, how has this changed? *(For each way that units are located and obtained, probe for percent of units in which this method was used last year vs. now)*

	Way unit is located and obtained	Refrigerators	
		Percent of units last year	Percent of units now
a.	_____	_____	_____
b.	_____	_____	_____
c.	_____	_____	_____
d.	_____	_____	_____
e.	_____	_____	_____

11. Who are your main suppliers of used refrigerators? *(Ask for description of each supplier)*

12. Roughly how many used refrigerators do you obtain in typical year? *(If not answered in Q4-Q6, then probe for changes in the last year)*

		Number of refrigerators
a.	Now	_____
b.	Last year	_____

13. How do the number of refrigerators you obtain vary by supplier? *(Obtain percent breakdown of refrigerators by supplier)*

	Supplier (from Q11)	Percent of refrigerators
a.	_____	_____

b.	_____	_____
c.	_____	_____
d.	_____	_____
e.	_____	_____

14. Do you have enough used refrigerators to meet customer demand? If not, why is there a shortage? *(If not answered in Q4-Q6, then probe for changes in the last year)*

15. Please describe the range of conditions of the units that you accept in terms of age, working condition, wear, damage, appearance, etc?

16. What steps do you take to prepare the units you accept for sale to the public?

17. What are the main reasons why you reject units?

18. What do your suppliers do with the units that you reject?

Market for used refrigerators

19. Can you please characterize the general types of customers you sell to? (*Landlords, individuals, people looking for a primary or secondary unit, homeowners/renters/college students, etc.)*

20. What percent of the used refrigerators that you get in are made available for sale to your customers? What happens to the other percentages?

    _____ %

21. Of the number you get in and make available for sale, what percent are actually sold?

    _____ %

22. Typically about what percent of the units you make available for sale do you end up getting rid of because you were unable to sell them?

    _____ %

23. What are the main reasons why you are unable to sell these units?

24. I would now like to ask you a hypothetical question: If your current used refrigerator stream was reduced in half, how would that effect your sales of used refrigerators?

25. What kind of things would you do to cope with this market reduction? Could you get more from other sources?

26. How successful do you think you would be in filling the void?

27. I would now like to ask you a question about the used refrigerator market. I would like you to tell me, in your opinion, which of the following three phrases most closely describes the used refrigerator market in your area?

- ☐ It is a supply-constrained market. That is, if you could obtain more units that were in reasonably good condition you could sell them in a reasonable amount of time.
- ☐ It is a demand-constrained market. That is, if you could obtain more units that were in reasonably good condition you would not be able to sell them in a reasonable amount of time.
- ☐ The market is a balanced market in which your current supply is about equal to your ability to sell them in a reasonable amount of time.

Decommissioning and recycling process

28. What do you do with the refrigerators that you cannot sell?

29. What steps do you take to decommission and recycle the parts from the refrigerators that you cannot sell? On about what percent of these units are you able to recycle parts?

Other notes (ask if any other comments)

_____

_____

Appendix I: New Appliance Dealer Survey Instrument

INSTRUMENT

Respondent information

Name: _____ Title: _____

Address: _____ City: _____

Zip: _____ Phone: _____

Introduction

Hello. I am calling on behalf of Duke Energy, which sponsors the Appliance Recycling program that collects and recycles old operating refrigerators and freezers. We are trying to figure out how this program is affecting the market for used refrigerators and freezers. First, we want to ask your opinions of the program and the effects it may or may not be having on your business and the market for used units. Then, we want to ask you some questions to understand how the market for used units operates. The information you provide will be combined with information from others and summarized to describe how this market works. As we are doing the interview, please feel free to let me know if you are not comfortable with answering any of the questions I ask.

Respondent responsibilities

30. What are your title and your primary responsibilities at the location where you sell new refrigerators? *(Get respondent's title)*

Effect of Appliance Recycling- program on market

31. Are you aware of Duke Energy's Appliance Recycling program? *(Describe program to respondent if not aware. The Duke Energy Appliance Recycling program pays the utility's residential customers a rebate to have their working refrigerators and freezers picked up and removed from their homes to be recycled in an environmentally safe way.)*

32. What are your opinions of the Appliance Recycling program?

33. What effect does the program have on your business? Why? *(Carefully probe for whether or not these effects have already happened. If they have already happened, ask for examples. If they have not already happened, ask about how big they think the program would have to be and how long they think the program would have to run before it started to have an effect on their business.)*

34. What effect does the program have on your company's sales of new refrigerators? Why? *(As with Q4, carefully probe for whether or not these effects have already happened.)*

35. Do you think that a program that dismantles old units leads to increased sales of new units?

New Unit Sales

36. What is your best estimate of many new refrigerators and freezers your company sells in a year?

37. Considering the other businesses that you know of in STATE NAME that sell new refrigerators and freezers, how would you compare the number of units that your company sells compared to the average number that are sold by these other businesses?

- ☐ We sell more new units than the average company
- ☐ We sell about the same number as other companies.
- ☐ We sell fewer new units than the average company
- ☐ Don't know/Not Sure

Dealing with Old Units

38. Does your company offer to remove old units for your customers who buy new units?

39. If you do remove older units, what percent and volume of buyers opt to have their older units taken away?

40. If so, who removes the old units?

41. What is typically done with the old units? What percentage and volume are resold at retail, resold at wholesale, given away (ask who?), recycled, trashed?

Percent
___ sold in their own retail shop(s)
___ sold wholesale to a bulk receiver of used units
___ given away
___ recycled via a recycling facility
___ trashed or dumped at waste or landfill facility
___ other (what is that) _____

42. If your company does not help with the removal of older units, what do you typically advise customers buying new units to do with their old ones?

Other notes (ask if any other comments)

_____

_____

Appendix J: Marketing Samples

Figure 16. Seasonal Bill Insert

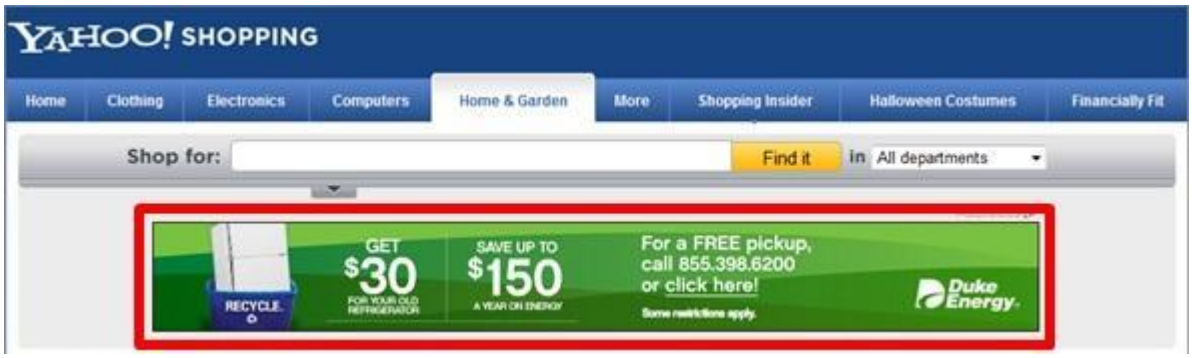


Figure 17. Yahoo Banner Ad

Figure 18. Google Pay-Per-Click Ad

Figure 19. Email Promotion

Figure 20. Newspaper Ad

Appendix K: Earned Media Examples

Figure 21. Pop up museum in Charlotte, NC

Figure 22. Old refrigerators on display at pop up museum

Figure 23. Program messaging via refrigerators on display

Figure 24. Refrigerator art and equivalency messaging at pop up museum

Appendix L: Online Scheduling Module

Sign Up

Please enter your zip code to schedule your Unit Pickup.

zip code [ ] Show Schedule Dates

Requirements for Program Participation

1. The eligible refrigerator or freezer must be clean, empty, defrosted, and in working condition.
2. The unit must meet the size requirement which is 10 cu ft - 30 cu ft.
3. You must have an active residential electric account with Duke Energy at the address where you would like us to pickup the refrigerator/freezer.
4. There is a limit of two (2) units per customer address per calendar year.
5. An adult, 18 years of age or older, must be present to sign and release the unit at the time of the pickup.
6. The unit needs to be plugged in and running on the day of the pickup.
7. Recycling appliance must be disconnected from waterlines prior to the pickup crew's arrival.
8. **You must provide clear and safe access to your appliances for the removal team. They will not risk injury or be able to move personal effects or modify your home (e.g.: remove door or railings) to remove the unit(s).**

Why participation is important to you

1. We give you a rebate of $30 for a working refrigerator or freezer, pick them up and recycle them.
2. Old refrigerators and freezers typically use two times more electricity than newer models that are being produced today. If everybody tries to do their part to conserve energy and to recycle responsibly, this could help manage our energy resources well into the future.

If you have any questions about the recycling program, or if you would like to schedule your pickup date by phone; please feel free to contact our customer service center toll free at 855-398-6200.

Figure 25. Online Scheduling Module page 1

Select your preferred Schedule Date :

Please select a day that is most convenient for you. You will receive a call 24 to 48 hours before your appointment date to confirm a 4-hour window for the pickup to take place.

Postal Code	Open Dates	Day	Select	Open Appointments
47129	8/23/2013	Friday	○	4
47129	8/31/2013	Saturday	◉	15
47129	9/5/2013	Thursday	○	15

Choosing a city is optional, choosing a city will put the city in automatically on the fill out page.

Clarksville	○

Requirements for Program Participation

1. The eligible refrigerator or freezer must be clean, empty, defrosted, and in working condition.
2. The unit must meet the size requirement which is 10 cu ft - 30 cu ft.
3. You must have an active residential electric account with Duke Energy at the address where you would like us to pickup the refrigerator/freezer.
4. There is a limit of two (2) units per customer address per calendar year.
5. An adult, 18 years of age or older, must be present to sign and release the unit at the time of the pickup.
6. The unit needs to be plugged in and running on the day of the pickup.
7. Recycling appliance must be disconnected from waterlines prior to the pickup crew's arrival.
8. **You must provide clear and safe access to your appliances for the removal team. They will not risk injury or be able to move personal effects or modify your home (e.g.: remove door or railings) to remove the unit(s).**

☑ I have read and agree to the above terms and conditions of the Appliance Recycling Program.

Apply for Selected Date

Why participation is important to you

1. Because of the way appliances have to be recycled, many recycling companies have to charge a fee to pickup and recycle your old appliances. When you participate in this program, we pick it up and recycle your old refrigerator or freezer for free.
2. Old refrigerators and freezers typically use two times more electricity than newer models that are being produced today. If everybody tries to do their part to conserve energy and to recycle responsibly, this could help manage our energy resources well into the future.

If you have any questions about the recycling program, or if you would like to schedule your pickup date by phone; please feel free to contact our customer service center toll free at 855-398-6200.

Figure 26. Online Scheduling Module page 2

Enrollment Form for Appliance Recycling Program

In order to be eligible for the Refrigerator/Freezer recycling program, you must fill in all of the fields below. When you are done, click the continue button to submit your information. Please make sure all the information is correct. If you have any questions related to this form, please call our operators at 855-398-6200

All fields marked with a " * " are required.

Pickup Date: 8/31/2013

How did you hear about us? * -Select-

Resident Status * -Select-

Electric Account Information

Account Holder First Name: *

Account Holder Last Name: *

Service Address: *

(Address where appliance is located at for the day of pickup)

Service City: *

Service State: *

Which intersection is nearest to your home? *

Service Zip Code: *
47129

Email: *

Daytime Phone: *

Alternate Phone: Ext:

Utility Account Number:

Are you interested in donating your rebate check to the Duke Energy Helping Hands Program? * -Select-

☐ **Opt-in**

By checking the "Opt-in" checkbox above, I acknowledge that I'm signing up to receive important messages about appliance recycling and similar offerings. I understand that I will be able to unsubscribe from these messages at any time.

Figure 27. Online Scheduling Module page 3 (part 1)

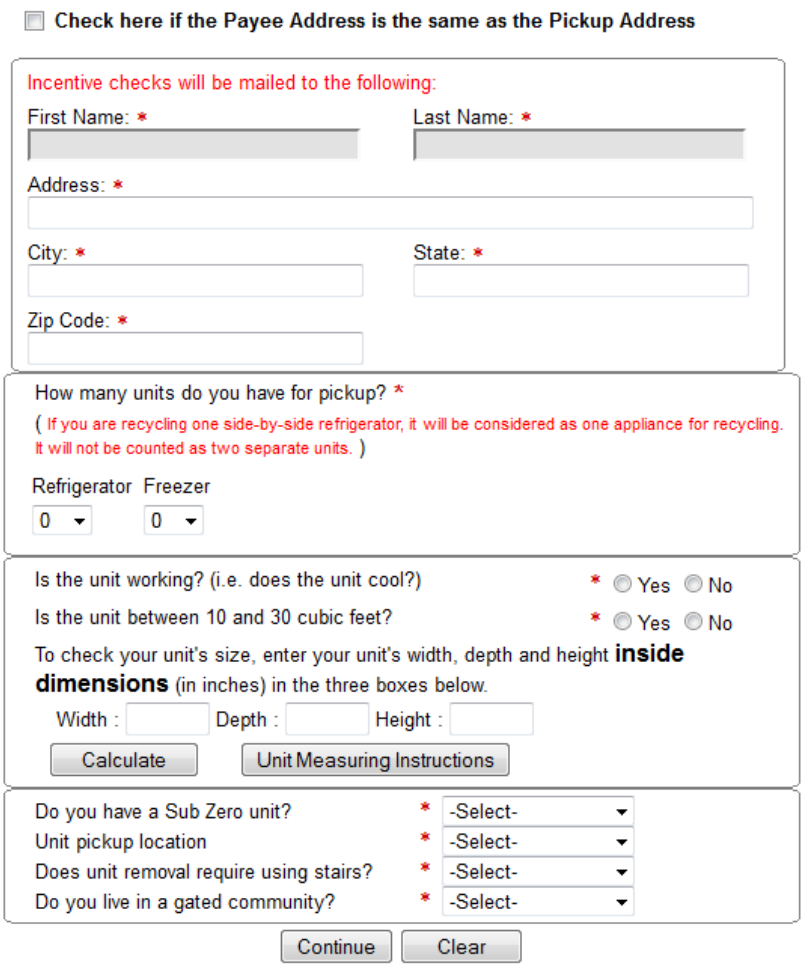


Figure 28. Online Scheduling Module page 3 (part 2)

Customer Information

This is the information you entered. Carefully review all entries. Click the "Edit" button if you need to make any corrections. **Please click the "Final Submission" button to confirm your pickup appointment.**

Pickup Date	: 12/31/2013
How did you hear about us?	: Appliance retailer
Account Holder First Name	: zzzTEST4416
Account Holder Last Name	: zzzz
Service Address	: zzz4416
Service City	: zz
Service State	: zz
Service Zip Code	: 00141
Email	: no@email.com
Alternate Phone	:
Ext	:
Daytime Phone	: 000-000-0000
Utility Account Number	: 0
First Name	:zzzTEST4416
Last Name	:zzzz
Address	:zzzMailAddress4416
City	:zzzMailCity
State	:zzzMailState
Zip Code	:95551
Resident Status	: Owner
Which intersection is nearest to your home?	: zzz zzz zzz
Do you have a Sub Zero unit?	: No
Unit pickup location	: Kitchen
Does unit removal require using stairs?	: No
Do you live in a gated community?	: No
Refrigerator Count	: 1
Freezer Count	: 0

An email will be sent to you 48 hours prior to your pickup date as a reminder. Please call Jaco Environmental at 855-398-6200 if you should have any questions.

The Jaco Staff

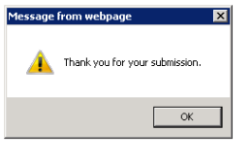
Edit | Final Submission

Figure 29. Online Scheduling Module page 4

PickUp Confirmation

Date of Scheduled Pickup : 12 31 2013 Tuesday
ATO # 2831185 The ATO Number is your reference number.

Your pickup is planned for 1 Refrigerator unit(s).



You will receive a call 24 to 48 hours prior to your appointment date listed above to confirm the appointment and provide a 4-hour window for the pick-up to take place.

The refrigerator or freezer needs to be plugged in and working at the time of the pickup. Remove all food prior to the time of pickup. You need to provide clear access to your unit. Our pickup team will not be able move furniture or other materials in the way of the removal or modify your home in any way to get the unit out (such as removing doors or railings). If clear access is not provided when the crew arrives, the crew may ask you to reschedule your pickup when you can provide a clear path.

As a contracted partner of your utility company, it is important to know that our drivers are required to have a visible identification badge. **Please be sure to look for the identification badge.**

Thank you for your order.

If you have any questions about the recycling program, or need to reschedule your pickup, please feel free to contact our customer service center toll free at 855-398-6200.

Print My Confirmation Schedule

JACO Environmental, on behalf of Duke Energy would like to thank you for your participation in the program. JACO Environmental is totally committed to protecting the environment and preserving the earth's valuable resources through the art of responsible appliance recycling.

Figure 30. Online Scheduling Module page 5

Appendix M: Participant Survey Instrument

The questions below require mostly short, scaled replies from the interviewee, and not all questions will be asked of all participants. This interview will take approximately 20 minutes. Use four attempts at different times of the day and different days before dropping from contact list. Call times are from 10:00 a.m. to 8:00 p.m. EDT or 9-7 CDT Monday through Saturday. No calls on Sunday.

Note: Only read words in bold type. Instructions are in italics.

Always make sure you have the correct Survey ID.
Please copy and paste it. A hand-typed approximation is not acceptable.

Surveyor Name*

_____

Survey ID*

_____

State*
( ) North Carolina

( ) South Carolina

( ) Indiana

( ) Ohio

( ) Kentucky

for answering machine 1st through penultimate attempts:

Hello, my name is _____ . I am calling to conduct a customer survey about the Appliance Recycling Program, on behalf of Duke Energy. I'm sorry I missed you. I'll try again another time.

for answering machine - Final Attempt:
Hello, my name is _____ . I am calling to conduct a customer survey, on behalf of Duke Energy. This is my last attempt at reaching you, my apologies for any inconvenience.

if person answers
Hello, my name is _____. I am calling on behalf of Duke Energy to conduct a customer survey about the Appliance Recycling Program. May I speak with _____ please?

If person talking, proceed. If person is called to the phone reintroduce. If not home, ask when would be a good time to call and schedule the call-back.

We are conducting this survey to obtain your opinions about the Appliance Recycling Program. Duke Energy's records indicate that you participated in the Appliance Recycling Program in [*month / year*]. If you qualify, we will send you a check for $20 for completing

the survey. It will take about 20 minutes and your answers will be confidential, and will help us to make improvements to the program to better serve others. May we begin the survey?
Note: If this is not a good time, ask if there is a better time to schedule a callback.

1a. **Do you recall participating in the Appliance Recycling Program?***
( ) Yes
( ) No
( ) DK/NS

If NO or DK/NS to Q1a, ask:
1b. **This program was provided through Duke Energy. In this program, Duke Energy sends contractors to your home to pick up your old refrigerator or freezer for recycling. Do you remember participating in this program?***
( ) Yes
( ) No
( ) DK/NS
If No or DK/NS to Q1b, end interview and go to next participant.

1c. **How many stand-alone freezers did you get rid of through Duke Energy's Appliance Recycling Program?***
( ) 0
( ) 1
( ) 2
( ) 3 or more *specify:*: _____*

1d. **How many refrigerators did you get rid of through Duke Energy's Appliance Recycling Program?***
( ) 0
( ) 1
( ) 2
( ) 3 or more *specify:*: _____*

[ASK IF "REFRIGERATOR" CHECKED IN Q1c]:
1e. **Was the refrigerator you recycled your main refrigerator in or near your kitchen, or was it a secondary refrigerator kept somewhere else in the house, or did you recycle more than one refrigerator?***
( ) Main (kitchen)
( ) Spare/Secondary (not in kitchen)
( ) Recycled multiple refrigerators
( ) N/A -- (Respondent is not primary user of fridge (landlord, etc.)) *TERMINATE*
( ) DK/NS

1f. **Were any of these your main refrigerator kept in or near the kitchen?***
( ) Yes
( ) No

1g. **Was the freezer that you recycled one that used primarily by people in your household, or was it primarily used by tenants or other people?***
( ) Primarily used by respondent's household
( ) Respondent is not primary user of freezer (landlord, etc.) *[TERMINATE]*

TERMINATE IF RESPONDENT DID NOT RECYCLE AT LEAST ONE REFRIGERATOR OR FREEZER.

REFRIGERATOR QUESTIONS

IF "REFRIGERATOR" CHECKED IN Q1c, BEGIN WITH Q2a AND CONTINUE FOLLOWING "SKIP" PROMPTS; OTHERWISE SKIP AHEAD TO Q14a FOR FREEZER QUESTIONS.

2a. **How old was the refrigerator when Duke Energy removed it?**
[OR if multiple refrigerators, read]:
How old were the refrigerators when Duke Energy removed them?*
( ) *Numeric open end; record in years (record all units if more than one, noting which is main/kitchen unit*: _____*
( ) Less than one year
( ) DK/NS

if they recycled one refrigerator, ask:
2b. **What was the condition of the refrigerator? Would you say …***
( ) **It worked and was in good physical condition**
( ) **It worked but needed minor repairs like a door seal or handle**
( ) **It worked but had some significant performance problems**
( ) **It did not work**
( ) DK/NS

if they recycled two refrigerators, ask:
2c. **What was the condition of the main refrigerator from your kitchen that you recycled? Would you say …***
( ) **It worked and was in good physical condition**
( ) **It worked but needed minor repairs like a door seal or handle**
( ) **It worked but had some significant performance problems**
( ) **It did not work**
( ) DK/NS

if they recycled two refrigerators, ask:
2d. **What was the condition of the spare refrigerator which was not in your kitchen that you recycled? Would you say …***
( ) **It worked and was in good physical condition**
( ) **It worked but needed minor repairs like a door seal or handle**
( ) **It worked but had some significant** performance problems
( ) **It did not work**
( ) DK/NS

3. **What was the main reason you chose to get rid of the old refrigerator that was picked up by Duke Energy?***
if they recycled two units, use "other specify" response and write in details]
( ) The refrigerator was expensive to run / to save money
( ) Wanted to reduce energy use / to save energy
( ) The refrigerator was not working properly
( ) The refrigerator was a spare that I did not use very much / use at all
( ) The refrigerator was old and I wanted something with more modern features
( ) I wanted a bigger refrigerator
( ) I wanted a new refrigerator
( ) The information provided by the program
( ) Past experience with this program
( ) Because of past experience with another Duke Energy program
ask: **What other Duke program?**: _____*
( ) Recommendation from other utility program
ask: **What other utility program?**: _____*
( ) Recommendation of family/friend/neighbor/co-worker
( ) Recommendation of dealer/retailer/contractor
( ) Recommendation of someone else
ask: **Who?**: _____*
( ) Environmental concerns / going “green”
( ) Other
SPECIFY:: _____*
( ) DK/NS

4. **Were there any other reasons you chose to get rid of the refrigerator?***
if they recycled two units, use "other specify" response and write in details]
[ ] The refrigerator was expensive to run / save money
[ ] Wanted to reduce energy use / save energy
[ ] The refrigerator was not working properly
[ ] The refrigerator was a spare that I did not use very much / use at all
[ ] The refrigerator was old and I wanted something with more modern features
[ ] I wanted a bigger refrigerator
[ ] I wanted a new refrigerator
[ ] The information provided by the program
[ ] Past experience with this program
[ ] Because of past experience with another Duke Energy program
ask: **What other Duke program?**
[ ] Recommendation from other utility program
ask: **What other utility program?**
[ ] Recommendation of family/friend/neighbor/co-worker
[ ] Recommendation of dealer/retailer/contractor
[ ] Recommendation of someone else
ask: **Who?**
[ ] Environmental concerns / going "green"

[ ] Other *SPECIFY*
[ ] DK/NS
[ ] No other reasons

if "spare/secondary" or "two refrigerators" checked in q1d, ask q5a through q6c; otherwise skip to q7a.

5a. **Where was your spare or secondary refrigerator located before it was removed by Duke Energy? That is, not where it was located when it was picked it up, but where it was located when you were still using it?***
( ) Kitchen
( ) Garage
( ) Porch/Patio
( ) Basement
( ) Other *SPECIFY*: _____*
( ) DK/NS

5b. **Was this refrigerator located in a room that is heated in the winter?***
( ) Yes
( ) No

5c. **Was this refrigerator located in a room that is cooled in the summer?***
( ) Yes
( ) No

5d. **For how long had you been using this refrigerator as a spare or secondary when you decided to get rid of it?***
( ) *[numeric open end, record in years]*: _____*
( ) Less than one year
( ) DK/NS

6a. **Thinking just about the past year, was the refrigerator in your [question("option value"), id="33"] plugged in and running…?***
( ) **All the time**
( ) **For special occasions only**
( ) **During certain months of the year only, or**
( ) **Was it never plugged in and running?**
( ) DK/NS

6b. **If you add up the total time the refrigerator in your [question("option value"), id="33"] was plugged in and running during the last 12 months that you had it, about how many total months would that be? Your best estimate is okay.***
( ) Less than 1 month
( ) 1 Month
( ) 2 Months
( ) 3 Months

( ) 4 Months
( ) 5 Months
( ) 6 Months
( ) 7 Months
( ) 8 Months
( ) 9 Months
( ) 10 Months
( ) 11 Months
( ) 12 Months
( ) DK/NS

6c. **Was the refrigerator in your [question("option value"), id="33"] running during the summer or was it mainly running during other times of the year?***
( ) Running all the time
( ) Running during the summer
( ) Mainly running other times of the year
( ) A mix of both summer and other times of the year
( ) DK/NS
( ) Other *specify*:: _____

7a. **Was the refrigerator that was picked up by Duke Energy replaced with another one?***
( ) Yes
( ) No

7b. **Are you intending to purchase another refrigerator within the next 12 months to replace the one that you recycled?***
( ) Yes
( ) No
( ) DK/NS

CONTINUE ONLY IF "YES" CHECKED IN Q7a; OTHERWISE SKIP TO Q11

8a. **Did you replace the refrigerator that was removed with a new refrigerator you bought, a used refrigerator you bought, or a refrigerator you moved from somewhere else in the house?***
If they got a replacement without having to pay for it themselves, check "bought new" if it was a new unit, or "bought used" if it was not a new unit.
( ) Bought New
( ) Bought Used
( ) Moved from somewhere else in the house
( ) DK/NS

8b. **Did you acquire the replacement refrigerator before or after the old refrigerator was picked up by Duke Energy?***
( ) Before
( ) After
( ) Got it the same day

( ) DK/NS

8c. **How long [BEFORE / AFTER** *from Q8b*] **the old one was picked up did you get the replacement refrigerator? Was it***
( ) **Within one to two weeks**
( ) **Over two weeks, but less than two months**
( ) **Within two to three months**
( ) **Within four to six months**
( ) **Within six to twelve months/ one year, or**
( ) **More than one year**
( ) Other *(Please specify)*: _____*
( ) DK/NS

ASK q9 ONLY IF "BOUGHT USED" OR "MOVED FROM SOMEWHERE ELSE" IN Q8a

9. **How old is this replacement refrigerator?***
( ) *[NUMERIC OPEN END, RECORD IN YEARS]*: _____*
( ) Less than one year
( ) DK/NS

10a. **Please keep thinking about the refrigerator that replaced the refrigerator removed by Duke Energy. Does your replacement refrigerator have …***
( ) **A single door, with a freezer compartment inside**
( ) **Two doors, side by side, with a freezer on one side**
( ) **A Top freezer, or**
( ) **A Bottom freezer?**
( ) Other *SPECIFY*:: _____*
( ) DK/NS

10b. **Is the replacement refrigerator frost-free or manual defrost?***
( ) Frost free
( ) Manual defrost
( ) Other *SPECIFY*:: _____*
( ) DK/NS

10c. **Is your replacement refrigerator larger, smaller or the same size as the one it replaced?***
( ) Larger
( ) Smaller
( ) Same Size
( ) DK/NS

10d. **Do you know the cubic footage of your new refrigerator?***
( ) Yes *[numeric open end]*:: _____*
( ) No or DK/NS

Next I am going to ask you about alternative steps you might have taken with your refrigerator(s) if the Duke Energy Appliance Recycling program had not been available.

11. **Please tell me which of the following you would have been most likely to have done if the Appliance Recycling program from Duke Energy had not been available to pick up your refrigerator(s) for recycling. Would you have…***
[read response list; record only one response]
( ) **Kept your old refrigerator**
( ) **Sold it**
( ) **Given it away for free**
( ) **Had it removed by the dealer you got your new or replacement refrigerator from**
( ) **Given it to a dealer that accepts used refrigerators (without purchasing a new refrigerator)**
( ) **Taken it to a dump or recycling center**
( ) **Hired someone to take it to a dump or recycling center**
( ) **Or, get rid of it some other way.**
ask: **What would you have done?** : _____*
( ) DK/NS

11a. **How much do you think you would have been able to sell your old refrigerator for?***
_____

11b. **How would you have tried to sell your old refrigerator?***
check all mentioned
[ ] Garage or curb sale
[ ] Newspaper ad
[ ] craigslist or internet sale
[ ] Sold to a used appliance dealer
[ ] Word of mouth / friends, family, neighbors
[ ] Other *(specify):*

11c. **How much would you have been willing to spend to hire someone to take your refrigerator away?***
_____

12a. **If the Duke Energy Appliance Recycling program had not been available, do you think you would you have gotten rid of your refrigerator(s) even sooner than you did, at the same time, or would it have taken you longer to get rid of it(/them)?***
( ) Would have done sooner
( ) Done at the same time
( ) Would have taken longer *ask:* **How much longer?** : _____*
( ) DK/NS

12b. **If the Appliance Recycling program from Duke Energy had not been available to pick up your refrigerator(s) for recycling, would you have replaced the refrigerator you recycled with a newer one?***

( ) Yes, replace one recycled unit
( ) No
( ) DK/NS

12b. **If the Appliance Recycling program from Duke Energy had not been available to pick up your refrigerators for recycling, would you have replaced the refrigerators you recycled with newer ones?***
( ) Yes, replace one recycled unit
( ) Yes, replace two units
( ) No
( ) DK/NS

12c. **You said you would have given away your old refrigerator if the recycling program from Duke Energy had not been available. Is there a specific person that you would have given it to?***
ask only if "give it away" checked in q11
( ) Yes
( ) No
( ) DK/NS

12c. **You said you would have sold your old refrigerator if the recycling program from Duke Energy had not been available. Is there a specific person that you would have sold it to?***
ask only if "sold it" checked in q11
( ) Yes
( ) No
( ) DK/NS

*if "yes" in q12c, ask:**
Who is it?: _____
What is this person's relationship to you?
RECORD RESPONSE (neighbor, relative, coworker, etc.): _____

if "yes" in q12c, ask:
12d. **Do you know if the person you had intended to ["SELL"** OR **"GIVE"** *FROM Q11***] your old refrigerator to was planning to use it as their main kitchen refrigerator, or would they have used it as a secondary or spare refrigerator, or done something else with it?***
( ) Yes, would have been used as main kitchen refrigerator
( ) Yes, would have been used as secondary refrigerator
( ) Yes, would have done something else with it *ask:* **What would they have done with it?** : _____*
( ) No/DK/NS

CONTINUE ONLY IF "KEPT IT" OR "DON'T KNOW" CHECKED IN Q11; OTHERWISE SKIP TO Q14a (IF RECYCLED A FREEZER) OR Q25 (IF THEY DID NOT RECYCLE A FREEZER)

if "kept it" in q11

13a. **If you had kept the refrigerator, would it have been stored unplugged or used as a secondary refrigerator?***
( ) Stored it unplugged
ask: **How long would you have kept this unplugged refrigerator stored at your home?**:
_____*
( ) Used it as a secondary refrigerator at least some of the time
( ) Used it as my primary refrigerator
( ) DK/NS

read if "don't know" in q11
13a. **Assuming you would have kept the refrigerator, would it have been stored unplugged or used as a secondary refrigerator?***
( ) Stored it unplugged
ask: **How long would you have kept this unplugged refrigerator stored at your home?**:
_____*
( ) Used it as a secondary refrigerator at least some of the time
( ) Used it as my primary refrigerator
( ) DK/NS

13b. **If you had kept the refrigerator would you have had it plugged in and running…?***
record only one response
( ) **All the time,**
( ) **During certain months of the year only,**
( ) **For special occasions only, or**
( ) **Not at all?**
[SKIP TO Q14a IF ALSO RECYCLING FREEZER, OTHERWISE SKIP TO Q25]
( ) DK/NS

13c. **If you add up the total time this refrigerator would have been plugged in and running over a 12 month period, about how many total months would that be? Your best estimate is okay.***
( ) Less than 1 month
( ) 1 Month
( ) 2 Months
( ) 3 Months
( ) 4 Months
( ) 5 Months
( ) 6 Months
( ) 7 Months
( ) 8 Months
( ) 9 Months
( ) 10 Months
( ) 11 Months
( ) 12 Months
( ) DK/NS

13d. **For how many years would you have continued using this refrigerator?***
best estimate is fine
( ) Less than 1 year
( ) *[NUMERIC OPEN END; RECORD IN YEARS]*: _____*
( ) Until it broke, indefinitely
( ) DK/NS

FREEZER QUESTIONS

IF "FREEZER" CHECKED IN Q1c, BEGIN WITH Q14a AND CONTINUE FOLLOWING "SKIP" PROMPTS; OTHERWISE SKIP AHEAD TO Q25 NOW.

Next, I'm going to ask you some specific questions about the freezer that was picked up by Duke Energy.

14a. **How old was the freezer when Duke Energy removed it?***
( ) *numeric open end; record in years (record all units if more than one)*: _____*
( ) Less than 1 year
( ) DK/NS

if they recycled one freezer:
14b. **What was the condition of the freezer? Would you say …***
( ) **It worked and was in good physical condition**
( ) **It worked but needed minor repairs like a door seal or handle**
( ) **It worked but had some significant performance problems, or that**
( ) **It wasn't working**
( ) DK/NS

if they recycled two or more freezers:
14c. **What was the condition of the MAIN FREEZER that you recycled? That is, the one that was used most often. Would you say …***
( ) **It worked and was in good physical condition**
( ) **It worked but needed minor repairs like a door seal or handle**
( ) **It worked but had some significant performance problems, or that**
( ) **It wasn't working**
( ) DK/NS

ask if they recycled two or more freezers
14d. **What was the condition of the SECONDARY freezer that you recycled? Would you say …***
( ) **It worked and was in good physical condition**
( ) **It worked but needed minor repairs like a door seal or handle**
( ) **It worked but had some significant performance problems, or that**
( ) **It wasn't working**
( ) DK/NS

15. **What was the <u>main</u> reason you chose to get rid of the old freezer that was picked up by Duke Energy?***
Record only one response. If they recycled two units, use "other specify" response and write in details
( ) The freezer was expensive to run / to save money
( ) Wanted to reduce energy use / to save energy
( ) The freezer was not working properly
( ) The freezer was a spare that I did not use very much / use at all
( ) The freezer was old and I wanted something with more modern features

( ) I wanted a bigger freezer
( ) I wanted a new freezer
( ) The information provided by the program
( ) Past experience with this program
( ) Because of past experience with another Duke Energy program
ask: **What other Duke program?** : _____*
( ) Recommendation from other utility program
ask: **What other utility program?** : _____*
( ) Recommendation of family/friend/neighbor/co-worker
( ) Recommendation of dealer/retailer/contractor
( ) Recommendation of someone else
ask: **Who?** : _____*
( ) Environmental concerns / going "green"
( ) Other *specify*: _____*
( ) DK/NS

16. **Were there any other reasons you chose to get rid of the freezer?***
do not select answer selected in q15; allow for multiple responses
if they recycled two units, use "other specify" response and write in details

[ ] The freezer was expensive to run / to save money
[ ] Wanted to reduce energy use / to save energy
[ ] The freezer was not working properly
[ ] The freezer was a spare that I did not use very much / use at all
[ ] The freezer was old and I wanted something with more modern features
[ ] I wanted a bigger freezer
[ ] I wanted a new freezer
[ ] The information provided by the program
[ ] Past experience with this program
[ ] Because of past experience with another Duke Energy program
ask: **What other Duke program?**
[ ] Recommendation from other utility program
ask: **What other utility program?**
[ ] Recommendation of family/friend/neighbor/co-worker
[ ] Recommendation of dealer/retailer/contractor
[ ] Recommendation of someone else
ask: **Who?**
[ ] Environmental concerns / going "green"
[ ] Other *specify*
[ ] DK/NS
[ ] No other reason

17a. **Thinking just about the past year, was the freezer plugged in and running …***
If they recycled more than one freezer, use "other specify" response to record details.
( ) **All the time**
( ) **For special occasions only**

( ) **During certain months of the year only, or**
( ) **It was never plugged in and running**
( ) Other *SPECIFY*: _____*
( ) DK/NS

If "special occasions" or "certain months" checked in q17a, ask q17b and q17c; otherwise skip to q18.

17b. **If you add up the total time your freezer was plugged in and running during the last 12 months that you had it, about how many total months would that be? Your best estimate is okay.***
( ) *numeric open end; record in years (record all units if more than one)*: _____*
( ) Less than 1 month
( ) DK/NS

17c. **Was the freezer running during the summer or was it mainly running during other times of the year?***
if they recycled more than one freezer, use "other specify" response to record details
( ) Running during the summer
( ) Mainly running other times of the year
( ) A mix of both summer and other times of the year
( ) Other *(specify)*: _____*
( ) DK/NS

18a. **Where was the freezer located in your home before it was removed by Duke Energy?***
if they recycled more than one freezer, use "other specify" response to record details
( ) Kitchen
( ) Garage
( ) Porch/Patio
( ) Basement
( ) Other *(specify)*: _____*
( ) DK/NS

18b. **Was the freezer located in a room that is heated in the winter?***
( ) Yes
( ) No

18c. **Was the freezer located in a room that is cooled in the summer?***
( ) Yes
( ) No

for 19 Yes [SKIP TO Q20a] No [CONTINUE WITH Q19b, THEN SKIP TO Q23]

19a. **Was the freezer that was picked up by Duke Energy replaced with another one?***
( ) Yes
( ) No

19b. **Are you intending to purchase another freezer within the next 12 months to replace the one that you recycled?***
( ) Yes
( ) No
( ) DK/NS

CONTINUE ONLY IF "YES" CHECKED IN Q19a; OTHERWISE SKIP TO Q23

20a. **Did you replace the freezer that was removed with a new freezer you bought, a used freezer you bought, or a freezer you moved from somewhere else in the house?***
If they got a replacement without having to pay for it themselves, check "bought new" if it was a new unit, or "bought used" if it was not a new unit.
( ) Bought New
( ) Bought Used
( ) Moved from somewhere else in the house *[SKIP TO Q21]*
( ) DK/NS

20b. **Did you acquire the replacement freezer before or after the old freezer was picked up by Duke Energy?***
( ) Before
( ) After
( ) Got it the same day *SKIP TO Q21*
( ) DK/NS *SKIP TO Q21*

20c. **How long [BEFORE / AFTER** *from Q20b***] the old one was picked up did you get the replacement freezer?***
Record only one response
( ) **Within one to two weeks**
( ) **Over two weeks, but less than two months**
( ) **Within two to three months**
( ) **Within four to six months**
( ) **Within six to twelve months/ one year, or**
( ) **More than one year**
( ) Other *(Please specify)*: _____*
( ) DK/NS

21. **How old is this replacement freezer?***
ASK ONLY IF "BOUGHT USED" OR "MOVED FROM SOMEWHERE ELSE" IN Q20a
( ) *numeric open end; record in years*: _____*
( ) Less than 1 year
( ) DK/NS

22a. **Is your replacement freezer …***
( ) **A chest freezer or**
( ) **An upright freezer**
( ) Other: _____*
( ) DK/NS

22b. **Is the replacement freezer frost free or manual defrost?***
( ) Frost free
( ) Manual defrost
( ) Other: _____*
( ) DK/NS

22c. **Is your replacement freezer larger, smaller or the same size as the one it replaced?***
( ) Larger
( ) Smaller
( ) Same Size
( ) DK/NS

22d. **Do you know the cubic footage of your new freezer?***
( ) YES *[numeric open end]*: _____*
( ) NO/DK/NS

Next I am going to ask you about alternative steps you might have taken with your freezer(s) if the Duke Energy Appliance Recycling program had not been available.

23. **Please tell me which of the following you would have been most likely to have done if the Appliance Recycling program from Duke Energy had not been available to pick up your freezer(s) for recycling. Would you have…***
( ) **Kept your old freezer, or**
( ) **Sold it** -- *ask:* **How much do you think you would have been able to sell your old freezer for?**: _____*
( ) **Given it away for free**
( ) **Had it removed by the dealer you got your new or replacement freezer from**
( ) **Give it to a dealer that accepts used freezers (without purchasing a new freezer)**
( ) **Taken it to a dump or recycling center**
( ) **Hired someone to take it to a dump or recycling center** - *ask:* **How much would you have been willing to spend to hire someone to take your freezer away?**: _____*
( ) **Or, get rid of it some other way.**
ask: **What would you have done?**: _____*
( ) DK/NS

If 'Sold it", ask:
23a. **How would you have tried to sell your old freezer?***
[ ] Garage or curb sale
[ ] Newspaper ad
[ ] Craig's list or internet sale
[ ] Sold to a used appliance dealer
[ ] Word of mouth / friends, family, neighbors
[ ] Other

24a. **If the Duke Energy Appliance Recycling program had not been available, do you think you would you have gotten rid of your freezer(s) even sooner than you did, at the same time, or would it have taken you longer to get rid of it(/them)?***
( ) Would have done sooner
( ) Done at the same time
( ) Would have taken longer *ask:* **How much longer?**: _____*
( ) DK/NS

24b. **If the Appliance Recycling program from Duke Energy had not been available to pick up your freezer(s) for recycling, would you have replaced the freezer(s) you recycled with (a) newer one(s)?***
( ) Yes, replace one recycled unit
( ) No
( ) DK/NS

24c. **If the Appliance Recycling program from Duke Energy had not been available to pick up your freezers for recycling, would you have replaced the freezers you recycled with newer ones?***
( ) Yes, replace one recycled unit
( ) Yes, replace two units
( ) No
( ) DK/NS

if "Sold It", ask
24c1. **You said you would have sold your old freezer if the recycling program from Duke Energy had not been available. Is there a specific person that you would have sold it to?***
( ) Yes
ask: **Who is it?**
If needed: **What is this person's relationship to you?** *RECORD RESPONSE (neighbor, relative, coworker, etc.)*: _____*
( ) No
( ) DK/NS

if "Given it away", ask
24c2. **You said you would have given away your old freezer if the recycling program from Duke Energy had not been available. Is there a specific person that you would have given it to?***
( ) Yes
ask: **Who is it?**
If needed: **What is this person's relationship to you?** *RECORD RESPONSE (neighbor, relative, coworker, etc.)*: _____*
( ) No
( ) DK/NS

Continue Only If "Kept It" Or "Don't Know" Checked In Q23; Otherwise Skip To Q25
read if "kept it" in q23

24c2. **If you had kept the freezer, would it have been stored unplugged or would you have continued using it?***
( ) stored unplugged
*ask:***How long would you have kept this unplugged freezer stored at your home?**:
_____*
( ) continued using it
( ) DK/NS

read if "Don't Know" in q23
24c3. **Assuming you would have kept the freezer, would it have been stored unplugged or would you have continued using it?***
( ) stored unplugged
ask: **ask: How long would you have kept this unplugged freezer stored at your home?**:
_____*
( ) continued using it
( ) DK/NS

24d. **If you had kept the freezer would you have had it plugged in and running…?***
Record only one response
( ) **All the time,**
( ) **During certain months of the year only,**
( ) **For special occasions only, or**
( ) **Not at all?**
( ) DK/NS

24e. **If you add up the total time this freezer would have been plugged in and running over a 12 month period, about how many total months would that be? Your best estimate is okay.***
( ) less than 1 month
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10
( ) 11
( ) 12
( ) DK/NS

24f. **For how many years would you have continued using this freezer? Your best estimate is fine.***
( ) Less than 1 year

( ) # of years
numeric open end; record in years: _____*
( ) Until it broke, indefinitely
( ) DK/NS

25. **How were you first made aware of Duke Energy's Appliance Recycling Program?***
Allow for multiple responses
[ ] Insert with monthly bill / mailing from Duke Energy
[ ] Email from Duke Energy
[ ] Saw information at the Duke Energy website
[ ] Other web site
ask: **Which one?**
[ ] Saw an advertisement on radio, TV, or on the newspaper
ask: **Where?**
[ ] From an appliance dealer or retailer
ask: **Which one?**
[ ] Through another energy program
ask: **Which program?**
[ ] Through a low-income program
ask: **Which program?**
[ ] Friend/ Family Member/ Neighbor / Co-Worker
[ ] Other, *please specify:*
[ ] DK/NS

26a. **Once you decided to participate, the first step was signing up for the program. Are you the one that signed up, or did someone else in your household sign up?***
( ) I signed up
( ) Someone else signed up
( ) DK/NS

26b. **Did you sign up online or on the phone?***
( ) Telephone
( ) Online
( ) Other *specify* : _____*
( ) DK/NS

CONTINUE IF "TELEPHONE" CHECKED IN Q26b; OTHERWISE SKIP TO Q27

26c. **Did you have to call more than once?***
( ) Yes *ask:* **Why did you need to call more than once?**: _____*
( ) No
( ) DK/NS

26d. **On a scale of 1 to 10 where 1 is very dissatisfied and 10 is very satisfied, how satisfied were you with the customer service provided by the representative who took your call?***
( ) 1 = very dissatisfied
…

( ) 10 = very satisfied
( ) DK/NS

If 7 or less ask:
26e. **How could this be improved?***

27. **Were you able to schedule a pick-up date and time that was convenient for you?***
( ) Yes
( ) No
( ) DK/NS

28a. **On a scale of 1 to 10 where 1 is very dissatisfied and 10 is very satisfied, how satisfied were you with the process of signing up for and scheduling your pick up?***
( ) 1 = very dissatisfied
…
( ) 10 = very satisfied
( ) DK/NS

If 7 or less ask:
28b. **How could this be improved?***

29a. **How much time passed between when you scheduled the appointment and when your appliance(s) was/were picked up?***
( ) *record*: _____*
( ) DK/NS

29b. **On a scale of 1 to 10 where 1 is very dissatisfied and 10 is very satisfied, how satisfied are you with the time it took between when you scheduled the appliance pickup and when it actually was picked up?***
( ) 1 = very dissatisfied
…
( ) 10 = very satisfied
( ) DK/NS

If 7 or less ask:
29c. **How could this be improved?***

30a. **Just before the pick-up took place, did you or anyone in your household receive a call in advance to confirm the appointment or to let you know the collection team was coming?***
( ) Yes
( ) No
( ) DK/NS

30b. **Did the collection team arrive on time?***
( ) Yes

( ) No
( ) DK/NS

30c. **On a scale of 1 to 10 where 1 is very dissatisfied and 10 is very satisfied, how satisfied were you with the collection team who picked up your appliance(s)? ***
( ) 1 = very dissatisfied
…
( ) 10 = very satisfied
( ) DK/NS

If 7 or less ask:
30d. **How could this be improved?***

31a. **How much was the payment that Duke Energy offered you for recycling your appliance?***
_____

31b. **Did you take the payment, or choose the option to donate the money to the Helping Hand Assistance program?***
( ) took payment
( ) donated to Helping Hand Assistance program
( ) DK/NS

31c. **On that same scale from 1 to 10, how satisfied are you with the size of the payment for participation in the Duke Energy Appliance Recycling program?***
( ) 1 = very dissatisfied
…
( ) 10 = very satisfied
( ) DK/NS

If 7 or less ask:
31d. How could this be improved?*

ONLY ASK Q31e-Q31g IF RESPONDENT ANSWERED "TOOK PAYMENT" IN Q31b, OTHERWISE SKIP AHEAD TO Q32a

31e. **How long did it take to get the check after your appliance was picked up?***
( ) 1 week or less
( ) more than one week to 2 weeks
( ) more than 2 weeks to 3 weeks
( ) more than 3 weeks to 4 weeks
( ) more than 4 weeks to 5 weeks
( ) more than 5 weeks to 6 weeks
( ) more than 6 weeks to 7 weeks
( ) longer than 7 weeks *SPECIFY NUMBER OF WEEKS*: _____*
( ) have not received my check yet *SPECIFY NUMBER OF WEEKS*: _____*
( ) DK/NS [SKIP TO 32a]

31f. **How satisfied are you with the amount of time it took to receive your payment from Duke Energy, using the same scale from 1 to 10? ***
( ) 1 = very dissatisfied
…
( ) 10 = very satisfied
( ) DK/NS

If 7 or less ask:
31g. **How could this be improved?***

32a. **There are a number of ways you could have gotten rid of your appliance(s). What is the MAIN reason you chose the Duke Energy Appliance Recycling Program instead of some other way?***
Record only one response
( ) The cash incentive
( ) The convenience of the home pick-up / don't have to take it someplace myself
( ) Pick up was free
( ) Appliance was recycled / disposed of in a way that was good for environment
( ) Was recommended by friend / family / neighbor / coworker
( ) Was recommended by dealer / retailer / contractor
( ) Did not know of any other way / no other option
( ) Other *specify*: _____*
( ) DK/NS

32b. **Were there any other reasons?***
[do not read response list; do not select answer selected in q32a; allow for multiple responses]
[ ] The cash incentive
[ ] The convenience of the home pick-up / don't have to take it someplace myself
[ ] Pick up was free
[ ] Appliance was recycled / disposed of in a way that was good for environment
[ ] Was recommended by friend / family / neighbor / coworker
[ ] Was recommended by dealer / retailer / contractor
[ ] Did not know of any other way / no other option
[ ] Other *specify*
[ ] No other reason
[ ] DK/NS
[ ] No other reason

33a. **Did the <u>incentive payment</u> have any influence at all on your decision to participate in Duke Energy's Appliance Recycling program?***
( ) Yes
( ) No
( ) DK/NS

34a. **Did the <u>information provided explaining the program</u> have any influence at all on your decision to participate in Duke Energy's Appliance Recycling program?***
( ) Yes
( ) No
( ) DK/NS

35a. **Thinking about your entire experience with the Duke Energy Appliance Recycling Program overall, how satisfied are you with the service, using the same scale from 1 to 10?***
( ) 1 = very dissatisfied
…
( ) 10 = very satisfied
( ) DK/NS

If 7 or less ask:
35b. **How could this be improved?***

35c. **What was your FAVORITE thing about participating in the Appliance Recycling program?***
( ) *(answer)*: _____*
( ) DK/NS

35d. **What was your LEAST favorite thing about participating in the Appliance Recycling program?***
( ) *(answer)*: _____*
( ) DK/NS

(ask q35e for Ohio only)
35e. **If you were rating your overall satisfaction with the Appliance Recycling Program, would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?***
( ) Very Satisfied
( ) Somewhat Satisfied
( ) Neither Satisfied nor Dissatisfied
( ) Somewhat Dissatisfied
( ) Very Dissatisfied
( ) Refused
( ) DK/NS

(ask q35f for Ohio only)
35f. **Why do you give it that rating?***

36a. **Using the same scale from 1 to 10, how satisfied are you with Duke Energy overall?***
( ) 1 = very dissatisfied
…
( ) 10 = very satisfied
( ) DK/NS

If 7 or less ask:

36b. **How could this be improved?***

36c. **Would you say participating in this program has made you feel more favorable, less favorable, or no different about Duke Energy? ***
( ) More favorable about Duke Energy
( ) Less favorable about Duke Energy
( ) No different about Duke Energy
( ) DK/NS

37. **Based on your participation in the Duke Energy Appliance Recycling Program, have you been inspired to take any additional actions to save energy?***
( ) Yes *ask:* **What energy saving actions have you taken?** : _____*
( ) No
( ) DK/NS

37a. **Using a scale of 1 to 10, where 10 means very much and 1 means very little - to what extent did the Appliance Recycling program from Duke Energy motivate you to take these additional energy saving actions?***
Very little
( ) 1
…
( ) 10
( ) DK/NS
Very much

37b. **Since participating in the program, have you participated in any other Duke Energy energy efficiency programs?***
( ) Yes - *ask:* **Which programs?** : _____*
( ) No
( ) DK/NS

37c. **Have you noticed a reduction in the amount of your electric bill since your appliance(s) was/were removed?***
( ) Yes
( ) No
( ) DK/NS

Demographics

Finally, we have some general demographic questions…

d18. **Do you own or rent your home?***
( ) Rent
( ) Own
( ) DK/NS

d18a. **Do you pay your own electric bill or is it included in your rent?***
( ) Pay bill
( ) Included in Rent

d1. **In what type of building do you live?***
( ) Single-family home, detached construction
( ) Single family home, factory manufactured/modular
( ) Single family, mobile home
( ) Row House
( ) Two or Three family attached residence-traditional structure
( ) Apartment (4 + families)---traditional structure
( ) Condominium---traditional structure
( ) Other: _____
( ) Refused
( ) DK/NS

d2. **What year was your residence built?***
( ) 1959 and before
( ) 1960-1979
( ) 1980-1989
( ) 1990-1997
( ) 1998-2000
( ) 2001-2007
( ) 2008-present
( ) DK/NS

d3. **How many rooms are in your home (excluding bathrooms, but including finished basements)?***
( ) 1-3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 or more
( ) DK/NS

d4. **Which of the following best describes your home's heating system?***
Check all that apply
[ ] None
[ ] Central forced air furnace
[ ] Electric Baseboard
[ ] Heat Pump
[ ] Geothermal Heat Pump

[ ] Other

d5. **How old is your heating system?***
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) 19 years or older
( ) DK/NS
( ) Do not have

d6. **What is the primary fuel used in your heating system?***
( ) Electricity
( ) Natural Gas
( ) Oil
( ) Propane
( ) Other: _____
( ) DK/NS

d7. **What is the secondary fuel used in your primary heating system, if any?***
( ) Electricity
( ) Natural Gas
( ) Oil
( ) Propane
( ) Other: _____
( ) None
( ) DK/NS

d8. **Do you use one or more of the following to cool your home?***
(Mark all that apply)
[ ] None, do not cool the home
[ ] Heat pump for cooling
[ ] Central air conditioning
[ ] Through the wall or window air conditioning unit
[ ] Geothermal Heat pump
[ ] Other *(please specify?)*
[ ] DK/NS

d9. **How many window-unit or "through the wall" air conditioner(s) do you use?***
( ) None
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6

( ) 7
( ) 8 or more
( ) DK/NS

d10. **What is the fuel used in your cooling system?***
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] None
[ ] DK/NS

d11. **How old is your cooling system?***
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) 19 years or older
( ) DK/NS
( ) Do not have

d12. **What is the fuel used by your water heater?***
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No water heater
[ ] DK/NS

d13. **How old is your water heater?***
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) More than 19 years
( ) DK/NS

d14. **What type of fuel do you use for indoor cooking on the stovetop or range?***
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane

[ ] Other
[ ] No stovetop or range
[ ] DK/NS

d15. **What type of fuel do you use for indoor cooking in the oven?***
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No oven
[ ] DK/NS

d16. **What type of fuel do you use for clothes drying?***
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No clothes dryer
[ ] DK/NS

d17. **About how many square feet of living space are in your home?***
(Do not include garages or other unheated areas)
Note: A 10-foot by 12 foot room is 120 square feet
( ) Less than 500
( ) 500 to 999
( ) 1000 to 1499
( ) 1500 to 1999
( ) 2000 to 2499
( ) 2500 to 2999
( ) 3000 to 3499
( ) 3500 to 3999
( ) 4000 or more
( ) DK/NS

d19. **How many levels are in your home (not including your basement)?***
( ) One
( ) Two
( ) Three

d20. **Does your home have a heated or unheated basement?***
( ) Heated

( ) Unheated
( ) No basement

d21. **Does your home have an attic?***
( ) Yes
( ) No

d22. **Are your central air/heat ducts located in the attic?***
( ) Yes
( ) No
( ) N/A

d23. **Does your house have cold drafts in the winter?***
( ) Yes
( ) No

d24. **Does your house have sweaty windows in the winter?***
( ) Yes
( ) No

d25. **Do you notice uneven temperatures between the rooms in your home?***
( ) Yes
( ) No

d26. **Does your heating system keep your home comfortable in winter?***
( ) Yes
( ) No

d27. **Does your cooling system keep your home comfortable in summer?***
( ) Yes
( ) No

d28. **Do you have a programmable thermostat?***
( ) Yes
( ) No

d28b. **How many thermostats are there in your home?***
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4 or more
( ) DK/NS

d29. **What temperature is your thermostat set to on a typical summer weekday afternoon?***
( ) Less than 69 degrees

( ) 69-72 degrees
( ) 73-78 degrees
( ) Higher than 78 degrees
( ) Off
( ) DK/NS

d30. **What temperature is your thermostat set to on a typical winter weekday afternoon?***
( ) Less than 67 degrees
( ) 67-70 degrees
( ) 71-73 degrees
( ) 74-77 degrees
( ) 78 degrees or higher
( ) Off
( ) DK/NS

d31. **Do You Have a swimming pool, hot-tub or spa?***
( ) Yes
( ) No

d32. **Would a two-degree increase in the summer afternoon temperature in your home affect your comfort..***
Read all answers until they reply
( ) **Not at all**
( ) **Slightly**
( ) **Moderately, or**
( ) **Greatly**

d33. **How many people live in this home?***
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d34. **How many of them are teenagers?***
(age 13-19)
If they ask why: Explain that teenagers are generally associated with higher energy use.
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4

( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d35. **How many persons are usually home on a weekday afternoon?***
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d36. **Are you planning on making any large purchases to improve energy efficiency in the next 3 years?***
( ) Yes
( ) No
( ) DK/NS

The following questions are for classification purposes only and will not be used for any other purpose than to help Duke Energy continue to improve service.

d37. **What is your age group?***
Read all.
( ) **18-34**
( ) **35-49**
( ) **50-59**
( ) **60-64**
( ) **65-74**
( ) **Over 74**
( ) Prefer not to answer

d38. **Please indicate your annual household income.***
Read all.
( ) **Under $15,000**
( ) **$15,000-$29,999**
( ) **$30,000-$49,999**
( ) **$50,000-$74,999**
( ) **$75,000-$100,000**
( ) **Over $100,000**
( ) Prefer Not to Answer

We've reached the end of the survey. As I mentioned earlier, we would like to send you $20 for your time and feedback today. Should we send the $20 to *{address on file}*, or would a different address be better?*

Either way, enter entire address here
Name: _____
Address: _____
City: _____
State: _____
Zip: _____

You should receive your $20 check in about 4-6 weeks. It will come in an envelope from our company: TecMarket Works.
Thanks again for your time today!

(politely end call)

Survey ID*
_____

Appendix N: Household Characteristics and Demographics

This section presents the responses to demographic and household questions asked during the participant survey in the Carolinas system.

In what type of building do you live? * State

			State		Total
			North Carolina	South Carolina	
In what type of building do you live?	Single-family home, detached construction	Count	95	58	153
		% within State	96.0%	95.1%	95.6%
	Single family home, factory manufactured/modular	Count	3	1	4
		% within State	3.0%	1.6%	2.5%
	Single family, mobile home	Count	1	1	2
		% within State	1.0%	1.6%	1.3%
	Two or Three family attached residence-traditional structure	Count	0	1	1
		% within State	0.0%	1.6%	0.6%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What year was your residence built? * State

			State		Total
			North Carolina	South Carolina	
What year was your residence built?	1959 and before	Count	17	8	25
		% within State	17.2%	13.1%	15.6%
	1960-1979	Count	43	24	67
		% within State	43.4%	39.3%	41.9%
	1980-1989	Count	17	5	22
		% within State	17.2%	8.2%	13.8%
	1990-1997	Count	8	9	17
		% within State	8.1%	14.8%	10.6%
	1998-2000	Count	6	3	9
		% within State	6.1%	4.9%	5.6%
	2001-2007	Count	5	5	10
		% within State	5.1%	8.2%	6.3%
	2008-present	Count	1	2	3
		% within State	1.0%	3.3%	1.9%
	DK/NS	Count	2	5	7

	% within State	2.0%	8.2%	4.4%
Total	Count	99	61	160
	% within State	100.0%	100.0%	100.0%

How many rooms are in your home (excluding bathrooms, but including finished basements)? * State

			State		Total
			North Carolina	South Carolina	
How many rooms are in your home (excluding bathrooms, but including finished basements)?	4	Count	3	4	7
		% within State	3.0%	6.6%	4.4%
	5	Count	9	8	17
		% within State	9.1%	13.1%	10.6%
	6	Count	15	9	24
		% within State	15.2%	14.8%	15.0%
	7	Count	27	17	44
		% within State	27.3%	27.9%	27.5%
	8	Count	16	8	24
		% within State	16.2%	13.1%	15.0%
	9	Count	10	6	16
		% within State	10.1%	9.8%	10.0%
	1-3	Count	1	1	2
		% within State	1.0%	1.6%	1.3%
	10 or more	Count	17	7	24
		% within State	17.2%	11.5%	15.0%
	DK/NS	Count	1	1	2
		% within State	1.0%	1.6%	1.3%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Which of the following best describes your home's heating system?	**North Carolina N=99**		**South Carolina N=61**		**Total N=160**	
None	0	0.0%	1	1.6%	0	0.6%
Central forced air furnace	50	50.5%	25	41.0%	75	46.9%
Electric Baseboard	1	1.0%	3	4.9%	4	2.5%
Heat Pump	49	49.5%	29	47.5%	78	48.8%
Geothermal Heat Pump	1	1.0%	0	0.0%	1	0.6%
Electric space heaters	2	2.0%	2	3.3%	4	2.5%
Wood fireplace / wood stove	0	0.0%	2	3.3%	2	1.3%

Gas pack / gas log fireplace	0	0.0%	5	8.2%	5	3.1%
Other: listed below	9	9.1%	2	3.3%	11	6.9%
Don't know	0	0.0%	1	1.6%	1	0.6%

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

Eleven respondents mentioned "other" types of heating system; these are listed below.

- *Apollo system*
- *Cable ceiling heat*
- *Hot water boiler*
- *Hybrid heat pump with gas furnace*
- *Hybrid system*
- *Siegler kerosene forced air furnace*
- *Kerosene heater*
- *Mini split system*
- *Oil furnace*
- *Oil furnace or stove, I'm not sure*
- *Propane space heater*

How old is your heating system? * State

			State		Total
			North Carolina	South Carolina	
How old is your heating system?	0-4 years	Count	28	14	42
		% within State	28.3%	23.0%	26.3%
	5-9 years	Count	21	14	35
		% within State	21.2%	23.0%	21.9%
	10-14 years	Count	19	11	30
		% within State	19.2%	18.0%	18.8%
	15-19 years	Count	9	4	13
		% within State	9.1%	6.6%	8.1%
	19 years or older	Count	17	9	26
		% within State	17.2%	14.8%	16.3%
	DK/NS	Count	5	8	13
		% within State	5.1%	13.1%	8.1%
	Do not have	Count	0	1	1
		% within State	0.0%	1.6%	0.6%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What is the primary fuel used in your heating system? * State

			State		Total
			North Carolina	South Carolina	
What is the primary fuel used in your heating system?	Electricity	Count	53	31	84
		% within State	53.5%	50.8%	52.5%
	Natural Gas	Count	38	24	62
		% within State	38.4%	39.3%	38.8%
	Oil	Count	2	2	4
		% within State	2.0%	3.3%	2.5%
	Propane	Count	2	2	4
		% within State	2.0%	3.3%	2.5%
	Kerosene	Count	1	1	2
		% within State	1.0%	1.6%	1.3%
	Other: "*furnace is gas and heat pump is electric*"	Count	1	0	1
		% within State	1.0%	0.0%	0.6%
	DK/NS	Count	2	1	3
		% within State	2.0%	1.6%	1.9%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What is the secondary fuel used in your primary heating system, if any? * State

			State		Total
			North Carolina	South Carolina	
What is the secondary fuel used in your primary heating system, if any?	Electricity	Count	13	5	18
		% within State	13.1%	8.2%	11.3%
	Natural Gas	Count	6	2	8
		% within State	6.1%	3.3%	5.0%
	Oil	Count	2	0	2
		% within State	2.0%	0.0%	1.3%
	Propane	Count	1	0	1
		% within State	1.0%	0.0%	0.6%
	Wood	Count	2	1	3
		% within State	2.0%	1.6%	1.9%
	Gas logs	Count	3	0	3
		% within State	3.0%	0.0%	1.9%
	Other (listed	Count	5	0	5

	below)	% within State	5.1%	0.0%	3.1%
	None	Count	64	52	116
		% within State	64.6%	85.2%	72.5%
	DK/NS	Count	3	1	4
		% within State	3.0%	1.6%	2.5%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Five respondents mentioned "other" secondary sources of heat; these are listed below.

- *Baseboard electric.*
- *Rolling heaters.*
- *Water stove.*
- *Heat pump used for one room only.*
- *We can also use oil but we choose not to continue using it because it was too expensive.*

Do you use one or more of the following to cool your home?	**North Carolina N=99**		**South Carolina N=61**		**Total N=160**	
None, do not cool the home	4	4.0%	1	1.6%	5	3.1%
Heat pump for cooling	51	51.5%	29	47.5%	80	50.0%
Central air conditioning	51	51.5%	26	42.6%	77	48.1%
Through the wall or window air conditioning unit	1	1.0%	6	9.8%	7	4.4%
Geothermal Heat pump	1	1.0%	0	0.0%	1	0.6%
Fans (ceiling, window, portable)	1	1.0%	0	0.0%	1	0.6%
Gas pack for cooling	0	0.0%	2	3.3%	2	1.3%
Other: "*mini split system*"	1	1.0%	0	0.0%	1	0.6%
Don't know	1	1.0%	0	0.0%	1	0.6%

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

How many window-unit or through the wall air conditioner(s) do you use? * State

			State		Total
			North Carolina	South Carolina	
d9 How many window-unit or through the wall air conditioner(s) do you use?	1	Count	3	2	5
		% within State	3.0%	3.3%	3.1%
	2	Count	2	4	6
		% within State	2.0%	6.6%	3.8%
	3	Count	1	0	1
		% within State	1.0%	0.0%	0.6%
	4	Count	0	1	1

		% within State	0.0%	1.6%	0.6%
	None	Count	93	54	147
		% within State	93.9%	88.5%	91.9%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What is the fuel used in your cooling system?	North Carolina N=99		South Carolina N=61		Total N=160	
Electricity	93	93.9%	58	95.1%	151	94.4%
Natural Gas	2	2.0%	2	3.3%	4	2.5%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
None (no cooling system)	2	2.0%	1	1.6%	3	1.9%
DK/NS	3	3.0%	1	1.6%	4	2.5%

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

How old is your cooling system? * State

			State		Total
			North Carolina	South Carolina	
How old is your cooling system?	0-4 years	Count	25	15	40
		% within State	25.3%	24.6%	25.0%
	5-9 years	Count	20	15	35
		% within State	20.2%	24.6%	21.9%
	10-14 years	Count	17	12	29
		% within State	17.2%	19.7%	18.1%
	15-19 years	Count	9	6	15
		% within State	9.1%	9.8%	9.4%
	19 years or older	Count	17	3	20
		% within State	17.2%	4.9%	12.5%
	DK/NS	Count	8	9	17
		% within State	8.1%	14.8%	10.6%
	Do not have	Count	3	1	4
		% within State	3.0%	1.6%	2.5%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What is the fuel used by your water heater?	North Carolina N=99		South Carolina N=61		Total N=160	
Electricity	63	63.6%	45	73.8%	108	67.5%
Natural Gas	34	34.3%	17	27.9%	51	31.9%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
No water heater	0	0.0%	0	0.0%	0	0.0%
DK/NS	2	2.0%	1	1.6%	3	1.9%

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

How old is your water heater? * State

			State		Total
			North Carolina	South Carolina	
How old is your water heater?	0-4 years	Count	20	21	41
		% within State	20.2%	34.4%	25.6%
	5-9 years	Count	35	12	47
		% within State	35.4%	19.7%	29.4%
	10-14 years	Count	19	11	30
		% within State	19.2%	18.0%	18.8%
	15-19 years	Count	9	6	15
		% within State	9.1%	9.8%	9.4%
	More than 19 years	Count	6	2	8
		% within State	6.1%	3.3%	5.0%
	DK/NS	Count	10	9	19
		% within State	10.1%	14.8%	11.9%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What type of fuel do you use for indoor cooking on the stovetop or range?	North Carolina N=99		South Carolina N=61		Total N=160	
Electricity	88	88.9%	52	85.2%	140	87.5%
Natural Gas	9	9.1%	9	14.8%	18	11.3%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	2	2.0%	0	0.0%	2	1.3%
None (no stove)	0	0.0%	0	0.0%	0	0.0%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

What type of fuel do you use for indoor cooking in the oven?	North Carolina N=99		South Carolina N=61		Total N=160	
Electricity	91	91.9%	56	91.8%	147	91.9%
Natural Gas	7	7.1%	5	8.2%	12	7.5%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	1	1.0%	0	0.0%	1	0.6%
None (no oven)	0	0.0%	0	0.0%	0	0.0%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

What type of fuel do you use for clothes drying?	North Carolina N=99		South Carolina N=61		Total N=160	
Electricity	90	90.9%	55	90.2%	145	90.6%
Natural Gas	6	6.1%	4	6.6%	10	6.3%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	2	2.0%	0	0.0%	2	1.3%
None (no dryer)	1	1.0%	2	3.3%	3	1.9%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

About how many square feet of living space are in your home? * State

			State		Total
			North Carolina	South Carolina	
About how many square feet of living space are in your home?	Less than 500	Count	0	1	1
		% within State	0.0%	1.6%	0.6%
	500 to 999	Count	3	2	5
		% within State	3.0%	3.3%	3.1%
	1000 to 1499	Count	13	6	19
		% within State	13.1%	9.8%	11.9%
	1500 to 1999	Count	27	11	38
		% within State	27.3%	18.0%	23.8%
	2000 to 2499	Count	17	6	23
		% within State	17.2%	9.8%	14.4%
	2500 to 2999	Count	12	6	18
		% within State	12.1%	9.8%	11.3%
	3000 to 3499	Count	7	5	12
		% within State	7.1%	8.2%	7.5%
	3500 to 3999	Count	2	2	4
		% within State	2.0%	3.3%	2.5%

	4000 or more	Count	6	1	7
		% within State	6.1%	1.6%	4.4%
	DK/NS	Count	12	21	33
		% within State	12.1%	34.4%	20.6%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Do you own or rent your home? * State

			State		Total
			North Carolina	South Carolina	
Do you own or rent your home?	Rent, pay separate electric bill	Count	2	2	4
		% within State	2.0%	3.3%	2.5%
	Rent, electric bill included	Count	0	1	1
		% within State	0.0%	1.6%	0.6%
	Own	Count	97	58	155
		% within State	98.0%	95.1%	96.9%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

How many levels are in your home (not including your basement)? * State

			State		Total
			North Carolina	South Carolina	
How many levels are in your home (not including your basement)?	One	Count	64	48	112
		% within State	64.6%	78.7%	70.0%
	Two	Count	35	13	48
		% within State	35.4%	21.3%	30.0%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Does your home have a heated or unheated basement? * State

			State		Total
			North Carolina	South Carolina	
Does your home have a heated or unheated basement?	Heated	Count	31	12	43
		% within State	31.3%	19.7%	26.9%
	Unheated	Count	10	8	18
		% within State	10.1%	13.1%	11.3%

	No basement	Count	58	41	99
		% within State	58.6%	67.2%	61.9%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Does your home have an attic? * State

			State		Total
			North Carolina	South Carolina	
Does your home have an attic?	Yes	Count	83	41	124
		% within State	83.8%	67.2%	77.5%
	No	Count	16	20	36
		% within State	16.2%	32.8%	22.5%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Are your central air/heat ducts located in the attic? * State

			State		Total
			North Carolina	South Carolina	
Are your central air/heat ducts located in the attic?	Yes	Count	25	10	35
		% within State	25.3%	16.4%	21.9%
	No	Count	47	31	78
		% within State	47.5%	50.8%	48.8%
	N/A	Count	27	20	47
		% within State	27.3%	32.8%	29.4%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Does your house have cold drafts in the winter? * State

			State		Total
			North Carolina	South Carolina	
Does your house have cold drafts in the winter?	Yes	Count	17	15	32
		% within State	17.2%	24.6%	20.0%
	No	Count	82	46	128
		% within State	82.8%	75.4%	80.0%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Does your house have sweaty windows in the winter? * State

			State		Total
			North Carolina	South Carolina	
Does your house have sweaty windows in the winter?	Yes	Count	14	5	19
		% within State	14.1%	8.2%	11.9%
	No	Count	85	56	141
		% within State	85.9%	91.8%	88.1%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Do you notice uneven temperatures between the rooms in your home? * State

			State		Total
			North Carolina	South Carolina	
Do you notice uneven temperatures between the rooms in your home?	Yes	Count	38	17	55
		% within State	38.4%	27.9%	34.4%
	No	Count	61	44	105
		% within State	61.6%	72.1%	65.6%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Does your heating system keep your home comfortable in winter? * State

			State		Total
			North Carolina	South Carolina	
Does your heating system keep your home comfortable in winter?	Yes	Count	95	59	154
		% within State	96.0%	96.7%	96.3%
	No	Count	4	2	6
		% within State	4.0%	3.3%	3.8%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Does your cooling system keep your home comfortable in summer? * State

			State		Total
			North Carolina	South Carolina	
Does your cooling system keep your home comfortable in summer?	Yes	Count	93	60	153
		% within State	93.9%	98.4%	95.6%
	No	Count	6	1	7
		% within State	6.1%	1.6%	4.4%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Do you have a programmable thermostat? * State

			State		Total
			North Carolina	South Carolina	
Do you have a programmable thermostat?	Yes	Count	68	35	103
		% within State	68.7%	57.4%	64.4%
	No	Count	31	26	57
		% within State	31.3%	42.6%	35.6%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

How many thermostats are there in your home? * State

			State		Total
			North Carolina	South Carolina	
How many thermostats are there in your home?	0	Count	2	2	4
		% within State	2.0%	3.3%	2.5%
	1	Count	67	45	112
		% within State	67.7%	73.8%	70.0%
	2	Count	22	7	29
		% within State	22.2%	11.5%	18.1%
	3	Count	5	3	8
		% within State	5.1%	4.9%	5.0%
	4 or more	Count	3	4	7
		% within State	3.0%	6.6%	4.4%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What temperature is your thermostat set to on a typical summer weekday afternoon? * State

			State		Total
			North Carolina	South Carolina	
What temperature is your thermostat set to on a typical summer weekday afternoon?	Less than 69 degrees	Count	3	1	4
		% within State	3.0%	1.6%	2.5%
	69-72 degrees	Count	15	15	30
		% within State	15.2%	24.6%	18.8%
	73-78 degrees	Count	67	39	106
		% within State	67.7%	63.9%	66.3%
	Higher than 78 degrees	Count	9	1	10
		% within State	9.1%	1.6%	6.3%
	Off	Count	4	2	6
		% within State	4.0%	3.3%	3.8%
	DK/NS	Count	1	3	4
		% within State	1.0%	4.9%	2.5%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What temperature is your thermostat set to on a typical winter weekday afternoon? * State

			State		Total
			North Carolina	South Carolina	
What temperature is your thermostat set to on a typical winter weekday afternoon?	Less than 67 degrees	Count	2	5	7
		% within State	2.0%	8.2%	4.4%
	67-70 degrees	Count	45	28	73
		% within State	45.5%	45.9%	45.6%
	71-73 degrees	Count	31	13	44
		% within State	31.3%	21.3%	27.5%
	74-77 degrees	Count	14	7	21
		% within State	14.1%	11.5%	13.1%
	78 degrees or higher	Count	0	1	1
		% within State	0.0%	1.6%	0.6%
	Off	Count	0	2	2
		% within State	0.0%	3.3%	1.3%
	DK/NS	Count	7	5	12
		% within State	7.1%	8.2%	7.5%

Total	Count	99	61	160
	% within State	100.0%	100.0%	100.0%

Do You Have a swimming pool, hot-tub or spa? * State

			State		Total
			North Carolina	South Carolina	
Do You Have a swimming pool, hot-tub or spa?	Yes	Count	13	7	20
		% within State	13.1%	11.5%	12.5%
	No	Count	86	54	140
		% within State	86.9%	88.5%	87.5%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Would a two-degree increase in the summer afternoon temperature in your home affect your comfort * State

			State		Total
			North Carolina	South Carolina	
Would a two-degree increase in the summer afternoon temperature in your home affect your comfort	Not at all	Count	32	20	52
		% within State	32.3%	32.8%	32.5%
	Slightly	Count	34	13	47
		% within State	34.3%	21.3%	29.4%
	Moderately, or	Count	25	24	49
		% within State	25.3%	39.3%	30.6%
	Greatly	Count	8	4	12
		% within State	8.1%	6.6%	7.5%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

How many people live in this home? * State

			State		Total
			North Carolina	South Carolina	
How many people live in this home?	1	Count	25	20	45
		% within State	25.3%	32.8%	28.1%
	2	Count	50	28	78
		% within State	50.5%	45.9%	48.8%
	3	Count	7	6	13
		% within State	7.1%	9.8%	8.1%
	4	Count	10	4	14
		% within State	10.1%	6.6%	8.8%
	5	Count	4	1	5
		% within State	4.0%	1.6%	3.1%
	6	Count	1	1	2
		% within State	1.0%	1.6%	1.3%
	7	Count	1	0	1
		% within State	1.0%	0.0%	0.6%
	8 or more	Count	1	0	1
		% within State	1.0%	0.0%	0.6%
	Prefer not to answer	Count	0	1	1
		% within State	0.0%	1.6%	0.6%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

How many of them are teenagers? * State

			State		Total
			North Carolina	South Carolina	
How many of them are teenagers?	0	Count	85	58	143
		% within State	85.9%	95.1%	89.4%
	1	Count	10	1	11
		% within State	10.1%	1.6%	6.9%
	2	Count	4	1	5
		% within State	4.0%	1.6%	3.1%
	Prefer not to answer	Count	0	1	1
		% within State	0.0%	1.6%	0.6%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

How many persons are usually home on a weekday afternoon? * State

			State		Total
			North Carolina	South Carolina	
How many persons are usually home on a weekday afternoon?	0	Count	5	4	9
		% within State	5.1%	6.6%	5.6%
	1	Count	37	27	64
		% within State	37.4%	44.3%	40.0%
	2	Count	50	23	73
		% within State	50.5%	37.7%	45.6%
	3	Count	3	4	7
		% within State	3.0%	6.6%	4.4%
	4	Count	3	1	4
		% within State	3.0%	1.6%	2.5%
	5	Count	1	0	1
		% within State	1.0%	0.0%	0.6%
	Prefer not to answer	Count	0	2	2
		% within State	0.0%	3.3%	1.3%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Are you planning on making any large purchases to improve energy efficiency in the next 3 years? * State

			State		Total
			North Carolina	South Carolina	
Are you planning on making any large purchases to improve energy efficiency in the next 3 years?	Yes	Count	21	14	35
		% within State	21.2%	23.0%	21.9%
	No	Count	73	40	113
		% within State	73.7%	65.6%	70.6%
	DK/NS	Count	5	7	12
		% within State	5.1%	11.5%	7.5%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

What is your age group? * State

			State		Total
			North Carolina	South Carolina	
What is your age group?	18-34	Count	1	2	3
		% within State	1.0%	3.3%	1.9%
	35-49	Count	10	4	14
		% within State	10.1%	6.6%	8.8%
	50-59	Count	18	10	28
		% within State	18.2%	16.4%	17.5%
	60-64	Count	4	7	11
		% within State	4.0%	11.5%	6.9%
	65-74	Count	30	17	47
		% within State	30.3%	27.9%	29.4%
	Over 74	Count	35	16	51
		% within State	35.4%	26.2%	31.9%
	Prefer not to answer	Count	1	5	6
		% within State	1.0%	8.2%	3.8%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Please indicate your annual household income * State

			State		Total
			North Carolina	South Carolina	
Please indicate your annual household income	Under $15,000	Count	4	4	8
		% within State	4.0%	6.6%	5.0%
	$15,000-$29,999	Count	11	7	18
		% within State	11.1%	11.5%	11.3%
	$30,000-$49,999	Count	21	7	28
		% within State	21.2%	11.5%	17.5%
	$50,000-$74,999	Count	9	5	14
		% within State	9.1%	8.2%	8.8%
	$75,000-$100,000	Count	11	3	14
		% within State	11.1%	4.9%	8.8%
	Over $100,000	Count	10	5	15
		% within State	10.1%	8.2%	9.4%
	Prefer Not to Answer	Count	33	30	63
		% within State	33.3%	49.2%	39.4%
Total		Count	99	61	160
		% within State	100.0%	100.0%	100.0%

Appendix O: DSMore Table

Impacts / Technology	Product code	State	EM&V gross savings (kWh/unit)	EM&V gross kW (coincident peak/unit)	EM&V gross kW (non-coincident peak/unit)	Unit of measure	Combined spillover less freeridership adjustment	EM&V net savings (kWh/unit)	EM&V net kW (coincident peak/unit)	EM&V net kW (non-coincident peak/unit)	EM&V load shape (yes/no)	EUL (whole number)
Refrigerator		Carolinas	952	0.1359	0.1359	refrigerator	46.2%	512	0.0731	0.0731	no	6
Freezer		Carolinas	869	0.1035	0.1035	freezer	52.8%	410	0.0489	0.0489	no	6
Program wide			**930**	**0.1275**	**0.1275**		**47.9%**	**485**	**0.0664**	**0.0664**		**6**

Final Report

Process and Impact Evaluation of the 2013-2014 Residential Neighborhood Program in the Carolina System

Prepared for
Duke Energy

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Executive Summary

Significant Impact Evaluation Findings

This section presents the key findings and recommendations identified through the evaluation of Duke Energy's Residential Neighborhood Program in the Carolina System. This evaluation covers program participation from March, 2013 through July, 2014 (n= 8,147 participants). A billing analysis was conducted to estimate the net energy savings by participants in the program. The billing analysis employs a statistical analysis of actual customer-billed monthly electricity usage of customers participating in the program. The statistical model used for the billing analysis produces estimates of the monthly electricity savings resulting from participation in the program, and Table 1 presents the estimated overall ex post energy impacts from the billing analysis. The billing analysis approach used to assess energy savings provides a direct net (net of short-term freeridership, short-term participant spillover, and participation in other Duke Energy programs) energy impact estimate[1] by employing a quasi-experimental analysis design.

Table 1. Estimated Overall Impacts

	Net Savings
Annual Savings Per Participant Per Year	
kWh	350
kW	0.0944

The billing analysis gives the estimated overall net kWh savings per participant, but is incapable of estimating coincident kW reduction. As a result, kW is determined using the results of the billing analysis in DSMore. Additionally, program per participant savings as reported in Table 1 includes an adjustment made to CFL savings over the effective useful life of a bulb. The adjustment factor is computed in the course of the engineering analysis. The purpose of the adjustment factor is to account for the decrease in baseline wattage over time due to the phase out of standard wattage incandescent bulbs as stipulated in the Energy Independence and Security Act (EISA) of 2007. See *Appendix K: EISA Schedule and CFL Baseline* for a detailed description of baseline adjustments by year. See *Billing Analysis EISA Effects* for the calculation of the adjustment factor.

Significant Process Evaluation Findings

From the Participant Surveys

- A plurality of 36.3% (29 out of 80) of participants first learned about this program from letters and postcards received in the mail. Home visits from the enrollment team (23.8% or 19 out of 80) were the next most-mentioned source of awareness, followed by door hangers (12.5% or 10 out of 80).

[1] The net long-term spillover or short and long-term market effects savings were not documented in this evaluation. These savings are in addition to those identified in this report, but are beyond the researchable issues associated with this evaluation.

- When participants were asked what they understood this program was about, 57.5% (46 out of 80) mentioned the installation of energy-saving measures, 43.8% (35 out of 80) mentioned a home audit, 35.0% (28 out of 80) mentioned saving energy, 26.3% (21 out of 80) mentioned saving money on energy bills, and 26.3% (21 out of 80) mentioned home weatherization.
- When asked for reasons they chose to participate in this program, the most common answers are "saving money on utility bills" (by 55.0% or 44 out of 80) and "saving energy" (42.5% or 34 out of 80). About one participant in four also mentioned "receiving efficiency measures" (25.0% or 20 out of 80) and "home weatherization and repairs" (22.5% or 18 out of 80).
- About half of participants (45.0% or 36 out of 80) had to wait less than a week from enrollment to audit, including 12.5% (10 out of 80) who reported that they enrolled on the same day of their audit or that "I did not enroll, the auditor just showed up." Only 3.8% (3 out of 80) thought the length of time between enrollment and audit was too long, and only 5.0% (4 out of 80) thought that the length of time the auditor was in their home should have been longer or shorter than it was.
- About a third of surveyed participants (32.5% or 36 out of 80) attending the community meeting kick-off event in their neighborhood. These customers were very satisfied with the staff and presenters at the meeting (mean satisfaction rating 9.8 on a 10-point scale) and the information presented at the meeting (mean satisfaction rating 9.5 out of 10).
- Participants are generally quite satisfied with the measures they received during the audit: among the most highly-rated items are the door sweeps (mean satisfaction rating 9.6 out of 10), years' supply of HVAC filters (9.5 out of 10), filter change calendar (9.4 out of 10), water tank insulation wrap (9.7 out of 10) and water heater temperature adjustment (9.5 out of 10). The lowest-rated measures are vinyl weather stripping for doors (8.1 out of 10) and the window HVAC winter kit (8.4 out of 10), which are the only items to receive mean satisfaction ratings of less than 8.5 out of 10; these are not low satisfaction scores, but there is room for improvement relative to customer satisfaction with some of the other measures.
- Program satisfaction is quite high, with the program receiving a mean satisfaction rating of 9.35 out of 10 overall. The program also receives high scores for convenience of enrollment (9.5 out of 10), the knowledge of the auditors (9.4 out of 10) and the helpfulness of the auditors (9.3 out of 10). Relative to the Residential Neighborhoods program, participants' satisfaction with Duke Energy is somewhat lower at 8.7 out of 10.
- A majority of 58.8% (47 out of 80) of surveyed participants report that this program has made their attitude towards Duke Energy more positive, while only 2.5% (2 out of 80) say it has made their attitude towards Duke Energy more negative. Two-thirds (67.5% or 54 out of 80) also report that the program has increased their knowledge of how to save energy.
- Nearly half of surveyed participants (43.8% or 35 out of 80) report that their utility bills have decreased since they participated in this program, though another 10.0% (8 out of 80) report that their bills have increased. Overall, customers estimate that their utility bills have decreased by an average of about $8 per month since the program.
- According to auditor records, the percentage of participating customers receiving measures ranges from 97.5% (78 out of 80) for CFLs down to 7.5% (6 out of 80) for both the clear glass patch tape and vinyl weather stripping for HVAC window units. Surveyed

customers received between five and thirteen types of measure during their home audits, with the average and median number of measures received being about nine.

- Surveyed participants were asked to confirm the installation of measures from auditor records. Some measure installations were confirmed at high rates (such as 96.1% or 75 out of 78 customers confirming that they received CFLs as reported in auditor records), while other measures were confirmed at much lower rates (only 9.1% or 1 out of 11 customers receiving window caulk according to auditor records was able to confirm this installation).
- Some participants report that auditors have left measures behind for the customer to install themselves; in particular, 41.0% (32 out of 78) of customers who received program CFLs report that the auditor left some uninstalled bulbs behind (most of these bulbs have since been installed by the customers themselves, although 50 CFLs out of 765 confirmed received by participants remained uninstalled at the time of this survey). The winter kits for window HVAC units were also mostly installed by customers (61.5% or 16 out of 26 confirmed installations), because this measure is meant for wintertime use and the audits were performed in the spring and summer.
- Customers who received the switch plate thermometer and who did not previously have any thermometers in their home are twice as likely to report turning the temperature down during the winter (36.7% or 11 out of 30) compared to those who received this measure but who already had a thermometer in their home before the program (16.7% or 6 out of 36; this difference is significant at $p<.05$ using Student's t-test). However, there is no significant difference in temperature settings during the summer (overall only 4.5% or 3 out of 66 participants who received thermometers report using less cooling in the summer).
- When asked what they learned from participating in this program, most customers (86.2% or 69 out of 80) were able to name something that they learned. The most-mentioned lessons include the importance of weatherization and plugging drafts (mentioned by 17.5% or 14 out of 80), that energy efficiency measures save money over time through lower bills (15.0% or 12 out of 80) and about efficient lighting (13.8% or 11 out of 80).
- Sixty percent (48 out of 80) surveyed participants report taking additional actions to save energy since participating in the program: the most commonly reported actions are turning off lights and electronic items and using less heat in the winter.
- Survey participants' favorite things about this program include the home audit and assistance from the auditor (32.5% or 26 out of 80), the fact that participation and the measures are cost-free for customers (27.5% or 22 out of 80), the information and education gained (17.5% or 14 out of 80) and saving money through lower bills (17.5% or 14 out of 80).
- Two-thirds of participants (67.5% or 54 out of 80) could not name a least favorite aspect of the program. The most frequently-mentioned complaints about the program are about problems with specific measures (13.8% or 11 out of 80) and not receiving measures (6.3% or 5 out of 80, with four of these cases involving undelivered HVAC filters).
- When asked for their suggestions to improve the program, the top suggestions are that the auditor should provide more information during the audit (13.8% or 11 out of 80) and that the program could include additional measures and services (12.5% or 10 out of 80).

From the Non-Participant Surveys

- Two-thirds of non-participants contacted (82 out of 123) are aware of this program's existence, while the other third (33.3% or 41 out of 123) had not heard anything about it. Non-participants were only invited to complete the remaining parts of the survey if they were aware of the Residential Neighborhoods program.
- Non-participants who are aware of the program learned about it through the same channels as participants: mailings are the most-mentioned (47.5% or 38 out of 80), followed by door hangers (31.3% or 25 out of 80) and visits from the enrollment team (20.0% or 16 out of 80).
- When asked what they understood the Residential Neighborhoods program to be about, non-participants are most likely to mention "receiving free measures" (31.3% or 25 out of 80) and the home audit (30.0% or 24 out of 80). Only 16.3% (13 out of 80) of non-participants who are aware of the program were unable to answer this question.
- Only 55.0% (44 out of 80) of surveyed non-participants are certain that they would have been eligible to participate in the program, while 35.0% (28 out of 80) are not sure and 10.0% (8 out of 80) believe that they would not have been eligible. Among those who believe they are not eligible, most (5 out of 8) mentioned that their status as renters rather than owners played a part in their non-participation.
- When asked for their suggestions for improving program participation, non-participants' top responses are giving customers more information about the program (13.8% or 11 out of 80), improving communications about the program (12.5% or 10 out of 80) and making more weekend and evening hours available for audits (10.0% or 8 out of 80).
- Four-fifths of surveyed non-participants (81.3% or 65 out of 80) report that they have taken steps to save energy on their own in the past year. The most common action is using efficient light bulbs such as CFLs (37.5% or 30 out of 80), while another 15.0% (12 out of 80) mention that they sealed leaks around windows and doors.
- Non-participants' mean satisfaction rating with Duke Energy overall is 8.0 on a 10-point scale, which is lower than the 8.7 mean rating given by program participants. Though this difference is not quite statistically significant, it could indicate that having a lower opinion of Duke Energy is a barrier to participation in Duke Energy programs, even when they are free to all customers.
- In spite of not having participated in this program, 60.0% (48 out of 80) of non-participants report that their opinion of Duke Energy has become more positive based on what they know about the Residential Neighborhoods program, compared to 6.3% (5 out of 80) who say their attitude towards Duke Energy has become more negative.

Recommendations

- Suggestions for improving program participation:
    - Make mailings more personalized if possible (a personal invitation rather than "advertising")
    - Work with local housing authority to pre-arrange permission for tenants living in properties with fewer than eight units to participate

Introduction and Purpose of Study

Summary Overview

This document presents the process and impact evaluation report for Duke Energy's Residential Neighborhood program as it was administered in North Carolina and South Carolina. The evaluation was conducted by TecMarket Works, BuildingMetrics, and Integral Analytics.

Summary of the Evaluation

TecMarket Works performed a process evaluation comprised of management interviews to review program operations and administration, and a participant and non-participant survey to determine satisfaction levels and identify any program implementation issues.

Impact was evaluated using a billing analysis together with engineering estimates for the purpose of determining individual measure contributions to savings as well as coincident peak demand reduction.

Table 2. Evaluation Date Ranges

Evaluation Component	Dates of Analysis
Participant Surveys	Surveyed from April 4, 2014 to May 9, 2014
Non-Participant Surveys	Surveyed from February 22, 2014 to March 8, 2014
Management Interviews	Conducted in February and May of 2014
Engineering Estimates	September through October 2014
Billing Analysis	September through October 2014

Evaluation Objectives

The objective of this evaluation is to determine the effectiveness of and customer satisfaction with Duke Energy's Residential Neighborhood program as it was administered in the Carolina System.

Description of Program

The program assists customers in reducing energy costs through energy education and by installing or providing energy conservation measures for each customer's residence. Areas targeted for participation in this program have approximately 50% of the households with income equal to or less than 200% of the federal poverty level. Once a neighborhood is identified, all participants within the boundaries will qualify for the program, regardless of income status. Under this program, participating customers will receive an energy assessment to identify energy efficiency opportunities in the customer's home, one-on-one education on energy efficiency techniques and measures, and a package of energy conservations measures installed or provided to the extent the measure is identified as an energy efficiency opportunity (based on the results of the energy assessment). Energy conservation measures, up to $210, may include the following energy efficiency starter items:

- AC/Heat Filters
- Change Filter Reminder
- Aerators
- Caulking
- Weatherstripping
- Clear Glass Patch Tape
- 13W CFLs
- 18W CFLs
- Door Sweeps
- Foam Insulation Spray
- HVAC Winterization Kit
- Low Flow Showerhead
- Water Heater Tank Insulation
- Water Heater Pipe Wrap
- Water Heater Temp Adjustment
- Switch Plate Wall thermometer

Methodology

Overview of the Evaluation Approach

The process evaluation has three components: management interviews, participant surveys and non-participant surveys. The impact evaluation has engineering and billing analysis components.

Study Methodology

Management Interviews

Interviews were conducted with the Duke Energy product managers and with the program vendor (GoodCents) manager.

Participant Surveys

TecMarket Works fielded a phone survey with randomly selected participants in order to measure satisfaction and to identify areas for program improvement. Eighty (80) surveys were completed with Residential Neighborhoods participants in the Carolina System whose home audits were completed between March 6, 2013 and August 23, 2013 according to auditor records.[2] Roughly half of the participants surveyed live in North Carolina (55.0% or 44 out of 80) and roughly half live in South Carolina (45.0% or 36 out of 80).

Non-Participant Surveys

TecMarket Works fielded a phone survey with randomly selected non-participants in order to identify barriers to program participation. Eighty (80) surveys were completed with Residential Neighborhood participants in the Carolina System. Thirty-one surveys (38.8% of 80) were completed with non-participants in North Carolina and 49 surveys (61.3% of 80) were completed with non-participants in South Carolina.

Engineering Estimates

Engineering algorithms taken from the Draft Ohio and New York Technical Reference Manuals (TRMs) along with DOE-2 simulations were used to estimate savings. These unit energy savings values were applied to customers in the engineering analysis sample.

Billing Analysis

For this analysis, billing data were obtained for all participants in the program between March 2013 and July 2014. There were a total of 8,147 usable accounts after processing. A panel model specification was used that analyzed the monthly billed energy use across time and participants. The model included terms to control for the effect of weather on usage, the effect of impact from other Duke Energy offers, the effect of normal non-program induced energy use changes, as well as a complete set of monthly indicator variables to capture the effects of non-measureable factors that vary over time (such as economic conditions and season loads).

[2] One surveyed participant had December 27, 2013 listed as the date their work was completed. However since all other participants have completion dates between March and August, the December date is probably the result of this participant's record being updated or modified months after their audit.

Data collection methods, sample sizes, and sampling methodology

Management Interviews

All contacts provided by Duke Energy for the management interviews were contacted and interviewed for this evaluation.

Participant Surveys

Duke Energy provided TecMarket Works with a list of 941 records of program participants in the Carolina System (439 from North Carolina and 502 from South Carolina). After removing records with missing contact information, duplicate records, "do not contact" numbers and customers who have recently been surveyed about other programs, the sample list consisted of 510 contactable customers. The survey was conducted by telephone by TecMarket Works staff from the list of 510 participant customers in the Carolina System, and 80 respondents completed the survey (44 from North Carolina and 36 from South Carolina). The survey instrument can be found in *Appendix F: Participant Survey Instrument.*

Non-Participant Surveys

Duke Energy provided TecMarket Works with a list of 3,482 records of non-participants in the Carolina System (1670 from North Carolina and 1812 from South Carolina) that lived in targeted neighborhoods but did not participate in the program. After removing records with missing contact information, duplicate records, "do not contact" numbers and customers who have recently been surveyed about other programs, the sample list consisted of 2,341 contactable customers. The survey was conducted by telephone by TecMarket Works staff from the list of 2,341 non-participant customers in the Carolina System, and 80 respondents completed the survey (31 from North Carolina and 49 from South Carolina).

Engineering Estimates

The engineering analysis relied on primary data collected through the participant phone survey, which was conducted with a random sample of 80 participants.

Billing Analysis

The billing analysis used consumption data from all complete data provided for the participants in North and South Carolina that participated between March, 2013 and July 2014. The billing analysis used data of all participation homes with reliable data.

Number of completes and sample disposition for each data collection effort

Management Interviews

All contacts provided by Duke Energy for the management interviews were contacted and interviewed for this evaluation.

Participant Surveys

From the sample list of 510 customers, 501 participants were called between April 4, 2014 and May 9, 2014, and a total of 80 usable telephone surveys were completed yielding a response rate of 16.0% (80 out of 501).

Non-Participant Surveys

From the sample list of customers, 718 non-participants in the Carolina System (306 in North Carolina and 412 in South Carolina) were called between February 22 and March 8, 2014, and a total of 80 usable telephone surveys were completed (31 from North Carolina and 49 from South Carolina) yielding a response rate of 11.1% (80 out of 718).

Engineering Estimates

The engineering analysis relied on primary data collected through the participant phone survey, which was conducted with a random sample of 80 participants.

Billing Analysis

The billing analysis used consumption data from all complete data provided for the participants in North and South Carolina that participated between March, 2013 and July 2014. There were a total of 8,147 usable accounts after processing.

Table 3. Summary of Data Collection Efforts

Residential Neighborhoods Program			
Data Collection Effort	**Size of Population in Sample for Surveys**	**# of Successful Contacts**	**Sample Rate**
Management Interviews	3	3	100%
Participant Surveys	510	80	15.7%
Non-Participant Surveys	2341	80	3.4%
Engineering Estimates	510	80	15.7%
Billing Analysis	8,147 participants		

Expected and achieved precision

Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 8.5% and an achieved precision of 90% +/- 8.5%.

Non-Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 9.0% and an achieved precision of 90% +/- 9.0%.

Billing Analysis

The savings estimates for this program that were estimated from the billing analysis and presented in this report are statistically significant at the 95% confidence level unless otherwise noted.

Description of baseline assumptions, methods and data sources

Baseline assumptions for CFLs were determined through phone surveys with customers providing self-reported values of baseline lamp watts and operating hours. Baseline assumptions for other measures were taken from the Draft Ohio TRM.

The HVAC system interaction factors are the result of a series DOE-2 of simulations and represent the weighted average value across all HVAC system types according to their prevalence in the Carolinas.

Description of measures and selection of methods by measure(s) or market(s)

The audits may provide the following measures, depending on customer needs:

- Up to fifteen 18-watt CFL
- Up to fifteen 13 watt CFLs
- Up to two low flow showerheads
- Up to three faucet aerators
- One switch plate wall thermometer
- One year's supply of HVAC filters and filter change calendar
- Door sweeps for up to two doors
- Vinyl weatherstripping for up to two doors
- Caulking for up to two doors
- Caulking for up to three windows
- Clear glass patch tape for up to two windows
- Vinyl weatherstripping for window HVAC units
- Winterization kits for window HVAC units
- Spray foam insulation
- Water heater pipe wrap
- Water heater tank wrap
- Water heater temperature check and adjustment

Use of TRM values

Algorithms were selected from the Draft Ohio and New York TRMs to make the best use of primary data collected through the participant survey. DOE-2 simulations of prototypical building models were used to estimate savings for infiltration measures. The HVAC interaction factors were developed from prototypical building simulations conducted across several HVAC system types. The results were weighted according to HVAC system type weights developed from Duke Energy's appliance saturation survey.

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

Engineering Analysis

The participant responses are self-reported and therefore may be affected by self-selection bias, false response bias or positive result bias. If these biases are present, the savings achieved can be expected to be higher than those reported in the impact evaluation. The effects of any bias in the participant responses is expected to be minimal as all measures distributed and installed were recorded by an auditor at the premise.

Billing Analysis

The specification of the model used in the billing analysis was designed specifically to avoid the potential of omitted variable bias by including monthly variables that capture any non-program

effects that affect energy usage, as well as other Duke Energy offers. Moreover, the interaction of temperature (cooling degree days and heating degree days) and monthly variables were also taken consideration to further control for differences in how consumption responds to weather in different months. The model did not correct for self-selection bias because there is no need as long as the program remains voluntary.

Impact Evaluation: Engineering Analysis

Measure and program impacts were calculated using a combination of engineering and billing analysis. The engineering analysis was based on a combination of standard engineering assumptions and self-reported information from a sample of participants. Overall program savings are based on a pre/post billing data analysis results conducted on a near-census of participants. The engineering estimates were developed to provide insight into individual measure contributions to overall savings as well as a way to measure the effects of the Federal EISA standards on lifecycle program savings.

Table 4 shows the estimated energy savings per unit distributed adjusted downward for the ISR computed from participants' survey responses. The savings per unit distributed are shown for each energy saving item offered through the program and, in the final row, savings resulting from the all measures together.

Table 4. Gross Program kWh and Coincident kW Savings by Measure

Measure	Quantity	Units	ISR	Gross kWh/unit	Gross kW/unit	Gross kWh	Gross kW
CFL	715	Bulb	95.0%	32.98	0.0029	23,579	2.0560
Low-Flow Showerhead	74	showerhead	98.7%	127.6	0.0100	9,440	0.7381
Faucet Aerator	149	Aerator	98.7%	8.80	0.0011	1,311	0.1639
Weather Stripping	1508	linear foot	86.0%	0.36	0.0002	545	0.2656
Caulking	2112	linear foot	100.0%	0.22	0.0001	468	0.2282
Door Sweep	113	Each	95.8%	1.36	0.0007	153	0.0747
Foam Insulation Spray	196	Sink	100.0%	2.83	0.0014	556	0.2707
DHW Pipe Insulation	225	linear foot	100.0%	24.64	0.0028	5,544	0.6329
DHW Tank Wrap	19	tank wrap	100.0%	125.8	0.0144	2,389	0.2727
DHW Temp Adjust	43	adjustment	97.7%	86.08	0.0098	3,701	0.4225
AC Filters/Calendar	56	participant	87.5%	23.01	0.0017	1,289	0.0924
Overall Savings	**80**	**Survey participant**		**612**	**0.0652**	**48,976**	**5.2177**

Effective Useful Life (EUL) Calculation

The EUL of program savings is a weighted average derived from the effective useful lives of the individual measures weighted based on their contribution to overall gross kWh savings. The overall EUL for the program is seven years as seen in Table 5.

Table 5. Effective Useful life of Program Measures

Measure	Weight	EUL
CFL	48.1%	5
Low-Flow Showerhead	19.3%	10
Faucet Aerator	2.7%	10
Weather Stripping	1.1%	5
Caulking	1.0%	15
Door Sweep	0.3%	5
Foam Insulation Spray	1.1%	15
DHW Pipe Insulation	11.3%	15
DHW Tank Wrap	4.9%	5
DHW Temp Adjust	7.6%	4
AC Filters/Calendar	2.6%	1
Overall Effective Useful Life		**7**

In Service Rate (ISR) Calculation

Survey respondents were asked to report whether or not any of the energy saving measures installed through the program had been subsequently removed. As Residential Neighborhood program measures are directly installed by auditors, rather than afterward by participants, auditors' accounts of measure installations are considered to be the most accurate. Baseline ISR was set to 100% for each measure with reductions made for subsequently uninstalled units. The ISR for the furnace filters that were left behind for customer installation is determined through the participant survey, where respondents were asked if they had been installing the filters monthly as suggested by the calendar.

For CFLs, an allowance is made for program bulbs that are left behind by the auditor, placed into storage, and subsequently used to replace an incandescent bulb, thereby yielding energy savings. At the time of the phone survey, 96.9% of 13-Watt and 89.4% of 18-Watt bulbs distributed to respondents were installed and operable; this is the first year ISR.

The final ISR value is calculated, using 18-Watt CFLs as an example, with the following formula as presented in the Draft Ohio TRM:

ISR = first year ISR + (43% * remainder) = **89.4% + (43% * 7.6%) = 92.7%**

The remainder is the percentage of bulbs that are not installed in the first year (100% - 89.4% = 10.6%) less 3% for the 97% lifetime ISR[3]. In this case, the remainder is 7.6%. The 43% represents the percentage of the remainder that will replace an incandescent bulb rather than a CFL[4]. The ISR for each wattage of CFL is assigned a weight that represents its prevalence in the participant population and a weighted average ISR is calculated (95%).

[3] As established in the Nexus Market Research, RLW Analytics, and GDS Associates study, dated January 20, 2009: "New England Residential Lighting Markdown Impact Evaluation".
[4] As established in the Nexus Market Research, RLW Analytics, dated October 2004: "Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs", table 6-4 where 24 out of 56 respondents indicated that they did not purchase the CFLs as spares.

The ISR for the other program measures were taken from the customer survey responses regarding the fraction of initially installed measures that were subsequently removed. The ISR assumptions for each program measure can be seen in Table 4.

CFL Impact Calculation and EISA Application

Average daily hours of use, replaced wattage, and the room in which the bulb was installed were included in data collected from survey participants. Customers were asked if they had increased or decreased their lighting usage since installing the CFLs they received through the program. This enabled the detection of a slight decrease in hours of use going from an incandescent bulb to a CFL.

Table 6 shows the unadjusted weighted average daily hours of use values along with the updated values after the self-reporting bias is applied. Previous studies that have included both customer surveys and lighting loggers have shown that, comparing customers' self-reported hours of operation to the actual hours of operation, customers responding to the survey overestimated their lighting usage by about 27%[5]. As this study did not employ lighting loggers, there is no data with which to make a comparison for this program specifically. Consequently, the self-reported hours of use obtained from the survey were reduced by the 27% shown in Table 6.

Table 6. Adjusted Average Daily Hours of Use

Adjustment	Magnitude of Adjustment	Average Daily Hours of Use (Incandescent)	Average Daily Hours of Use (CFL)
Unadjusted	N/A	4.17	4.06
Self-Reporting Bias	27%	3.05	2.96

The adjusted average daily hours of use by room type are shown in Table 7. The row labelled "Overall" represents the weighted average across all room types.

Table 7. Adjusted Average Daily Hours of Use by Room Type

Room Type	Number of Installations	Mean Daily Hours of Use (Old)	Mean Daily Hours of Use (New)
Bathroom	38	2.34	2.47
Kitchen	51	3.65	3.73
Living/Family Room	49	3.40	3.40
Dining Room	12	1.70	1.70
Master Bedroom	34	2.38	2.47
Other Bedroom	13	2.22	2.25
Closet	1	2.56	2.56
Hall	4	1.10	1.19
Other	16	4.15	4.52
Overall	**218**	**2.96**	**3.05**

[5] The adjustment for the self-reporting bias used in this study was determined using paired lighting logger and customer self-reported data from Kentucky, Ohio, Indiana, North Carolina, and South Carolina.

As described in *Appendix K: EISA Schedule and CFL Baseline*, it is assumed that a baseline incandescent lamp will be replaced several times during the life of a CFL. Due to EISA legislation which limits the wattage of an incandescent lamp, the baseline lamp wattage decreases during each replacement. The baseline wattage by room type and by year is shown in Table 8 with the average in the final column and the overall weighted average in the highlighted cell in the bottom right, the numbers used for the savings calculations. Baseline estimates for each room type are based on small sample sizes and have limited statistical reliability at the individual room type level. Gross savings for the program are presented in the same manner in Table 9 and Table 10.

Table 8. Baseline Wattage by Room Type and Year

Room Type	2014	2015	2016	2017	2018	Average
Bathroom	57	47	46	44	43	47
Kitchen	52	43	42	41	40	44
Living/Family Room	61	50	48	47	45	50
Dining Room	63	51	49	47	46	51
Master Bedroom	55	45	43	42	41	45
Other Bedroom	61	51	50	48	46	51
Closet	18	18	18	18	18	18
Hall	60	51	50	48	46	51
Other	69	56	54	52	51	56
Overall	**58**	**48**	**46**	**45**	**43**	**48**

Applying these adjustments to each individual room type shows estimated bulb savings by room type. As described above, calculations by room type have limited statistical reliability. Only the weighted mean across all room types, in the bottom rows of these tables, were used in the calculations. The overall averages in the bottom right corners of Table 9 below are the numbers reported as per unit savings for the engineering analysis seen in Table 4.

Table 9. Gross kWh Savings by Room Type and Year

Room Type	2014	2015	2016	2017	2018	Average
Bathroom	34.2	26.5	25.3	23.9	22.9	26.6
Kitchen	45.9	34.9	33.0	31.4	30.2	35.1
Living/Family Room	50.7	38.5	36.7	35.1	33.7	38.9
Dining Room	26.9	20.3	19.0	17.9	17.3	20.3
Master Bedroom	32.5	24.7	23.3	22.2	21.5	24.8
Other Bedroom	34.2	26.6	25.6	24.3	23.0	26.7
Closet	1.9	1.9	1.9	1.9	1.9	1.9
Hall	18.0	14.3	13.9	13.3	12.6	14.4
Other	81.4	62.1	58.9	56.9	54.9	62.8
Overall	**42.9**	**32.7**	**31.1**	**29.6**	**28.5**	**33.0**

Coincident peak demand savings were calculated based on the lamp wattage difference across each room and parameters from *Appendix C: Engineering Algorithms*. The results are shown in Table 10 below.

Table 10. Gross Coincident kW by Room Type and Year

Room Type	2014	2015	2016	2017	2018	Average
Bathroom	0.0037	0.0028	0.0027	0.0025	0.0024	0.0028
Kitchen	0.0033	0.0025	0.0024	0.0022	0.0021	0.0025
Living/Family Room	0.0040	0.0031	0.0029	0.0028	0.0027	0.0031
Dining Room	0.0043	0.0032	0.0030	0.0028	0.0027	0.0032
Master Bedroom	0.0035	0.0026	0.0025	0.0024	0.0023	0.0026
Other Bedroom	0.0041	0.0032	0.0031	0.0029	0.0027	0.0032
Closet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Hall	0.0040	0.0031	0.0031	0.0029	0.0027	0.0032
Other	0.0047	0.0036	0.0034	0.0033	0.0032	0.0036
Overall	**0.0038**	**0.0029**	**0.0027**	**0.0026**	**0.0025**	**0.0029**

Low-Flow Showerheads and Faucet Aerators

A total of 74 low-flow showerheads and 149 faucet aerators were installed in the homes of survey respondents. According to customer self-reported data, nearly all of these units (98.7%) remain installed.

To determine impacts for low-flow showerheads, survey respondents were asked how many showers per week on average were taken using the showerhead provided by the program, which is rated at 1.75 GPM. Faucet aerators provided by the program are rated at 1.5 GPM. The baseline showerhead flow rate is assumed to be 2.87 GPM and the baseline faucet flow rate is assumed to be 2.2 GPM per the Draft Ohio TRM. This reduction in hot water usage was converted into kWh savings using the algorithm shown in *Appendix C: Engineering Algorithms.* This measure produces zero kW or kWh savings in households that use gas water heaters. Approximately 41% of households in the Carolinas have electric water heaters per Duke Energy's appliance saturation survey data. This is reflected in the unit savings values in Table 11.

Table 11. Unit Savings Estimation for Low-Flow Showerheads and Faucet Aerators

Measure	Quantity	ISR	Base Flow Rate (GPM)	EE Flow Rate (GPM)	Gross kWh/unit	Gross Coincident kW/unit
Low-Flow Showerhead	74	98.7%	2.87	1.75	127.6	0.0100
Faucet Aerator	149	98.7%	2.20	1.50	8.80	0.0011

Air Sealing – Reduce Infiltration Measures

Program measures aimed at infiltration reduction include weather stripping, caulking, foam insulation spray, and door sweeps. Savings are calculated using kWh and kW per unit cfm reduction factors. These values were based on DOE-2 simulations of a set of prototypical residential buildings. The unit infiltration airflow rate reduction for each measure were determined using the ASHRAE tables, equations, and calculation methods described in the 2005 ASHRAE Fundamentals Handbook, Chapter 27, "Ventilation and Infiltration." Tables S3.1, S3.2, S3.3, and S3.4. The equation used can be seen in *Appendix C: Engineering Algorithms*. Unit savings estimates described above were applied to installed measure quantities from the installing contractors. Note, according to Duke Energy program staff, the foam insulation spray was used to seal pipe penetrations under sinks.

Table 12. Unit Savings Estimation for Infiltration Reduction Measures

Measure	Quantity	Units	ISR	cfm Reduction per unit	Gross kWh/unit	Gross kW/unit
Weather Stripping	1508	linear foot	86.0%	0.0583	0.36	0.0002
Caulking	2112	linear foot	100.0%	0.0308	0.22	0.0001
Door Sweep	113	each	95.8%	0.3932	1.36	0.0007
Foam Insulation Spray	196	sink	100.0%	0.1966	2.83	0.0014

Water Heater Measures

Water heater measures available through the program include hot water pipe insulation, water heater tank wrap, and a tank temperature turn-down. The pipe insulation and tank wraps were only available to participants with electric water heaters. As such, no adjustment to unit savings, similar to that made for low-flow showerheads and faucet aerators to exclude gas water heater participants, is necessary.

Algorithms for calculating impacts are shown in *Appendix C: Engineering Algorithms*. The equation and parameters used for pipe insulation were taken from the Draft Ohio TRM. Tank wrap calculations use the New York TRM as the Draft Ohio TRM offers only deemed savings for this measure. This same algorithm was used for the tank temperature adjustment, holding tank insulation constant and varying the temperature difference assuming a 20 degree turn-down from 140 to 120 degrees Fahrenheit.

Table 13. Unit Savings Estimation for Water Heater Measures

Measure	Quantity	Units	ISR	Gross kWh/unit	Gross kW/unit
DHW Pipe Insulation	225	linear foot	100.0%	24.64	0.0028
DHW Tank Wrap	19	tank wrap	100.0%	125.8	0.0144
DHW Temp Adjust	43	adjustment	97.7%	86.08	0.0098

Furnace Filters and Calendar

Participants were left with a year supply of furnace filters and a calendar instructing them to replace their filter monthly. As dirt accumulates on the air filter, more energy is required to move air through the filter. Changing the filter monthly reduces the amount of time the unit is operated

with a dirty filter, and therefore, lowers fan energy consumption for both the heating and cooling seasons.

Table 14. Increased Power Use Over Time

Month	Percent Increase in Power due to Dirty Filter
0	0.00%
1	0.33%
2	0.66%
3	0.98%
4	1.31%
5	1.64%
6	1.97%
7	2.30%
8	2.63%
9	2.95%
10	3.28%
11	3.61%
12	3.94%

Table 14, taken from Southern California Edison Company's work paper on air filter alarms dated April 27, 2012, summarizes the linear increase over a 12 month average air filter replacement interval. Savings is estimated using a yearly changeout as a baseline. Annual fan energy consumption was estimated at 644 kWh/yr, based on the prototypical building simulations. The maximum percentage increase in power due to a dirty air filter was estimated as 3.94%, compared to 0.33% after one month.

Measure	Quantity	Units	ISR	Gross kWh/unit	Gross kW/unit
AC Filters/Calendar	56	Participant	87.5%	23.01	0.0017

Net to Gross Analysis

Typically, net to gross ratio (NTGR) for low income programs is simply deemed at 1.0. This is common practice in the industry, and discussed in the memo presented in *Appendix D: Memo: Low Income Programs and Freeridership*. Since this program operates at the neighborhood level, low income and standard income households are free to participate once the neighborhood as a whole has qualified. Freeridership for the program is thus calculated based only on phone survey responses given by standard income respondents (those over 200% of the Federal Poverty Level). Low income participants are assumed to have 0% freeridership and assigned a NTGR of 1.0. The overall program NTGR is the weighted average of both populations.

Using the participant survey responses, we have found that:

- 8.75% (7 out of 80) of the surveyed participant households are above the 200% Federal Poverty Level,
- 52.5% (42 out of 80) of the surveyed participant households are below the 200% Federal Poverty Level, and
- 38.75% (31 out of 80) are unknown (refused to answer, etc.).

Freeridership and spillover are calculated based on survey responses for households that are identified as standard income according to the participant's description of their household income and the number of residents in the home. Standard income household freeridership is calculated for each measure and then weighted by the percentage of standard income households identified among surveyed participants to calculate the freeridership level for all program participants. The methods used to calculate freeridership in standard income households are all based on survey responses, but the specific questions and calculations differ by measure.[6]

Of the 80 program participants surveyed in the Carolinas, 49 participants gave responses to the income and household composition questions which allowed them to be categorized as low-income or standard income (defined as being at or below 200% of the federal poverty income level). The other 31 participants could not be definitively categorized, including 16 participants who did not answer the question about household income. Thus the ratio of standard-income households in the program population is estimated at 14.3% (7 out of 49 customers whose survey responses allowed their income category to be determined). Table 15 shows the freeridership levels for measures confirmed to be installed in the seven households identified as standard income (over 200% of federal poverty level), and the estimated freeridership level for the measure among all program participants based on weighting standard income freeridership (14.3% of program population) with low income freeridership (85.7% of the program population who are assigned zero freeridership).

[6] Examples of freeridership calculations for measures such as those in the Residential Neighborhood program can be found in *Process and Impact Evaluation of the Residential Energy Assessments Program in the Carolina System*, TecMarket Works on behalf of Duke Energy, March 29, 2013.

Table 15. Freeridership for Measures Installed in Standard Income Households

	Homes with Measures Installed, Standard Income households (valid N = # households)	Standard Income Freeridership	Population-weighted Freeridership
CFLs	6	24.9%	3.6%
Low-flow showerheads	6	8.3%	1.2%
Faucet aerators	5	20.0%	2.9%
Foam insulation spray	1	0.0%	0.0%
Weather stripping	4	25.0%	3.6%
Window AC kit	2	50.0%	7.1%
Caulking doors	1	0.0%	0.0%
Caulking windows	0	NA[7]	0.0%
Door sweeps	5	30.0%	4.3%
Glass patch tape	1	0%	0.0%
Water pipe wrap	3	0%	0.0%
Water tank wrap	2	0%	0.0%
Water temp adjustment*	N/A	0%	0.0%
Filter changes/calendar*	N/A	0%	0.0%

*Freeridership for these measures is assumed to be 0%.

None of the seven survey participants who are identified as standard income households gave responses indicating program spillover. Thus program-level spillover is zero, based on low income spillover being assigned zero percent and standard income household spillover being estimated at zero percent.

Table 16. Gross and Net Program Savings by Measure

Measure	Gross kWh	Gross kW	Net kWh	Net kW
CFL	23,579	2.0560	22,731	1.9820
Low-Flow Showerhead	9,440	0.7381	9,326	0.7293
Faucet Aerator	1,311	0.1639	1,273	0.1592
Weather Stripping	545	0.2656	526	0.2560
Caulking	468	0.2282	468	0.2282
Door Sweep	153	0.0747	147	0.0715
Foam Insulation Spray	556	0.2707	556	0.2707
DHW Pipe Insulation	5,544	0.6329	5,544	0.6329
DHW Tank Wrap	2,389	0.2727	2,389	0.2727
DHW Temp Adjust	3,701	0.4225	3,701	0.4225
AC Filters/Calendar	1,289	0.0924	1,289	0.0924
Overall Savings	**48,976**	**5.2177**	**47,950**	**5.1173**

The final overall freeridership for the program is set at 2.1% (47,950/48,976) for a program NTGR of 0.979.

[7] Since no surveyed standard income households received this measure, the program-level freeridership is based on low income households only (zero percent freeridership).

Impact Evaluation: Billing Analysis

This section of the report presents the results of a billing analysis conducted among the participants in the Residential Neighborhood Program in the Carolina System. Billing data were obtained for all participants in the program between March, 2013 and July, 2014 that had accounts with Duke Energy (after processing, there were a total of 8,147 accounts from Carolinas)[8]. A panel model was used to determine program impacts, where the dependent variable was monthly electricity consumption from November 2010 to August 2014.

The estimated savings obtained from the billing data analysis are presented below.

Table 17. Estimated Impacts: Billing Analysis

	95% Confidence Interval		
	Lower Bound	Mean Estimate, Unadjusted for EISA	Upper Bound
Per Participant Annual Savings kWh	309	393	477

This table shows that the Residential Neighborhood Program produced statistically significant savings for participants.

Note that the billing data analysis includes variables to capture effect of participation in other Duke Programs. This is to explicitly control for any impact from other program participation.

For this analysis, data are available both across households (i.e., cross-sectional) and over time (i.e., time-series). With this type of data, known as "panel" data, it becomes possible to control, simultaneously, for differences across households as well as differences across periods in time through the use of a "fixed-effects" panel model specification that provides net savings estimates that are already adjusted for freeridership and participant spillover that occurs during the analysis period. The approach does not include the program induced savings that are associated with short and longer term non-participant spillover or market effects. As a result, these savings should be considered conservative for an estimate actual achieved savings. The fixed-effect refers to the model specification aspect that differences across homes that do not vary over the estimation period (such as square footage, heating system, etc.) can be explained, in large part, by customer-specific intercept terms that capture the net change in consumption due to the program, controlling for other factors that do change with time (e.g., the weather). That is to say, the fixed effects model can be viewed as a type of differencing model in which all characteristics of the home, which (1) are independent of time and (2) determine the level of energy consumption, are captured within the customer-specific constant terms. Differences in customer characteristics that cause variation in the level of energy consumption, such as building size and structure, are captured by constant terms representing each unique household. The model does control for what would have been done without the program within the participants' homes.

[8] Useable accounts are those accounts which have billing data for at least a year of the pre- and a portion of the post-participation period, as well as monthly kWh greater than 10 and less than 10,000 kWh. It was not required that the data covers the complete evaluation period, only that there is at least one observation in each period.

Because the consumption data in the panel model includes months before and after the installation of measures through the program, the period of program participation (or the participation window) may be defined specifically for each customer. This feature of the panel model allows for the pre-installation months of consumption to effectively act as the comparison group for post-participation months. In addition, this model specification, unlike annual pre/post-participation models such as annual change models, does not require a full year of post-participation data. Effectively, the participant becomes their own comparison group, thus eliminating the need for a non-participant comparison or control group. We know the exact month of participation in the program for each participant, and are able to construct customer specific models that measure the change in usage consumption immediately before and after the date of program participation, controlling for weather and customer characteristics.

In essence, because the model is analyzing the impacts at a monthly level, the model requires an adequate sample of monthly data to estimate the savings for each month. As a result, there is no need to have a full year of post-participant data for all participants. With past methods, the impact evaluations used annual data which required a full year of post-participation data to account for seasonal variations. With the monthly model, this is no longer required since each month is treated independently.

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

$$y_{it} = \alpha_i + ß(x_{it} * T) + \varphi P_t + \delta\, DP_{it} + \varepsilon_{it}$$

where:

y_{it} = energy consumption for home *i* during month *t*
α_i = constant term for site *i* (the fixed-effect)
T = indicator variables for each month in the analysis
P = indicator for the treatment for the program in question
DP = indicators for other utility-sponsored programs
β, φ, δ = vectors of estimated coefficients
x = vector of non-program variables that represent factors causing changes in energy consumption for home *i* during month *t* (i.e., weather)
$x*T$ = *interaction of temperature and monthly indicator*
ε = error term for home *i* during month *t.*

With this specification, the only information necessary for estimation is those factors that vary month to month for each customer, and that will affect energy use, which effectively are weather conditions and program participation. Other non-measurable factors can be captured through the use of monthly indicator variables (e.g., to capture the effect of potentially seasonal energy loads).

The effect of the Residential Neighborhood program are captured by including a variable which is equal to one for all months after the household participated in the program. The coefficient on this variable is the savings associated with the program. In order to account for differences in

billing days, the usage was normalized by days in the billing cycle. The estimated electric model for the Residential Neighborhood program is presented in Table 18.

Table 18. Estimated Savings Model – dependent variable is daily kWh usage, November 2010 through August 2014 (savings are negative).

Independent Variable	Coefficient (Daily kWh Savings)	t-value
Participation	-1.08	-9.17
Sample Size	281,382 observations (8,147 homes)	
R-Squared	66%	

The complete estimate model, showing the weather and time factors, is presented in *Appendix B: Estimated Model.*

Billing Analysis EISA Effects

As the billing analysis does not span the entire EUL of a CFL, it does not take into account the future effects of EISA (See *Appendix K: EISA Schedule and CFL Baseline*). From Table 9, first year annual CFL savings is 42.9 kWh per bulb. As this is the first year of counted savings, no adjustment is made to the baseline wattage. The average annual CFL savings is 33.0 kWh per bulb, a reduction of 23.1%. [(42.9-33.0)/42.9].

From Table 20, engineering estimates show that CFLs contribute 47.4% of net program kWh savings. In terms of the raw billing analysis savings of 393 kWh per participant, from Table 17, this represents 186 kWh (0.474 * 393). This portion of the billing savings is adjusted downward 23.1% to account for EISA, resulting in the overall net savings from the billing analysis of 350 kWh per participant seen in Table 20 (393 – 0.231 * 186).

Table 19. EISA Adjustments to Billing Analysis by year

Billing Analysis	2014	2015	2016	2017	2018	Average
Adjustment	0.0%	11.2%	13.0%	14.7%	15.9%	11.0%
kWh	393	349	342	335	330	350

Table 20. Breakdown of Per Participant Savings Contributions by Measure from Engineering Estimates Extrapolated to Billing Analysis

Measure	Net kWh Contribution from Engineering	Net kW Contribution from Engineering	Billing Analysis Average kWh Allocation	Billing Analysis kW Allocation
CFLs	47.4%	38.7%	166	0.0365
Low-Flow Showerhead	19.5%	14.3%	68	0.0135
Faucet Aerator	2.7%	3.1%	9	0.0029
Weather Stripping	1.1%	5.0%	4	0.0047
Caulking	1.0%	4.5%	3	0.0042
Door Sweep	0.3%	1.4%	1	0.0013
Foam Insulation Spray	1.2%	5.3%	4	0.0050
DHW Pipe Insulation	11.6%	12.4%	40	0.0117
DHW Tank Wrap	5.0%	5.3%	17	0.0050
DHW Temp Adjust	7.7%	8.3%	27	0.0078
AC Filters/Calendar	2.7%	1.8%	9	0.0017
Overall Savings			**350**	**0.0944**

The billing analysis approach used to assess energy savings provides a direct net (net of short-term freeridership, short-term participant spillover, and participation in other Duke Energy programs) energy impact estimate by employing a quasi-experimental design. Therefore, it is necessary to apply a net to gross ratio to the engineering estimates for comparison to the billing analysis.

Management Interviews

Program Operations

Duke Energy's Residential Neighborhood Program supplies eligible Duke Energy customers with home energy audits, one-on-one education during the audit, and the installation of energy efficiency measures as appropriate[9]. Duke Energy provides administrative oversight for the program, including vendor management, confirmation of eligible neighborhoods. GoodCents handles day-to-day program activities including marketing, customer enrollment, measure ordering, oversight of installations and timelines, data collection and database management, and reporting.

The neighborhoods are served one at a time and selected using U.S. Census Tract data showing the percent of residents that live at or below 200% of the federal poverty level (FPL). If at least 50% of the residents are at or below 200% of the FPL, the neighborhood is considered. The program managers conduct additional research on the area to determine if it is a good selection for the program. For example, they consider safety issues (inquiring with the local police department), the size of the area (number of homes), and other factors. After a neighborhood is selected, the boundaries are set to include approximately 500-800 homes, however some neighborhoods have been as large as 2,000 homes.

Marketing and Outreach

After the neighborhood and the 6-8 week period of time the program will operate are selected and confirmed, the program managers and GoodCents initiate more detailed planning for that neighborhood. The first outreach effort is targeted to all homes by mail two weeks prior to the neighborhood kick-off event. The purpose of the mailing is to inform the residents about the program, encourage them to learn more about it, and invite them to the program's kick-off event. The kick-off event provides more information about the program and how it operates and provides an opportunity for residents to meet the auditors. The event serves a catered dinner for the household to encourage participation and attendance. About a week before the kick-off event, postcards are sent as reminders to attend and learn more. Door hangers are also left on the doors of residents in the neighborhood throughout the 6-8 week period in which auditors are in the area. Residents are encouraged to RSVP for the event to help the managers order the correct amount of food for the dinner, however a response is not required to attend. Currently GoodCents and Duke Energy are reaching out to the residents six or seven times over the 6-8 week period they are in the neighborhood to encourage participation.

Kick-off Event

The kick-off event is held at a place familiar to the neighborhood such as a school or community center. There are signs directing residents to the event on major streets close to the event (see Figure 1). During the first hour, residents are encouraged to sign up for an audit, informed of the program and its benefits to their homes, their utility bills, and to Duke Energy. GoodCents staff including all of the auditors that will be working in the neighborhood attend so that residents can

[9] Not all items are installed during the audit. For instance, a year's supply of furnace filters are left at the residence for future filter changes.

meet the people that will be entering their home and conducting the audit. All GoodCents and Duke Energy staff are wearing the same blue colored shirt that matches the program marketing materials and the vehicles that will be in the neighborhood. In addition, Duke Energy program managers invite trusted community members to attend and speak, encouraging residents to participate. TecMarket Works attended one of these events which included the mayor, a community center director, the Duke Energy liaison for the area, and a church leader. Attendees are provided with a catered dinner, and everyone is entered to win one of four $25 Visa gift cards which are awarded after the presentation. The events are very well organized and effective. Many residents sign up for their audit before they leave the event. A flyer that is displayed at the entrance of the kick-off event is shown in *Appendix J: Flyer at Kick-off Event*.

Figure 1. Sign for the Kick-off Event

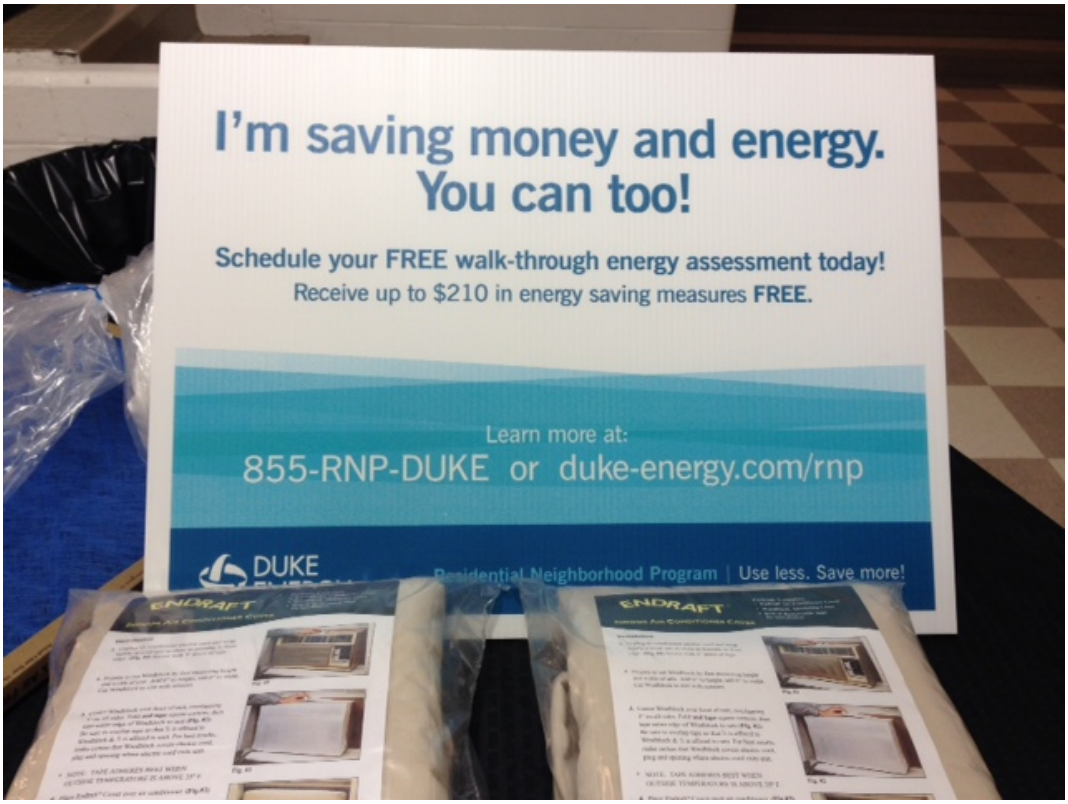

Figure 2. Table at the Kick-off Event with the Measures Available to Participants

Post-Event Activities

After the event, the auditors are in the neighborhood for eight to ten weeks conducting audits and approaching residents encouraging them to participate. The trucks, shown in Figure 3, are parked in conspicuous areas so that the residents are aware of and reminded of their presence and the services they are offering. Audits generally take from one to two hours to complete and the auditors are available from 8am to 7pm Monday through Friday, and from 10am to 3pm on Saturdays. The auditors are available to make appointments at any time for the following week (past a week they have found that some appointments are not held by the customer).

Figure 3. Residential Neighborhood Vehicle

During the audit, participants are provided with one-on-one education about what the auditor is doing, and what measures they are installing. Each of the GoodCents auditors are provided with training specific to this program (see training guide in *Appendix I: Auditor Training Guide*). GoodCents hires auditors that have carpentry, weatherization, or some HVAC-related job history. Then they attend an internal training for this program, followed by one week of supervised on-site work. GoodCents also conducts safety training for carbon monoxide so that they can discuss carbon monoxide levels with the customers and its effects on health. Auditors also undergo quality assurance training which includes driving safety, in-home safety, and are required to review all training materials regularly (weekly, monthly or quarterly, depending on measure).

Eligibility

This program is available to Duke Energy customers that live in the defined neighborhood. The neighborhood is selected as described above. However, residents from outside of the neighborhood borders have attended events and tried to participate. None are turned away from the event, however, customers from outside the targeted neighborhood are informed that when the auditors will be in their area, that they will be in contact to enroll them in the program.

While the eligibility rules are clearly defined and explained, non-participant surveys reveal some confusion about the hours that audits are available (believing the audits would conflict with their work hours), that their income is too high to participate, or since they have CFLs they believe their home is already efficient. This is discussed in more detail the section *Non-Participants' Understanding of the Program.*

Management Communication and Coordination

All parties interviewed for this evaluation reported positive working relationships between Duke Energy and GoodCents. Representatives from the two entities meet to review progress toward goals, discuss challenges or discrepancies, adjust strategies, and coordinate marketing and field activities. All communications are reported to be effective and timely.

Key Findings and Conclusions from Management Interviews

Duke Energy and its key vendor, GoodCents, work well together with no issues in communications or operational effectiveness.

All parties agree that all of the managers are open to discussing and trying out new marketing ideas, hoping to improve program participation.

Participant Surveys Results

Awareness and Understanding of the Program

A plurality of surveyed program participants in the Carolina System first learned about the Residential Neighborhoods program from letters and postcards in the mail (mentioned by 31.8% or 14 out of 44 North Carolina customers and 41.7% or 15 out of 36 South Carolina customers), as seen in Figure 4. People visiting the customers' homes were the second-most mentioned source of awareness (22.7% or 10 out of 44 North Carolinians and 25.0% or 9 out of 36 South Carolinians). Door hangers were the only other source of awareness mentioned by more than 10% of customers in South Carolina, however in North Carolina customers attending the community event, word of mouth, and spotting auditors and their trucks in the neighborhood were also mentioned by more than 10% of participants.

None of these customers learned about the program online (0% in both states), and very few mentioned traditional media sources (2.3% or 1 out of 44 for North Carolina and 2.8% or 1 out of 36 in South Carolina). The only statistically significant difference between North and South Carolina customers in terms of their initial source of awareness of the program is that North Carolinians are more likely to mention spotting auditors and their trucks in the neighborhood (13.6% or 6 out of 44, versus 2.8% or 1 out of 36 in South Carolina; this difference is significant at $p<.05$ using Student's t-test).

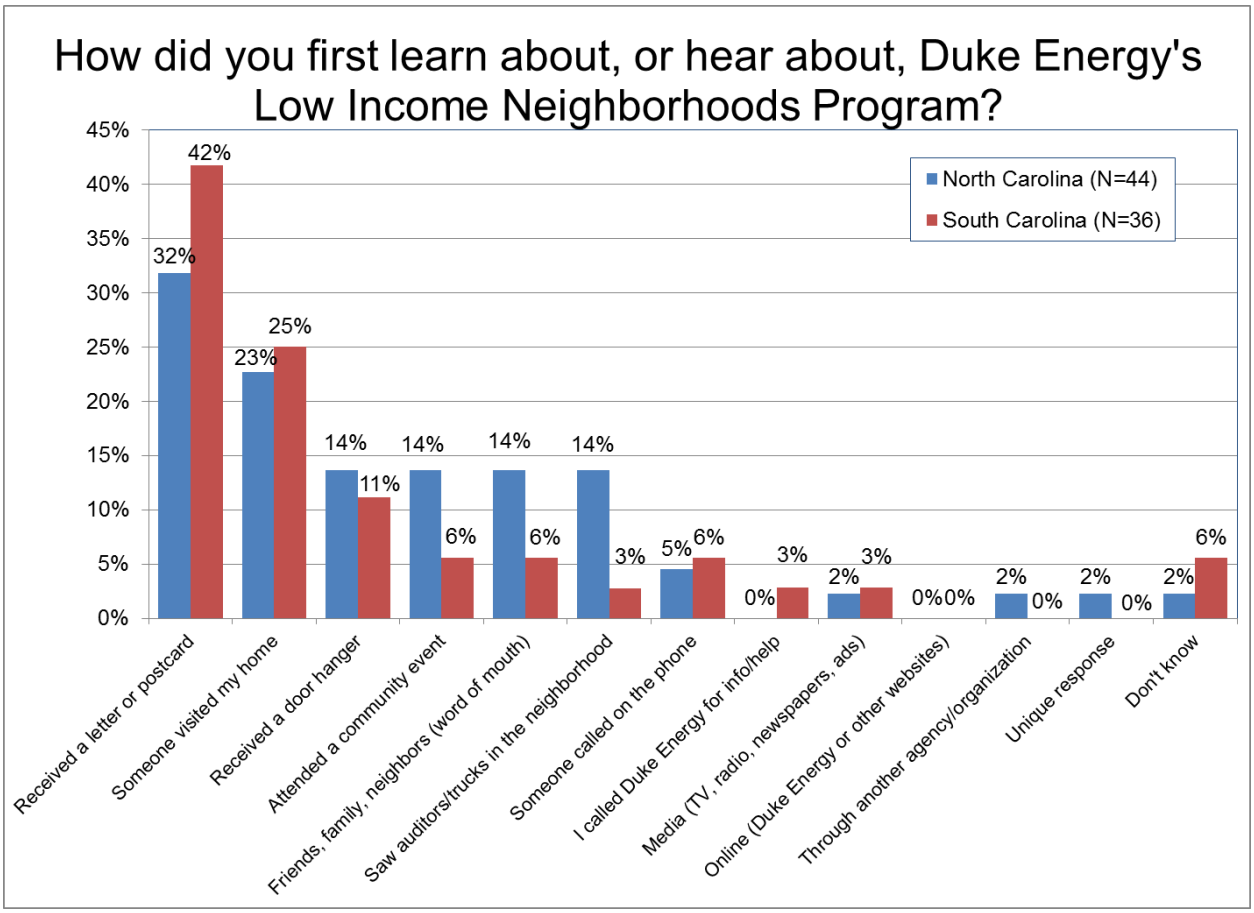

Figure 4. Source of Program Awareness for Residential Neighborhood Participants in the Carolina System (N=80)
Percentages total to more than 100% because participants could name multiple sources of awareness.

Among the 29 customers in the Carolina System who mentioned finding about the program through the mail, 93.1% (27 out of 29) identified Duke Energy as the organization that sent the mailings (including two customers who said they received a notice with their bill[10]). One South Carolina customer said their mailing came from "*one of the neighborhood centers: Northwest? C.C. Woodson?*", and one North Carolina customer could not recall the source of the mailing they received.

Among the 19 customers who learned about this program when someone visited their home, 73.7% (14 out of 19) identified Duke Energy as the organization that sent the representatives to their home, while the rest did not know or did not specify. All ten customers who learned about the program from door hangers (100% of 10) identified Duke Energy as the source of these communications.

Among the four customers who received phone calls about the program, three (75%) identified Duke Energy as the organization calling, while one customer from North Carolina stated that

[10] The program did not conduct a marketing effort via bill inserts.

"*someone from the city contacted me; I am a community leader, so I was asked to get involved with the program.*"

Two customers mentioned that they heard about this program through the media. They were asked to specify which media source, and these responses are listed below.

- *Channel 7* (South Carolina)
- *I think I saw it on TV as well.* (North Carolina)

One participant in North Carolina mentioned learning about the program from an agency or community organization; they specified that this organization was "*the Housing Authority*."

One participant in North Carolina mentioned a unique method of learning about the program, listed below.

- *There was a note from the rental office.*

Participants were asked to describe in their own words what they understood was required of them as a participant in the program, and what they would receive in return for their participation; these responses are summarized in Table 21. A majority mentioned that they would receive measures such as light bulbs, showerheads and HVAC filters (57.5% or 46 out of 80), nearly half mentioned the home audit (43.8% or 35 out of 80), a third mentioned saving energy (35.0% or 28 out of 80), and a quarter mentioned saving money on bills (26.3% or 21 out of 80) and home weatherization (26.3% or 21 out of 80).

Table 21. Participants Understanding of the Program (N=80)

	Carolina System (count)	Carolina System (percent)
Install measures	46	57.5%
Home audit	35	43.8%
Save energy	28	35.0%
Save money on bills	21	26.3%
Weatherize home	21	26.3%
Information / education about saving energy	14	17.5%
Must be present during home audit	12	15.0%
Make home more comfortable / fix things	7	8.8%
Participation is free	7	8.8%
Attend a community meeting	6	7.5%
Renters must notify landlord	4	5.0%
Everyone in the neighborhood is eligible	3	3.8%
I don't recall signing up for this program / they just showed up at my home	2	2.5%
Must be a home owner to participate	1	1.3%
Good for the environment	0	0.0%
Unique comments, listed below	3	3.8%
Negative comments, listed below	3	3.8%
I just let them do what they came to do	4	5.0%
Don't know	6	7.5%

Percentages total to more than 100% because responses mentioned multiple aspects of the program.

Three participants had unique comments, which are listed below.

- *I would get a change in batteries for my smoke detector.*
- *I expected I would get information about what I could do about signing up for more programs to reduce my energy bills.*
- *The program would help the neighborhood.*

Three participants had negative comments, which are listed below; all three of these comments are about increasing energy bills.

- *This program was supposed to save me money, but I want to find out why my bill has gone up. I'm on a fixed income and want to make sure my lights stay on.*
- *I was led to believe that I would get energy efficient things put in my house that was supposed to cut the cost of my monthly bill, but it didn't help the cost go down at all. My Duke Energy bill has actually increased since they came and supposedly did these improvements to my home.*
- *I don't know; after they did that, my bill was a little higher.*

Factors Motivating Participation

Participants were asked to list all of the reasons that they participated in the Residential Neighborhoods program, including the main reason for their participation; these results are shown in Figure 5. The most-mentioned reason overall is to save money on utility bills, which is the main reason for participation for 27.5% (22 out of 80) of customers and a secondary reason for participating for another 27.5% (22 out of 80), thus is the only reason for participation mentioned by a majority of surveyed customers (overall 55.0% or 44 out of 80). The second most-mentioned reason for participating in the program is to save energy (also the main reason for 27.5% or 22 out of 80, but a secondary reason for only 15.0% or 12 out of 80). Obtaining energy efficiency measures (overall 25.0% or 20 out of 80) and weatherization services and repairs (overall 22.5% or 18 out of 80) were also mentioned by about one-quarter of participants.

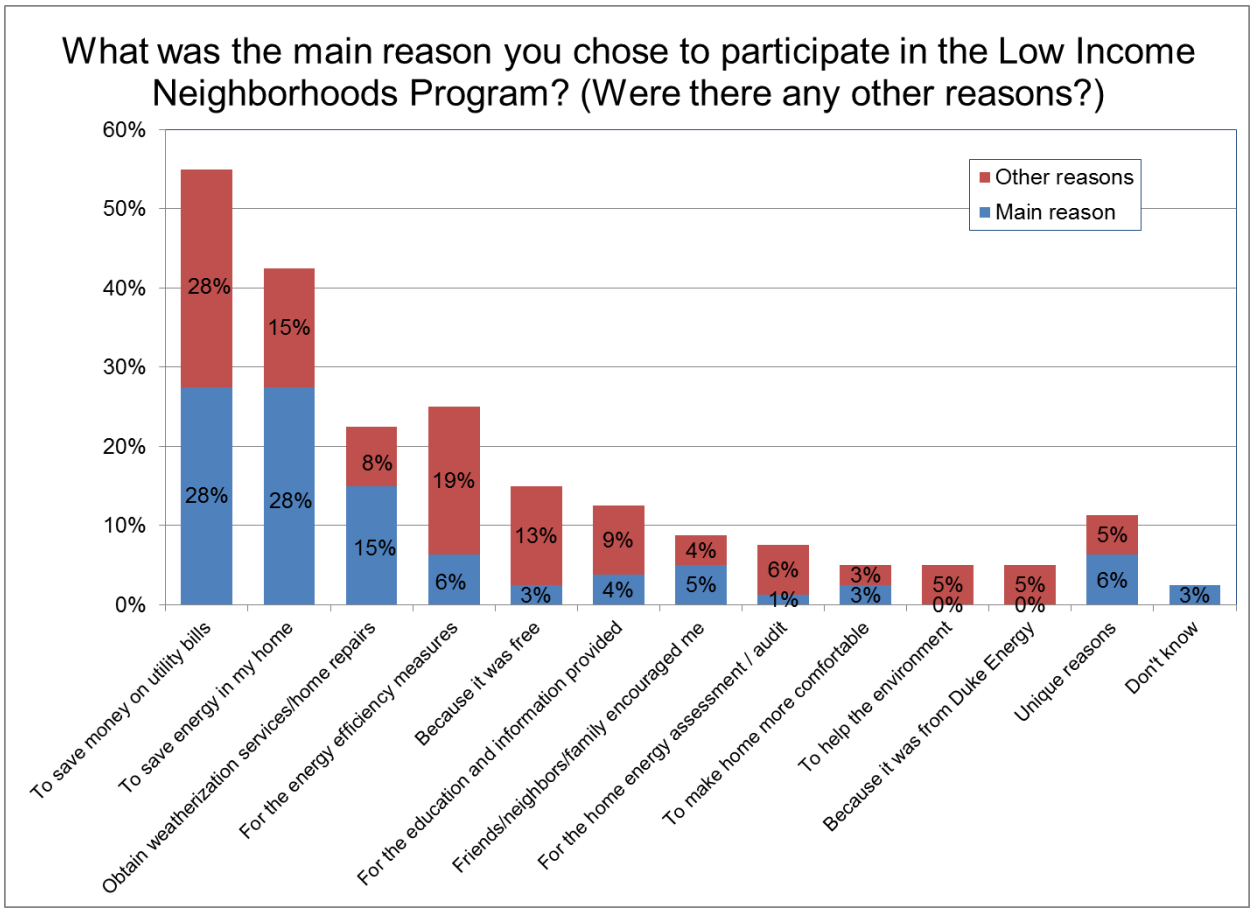

Figure 5. Factors Motivating Participation in the Residential Neighborhoods Program the Carolina System (N=80)

"Other reason" percentages total to more than 100% because participants could name multiple "other" reasons. "Main reason" percentages total to 100% because participants could only name one "main" reason.

Nine participants gave unique reasons for participating in the Residential Neighborhoods program, which are listed below.

Unique main reasons (N=5)

- *Duke was going to do all the units in my building anyway.*
- *The building management chose for me. I was at work when it was going on.*
- *I don't recall choosing to be in this program.*
- *I live in an older house, and although I rent, I am still concerned. I thought it would be the right thing to do.*
- *I saw no reason not to.*

Unique other reasons (N=4)

- *I did it to help out the landlord.*
- *It seemed like all the people involved in offering the program were polite and eager to help out the folks in my neighborhood.*
- *We needed new light bulbs.*
- *I didn't know anything about it. I had heard home owners talking about the program, but I didn't know whether Duke would also do the projects.*

Enrollment and Participation

Participants were asked how long they waited between signing up for the Residential Neighborhoods program and receiving the home audit. As seen in Table 22, about half of surveyed participants waited less than a week (45.0% or 36 out of 80 including customers who signed up the same day and those who claimed that they never signed up but the audit was performed anyway). Only 6.3% (5 out of 80) reported that they had two wait for three weeks or longer, though one in five (20.0% or 16 out of 80) could not recall the length of time between sign-up and audit. TecMarket Works considers this "service wait time" to be a best practice in the field of energy efficiency audit service offerings. Few utilities provide audits to customers with so few days between enrollment and service delivery.

Table 22. Length of Time between Sign-up and Audit (N=80)

	Carolina System (count)	Carolina System (percent)
Same day	8	10.0%
Next day up to one week	26	32.5%
One week up to two weeks	17	21.3%
Two weeks up to three weeks	6	7.5%
Three weeks up to six weeks	3	3.8%
Six weeks or longer	2	2.5%
I did not sign up, they just showed up and went to work	2	2.5%
Don't know / can't recall	16	20.0%

Participants were asked if the length of time they waited between signing up and receiving the audit was too long, too short or about right. Table 23 indicates that three-quarters (76.3% or 61 out of 80) feel that the time from sign-up to audit is "about right" though 17.5% (14 out of 80) are not sure. Participants were asked a similar question about the length of time the auditor was

in their home, and 92.5% (74 out of 80) reported that this was "about right." For both of these questions, the percentages of customers saying "too long" or "too short" are about equal and in the low single-digits.

Table 23. Customer Perception of Home Audit Timing (N=80)

	Carolina System (count)	Carolina System (percent)
Time between signing up and audit was….		
Too long	3	3.8%
About right	61	76.3%
Too short	2	2.5%
Don't know	14	17.5%
Length of time auditor was in the home was….		
Too long	1	1.3%
About right	74	92.5%
Too short	3	3.8%
Don't know	2	2.5%

Attending the Community Meeting

Before auditing teams begin to install measures in customers' homes, there is a kick-off meeting to inform customers about the program and what participation entails. About one in three surveyed participants (32.5% or 26 out of 80) attended the meeting in their area. Participant ratings of satisfaction with the staff and presenters and the information presented the meetings are included in the *Program Satisfaction* section of this report.

Recommending the Program

Surveyed participants were asked if they recommended this program to any of their friends, neighbors or relatives, and if so to how many people. Four out of five participants (81.3% or 65 out of 80) reported that they did recommend the program, and the range of reported recommendations per participant ranges from one to sixty, with an average of 5.5 and a median of three recommendations per participant recommending the program.

Participant Satisfaction

Participants were asked for their levels of satisfaction on a 1 to 10 scale (with one being the lowest and ten being the highest) for individual measures they received as well as different aspects of the program. The survey can be found in *Appendix F: Participant Survey Instrument* and the results of the satisfaction questions are presented below.

Measure Satisfaction

Table 24 below shows the respondents' mean satisfaction scores with the various measures provided by this program. Customers only provided satisfaction ratings for measures they confirmed receiving.

Most measures provided by this program received mean satisfaction ratings between 8.5 and 9.5, indicating high levels of satisfaction. The highest satisfaction ratings are for the door sweeps (9.63 with 56 customers rating this measure), water heater insulation tank wrap (9.73 based on 15 ratings) and foam insulation spray (9.75 based on 12 ratings). The lowest satisfaction ratings

are for vinyl weather stripping for doors (8.14 based on 42 ratings) and the HVAC winter kit (8.35 based on 17 ratings).

Table 24. Mean Satisfaction Ratings for Measures (N=80)

Measure	Average Rating	Valid N (not including don't know)	Percentage of ratings at "7 out of 10" or lower
CFLs	9.18	73	11.0%
Switch Plate Wall Thermometer	9.11	65	10.8%
Door Sweeps	9.63	56	3.6%
Low-flow Showerheads	8.85	55	12.7%
Faucet aerators	9.22	49	12.2%
AC/Heat Filters Year Supply	9.47	43	4.7%
Vinyl Weather Stripping Doors	8.14	42	23.8%
Change Filter Calendar	9.35	26	7.7%
Water Heater Temperature Adjustment	9.36	22	9.1%
Water Heater Pipe Wrap	8.95	21	9.5%
HVAC Winter Kit for Wall/Window Unit	8.35	17	35.3%
Water Heater Tank Insulation Wrap	9.73	15	6.7%
Caulking Doors	8.83	12	16.7%
Foam Insulation Spray	9.75	12	0.0%
Vinyl Weather for window HVAC units	9.00	4	25.0%
Clear Glass Patch Tape	10.00	4	0.0%
Caulking Windows	10.00	1	0.0%

Customers who gave satisfaction ratings of "7" or lower on a ten-point scale were asked the reason for their relatively low satisfaction with a measure. These responses are listed in later sections of this report that discuss the installation of each individual measure.

Program Satisfaction

The surveyed participants are very satisfied with the Residential Neighborhood program. Table 25 below shows the respondents' mean satisfaction scores with various aspects of the program.

Overall program satisfaction is very high with a mean of 9.35 on a 10-point scale. Surveyed participants also rated their satisfaction with the auditors who came to their homes and performed the audit: on a 1 to 10 scale, the auditors' knowledge was rated at 9.39, and their helpfulness was rated at 9.31. The highest satisfaction ratings were given to the information presented at the community meetings (9.54) and the staff and presenters at these meetings (9.77), tough only about a third of these participants attended a meeting and were thus able to give a satisfaction rating.

Table 25. Mean Satisfaction with Program Components (N=80)

Metric	Average Rating	Valid N (not including don't know)	Percentage of ratings at "7 out of 10" or lower
Convenience of enrolling in the program	9.49	76	6.6%
Knowledge of the auditor	9.39	76	6.6%
Helpfulness of the auditor	9.31	78	9.0%
Information presented at the community meeting *(only asked of customers who attended)*	9.54	26	3.8%
Staff and presenters at the community meeting *(only asked of customers who attended)*	9.77	26	0.0%
Overall program satisfaction	9.35	78	6.4%

For satisfaction ratings of "7" or below, participants were asked what could be done to improve the situation. The verbatim responses of these less-satisfied customers are listed below for each aspect rated.

Rated satisfaction with program overall at "7" or less (N=5)

- *I think that this is a great idea, and overall a great program, but I personally have not seen any results in my Duke Energy bill being reduced. The only change I have seen since participating in this program is that the cost on my monthly bill has actually gone up. I think, for folks who participate in this program whose bills don't reduce, another home audit, perhaps a more advanced one, should be performed and have it figured out as to why no improvements were made on reducing the amount of energy used in the home.*
- *This program should have followed through with what they said they were going to do. I did not receive the installations that were proclaimed to be installed, and I did not see a change for the better on my Duke Energy bill. I suggest for the program to offer installation of programmable thermostats as well as other options for energy efficient light bulbs besides CFLs. I like high wattage or very bright lights, and those CFLs do not offer that sort of light.*
- *I don't know how this can be improved. I didn't like the shower head and faucet aerators. I did like the door sweep which was keeping the air conditioning in, but the landlord had it removed.*
- *They could use products that are not so cheap.*
- *I would have like it better if I had more knowledge about the improvements they made.*

Rated convenience of enrolling at "7" or less (N=5)

- *The convenience could be improved by reducing the number of calls it takes to enroll in the program.*
- *Duke could set up appointments for the audit rather than soliciting participants door-to-door.*

- *They just showed up at my house and offered the services right away, I never really signed up to participate.*
- *They did a sloppy job. I am very dissatisfied.*
- *Explain more about it.*

Rated knowledge of auditor at "7" or less (N=5)

- *It didn't seem like my auditor knew what he was doing, I think he needed more training to have knowledge of what he was doing and what needed to be done to my home to help it save energy. Also, the things he did, like installing the foam vinyl door insulation, did not stay installed.*
- *The auditor had to come back to my house after the initial visit and needed to change out one of the shower heads that he installed. He did not test the shower head to see if it actually worked when he first installed it. Also, I asked about the purpose and function of the switch plate wall thermometer, and he was unable to give me any information about it. I still don't see the purpose of that thermometer.*
- *The auditor would have been more helpful if he was more knowledgeable about energy. I would have liked the auditor to be more knowledgeable about energy savings devices. The auditor was not able to answer a question I had about the device that attaches to the refrigerator to help save energy. He had not heard of it. I was hoping to find out what it was called.*
- *They should have explained about what they were putting in and why.*
- *Explain things better.*

Rated helpfulness of auditor at "7" or less (N=7)

- *They never explained what the things they put in are used for.*
- *The auditor could provide more explanation of what he's doing and why he's doing it.*
- *The auditor didn't seem to know much about what he was doing. This program should offer more training to the auditors. He should have been able to answer my questions about what he was installing and the function or maintenance of these things, and he could not do that for me.*
- *The auditor should have had full knowledge of what each installation's purpose was. I'm referring to how my auditor did not know what the purpose or function of the switch plate wall thermometer was to me. He was unable to explain it to me.*
- *The auditor would have been more helpful if he was more knowledgeable about energy savings devices. The auditor was not able to answer a question I had about the device that attaches to the refrigerator to help save energy. He had not heard of it. I was hoping to find out what it was called.*
- *He didn't talk much.*
- *I wish he took more time.*

Rated information presented at community meeting at "7" or less (N=1)

- *First of all, now everybody in the neighborhood may not be as dumb as I am, but we don't have the information about these energy-saving things. There needs to be more emphasis on identifying what things cause energy to go up and what can be done to reduce energy costs. A lot of people really need to know. Politicians like to be there to say hello, to say that they support the program, and that's good. But, what we really need to be presented with is with what causes energy bills to be high and what can be done to lower bills. A lot of people are not able to read the program information on the computer or the letters. When a block of people are listening at a meeting, it's a good thing. We can talk to each other. How often do we leave our cell phone chargers plugged in or appliances we're not using? For those of us who are conscious of saving energy, it's still important.*

Rated staff and presenters at community meeting at "7" or less (N=0)

Satisfaction with Duke Energy

Satisfaction with Duke Energy was generally high among these program participants, with a mean rating of 8.71 on a 10-point scale where "10" means "very satisfied", and more than half of surveyed participants (53.8% or 43 out of 80) rate their satisfaction with Duke Energy at "10 out of 10", the highest possible score. The full distribution of responses is shown in Figure 6.

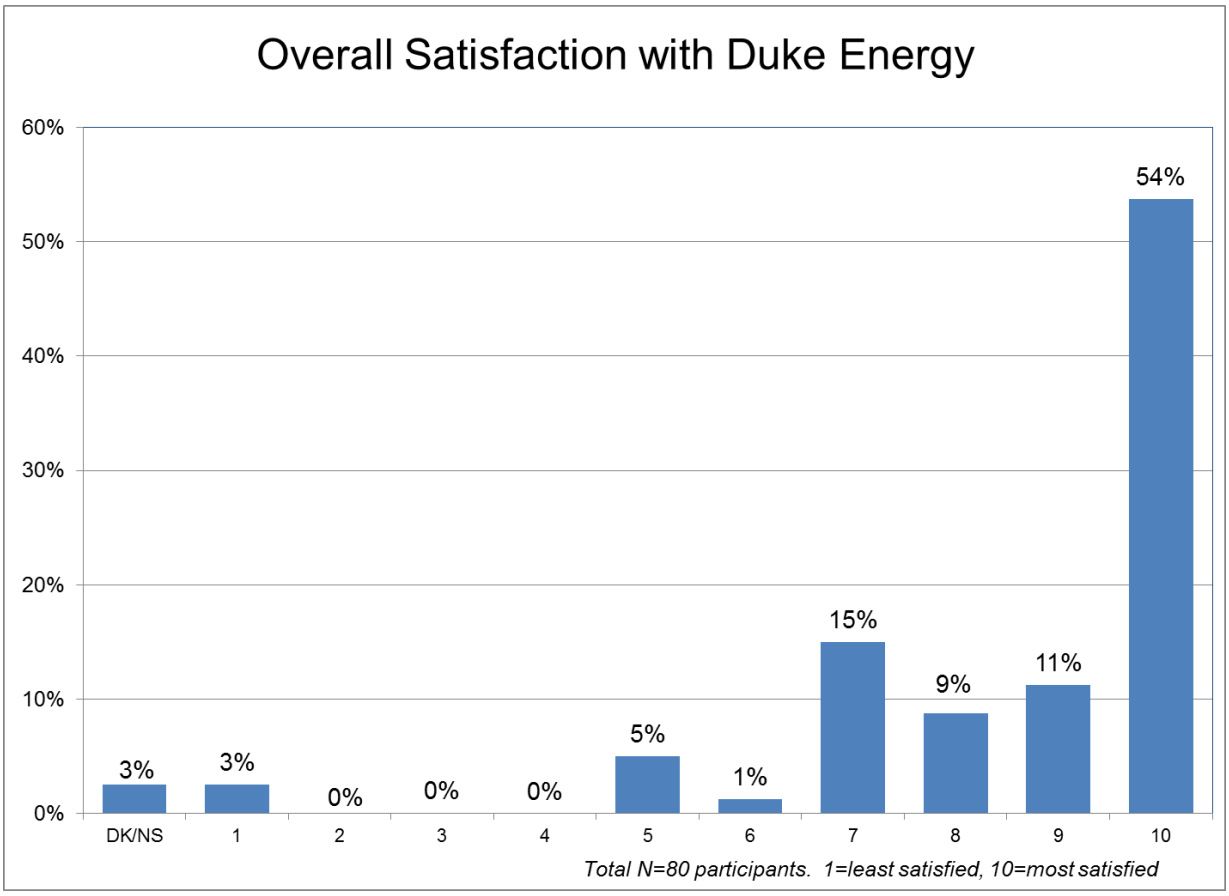

Figure 6. Program Participants' Overall Satisfaction with Duke Energy (N=80)

Nineteen participants (23.8% of 80) rated their satisfaction with Duke Energy at "7" or less on a 10-point scale and were asked how this situation could be improved. The most common responses to this question had to do with concerns about high energy rates and utility fees, as seen in the list below.

Rated satisfaction with Duke Energy overall at "7" or less (N=19)

- *Duke could reduce their energy rates.*
- *I think their rates are too high, they should work on lowering those rates.*
- *Duke could lower energy rates for elderly and/or infirmed people.*
- *The cost of my energy bill keeps on going up, I don't understand why my bills are so high. I live alone and am at work all day, I try my best to cut back and be energy efficient. I just don't understand why my monthly bill is now around $150 per month when it used to be under $100, usually around $80 or $90 dollars. Has the cost of Duke Energy really gone up that much recently?*
- *My bill was $89 per month; it's now $98. I don't know why it went up.*
- *My bill's just been high and I can't see where anything's really helping.*
- *Stop telling lies. Why is my bill so much higher than it used to be? There is something wrong with this picture.*
- *I understand that it takes money to maintain power grids, but it's hard on folks every time they raise rates. That seems to be happening a lot. Duke must think we're crazy. They know we need lights, we like electricity, so we put up with it.*
- *I am on a fixed income so I don't always have the full amount of the payment due and I frequently get cut off notices. The Duke Energy customer service people aren't flexible with the amount of money that I have to pay. It's frustrating for me because I don't like having to choose between having power in the apartment and being able to pay for food.*
- *What I don't like about Duke is they send this little card out with the bill, Share the Warmth, where they round off your bill to help someone else to pay their energy bill. They shouldn't do this when they give out these huge, huge, huge bonuses to their people and they're rounding off people's bill to pay off others' bills. It's a struggle for a lot more people than they may think. I don't like this at all!*
- *I wish Duke Energy had a payment plan for folks who are on a fixed income.*
- *Don't add a security deposit to your bill after six years.*
- *I think it's a pain in the neck when you have to call all those numbers to get to somebody, and the deposits for changing residences is outrageous.*
- *I'm disappointed by the reconnection fee. The DSS (a federally funded program) said that they would send Duke Energy $200 on my behalf but that it would take 6-8 weeks for the money to get to Duke. My most recent bill was $255 which I could not afford to pay. I had hoped that the $200 from the DSS would have applied to that bill but it didn't and my power was shut off. Crisis Ministry paid the $255 and $75 reconnection fee for me. I feel like Duke didn't care about my situation and that the $75 reconnection fee is excessive.*
- *I am disappointed that they used such cheap products. I hear other people complaining. I could have installed cheap stuff myself.*

- *Duke is great with emergencies, but I do have a problem with the ash spill. I don't think the customers should have to pay for it and I have concern about the impact on the environment.*
- *I'm not getting very good prices lately and all that coal ash stuff has given them a black eye. I guess more community involvement helps.*
- *Duke Energy does not give you any warning for when your services are to be interrupted. They don't give us enough time to pay our bills, and their deferment plan does not help us. I think Duke Energy needs to get a whole new CEO and new team, start all over again. What they are doing now is not currently working. I want to move somewhere where I don't have to deal with Duke Energy anymore. Duke needs to stop doing stuff that is making them look bad, all this pollution is bad for them, their customers, and especially the environment, Duke's 'efforts' are poisoning people's drinking water! Duke needs to start helping us, not hurting us! The cost of Duke Power is too high on too many levels.*
- *I don't know.*

Surveyed participants were also asked if their participation in the Residential Neighborhoods program has made their attitude toward Duke Energy more positive or more negative. Table 26 shows that nearly a clear majority say that the program has made them more positive towards Duke Energy (58.8% or 47 out of 80), and nearly two-thirds report that their knowledge of how to save energy has increased (67.5% or 54 out of 80). Only two customers report that their attitude towards Duke Energy has gotten worse (2.5% of 80) and a similar number report that their knowledge of how to save energy has decreased somewhat (2.5% or 2 out of 80).

Table 26. Changes in Attitude and Knowledge due to Program Participation (N=80)

	Carolina System (count)	Carolina System (percent)
This program has made my attitude towards Duke Energy….		
Much more positive	22	27.5%
Somewhat more positive	25	31.3%
About the same	30	37.5%
Somewhat more negative	0	0.0%
Much more negative	2	2.5%
Don't know	1	1.3%
Has your knowledge of how to save energy ….		
Increased a lot	21	26.3%
Increased somewhat	33	41.3%
Stayed the same	24	30.0%
Decreased somewhat	2	2.5%
Decreased a lot	0	0.0%
Don't know	0	0.0%

Participants who said their attitude towards Duke Energy was altered by their participation in the program were asked to explain this; these responses are categorized and listed below.

Much more negative towards Duke Energy (N=2)

- *They did not do the installations they said they would and I have not seen any savings on my utility bill; there have been no actual improvements made.*
- *The materials they used are of waste of money and my time.*

Much more positive towards Duke Energy (N=22)

- *Because it seems as though Duke Energy is making an effort to save costs and offer provisions for the homes. Costs are always going up on everything we need, so it's great that Duke has made an effort to help control those necessary costs.*
- *Because of the impact that this program has made. The program is working! People have had the opportunity to improve things in their homes that would have never been improved without the help from this program offered by Duke Energy.*
- *Because their lighting seems to last longer and you don't have to buy as many bulbs.*
- *I did not know that Duke Power would come to your home and do those repairs. I think it's a very good project.*
- *I like that they are trying to give their customers help.*
- *I think it was very nice of them to provide this service and to help us senior. We are so often neglected. I have been working since I was 14 and am now almost 80. I see young people getting so much help but as a senior I get very little help. I have so much to pay on a limited income: taxes, insurance, utility bills.....*
- *It shows that they are more concerned about us saving a dollar than them making a dollar.*
- *It was great that Duke offered a free program that would potentially save us money on our utility bills.*
- *It was very helpful Duke came out and make this program for us. Also I liked that the program is free.*
- *It's nice that Duke has done this program. It really helps people like me who want to conserve energy for financial reasons but aren't able to afford the things that Duke provided. I wanted to use door sweeps and try out CFLs but I really couldn't find the money to do these things. I don't think that my bill has decreased but I think that's because the rates keep going up and I think I'm using fewer kilowatt hours.*
- *My attitude is much more positive because I am grateful for the help I received. I knew that Duke's rates were going up, so getting an offer for a free energy assessment was nice.*
- *My attitude is much more positive because I learned ways to reduce my energy bill. Duke Energy demonstrated that they care about their customers.*
- *Programs like the Residential Neighborhood Program demonstrate that Duke Energy cares about their customers.*
- *They are helping us conserve on energy.*
- *They did a lot for our neighborhood. They visited many peoples' homes.*
- *They helped a lot of people.*

- *They work with you and they try to help you out. There's no other company that I know of who think about equality Very good for them! Whoever owns Duke must have a big heart.*
- *They're helping people save energy; they didn't have to do that. They could have let us keep wasting power.*
- *Things are working out for me, the program worked out great towards making my home more comfortable. I think my energy bills came down a little bit as well.*
- *Through participating in this program, it is the first time I have ever known that Duke Energy wanted to help the residents to be more energy efficient. I see it as they are caring for their customers.*
- *Who else does these things? Why would you do these things if you didn't care? They were all over the neighborhood. Really nice they are reaching out. I was unemployed at time and the program saved me money. I think it's awesome that someone was doing something.*
- *With this program they try to show you things that you probably would have missed, or did not even know, that could help you save energy. This program offered things that everyone should be doing for their homes.*

Somewhat more positive towards Duke Energy (N=25)

- *After taking advantage of this program, I got a feeling that Duke Energy cared about how much money I had to spend on my utilities. This program helped me save money, yet it did not cost me anything but a little bit of time. I think it is wonderful.*
- *Because for them to offer us this program, to save on our electricity, I have a better opinion about them. It's so great that this program and all these home improvements were all free to us, it shows that Duke Energy cares about being conservative with energy use. I like that they have given us the right things to conserve energy in our homes.*
- *Duke Energy is giving us something for nothing even though they don't have to. They are concerned about their customers' bills and helping the environment.*
- *I appreciated it. Any help I can get, I'm all for it. I'm disabled and I'm on a fixed income.*
- *I learned a little bit and got some things done I needed to.*
- *I like that they are taking the initiative to let people know how to save energy.*
- *I like the helpfulness of the auditor. I would give a higher rating if their rates were lower.*
- *I like their concern for us and the help they gave our neighborhood.*
- *I love what they offered.*
- *I mean, Duke Energy was nice enough to come out to my neighborhood and help us out with saving energy in our homes, I'm impressed on their efforts to help out individuals.*
- *I understand that Duke Energy's rates have gone up quite some percentage wise, but they are still trying to save their customers money by offering programs like this one.*
- *I've always liked Duke Energy but I thought that it was really nice that they are providing this service to their customers. It's not something that they have to do, but they are doing it for their customers and the environment.*
- *It was a good idea to help people save money and energy.*

- *It woke me up to change some of the things I was doing.*
- *It's beneficial to the community, so that's a positive step.*
- *It's a good program.*
- *It's like they're giving back to community. Not just out there to make money.*
- *My attitude is somewhat more positive because I gained useful knowledge about energy efficiency.*
- *They did everything well.*
- *They send me a form every month and I can tell where I was before I got these lights.*
- *They're trying to help people save on their bill.*
- *You don't really think of an energy company helping you save energy in your home and taking an interest in us personally.*
- *My bill's the same.*
- *I think they could do more, Duke Energy could get more involved in communities and offer more of these energy efficiency programs to the 'little people'. Currently, it seems like a lot of Duke's attention goes to industrial and commercial efforts instead of residents and the individuals.*
- *I like the program. However, Duke has been sloppy with the Ash Spill. It's endangering our environment and health. The customers have to pay for the Ash problem yet executives are getting raises and utility bills are increasing.*

Nearly half of surveyed participants (43.8% or 35 out of 80) report that their utility bills have decreased since participating in the program, though one in ten (10.0% or 8 out of 80) report that their bills have actually increased. A third of these participants (31.3% or 35 out of 80) have seen no change, and 15.0% (12 out of 80) are not sure if their bills have gone up or down. Table 27 also shows participants' estimates for the monthly change in their bills; the six customers who say their bills "decreased a lot" report saving an average of about $70 per month, while those who say their bills "decreased somewhat" report saving an average of about $13 per month. Overall, the average savings of the 65 participants[11] who were able to estimate the change in their bill is about $8 per month, though the median savings is only $1 per month (indicating that overall nearly as many surveyed participants saw their bills stay the same or increase as saw their bills decrease).

[11] Out of 80 participants surveyed, twelve participants were not sure if their bills had changed, so were not asked to estimate the amount of the change. Three more participants who were able to answer the question about their bill changing were unable to provide a specific dollar estimate for the amount of the change.

Table 27. Changes in Energy Bills due to Program Participation (N=80)

	Carolina System (count)	Carolina System (percent)	Estimated dollars per month savings (negative means increase in bill)
Have your monthly utility bills ….			
Decreased a lot	6	7.5%	$69.6
Decreased somewhat	29	36.3%	$12.6
Stayed about the same	25	31.3%	$0.0
Increased somewhat	5	6.3%	-$23.8
Increased a lot	3	3.8%	-$47.5
Don't know	12	15.0%	NA
Total average savings per month			$8.4

Predicting Overall Program Satisfaction

Table 28 shows the correlations between overall program satisfaction and seven factors which could be used to predict program satisfaction. All of the satisfaction ratings with aspects of the program, mean satisfaction with measures received, and satisfaction with Duke Energy are highly correlated to satisfaction with the program. However, attending the community meeting and the number of measures received are not significantly correlated with overall program satisfaction.

Table 28. Correlations with Overall Program Satisfaction

	Correlation with program satisfaction (Pearson's r)	Significance
Helpfulness of the auditor	.784	p<.01
Satisfaction with Duke Energy	.727	p<.01
Convenience of enrolling in the program	.715	p<.01
Knowledge of the auditor	.644	p<.01
Mean satisfaction with measures received	.487	p<.01
Attended community meeting	.117	-
Number of measures received	.094	-

Next, simple linear regressions were performed to predict overall participant satisfaction with the program using ratings of satisfaction for ten different aspects of the program. Two models were used: a stepwise model that selects predictors based on incremental improvements to the model (producing the most efficient model that predicts the most variance using the fewest predictors), and a "complete" model that uses all predictors simultaneously (which represents the maximum variance that can be explained using this set of predictors).

The two regression models produce highly consistent results, as both indicate the aspects of the program that have the most influence on overall program satisfaction are being satisfied with the helpfulness of the auditor and being satisfied with Duke Energy in general, followed by

satisfaction with the convenience of enrollment. The two models also produce very similar levels of variance explained, indicating that the non-significant predictors included in the complete model have little additional effect.

The stepwise algorithm is iterative, adding or subtracting predictors from the model based on predetermined criteria. For the model presented in Table 29, predictors are added to the model as long as their coefficients when added to the model are significant at the p<.10 level, and removed from the model if the significance of their coefficients falls below p<.20 (due to multicolinearity with other predictors added to the model on subsequent steps). The algorithm will take as many steps as necessary until all predictors that meet the criteria have been added to (or subtracted from) the model. For this model, the algorithm added three predictors (and removed none) in order to arrive at the final regression equation in three steps.

Table 29. Stepwise Regression to Predict Overall Program Satisfaction (N=71[12])

Predictor	Beta coefficient	Significance
Satisfaction with Duke Energy	.393	p<.01
Helpfulness of the auditor	.380	p<.01
Convenience of enrolling in the program	.243	p<.05

The three-predictor regression model produced using the stepwise method predicts 76.7% of the variance in overall program satisfaction (R-squared), and is significant at the p<.01 level using ANOVA. Beta coefficients are standardized values and indicate the relative importance of the predictors in the model (absolute value of 1.0 would indicate that the predictor determines the predicted variable perfectly, and zero indicates no effect at all. Negative coefficients would represent negative influence, though for this model all coefficients are positive).

For the "complete" model, all seven predictors are used simultaneously to predict overall program satisfaction. Since there are no criteria used to determine which predictors are included in the model, most of the predictors do not reach the level of statistical significance. However the complete model does show the maximum amount of variance in overall satisfaction that can be explained using this set of predictors.

[12] Though there are 80 participants in this survey, the number of valid cases used for regression models is 71 due to "listwise" deletion of missing data. In order to be included in the model, a participant had to give valid answers to all questions used in the model; nine customers who are missing one or more ratings were excluded.

Table 30. "Complete" Regression to Predict Overall Program Satisfaction (N=71)

Predictor	Beta coefficient	Significance
Helpfulness of the auditor	.441	p<.01
Satisfaction with Duke Energy	.401	p<.01
Convenience of enrolling in the program	.263	p<.01
Number of measures received	.044	-
Mean satisfaction with measures received	.003	-
Knowledge of the auditor	-.085	-
Attended community meeting	-.106	-

The "complete" seven-predictor regression model predicts 77.7% of the variance in overall program satisfaction (R-squared), and is significant at the p<.01 level using ANOVA. The additional non-significant predictors in this model only increase the variance explained by 1.0% over the stepwise model. The negative beta coefficients seen in this model are not significantly different from zero at p<.10 or better.

Comparing the correlations in Table 28 (relationship between predictors and program satisfaction one-at-a-time) with the regression model in Table 30 (relationship between predictors and program satisfaction all-at-once) indicates that mean satisfaction with measures received and the knowledge of the auditor become non-significant in the presence of the three significant predictors in the regression model: helpfulness of the auditor, satisfaction with Duke Energy and convenience of enrollment.

Installation of Energy Efficiency Measures

Duke Energy provided program records of which measures were installed in which customers' homes, which are based on the auditors' records of which measures were installed during audits. The number and percentage of surveyed Carolina System participants who received each measure according to these records is shown in Table 31. Out of the sixteen categories of measures shown in this table, all customers who were surveyed received between five and thirteen measures, and on average customers received nine of these measures (the mean is 9.2 types of measures received and the median is 9.0).

More than 90% of surveyed customers received CFLs (of either wattage: 97.5% or 78 out of 80), switch plate wall thermometers (92.5% or 74 out of 80) and faucet aerators (91.3% or 73 out of 80). The measures customers were least likely to receive are caulking for windows (13.8% or 11 out of 80), vinyl weather stripping for window units (7.5% or 6 out of 80) and the glass patch tape (7.5% or 6 out of 80).

Table 31. Installation of Energy Efficiency Measures from Auditor Records (N=80)

	Carolina System (count)	Carolina System (percent)
Any CFL(s)	78	97.5%
13-watt CFL(s)	44	55.0%
18-watt CFL(s)	57	71.3%
Switch plate wall thermometer	74	92.5%
Faucet aerator(s)	73	91.3%
Door sweeps	71	88.8%
HVAC filters and filter change calendar	64	80.0%
Vinyl weather stripping doors	63	78.8%
Low-flow showerhead(s)	61	76.3%
Foam insulation spray	56	70.0%
Caulking doors	49	61.3%
Water heater temperature adjustment	44	55.0%
Water heater pipe wrap	36	45.0%
HVAC winter kit for wall/window unit	24	30.0%
Water heater tank insulation wrap	19	23.8%
Caulking windows	11	13.8%
Vinyl weather stripping HVAC window units	6	7.5%
Clear glass patch tape	6	7.5%

Surveyed customers who participated in the Residential Neighborhoods program were asked to confirm whether they received the measures that auditor records show they had received. Confirmation rates range as high as 91.8% (56 out of 61) for low-flow showerheads to as low as 9.1% (1 out of 11) for caulking windows. There is also high variability in the percent of customers who are unable to confirm measures ("don't know"), ranging from the low single digits for some measures such as CFLs (only 2.6% or 2 out of 78 were unsure if they had received these measures) up to 41.1% (23 out of 56) who were not sure if they received any foam insulation spray. For the two caulking measures, a majority of participants who received these measures according to auditor records reported that they did not receive caulk for their doors (51.0% or 25 out of 49) or windows (72.7% or 8 out of 11).

Table 32. Customer-Confirmed Installation of Energy Efficiency Measures (N=80)

	Valid count (# receiving according to auditor records)	**All measures installed %**	**Partially installed %**	**Not installed %**	**Don't know %**
Any CFL(s) *(partial = only some bulbs installed)*	78	76.9%	19.2%	1.3%	2.6%
13-watt CFL(s)	44	NA	NA	NA	NA
18-watt CFL(s)	57	NA	NA	NA	NA
Switch plate wall thermometer	74	89.2%	NA	6.8%	4.1%
Faucet aerator(s)	73	68.5%	NA	21.9%	9.6%
Door sweeps	71	80.3%	NA	16.9%	2.8%
HVAC filters and filter change calendar *(partial = received filters or calendar)*	64	42.2%	15.6%	25.0%	17.2%
Vinyl weather stripping doors	63	66.7%	NA	28.6%	4.8%
Low-flow showerhead(s)	61	91.8%	NA	6.6%	1.6%
Foam insulation spray	56	23.2%	NA	35.7%	41.1%
Caulking doors	49	24.5%	NA	51.0%	24.5%
Water heater temperature adjustment	44	56.8%	NA	9.1%	34.1%
Water heater pipe wrap	36	61.1%	NA	27.8%	11.1%
HVAC winter kit for wall/window unit	24	70.8%	NA	25.0%	4.2%
Water heater tank insulation wrap	19	84.2%	NA	10.5%	5.3%
Caulking windows	11	9.1%	NA	72.7%	18.2%
Vinyl weather stripping HVAC window units	6	66.7%	NA	33.3%	0.0%
Clear glass patch tape	6	66.7%	NA	16.7%	16.7%

These significant discrepancies between auditor records and customer recollections are not unexpected, for several reasons:

- Auditors record installations the day the work is done; customers are recalling what was done weeks or months after the installation.
- The auditors did the vast majority of the installations themselves; the customers may or may not have been paying attention to what the auditor was doing during the audit.
- Auditors have experience with installing these particular measures and with filling out the paperwork to record what was done; most customers do not have any experience with these measures, and are not familiar with the forms (i.e., the range of possible measures that could be installed).

Since this evaluation did not include on-site verification of measure installation, we cannot determine the objective accuracy of either the auditor records or the customers' recollections of what was done during the audits. However, for the reasons listed above, TecMarket Works assumes that the auditor records are more accurate than the customers' survey responses. Therefore, the process reporting for measure installations assumes that the auditor records are correct and the measure was installed when a customer cannot confirm auditor records ("don't know").

CFL Installations

Although auditors are supposed to install all measures, customers report that this does not always happen. As seen in Table 33, over half of the customers who received CFLs according to auditor records confirmed that the auditor installed all of the bulbs (55.1% or 43 out of 78), and another 21.8% (17 of 78) reported that all of the bulbs they received were installed by a combination of auditor and customer efforts. However, 17.9% (14 out of 78) report that the auditor left CFLs behind which have not been installed yet. Additionally, one customer (1.3% of 78) said that they received CFLs (two bulbs) but have not installed them yet, while another customer (1.3% or 1 out of 78) reports that they never received any CFLs, and two customers (2.6% of 78) could not recall if they received any CFLs.

Table 33. Measure Installation: CFLs (N=78)

78 participants received CFLs according to auditor records	**Carolina System (N)**	**Carolina System (%)**
Auditor installed all bulbs	43	55.1%
Auditor installed some bulbs, left other bulbs which customer installed	14	17.9%
Auditor gave bulbs to customer, customer installed all of them	3	3.8%
Auditor installed some bulbs, left other bulbs which customer has NOT installed	11	14.1%
Auditor gave bulbs to customer, customer installed some of them	3	3.8%
Auditor gave bulbs to customer, customer has not installed any of them	1	1.3%
Did not receive any CFLs	1	1.3%
Don't know / not specified	2	2.6%

The fourteen participants who said that they have uninstalled CFLs they received from the auditor were asked how many of these bulbs are left over, and what they have done or intend to do with those bulbs. These fourteen customers report having a total of thirteen 13-watt and 37 18-watt bulbs left over (an average of 0.9 13-watt and 2.6 18-watt CFLs apiece among customers with leftover program CFLs).

Table 34 compares auditor records of CFL installation with customer recollections. Auditor records report that 414 13-watt CFLs and 345 18-watt CFLs were installed across the 80 surveyed participant households. When asked to confirm the auditor bulb totals, in aggregate customers reported receiving slightly more bulbs than the program records showed (416 13-watt CFLs and 349 18-watt CFLs). However, after taking into account the 50 unused bulbs that customers say they received which had not been installed as of the time of this survey, the number of bulbs confirmed installed by customers is 403 13-watt CFLs (97.3% of the auditor-recorded total) and 312 18-watt CFLs (90.4% if the auditor-recorded total). Overall, the total number of customer-confirmed bulb installations is 94.2% of the auditor-reported total (715 out of 759 bulbs installed).

Table 34. Customer Confirmation of CFL Installations

	Count of CFLs
Auditor records: 13w CFLs installed	414
Customer confirmation: 13w CFLs received	416
Customer confirmation: 13w CFLs installed	403
Percent of 13w CFLs from auditor records confirmed installed by customers	97.3%
Auditor records: 18w CFLs installed	345
Customer confirmation: 18w CFLs received	349
Customer confirmation: 18w CFLs installed	312
Percent of 18w CFLs from auditor records confirmed installed by customers	90.4%
Auditor records: Total CFLs installed	759
Customer confirmation: Total CFLs received	765
Customer confirmation: Total CFLs installed	715
Percent of Total CFLs from auditor records confirmed installed by customers	94.2%

As indicated in Table 35, about one in six customers who received CFLs from this program still has some program bulbs in storage (16.9% or 13 out of 77 who confirmed that they received CFLs from the program), though stored bulbs only account for 5.8% of the bulbs that customers confirm were given to them. Only one customer gave away any program bulbs (to a family member; this represents 1.3% of 77 customers receiving CFLs, accounting for 0.8% or 6 out of 765 bulbs distributed), and none of the surveyed customers reported disposing of (throwing away or recycling) any uninstalled program bulbs.

Table 35. Customers with Uninstalled CFLs and Number of Uninstalled CFLs

	Customers (N)	Customers (%)
Customers who received bulbs (customer confirmed)	**77**	**100.0%**
Customers with bulbs not installed yet	14	18.2%
Uninstalled bulbs in storage	13	16.9%
Uninstalled bulbs given away	1	1.3%
Uninstalled bulbs other outcomes	0	0.0%
Uninstalled bulbs don't know	0	0.0%
	CFLs (N)	**CFLs (%)**
Number of bulbs received (customer confirmed)	**765**	**100.0%**
Number of bulbs not installed yet	50	6.5%
Uninstalled bulbs in storage	44	5.8%
Uninstalled bulbs given away	6	0.8%
Uninstalled bulbs other outcomes	0	0.0%
Uninstalled bulbs don't know	0	0.0%

Customers with spare program CFLs in storage were asked if they intend to use all these bulbs, and how long they think it will take to use them all. As seen in Table 36, overall 92.3% (12 out of 13) of customers with program CFLs in storage plan to use them all, while one customer said they "maybe" will use them all (7.7% of 13) and no customers reported that they do not intend to install the CFLs. Among those who plan to install all program CFLs eventually, most are not

sure how long it will take (53.8% or 7 out of 13 customers with bulbs in storage) though nearly as many believe they will install all remaining program bulbs within a year (38.5% or 5 out of 13).

Table 36. Customer Plans for Uninstalled Program CFLs

	Customers (N)	Customers (%)
Customers with program CFLs in storage	**13**	**100.0%**
Yes, plan on eventually installing all uninstalled CFLs	12	92.3%
Yes – will install all within a year	5	38.5%
Yes – will install all in 1-2 years	0	0.0%
Yes – will install all in 2-3 years	0	0.0%
Yes – will install all in 3-5 years	0	0.0%
Yes – will install all in more than 5 years	1	7.7%
Yes – will install all, not sure how long it will take	7	53.8%
Maybe, might eventually install all uninstalled CFLs	1	7.7%
No, do not plan to eventually install all uninstalled CFLs	0	0.0%
Don't know if all uninstalled CFLs will eventually be installed	0	0.0%

Customers who received CFLs from this program were asked a series of questions about up to three CFL installations. Table 37 indicates that program CFLs are most frequently installed in kitchens, living/family rooms, bedrooms and bathrooms; these correspond to the rooms in a home that generally have the highest occupancy time and thus highest lighting usage.

Table 37. Installation of Program CFLs by Room

Room where program CFLs were installed	13w CFLs count	18w CFLs count	Bulb wattage not recalled	Total CFLs count	% of CFL installations (N=218[13])
Kitchen	18	26	6	50	22.9%
Living/family room	18	28	3	49	22.5%
Bathroom	15	17	6	38	17.4%
Master bedroom	18	14	2	34	15.6%
Other bedroom	5	6	2	13	6.0%
Dining room/dinette	7	6	1	14	6.4%
Den/computer room	2	4	2	8	3.7%
Hall	1	3	0	4	1.8%
Porch/exterior	1	3	0	4	1.8%
Closet	0	1	0	1	0.5%
Basement	0	1	0	1	0.5%
Garage	0	0	0	0	0.0%
Don't know	0	2	0	2	0.9%

Respondents who have program CFLs installed are asked about up to three bulb installations.

[13] The 76 customers who confirmed that they have program CFLs installed in their homes were asked about up to three installations apiece, yielding data on 218 installations in total. This does not represent all installed bulbs, but rather a customer-selected sample of installations. There were a total of 715 CFLs confirmed installed by survey participants, though manyof these installations may involve multiple bulbs in the same fixtures, controlled by the same switches (we do not know the total number of installations represented by the 715 bulbs distributed).

Table 38 shows the bulb type and wattage of the light bulbs which were replaced by program CFLs, according to customers' recollections. Customers report that 6.0% (13 out of 218) installations consisted of a program CFL replacing a pre-existing CFL, 2.3% (5 out of 218) of installations consisted of a program CFL being placed in a previously empty socket, and for 2.3% (5 out of 218) of these installations the customer did not know the previous bulb's type. The remaining nine out of ten program bulbs installed (89.4% or 195 out of 218) replaced standard incandescent bulbs. The majority of replaced incandescent bulbs were 45 to 70 watt bulbs (60.9% or 106 out of 174 installations replacing incandescent bulbs where the customer was able to give a wattage for the previous bulb).

Table 38. Installation of Program CFLs: Replaced Bulb Type and Wattage

	Count of installations	% of CFL installations (N=218)
What type of bulb was previously in the socket where the CFL was installed?		
Standard incandescent	195	89.4%
CFL	13	6.0%
Other type	0	0.0%
No bulb in the socket	5	2.3%
Don't know	5	2.3%
How many watts was the bulb that was replaced by the CFL?		
Replaced CFL: 44 watts or less	13	6.0%
Replaced incandescent: 44 watts or less	26	11.9%
Replaced incandescent: 45 to 70 watts	106	48.6%
Replaced incandescent: 71 to 99 watts	26	11.9%
Replaced incandescent: 100 watts or more	16	7.3%
Replaced incandescent: Don't know	21	11.9%
No bulb in socket / bulb type unknown	10	4.6%

Respondents who have program CFLs installed are asked about up to three bulb installations.

Table 39 shows the hours of use for lights where program CFLs were installed, based on customers' reporting. Nearly half of lights where program CFLs were installed are used for less than two hours per day (47.9% or 104 out of 217 installations where customers were able to report hours of use), but more than a quarter are used for five or more hours per day (28.1% or 61 out of 217). For about nine out of ten installations (89.4% or 195 out of 218), customers report that hours of use has not changed since participating in the program; however 2.8% (6 out of 218) reported that hours of use increased while 6.0% (13 out of 218) reported that their usage decreased. Among the six CFL installations where customers reported that their usage increased, five had no bulb previously installed in the socket (i.e., previous usage was zero).

Table 39. Installation of Program CFLs: Hours of Use

	Count of installations	% of CFL installations (N=218)
How many hours per day is this light used?		
Less than 1	48	22.0%
1 to 2	56	25.7%
3 to 4	52	23.9%
5 to 10	46	21.1%
11 to 12	4	1.8%
13 to 24	11	5.0%
Don't know	1	0.5%
Did the hours of use for this light change since installing the CFL?		
Stayed the same	195	89.4%
Increased	6	2.8%
Decreased	13	6.0%
Don't know	4	1.8%

Respondents who have program CFLs installed are asked about up to three bulb installations.

Customers were asked to estimate the change in usage for the nineteen installations where usage went up or down after the program. These responses are listed below.

Hours of usage increased (N=6)

- *Three hours per day more; previously, there was no bulb installed.*
- *Less than one hour per day; previously, there was no bulb installed.* (N=4)
- *Fifteen minutes per day more.*

Hours of usage decreased (N=13)

- *Eight hours per day less.* (N=2)
- *Four hours less per day, because it is summer.*
- *Three hours per day less.* (N=2)
- *Two hours per day less.*
- *An hour and a half per day less.* (N=2)
- *One hour per day less.*
- *Half an hour per day less.* (N=2)
- *Fifteen minutes per day less.*
- *I don't know.*

About a third of previously installed bulbs were retained by customers and are being stored for potential future use (32.1% or 70 out of 218 installations), as seen in Table 40. A larger plurality of 47.2% (103 out of 218) of installations resulted in the old bulbs being thrown away, recycled, taken by the auditor, or stored for future disposal. In 13 of these 218 installations (6.0%), the old bulbs are still in use in the customer's home (0.9% or 2 out of 218 installations "installed elsewhere in the home") or could be being used in another person's home (5.0% of 11 out of 218

bulbs were "given to somebody"). There are also a total of 27 installations (12.4% of 218) where it is not known what happened to the previous bulb (customers could not recall).

Table 40. Installation of Program CFLs: Disposal of Old Bulbs

	Count of installations	% of CFL installations (N=218)
What happened to the old bulb that was removed?		
Threw it away	84	38.5%
Stored it	70	32.1%
Gave it to somebody	11	5.0%
Auditor took it with them	10	4.6%
Recycled it	6	2.8%
Temporarily stored to dispose of later	3	1.4%
Installed it elsewhere in the home	2	0.9%
Don't know what happened to it	22	10.1%
Old bulb type unknown	5	2.3%
No bulb in socket	5	2.3%

Respondents who have program CFLs installed are asked about up to three bulb installations.

About one in five participants who confirmed that they have program CFLs installed has since removed at least one program bulb (21.1% or 16 out of 76), as seen in Table 41. The sixteen customers who removed program bulbs uninstalled a total of 36 CFLs (an average of 2.3 CFLs per household that removed CFLs), or 5.0% of the 715 program CFLs which were confirmed installed.

Table 41. Removing Installed Program CFLs

	Customers (N)	Customers (%)
Number of customers who confirmed that they have program CFLs installed	**76**	**100.0%**
Yes, removed program CFL(s)	16	21.1%
No, all program CFLs are still installed	54	71.1%
Don't know	6	7.9%
	CFLs (N)	**CFLs (%)**
Number of bulbs installed (customer confirmed)	**715**	**100.0%**
Total number of bulbs uninstalled	36	5.0%
Number of 13w bulbs uninstalled	19	2.7%
Number of 18w bulbs uninstalled	14	2.0%
Number of bulbs uninstalled, wattage unknown	3	0.4%

The sixteen survey participants who removed program CFLs were asked why they did so. Their responses are listed below; in most cases bulbs were removed because they burned out.

- Bulbs burned out (N=12)
- Bulbs did not work with the dimmer switch (N=2)
- Bulbs were too bright (N=1)

- Bulbs broken by accident (N=1)

Seventy-three participants who confirmed that they have program-provided CFLs installed in their homes rated their satisfaction with the CFLs on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program CFLs is quite high at 9.18, and only 11.0% (8 out of 73) gave ratings of "7" or lower. Those eight customers with ratings of "7" or lower were asked the reason for their relatively low satisfaction with the CFLs; these responses are listed below.

- *It takes a little longer for it to get bright.*
- *The CFLs take a while to warm up to full brightness, and I really prefer to have bright lights in my house. Also, I guess you could say that I don't like change. I like standard bulbs and I understand the benefits of the CFLs, but I guess I'm stuck in my ways and like the old, bright, standard bulbs.*
- *I don't like that it takes a long time for the bulb to become bright enough for me to see. I have diabetes and have trouble with my vision.*
- *I'm a senior and, as you age, you need more light to see by and they're dimmer than the average light bulb.*
- *It's kind of dim.*
- *I was disappointed in the longevity of the CFLs. Five of the 18-watt bulbs burned out rather quickly.*
- *I haven't really used them that much.*
- *I really haven't paid it that much attention.*

CFLs and LEDs Installed Before Participating in the Program

Table 42 indicates that nearly two-thirds of participants (61.8% or 47 out of 76) already had some CFLs installed in their homes before participating in the Residential Neighborhoods program. The 43 surveyed customers who already had CFLs installed before the program and were able to answer the question "how many?" had an average of 6.3 CFLs apiece before the program; including the 26 customers who did not have any CFLs installed before the program, the average number of CFLs installed before the program is 3.7 per household.

Among the customers who had CFLs installed before the program, most acquired them from another Duke Energy program. In fact, nearly half of the participants who received CFLs from the Residential Neighborhoods program had already received CFLs from another Duke Energy program (40.8% or 31 out of 76 customers who confirmed the installation of program CFLs). However, only about one in four surveyed participants (25.0% or 19 out of 76) have been using CFLs for three years or more.

Table 42. Preinstalled CFLs (N=76)

Base: 76 participants who confirmed program CFLs were installed	Carolina System (N)	Carolina System (%)
Did you have any CFLs installed before participating in this program?		
No	26	34.2%
Yes, from 1 to 5	26	34.2%
Yes, from 6 to 11	11	14.5%
Yes, 12 or more	6	7.9%
Yes, don't know how many	4	5.3%
Don't know	3	3.9%
Where did you get the CFLs you were using in your home before participating in this program?		
Another Duke Energy program	31	40.8%
Purchased at a store	11	14.5%
A program from a company other than Duke Energy	2	2.6%
From a Community Assistance Program	1	1.3%
Another source, listed below	4	5.3%
Don't know	1	1.3%
How long have you been using CFLs?		
One year or less (but previous to program participation)	7	9.2%
One to two years	7	9.2%
Two to three years	13	17.1%
Three to five years	13	17.1%
Five years or more	6	7.9%
Don't know	1	1.3%

Although 47 participants reported having CFLs installed before participating in the program, there are 50 responses shown for the source of these CFLs; this is because participants could give multiple responses if they acquired CFLs from multiple sources.

Four surveyed participants said they acquired CFLs from "another source"; these responses are listed below.

- *My local Post Office offered free ones to us; I just had to fill out a post card request and they sent me free CFLs.*
- *A friend gave me one CFL.*
- *My daughter gave them to me.*
- *There were already CFLs here when I moved in.*

The 31 customers who said they received CFLs from "another Duke Energy program" were asked to describe or name the program: 29 customers mentioned variations on "free CFLs by mail" and two customers did not know (none of these customers mentioned any other Duke Energy programs).

The two customers who said they received CFLs from "a program from a company other than Duke Energy" were asked what company; these responses are listed below.

- *I was given them since I was a teacher at a school. They were given to us for free through a charity.*
- *I don't know, they were mailed to me.*

The eleven customers who purchased CFLs at a store were asked to name the store; these responses are listed below.

- Lowe's (N=5)
- Home Depot (N=2)
- Walmart (N=2)
- Family Dollar (N=1)
- "*Lowe's or HQ*" (N=1)

Only about a third of surveyed participants (32.9% or 25 out of 76) were already intending to buy CFLs before participating in the program, while another 7.9% (6 out of 76) said they "maybe" were going to buy CFLs before participating in the program. A majority of 55.3% (42 out of 76) had not intended to purchase any CFLs.

Nine participants (11.8% of 76) have purchased additional CFLs since participating in the program. These participants purchased at least 38 additional bulbs, an average of 4.2 CFLs per household that purchased additional CFLs.

Table 43. Intent to Purchase CFLs Before the Program and Additional CFLs Purchased since the Program (N=76)

Base: 76 participants who confirmed program CFLs were installed	Carolina System (N)	Carolina System (%)
Were you planning on buying CFLs for your home before participating in this program?		
Yes	25	32.9%
Maybe	6	7.9%
No	42	55.3%
No, already installed in all available outlets	0	0.0%
Don't know	3	3.9%
Have you purchased any CFLs since participating in this program?		
No	65	85.5%
Yes, from 1 to 5	7	9.2%
Yes, from 6 to 11	1	1.3%
Yes, 12 or more	1	1.3%
Don't know	2	2.6%

Table 44 indicates that only one surveyed customer confirmed that they had LEDs installed before participating in the Residential Neighborhoods program. This customer described these LEDs as "*six small decorative ones for a chandelier*."

Table 44. Preinstalled LEDs (N=76)

Base: 76 participants who confirmed program CFLs were installed	Carolina System (N)	Carolina System (%)
Did you have any LEDs installed before participating in this program?		
No	70	92.1%
Yes, from 1 to 5	0	0.0%
Yes, from 6 to 11	1	1.3%
Yes, 12 or more	0	0.0%
Yes, don't know how many	0	0.0%
Don't know	5	6.6%
Where did you get the LEDs you were using in your home before participating in this program?		
Another Duke Energy program	0	0.0%
Purchased at a store	1	1.3%
A program from a company other than Duke Energy	0	0.0%
From a Community Assistance Program	0	0.0%
Another source, listed below	0	0.0%
Don't know	0	0.0%
How long have you been using LEDs?		
One year or less (but previous to program participation)	0	0.0%
One to two years	0	0.0%
Two to three years	0	0.0%
Three to five years	1	1.3%
Five years or more	0	0.0%
Don't know	0	0.0%

The only customer with LEDs installed before the program purchased them at a store. They identified the store as "*either Family Dollar or Walmart.*"

Only one surveyed participant was intending to purchase LED bulbs before participating in the program (this is the same participant who already had LEDs installed before the program). An additional four participants (5.3% of 76) said they "maybe" were intending to purchase LEDs before the program.

Table 45. Intent to Purchase LEDs Before the Program and LEDs Purchased since the Program (N=76)

Base: 76 participants who confirmed program CFLs were installed	Carolina System (N)	Carolina System (%)
Were you planning on buying LEDs for your home before participating in this program?		
Yes	1	1.3%
Maybe	4	5.3%
No	66	86.8%
No, already installed in all available outlets	0	0.0%
Don't know	5	6.6%

Replacing Program CFLs and Spare Light Bulbs In Storage

Table 46 indicates that a slight majority of participants surveyed (54.1% or 40 out of 74 customers with program bulbs installed who answered the questions about spare bulbs) have extra CFLs in storage, while slightly less than half (44.6% or 33 out of 74) currently have spare incandescent bulbs in storage, and nobody in this survey (0% of 74) has any spare LEDs. Across all valid survey responses, there are an average of 3.2 spare CFLs and 2.8 spare incandescent bulbs per participant household (and zero spare LEDs).

Table 46. Types of Light Bulbs in Storage (N=74)

	All Surveyed Participants with Confirmed Program CFLs Installed Who Answered These Questions (Valid N=74)
% of customers with CFLs in storage	54.1%
% of customers with LEDs in storage	0.0%
% of customers with incandescent bulbs in storage	44.6%
	Total Number of Bulbs[14]
Number of CFL bulbs in storage	236.5
Number of LED bulbs in storage	0
Number of incandescent bulbs in storage	204.5
	Average Bulbs per Participant
Average number of CFL bulbs in storage	3.2
Average number of LED bulbs in storage	0.0
Average number of incandescent bulbs in storage	2.8

Some of the spare CFLs in storage are bulbs provided by the Residential Neighborhoods program which have not been installed yet, as seen in Table 47. About a quarter of customers with spare CFLs in storage (27.5% or 11 out of 40) report that all of their spare bulbs came from the program, while another 20.0% (8 out of 40) have some spare program CFLs in addition to other spare CFLs they acquired elsewhere. Half of the customers with spare CFLs in storage (50.0% or 20 out of 40) did not acquire any of their spare CFLs from this program. Overall, 78 of the 236.5 spare CFLs in storage in participant households (33.0%) were identified as CFLs provided by the Residential Neighborhoods program.

Table 47. CFLs in Storage Which Were Provided by the Residential Neighborhoods Program (N=40)

	Participants with Spare CFLs in Storage (Valid N=40)
None of the spare CFLs in storage are from the program	50.0%
Some of the spare CFLs in storage are from the program	20.0%
All of the CFLs in storage are from the program	27.5%
Don't know if any spare bulbs are from the program	2.5%

Participants who have incandescent light bulbs in storage were asked what type of bulb they would use to replace the program-provided CFLs when they need to be replaced. As seen in Table 48, even these customers are four times as likely to replace a program CFL with another

[14] Fractional bulb totals are due to values for customers who gave ranges of bulb quantities instead of integer responses being reported using the midpoint of the range (for example, "6 or 7 bulbs" is reported as 6.5 bulbs).

CFL (69.7% or 23 out of 33) as an incandescent bulb (18.2% or 6 out of 33). Assuming that the 41 participants with program CFLs installed who did not confirm having any incandescents in storage will not replace their program-provided CFLs with incandescent bulbs, then the estimated rate of program CFLs that will be replaced by incandescents would be 8.1% (6 out of 74).

Table 48. Replacing Program CFLs (N=33)

Base: 33 participants with program CFLs confirmed installed and incandescent light bulbs in storage	Carolina System (N)	Carolina System (%)
If one of the free CFLs that was installed through the Residential Neighborhood Program burns out, will you replace it with . . . ?		
A CFL	23	69.7%
An LED	0	0.0%
An incandescent bulb	6	18.2%
It depends on the socket or other factors (listed below)	2	6.1%
Don't know	2	6.1%

Two participants with program-provided CFLs installed and spare incandescent bulbs in storage said that the type of bulb they would use to replace program CFLs depends on the type of socket or other factors. These customers' explanations are listed below.

- *I would replace the burned out bulb with the ones that the auditor uninstalled that I have in storage. I have some candelabra bulbs, unused CFLs that I had previously purchased, and a few standard incandescent bulbs.*
- *My budget at that time determines what kind of light bulbs I get. It depends on the need and time it runs out. A lot of stores aren't selling the old kind of bulbs. I'll probably put in the energy-efficient bulbs.*

Surveyed customers were asked how many of the next ten light bulbs they purchase will be standard incandescent (or halogen), CFL and LED bulbs. As seen in Table 49, nine out of ten participants surveyed reports that they intend to buy CFLs (91.0% or 61 out of 67), but only one in five says they intend to buy any standard incandescent or halogen bulbs 19.4% or 13 out of 67), and none (0.0% of 67) indicate an intention to buy LED bulbs at this point. The majority of bulbs these customers intend to purchase in the future will be CFLs (87.0% or 578 out of 664 bulbs), while only about an eighth will be standard incandescent or halogen bulbs (13.0% or 86 out of 664) and none will be LEDs (zero out of 664).

Table 49. Purchase Intent: Next Ten Bulbs Purchased

Of the Next Ten Light Bulbs You Purchase, How Many Will Be…?	All Surveyed Participants with Confirmed Program CFLs Installed Who Answered This Question (Valid N=67)
% of surveyed customers who intend to buy at least one incandescent and/or halogen bulb	19.4%
% of surveyed customers who intend to buy at least one CFL bulb	91.0%
% of surveyed customers who intend to buy at least one LED bulb	0.0%
	All Bulbs To Be Purchased (N=664)[15]
Percentage of next ten bulbs that will be incandescent and/or halogen bulbs	13.0%
Percentage of next ten bulbs that will be CFL bulbs	87.0%
Percentage of next ten bulbs that will be LED bulbs	0.0%

Percentages in the first three rows total to more than 100% because participants could give multiple responses. Percentages in the bottom three rows are mutually exclusive and add up to 100%.

Figure 7 presents the distribution of future bulb purchases in the form of an area chart as a visual aid: the Y-axis shows the distribution of bulbs intended to be purchased, and the X-axis shows all 67 valid responses sorted by the distribution of bulb types. The chart shows that none of the customers surveyed intend to purchase any LEDs (there is no blue area in the chart). A majority of 54 out of 67 customers surveyed (80.6%) say they intend to purchase exclusively CFLs for their next ten bulbs, while only 6 out of 67 (9.0%) intend to purchase all standard incandescent and halogen bulbs for their next ten bulbs.

[15] All 76 respondents who confirmed that they received program CFLs were asked the question about the next ten bulbs they intend to purchase. Nine respondents said they "don't know" what any of their next ten bulbs purchased will be, and across the other 67 respondents there were another six bulbs that were designated "don't know" (i.e., the customer knew what some of their next ten bulbs purchased would be, but did not know all ten). When calculating the percentage of incandescent/halogen, CFL and LED bulbs purchased, "don't know" bulbs are not included in the analysis. Thus the base number of intended bulb purchases is 664 bulbs (10 bulbs times 76 respondents minus 96 "don't know" bulbs).

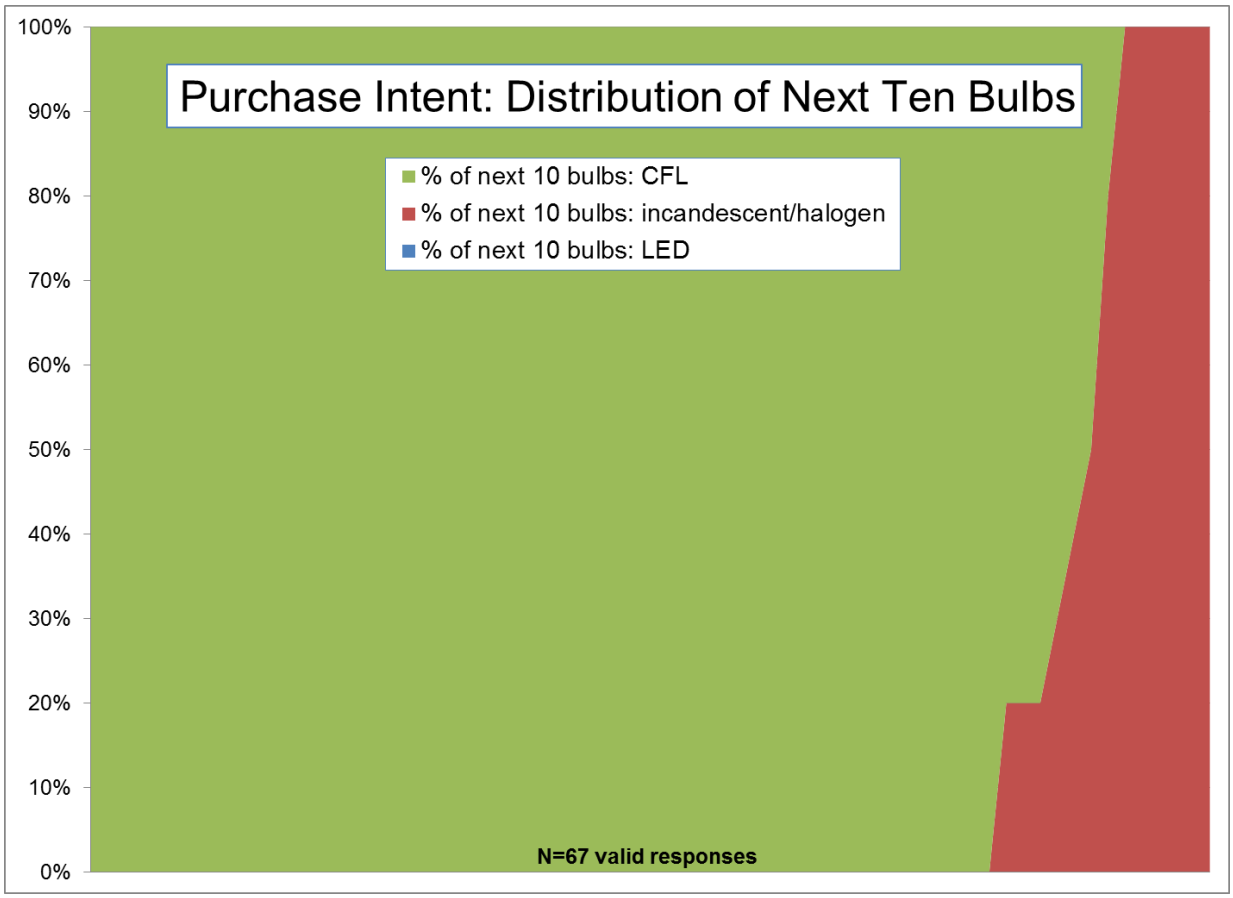

Figure 7. Area Chart of Intentions for Next Ten Bulbs Purchased (N=67)
Nine survey participants (11.8% of 76 who confirmed the installation of program CFLs)"don't know" what kind of bulbs they will buy in the future, and are not included in this chart.

Low-Flow Showerhead Installations

As seen in Table 50, the 61 surveyed participants confirmed the installation of 71 low-flow showerheads provided by the program, which is 94.7% of the 75 installations recorded by auditors. Four of the showerheads (5.6% of 71) were installed by the customers themselves.

Table 50. Measure Installation: Low-Flow Showerheads

61 participants received low-flow showerheads according to auditor records	**Customer count (N=61)**	**Measures installed count according to auditor records (N=75)**	**Confirmed measures installed count (N=71)**
Auditor installed showerhead(s)	86.9%	88.0%	93.0%
Auditor gave showerhead(s) to customer, customer installed them	4.9%	5.3%	5.6%
Auditor gave showerhead to customer, customer has NOT installed it	1.6%	1.3%	0.0%
Did not receive a showerhead	4.9%	4.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	1.6%	1.3%	1.4%

One surveyed participant has one showerhead (1.3% of 75 distributed according to auditor records) which they received from an auditor but which has not been installed yet. This customer does not plan to install this showerhead, explaining "*I have a hand-held shower, I can't use this fixture*."

Three customers installed their program-provided showerheads themselves (5.3% of 75 showerheads); two of these customers said the showerheads were easy to install, the third did not recall.

Customers who confirmed the installation of program-provided showerheads were asked if any of their showerheads have been removed from where they were installed. As indicated in Table 51, only one surveyed participant (1.8% of 57 who confirmed installations) uninstalled one showerhead (1.4% of 71 measures confirmed installed).

Table 51. Removing Program-Provided Low-Flow Showerheads

	Customers who confirmed installation percent (N=57)	Confirmed measures installed percent (N=71)
Have any of the low-flow showerheads that were installed through the Residential Neighborhood Program since been uninstalled or removed?		
No, all showerheads are currently installed	94.7%	94.4%
Yes, one showerhead removed	1.8%	1.4%
Yes, two showerheads removed	0.0%	0.0%
Customer confirmed two showerheads were installed, but only answered questions about one installation	1.8%	2.8%
Not sure if showerhead installed (did not answer questions about installation)	1.8%	1.4%

The customer who removed the showerhead was asked who did so and why; their response is below.

- *I didn't like that it had only three different sprays and it reduced the pressure too much.*

Table 52 shows how many showers are taken per week using the showers where program-provided showerheads were confirmed installed. Among the 68 installations described[16], about half (54.4% or 37 out of 68) are used for ten or fewer shower per week, while about a quarter (27.9% or 19 out of 68) are used for sixteen or more showers per week. Nearly half of the program-provided showerheads are reported as having a lower water flow than the previously-installed previous showerheads (45.6% or 31 out of 68), while about the same number report that

[16] Customers confirmed 71 showerheads installed (including one customer who did not recall the installation of a showerhead, thus auditor records are assumed correct for this customer). The customer who did not recall whether the installation occurred did not answer detailed questions about the installation, one showerhead was removed (thus questions were not asked about this installation), and one customer only answered questions about one installation though they confirmed receiving two showerheads. Thus the total number of showerhead installations described by participants is 68 (71 confirmed installed minus one removed, one not asked, and one not answered).

the water flow is about the same (44.1% or 30 out of 68), and for one program showerhead in ten (10.3% or 7 out of 68) the customer reported that the water flow actually seems to have increased.

Table 52. Shower Usage for Low-Flow Showerhead Installations (N=68)

	Installations described (N)	Installations described (%)
How many showers per week are taken using this showerhead		
0 to 4	12	17.6%
5 to 10	25	36.8%
11 to 15	12	17.6%
16 to 20	8	11.8%
21 or more	11	16.2%
Don't know	0	0.0%
Flow of water after replacing showerhead		
Less than the old unit	31	45.6%
About the same as the old unit	30	44.1%
More than the old unit	7	10.3%
Don't know / not specified	0	0.0%

Fifty-five participants who confirmed that they currently have program-provided low-flow showerheads installed in their homes rated their satisfaction with the showerheads on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program showerheads is quite high at 8.85, and only 12.7% (7 out of 55) gave ratings of "7" or lower.

The seven customers with ratings of "7" or lower were asked the reason for their relatively low satisfaction with the showerheads; these responses are listed below. Five of these customers (8.9% of 56 customers with showerheads currently installed) state that they preferred the stronger water flow of their previous showerheads (though only one of these customers reports uninstalling one program showerhead). One customer (1.8% of 56) thinks their new showerhead's water flow is "too hard", and the seventh less-satisfied customer prefers a more adjustable showerhead.

- *I really don't care too much for that low-flowing water; the water pressure seems less.*
- *The water pressure is much lower with the low-flow showerhead, I prefer what the water pressure was before this new low-flow showerhead was installed.*
- *The pressure was reduced too much.*
- *There is not enough water pressure.*
- *There isn't enough water pressure. The old one was good and hard, which I liked.*
- *I'm not used to that level of water pressure, the water pressure is a little too hard for my liking.*
- *My old shower head I could move around. I liked being able to do this and wish this low-flow shower head could do this also.*

Only one in eight surveyed participants (12.5% or 7 out of 56) already had any low-flow showerheads installed, as seen in Table 53 (the seven participants with previously installed showerheads had a total of eight low-flow showerheads previously installed). Prior to the program, only four respondents (7.1% of 56) had intended to purchase a low-flow showerhead, while another eleven respondents (19.6% of 56) said they "maybe" would have installed a new showerhead before participating in the program, and a large majority of 73.2% (41 out of 56) did not intend to purchase low-flow showerheads. None of the surveyed program participants (0 out of 56) have purchased any additional showerheads since the receiving measures from the program audit.

Table 53. Showerheads Installed Before the Program and Additional Showerheads Purchased (N=56)

	Customers (N)	Customers (%)
Previously installed showerheads		
Already had low-flow showerhead(s) installed	7	12.5%
Did not already have low-flow showerhead(s) installed	48	85.7%
Don't know / not specified	1	1.8%
Were you planning on purchasing a low-flow showerhead before participating in the program?		
No	41	73.2%
No, already installed in all available showers	0	0.0%
Maybe	11	19.6%
Yes	4	7.1%
Don't know / not specified	0	0.0%
Additional showerheads purchased since program		
Have not purchased additional showerhead(s)	56	100.0%
Purchased additional showerhead(s)	0	0.0%

Faucet Aerator Installations

Table 54 shows that 73 surveyed participants confirmed the installation of 120 faucet aerators provided by the program, which is 79.5% of the 151 installations recorded by auditors; one participant in five who received aerators according to auditor records (19.2% or 14 out of 73) reported that they did not receive any aerators. Two of the aerators (1.7% of 120 aerators confirmed installed) were installed by one of the customers (1.4% of 73 customers).

Table 54. Measure Installation: Faucet Aerators

73 participants received faucet aerators according to auditor records	Customer count (N=73)	Measures installed count according to auditor records (N=151)	Confirmed measures installed count (N=120)
Auditor installed aerator(s)	67.1%	68.9%	86.7%
Auditor gave aerator(s) to customer, customer installed them	1.4%	1.3%	1.7%
Auditor gave aerator(s) to customer, customer has NOT installed them	2.7%	2.6%	0.0%
Did not receive aerators	19.2%	17.9%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	9.6%	9.3%	11.7%

The lone respondent who installed two program-provided aerators themselves indicated that the installation was not difficult.

Two respondents reported that the auditor gave them aerators which have not been installed yet: one of these respondents plans to install the two aerators they were provided, and the other respondent does not plan to, explaining "*they won't fit on my faucets*."

Customers who confirmed the installation of program-provided aerators were asked if any of their aerators have been removed from where they were installed. As indicated in Table 55, only two surveyed participants (3.4% of 59 who confirmed installations) uninstalled one aerator apiece (1.7% of 120 measures confirmed installed).

Table 55. Removing Program-Provided Faucet Aerators

	Customers who confirmed installations (N=59)	Confirmed measures installed (N=120)
Have any of the aerators that were installed through the Residential Neighborhood Program since been uninstalled or removed?		
No, all aerators are currently installed	84.7%	86.7%
Yes, one aerator removed	3.4%	1.7%
Yes, two or more aerators removed	0.0%	0.0%
Not sure if aerators installed (did not answer questions about installation)	11.9%	11.7%

The two participants who removed aerators were asked who did so and why; these responses are below.

- *I removed the kitchen aerator because I prefer the spray handle that I had on that faucet before the auditor changed it.*
- *I removed the kitchen aerator because I didn't like its lowered water pressure.*

Surveyed participants answered questions about the usage of program-provided faucet aerators

for 49 kitchen installations and 55 bathroom installations.[17] Table 56 shows that about three-quarters of faucet aerators installed in kitchens involved a single aerator (73.5% or 36 out of 49). Customers confirmed that 42.9% (21 out of 49) of program-provided faucet aerators installed in kitchens replaced other faucet aerators that were already installed. A majority of installations are described as providing lower water flow than before the program aerators were installed (61.2% or 30 out of 49).

Table 56. Usage of Faucet Aerators in the Kitchen (N=49)

	Kitchen Installations described (N)	Kitchen Installations described (%)
Program aerators installed in kitchen		
One	36	73.5%
Two	10	20.4%
Three	3	6.1%
Was there an aerator previously installed on this faucet that had to be removed?		
Yes	21	42.9%
No	25	51.0%
Don't know / not specified	3	6.1%
Flow of water after installing program aerator		
Less than the old unit	30	61.2%
About the same as the old unit	17	34.7%
More than the old unit	1	2.0%
Don't know how compares to old unit	1	2.0%

Table 57 shows that only about half of faucet aerators installed in bathrooms involved a single aerator (54.5% or 30 out of 55). Customers confirmed that 36.4% (20 out of 55) of program-provided faucet aerators installed in bathrooms replaced other faucet aerators that were already installed. A majority of installations are described as providing lower water flow than before the program aerators were installed (56.4% or 35 out of 55).

[17] Customers confirmed 120 aerators installed (including seven customers who did not recall the installation of a total of 14 aerators, thus auditor records are assumed correct for these customers). Customers who did not recall whether installations occurred did not answer detailed questions about installations, and two of the installed aerators were removed by participants. Thus the total number of aerator installations described by participants is 104 (120 confirmed installed minus two removed and fourteen not asked).

Table 57. Usage of Faucet Aerators in the Bathroom (N=55)

	Bathroom Installations described (N)	Bathroom Installations described (%)
Program aerators installed in bathrooms		
One	30	54.5%
Two	22	40.0%
Three	3	5.5%
Was there an aerator previously installed on this faucet that had to be removed?		
Yes	20	36.4%
No	30	54.5%
Don't know / not specified	5	9.1%
Flow of water after installing program aerator		
Less than the old unit	31	56.4%
About the same as the old unit	18	32.7%
More than the old unit	3	5.5%
Don't know how compares to old unit	3	5.5%

Forty-nine participants who confirmed that had program-provided faucet aerators rated their satisfaction with the aerators on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program showerheads is quite high at 9.22, and only 12.2% (6 out of 49) gave ratings of "7" or lower.

The six customers with ratings of "7" or lower were asked the reason for their relatively low satisfaction with the aerators; these responses are listed below. Four of these six customers complain about the lower water flow of their new faucet aerators compared to their water flow before the program, however only one of these customers removed their program-provided aerator (the only other customer who removed a program aerator rated their satisfaction with the measures at "9" out of 10, and still has two other program-provided aerators installed).

- *I don't like how it runs in the kitchen; it doesn't have a lot of pressure and runs really slow now.*
- *I don't like the water pressure of the faucet anymore.*
- *It takes longer to fill the sink and the water pressure is too low.*
- *The flow isn't as forceful as it used to be.*
- *The water has a little split end on it. The water doesn't run smoothly.*
- *I prefer the spray handle that I had on the faucet before the auditor changed it.* [This customer uninstalled the only program aerator they received.]

Table 58 shows information about participants' previously installed aerators and intentions to purchase additional aerators. About half of participants surveyed (48.0% or 24 out of 50) said they already had aerators installed before participating in the program, but only 4.0% (2 out of 50) said they intended to purchase aerators before receiving them from the program (though one participant, or 2.0% of 50, reported that they already have aerators on every faucet). None of the

surveyed participants have purchased additional aerators since participating in the Residential Neighborhoods program.

Table 58. Faucet Aerators Installed Before the Program and Additional Aerators Purchased (N=50)

	Customers (N)	Customers (%)
Previously installed aerators		
Already had low-flow showerhead(s) installed	24	48.0%
Did not already have low-flow showerhead(s) installed	22	44.0%
Don't know / not specified	4	8.0%
Were you planning on purchasing faucet aerators before participating in the program?		
No	46	92.0%
No, already installed in all available showers	1	2.0%
Maybe	1	2.0%
Yes	2	4.0%
Don't know / not specified	0	0.0%
Additional showerheads purchased since program		
Have not purchased additional showerhead(s)	50	100.0%
Purchased additional showerhead(s)	0	0.0%

Twenty-four participants reported having faucet aerators installed in their homes before participating in the program: five of these participants had only one aerator before the program, 17 participants had two aerators installed before the program, and two participants had three aerators apiece. In total, there were 45 aerators installed across the 24 participant households that confirmed having aerators before the program.

Door Sweep Installations

As seen in Table 59, the 71 surveyed participants confirmed the installation of 107 door sweeps provided by the program, which is 90.7% of the 118 installations recorded by auditors.[18] None of the door sweeps (0% of 100) were installed by the customers themselves.

[18] The 57 participants who confirmed that the auditor installed door sweeps should have received 100 sweeps according to auditor records, however the customers claimed to have 103 sweeps installed. Ten customers (17.5% of 57) reported a different number of sweeps installed than auditor records: seven said they received one more door sweep than program records and three said they received one less. In addition, two customers did not know if they received door sweeps, and according to program records these customers should have received four door sweeps. Thus the total confirmed installed is 103 confirmed and corrected by customers plus four where auditor records are assumed correct equals 107 door sweeps.

Table 59. Measure Installation: Door Sweeps

71 participants received door sweeps according to auditor records	Customer count (N=71)	Measures installed count according to auditor records (N=118)	Confirmed measures installed count (N=107)
Auditor installed doorsweep(s)	80.3%	81.4%	96.3%
Auditor gave doorsweep(s) to customer, customer installed them	0.0%	0.0%	0.0%
Auditor gave doorsweep(s)to customer, customer has NOT installed them	0.0%	0.0%	0.0%
Did not receive doorsweep(s)	16.9%	15.3%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	2.8%	3.4%	3.7%

Customers who confirmed the installation of program-provided door sweeps were asked if any of their door sweeps have been removed from where they were installed. As indicated in Table 60, three surveyed participants (5.1% of 59 who confirmed installations) reported that a combined five program-installed door sweeps were removed (4.7% of 107 measures confirmed installed).

Table 60. Removing Program-Provided Door Sweeps

	Customers with confirmed installation percent (N=59)	Confirmed measures installed percent (N=107)
Have any of the door sweeps that were installed through the Residential Neighborhood Program since been uninstalled or removed?		
No, all door sweeps are currently installed	91.5%	90.7% installed
Yes, one door sweep removed (one remains installed)	1.7%	0.9% installed 0.9% removed
Yes, two door sweeps removed (none remain installed)	3.4%	3.7% removed
Not sure if door sweeps installed (did not answer questions about installation)	3.4%	3.7% assume installed

The three customers whose combined five door sweeps that were removed were asked who removed them and why. These responses are listed below; four of the sweeps that were removed were uninstalled by landlords and the fifth sweep came loose and was removed by the customer.

- *My landlord said that it was messing up the doors somehow, so he removed both of them.*
- *The landlord removed both of them; I don't know why.*
- *The door sweep on the front door came loose, so I removed it.*

Fifty-six participants who confirmed that they currently have program-provided door sweeps installed in their homes rated their satisfaction with the sweeps on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program door sweeps is very high at 9.63, and only 3.6% (2 out of 56) gave ratings of "7" or lower.

The two customers with ratings of "7" or lower both rated their satisfaction with this measure at "5" out of 10, and they were asked the reason for their relatively low satisfaction with the door sweeps; these responses are listed below. Both of these customers report that these door sweeps are still installed in their homes.

- *It is not fitting well; it's up too high. You can still see through to the outdoors under the door. I had to put a rug underneath the door to block the drafts.*
- *I can't put my rug in front of the door anymore.*

About one in four surveyed participants (22.8% or 13 out of 57) already had door sweeps installed before participating in the Residential Neighborhoods program, as seen in Table 61 (these 13 participants with previously installed door sweeps had a total of 21 doors with sweeps previously installed). Prior to the program, nine respondents (15.8% of 57) say they intended to purchase and install door sweeps, while another five respondents (8.8% of 57) said they "maybe" would have installed door sweeps before participating in the program, while a large majority of 75.4% (43 out of 57) did not intend to purchase any door sweeps. None of the surveyed program participants (0 out of 57) have purchased any additional door sweeps since receiving measures from the program audit.

Table 61. Door Sweeps Installed Before the Program and Additional Door Sweeps Purchased (N=57)

	Customers (N)	Customers (%)
Previously installed door sweeps		
Already had door sweep installed – one door	5	8.8%
Already had door sweep installed – two doors	8	14.0%
Did not already have door sweep(s) installed	42	73.7%
Don't know / not specified	2	3.5%
Were you planning on purchasing door sweep before participating in the program?		
No	43	75.4%
No, already installed on all available doors	0	0.0%
Maybe	5	8.8%
Yes	9	15.8%
Don't know / not specified	0	0.0%
Additional door sweeps purchased since program		
Have not purchased additional door sweep(s)	57	100.0%
Purchased additional door sweep(s)	0	0.0%

Vinyl Weather Stripping for Doors Installations

As seen in Table 62, the 63 surveyed participants confirmed the installation of vinyl weather stripping on 84 doors, which is 84.0% of the 100 installations recorded by auditors.[19] Vinyl

[19] The 42 participants who confirmed that the auditor installed vinyl weather stripping for doors should have received vinyl weather stripping for 68 doors according to auditor records, however the customers claimed to have 80 doors weather stripped by the program. Fifteen customers (35.7% of 42) reported a different number of doors

weather stripping for one of these doors (1.2% of 84 doors weather stripped) was installed by the customer; another customer (1.6% of 63 customers who received measures) claims the auditor left weather stripping behind that has not been installed yet.

Table 62. Measure Installation: Vinyl Weather Stripping for Doors

63 participants received vinyl weather stripping for doors according to auditor records	**Customer count (N=63)**	**Measures installed count according to auditor records (N=100 doors)**	**Confirmed measures installed count (N=84 doors)**
Auditor installed vinyl weather stripping for doors	65.1%	67.0%	94.0%
Auditor gave vinyl weather stripping for doors to customer, customer installed it	1.6%	1.0%	1.2%
Auditor gave vinyl weather stripping for doors to customer, customer has NOT installed it	1.6%	1.0%	0.0%
Did not receive vinyl weather stripping for doors	27.0%	27.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	4.8%	4.0%	4.8%

One customer who installed the vinyl weather stripping themselves was asked if this was easy to do, and they confirmed that it was. There is also one surveyed participant who claims they were given the vinyl weather stripping measure by the auditor; this customer still intends to install it in the future.

Customers who confirmed the installation of program-provided vinyl weather stripping for doors were asked if any of the weather stripping has been removed from where it was installed. As indicated in Table 63, at least some of the program-provided weatherstripping has been removed from about a third (31.0% or 13 out of 42) of households where it was installed, representing one in five doors (20.2% or 17 out of 84) that were weather-stripped by the program.

with weather stripping installed than auditor records: thirteen claim to have received measures for between one and three doors more than auditors recorded, and three customers claim to have received measures for one door fewer than auditors recorded. In addition, three customers did not know if they received vinyl weather stripping for doors, and according to program records these customers should have received weather stripping for four doors. Thus the total confirmed number of doors weather stripped is 80 confirmed and corrected by customers plus four where auditor records are assumed correct equals 84 doors with vinyl weather stripping provided by the program.

Table 63. Removing Program-Provided Vinyl Weather Stripping for Doors

	Customers with confirmed installation percent (N=42)	Confirmed measures installed percent (N=84)
Has any of the vinyl weather stripping for doors that was installed through the Residential Neighborhood Program since been uninstalled or removed?		
No, all vinyl weather stripping for doors is currently installed	69.0%	65.5% installed
Yes, vinyl weather stripping for one door removed (other doors may remain installed)	21.4%	10.7% removed 9.5% installed
Yes, vinyl weather stripping for two doors removed (none remains installed)	9.5%	9.5% removed
Not sure if vinyl weather stripping for doors installed (did not answer questions about installation)	0.0%	4.8% assumed installed

The thirteen customers whose combined 17 doors had their weather stripping removed were asked who removed it and why. These responses are listed below; most of these customers report that the tape started coming unstuck and falling off on its own. In two cases the landlord removed the measure (15.4% of 13, in one case it was another weatherization program provided by "the city" (7.7% of 13) , and in the other ten cases (76.9% of 13) it was the customer (though they often said they didn't remove it so much as it fell off on its own).

Customers who removed vinyl weather stripping from one door (N=9)

- *It fell off because it wasn't sticking anymore.*
- *It started to peel off. It was not staying on.*
- *It's falling out from front door.*
- *It was not removed, it's just falling off.*
- *The tape kept on getting unstuck. I tried several times to press it back in place, but it continued to come off.*
- *It worked its way loose from the area on the frame above the handle, maybe a couple of inches.*
- *It started peeling off, so about 10% is no longer attached. The landlord was working on the door and made it come loose.*
- *I had water damage, so I had to remove the tape from that door because it was coming undone.*
- *The door wouldn't shut all the way.*

Customers who removed vinyl weather stripping from two doors (N=4)

- *It's falling apart, crumbling, and falling off.*
- *I participated in another weatherization program; the city came around and put something else around it.*

- *The landlord said that it was messing up the door, so they removed it.*
- *The tape kept on getting unstuck.*

Forty-two participants who confirmed that they had program-provided vinyl weather stripping installed on doors in their homes rated their satisfaction with this measure on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the vinyl weather stripping for doors is moderately high at 8.14 (though this is the lowest mean satisfaction rating of all the measures provided by this program), and 23.8% (10 out of 42) gave ratings of "7" or lower.

The ten customers with ratings of "7" or lower were asked the reason for their relatively low satisfaction with this measure; these responses are listed below. As with reasons for removing this measure, the main reason for low satisfaction is that the tape comes unstuck and peels off.

Customers who rated their satisfaction with vinyl weather stripping for doors at "5" to "7" out of ten (N=6)

- *It's falling apart, crumbling, and falling off.*
- *The landlord said that it was messing up the door.*
- *The tape kept on getting unstuck.*
- *It fell off because it wasn't sticking anymore.*
- *The foam insulation tape is actually coming undone. I keep on pressing on it, trying to make it re-stick, but it just falls off again.*
- *We couldn't get one of the doors to close. My husband had to cut some of the tape off.*

Customers who rated their satisfaction with vinyl weather stripping for doors at "1" out of ten (N=4)

- *It did not stay on.*
- *It's falling off.*
- *It's falling off and crumbling.*
- *The tape is always coming undone; it's not helping to insulate the doors at all.*

About one in three surveyed participants (33.3% or 14 out of 42) already had doors with vinyl weather stripping installed before participating in the Residential Neighborhoods program, as seen in Table 67 (these 14 participants with previously installed weather stripping had a total of 23 doors with weather stripping previously installed). Prior to the program, 14 respondents (33.3% of 42) say they intended to purchase and install vinyl weather stripping for doors, while another five respondents (11.9% of 42) said they "maybe" would have installed vinyl weather stripping on their doors before participating in the program, and one surveyed participant (2.4% of 42) said they already had weather stripping installed on every door. However, half (50.0% or 21 out of 42) did not intend to purchase any vinyl weather stripping for doors. Three of the surveyed program participants (7.1% of 42) have purchased enough additional measures to apply vinyl weather stripping to four more doors since receiving measures from the program audit.

Table 64. Vinyl Weather Stripping for Doors Installed Before the Program and Additional Vinyl Weather Stripping Purchased (N=42)

	Customers (N)	Customers (%)
Previously installed vinyl weather stripping for doors		
Already had vinyl weather stripping for doors installed – one door	7	16.7%
Already had vinyl weather stripping for doors – two or more doors	7	16.7%
Did not already have vinyl weather stripping for doors installed	28	66.7%
Don't know / not specified	0	0.0%
Were you planning on purchasing vinyl weather stripping for doors before participating in the program?		
No	21	50.0%
No, already installed on all available doors	1	2.4%
Maybe	5	11.9%
Yes	14	33.3%
Don't know / not specified	1	2.4%
Additional vinyl weather stripping for doors purchased since program		
Have not purchased additional vinyl weather stripping for doors	39	92.9%
Purchased additional vinyl weather stripping for doors	3	7.1%

Caulking Doors Installations

As seen in Table 65, the 49 surveyed participants confirmed that 35 doors were caulked by the program, which is only 48.6%% of the 72 installations recorded by auditors.[20] A slight majority of 51.0% (25 out of 49) of customers who received this measure according to auditor records reported that they did not have any doors caulked by the program. None of the doors (0% of 35 confirmed installations) were caulked by the customers themselves.

[20] The 49 participants who confirmed that the auditor caulked doors should have had 72 doors caulked according to auditor records, however the customers claimed to have had 35 doors caulked. Seven customers (14.3% of 49) reported a different number of doors caulked than auditor records: according to auditor records these seven customers had 20 doors caulked, but when asked how many doors were caulked these respondents reported 16 doors caulked. In addition, twelve customers did not know if they had any doors caulked, and according to program records these customers should have had 19 of their doors caulked. Thus the total confirmed installed is 16 doors caulked confirmed and corrected by customers plus 19 doors where auditor records are assumed correct equals 35 doors caulked.

Table 65. Measure Installation: Caulking Doors

49 participants received door caulk according to auditor records	Customer count (N=49)	Measures installed count according to auditor records (N=72)	Confirmed measures installed count (N=35)
Auditor caulked door(s)	24.5%	27.8%	45.7%
Auditor gave caulk to customer, customer caulked doors	0.0%	0.0%	0.0%
Auditor gave caulk to customer, customer has NOT caulked doors	0.0%	0.0%	0.0%
Did not receive door caulk	51.0%	45.8%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	24.5%	26.4%	54.3%

Customers who confirmed that their doors were caulked by the program were asked if any of the caulking has been removed from where it was installed. As indicated in Table 66, one surveyed participants (8.3% of 12 who confirmed installations) reported that caulking was removed from one door (2.9% of 35 measures confirmed installed).

Table 66. Removing Program-Provided Door Caulking

	Customers with confirmed installation percent (N=12)	Confirmed measures installed percent (N=35)
Have any of the door caulking that was installed through the Residential Neighborhood Program since been removed?		
No, all caulked doors are currently caulked	91.7%	42.9% installed
Yes, caulk removed from one door	8.3%	2.9% removed
Not sure if doors were caulked (did not answer questions about installation)	0.0%	54.3% assumed installed

The customer whose door had caulking removed was asked who removed it and why; their response is listed below.

- *The door wasn't shutting right, so my daughter removed the caulking.*

Twelve participants who confirmed that they currently have doors caulked by the program rated their satisfaction with the caulking on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program-provided door caulking is quite high at 8.83, and only 16.7% (2 out of 12) gave ratings of "7" or lower.

The two customers with ratings of "7" or lower were asked the reason for their relatively low satisfaction with the door caulking; these responses are listed below.

- *The auditor didn't do all around the door but he came back and fixed it up so there isn't a problem.* (Satisfaction rating "7 out of 10".)

- *The door wasn't shutting right, so we had to take the caulking off.* (Satisfaction rating "2 out of 10".)

A third of surveyed participants (33.3% or 4 out of 12) already had doors caulked before participating in the Residential Neighborhoods program, as seen in Table 67 (these four participants with previously caulked doors had a total of nine doors with caulking installed, though one participant added that the caulking on their two previously-caulked doors "*was really old and didn't work well*"). Prior to the program, five respondents (41.7% of 12) say they intended to purchase caulk and install it on their doors, while another two respondents (16.7% of 12) said they "maybe" would have intended to caulk their doors before participating in the program, while the remaining 41.7% (5 out of 12) did not intend to caulk any doors. None of the surveyed program participants (0 out of 12) have caulked any additional doors since receiving measures from the program audit.

Table 67. Doors Caulked Before the Program and Additional Caulk Purchased (N=12)

	Customers (N)	Customers (%)
Previously installed door caulk		
Already had one door caulked	0	0.0%
Already had two doors caulked	3	25.0%
Already had three or more doors caulked	1	8.3%
Did not already have doors caulked	8	66.7%
Don't know / not specified	0	0.0%
Were you planning on purchasing door caulk before participating in the program?		
No	5	41.7%
No, already installed on all available doors	0	0.0%
Maybe	2	16.7%
Yes	5	41.7%
Don't know / not specified	0	0.0%
Additional door caulk purchased since program		
Have not purchased additional door caulk	12	100.0%
Purchased additional door caulk	0	0.0%

HVAC Winterization Kit Installations

As seen in Table 68, the 24 surveyed participants who should have received winter kits for wall or window HVAC units confirmed that 26 units were installed, which is only 72.2% of the 36 installations recorded by auditors.[21] A majority of 54.2% (13 out of 24) of customers who received this measure according to auditor records reported that the auditor gave them the

[21] Five customers who received winter kits according to auditor records report that these measures were either not received, or were received but have not been installed yet. The 17 participants who confirmed that winter kits were installed should have had 24 kits installed according to auditor records, however the customers reported having only 22 kits installed: Two of these customers should have received two kits apiece according to auditor records, but when asked how many kits were installed these respondents reported only one kit per household was installed. In addition, two customers did not know if they had any winter kits installed, and according to program records these customers should have had four kits installed. Thus the total confirmed kits installed is 22 confirmed and corrected by customers plus four kits where auditor records are assumed correct equals 26 kits installed.

measure and they installed it themselves, accounting for 61.5% (16 out of 26) measures that were confirmed installed by surveyed participants.[22]

Table 68. Measure Installation: Winter Kit for Wall or Window HVAC

24 participants received door caulk according to auditor records	Customer count (N=24)	Measures installed count according to auditor records (N=36)	Confirmed measures installed count (N=26)
Auditor installed kit(s)	16.7%	16.7%	23.1%
Auditor gave kit(s) to customer, customer installed	54.2%	50.0%	61.5%
Auditor gave kit(s) to customer, customer has NOT installed	16.7%	19.4%	0.0%
Did not receive winter kit	4.2%	2.8%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	8.3%	11.1%	15.4%

The thirteen customers who installed their winter kits themselves were asked if this was easy to do; nine (69.2% of 13) reported that it was easy, while three (23.1% of 13) reported that it was not easy, and one (7.7% of 13) was not sure.

The four customers who reported that they received winter kits from auditors which have not been installed yet report that they received a combined six kits, and all four of these customers (100%) say they do intend to install these kits.

Customers who confirmed that this measure was installed were asked if any of winter kits have been removed from where they was installed. As indicated in Table 69, 26.3% (5 out of 19) of surveyed participants who confirmed installations report that kits have since been uninstalled: The five participants whose measures were uninstalled accounted for 23.1% (6 out of 26) of measures that were confirmed installed.

Table 69. Removing Program-Provided Winter Kit for Wall or Window HVAC

	Customers with confirmed installation percent (N=19)	Confirmed measures installed percent (N=26)
Have any of the door caulking that was installed through the Residential Neighborhood Program since been removed?		
No, all kits installed kits are still installed	63.2%	61.5% installed
Yes, kit removed from one unit	21.1%	15.4% removed
Yes, kit removed from two units	5.3%	7.7% removed
Not sure if kits were installed (did not answer questions about installation)	10.5%	15.4% assumed installed

[22] Participants surveyed in the Carolina System for this evaluation had their homes audited by the program between March and August, 2013. Since the winter kit is intended for use in the winter, this may explain why this measure was usually left by auditors for the customers to install themselves. The participant survey was conducted in April and May of 2014, with the winter of 2013-14 intervening between the home audits and the survey.

The customers whose kits were removed from HVAC units were asked who removed them and why. Their responses are listed below: Four of the five customers who removed this measure did so because of warmer outdoor weather (the kit is intended to wintertime use).

- *It was never completely installed because we couldn't do it properly, so I removed it.*
- *The weather improved, so I removed it.*
- *I took it off for spring just last week.*
- *I took it off because the weather got warm and I started using the A/C again.*
- *We wanted to start using the air conditioner because it was getting hot out, so my husband removed it.*

Seventeen participants who confirmed that they had winter kits installed by the program rated their satisfaction with this measure on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program-provided door caulking is quite high at 8.35, and 35.3% (6 out of 19) gave ratings of "7" or lower. The six customers with ratings of "7" or lower were asked the reason for their relatively low satisfaction with the door caulking; these responses are listed below.

- *I couldn't get it installed.* (Satisfaction rating "1 out of 10")
- *I didn't know how to put it in. It doesn't look quite right but it seems to help.* (Satisfaction rating "6 out of 10")
- *The kit was fine. My husband had to install it. I don't know why the auditor didn't do it while he was here.* (Satisfaction rating "7 out of 10")
- *The second winter kit that was left with me to install on my A/C unit was too big for one of my units. I believe that those kits don't fit snugly, they don't do a good job of sealing up that area.* (Satisfaction rating "7 out of 10")
- *There is still air coming in.* (Satisfaction rating "7 out of 10")
- *I don't know.* (Satisfaction rating "7 out of 10")

Only two surveyed participants (11.8% of 17) already had winter kits before participating in the Residential Neighborhoods program, as seen in Table 70 (the two participants with previously installed kits had them installed on one unit apiece). Prior to the program, only one respondent (5.9% of 17) reports that they intended to purchase and install a winter kit, while another respondent (5.9% or 1 out of 17) said they "maybe" would have intended to install this measure before participating in the program, while the remaining 88.2% (15 out of 17) did not intend to. None of the surveyed program participants (0 out of 17) have purchased or installed any additional kits since receiving measures from the program audit.

Table 70. HVAC Window Kits Installed Before the Program and Additional Kits Purchased (N=17)

	Customers (N)	Customers (%)
Previously installed HVAC winter kits		
Already had one kit installed	2	11.8%
Already had two or more kits installed	0	0.0%
Did not have any HVAC winter kits	15	88.2%
Don't know / not specified	0	0.0%
Were you planning on purchasing HVAC winter kits before participating in the program?		
No	15	88.2%
No, already installed on all units	0	0.0%
Maybe	1	5.9%
Yes	1	5.9%
Don't know / not specified	0	0.0%
Additional kits purchased since program		
Have not purchased additional HVAC winter kits	17	100.0%
Purchased additional HVAC winter kits	0	0.0%

Customers who confirmed the installation of program-provided winter kits for wall and window HVAC units were asked about their habits regarding seasonal location of their HVAC units. As indicated by Table 71, most respondents' winterized wall and window HVAC units can be removed for winter (88.2% or 15 out of 17).

Only 70.6% (12 out of 17) of participants who confirmed the installation of winter kits said that they always left their HVAC units in for winter in past years, compared to 82.4% (14 out of 17) saying that they left their removable units in place during the most recent winter (which occurred in between the home audits and this survey). Although the difference between these figures is based on two customers reporting different behavior in "previous years" versus "the most recent winter", these customers claim that they would have done the same thing during the recent winter with or without the program. Two customers report that their units are not removable, or that they are not sure if the unit is removable; logically, both of these customers' units were also left in place during the recent winter (if a customer does not know if their unit is removable, then they must not have not removed it). Thus all customers with this measure installed left their units in place for the most recent winter, which is logical since that is the purpose of this measure (to insulate removable HVAC units that are left in place for the winter) and these questions are only asked of customers with program-provided measures installed (i.e., customers who remove their window units during the winter do not need this measure, so would not have it installed).

Table 71. Removing HVAC Units for Winter and Leaving Them in Place (N=17)

	Customers (N)	Customers (%)
Are any of the window or wall units winterized with the kit removable?		
No, all are permanently installed	1	5.9%
Yes, there is one removable unit	9	52.9%
Yes, there are two removable units	6	35.3%
Not sure	1	5.9%
In previous years, did you remove units for the winter or leave them in place?		
Always left in place during winter	12	70.6%
Sometimes removed, sometimes left in place	1	5.9%
Always removed for winter	1	5.9%
Unit is not removable / not sure if removable (therefore units are left in place for winter)	2	11.8%
Not applicable (HVAC units are new, not used in previous winters)	1	5.9%
What did you do with your units during the most recent winter? (After the home audit)		
Left units in place for winter, and would have done this regardless of the program	14	82.4%
Took units out for winter, and would have done this regardless of the program	0	0.0%
Left units in place for winter, but would have removed them without the program	0	0.0%
Took units out for winter, but would have left them in place without the program	0	0.0%
Unit is not removable / not sure if removable (therefore units are left in place for winter)	2	11.8%
Did not answer question (assume units were left in place[23])	1	5.9%

Vinyl Weather Stripping for HVAC Window Units Installations

As seen in Table 72, the six surveyed participants who received measures according to auditor records confirmed that five window units were weather stripped by the program, which is only 71.4% of the seven installations recorded by auditors.[24] Two customers (33.3% of 6) report that the auditor installed these measures, two customers (33.3% of 6) report that the auditor gave them the materials and they did the installation themselves, and two customers (33.3% of 2 out of 6) claim that they did not receive this measure.

[23] One participant who received winter kits for window AC units only acquired their AC units shortly before participating in the program, and did not previously have any AC units. Thus they did not answer the question about "previous winters" (not applicable since they had no AC units during previous winters). This participant did not answer the question about "the most recent winter" either, but since they reported that the winter kits were installed on both of their units, TecMarket Works assumes that these units must have been left in place for the winter.

[24] The four participants who confirmed that this measure was installed should have had five window units weather stripped according to auditor records, and collectively they do confirm five installations though two customers reported a different number of measures than auditor records: one customer confirmed two measures when auditor records showed one, and the other customer confirmed one measure when the auditor records showed two.

Table 72. Measure Installation: Vinyl Weather Stripping for HVAC Window Units

6 participants received weather stripping for window units according to auditor records	**Customer count (N=6)**	**Measures installed count according to auditor records (N=7)**	**Confirmed measures installed count (N=5)**
Auditor installed weather stripping for window units	33.3%	28.6%	60.0%
Auditor gave weather stripping for window units to customer, customer installed	33.3%	42.9%	40.0%
Auditor gave weather stripping for window units to customer, customer has NOT installed	0.0%	0.0%	0.0%
Did not receive weather stripping for window units	33.3%	28.6%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	0.0%	0.0%	0.0%

Two customers reported installing a total of three of these measure themselves (60.0% of five measures confirmed installed); one of these customers said the measure was easy to install (50.0% of 2), and the other did not recall.

Customers who confirmed the installation of weather stripping for window units were asked if any measures have been removed from where they was installed. As indicated in Table 73, all measures are still installed and none have been removed.

Table 73. Removing Program-Provided Vinyl Weather Stripping for HVAC Window Units

	Customers with confirmed installation percent (N=4)	**Confirmed measures installed percent (N=5)**
Have any of the weather stripping for HVAC window units that was installed through the Residential Neighborhood Program since been removed?		
No, all weather stripping for HVAC window units is still in place	100.0%	100.0% installed
Yes, weather stripping for HVAC window units has been removed	0.0%	0.0% removed

Four participants who confirmed that they currently have weather stripping for HVAC window units installed by the program rated their satisfaction with this measure on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for this measure is high at 9.00, and only one participant (25.0% of 4) gave a rating of "7" or lower.

The customer who rated their satisfaction with this measure at "6 out of 10" was asked the reason for their relatively low satisfaction, and they responded "*there is still air coming in*."

None of the surveyed participants (0% of 4) already had weather stripping on window HVAC units before participating in the Residential Neighborhoods program, as seen in Table 74. Prior to the program, none of these respondents (0% of 4) say they intended to purchase and install this measure (or even that they "maybe" would have). Three-quarters (75.0% of 4) did not intend to purchase any measures, and the other participant (25.0% of 4) was not sure. None of the surveyed program participants (0 out of 4) have installed any additional weather stripping on window HVAC units since receiving measures from the program audit.

Table 74. Vinyl Weather Stripping for HVAC Window Units Installed before the Program and Additional Measures Purchased (N=4)

	Customers (N)	Customers (%)
Previously installed weather stripping		
Already had one or more units weather stripped	0	0.0%
Did not already have any units weather stripped	4	100.0%
Don't know / not specified	0	0.0%
Were you planning on purchasing weather stripping before participating in the program?		
No	3	75.0%
No, already installed on all available units	0	0.0%
Maybe	0	0.0%
Yes	0	0.0%
Don't know / not specified	1	25.0%
Additional weather stripping purchased since program		
Have not purchased additional weather stripping	4	100.0%
Purchased additional weather stripping	0	0.0%

Caulking Windows Installations

As seen in Table 75, the eleven surveyed participants who received this measure according to auditor records confirmed that eleven windows were caulked by the program, which is only 68.8% of the 16 installations recorded by auditors.[25] However only one of the eleven customers who received this measure (9.1%) confirmed that it was installed by the auditor, while 72.7% (8 out of 11) claim that they never received this measure and two customers (18.2% of 11) were not sure. However, it is common for participants to not be able to confirm measures that they did not know they received, have not personally seen after installation, or that are not significantly interesting to the participant.

[25] The one participant who confirmed that the auditor caulked windows should have had one window caulked according to auditor records, however this customers claimed to have had eight windows caulked. In addition, two customers did not know if they had any windows caulked, and according to program records these customers should have had three of their windows caulked. Thus the total confirmed installed is eight windows caulked confirmed and corrected by customers plus three windows where auditor records are assumed correct equals eleven windows caulked.

Table 75. Measure Installation: Caulking Windows

11 participants received door caulk according to auditor records	Customer count (N=11)	Measures installed count according to auditor records (N=16)	Confirmed measures installed count (N=11)
Auditor caulked window(s)	9.1%	6.3%	72.7%
Auditor gave caulk to customer, customer caulked window(s)	0.0%	0.0%	0.0%
Auditor gave caulk to customer, customer has NOT caulked windows	0.0%	0.0%	0.0%
Did not receive window caulk	72.7%	75.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	18.2%	18.8%	27.7%

The customer who confirmed that their windows were caulked by the program was asked if any of the caulking has been removed from where it was installed, and they confirmed that all installations are still in place.

Only one participant confirmed that they currently have windows caulked by the program, and this customer rated their satisfaction with the caulking at "10 out of 10" on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program-provided door caulking is thus 10.0, and nobody (0% of 1) gave ratings of "7" or lower for this measure.

The only surveyed participant who confirmed this measure was installed did not have any windows caulked before the program, had not been intending to install any caulking before the program, and has not purchased any additional caulking for windows since the program.

Clear Glass Patch Tape Installations

As seen in Table 76, the six surveyed participants who received this measure according to auditor records confirmed that eight windows were patched by the program, which is 88.9% of the nine installations recorded by auditors.[26] Most of these measures were installed by auditors (66.7% or 4 out of 6), though one customer claims not to have received this measure (16.7% of 6) and one customer does not know for sure (16.7% of 6). None of the window patch tape (0% of 8 confirmed installations) was installed by the customers themselves.

[26] The four participants who confirmed that the auditor installed glass patch tape should have had six windows patched according to auditor records, and collectively they do confirm six installations though two customers reported a different number of measures than auditor records: one customer confirmed two measures when auditor records showed one, and the other customer confirmed one measure when the auditor records showed two. In addition, one customer did not know if they had any windows patched, and according to program records this customers should have had two of their windows patched. Thus the total confirmed installed is six windows patched confirmed and corrected by customers plus two windows where auditor records are assumed correct equals eight windows patched.

Table 76. Measure Installation: Clear Glass Patch Tape

6 participants received clear glass patch tape according to auditor records	Customer count (N=6)	Measures installed count according to auditor records (N=9)	Confirmed measures installed count (N=8)
Auditor patched windows	66.7%	66.7%	75.0%
Auditor gave patch tape to customer, customer patched windows	0.0%	0.0%	0.0%
Auditor gave patch tape to customer, customer has NOT patched windows	0.0%	0.0%	0.0%
Did not receive patch tape	16.7%	11.1%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	16.7%	22.2%	25.0%

Customers who confirmed that their windows were patched by the program were asked if any of the patch tape has been removed from where it was installed. As indicated in Table 77, participants report that all installations are still in place.

Table 77. Removing Program-Provided Clear Glass Patch Tape

	Customers with confirmed installation percent (N=5)	Confirmed measures installed percent (N=8)
Have any of the clear glass patch tape that was installed through the Residential Neighborhood Program since been removed?		
No, all patch tape is still in place	80.0%	75.0% installed
Yes, patch tape has been removed	0.0%	0.0% removed
Not sure if patch tape installed (did not answer questions about installation)	20.0%	25.0% assumed installed

All four participants who confirmed that they currently have windows patched by the program rated their satisfaction with this measure at "10 out of 10" on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program-provided door caulking is thus 10.0, and nobody surveyed (0% out of 4) gave ratings of "7" or lower for this measure.

As seen in Table 78, all four customers (100%) who confirmed the installation of clear glass patch tape report that they did not have this measure installed before participating in the Residential Neighborhoods program, they had not been intending to install any before the program, and they have not purchased any additional patch tape since the program.

Table 78. Windows Patched with Clear Glass Tape Before the Program and Additional Patch Tape Purchased (N=4)

	Customers (N)	Customers (%)
Previously installed patch tape		
Already had one or more windows patched	0	0.0%
Did not already have windows patched	4	100.0%
Don't know / not specified	0	0.0%
Were you planning on purchasing patch tape before participating in the program?		
No	4	100.0%
No, already installed on all windows	0	0.0%
Maybe	0	0.0%
Yes	0	0.0%
Don't know / not specified	0	0.0%
Additional patch tape purchased since program		
Have not purchased additional patch tape	4	100.0%
Purchased additional patch tape	0	0.0%

Water Heater Pipe Wrap Installations

As seen in Table 79, the 36 surveyed participants who received pipe wrapping confirmed that 69 linear feet of pipe were wrapped by the program, which is 92.0% of the 75 linear feet installed recorded by auditors.[27] About a quarter of participants report that they did not receive this measure (27.8% or 10 out of 36 receiving the measure according to program records). None of the pipe wrap (0% of 69 feet confirmed installed) was installed by the customers themselves.

Table 79. Measure Installation: Water Heater Pipe Wrap

36 participants received pipe wrap according to auditor records	Customer count (N=36)	Linear feet of measure installed according to auditor records (N=75)	Confirmed linear feet of measure installed (N=69)
Auditor wrapped pipes	61.1%	54.7%	81.2%
Auditor gave wrap to customer, customer wrapped pipes	0.0%	0.0%	0.0%
Auditor gave wrap to customer, customer has NOT wrapped pipes	0.0%	0.0%	0.0%
Did not receive pipe wrapping	27.8%	28.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	11.1%	17.3%	18.8%

[27] The 22 participants who confirmed that the auditor wrapped pipes should have had 41 feet of wrapping installed according to auditor records, however eight customers reported that they had a combined 15 feet of additional pipes wrapped beyond what auditor records showed (the other 14 participants who confirmed installations did not know how many feet of wrap was installed, so auditor records are assumed to be correct). In addition, four customers did not know if they had any pipes wrapped, and according to program records these customers should have had 13 feet of pipe wrap installed. Thus the total confirmed installed is 56 feet confirmed and corrected by customers plus 13 feet of wrap where auditor records are assumed correct equals 69 linear feet of pipe wrapped.

Customers who confirmed that pipe wrap installed by the program were asked if there was previously any wrap on these hot water pipes: 86.4% (19 out of 22) said there was not, and the other 13.6% (3 out of 22) did not know.

Customers who confirmed that their pipes were wrapped by the program were asked if any of the pipe wrap has been removed from where it was installed. As indicated in Table 80, none of these participants (0% of 26 with confirmed installations) reported that wrap was removed from pipes.

Table 80. Removing Program-Provided Hot Water Pipe Wrap

	Customers with confirmed installation percent (N=26)	Confirmed linear feet of measure installed percent (N=69)
Have any of the pipe wrap that was installed through the Residential Neighborhood Program since been removed?		
No, all pipes wrapped are currently wrapped	84.6%	81.2% installed
Yes, some or all wrapping removed from pipe	0.0%	0.0% removed
Not sure if pipes were wrapped (did not answer questions about installation)	15.4%	18.8% assumed installed

Twenty-two participants who confirmed that they currently have pipes wrapped by the program rated their satisfaction with this measure on a ten-point scale where “10” is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program-provided pipe wrap is quite high at 8.95, and only 9.1% (2 out of 22) gave ratings of “7” or lower.

The two customers with ratings of “7” or lower were asked the reason for their relatively low satisfaction with the door caulking; these responses are listed below.

- *It's coming apart. It's not sticking. It's awful. It's cheap and falling apart.* (Satisfaction rating “1 out of 10”)
- *I keep having to re-tape the insulation wrap as it comes undone, but other than that I like it.* (Satisfaction rating “7 out of 10”)

Only one surveyed participant (4.5% of 22) already had hot water pipes wrapped before participating in the Residential Neighborhoods program, as seen in Table 81. Prior to the program, three respondents (13.6% of 22) say they intended to purchase and install pipe wrap, while another respondent (4.5% or 1 out of 22) said they “maybe” would have intended to wrap their pipes before participating in the program, while the remaining 81.8% (18 out of 22) did not intend to wrap any pipes. None of the surveyed program participants (0 out of 22) have wrapped any additional hot water pipes since receiving measures from the program audit.

Table 81. Hot Water Pipes Wrapped Before the Program and Additional Wrap Purchased (N=22)

	Customers (N)	Customers (%)
Previously installed hot water pipe wrap		
Already had pipes wrapped	1	4.5%
Did not already have pipes wrapped	19	86.4%
Don't know / not specified	2	9.1%
Were you planning on purchasing pipe wrap before participating in the program?		
No	18	81.8%
No, already installed on all available pipe	0	0.0%
Maybe	1	4.5%
Yes	3	13.6%
Don't know / not specified	0	0.0%
Additional pipe wrap purchased since program		
Have not purchased additional pipe wrap	22	100.0%
Purchased additional pipe wrap	0	0.0%

Water Heater Tank Insulation Wrap Installations

As seen in Table 82, the 19 surveyed participants confirmed that 17 water heaters were insulated by the program, which is 89.5% of the 19 installations recorded by auditors.[28] Two customers (10.5% of 19) report that they did not receive this measure, and none of the measures (0% of 17 confirmed installations) were installed by the customers themselves.

Table 82. Measure Installation: Water Heater Tank Insulation Wrap

19 participants received door caulk according to auditor records	Customer count (N=19)	Measures installed count according to auditor records (N=19)	Confirmed measures installed count (N=17)
Auditor caulked door(s)	84.2%	84.2%	94.1%
Auditor gave caulk to customer, customer caulked doors	0.0%	0.0%	0.0%
Auditor gave caulk to customer, customer has NOT caulked doors	0.0%	0.0%	0.0%
Did not receive door caulk	10.5%	10.5%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	5.3%	5.3%	5.9%

Customers who confirmed that water heaters were insulated by the program were asked if any of the insulation has been removed from where it was installed. As indicated in Table 83, none of the surveyed participants (0.0% of 17 who confirmed installations) reported that insulation was removed.

[28] The 16 participants who confirmed that the auditor insulated their water heaters had 16 water heaters insulated according to auditor record. In addition, one customer did not know if they had their water heater insulated. Thus the total confirmed installed is 16 units insulated confirmed by customers plus one unit where auditor records are assumed correct equals 17 units insulated.

Table 83. Removing Program-Provided Water Heater Tank Insulation

	Customers with confirmed installation percent (N=17)	Confirmed measures installed percent (N=17)
Have the water heater tank insulation that was installed through the Residential Neighborhood Program since been removed?		
No, insulation currently installed	94.1%	94.1% installed
Yes, insulation removed	0.0%	0.0% removed
Not sure if insulation was installed (did not answer questions about installation)	5.9%	5.9% assumed installed

Sixteen participants who confirmed that they currently have water heaters insulated by the program rated their satisfaction with this measure on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program-provided door caulking is very high at 9.73, and only 6.3% (1 out of 16) gave a rating of "7" or lower (this customer's satisfaction rating is "7 out of 10). The customer with relatively low satisfaction was asked why they gave this rating, and they responded "*the wrap came loose from the tank soon after it was installed*."

None of the surveyed participants who confirmed the installation of this measure (0% of 16) already had insulation wrap on their water heater tanks before participating in the Residential Neighborhoods program, as seen in Table 84. Prior to the program, one respondent (6.3% of 16) say they intended to purchase and install insulating wrap on their water heater, while another respondent (6.3% or 1 out of 16) said they "maybe" would have intended to insulate their water heater before participating in the program, while the remaining 87.5% (14 out of 16) did not intend to insulate their water heaters before the program.[29]

[29] Participants were not asked if they have purchased additional water heater tank insulation wrap after participating the program, since this question is only asked of respondents who had the program-provided insulating wrap installed, and it is assumed that residences do not have more than one water heater.

Table 84. Water Heater Tank Insulation Wrap Installed before the Program (N=16)

	Customers (N)	Customers (%)
Previously installed water heater tank insulation		
Already had insulation on tank	0	0.0%
Did not already have insulation on tank	16	100.0%
Don't know / not specified	0	0.0%
Were you planning on purchasing water heater tank insulation before participating in the program?		
No	14	87.5%
No, already installed on water heater	0	0.0%
Maybe	1	6.3%
Yes	1	6.3%
Don't know / not specified	0	0.0%

Water Heater Temperature Adjustments

As seen in Table 85, the 44 surveyed participants whose water temperature was checked according to auditor records confirmed that their water temperature was checked in 40 cases (90.9% of 44).[30] Only 9.1% (4 out of 44) of these participants report that they did not receive a check of their water heater temperature and none of the participants (0% of 44) checked the temperature themselves.

Table 85. Checking Water Heater Temperature

44 participants had their water temperature checked according to auditor records	Customer count (N=44)	Temps checked according to auditor records (N=44)	Confirmed temps checked (N=40)
Auditor checked temperature	56.8%	56.8%	62.5%
Customer checked temperature	0.0%	0.0%	0.0%
Did not receive temperature check	9.1%	9.1%	0.0%
Don't know (assuming auditor record is correct and temperature was checked)	34.1%	34.1%	37.5%

The 25 participants who confirmed that the auditor checked the temperature of their water heater were asked if any adjustments were made to the temperature settings. As seen in Table 86, 44.0% (11 out of 25) report that their temperature was adjusted, while 32.0% (8 out of 25) report that there was no adjustment and 24.0% (6 out of 25) are not sure.

[30] Twenty-five participants confirmed that the auditor checked the temperature of their hot water, and fifteen participants were not sure if this had been done or not. Thus the total confirmed temperature checks is 25 confirmed by customers plus 15 where auditor records are assumed correct equals 40 temperatures checked.

Table 86. Adjusting Water Heater Temperature

25 participants confirmed that the auditor checked their water heater temperature	Customer count (N=25)
Auditor adjusted temperature	44.0%
Auditor did not make an adjustment	32.0%
Not sure if the temperature was adjusted or not	24.0%

The 25 participants who confirmed that the auditor checked the temperature of their water heater were also asked if they knew the temperature readings before and after any adjustments. Only one customer who did not confirm that their temperature was adjusted (7.1% of 14) was able to report the temperature reading from the home audit: this customer says their water heater was set to 90 degrees. Five customers who did have their temperatures adjusted (45.5% of 11) were able to give temperature readings: four of these customers pre-adjustment settings ranged from 130 to 180 degrees and all four were adjusted down to 120 degrees by the auditor, while the fifth participant had their water temperature turned down from 120 degrees to 104 degrees (they explained that this was "*due to young children in our home*").

Customers whose water heater temperature was checked were asked if any further adjustments have been made since the program audit. Table 87 shows that 92.0% (23 out of 25) of participants report no further adjustments, while one participant (4.0% of 25) confirms that there was a further adjustment made and one participant (4.0% of 25) is not sure.

Table 87. Undoing Water Heater Temperature Adjustments (N=25)

25 participants confirmed that the auditor checked their water heater temperature	Customer count (N=25)
Has anyone made any further changes to the temperature setting since the home audit?	
No, temperature has not been adjusted since audit	92.0%
Yes, temperature has been adjusted since audit	4.0%
Not sure if temperature has been adjusted since audit or not	4.0%

The customer whose water temperature was adjusted after the audit was asked who did this and what adjustment was made; they reported that "*building maintenance turned the temperature up to 125 degrees*". Overall, the five participants who were able to give specific temperature readings report that their water temperatures were adjusted down from an average setting of 143 degrees before the audit to 118 degrees afterwards (including one participant's post-audit adjustment).

Twenty-five participants who confirmed that their water temperature was checked during the program audit rated their satisfaction with this measure on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the temperature check is quite high at 9.36, and only 8.0% (2 out of 25) gave ratings of "7" or lower.

The two customers with ratings of "7" or lower were asked the reason for their relatively low satisfaction with the water temperature check; these responses are listed below.

- *The temperature was too low; it didn't have any steam anymore.* (Satisfaction rating "2 out of 10"; this is the customer whose temperature was adjusted back up to 125 after the audit.)
- *I like the water to be hotter.* (Satisfaction rating "7 out of 10"; this is the customer whose temperature was adjusted down to 104 degrees due to small children in the home.)

Customers who received the temperature check without an adjustment seem to be more satisfied on the whole than those who confirmed that the auditor made a temperature adjustment, although this difference is entirely accounted for by the lower satisfaction of the two customers with adjustments who are quoted above. [31] Another way to state this is that 18.2% of 11 customers who confirmed temperature adjustments had complaints about this measure (indicated by satisfaction ratings of "7" or lower) while 0% of 11 customers who did not confirm temperature adjustments have complaints about this measure.

Only 20.0% (5 out of 25) program participants who confirmed that the auditor checked their water temperature report that they ever checked their water temperature before the program, and only 4.0% (1 out of 25) reports checking their water temperature on a regular basis. Three-quarters of surveyed participants (76.0% or 19 out of 25) have never checked the temperature on their water heaters.

Table 88. Checking Water Temperature before the Program (N=25)

	Customers (N)	Customers (%)
How often did you check the temperature on your water heater before participating in the program?		
Never checked	19	76.0%
Checked once or twice / a few times	4	16.0%
Checked regularly, once per year or more often	1	4.0%
Don't know	1	4.0%

Foam Insulation Spray Installations

As seen in Table 89, a minority of participants were able to positively confirm the installation of foam insulation spray measures. A third of participants (35.7% or 20 out of 56) who received this measure according to program records claim that they did not receive any foam insulation spray (accounting for 34.0% or 32 out of 94 cans of spray distributed according to auditor records). The 56 surveyed participants confirmed the installation of only 62 cans of insulation spray, which is 66.0% of the 94 installations recorded by auditors; this includes 42 cans (44.7% of 94) which are counted as installed according to auditor records because the customer did not know if

[31] Eleven surveyed participants said "no" or "don't know" when asked if the auditor adjusted their temperature, and these customers' average satisfaction rating for this measure is 9.82. Another eleven participants said "yes" when asked if the auditor adjusted their temperature, and these customers' average satisfaction rating is about a point lower at 8.91 (though this difference is not statistically significant due to small sample sizes). However if the two customers with adjustments who were less satisfied (ratings of "7" or lower) were removed from this group, the average satisfaction for the remaining nine customers with adjustments is 9.89, equivalent to the non-adjustment group.

they had received the measure or not. None of the surveyed participants reported installing this measure themselves, or receiving any spare measures to install.

Table 89. Measure Installation: Foam Insulation Spray

56 participants received foam insulation spray according to auditor records	**Customer count (N=56)**	**Measures installed count according to auditor records (N=94 cans of spray)**	**Confirmed measures installed count (N=62 cans of spray)**
Auditor installed showerhead(s)	23.2%	21.3%	32.3%
Auditor gave foam insulation spray to customer, customer installed it	0.0%	0.0%	0.0%
Auditor gave foam insulation spray to customer, customer has NOT installed it	0.0%	0.0%	0.0%
Did not receive foam insulation spray	35.7%	34.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	41.1%	44.7%	67.7%

The thirteen participants who confirmed that foam insulation spray was installed were asked if they knew how much was installed; nine (69.2% of 13) could not estimate the amount, and the other four customers estimated that from "*less than one can*" to "*two cans*" were installed (averaging about one can per household). Three of these customers' estimates did match the auditor-recorded number of cans installed (the fourth customer estimated one can but the auditor recorded two cans), thus even among customers who confirmed that the foam spray was installed only about one in four (23.1% or 3 out of 13) were able to accurately recall the amount installed.

The thirteen customers who confirmed the installation of foam insulation spray were asked where in their home this insulation was installed; these responses are listed below. Eight of these thirteen responses identify kitchen and/or bathroom sinks and their pipes as the place in the home where this measure was installed, while four mentioned doors and three mentioned hot water heaters.

- *He sprayed the pipes from under the kitchen sink to outside the house.*
- *Under the kitchen sink and around a door.*
- *Under the kitchen sink, under the bathroom sink, and around the back door.*
- *Under my sinks.*
- *Under the house and under the kitchen sink.*
- *Under the sinks in the kitchen and the bathroom and the hot water heater.*
- *In the kitchen and maybe the bathroom.*
- *In the kitchen and two bathrooms.*
- *Around doors and the air conditioner.*
- *Around front and back doors.*
- *Around the hot water heater.*
- *It was used on the hot water heater, which is in a small closet just off of the kitchen.*
- *I don't recall.*

Customers who confirmed the installation of foam insulation spray were asked if any of this insulation has been removed from where it was installed; all thirteen (100%) confirmed that all of the auditor-installed foam insulation spray is still installed.

Twelve participants who confirmed that they currently have program-provided foam insulation spray installed in their homes rated their satisfaction with the insulation spray on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for this measure is very high at 9.75, and none of these participants (0 out of 12) gave ratings of "7" or lower. Since none of the customers gave ratings of "7" or lower, none of them were asked to explain why they were less than satisfied with this measure.

A third of surveyed participants who confirmed the installation of program-provided foam insulation spray (30.8% or 4 out of 13) already had foam insulation in their homes, as seen in Table 90. Prior to the program, only three respondents (23.1% of 13) had intended to purchase foam insulation spray, while another respondents (7.7% of 13) said they "maybe" would have installed foam insulation spray before participating in the program, but a large majority of 69.2% (9 out of 13) did not intend to purchase foam insulation spray. One of the surveyed program participants (7.7% of 13) has purchased an additional can of foam insulation spray (one can) on their own since receiving this measure from the program audit.

Table 90. Foam Insulation Spray Installed Before the Program and Additional Insulation Spray Purchased (N=13)

	Customers (N)	Customers (%)
Previously installed showerheads		
Already had foam insulation spray installed	4	30.8%
Did not already have foam insulation spray installed	9	69.2%
Don't know / not specified	0	0.0%
Were you planning on purchasing any foam insulation spray before participating in the program?		
No	9	69.2%
Maybe	1	7.7%
Yes	3	23.1%
Don't know / not specified	0	0.0%
Additional foam insulation spray purchased since program		
Have not purchased additional foam spray	12	92.3%
Purchased additional foam insulation spray	1	7.7%

HVAC Filters and Filter Change Calendar Installations

As seen in Table 91, the 64 surveyed participants who received a year's supply of HVAC filters and/or the filter change calendar according to auditor records confirmed that 44 of them received filters from the program, which is 68.8% of the 64 measures recorded by auditors. Only 61.4% (27 out of 44) of customers confirming they received filters also confirmed that they received the filter change calendar (customers who are not sure if they received the calendar can be assumed

to not be using the calendar, whether or not they actually received it[32]). There were also three customers (4.7% of 64) who report that they received the calendar but not the filters. About one in four participants who received these measures according to auditor records (26.6% or 17 out of 64) could not confirm the receipt of either the filters or calendar (including one customer who reported not receiving any filters but was not sure about the calendar).

Table 91. Measure Installation: HVAC Filters and Filter Change Calendar

64 participants received filters and/or calendar according to auditor records	Customer count (N=64)	Confirmed filters received count (N=44)
Received filters and calendar	42.2%	61.4%
Received filters but not calendar	10.9%	15.9%
Received filters, not sure if received calendar	15.6%	22.7%
Received calendar but not filters	4.7%	-
Did not receive filters or calendar	25.0%	-
Did not receive filters, not sure if received calendar)	1.6%	-

Customers who confirmed the receipt of either of these measures were asked if the auditor changed their filter during the audit.[33] As indicated in Table 92, three-quarters of those who reported receiving filters say that the auditor changed filters during the audit (72.7% or 32 out of 44) and one participant (2.3% of 44) changed the filter himself during the audit. The lone customer who changed the filter himself confirmed that this was "easy" to do.

Table 92. Changing Filters During the Home Audit (N=44)

	Confirmed filters received (N=44)	Percentage
Did you or the auditor change your A/C or heater filter during their visit to your home?		
Yes, auditor changed filter	32	72.7%
Yes, I changed the filter	1	2.3%
No, filter was not changed	8	18.2%
Don't know	3	6.8%

As seen in Table 93, three-quarters of participants who confirmed that the received the filters and the calendar (77.8% or 21 out of 27) report that they are using the calendar and changing filters though only about half (51.9% or 24 out of 27) confirm that they are changing the filters as often as suggested, while 22.2% (6 out of 27) are changing them less frequently than the calendar suggests and none (0% of 27) are changing filters more often than suggested. Another 14.8% (4

[32] Program participants are supposed to receive the filters and the calendar together, since they are intended to be used together. This survey asked them to confirm the receipt of both items separately, and customers often report that they did not receive both items. However, this is more likely due to incorrect recall by participants rather than auditors failing to deliver both measures; in particular they are less likely to recall the calendar (46.9% or 30 out of 64) than the filters (68.8% or 44 out of 64), indicating many may have "forgotten about" or "lost" the calendar. However, the energy savings for this set of measures are provided by the filters and not the calendar (the calendar is just a reminder to use the filters).

[33] Three customers who confirmed the receipt of the calendar but not the filters also confirmed that no filters (0% of 3) were changed during their home audits (not shown in Table 73).

out of 27) are changing their filters regularly without using the calendar, and only 7.4% (2 out of 27) are not changing their filters at all.

Among the 17 participants who confirmed receiving the filters but not the calendar, only half (47.1% or 8 out of 17) confirm that they are regularly changing filters, though another 23.5% (4 out of 17) are not sure (perhaps indicating that someone else in the household is responsible for changing filters). Among the three customers who report receiving the calendar but not the filters, one says they are using the calendar to change filters that they did not acquire from the program[34] (33.3% of 3), one is changing their own filters without using the calendar (33.3% of 3) and one is not changing their filters at all (33.3% of 3).

Table 93. Using the Filter Change Calendar (N=47)

	Confirmed calendar and filters received (N=27)	Confirmed filters received but not calendar (N=17)	Confirmed calendar but not filters (N=3)
Have you been using the filter change calendar and changing your filters regularly since the Residential Neighborhood Program audit?			
Yes, I am using the calendar and changing filters as the calendar suggests	51.9%	0.0%	0.0%
Yes, I am using the calendar and changing filters more often than the calendar suggests	0.0%	0.0%	0.0%
Yes, I am using the calendar and changing filters less often than the calendar suggests	22.2%	0.0%	33.3%
Yes, I am using the calendar and changing filters, don't know if more or less often than suggested	3.7%	0.0%	0.0%
Yes, I have been changing filters but not using the calendar	14.8%	47.1%	33.3%
No, not using calendar or changing filters	7.4%	29.4%	33.3%
Don't know	0.0%	23.5%	0.0%

Seven participants who report that they use the calendar but change their filters less often than suggested gave estimates of how often they do change their filters: six of these customers report changing filters from between "every month or two" up to "every four months" and average 2.3 months between changing filters, while the seventh customer says only "*I check it monthly but if it's clean I don't change it*."

Five customers who report that they received the calendar and are changing filters without using the calendar were asked why they are not using the calendar. These responses are listed below.

<u>Participants who confirmed receiving both filters and calendar (N=4)</u>

- *I am not sure where the calendar is.*

[34] This customer changes filters less often than the calendar suggests, and explained their usage of the calendar as follows: "*I just use the calendar for reference, or a reminder. I use my own filters and I change them about every two or three months, depending on the season and how visually dirty the filter appears.*"

- *I know to change the filter at the start of the month.*
- *I write the date I changed the filter on the filter, and then write that I changed the filter on the calendar.*
- *I just go by if the filter looks like it needs to be changed. If it looks dirty, I change it.*

Participants who confirmed receiving calendar but not filters (N=1)

- *I know how often to change it according to the type of filters that I buy.*

The five participants who are changing filters without using the calendar were also asked how often they change their filters: three of these (60% of 5) change their filters every month, one changes them every other month, and the fifth explained "*I change it when it gets dirty. I really don't use the heater often because my oxygen machine emits so much heat*."

Seven participants confirmed receiving the filters but reported that they are not changing them, and they were asked why not. These responses are listed below; interestingly, most of the customers who do not recall receiving the calendar usually point to the lack of the calendar as the reason that they are not changing the filters. In contrast, the customers who recall receiving the calendar say they are too busy or just forgot.

Participants who confirmed receiving both filters and calendar (N=2)

- *Because I'm a busy man. I'm not at home a whole lot because I work a lot. I have more important things to do.*
- *It passed my mind.*

Participants who confirmed receiving filters but not calendar (N=5)

- *I never got the calendar.*
- *I did not receive the calendar.*
- *I've misplaced the calendar.*
- *I'm not sure that I ever received the calendar.*
- *I'm not sure where any of that stuff is.*

Twenty-six participants who confirmed that they received the filter change calendar provided by the program rated their satisfaction with the calendar, and 43 participants who confirmed receiving the year's supply of HVAC filters rated their satisfaction with the filters, both using a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction ratings for the program-provided calendar and filters are quite high at 9.35 and 9.47 respectively, and only 7.7% (2 out of 26) of calendar raters and 4.7% (2 out of 43) of filter raters gave satisfaction ratings of "7" or lower for these measures. These customers' explanation for their relatively low satisfaction scores are listed below.

Participants who rated the calendar at "7 out of 10" or lower (N=2)

- *It's nice they gave me one, but I don't use it.* (rating "6 out of 10")
- *It's not that I'm not satisfied with the calendar. The auditor put it in a place that's out of the way, so I just don't really use it at all.* (rating "7 out of 10")

Participants who rated the filters at "7 out of 10" or lower (N=2)

- *The filters provided by the program are kind of flimsy and cheap compared to the filters I was previously using which I bought myself.* (rating "5 out of 10")
- *They're just those little cheap ones.* (rating "5 out of 10")

Seven out of ten surveyed participants who confirmed receiving the calendar or filters (70.2% or 33 out of 47) report that they were already planning to purchase HVAC filters before participating in the Residential Neighborhoods program, however two in ten (21.3% or 10 out of 43) had not been intending to purchase any filters, as seen in Table 94. Only three participants (6.4% of 47) have purchased additional filters since participating in the program; these three participants have purchased from three to six filters on their own, averaging 5.0 filters purchased apiece.

Table 94. Purchasing HVAC Filters Before and After Participating in the Program

	Confirmed calendar and filters received (N=27)	Confirmed filters received but not calendar (N=17)	Confirmed calendar but not filters (N=3)	Total confirmed either measure received (N=47)
Were you planning to purchase HVAC filters before receiving filters from the program				
Yes	70.4%	76.5%	33.3%	70.2%
Maybe	11.1%	0.0%	0.0%	6.4%
No	14.8%	23.5%	66.7%	21.3%
Don't know / not specified	3.7%	0.0%	0.0%	2.1%
Have you purchased any additional HVAC filters since participating in the program?				
Yes	3.7%	5.9%	33.3%	6.4%
No	96.3%	94.1%	66.7%	93.6%

Before participating in the program, 42.6% (20 out of 47) of participants who confirmed the receipt of these measures were already changing their filters on a near-monthly basis, though 17.0% (8 out of 47) were changing them less often than every three months. Overall, the 42 participants who were able to provide an estimate on the number of months between filter changes reported changing the filters every 2.8 months on average.

Table 95. Changing HVAC Filters Before and After Participating in the Program

	Total confirmed calendar and/or filters received (N=47)
How often were you changing your filters before you participated in this program?	
More often than every other month	42.6%
Every other month up to every three months	29.8%
Less often than every three months	17.0%
Other response, listed below	8.5%
Don't know	2.1%

Four surveyed participants gave "other" responses when asked how often they changed their filters before participating in the program, which are listed below.

- *I only changed it when I thought it needed it, if the filter looked dirty.*
- *Before, I would only change the filter when it looked to be really dirty.*
- *I really don't use the heater often because my oxygen machine emits quite a bit of heat.*
- *I change the filters every other month in the summer and monthly in the winter.*

Among 29 participants who used these measures and reported specific time periods for changing their filters both before and after the program, three (10.3%) reported changing their filters more frequently after the program (these three customers went from changing filters an average of every 3.5 months to once every 1.3 months), and none (0% of 29) reported changing their filters less frequently after the program.

Switch Plate Wall Thermometer Installations

As seen in Table 96, most participants confirmed receiving switch plate wall thermometers (89.2% or 66 out of 74 who received this measure according to auditor records). According to auditor records, one of these customers received two thermometers, while the rest received one apiece. Overall, customers confirmed the installation of 70 out of 75 (93.3%) thermostats received according to auditor records.[35] None of the surveyed participants reported installing this measure themselves, or receiving any spare measures to install later.

[35] Sixty-six participants confirmed that the auditor installed the installation of 67 thermometers, while three participants did not recall if they received a thermostat. Thus the total confirmed thermostats installed is 67 confirmed by customers plus 3 where auditor records are assumed correct equals 70 installed.

Table 96. Measure Installation: Switch Plate Wall Thermometer

74 participants received wall thermometers according to auditor records	Customer count (N=74)	Measures installed count according to auditor records (N=75)	Confirmed measures installed count (N=70)
Auditor installed thermometer	89.2%	89.3%	95.7%
Auditor gave thermometer to customer, customer installed it	0.0%	0.0%	0.0%
Auditor gave thermometer to customer, customer has NOT installed it	0.0%	0.0%	0.0%
Did not receive thermometer	6.8%	6.7%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	4.1%	4.0%	4.3%

Table 97 shows where in the home switch plate wall thermometers were installed: a third are installed in hallways (33.3% or 22 out of 66), and a quarter are installed in bedrooms (25.8% or 17 out of 68).

Table 97. Switch Plate Wall Thermometer: Room Installed (N=66)

66 participants confirmed the installation of thermometers	Count	Percent
Hallway	22	33.3%
Bedroom	17	25.8%
Kitchen	9	13.6%
Dining room	7	10.6%
Den / computer room / office	4	6.1%
Living room / family room	3	4.5%
Bathroom	2	3.0%
Other, listed below	2	3.0%

Two participants reported "other rooms" where their thermometers were installed; these are listed below.

- *At the bottom of the stairs, by the TV.*
- *In the kitchen hallway.*

Nearly half of participants surveyed (45.5% or 30 out of 66 who confirmed the installation of thermometers) did not have any thermometers in their home before the program, as seen in Table 98.

Table 98. Number of Thermometers in the Home After the Program (N=66)

66 participants confirmed the installation of thermometers	Count	Percent
One thermometer (none before the program)	30	45.5%
Two thermometers (one before the program)	34	51.5%
Three thermometers (two before the program)	2	3.0%

One participant who received a thermometer has moved it to a different room in their home, but none of the thermometers have been removed completely, as seen in Table 99. The participant

who moved their thermometer moved it from the master bedroom to the laundry room, and explained: "*the laundry room is not insulated and we wanted to watch the temperature in that room for the safety of the pipes.*"

Table 99. Removing Program-Provided Switch Plate Wall Thermometer

	Customers with confirmed installation percent (N=69)	Confirmed measures installed percent (N=70)
Has the thermometer that was installed through the program since been removed?		
No, installation is still in place	65	94.3% installed
Yes, moved to somewhere else in the home	1	1.4% installed
Yes, thermometer is no longer installed	0	0.0% removed
Not sure if thermometer was installed (did not answer questions about installation)	3	4.3% assumed installed

Customers who confirmed receiving wall thermometers from the program were asked how often they use them. Table 100 indicates that nearly two-thirds (62.1% or 41 out of 66) check their thermometers at least once a week, and the frequency of use by customers who did not previously have thermometers in their homes is similar to the frequency among customers who did previously have thermometers in their homes.

Table 100. Frequency of Checking the Program-Provided Thermometer (N=66)

	Customers with thermometers before audit (N=36)	Customers with no thermometer before audit (N=30)	Total confirming thermometer installed (N=66)
How often do you check the thermometer that was installed through this program?			
More than once a day	13.9%	6.7%	10.6%
About once a day	16.7%	26.7%	21.2%
Once every few days	30.6%	16.7%	24.2%
About once a week	2.8%	10.0%	6.1%
Less often than once a week	27.8%	26.7%	27.3%
Never	8.3%	13.3%	10.3%

Participants who confirmed the installation of the wall thermometer were asked if they have made any adjustments to their heating or cooling settings since the program. Table 101 indicates that about one participant in four (25.8% or 17 out of 66) turned their heat down in the winter, but only about one in twenty turned their cooling temperature up in the summer (4.5% or 3 out of 66). Customers who did not previously have a thermometer in their home are twice as likely to report turning their heat down (36.7% or 11 out of 30) compared to those who already had thermometers (16.7% or 6 out of 36; this difference is significant at $p<.05$ using Student's t-test). However, the behavior patterns between these two groups are not significantly different when it comes to cooling adjustments in the summer.

Table 101. Heating and Cooling Adjustments since Installation of the Thermometer (N=66)

	Customers with thermometers before audit (N=36)	Customers with no thermometer before audit (N=30)	Total confirming thermometer installed (N=66)
Have you made any adjustments to your heating settings in the winter since the thermometer was installed?			
No changes	72.2%	43.3%	59.1%
Yes, turned temperature up	5.6%	10.0%	7.6%
Yes, turned temperature down	16.7%	36.7%	25.8%
Yes, with no effect or unexplained	5.6%	6.7%	6.1%
Don't know	0.0%	3.3%	1.5%
Have you made any adjustments to your heating settings in the summer since the thermometer was installed?			
No changes	72.2%	70.0%	71.2%
Yes, turned temperature up	2.8%	6.7%	4.5%
Yes, turned temperature down	0.0%	3.3%	1.5%
Yes, with no effect or unexplained	5.6%	10.0%	7.6%
Don't know	0.0%	6.7%	3.0%
Not applicable (no air conditioning)	19.4%	3.3%	12.1%

The 26 customers who reported adjusting their heating temperatures in the winter (39.4% of 66 with thermometers installed) were asked what changes were made: On average, these customers turned their heating down by 2.7 degrees Fahrenheit.

The nine customers who reported adjusting their cooling temperatures in the summer (13.6% of 66) were also asked what changes were made: The average adjustment made by these customers is to set the cooling back (raise the temperature) by 1.4 degrees Fahrenheit.

Sixty-five participants who confirmed that they currently have wall thermometers supplied by the program installed in their homes rated their satisfaction with this measure on a ten-point scale where "10" is the most satisfied. As seen previously in Table 24, the mean satisfaction rating for the program-provided door caulking is quite high at 9.11, and only 10.8% (7 out of 66) gave a rating of "7" or lower. The seven participants who gave ratings of "7" or lower were asked the reasons for their relatively low ratings, which are listed below; four of these customers report that they have trouble reading the display.

- *When the switch plate wall thermometer was first installed I checked it every day, but it was always at the same temperature. I still look at it a couple times during the week just to see if it has changed, but it doesn't.*
- *I'm not so sure that the switch plate thermometer was reading correctly, it always felt warmer than what the thermometer reading was saying. I have basically stopped looking at it.*

- *It does not do anything, I don't understand the purpose of that switch plate wall thermometer. I even asked the auditor what it was for and he could not explain it to me.*
- *It is too small for me to read.*
- *The numbers are too small to read clearly.*
- *It's hard to read.*
- *I don't understand the numbers because it's in Centigrade.*

Additional Actions to Save Energy in the Home

A majority of 60.0% (48 out of 80) of surveyed participants report that they have taken additional steps to save energy since participating in the Residential Neighborhoods Program. These actions are categorized in Table 102; the only actions mentioned by at least 10% of surveyed participants are turning off lights when not in use (22.5% or 18 out of 80) and using less heating (11.3% or 9 out of 80)

Table 102. Additional Actions to Save Energy since Participating in the Program (N=80)

	Count	Percent
Have not taken any additional actions	32	40.0%
Have taken additional actions	48	60.0%
Actions taken:		
Turn off lights when not in use	18	22.5%
Use less heat / turn down thermostat	9	11.3%
Turn electronics off / unplug	7	8.8%
Caulk/tape doors/windows	4	5.0%
Add insulation to walls, floors, ceilings, attics	4	5.0%
Upgrade HVAC system	3	3.8%
Maintain steady temp / do not adjust thermostat	3	3.8%
Upgrade windows / doors	3	3.8%
Use curtains / shades to control heat/light	3	3.8%
Keep doors / windows shut	2	2.5%
Use efficient lighting / CFLs	2	2.5%
Added space heaters	2	2.5%
Turn down temp of water heater	2	2.5%
Upgrade to Energy Star appliances	1	1.3%
Conserving water (other than clothes washing)	1	1.3%
Use fans to circulate air better	1	1.3%
Use stove / oven less	1	1.3%
Close off rooms / don't use entire house	1	1.3%
Outlet / switch gasket insulators	1	1.3%
Unique actions, listed below	7	8.8%

Percentages total to more than 100% because respondents could take multiple actions.

Seven respondents reported taking unique actions to save energy, which are listed below.

- *I put in new power vents underneath the house.*
- *I upgraded my circuit breaker box.*

- *I installed blinds.*
- *I installed a water purifier on my faucet.*
- *I've educated my children about ways to save energy.*
- *I'm making sure those energy efficiency efforts are still installed properly.*
- *I applied for a city program to make my house more energy efficient.*

What Participants Learned from Residential Neighborhoods

TecMarket Works asked participants "*what would you say are the most important things you learned from the Residential Neighborhood Program?*" and recorded up to three responses per respondent. These responses are categorized in Table 103; the lessons learned cover a broad range of topics, with the most-mentioned being "saving energy" in general (17.5% or 14 out of 80), the need to weatherize and plug leaks (17.5% or 14 out of 80), that measures and steps to save energy also save money on utility bills in the long run (15.0% or 12 out of 80), about the benefits of CFLs and efficiency lighting (13.8% or 11 out of 80) and that Duke Energy offers programs to help their customers (10.0% or 8 out of 80). Only about one in seven customers could not name anything that they learned by participating in this program (13.8% or 11 out of 80).

Table 103. What Participants Learned by Participating in the Residential Neighborhoods Program (N=80)

What are the most important things you learned from this program?	**Count**	**Percent**
About saving energy (general measures)	14	17.5%
Need to plug drafts / weatherize	14	17.5%
Measures save money on bills / cost effective over time	12	15.0%
About CFLs / efficient lighting	11	13.8%
Duke Energy has programs to help customers / Duke cares	8	10.0%
Turn off / unplug unused electronics	7	8.8%
Use less heating and cooling / how to use a thermostat	7	8.8%
About saving water (aerators & showerheads)	5	6.3%
Closing blinds / keeping doors shut	4	5.0%
My home needed efficiency improvements / that I should use less energy	4	5.0%
Turn off lights when not in use	3	3.8%
My home was already very efficient / I am doing things right	3	3.8%
Change HVAC filters regularly	3	3.8%
Duke is trying to lower customer bills	2	2.5%
Save energy by hot water adjustment	2	2.5%
Unique responses, listed below	14	17.5%
Don't know / nothing	11	13.8%

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

Fourteen participants gave unique responses when asked what were the most important things they learned from the program, which are listed below.

- *I learned how to check my home for air leaks.*

- *I learned that it is important to replace some of the things you might already have installed in the past.*
- *I know the home repairs should be kept up.*
- *It set me off on replacing and fixing items in my home to make my home more efficient.*
- *I learned how they'd been around to other communities. I was surprised to hear that.*
- *I am more aware about the utility bill now.*
- *The air conditioners are heavy, so it's nice I can leave it in the window this year.*
- *They did the work they were supposed to do and didn't mess around.*
- *They took the time to answer questions at the meeting.*
- *I have a better general awareness.*
- *It gave me an awareness of my home in general. Nothing particularly stands out thought.*
- *That sometimes you can get something for nothing.*
- *The reports I get in the mail give me more information than any of the programs.*
- *That they use cheap material.*

What Participants Liked Most about Residential Neighborhoods

TecMarket Works asked participants what was their favorite thing about participating in this program; their responses are shown in Table 104. Positive comments about the audit and the auditors were the most frequently mentioned (by 32.5% or 26 out of 80), followed by the fact that the program and/or measures were free (27.5% or 22 out of 80), the informational and educational aspects of the program (17.5% or 14 out of 80), and saving money on utility bills (17.5% or 14 out of 80).

Table 104. What Participants Liked Most About the Residential Neighborhoods Program (N=80)

What was your favorite thing about participating in this program?	Count	Percent
Home audit / advice and assistance from auditor	26	32.5%
Free program / free measures	22	27.5%
Saving money on energy bills	14	17.5%
Education and information gained	14	17.5%
Saving energy / conservation	13	16.3%
Like measures received, listed below	13	16.3%
Improvements to the home	10	12.5%
Duke Energy wants to help customers	6	7.5%
Participation was easy / convenient	1	1.3%
Unique responses, listed below	3	3.8%
Don't know / nothing	4	5.0%

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

Three participants made unique comments about their favorite aspect of the program, which are listed below.

- *The community meeting was great. We got to meet more of the people in our neighborhood. We're retired, so I always enjoy a reason to get out and socialize and they even served barbeque.*
- *I like that they gave us gifts at the community meeting.*
- *It was great to find out that I was already doing everything right.*

Thirteen participants mentioned specific measures received as being their favorite aspect of the program; these are listed below.

- *I like that they're changing the lights, which seem to last a long time.*
- *I liked getting the light bulbs.*
- *That I got the bulbs and the strips around the door preventing air from going through. Everything he did I needed. I think it really helped.*
- *I liked receiving the heater and air conditioner filters and I like the CFL light bulbs. The offering of these items has saved me some money that I would have had to spend on these necessary items.*
- *The night light!! I love, love, love it!*
- *I like the new low-flow showerheads, I can tell the difference from my old ones, these seem to be using less water while still doing a good job as a showerhead.*
- *Receiving things, especially the furnace filters and faucet aerator. The program was beneficial, even without the light bulbs.*
- *I really liked having those door sweeps installed; they make a big difference in keeping cold, drafty air out.*
- *Weather stripping around the door helped me a lot, because I'm short and couldn't reach that high to install it myself. The weatherstripping keeps a lot of air from going past the door and saves a lot now.*
- *I use the thermometer.*
- *I like that they put up a motion detector light outside.*[36]
- *My favorite part was all the things the auditor brought out.*
- *I was very pleased with the program and the things that they offered me.*

What Participants Liked Least about Residential Neighborhoods

TecMarket Works also asked the surveyed participants what they liked least about the program. Their responses are shown in Table 105. Two-thirds of participants (67.5% or 54 out of 80) could not name a least favorite aspect of the program. The only other response categories mentioned by more than 5% of participants are that they disliked measures they received (13.8% or 11 out of 80) or didn't receive a measure they wanted or expected (6.3% or 5 out of 80).

[36] The Residential Neighborhoods program does not include outdoor light sensors.

Table 105. What Participants Liked Least About Residential Neighborhoods (N=80)

What was your least favorite thing about this program?	Count	Percent
Did not like measures, listed below	11	13.8%
Did not receive measures, listed below	5	6.3%
Not saving any money / rates going up	3	3.8%
Difficulty scheduling audit / inconvenient	2	2.5%
Wanted more free items	2	2.5%
Unique responses, listed below	4	5.0%
No complaints / nothing / don't know	54	67.5%

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

Four respondents made unique comments regarding their least favorite part of participating in the program, which are listed below.

- *My least favorite thing was the lack of an informational pamphlet. I would reference such written material regularly if it was available.*
- *I wish that they had offered more CFL light bulb size options.*
- *I didn't like that the landlord came back and took the sweeps off the doors.*
- *The program didn't help me at all; it was a waste of time and effort.*

Eleven participants said their least favorite thing about this program was a measure or measures they received. These responses are listed below.

- *I don't like the water pressure of the low-flow showerhead and the water pressure of the faucet aerators.*
- *The water pressure in the kitchen sink is too low.*
- *I don't really like the aerators that were installed on the faucets in my kitchen and bathrooms, I'd like to have more water pressure coming out of the faucets.*
- *The hot water is not hot enough.*
- *I don't like how the hot water tank insulation looks, although it does work well. It just doesn't look good.*
- *The light bulbs are too dim.*
- *The furnace filters that he brought did not work for my furnace, and the light bulbs did not fit our ceiling fan lamps.*
- *The door sweep doesn't fit properly.*
- *I didn't care too much for the things they put at the bottom of the door. I have to step sideways to wipe my feet now.*
- *The stripping around the door fell off.*

- *They used cheap stuff which is falling apart and falling off.*

Five participants said their least favorite thing about this program is that they did not receive measures that they were promised or expected; four out of five of these complaints involve not receiving the year's supply of HVAC filters, and in three of these cases the customer reports that the auditor told them they would return with the filters or send them later, but this did not happen.

- *I didn't get the filters I was promised. The man said he was out of filters, but that he would send me some, but I never got any; I had to go and buy them myself. I did not receive many of the items you say I was supposed to receive.*[37]
- *The auditor said he was going out to get some filters for my heater and he never came back.*
- *My least favorite thing was that auditor never returned with the HVAC filters he promised.*
- *I didn't get any filters for the furnace.*
- *I didn't get a new refrigerator. He mentioned that sometimes they replace refrigerators for you.*[38]

Program Improvements and Additional Services

TecMarket Works asked surveyed participants "*are there things that this program could have provided that you think would have made more people want to participate?*" These suggestions are shown in Table 106 below. The most common recommendations are for the auditors to provide more information to customers during the audit (13.8% or 11 out of 80) and to provide more measures and services (12.5% or 10 out of 80). No other category of response was mentioned by more than 10% of participants, and half of surveyed customers (48.8% or 39 out of 80) did not have any suggestions.

[37] Survey respondents were asked about all of the measures that they received according to the auditor records; survey questions about a particular measure were not asked if the auditor records did not show that the measure was installed.
[38] The Residential Neighborhoods program does not replace refrigerators.

Table 106. Participants' Suggestions for Increasing Program Participation (N=80)

	Count	Percent
Auditor should provide more information / explanation during audit	11	13.8%
Include additional measures / services, listed below	10	12.5%
Provide more information about the program ahead of time	5	6.3%
Highlight no cost to customer (free)	5	6.3%
Highlight utility bill savings	4	5.0%
More mailings and flyers	4	5.0%
Need security assurance (strangers in the home)	4	5.0%
More advertising	3	3.8%
Highlight eligibility (renters qualify)	2	2.5%
More recruiting and auditing on evenings and weekends to get working people	2	2.5%
People will participate when they see others are participating	2	2.5%
Negative comments, listed below	3	3.8%
Unique suggestions, listed below	10	12.5%
Don't know / nothing / fine as is	39	48.8%

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

Ten respondents suggested additional measures and services; these suggestions are listed below.

- *Something that this program could have provided would be a wider variety of CFL light bulb types. With the screw in part that goes into the bulb, this program only offers the male socket, the bigger size, customers need small male light bulb sizes. It would have helped me tremendously because most of the bulbs provided by the program did not fit in places where I needed them.*
- *I think that if the program offered a wider variety of the energy saving CFL lights, more people would sign up for the program. Those specialty CFLs are expensive and can be hard to find, so I think more people would be interested in getting those from this program.*
- *I would have liked if the auditor would have left me with more light bulbs. I think the program should give you a CFL bulb for every socket that you have in your home. They could either leave the bulbs with you, or just replace all standard incandescent bulbs with new CFLs. Also, as this program continues in the future, I think the weather stripping for around the doors should be better, I think that weather stripping fell off rather quickly.*
- *The windows in this apartment are very inefficient and I can feel air coming in through them in winter. It would be a great help if there was something that you could do to help with them.*
- *Include help in upgrading windows.*
- *I'd like plastic for the windows.*
- *They could provide plastic for the window to keep the air from coming in.*
- *The program could provide additional weatherization services.*
- *Everything was fine, except the hot water being too low; people probably have a problem with that.*

- *The auditor said he did not have the right size furnace filters on his truck and that he would send them, but never did get the filters.*

Ten respondents made unique suggestions, which are listed below.

- *I am disabled and have learned that conversation can move mountains. Duke Energy needs to communicate with people and then they'll generate more interest in programs like this.*
- *I never called to enroll in the program, but then when I saw the truck I took advantage of the opportunity. Since that was the way I ended up being part of the program, I guess that my suggestion would be to have those auditors come thru the neighborhoods more often and have them ready to take care of people's home right then and there.*
- *Advertise the contact phone number more. I wrote out and gave the phone number to five of my friends. They did not know about the program before I told them.*
- *Maybe they could emphasize how the customer basically does not have to do any of the work themselves besides signing up and being there when the auditor is there.*
- *I think if people could see some examples of what they will actually receive and what sort of benefits that come along with those things, more people would be more apt to get involved.*
- *This is a middle to lower-income community. I wish there was some way to test where the most energy is in use. I've been in the house for 14 years. I just wish that could have been possible.*
- *I think that they should offer everybody the program instead of just picking certain neighborhoods.*
- *Provide more education in weatherizing in general.*
- *I don't know why anybody wouldn't want them to come in to check their house.*
- *A lot of our street lights are out. I have called that in to the city but they are still out.*

Three respondents offered negative comments rather than suggestions, which are listed below.

- *Well, I think if this program really offered all the things they said they would, then they should have no problem getting people to be a part of it. Maybe it all sounded too good to be true, maybe that's why people won't participate because they think that doing this stuff probably won't save them any money.*
- *My bill was $89 and now it is $98. Why?*
- *You know how people can be with work orders. The landlord needs to take care of things.*

Participants were also asked, "*are there any additional services that you would like the Residential Neighborhood Program to provide that it does not currently provide?*" Twenty-five surveyed participants (31.3% of 80) offered suggestions, which are listed below.

- *Maybe call up the participants 6 months after the audit and installations were performed and ask how the improvements are holding up. See if any additional work needs to be done or if any installations need to be fixed or replaced.*
- *The program could provide a pamphlet detailing ways to save energy. Duke could also upgrade the electrical service for old homes.*
- *I wish there was some way to test where the most energy is in use.*
- *Expand the program to measure the amount of water our home uses.*
- *I would like that there were more water savings like on my washing machine. I need new piping.*
- *Like houses, they might have holes in the walls and floors, check for stuff like that.*
- *More assistance on upgrading windows.*
- *The Residential Neighborhood Program could provide more home weatherization services.*
- *I think a great service to offer is cleaning out the air ducts in the home.*
- *A service that should be offered is performance checkups on A/C and heating units. Also, if they could evaluate your home appliances like your fridge and washer and dryer and such to see how energy efficient they are, or are not.*
- *The program should provide maintenance for our heating and cooling units. I think it would be a great service if they would check over our heating and cooling units to make sure they are running efficiently, and perhaps provide tips as to how the homeowner/landlord can keep the units running efficiently.*
- *The program could evaluate the HVAC system and offer discounts, or some kind of assistance, with upgrading and making the units more efficient.*
- *Repair light switches that are not working. Supply light switch covers.*
- *I would like to see a wider variety of CFL light bulbs to replace all of the bulbs in and around my home. Especially I would like exterior sensor security lights which are energy efficient.*
- *Perhaps offer CFL bulbs that are more universal, or a wider variety of sizes of CFLs so they can fit in all potential light sockets in the home.*
- *I would like to get some 100 watt light bulbs, I want standard bulbs or some sort of energy efficient light besides CFL. The CFL lights that this program offers are not bright enough for me. Another service that the program should provide is to install programmable thermostats in the customer's homes.*
- *Installing or providing clear window plastic would be a great heat saving service.*
- *They could provide plastic for the window to keep the air from coming in.*
- *I heard that some of the people who participated in the program did not receive the motion detector lights and do want them.*[39]
- *I wish they would cut trees for us. I want them to do more tree removal and trim branches more when needed and upon customer request.*

[39] The Residential Neighborhoods program does not provide motion detectors.

- *I would like the program to provide tree trimming services.*
- *Lower rates for participating in programs. It's so easy to fall behind in payment so reduction in rates would be helpful. It's hard to keep up on a fixed income.*
- *I would have liked a bigger incentive, like a discount on my bill because I participated in the program. I think that if there was a one-time credit on the person's energy bill, it would be a good incentive for people to sign up.*
- *The program could provide bill credits or incentives.*
- *I would like an explanation on why my payment went up. I thought my bill would go down?!*

Finally, surveyed participants were asked "*are there any other things that you would like to see changed about the program*?" Fifteen respondents (18.8% of 80) offered suggestions, which are listed below.

- *I would have liked a confirmation that my application had been received. I waited a long time between sending in the application and having the auditor come to my home. I started wondering if my application had gotten lost. One day I saw a Duke Energy truck in the neighborhood and spoke with the employees. They saw my name on the computer and then visited my home later that same day.*
- *If you're not paying attention, I don't know, there's a lot of throw away material. They need more visibility for the program, more advertisement.*
- *Do this program more frequently, and try to reach more people.*
- *Offer this program more often.*
- *I think that they should offer everybody the program instead of just picking certain neighborhoods. They picked the poor side of town, I would say. They picked the poorest neighborhood.*
- *They should have only one consultant doing the audits, not to different groups. It needs to be clearer that Home Energy House Call and this program are two different programs. Both are listed through Duke. It should have been more clear in the marketing.*
- *The guy came out and my mother-in-law, who was visiting at the time, was very interested. The Duke Energy rep she spoke to on the phone told her that there was no such program. The communication there might have been a little better. It kind of scared her a little bit because then she thought the people who visited our house were not from Duke, but we saw Duke Energy on the side of the trucks and everything. I called customer service and found out there was such a program and let her know. It was all very confusing.*
- *When they send the auditors out I would like for them to be more knowledgeable about their products.*
- *They should explain more what they're doing. They told me what they were doing, but not why.*
- *It would have been nice if the auditors had a history of my home from the last audit that they did.*

- *I think the auditors should check the windows more, I'm not sure if they checked to see how efficient or sufficient my windows are.*
- *It would be great if the program would check and evaluate the insulation of the home. It would be nice to know if we could use more insulation in certain areas of the house. And, of course, if there was a need for additional insulation, the program would offer to install the additional insulation or at least offer a reduced rate resource to get the insulation installed.*
- *Something that this program could have provided would be a wider variety of CFL light bulb types. With the screw in part that goes into the bulb, this program only offers the male socket, the bigger size, customers need small male light bulb sizes. It would have helped me tremendously because most of the bulbs provided by the program did not fit in places where I needed them.*
- *They just need to follow through with what they claim they will do. If they make all these efforts and I still don't save any money on my utility bill, I should receive some sort of incentive for my time and efforts involved.*
- *They should use better quality material. Duke is trying to impress us but it's not working.*

Non-Participant Survey Results

Non-Participant Program Awareness

TecMarket Works contacted 123 non-participating customers in the Carolina system, and two-thirds (66.7% or 82 out of 123) said they recalled hearing something about the Residential Neighborhood program in their community. The awareness levels are broken out by state in Table 107; the differences between customers in North and South Carolina are not statistically significant.

Table 107. Awareness of the Residential Neighborhood Program

Base: all contacted non-participants	North Carolina (N=43)	South Carolina (N=80)	Total (N=123)
Aware of program	63.8%	72.1%	66.7%
Not aware of program	37.2%	27.9%	33.3%

Customers who had not heard anything about this program before the survey call were disqualified based on their lack of awareness (customers who were called for the non-participant surveys were also disqualified if someone in their household participated in the program).

Non-participant customers who qualified for the survey were asked how they first learned about the Residential Neighborhood program; these responses are shown in Table 108. The three most frequently-mentioned sources of program awareness for non-participants are letters and postcards from Duke Energy (40.0% or 32 out of 80), door-hangers from Duke Energy (20.0% or 16 out of 80) and home visits from Duke Energy (18.8% or 15 out of 80).

The percentage of non-participants mentioning mailings and home visits as sources of awareness are similar to the percentages of program participants mentioning these sources, though non-participants are more likely to report learning about the program from door hangers (12.5% or 10 out of 80 participants found out about the program through door hangers, compared to 31.3% or 25 out of 80 non-participants including those who did not recall Duke Energy as the organization leaving the door hangers; this difference is significant at $p<.05$ using Student's t-test. See *Awareness and Understanding of the* Program on page 34).

There is one significant difference between non-participants in North and South Carolina: North Carolina customers are much more likely to have learned about the program from a door-hanger left by Duke Energy (38.7% or 12 out of 31, compared to only 8.2% or 4 out of 49 South Carolina customers; this difference is statistically significant at $p<.05$ using Student's t-test). This is both because North Carolina customers are more likely to mention receiving door-hangers in general (45.2% or 14 out of 31 including those who were not sure of the source, compared to 22.4% or 11 out of 49 for South Carolina), and because North Carolina customers who received door-hangers are more likely to report that these communications came from Duke Energy (85.7% or 12 out of 14 North Carolina customers who received door-hangers said they came from Duke Energy, compared to only 36.4% or 4 out of 11 South Carolina customers).

Table 108. Source of Awareness of the Residential Neighborhood Program

Base: non-participants who are aware of the program	North Carolina (N=31)	South Carolina (N=49)	Total (N=80)
Received a letter or postcard in the mail from Duke Energy	32.3%	44.9%	40.0%
Received a letter or postcard in the mail from landlord	3.2%	0.0%	1.3%
Received a letter or postcard in the mail but not sure who it was from	3.2%	8.2%	6.3%
Received a door-hanger from Duke Energy	38.7%	8.2%	20.0%
Received a door-hanger but not sure who it was from	6.5%	14.3%	11.3%
Someone from Duke Energy visited my home to tell me about it	16.1%	20.4%	18.8%
Someone visited my home to tell me about it, not sure what organization	0.0%	2.0%	1.3%
Heard about a community event promoting the program but did NOT attend	3.2%	6.1%	5.0%
Attended a community event promoting the program	3.2%	2.0%	2.5%
Someone from Duke Energy called to tell me about the program	0.0%	4.1%	2.5%
Someone else called to tell me about the program	0.0%	0.0%	0.0%
I called Duke Energy (or someone else) for information or help	0.0%	0.0%	0.0%
Friends / Family / Neighbors (word of mouth)	6.5%	8.2%	7.5%
Through another agency or organization (listed below)	0.0%	4.1%	2.5%
Media (“*I saw it on TV*”)	0.0%	2.0%	1.3%
Online (Duke Energy or other websites)	0.0%	0.0%	0.0%
Some other way (listed below)	3.2%	4.1%	3.8%
Don’t know / not specified	3.2%	2.0%	2.5%

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

Two South Carolina non-participants mentioned becoming aware of the program through other agencies or organizations; these responses are listed below.

- *Northwest Community Center.*
- *I can’t recall.*

Three non-participants mentioned becoming aware of the program “some other way”; these responses are listed below.

- *I saw their truck driving around in the neighborhood.* (NC)
- *I noticed small billboards promoting the program in our neighborhood.* (SC)
- *I saw someone walking around the neighborhood handing out information; I think they were from Duke Power.* (SC)

Only two surveyed non-participants in the Carolina System (2.5% of 80) said that they attended the community meeting to promote the program. These customers were asked to rate their satisfaction with the information presented at the meeting, the staff and presenters, and the community meeting overall: the mean ratings for all three of these measures are 9.5 (one customer gave all "9" ratings and the other gave all "10" ratings). Since these customers were very satisfied with the meeting, they were not asked to give suggestions for improving it.

Non-Participants' Understanding of the Program

Surveyed non-participants were asked to describe in their own words what they thought the Residential Neighborhood program was about and what it would do for them: "*Please describe what you understood was required of participants in this program, and what you could have received in return had you participated in Duke Energy's Residential Neighborhood Program. (What is this program about / what would they do?)*" These responses are categorized below in Table 109.

The aspects of the program that are most likely to be recalled by non-participants are "receiving free energy-saving measures" (mentioned by 31.3% or 25 out of 80) and "visiting the home for a free energy audit" (30.0% or 24 out of 80); both of these are "correct" responses that accurately describe the program. Four more categories of response were mentioned by at least 10% of surveyed non-respondents: "saving money on energy bills" (11.3% or 9 out of 80) and "receiving home weatherization" (11.3% or 9 out of 80) are also both accurate responses, while "visiting the home to inspect systems and measure energy usage" (11.3% or 9 out of 80) is only partially correct (these responses describe the home audit but not its actual purpose). Another common response, "participation requires landlord's permission" (10.0% or 8 out of 80), is an accurate description of a potential barrier to participation (many of the customers mentioning this aspect did not participate because their landlord did not give permission). Only 16.3% (13 out of 80) of surveyed non-participants could not answer this question ("don't know / not specified").

Only one of the differences by state shown in Table 109 is statistically significant: Customers in South Carolina are more likely to respond with "we are already efficient / not interested" (8.2% or 4 out of 49, compared to 0% of 31 for North Carolina respondents; this difference is significant at $p<.10$ using Student's t-test).

Table 109. Non-Participants' Understanding of the Residential Neighborhood Program

Base: non-participants who are aware of the program	North Carolina (N=31)	South Carolina (N=49)	Total (N=80)
Receive free energy-saving measures (bulbs, aerators, sweeps, etc.)	32.3%	30.6%	31.3%
Visit home for free energy audit and energy-saving information	29.0%	30.6%	30.0%
Saving money on energy bills	16.1%	8.2%	11.3%
Receive home weatherization / seal leaks (doors, windows, insulation, etc.)	12.9%	10.2%	11.3%
Visit home to inspect systems / measure energy usage	12.9%	10.2%	11.3%
Participation would require my landlord's permission / for homeowners only	6.5%	12.2%	10.0%
Attending community meeting to discuss energy issues & learn about energy efficiency	6.5%	8.2%	7.5%
We are already efficient / don't need what this program offers / not interested	0.0%	8.2%	5.0%
Learning how to save energy (other than through audit or meeting)	3.2%	4.1%	3.8%
Other responses (listed below)	12.9%	14.3%	13.8%
Don't know / not specified	19.4%	14.3%	16.3%

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

Eleven non-participants surveyed in the Carolina system gave "other" responses when asked to describe the program, which are listed below. Many of these responses are either vague ("*make the neighborhood better*") or inaccurate ("*get some kind of coupon for free stuff*").

North Carolina (N=4)

- *I think they were trying to make the neighborhood better.*
- *It was supposed to be a program where they'd fix things in your house.*
- *I don't think there was anything that you would receive.*
- *I think it was a program offered only for our area since it seems like a low income neighborhood.*

South Carolina (N=7)

- *There would be an environmental impact towards helping the environment. The neighborhood's overall energy efficiency would improve. I also remember that they offered appliance pick-up.*
- *They were doing things to help make your house warmer.*
- *They offered an upgrade on my house to save energy.*
- *I think Duke is trying to make a push for local residents to save energy.*
- *My neighbor told me a little bit about it; they said it was something about how to make your home more efficient.*
- *They were supposed to inspect your home, tell you where your leaks were, tell you how you could save energy, and then you would get some kind of coupon for free stuff.*

- *I believe that anybody who lived in that neighborhood could participate.*

The top responses for non-participants' understanding of the program mirror the top responses for program participants (reported in Table 21 on page 37), though a significantly larger percentage of participants are able to name these benefits of the program. For example, the top response for both groups is "installing measures", mentioned by 57.5% or 46 out of 80 participants but only 31.3% or 25 out of 80 non-participants, a difference which is significant at $p<.05$ using Student's t-test. Participants are also significantly more likely than non-participants to mention the home audit, home weatherization, saving energy and saving money on utility bills (all $p<.05$), though this is not surprising considering that participants have actually participated in the program before they were asked their understanding of the program (their experience with the program is first-hand, rather than based only on communications about the program).

As indicated by Table 110, more than half of non-participants who were aware of the program believed that they would have been eligible to participate (55.0% or 44 out of 80). Only 10.0% (8 out of 80) believed that they would not have been eligible, while another 35.0% (28 out of 80) were not sure if they were eligible or not. There are no significant differences between states.

Table 110. Non-Participants' Understanding of Their Eligibility to Participate in the Residential Neighborhood Program

Base: non-participants who are aware of the program	North Carolina (N=31)	South Carolina (N=49)	Total (N=80)
Think I would have been eligible	58.1%	53.1%	55.0%
Do not think I would have been eligible	6.5%	12.2%	10.0%
Don't know if I would have been eligible	35.5%	34.7%	35.0%

The 44 surveyed non-participants who believe that they would have been eligible to participate in the Residential Neighborhoods program were asked why they did not participate in the program. These responses are listed and categorized below; a plurality of these customers (43.2% or 19 out of 44) did not participate due to issues with availability and scheduling.

Customers Who Believe They Qualify for the Program: Not Available / Scheduling / Too Busy (N=19)

- *At the time I was busy and didn't have time to get involved with anything else.*
- *At the time I was still on active duty. I was unavailable to participate in the program because I was working and would not be at home.*
- *At the time that the program was offered, I was very busy, I had no time. I want to participate in the program now though! I know that my house would really benefit from those improvements and I believe that my utility bills are way too high right now.*
- *From the times that they were available, and times I was home from work, our schedules didn't mesh together.*
- *I had just moved here at the time the program was offered and I was just getting familiar with the area.*
- *I missed it because of my job. My hours at my job are uncertain. I couldn't give them a specific time I could be there. At the time, I lived by myself.*

- *I was not at home when they came around to talk to me about the program. I work during the day, I wanted to participate, but I was not available to sign up for the program when they came door to door.*
- *I was not at home when they came around with the information and I work 8 a.m. to 5 p.m. every weekday, so I was unable to participate.*
- *I know my house needs a lot of work done to it and I was hoping they'd come back later on down the road after I'd done some of the stuff I need to do. I need new windows and a lot of other things.*
- *I was too busy, I really wanted to go, I even had the meeting written in my calendar but, I had to work and was unable to make the meeting.*
- *I was working like six days a week. I work road construction, paving, so I leave really early in the morning and, by the time I get home, it's like 8:00.*
- *It took place during the workday and I could not afford to take the time off work.*
- *It was just bad timing for me; I was fixing to move to Missouri.*
- *They put a number on there, but I was working during the time they would come back around.*
- *I was not feeling well. I was sick and unable to attend the meeting.*
- *I was out of town for my job.*
- *I was too busy at the time.*
- *I didn't have the time.*
- *I just didn't get around to it.*

Customers Who Believe They Qualify for the Program: Not Interested / Already Efficient / Already Participated in a Similar Program (N=8)

- *I did the one through the city that was exactly like it, so I felt I didn't need it.*
- *I had already had something like this done to my home a little bit ago.*
- *My sister's granddaughter got materials through school, so I got the whole kit. The kit included light bulbs, a showerhead, and tape. I didn't see any sense in duplicating what I got.*
- *My bill says that I was really low energy so I didn't do it. I have a very energy efficient home already.*
- *They said I was pretty energy-efficient and that the only thing it sounded like I might need is a little bit of insulation around one of the outside doors. I didn't really need the program.*
- *We really didn't need anything; our house was already approved to be energy efficient.*
- *My energy bills have always stayed the same, and then this cold snap hit and my bills doubled. I just wasn't concerned at that time.*
- *I didn't want anyone coming into my house and telling me what I need.*

Customers Who Believe They Qualify for the Program: Applications / Paperwork / Miscommunications (N=8)

- *After I got my landlord to sign the paper, I lost all the information including a phone number to call and make the appointment.*
- *I got the papers signed by my landlord, but they never came back to pick them up.*
- *Because the flyer did not state my apartment complex, I had no idea that the information was for me or that it applied to my apartment complex.*
- *I needed my landlord's approval, and he said yes, but I didn't get the paper back to Duke in time.*
- *I assumed the two programs were the same. I guess I thought that the free light bulbs I requested and never received was the same as this Neighborhood program.*
- *The first time it was offered I did not fill out the information card by the due date. I think they are offering the program again, but I have to fill out the information card before March 1st, I have not filled it out yet.*
- *I misplaced the paperwork; it was something from my doorknob.*
- *I didn't know what else I had to do.*

Customers Who Believe They Qualify for the Program: Landlord Permission / Rental Issues (N=4)

- *An approval letter from my landlord was needed to be able to do the program. My landlord was unavailable to do the approval. The landlord was only going to be available the day after the deadline to apply to the program.*
- *I needed permission from my landlord. My landlord is out of town a lot, and was at that time, so I couldn't get him to sign the paperwork in time. Duke Energy told me the paper had to be signed in order to have them come. My landlord was gone then.*
- *We had to get management to sign-off before it could take place. I asked them, but management wouldn't sign-off on it.*
- *Well, if I'm remembering right, I had to fill out some information about my house and then have my landlord sign it and maybe fill some information out themselves. My landlord lives out of state, so it was inconvenient for me to get her to do the necessary work to be able to participate, that's why I didn't participate. I would have participated if I could.*

Customers Who Believe They Qualify for the Program: Don’t Want to Let Strangers into the Home (N=3)

- *I am by myself and I was scared.*
- *My home was in disarray and I didn't want anyone coming in.*
- *The house was a mess and two of my kids' rooms you can't even get into. My kids are hoarders and you can't even get to the windows without climbing over everything in the room.*

Customers Who Believe They Qualify for the Program: Don't Know (N=2)

- *I just didn't really know anything about it; maybe I received the information too far after the program was offered.*
- *I can't remember.*

The 28 surveyed non-participants who did not know if they would have been eligible to participate in the Residential Neighborhoods program were asked why they did not apply or seek more information about the program. These responses are listed and categorized below; the most frequent category of response again has to do with scheduling and availability (mentioned by 39.3% or 11 out of 28 non-participants who were not sure if they qualified for the program).

Customers Who Are Not Sure If They Qualify for the Program: Not Available / Scheduling / Too Busy (N=11)

- *We were always out and nobody would have been here at the time.*
- *I am overly consumed with work and my family so I had no time to do any extra programs.*
- *I just didn't have time at the time they came around. I had a whole bunch of stuff going on.*
- *I was having work done around my house and I told them I preferred not to do it right then.*
- *I was real sick at the time and I didn't want to deal with it.*
- *I was still grieving over the loss of my wife and having to take care of my two girls as a single parent. I had other things on my mind at that time.*
- *I was the only income and I had a lot going on taking up time.*
- *It was during my work hours.*
- *It was just that I had other things going on and I wasn't interested at that time.*
- *It was just timing; it was a busy time of the year and I did not get around to looking further into the program.*
- *When I thought about it, it was too late.*

Customers Who Are Not Sure If They Qualify for the Program: Not Interested / Already Efficient / Already Participated in a Similar Program (N=4)

- *I already had energy-efficient light bulbs. I just didn't see any sense in doing it.*
- *I already upgraded my house. I saw no need to participate.*
- *My house is already snug. I really don't know if there's anything else I could do. I didn't need it.*
- *I didn't want to do any of their programs.*

Customers Who Are Not Sure If They Qualify for the Program: Applications / Paperwork / Miscommunications (N=3)

- *I tried to get them to come to my house by telling one of my neighbors to have them come over because they were out in the neighborhood. They never did come by, though. I wanted to participate.*
- *He was supposed to come back, but he didn't that I know of; he probably returned when I wasn't there.*
- *I wanted to participate, but I didn't get the paperwork signed in time.*

Customers Who Are Not Sure If They Qualify for the Program: Don't Want to Let Strangers into the Home (N=1)

- *I did not want anybody entering my home.*

Customers Who Are Not Sure If They Qualify for the Program: Landlord Permission / Rental Issues (N=1)

- *I didn't call my landlord in time. I don't own this place and I didn't know what had to be done.*

Customers Who Are Not Sure If They Qualify for the Program: Other Barriers to Participation (N=4)

- *For one thing, I am on oxygen and it's a bother to do anything like that. If I have to walk around, and show them where everything electrical is, I can't really walk around and do that.*
- *I was told they wouldn't do it because of the dogs.*
- *I didn't have any money to do it. I figured it cost money.*
- *I'm not sure what the income requirement would be.*

Customers Who Are Not Sure If They Qualify for the Program: Don't Know (N=4)

- *I honestly didn't pay any attention to it.*
- *It probably slipped my mind.*
- *Nobody's ever asked me about it. I don't know.*
- *I don't know.*

All non-participants were next asked if there were "any other reasons" why they did not participate in the program. Twenty-two non-participants (27.5% of 80) gave additional reasons why they did not participate, which are categorized and listed below.

Most of the customers who believe they qualify for the program mentioned scheduling and availability (83.3% or 5 out of 6), while most of the customers who believe they do not qualify mentioned landlord and renter issues (62.5% or 5 out of 8). Customers who are not sure if they qualify for the program gave a wider variety of responses, with the most common being that they are not interested because their homes are already sufficiently efficient (37.5% or 3 out of 8).

Customers Who Believe They Qualify for the Program: Other Reasons for Not Participating (N=6)

- *I was really busy at the time.*
- *It was too much bother.*
- *The time was a concern, with my work schedule. My hours fluctuate so much.*
- *We weren't available; it wasn't a good time.*
- *I didn't have transportation to the meeting place.*
- *I already have a lot of energy saving things in place.*

Customers Who Believe They Do Not Qualify for the Program: Other Reasons for Not Participating (N=8)

- *I don't own my home. I didn't pay too much attention after that my friend said I couldn't do it because I'm a renter; I didn't pay much attention to the letter after that.*
- *I thought the program was only open to home owners.*
- *I'm a renter. I figured the stuff they offered for your home was only open to home owners to have. Also, I figure my home is already pretty energy efficient and I most likely did not need to do any energy efficiency related efforts.*
- *I'm a renter.*
- *We are renters; we thought that the program was only open to home owners.*
- *The income requirements would have made me ineligible.*
- *Well, I think I have done enough to try to make my home energy efficient, I saw no need to participate in the program. My Home Energy Report shows that I'm one of the most efficient homes in the area.*
- *I am busy and gone for long periods of time. I also just did many things in my home to save energy.*

Customers Who Are Not Sure If They Qualify for the Program: Other Reasons for Not Participating (N=8)

- *I don't know what I could do different. I'm already watching my energy bill and they're pretty low.*
- *I figured that I'm good on energy in my house and I probably did not need those things.*
- *We already practice energy-efficient stuff and try to be a little green.*
- *They had a dinner or something at the community center, but I wasn't able to make it. I'm in school and I just forgot about the whole thing.*
- *I didn't know who to contact to see if they were going to have another one at a later date.*
- *We would have had to have a piece of paper filled out with our landlord. I don't think it would have been an issue, though.*
- *Usually there are only programs out there for single mothers, not for single fathers like me.*

- *I live in a very old house and I assumed that the program would not apply to my living quarters and it would be too expensive to do any upgrades for this house. I figured my house would not qualify to be in the program.*

Non-Participants Recommending the Program to Others

Non-participants who believe they would have qualified for the Residential Neighborhood program are more likely to report that they recommended this program to others (45.9% or 17 out of 37) compared to non-participants who did not believe (or were not sure) that they qualified for the program (25.0% or 8 out of 32; this difference is statistically significant at p<.05 using Student's t-test). However, among non-participants who recommended the program to others there are no significant differences between the numbers of recommendations given by customers who believe they would have qualified and those who believe they do not qualify or who are not sure.

Table 111. Non-Participants Recommending the Program to Other People

Base: non-participants who are aware of the program[40]	Believe they qualify (N=37)	Believe they do not qualify or not sure (N=32)	Total (N=69)
Recommended program to friends, neighbors or relatives (total)	**45.9%**	**25.0%**	**36.2%**
Recommended to 1-4 other people	35.1%	15.6%	26.1%
Recommended to 5 or more other people	5.4%	3.1%	4.3%
Recommended, don't know how many other people	5.4%	6.3%	5.8%
Did not recommend program	**54.1%**	**71.9%**	**62.3%**
Don't know / not specified	**0.0%**	**3.1%**	**1.4%**
Mean number of recommendations (among customers who made recommendations)	2.5	3.5	2.8
Median number of recommendations (among customers who made recommendations)	2	2	2
Maximum number of recommendations	7.5[41]	10	10

Non-Participant Recommendations for Increasing Participation

Non-participant customers were asked "*Are there things that this program could have provided that you think would have caused more people such as yourself to want to participate?*" Their responses are categorized below in Table 112; a little less than half of survey respondents had no suggestions (47.5% or 38 out of 80). Overall, the two most frequently-mentioned categories of response have to do with information (13.8% or 11 out of 80) and communications about the program (12.5% or 10 out of 80).

There are a few significant differences between states: North Carolinians are more likely to mention security concerns (9.7% or 3 out of 31), while South Carolinians are more likely to mention making weekend and evening hours available (14.3% or 7 out of 49) and highlighting

[40] Due to a survey programming error, the first eleven non-participant customers interviewed in the Carolina System were not asked about recommending the program to other people. Results are reported based only on the responses of the 69 customers in the Carolina System who were asked these questions.
[41] One customer said they recommended the program to "*seven or eight*" other people, which is reported (and included in calculations) as 7.5 recommendations.

the free energy-saving measures (8.2% or 4 out of 49; these differences are all significant at p<.10 using Student's t-test).

Table 112. Non-Participants' Suggestions for Improving Program Participation

Base: non-participants who are aware of the program	North Carolina (N=31)	South Carolina (N=49)	Total (N=80)
Give customers more / better information about this program	16.1%	12.2%	13.8%
Suggestions for improving communications about program (listed below)	12.9%	12.2%	12.5%
Make more weekend and evening hours available for audits	3.2%	14.3%	10.0%
Make program available again / more than once per year	3.2%	6.1%	5.0%
Give out more light bulbs / measures / emphasize free measures	0.0%	8.2%	5.0%
Landlord would not allow me to participate / renter issues	6.5%	4.1%	5.0%
Security concerns about letting people into the home	9.7%	2.0%	5.0%
Comments about participation and income requirements (listed below)	3.2%	4.1%	3.8%
Give more advance notice ahead of the program being available	0.0%	4.1%	2.5%
Lower the rates / payment issues (not program related)	3.2%	2.0%	2.5%
Make it easier to sign-up / enroll	3.2%	0.0%	1.3%
Other program-related suggestions or comments (listed below)	0.0%	4.1%	2.5%
No suggestions / don't know	54.8%	44.9%	48.8%

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

Ten non-participants in the Carolina System made suggestions about improving communications about the program to improve participation; these responses are listed below.

- *The mailer that I received about the program just looked like your average junk mail; it looked like an advertisement. Since my friends and neighbors had already mentioned the program I paid attention to the mailer, otherwise I would have just thrown out the information without a second thought. Perhaps if the information sent out was more personalized to the customer, it might gain more attention.*
- *Maybe, on the outside of the envelope, they could put something like important cost-savings information, which is something that would make it look more official. Or, better yet, they could include the program information with billing instead of as a separate mailing to save on postage.*
- *I think the information they gave was more than enough. I think it should have been brought to the housing authority's attention because I do participate in the board meetings and could have brought it to them. I think the presentation about it was more than enough to get people interested.*

- *I think more people would have applied for the program if we were like listed, or our apartment complex was listed as eligible. Another suggestion would be for Duke Energy to put a note in our bills, encouraging us to see if we qualify for the program.*
- *My neighborhood seems like a very low income area and with that you typically have people who lack in education or literacy. I think if there was more education offered in regards to energy efficiency, like maybe more hands-on interaction and more door to door efforts you'd get a better result in participation.*
- *Maybe offer some more of these programs. Have them scheduled for the future so we have an opportunity for another time to go to the meeting. Or maybe offer something by mail, phone, or online for the people who can't physically go to the meeting.*
- *Offer more information; consider different ways of contacting people like email perhaps.*
- *It would have been nice to have a Duke representative come door-to-door to explain the program.*
- *I had no excuse to not participate; I guess if they just try to get on people a little harder they might have more people doing it.*
- *Duke Energy needs a better way for people to hear about their program, rather than just people talking about it.*

Three non-participants had comments about income eligibility. At least one of these comments reflects confusion about the income qualifications for the program (this program does not have any income requirements).

- *People like myself who didn't meet the income requirements probably just trashed this. Regardless of your income level, they're going to charge you whatever they want to, I mean, they're reporting record profits and still raising the rates.*
- *Try to make it clear to the people right away that the program is open to all Duke Energy customers.*
- *If the customer service representative can be knowledgeable about the details of the program, and they have different income categories for the program, then that would be good.*

Two non-participant customers in the Carolina System gave miscellaneous suggestions or comments that did not fit into the categories listed in Table 112; these responses are listed below.

- *What they told me sounded pretty good. The timing was just off for me. I was in the process of doing work on my home. There just wasn't any purpose at that time with all the improvements I was doing. The windows were replaced since then.*
- *They might include some program which includes a payment plan when you choose to make energy efficient home improvements. Or maybe get an incentive on your utility bill for participating in the program.*

Non-Participant Actions to Save Energy in the Home

Non-participants were asked if they have taken any steps to save energy in their homes in the past year. Overall, 81.3% (65 out of 80) said that they have taken actions to save energy, and the actions they took are categorized in Table 113. The most frequently mentioned actions include using efficient light bulbs (37.5% or 30 out of 80), turning off lights when not in use (25.0% or 20 out of 80), and sealing door and window leaks (15.0% or 12 out of 80).

There are only two statistically significant differences between states: North Carolina customers are more like to mention turning non-lighting items off when not in use (12.9% or 4 out of 31) and performing regular HVAC maintenance (6.5% or 2 out of 31; both different from South Carolina customers at p<.10 using Student's t-test).

Table 113. Non-Participants' Steps Taken to Save Energy in the Past Year

Base: non-participants who are aware of the program	North Carolina (N=31)	South Carolina (N=49)	Total (N=80)
Did not take steps to save energy	**9.7%**	**20.4%**	**16.3%**
Took steps to save energy (total)	**87.1%**	**77.6%**	**81.3%**
Use more efficient light bulbs / CFL, LED	41.9%	34.7%	37.5%
Turn off lights when not in use / use less light	29.0%	22.4%	25.0%
Seal leaks / caulk, tape, plastic on windows, doors	9.7%	18.4%	15.0%
Use less heating (turn down thermostat, dress warmly)	12.9%	10.2%	11.3%
Turn items off when not in use / unplug, use power strips	12.9%	4.1%	7.5%
Added insulation to walls, ceilings, attic, floor	9.7%	6.1%	7.5%
Do not adjust thermostat (maintain steady temperature)	3.2%	8.2%	6.3%
Use less cooling (turn down or turn off AC)	3.2%	6.1%	5.0%
Upgrade to more efficient appliances / Energy Star	3.2%	4.1%	3.8%
Upgrade HVAC system	6.5%	2.0%	3.8%
Use stove/oven less	6.5%	2.0%	3.8%
Upgrade windows, doors	3.2%	2.0%	2.5%
Regular HVAC maintenance	6.5%	0.0%	2.5%
Conserving water	3.2%	2.0%	2.5%
Unique actions (listed below)	12.9%	8.2%	10.0%
Don't know / not specified	**3.1%**	**2.0%**	**2.5%**

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

Eight non-participants in the Carolina System mentioned unique actions they have taken to save energy; these responses are listed below.

- *I installed new siding.*
- *We got a new water heater.*
- *I had a new roof put on with 35-year anti-sun shingles, or something like that.*
- *I had an appointment for Duke to come out and install a Power Manager device; they came yesterday. It's supposed to save me $32.*
- *I only heat the parts of the house that I actually use in the winter and close off the other rooms.*
- *I use ceiling fans to try to circulate the air around my home.*

- *I have an electric stove, so I try to cook in the morning.*
- *I had a city inspection, much like this one [the Residential Neighborhoods program].*

Non-Participant Satisfaction with Duke Energy

Surveyed non-participants are generally satisfied with Duke Energy; Figure 8 shows the distribution of satisfaction ratings scores. The mean satisfaction rating among all surveyed non-participants in the Carolina System is 8.01 on a 10-point scale where "10" is the most satisfied, and the median ratings score is 8.[42] South Carolina residents give Duke Energy slightly higher satisfaction ratings (mean 8.25 versus 7.63 for North Carolina), though the difference in mean ratings scores between states is not statistically significant.

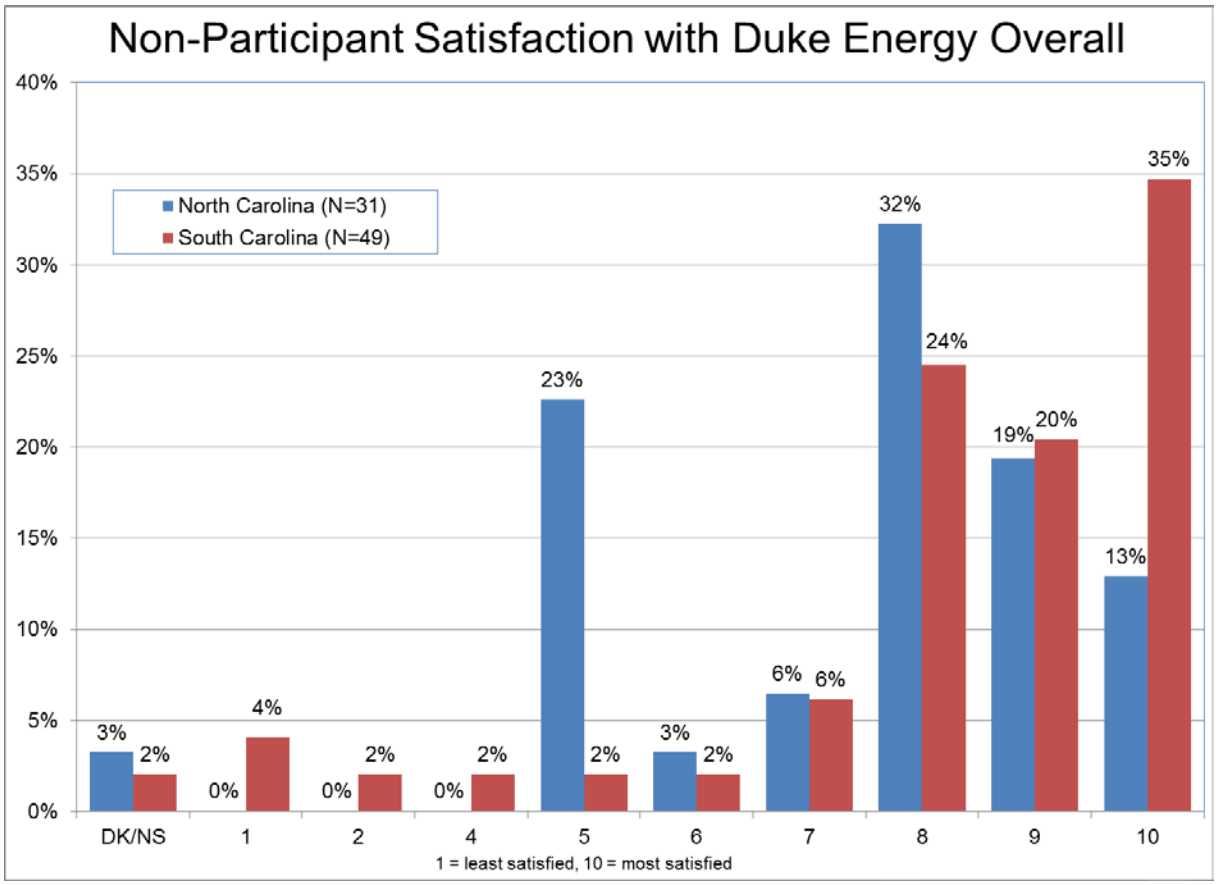

Figure 8. Non-Participant Satisfaction with Duke Energy Overall

Nineteen non-participants (23.8% of 80 surveyed) rated their satisfaction with Duke Energy at "7" or less, and these customers were asked how their satisfaction could be improved. Their

[42] Among 80 surveyed program participants in the Carolina System, the mean satisfaction rating for Duke Energy is 8.71 (as seen in *Satisfaction with Duke Energy* on page 25). The mean rating of 8.01 among non-participants is lower, though this difference is not quite statistically significant at p<.10 using Student's t-test. Satisfaction with Duke Energy is associated with satisfaction with the program (see *Predicting Overall Program Satisfaction* on page 31), and may also be a driver of participation (i.e., customers who are more satisfied with Duke Energy are more likely to participate in Duke Energy programs, and customers who are less satisfied are less likely to participate in programs).

responses are listed by state below; most of these comments have to do with rates and billing, particularly in South Carolina.

North Carolina (N=10)

- *I know they're working diligently to get people's power back on. Duke Energy needs to have numbers to call for a status updates to find out if your power is back on or not when you're away from home.*
- *I've had some difficulties with power being restored to one of my houses I recently renovated for a new tenant. The power was not turned on at the time I indicated it needed to be and it caused problems as far as being able to finish the project and getting the place ready for the new tenant to move in by the time I had earlier indicated. Somebody at Duke dropped the ball on this and I'm not happy about it.*
- *It's one of those days I need them and I wish I didn't. Meter reading should be done by a person getting out of their vehicle and coming to physically read it, not driving by with a scanner and a computer. If somebody protests something, they don't say anything. They don't care about the community; all they care about is control. Duke Energy is just a little too big for their britches.*
- *Like with the coal ash problem, Duke Energy needs to stop making excuses about that pollution and just clean it up. Also, the customer service needs to be better. Whenever I have an issue with my electricity it always takes them forever to help me get the problem fixed.*
- *Since November, I haven't been getting any kilowatt hours on my bill and I had to call in and let them know of their mistake. My bill was wrong and they weren't trying to rectify it. I called it this month and hopefully it will be fixed.*
- *Once, I went to pay the bill and I was $1 or something short and very close to having the power cut off, but they want it all. I'm mean, they could cut a break. Not everybody can come up with all that money.*
- *They don't give senior citizens like me a break. If you're late on your bill, they just cut you off. You could be a little more lenient with people over 50. I don't get much assistance, no Medicare, I get food stamps. I only have a part-time job. If you're on a fixed income, you need a little break.*
- *My bill's been really high. I haven't been using my heat too high. Each room has its own thermostat with no numbers.*
- *The rates are too high.*
- *They should lower their rates.*

South Carolina (N=9)

- *Duke could perform better maintenance on power lines and electrical boxes.*
- *My energy bills are still very high even though I'm doing things to not consume excess energy.*
- *The cost of my utilities has gone way, way up and I am not doing anything different as far as using energy. Ever since that new meter was installed my utility costs are out of hand*

high. Last month my bill was $298! I know that I'm not using that much power, I'm using the same amount I always have, but it costs much more.

- *It doesn't really matter how energy-efficient you are, you're still going to pay their high rates, while they post record profits.*
- *They have a monopoly in our area. The last rate increase that we got, it just wasn't necessary. Energy is something you have to have, you just have to suck it up. Don't increase the rates.*
- *The cost of the Kilowatt hour has gotten quite high, I'd like to see the cost go down for our utilities.*
- *My bill has been so high.*
- *The rates are too high. It's been hard these last three months.*
- *We could be notified ahead of time of large increases in rates.*

Table 114 indicates that 60.0% (48 out of 80) of surveyed non-participants felt more positive about Duke Energy based on what they know about the Residential Neighborhood program, including 20.0% (16 out of 80) who said they felt "much more positive" toward Duke Energy. Only 6.3% (5 out of 80) non-participants said the program made them feel more negative towards Duke Energy, while 32.5% (26 out of 80) said they felt about the same. There are no statistically significant differences between North and South Carolina customers.

Table 114. Changes in Non-Participants' Attitude toward Duke Energy Based on Knowledge of the Residential Neighborhoods Program

Base: non-participants who are aware of the program	North Carolina (N=31)	South Carolina (N=49)	Total (N=80)
Much more positive toward Duke Energy	12.9%	24.5%	20.0%
Somewhat more positive	41.9%	38.8%	40.0%
About the same	35.5%	30.6%	32.5%
Somewhat more negative	6.5%	2.0%	3.8%
Much more negative	0.0%	4.1%	2.5%
Don't know / not specified	3.2%	0.0%	1.3%

Non-participants who said they felt more positive or more negative towards Duke Energy based on what they know about the Residential Neighborhoods program were asked why they felt more positive or more negative. These responses are listed and categorized below; as indicated above in Table 114, there are about ten times as many "more positive" comments as there are "more negative" comments.

Much more positive (N=16)

- *Anyway they can help you save on your energy bill is good.*
- *Because in most states I've been in, I've never seen any other companies offer any sort of programs like this. It's great how Duke Energy is making efforts towards saving energy for their business and for their customers. Anything that saves money is good in my opinion.*

- *Because when talking about your energy company, sometimes you feel out of control, like you as the individual customer have no say or impact towards improving the energy situation. I like that Duke is trying to help out their customers on an individual basis.*
- *I appreciate that Duke is trying to help their customers save energy.*
- *I got the help I needed.*
- *I grew up with Duke Energy. I like it that Duke Energy provides you with some leeway. If you don't have enough money to make your electric bill that month, they work with you; I tip my hat to them because most energy companies don't let you do that.*
- *I see that Duke Energy wants to help me save money on my energy bills with these programs, and that is a plus.*
- *I think is good that they're willing to go out in the community to help people, to take the initiative to do this. This program makes me feel much more positive about them. The only problem I have with them is that they gave the guy who rented my house before my phone number by accident and he kept calling me for a refund that Duke was supposed to mail to him. They probably just read off a list of numbers associated with my address, but he knew I lived in this house, so he wrote down the one he knew wasn't his. He also would come by and check my mail when I wasn't home. I tried to complain, but I pay online, so it was too hard to do. I had to change my number because of this, so that's the only reason I gave them a nine instead of a ten.*
- *I think that any assistance is beneficial and results in positive opinions about the company. Anything offered to help with energy costs helps with our feeling towards Duke.*
- *It is great thing you are doing to help us folks out.*
- *It seems like Duke Energy was trying to help us out with our utility charges which is great. Also, by contacting each of us individually it makes us feel important, like our participation and opinions are important to Duke; it's good to be considered individually.*
- *It sounds like Duke is really trying to help folks out with their houses and their power bills. Also because, if we have a power outage, it doesn't take forever to get the power back on. I think Duke is doing a great job.*
- *Just for Duke Energy to offer services like free light bulbs and someone coming to your house to check your efficiency is a big step on their part; they didn't have to do that.*
- *My attitude would be even better if they come to my house again with this program.*
- *That's a lot of good ideas for things. You get a surprise like this winter and it really opens your eyes. This program sounds very good.*
- *They took the initiative to reach out to the neighborhood and the residents to help out with the cost of the bills. Some type of assistance was a good thing.*

Somewhat more positive (N=32)

- *Anything that is going to help folks out is a good thing.*
- *Duke Energy works with people and understands when people have high bills they can't pay. I would like it if this program came around again. I'd like to consider it, but the timing has to be right, not spring or summer.*

- *I am glad that they are trying to do something about energy use.*
- *I can see how these programs are helping people so I think those are good efforts on Duke Energy's part.*
- *I like the free bulbs that Duke sent me. If they didn't give them to me I wouldn't be using them on my own.*
- *I mean, I like Duke Energy, I think they do a good job. I think these programs they offer really can help a lot of people.*
- *I really don't know if those improvements given in the program really work because I did not do the program. It sounds good though.*
- *I think it's good that they're helping customers get their bill in line.*
- *I think this is a very good thing that they do for people.*
- *I thought it was real nice from what I'd seen, but I thought you couldn't do it if you didn't own your home.*
- *I'm glad to see that they are trying to help people out and I think their efforts to save energy help the environment.*
- *I'm only feeling somewhat more positive about Duke because their rates are too high. I like that they have these programs to help people with their homes though.*
- *I've never had any problems with Duke Energy and I like that they have these programs to help people out.*
- *I've never had problems with Duke, they have great customer service and with programs like these, it seems like they are concerned for their customers' well-being.*
- *It seems like they are trying to help people save energy; it seems like they do care. Duke Energy has worked with us several times when we were close to having our lights turned off, and I have a CPAP machine that needs to be on, or I'd be dead.*
- *It seems like you guys are making some kind of effort to help us out.*
- *It's positive if they help people.*
- *My light bill is still kind of high. I'm on disability, so I can't afford that much a month.*
- *The offering of the light bulbs through Duke Energy brought my opinion up. We appreciate any help we can get.*
- *Seeing how Duke Energy cares to help us heat our homes and make them more efficient to try to save us money is a good thing.*
- *The gentleman that I talked to was very helpful and my neighbors all did it. I have done a few things and my bill has gone down.*
- *There's always something that you might miss.*
- *They gave me those light bulbs free of charge to help me save energy.*
- *They make you have a better understanding and help you lower your energy bills.*
- *They try to get the customers to conserve energy; that helps us out a little more.*
- *They're coming around helping people save energy and all that. I hope they do it again this summer!*
- *They're trying to help out folks with lower incomes.*

- *This program's a good thing for people who need it. It's a good thing for Duke to bring it to people, but somebody's making money somewhere. They don't do this stuff for nothing. You have to pay to play.*
- *We all need to be helping with saving energy, and I can see with offering this program that Duke is trying to do their part.*
- *What they were trying to do was a great thing. They pay some of the money themselves to get stuff done.*
- *Y'all are trying to help us with our bills. Duke's always going the extra mile, passing out light bulbs and giving help like that.*
- *I don't know.*

Somewhat more negative (N=3)

- *My power bill was incorrect, so this has put a damper on things. I think they just do these things, like this program, to make themselves look better in the community. They don't care about the community. They don't listen to us.*
- *The prices are so high and getting higher, even though I'm not using as much.*
- *We're not seeing a change in our power bill versus last year. We've made all these adjustments this past year and haven't seen a change. The power bills have gone up so much, we've had to install solar panels at work.*

Much more negative (N=2)

- *Every year they report increased profits, while everyone's bills go up, regardless of income. They don't have many programs for the seniors and the poor. You either pay what they tell you or get your power cut off. It would be nice if they expanded the income requirements for this program.*
- *The program is probably a rip off. I don't like any little programs where some stranger has to come into my home.*

Appendix A: Counts of Participants for Billing Analysis

Participant Since YYYYMM	Number of New Participants in Each Month
201303	56
201304	100
201305	119
201306	307
201307	124
201308	401
201309	361
201310	302
201311	445
201312	629
201401	463
201402	325
201403	984
201404	1269
201405	912
201406	767
201407	514
201408	69

Appendix B: Estimated Model

This appendix presents the complete model estimated for the billing analysis. The model includes indicators for each month (the YYYYMM variable), temperature, and the participation variables.

Variables:

- Interaction of monthly binary indicator and temperature:
  - 201012 – 201408: Binary indicator variables for that YYYYMM
  - CDD*MonthlyID: product of monthly CDD and binary monthly variables
  - HDD* MonthlyID: product of monthly CDD and binary monthly variables
- Indicator variables for participation in other Duke Energy programs:
  - Free_cfl: Residential Smart $aver Energy Efficiency: CFL
  - CFL_promo: Residential Smart $aver Energy Efficiency: Discounted CFL
  - CFL_special: Residential Energy Efficiency: Specialty Bulbs
  - K12: Energy Education for Schools
  - HEHC: Home Energy House Call
  - lowinc_weath: Low Income Weatherization
  - PER-OHEC: Personalized Energy Report
  - appl_recycle: Appliance Recycling Program
  - insul_seal_date: Residential Smart $aver: Insulation and Seal
  - refrige_replace: Refrigerator replacement program (included in the analysis whereas no participation)
  - furnace_replace: Furnace replacement program (included in the analysis whereas no participation)
  - smsvr_HVAC: Residential Smart $aver HVAC
  - HVAC_tuneup_date: Residential Smart $aver HVAC tune up (included in the analysis whereas no participation)
  - Property_mgr: Residential Smart $aver: Property Manager CFLs
  - MyHER: My Home Energy Report

Number of Observations Read 281382
Number of Observations Used 281382

Dependent Variable: kwhd

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8250	93634249.4	11349.6	63.97	<.0001
Error	273131	48455708.6	177.4		
Corrected Total	281381	142089958.0			

R-Square	Coeff Var	Root MSE	kwhd Mean
0.658979	40.77580	13.31947	32.66514

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Account_Id	8146	78311901.75	9613.54	54.19	<.0001
cdd*monthID	45	7934142.79	176314.28	993.83	<.0001
hdd*monthID	46	7365957.26	160129.51	902.60	<.0001
k12_date	1	11.87	11.87	0.07	0.7959
Insul_Seal_date	1	11.42	11.42	0.06	0.7997
Free_CFL	1	1203.14	1203.14	6.78	0.0092
cfl_promo	1	8.23	8.23	0.05	0.8295
cfl_special	1	7.20	7.20	0.04	0.8403
HEHC	1	438.65	438.65	2.47	0.1159
lowinc_weath	1	490.88	490.88	2.77	0.0962
PER_OHEC	1	318.12	318.12	1.79	0.1805
SmSvr_HVAC	1	10.05	10.05	0.06	0.8119
Appl_Recycle	1	6.64	6.64	0.04	0.8466
Property_Mgr	1	2296.47	2296.47	12.94	0.0003
MyHER	1	2512.17	2512.17	14.16	0.0002
part	1	14932.74	14932.74	84.17	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
cdd*monthID	45	5676757.168	126150.159	711.07	<.0001
hdd*monthID	46	7327886.607	159301.883	897.94	<.0001
k12_date	1	8.935	8.935	0.05	0.8224
Insul_Seal_date	1	12.771	12.771	0.07	0.7885
Free_CFL	1	1401.022	1401.022	7.90	0.0050
cfl_promo	1	16.448	16.448	0.09	0.7608
Source	DF	Type III SS	Mean Square	F Value	Pr > F
cfl_special	1	3.734	3.734	0.02	0.8847
HEHC	1	445.266	445.266	2.51	0.1131
lowinc_weath	1	516.458	516.458	2.91	0.0880
PER_OHEC	1	325.125	325.125	1.83	0.1758
SmSvr_HVAC	1	14.422	14.422	0.08	0.7756
Appl_Recycle	1	4.639	4.639	0.03	0.8715
Property_Mgr	1	2551.777	2551.777	14.38	0.0001
MyHER	1	2159.766	2159.766	12.17	0.0005
part	1	14932.744	14932.744	84.17	<.0001

Parameter		Estimate		Standard Error	t Value	Pr > |t|
cdd*monthID	201012	0.12242608	B	1.4813726	0.08	0.9341
cdd*monthID	201101	0.01047102	B	0.4774856	0.02	0.9825
cdd*monthID	201102	1.00762539	B	0.1205422	8.36	<.0001
cdd*monthID	201103	0.22185978	B	0.0255465	8.68	<.0001
cdd*monthID	201104	0.07958351	B	0.0075044	10.60	<.0001
cdd*monthID	201105	0.07911493	B	0.0025031	31.61	<.0001
cdd*monthID	201106	0.07939523	B	0.0007300	108.76	<.0001
cdd*monthID	201107	0.07489890	B	0.0005254	142.56	<.0001
cdd*monthID	201108	0.07589485	B	0.0006331	119.88	<.0001
cdd*monthID	201109	0.07752588	B	0.0020414	37.98	<.0001
cdd*monthID	201110	0.07712457	B	0.0106534	7.24	<.0001
cdd*monthID	201111	0.17346772	B	0.0443337	3.91	<.0001
cdd*monthID	201112	-0.23843323	B	0.1620752	-1.47	0.1413
cdd*monthID	201201	0.20785646	B	0.0531915	3.91	<.0001
cdd*monthID	201202	0.25913327	B	0.0486594	5.33	<.0001
cdd*monthID	201203	0.09739021	B	0.0093475	10.42	<.0001
cdd*monthID	201204	0.11469817	B	0.0060616	18.92	<.0001
cdd*monthID	201205	0.08658451	B	0.0018908	45.79	<.0001
cdd*monthID	201206	0.08466735	B	0.0008824	95.95	<.0001
cdd*monthID	201207	0.07368587	B	0.0005264	139.99	<.0001
cdd*monthID	201208	0.07905480	B	0.0006773	116.72	<.0001
cdd*monthID	201209	0.07431302	B	0.0018157	40.93	<.0001
cdd*monthID	201210	0.15079504	B	0.0104384	14.45	<.0001
cdd*monthID	201211	0.48038836	B	0.0548442	8.76	<.0001
cdd*monthID	201212	3.14400440	B	0.4670784	6.73	<.0001
cdd*monthID	201301	0.56975469	B	0.1465595	3.89	0.0001
cdd*monthID	201302	0.76368526	B	0.2383061	3.20	0.0014
cdd*monthID	201303	0.14057106	B	0.0265282	5.30	<.0001

Parameter		Estimate		Standard Error	t Value	Pr > |t|
cdd*monthID	201304	0.09226234	B	0.0131384	7.02	<.0001
cdd*monthID	201305	0.06593390	B	0.0038088	17.31	<.0001
cdd*monthID	201306	0.07456326	B	0.0008957	83.24	<.0001
cdd*monthID	201307	0.07529974	B	0.0006564	114.71	<.0001
cdd*monthID	201308	0.07771548	B	0.0008072	96.27	<.0001
cdd*monthID	201309	0.08431202	B	0.0013751	61.31	<.0001
cdd*monthID	201310	0.12102001	B	0.0073569	16.45	<.0001
cdd*monthID	201311	0.25199087	B	0.0497445	5.07	<.0001
cdd*monthID	201312	0.67511172	B	0.0635582	10.62	<.0001
cdd*monthID	201401	0.97797623	B	0.2507453	3.90	<.0001
cdd*monthID	201402	4.29999516	B	0.3486099	12.33	<.0001
cdd*monthID	201403	0.38457056	B	0.0323087	11.90	<.0001
cdd*monthID	201404	0.10311979	B	0.0079558	12.96	<.0001
cdd*monthID	201405	0.07420068	B	0.0019305	38.44	<.0001
cdd*monthID	201406	0.07537367	B	0.0008021	93.97	<.0001
cdd*monthID	201407	0.07438252	B	0.0009009	82.56	<.0001
cdd*monthID	201408	-0.00035747	B	0.0232243	-0.02	0.9877
hdd*monthID	201011	-0.13304777		0.0103494	-12.86	<.0001
hdd*monthID	201012	0.04141844		0.0003951	104.82	<.0001
hdd*monthID	201101	0.04408070		0.0003038	145.12	<.0001
hdd*monthID	201102	0.04468261		0.0005760	77.58	<.0001
hdd*monthID	201103	0.04971754		0.0009587	51.86	<.0001
hdd*monthID	201104	0.07141765		0.0028957	24.66	<.0001
hdd*monthID	201105	0.12641956		0.0101477	12.46	<.0001
hdd*monthID	201106	0.12548474		0.0312087	4.02	<.0001
hdd*monthID	201107	0.21061278		0.0739400	2.85	0.0044
hdd*monthID	201108	0.48853786		0.0699229	6.99	<.0001
hdd*monthID	201109	0.13973767		0.0100157	13.95	<.0001
hdd*monthID	201110	0.07365867		0.0021197	34.75	<.0001
hdd*monthID	201111	0.05473029		0.0008758	62.49	<.0001
hdd*monthID	201112	0.05242333		0.0005400	97.09	<.0001
hdd*monthID	201201	0.04857181		0.0004157	116.85	<.0001
hdd*monthID	201202	0.04776258		0.0005891	81.07	<.0001
hdd*monthID	201203	0.06792506		0.0015994	42.47	<.0001
hdd*monthID	201204	0.06579443		0.0028816	22.83	<.0001
hdd*monthID	201205	0.15438145		0.0076109	20.28	<.0001
hdd*monthID	201206	0.08986214		0.0308475	2.91	0.0036
hdd*monthID	201207	0.23735480		0.0550991	4.31	<.0001
hdd*monthID	201208	0.21913417		0.0868698	2.52	0.0117
hdd*monthID	201209	0.19385673		0.0092089	21.05	<.0001
hdd*monthID	201210	0.06207532		0.0018681	33.23	<.0001
hdd*monthID	201211	0.05270682		0.0005324	99.00	<.0001
hdd*monthID	201212	0.05179656		0.0004550	113.83	<.0001
hdd*monthID	201301	0.04944975		0.0004038	122.46	<.0001

Parameter		Estimate	Standard Error	t Value	Pr > |t|
hdd*monthID	201302	0.04616824	0.0004003	115.34	<.0001
hdd*monthID	201303	0.04854534	0.0005156	94.15	<.0001
hdd*monthID	201304	0.06273890	0.0020151	31.13	<.0001
hdd*monthID	201305	0.14097334	0.0060986	23.12	<.0001
hdd*monthID	201306	0.27111413	0.0344485	7.87	<.0001
hdd*monthID	201307	0.75227106	0.5459625	1.38	0.1682
hdd*monthID	201308	0.64648682	0.0836063	7.73	<.0001
hdd*monthID	201309	0.23497863	0.0125078	18.79	<.0001
hdd*monthID	201310	0.07431079	0.0020218	36.75	<.0001
hdd*monthID	201311	0.05209481	0.0006242	83.46	<.0001
hdd*monthID	201312	0.04551292	0.0005830	78.07	<.0001
hdd*monthID	201401	0.04740798	0.0003332	142.29	<.0001
hdd*monthID	201402	0.04654439	0.0003836	121.35	<.0001
hdd*monthID	201403	0.04988105	0.0005253	94.95	<.0001
hdd*monthID	201404	0.06945916	0.0018043	38.50	<.0001
hdd*monthID	201405	0.15354932	0.0064585	23.77	<.0001
hdd*monthID	201406	0.39260212	0.0408723	9.61	<.0001
hdd*monthID	201407	18.42271508	6.4661767	2.85	0.0044
hdd*monthID	201408	-36.33626290	215.5990767	-0.17	0.8662
k12_date		-0.06574948	0.2929747	-0.22	0.8224
Insul_Seal_date		-1.68582223	6.2833457	-0.27	0.7885
Free_CFL		0.27569834	0.0981067	2.81	0.0050
cfl_promo		1.56743195	5.1477852	0.30	0.7608
cfl_special		-0.19005964	1.3100903	-0.15	0.8847
HEHC		0.85054143	0.5368744	1.58	0.1131
lowinc_weath		2.41266070	1.4140526	1.71	0.0880
PER_OHEC		-0.73461637	0.5426533	-1.35	0.1758
SmSvr_HVAC		0.37324155	1.3090581	0.29	0.7756
Appl_Recycle		-0.14340946	0.8868349	-0.16	0.8715
Property_Mgr		-0.62212566	0.1640377	-3.79	0.0001
MyHER		-0.35044884	0.1004404	-3.49	0.0005
part		-1.07687179	0.1173765	-9.17	<.0001

Appendix C: Engineering Algorithms

CFLs

General Algorithm

Gross Summer Coincident Demand Savings

$$\Delta kW = ISR \times units \times \left[\frac{Watts_{base} - Watts_{ee}}{1000}\right] \times CF \times WHF_d$$

Gross Annual Energy Savings

$$\Delta kWh = ISR \times units \times \left[\frac{(Watts \times HOURS)_{base} - (Watts \times HOURS)_{ee}}{1000}\right] \times 365 \times WHFe$$

where:

ΔkW = gross coincident demand savings
ΔkWh = gross annual energy savings
units = number of units installed under the program
$Watts_{ee}$ = connected load of energy-efficient lamp = 15.8
$Watts_{base}$ = connected load of baseline lamp
HOURS = Average daily hours of use
CF = coincidence factor = 0.081
WHFe = Waste heat factor for annual electricity consumption = 0.963
WHFd = Waste heat factor for demand = 1.169

The coincidence factor for this analysis was taken from Duke Energy's residential lighting logger study performed in the Carolinas with participants from the 2012 CFL campaigns.

The waste heat factor for annual energy consumption depends on the HVAC system, heating fuel type, and location. The waste heat factors for annual energy consumption were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix. The weights were determined through appliance saturation data from the Home Profile Database supplied by Duke Energy.

Charlotte, NC

Heating Fuel	Heating System	Cooling System	Weight	WHFe
Other	Any except Heat Pump	Any except Heat Pump	0.0042	1.069
		None	0.0004	0
Any	Heat Pump	Heat Pump	0.2782	0.9
Gas Propane Oil	Central Furnace	None	0.0067	0
		Room/Window	0.5508	1.069
		Central AC		1.069
Electricity	Electric baseboard/ central furnace	None	0.0030	0.57
		Room/Window	0.1493	0.69
		Central AC		0.69
None	None	Any	0.0074	1
Total Weighted Average			1	0.963

The waste heat factor for demand depends on the cooling system type. The HVAC interaction factors for summer peak demand were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix.

Charlotte, NC

Cooling System	Weight	WHFd
None	0.0074	0
All other	0.9926	0.170
Total Weighted Average		0.169

Air Sealing – Reduce Infiltration Measures

Gross Summer Coincident Demand Savings

$\Delta kW_S = units \times (\Delta cfm/unit) \times (kW/cfm) \times DF_S \times CF_S$

Gross Annual Energy Savings

$\Delta kWh = units \times (\Delta cfm/unit) \times (kWh/cfm)$

$\Delta therm = units \times (\Delta cfm/unit) \times (therm/cfm)$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
units	= number of buildings sealed under the program
Δcfm/unit	= unit infiltration airflow rate (ft^3/min) reduction for each measure
DF	= demand diversity factor = 0.8
CF	= coincidence factor = 1.0
kW/cfm	= demand savings per unit cfm reduction
kWh/cfm	= electricity savings per unit cfm reduction
therm/cfm	= gas savings per unit cfm reduction

Unit cfm savings per measure

The cfm reductions for each measure were estimated from equivalent leakage area (ELA) change data taken from the ASHRAE Handbook of Fundamentals (ASHRAE, 2001). The equivalent leakage area changes were converted to infiltration rate changes using the Sherman-Grimsrud equation:

$$Q = ELA \times \sqrt{A \times \Delta T + B \times v^2}$$

where:

A	= stack coefficient (ft^3/min-in^4-°F) = 0.015 for one-story house
ΔT	= average indoor/outdoor temperature difference over the time interval of interest (°F)
B	= wind coefficient (ft^3/min-in^4-mph^2) = 0.0065 (moderate shielding)
v	= average wind speed over the time interval of interest measured at a local weather station at a height of 20 ft (mph)

The location specific data are shown below:

Location	Average outdoor temp	Average indoor/outdoor temp difference	Average wind speed (mph)	Specific infiltration rate (cfm/in^2)
Charlotte	60	8	6.9	1.57

Measure ELA impact and cfm reductions are as follows:

Measure	Unit	ELA change (in^2/unit)	ΔCfm/unit
Weather stripping	Linear foot	0.089	0.058
Caulking	linear foot	0.047	0.031
Door Sweeps	each	0.3	0.197
Foam Insulation Spray	sink	0.6	0.392

Unit energy and demand savings

The energy and peak demand impacts of reducing infiltration rates were calculated from infiltration rate parametric studies conducted using the DOE-2 residential building prototype models, as described at the end of this Appendix. The savings per cfm reduction by heating and cooling system type are shown below. These data were weighted according to the HVAC system type weights shown above.

Heating Fuel	Heating System	Cooling System	kWh/cfm	kW/cfm	therm/cfm
Other	Any except Heat Pump	Any except Heat Pump	2.48	0.00248	0
Any	Heat Pump	Heat Pump	10.37	0.00248	0
Gas Propane Oil	Central Furnace	None	0	0	0.0743
		Room/Window	2.48	0.00248	0.0743
		Central AC	2.48	0.00248	0.0743
	Other	None	0	0	0.0743
		Room/Window	2.48	0.00248	0.0743
		Central AC	2.48	0.00248	0.0743
Electricity	Central furnace	None	17.01	0.00990	0.000
		Room/Window	18.54	0.01485	0.000
		Central AC	18.54	0.01485	0.000
	Electric baseboard	None	17.01	0.00990	0.000
		Room/Window	18.54	0.01485	0.000
		Central AC	18.54	0.01485	0.000
	Other	None	17.01	0.00990	0.000
		Room/Window	18.54	0.01485	0.000
		Central AC	18.54	0.01485	0.000
Total Weighted Average			7.21	0.00439	0.0414

Low-Flow Showerhead

Gross Summer Coincident Demand Savings

$$\Delta kW_S = units \times ISR \times \%Elec \times \frac{(GPD_{base} - GPD_{ee}) \times 8.33 \times \overline{\Delta T}}{3412 \times 24 \times RE} \times DF_x \times CF_s$$

Gross Annual Energy Savings

$$\Delta kWh = units \times ISR \times \%Elec \times \frac{(GPD_{base} - GPD_{ee}) \times 8.33 \times \overline{\Delta T}}{3412 \times RE} \times 365$$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
units	= number of units installed under the program
GPD_{base}	= daily hot water consumption before installation
GPD_{ee}	= daily hot water consumption after flow reducing measure installation
ΔT	= average difference between entering cold water temperature and the shower use temperature
RE	= water heater recovery efficiency (0.98)
DF	= demand diversity factor for electric water heating

CF	= coincidence factor
8.33	= conversion factor (Btu/gal-°F)
3412	= conversion factor (Btu/kWh)
24	= conversion factor (hr/day)
365	= conversion factor (days/yr)
100000	= conversion factor (Btu/therm)

Showerhead

GPD_{base} = showers/week / 7 x 2.87 gpm x 5 minutes/shower

GPD_{ee} = showers/week / 7 x 1.75 gpm x 5 minutes/shower

Showers/wk = 10.9 per showerhead (from survey data)

ΔT

City	Average cold water temperature	Shower use temperature	Average ΔT
Charlotte	60.3 °F	100°F	39.7°F

Demand diversity factor = 0.1

Coincidence factor = 0.4

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for the residential water heating end-use in a summer peaking utility.

Faucet Aerators

ΔkWH = ISR * ((((GPMbase - GPMlow) / GPMbase) * # people * gals/day * days/year * DR) / F/home) * 8.3 * (Tft - Tmains) / 1,000,000) / DHW Recovery Efficiency / 0.003412

Where:

ISR = In Service Rate or fraction of units that get installed
GPMbase = Gallons Per Minute of baseline faucet = 2.2
GPMlow = Gallons Per Minute of low flow faucet = 1.5
# people = Average number of people per household = 2.46
gals/day = Average gallons per day used by all faucets in home = 10.9
days/y = Days faucet used per year = 365
DR = Percentage of water flowing down drain (if water is collected in a sink, a faucet aerator will not result in any saved water) = 50%
F/home = Average number of faucets in the home = 3.5
8.3 = Constant to convert gallons to lbs

Tft = Assumed temperature of water used by faucet = 80
Tmains = Assumed temperature of water entering house = 60.3
DHW Recovery Efficiency = Recovery efficiency of electric hot water heater = 0.98
0.003412 = Constant to converts MMBtu to kWh

ΔkW = ΔkWh/hours * CF

Where:
Hours = Average number of hours per year spent using faucet
= (Gal/person * # people * 365) / F/home / GPM / 60
= (10.9 * 2.46 * 365) / 3.5 / 2.2 / 60
= 21 hours
CF = Summer Peak Coincidence Factor for measure = 0.00262

Hot Water Pipe Wrap

For electric DHW systems:

ΔkWh = ((1/Rexist – 1/Rnew) * (L * C) * ΔT * 8,760)/ ηDHW / 3413

Where:
Rexist = Pipe heat loss coefficient of uninsulated pipe (existing) (Btu/hr-°F-ft) = 1.0
Rnew = Pipe heat loss coefficient of insulated pipe (new) (Btu/hr-°F-ft) = 5
L = Length of pipe from water heating source covered by pipe wrap (ft)
C = Circumference of pipe (ft) (Diameter (in) * π * 0.083) = 0.196ft
ΔT = Average temperature difference between supplied water and outside air temperature (°F) = 60°F
8,760 = Hours per year
ηDHW = Recovery efficiency of electric hot water heater = 0.98
3413 = Conversion from Btu to kWh

ΔkW = ΔkWh/8760

Where:
ΔkWh = kWh savings from pipe wrap installation
8760 = Number of hours in a year (since savings are assumed to be constant over year).

Water Heater Tank Wrap and Temperature Turn-Down

$$\Delta kWh = units \times \frac{(UA_{base} - UA_{ee}) \times \overline{\Delta T}}{3413 \times \eta_{elec}} \times 8760$$

$\Delta kW = \Delta kWh/8760$

Where:

ΔkW = gross coincident peak demand savings
ΔkWh = gross annual electricity savings
units = number of water heaters installed under the program
UAbase= overall heat transfer coefficient of base water heater (Btu/hr-°F) = 4.1
UAee= overall heat transfer coefficient of improved water heater (Btu/hr-°F) = 3.3
ΔT = temperature difference between the water inside the tank and the ambient air (°F) = 60
3413 = conversion factor (Btu/kWh)
8760 = conversion factor (hr/yr)
$\eta elec$= electric water heater recovery efficiency = 0.98

Tank heat loss coefficients estimated from the energy factor:

$$UA = \frac{\frac{1}{EF} - \frac{1}{RE}}{67.5 \times \left(0.000584 - \frac{1}{RE \times Cap}\right)}$$

where: Cap = tank element heat output =15,400 Btu/hr

The EF for uninsulated (0.86) and insulated (0.88) tanks were taken from the Draft Ohio TRM.

Prototypical Building Model Description

The impact analysis for many of the HVAC related measures are based on DOE-2.2 simulations of a set of prototypical residential buildings. The prototypical simulation models were derived from the residential building prototypes used in the California Database for Energy Efficiency Resources (DEER) study (Itron, 2005), with adjustments make for local building practices and climate. The prototype "model" in fact contains 4 separate residential buildings; 2 one-story and 2 two-story buildings. The each version of the 1 story and 2 story buildings are identical except for the orientation, which is shifted by 90 degrees. The selection of these 4 buildings is designed to give a reasonable average response of buildings of different design and orientation to the impact of energy efficiency measures. A sketch of the residential prototype buildings is shown in Figure 9.

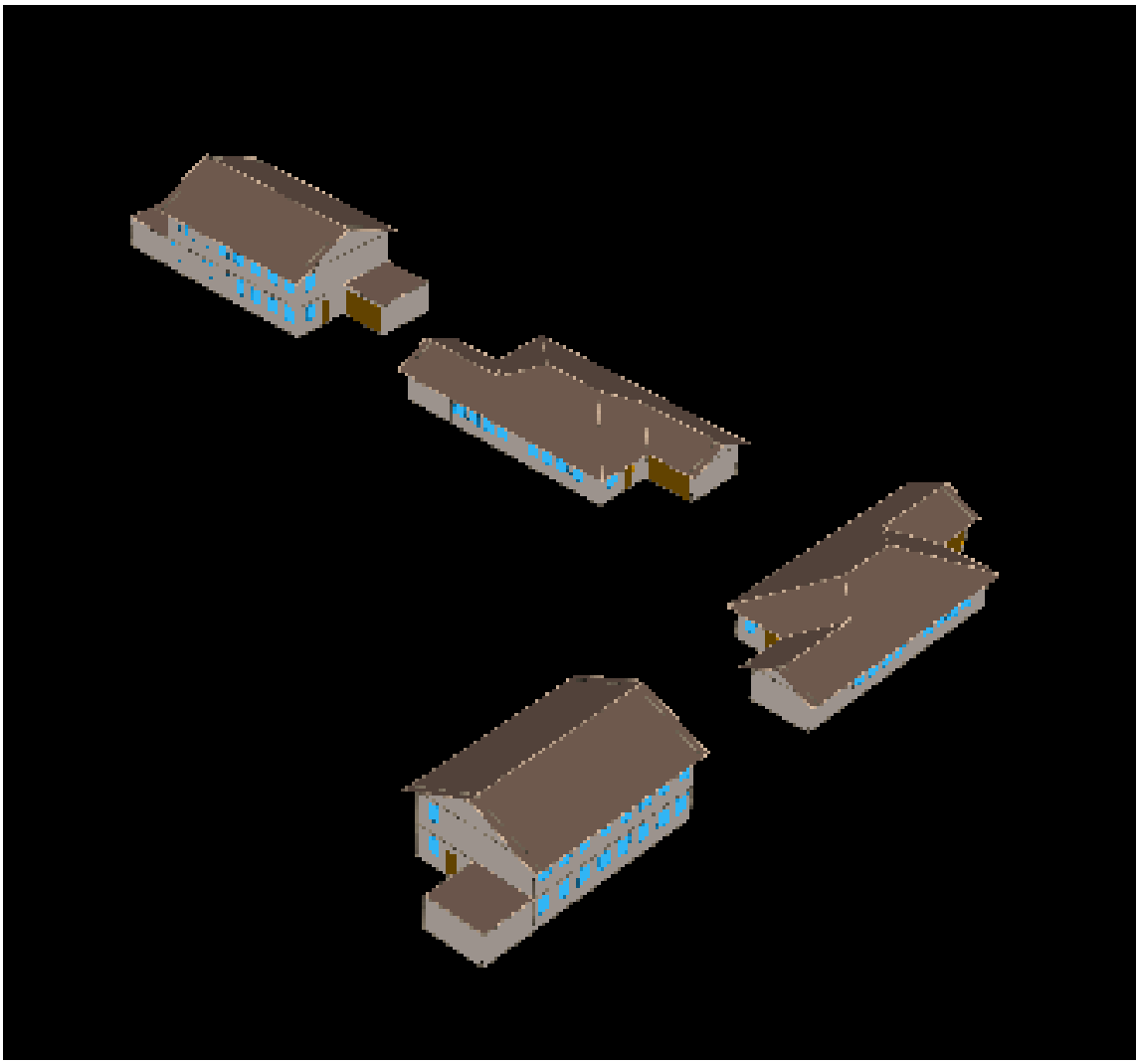

Figure 9. Computer Rendering of Residential Building Prototype Model

The general characteristics of the residential building prototype model are summarized below:

Residential Building Prototype Description

Characteristic	Value
Conditioned floor area	1 story house: 1465 SF 2 story house: 2930 SF
Wall construction and R-value	Wood frame with siding, R-11
Roof construction and R-value	Wood frame with asphalt shingles, R-19
Glazing type	Single pane clear
Lighting and appliance power density	0.51 W/SF average
HVAC system type	Packaged single zone AC or heat pump
HVAC system size	Based on peak load with 20% oversizing. Average 640 SF/ton
HVAC system efficiency	SEER = 8.5
Thermostat setpoints	Heating: 70°F with setback to 60°F Cooling: 75°F with setup to 80°F

Characteristic	Value
Duct location	Attic (unconditioned space)
Duct surface area	Single story house: 390 SF supply, 72 SF return Two story house: 505 SF supply, 290 SF return
Duct insulation	Uninsulated
Duct leakage	26%; evenly distributed between supply and return
Cooling season	Charlotte – April 17th to October 6th
Natural ventilation	Allowed during cooling season when cooling setpoint exceeded and outdoor temperature < 65°F. 3 air changes per hour

References

Itron, 2005. "2004-2005 Database for Energy Efficiency Resources (DEER) Update Study, Final Report," Itron, Inc., J.J. Hirsch and Associates, Synergy Consulting, and Quantum Consulting. December, 2005. Available at http://eega.cpuc.ca.gov/deer

Appendix D: Memo: Low Income Programs and Freeridership

TecMarket Business Center
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Memorandum

To: Roshena Ham, Duke Energy
From: Nick Hall, David Ladd, TecMarket Works, and Matthew Joyce
Date: January 15, 2014
Subject: Low Income Programs and Freeridership

On October 29, 2013, the North Carolina Public Utility Commission issued an order approving Duke Energy's Rider filing. Ordering Paragraph 8 of this order states:

> *That in future EM&V studies, DEC shall either specifically assess free ridership of low-income programs and incorporate the findings from participant surveys into the Company's free ridership calculations or shall provide justification showing that such assessment is unnecessary or that using a specific proxy for a free ridership estimate is reasonable.*[43]

This memorandum addresses that statement as follows.

Typically, low income evaluation studies have indicated that program participation by people near 150% of federal poverty thresholds have zero to very low freeridership levels. Studies have found that low-income households do not typically invest in energy-efficient measures on their own, but tend to acquire them via utility programs, social programs, low-income support efforts, and promotional giveaways. The higher price of consumable measures (such as CFLs versus incandescent bulbs), and the capital investment required for home improvements such as high efficiency HVAC and other equipment upgrades, represents a significant cost barrier for low income populations. Occasionally these economic realities appear to be at odds with freeridership survey data.

Within the field of survey research there is the concept of socially acceptable response bias in which people respond to questions regarding their behavior in a way that reflects what they think is the socially correct answer. This concept applies to market segments

[43] Order approving DSM/EE Rider and Requiring Filing of Proposed Customer Notice, filed October 29, 2013, in *Application Approval of Demand Side Management and Energy Efficient Cost Recovery Rider*, Docket Number E-7 Sub 1031.

differently. For example, the low-income sector does not want to be seen as being unable to do the "correct" behavior, so they respond that they would have done that "correct" behavior even when they do not have the resources to undertake that behavior. This is the reason why we sometimes see freerider scores within market sectors that do not have the financial capability to take a more costly action, but still report that they would have taken that action in the absence of the program. The degree of this false response bias is not known, however the concept, especially within the low-income sector responding to questions about what they perceive as socially acceptable behavior, is widely held with the social research community.

As a result, the NTG ratio used within the energy program evaluation community for low-income programs is typically set in both policy decisions and supported in evaluation findings at around 1.0, representing few freeriders associated with utility-sponsored programs. Historically the net-to-gross ratio of 1.0 has been applied to numerous low income program evaluations. For example, the table below lists examples from thirteen evaluation reports, policy documents, evaluation plans, annual reports, conference papers, commission hearings and Public Utility Commission case documents of the past ten years covering multiple states and jurisdictions.

A list of references for these documents follows the table, including URLs for documents currently available online.

The review of the research conducted on this topic as summarized below (with findings highlighted), provides sufficient justification that evaluations for utility energy efficiency programs, including Duke Energy's, continue the use of a 0% freeridership rates for low-income programs.

State and Year	Document	Low Income NTG policy/approach
Pennsylvania 2012	Evaluation Framework 2013	• Quote: *"[The] Commission recognizes that the calculation of NTG ratios is inexact at best. 'Free riders' are difficult and expensive to calculate, but even more difficult and costly to calculate is 'spillover'."*[67] *The PA PUC believes that, based on published studies, these two effects often come close to offsetting each other and result in a NTG ratio close to 1.0.*[68] [See TecMarket Works comment in bullet below] *Due to the substantial additional costs to calculate "freeriders" and "spillover," the PA PUC questions whether it is cost-effective to use ratepayer funds for these analyses, only to find that the NTG ratio is close to 1.0. No stakeholders have provided evidence to the contrary, so the PA PUC will continue to mandate that the EDCs calculate the NTG ratio as they did for Phase I.*[69]*" Footnote text:* [69] *"Pennsylvania Public Utility Commission, Energy Efficiency and Conservation Program Implementation Order, at page 83, at Docket No M-2012-2289411, (Phase II Implementation Order), entered August 3, 2012."* p. 59 • TecMarket Works comment: Without counting the additional market effects induced energy savings.
Pennsylvania	PPL Annual	• Summary: Net to Gross ratio set to 1.0 for Low-Income WRAP

State and Year	Document	Low Income NTG policy/approach
2010	Report	program. p. 9 • Quote: *"There is no free-ridership in this low income weatherization program. Measures are installed at no cost to these income eligible customers. In addition, no adjustments were made to compute savings net of freeridership for the Act 129 programs. Until directed otherwise by the SWE, the EM&V CSP will collect data and report the information for program process improvements only."* p. 58
New York 2007-2008	Evaluation Plan 2013	• Quote: *"The primary method of estimating program impacts for 2007-2008 CY participants was a full billing analysis. Impact evaluations of low income programs often exclude evaluation of Net-to-Gross (NTG) under the presumption that free ridership and spillover effects are small and offset each other. The prior evaluation's pilot NTG study found that for EmPower the factors virtually offset each other and recommended a NTG rate of 1.0. Therefore, a NTG assessment is excluded from the first cycle evaluation scope."* p. 8-9. • TecMarket Works comment: At this time there are no recommendations or considerations being contemplated by the NY Commission to change the 1.0 NTG assumption. (Mr. Hall is the lead advisor to the NY Commission on evaluation research approaches and lead evaluation manager for the development of NY evaluation protocols and technical manuals providing policy oversight to all evaluation contactors conducting studies in NY.)
New York 2007-2008	Impact Evaluation Report	• Quote: *"For EmPower, as is the case for many low income efficiency retrofit programs, the assumption has been that the net-to-gross ratio (NTGR) is 1.0, that is, that the program does not have free riders or spillover. A pilot net-to-gross (NTG) study was conducted to assess the validity of this assumption. The pilot effort indicates that both free ridership and spillover occur within the low income population. The NTG approach was consistent with the methods used in the evaluation of other NYSERDA programs, and the results indicate a free rider rate of 17% and spillover of 14%, for a combined NTG of 0.97. The program savings were not adjusted by the NTG ratio since this initial study was designed as a pilot. In addition, the NTG ratio of 0.97 is extremely close to the value of 1.00 currently in use."* Executive Summary p. 2 • Quote: *"The pilot study of net effects clearly demonstrated that there are net effects associated with the Empower Program. With an estimated FR rate of 17% and spillover of 14%, the overall NTGR is 0.97, which is very close to the current estimate of 1.00. Since this was a pilot effort and the result was so close to 1.00, the evaluated gross savings are reported for the Program without any adjustments for net effects. However, this study reflects the results for program years 2007 and 2008, and it is possible that the magnitude of the net effects may change in the future."* Executive Summary p. 9 • Quote: *"The 2007-2008 CY evaluation concluded the share of savings from large multi-family buildings did not warrant a separate NTG analysis at that time." Footnote text: "The pilot NTG evaluation undertaken as part of the CY 2007-2008 evaluation found a NTG ratio of approximately 1.0. A NTG of 1.0*

State and Year	Document	Low Income NTG policy/approach
		is a common assumption for low income evaluations." p. 9 footnote
Michigan 2012	Utilities Commission Hearing	• *Quote: "Consumers Energy also proposes to maintain the 1.0 NTG ratio for its pilot, low income, and educational programs." (Proposal approved by Public Services Commission) p. 4*
Wyoming 2011	Impact Evaluation Report	• Quote: *"Low-income programs generally experience no freeridership or spillover; consequently net program savings equal gross program savings."* p. 2-4
Nevada 2009	Nevada Power Integrated Resource Plan 2010 to 2029	• Summary: Freeridership rates for Low Income Weatherization NPC NTGRs = 0.0% Table 49: Demand Side Plan p. 95 • Quote: *"The Commission order in Docket No. 06-08020, refer to stipulation, paragraph 4, the order stated that "freeridership or spillover do not need to be considered in the financial analysis of the low-income programs. Net-to-Gross Ratio of 100% has been used in the economic evaluation of this program."* Section C, p. 15
Maine 2007	Impact Evaluation Report	• Quote: *"Freeridership, defined as program purchases that participants claim they would have made on their own in the absence of the program, was assumed to be zero because the refrigerators and CFLs were provided free of charge."* p. 83
Ontario 2005	Ontario Energy Board Case Document	• Quote: *"Therefore the rule of thumb estimate for programs specifically targeted at low income customers ought to be zero."* p. 9
General 2011	IEPEC conference poster	• Quote: *"Freeridership is not usually considered to be an important issue in the evaluation of low - income efficiency programs, as participants in these programs rarely undertake energy efficiency improvements in the absence of the program."* p. 3
Wisconsin 2009-2010	IEPEC conference paper	• Summary: *All energy savings from large multifamily building direct-install weatherization programs including low-income are due to the intervention of the EE program.* (see discussion on p. 2-4)

References:

1. *"State of North Carolina Utilities Commission Docket No. E-7, Sub 2031: In the Matter of Application of Duke Energy Carolinas, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider", June 4, 2013, page 21.*
2. *Statewide Evaluation Team (GDS Associates, Nexant, Research Into Action, Apex Analytics), "Evaluation Framework for Pennsylvania Act 129 Phase II Energy Efficiency and Conservation Programs", Public Utilities Commission, Pennsylvania, 2013, page 59. http://www.puc.pa.gov/Electric/pdf/Act129/SWE_PhaseII-Evaluation_Framework063013.pdf*
3. *PPL Electric and The Cadmus Group, "Annual Report to the Pennsylvania Public Utility Commission for the period ending May 2010 Program Year 1", Public Utilities Commission, Pennsylvania, 2010, pages 9, 58. https://www.pplelectric.com/save-energy-and-money/~/media/PPLElectric/Shared%20Content/master-pages/act-129/Docs/energy_efficiency/PY1_AnnualReport_Final_091410.pdf*
4. *NYSERDA, "EmPower Program Final Detailed Evaluation Plan", March 28, 2013, pages 8-9.*
5. *Medgal & Associates for NYSERDA, "2007-2008 Empower New York Program Impact Report", April 2012, pages ES-2, ES-9.*

6. *"State of Michigan Public Services Commission Case No. U-16670: In the Matter of the Application of Consumers Energy Company to Amend Its Energy Optimization Plan", November 7, 2012, page 4. http://efile.mpsc.state.mi.us/efile/docs/17138/0009.pdf*

7. *The Cadmus Group for Rocky Mountain Power Wyoming "Low-Income Weatherization Program Evaluation", October 18, 2011, page 11. http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/DSM_WY_LowIncome_Weath_2011.pdf*

8. *Nevada Power, "Triennial Integrated Resource Plan 2010-2029: Demand Side Plan, Vol. 5 Book 1", 2009, Table 49: Demand Side Plan page 95 and Section C page 15. http://www.swenergy.org/news/news/documents/file/2009-07-NV_Power_DSM_Plan_01.pdf*

9. *Nexus Market Research and RLW Analytics for Efficiency Maine, "Process and Impact Evaluation of the Low Income Appliance Replacement Program", December 21, 2007, page 83.*

10. *Indeco Strategic Consulting for Ontario Energy Board, "CDM Free Riders and Attribution Benefits", 2005, page 9. http://www.ontarioenergyboard.ca/documents/cases/EB-2005-0523/honi_submission_tabd_211205.pdf*

11. *Jacqueline Berger of APPRISE (Applied Public Policy Research Institute for Study and Evaluation), "Evaluating Low - Income Energy Efficiency Programs" Poster Summary, presented at IEPEC 2011 conference, Boston, page 3. http://www.iepec.org/conf-docs/papers/2011PapersTOC/papers/141.pdf#page=1*

12. *Don Hynek, Barbara Smith and Megan Levy of Wisconsin Division of Energy Services, "The Great White Whale in Weatherization: A Large Multifamily Building Program" presented at the 2011 IEPEC conference, Boston, pages 2-4. http://www.iepec.org/conf-docs/papers/2011PapersTOC/papers/007.pdf*

Appendix E: Management Interview Instrument

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

The interview will take about an hour to complete. Do you have any questions for me before we begin?

Program Background and Objectives

1. Please describe your role and scope of responsibility in detail.
2. How long have you been involved with the program?
3. (PM only) Describe the evolution of the Program. Why was the program created, and has the program changed since it was it first started?
4. Have there been any recent changes been made to your duties since you started?
    a. If YES, please tell us what changes were made and why they were made. What are the results of the change?
5. In your own words, please describe the Program's objectives. (e.g. enrollment, energy savings, non-energy benefits)
6. Can you please walk me through the program's implementation, starting with how the program is marketed and how you target your customers, through how the customer participates?
    a. Marketing/Targeting: How & Who
    b. Enrollment/Participation
7. Of the program objectives you mentioned earlier, do you feel any of them will be particularly easy to meet, and why?
8. Which program objectives, if any, do you feel will be relatively difficult to meet, and why?

9. Are there any objectives you feel should be revised prior to the end of this program cycle? If yes, why?

Vendors

10. Do you use any vendors or contractors to help implement the program?
    a. What responsibilities do they have?
    b. Are there any areas in which think they can improve their services?
11. *(If not captured earlier)* Please explain how activities of the program's vendors, customers and Duke Energy are coordinated.
    a. Do you think methods for coordination should be changed in any way? If so, how and why?

Measures/Incentives

12. Describe your quality control and process for tracking participants, shipments, and other program data.
13. Do you believe that the program currently offers the right energy efficient products to meet your customers' needs?
    a. If not, what products would you like to add?
14. Is the program offering enough of an incentive to motivate your customers to participate?
    a. If not, what do you think should be changed, and why?

Vendor Staff Training

15. Describe any program orientation training and development approach you use for the Program.
    a. How do you ensure that staff are getting adequate program training and updated program information?
    b. Can we obtain training materials that are being used?
16. Do you have any suggestions for improving their effectiveness?

Improvements

17. Are you currently considering any changes to the program's design or implementation?
    a. What are the changes?

b. What is the process for deciding whether or not to make these changes?

18. Do you have suggestions for improvements to the program that would increase participation rates, or is Duke Energy happy with the current level of participation?

19. Do you have suggestions for increasing energy impacts *per participant*, given the same participation rates, or is Duke Energy happy with the current per participant impact?

20. Overall, what would you say about the program is working really well?

    a. Is there anything in this program you could highlight as a best practice that other utilities might like to adopt?

21. What area needs the most improvement, if any?

    a. (If not mentioned before) What would you suggest can be done to improve this?

22. Are there any other issues or topics we haven't discussed that you feel should be included in this report?

23. Do you have any further questions for me about this study or anything else?

24. Thank you!

Appendix F: Participant Survey Instrument

Surveyor Name*

_____

Survey ID*

_____

State*
( ) Kentucky
( ) Ohio
( ) North Carolina
( ) South Carolina

Measures*
You must enter a number for each measure.
If you enter 0, no questions will be asked of that measure

	number
A. AC/Heat Filters Year Supply AND/OR Change Filter Calendar	_____
B. Aerators	_____
C. Caulking Doors	_____
D. Caulking Windows	_____
E. Clear Glass Patch Tape	_____
F. CFL, 13 Watt	_____
G. CFL, 18	_____

Watt	
H. Door Sweeps	_____
I. Foam Insulation Spray	_____
J. HVAC Winter Kit for Wall/Window Unit	_____
K. Low-flow Showerheads	_____
L. Switch Plate Wall Thermometer	_____
M. Vinyl Weather Stripping All HVAC Window Units	_____
N. Vinyl Weather Stripping Doors	_____
O. Water Heater Pipe Wrap	_____
P. Water Heater Tank Insulation Wrap	_____
Q. Water	_____

Heater Temperature Adjustment	

Complete ALL of the above information fields BEFORE calling each customer. The numbers above will be used to determine which questions are asked and imported into some questions.

Hello, my name is _____. I am calling from TecMarket Works on behalf of Duke Energy to conduct a customer survey about the Residential Neighborhood Program. May I speak with _____ please?

If person talking, proceed. If person is called to the phone reintroduce.

If not home, ask when would be a good time to call and schedule the call-back:
Interviewer: if the customer you are calling has only a small number of measures installed, tell them the survey will take "about 30 minutes". If they have a larger than average number of measures, tell them the survey will take "45 minutes to an hour". If they have an average/moderate number of measures, then tell them "about 45 minutes" as written below.

We are conducting this survey to obtain your opinions about the Residential Neighborhood Program in which your household participated. We are not selling anything. If you complete the survey, we will send you a $25 check for your time. The survey will take about 45 minutes, sometimes less. Your answers will be confidential, and will help us to make improvements to the program to better serve others. May we begin the survey?

for answering machine 1st through penultimate attempts:
Hello, my name is [full name] and I am calling from TecMarket Works on behalf of Duke Energy to conduct a customer survey regarding the Residential Neighborhood Program. This program provided free energy assessments and installed energy-saving improvements in your home. I am sorry I missed you. I will try again another time.

for answering machine - Final Attempt:
Hello, my name is [name] and I am calling from TecMarket Works on behalf of Duke Energy to conduct a customer survey regarding the Residential Neighborhood Program. This program provided free energy assessments and installed energy-saving improvements in your home. This is my last attempt at reaching you, my apologies for any inconvenience.

0. Do you still live at [*address from calling sheet*] ?*
( ) Yes
( ) No or DK/NS

1. Do you recall participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

2. **This program was provided through Duke Energy and provided residents in your area with free home energy assessments and, if needed, the free installation of energy-saving home improvements such as insulation, weather stripping, light bulbs, faucet aerators and showerheads. Do you remember participating in this program?** *
( ) Yes
( ) No
( ) DK/NS

If No or DK/NS terminate interview and go to next participant.
Click NEXT below to record this disqualification.

3. How did you first learn about, or hear about, Duke Energy's Residential Neighborhood Program?*
(Check all that apply)
[ ] Received a letter or postcard in the mail describing the program
3a. Who sent the letter or postcard?:
_____*
[ ] Received a "door hanger" describing the program
3b. Who left the door hanger?: _____*
[ ] Attended a community event promoting the program
[ ] Someone visited my home to tell me about the program
3c. What organization was this person from?:
_____*
[ ] Someone from Duke Energy called to tell me about the program
[ ] Someone else called to tell me about the program
3d. *Specify person/organization*: _____*
[ ] I called Duke Energy for information or help
[ ] I called someone else for information or help
3e. *Specify person/organization*: _____*
[ ] Friends, family, or neighbors (word-of-mouth)
[ ] Media (TV, radio, newspapers, news reports, advertising, etc.)
3f. *Specify sources*: _____*
[ ] Online (Duke Energy or any other websites)
3g. *Specify sites*: _____*
[ ] Through another agency or organization (Church, CAP, Energy Assistance, etc.)
3h. *Specify organizations*: _____*
[ ] Some other way
3i. *Specify*: _____*
[ ] DK/NS

4. What was the main reason you choose to participate in the Residential Neighborhood Program?*

(do not read list, check one response)

( ) To save money on utility bills
( ) To save energy in my home
( ) To help the environment / "green" reasons
( ) Friends/neighbors/family encouraged me
( ) To obtain weatherization services or home repairs
( ) To make home more comfortable
( ) For the education and information provided
( ) For the home energy assessment / audit
( ) For the energy efficiency measures
( ) Past experience with another energy efficiency program
Specify program and sponsor: _____*
( ) Because it was free
( ) Because it was from Duke Energy
( ) Other: _____*
( ) DK/NS

4a. Were there any other reasons you chose to participate in this program?*

Repeat up to three times or until 'no other reasons' response.

[ ] No other reason
[ ] To save money on utility bills
[ ] To save energy in my home
[ ] To help the environment / "green" reasons
[ ] Friends/neighbors/family encouraged me
[ ] To obtain weatherization services or home repairs
[ ] To make home more comfortable
[ ] For the education and information provided
[ ] For the home energy assessment / audit
[ ] For the energy efficiency measures
[ ] Past experience with another energy efficiency program
Specify program and sponsor: _____*
[ ] Because it was free
[ ] Because it was from Duke Energy
[ ] Other: _____*
[ ] DK/NS

5. We are interested in learning what people understood about how the program operated. Please describe what you understood was required of you as a participant in the program and what you would receive in return for your participation.*
(probe for details and fill in responses below)

_____
_____
_____
_____

Details on Energy Efficiency Items Installed: Only ask questions about the measures that were installed in the respondent's home (see page 1 of survey).

Now I'd like to talk about the energy efficiency items that you received for participating in this program.

CFLs

17. I'd like to talk about the compact fluorescent light bulbs, also called CFLs, which you received from this program. Our records indicate that you received [question("value"), id="556"] 13-watt CFLs and [question("value"), id="557"] 18-watt CFLs, is this correct?*
( ) Yes
( ) No
( ) DK/NS

if no, ask
*enter zero "0" for DK/NS, but try to get at least a minimum number.**

	number
17a. How many 13-watt CFLs did you receive?	_____
17a. How many 18-watt CFLs did you receive?	_____

18. Next I am going to read six statements. Please tell me which best describes the installation of the CFL light bulbs that were provided to you by this program*
(READ BOLDFACE RESPONSES)
( ) Did not receive any CFLs
( ) The auditor installed all of the bulbs and did not leave any extras.
( ) The auditor installed some of the bulbs and left some more bulbs, which I installed myself.
( ) The auditor installed some of the bulbs and left some extras, which have not been installed.
( ) The auditor gave me bulbs and I installed all of them myself.
( ) The auditor gave me bulbs and I installed some of them myself, and also have some left over.
( ) The auditor gave me bulbs and I have not installed any of them yet.
( ) DK/NS

If participant did not receive CFLs, skip to next measure.

If uninstalled CFLs remain, ask q19 and subsequent questions about uninstalled bulbs.

19a. How many 13-watt CFLs do you have which have not been installed yet?:*
( ) 0
( ) 1 or more *Specify number:* : _____*
( ) DK/NS

19b. How many 18-watt CFLs do you have which have not been installed yet?:*
( ) 0
( ) 1 or more *Specify number:* : _____*
( ) DK/NS

Continue with Q20a-Q20g only if they have one or more spare bulbs in q19a or Q19b; otherwise skip ahead to Q21.

20a. What have you done with the remaining CFLs that were not installed?*
(check all that apply)
[ ] Put them in storage / closet / shelf
[ ] Gave them away
[ ] Threw them out / Recycled them
[ ] Other *specify what was done and to how many bulbs*:
_____*
[ ] DK/NS

*If "Gave them away", ask Q20b-c:**
20b. You said you gave away some of the bulbs. To whom did you give them?:
_____

20c. How many did you give away?:

_____

If "threw out / recycled", ask:
20d. How many bulbs did you throw away or recycle?*

_____

If "put them in storage", ask:
20e. How many bulbs that you received from this program do you currently have stored for future use?*

_____

20f. Do you plan on eventually installing and using all of the free CFLs that you were provided through this program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS

If "yes", skip ahead to q20i

If "no" to Q20f, ask Q20g and then SKIP AHEAD TO Q21:

20g. Why not?*

_____
_____
_____
_____

If "maybe" or "DK/NS" to Q20f, ask:
20h. Why are you not sure you will use them all?*

_____
_____
_____
_____

If "Yes, maybe or DKNS" in Q20f

20i. How long do you think it will be before you will have installed all of the free bulbs you received from the Duke Energy program?*
( ) 1 year or less
( ) 13 to 24 months (2 years)
( ) 25 to 36 months (3 years)
( ) 37 to 48 months (4 years)
( ) 49 to 60 months (5 years)
( ) More than 5 years

( ) Never
( ) DK/NS

q21. 1st Installed Bulb[44]

INTERVIEWER: record answers for up to three CFLs installed by the program; if they installed fewer than three CFLs, ask about one or two bulbs as appropriate.

Now I'm going to ask you about three of the bulbs you put into light fixtures…
1stInstalled Bulb - 18 watt
21. For the first CFL, please tell me about one of the 18-watt bulbs that was installed; that is, the brighter, higher-wattage bulbs that were installed. In which room was this bulb installed?*
( ) Living/family room
( ) Dining room
( ) Kitchen
( ) Master bedroom
( ) Bedroom 2
( ) Bedroom 3 or other bedroom
( ) Hall
( ) Closet
( ) Basement
( ) Garage
( ) Bathroom
( ) Other: _____*

21a. Are you sure this bulb that was installed by the Residential Neighborhood Program was an 18-watt bulb?*
( ) Yes, it is an 18-watt bulb
( ) No, it is a 13-watt bulb
( ) DK/NS

If "No, it is a 13-watt bulb ", ask them to pick an 18-watt bulb and go back to Q21; if they cannot, then check "No, it is a 13-watt bulb" and continue

If "DK/NS (don't know/not sure)", ask them if there are any installed bulbs that they know for sure are 18-watt bulbs and go back to Q21; if they cannot, then check "DK/NS" and continue.

[44] Two repetitive survey sections are not shown in this appendix; the versions of Q21 through Q23 shown here are for customers who received both 13-watt and 18-watt CFLs. For computer-assisted survey programming purposes, there are alternate versions of these same questions which are asked for customers who received only one wattage of bulb (a series for 13-watt bulbs and a series for 18-watt bulbs). These alternate versions of the questions are identical to the versions shown in this appendix except for the wattages of bulbs mentioned (customers who only received 13-watt bulbs are not asked about 18-watt bulbs and vice versa).

21b. Was the bulb that was previously installed in this fixture or lamp a standard bulb or a CFL?*
( ) Standard Incandescent
( ) CFL
( ) Other: _____*
( ) There was no bulb in the socket
( ) DK/NS

21c. How many watts was the old bulb that was removed?*
( ) Less than 44
( ) 45-70
( ) 71-99
( ) 100 or more
( ) DK/NS

21d. What happened to the old bulb that was removed?*
( ) Recycled It
( ) Threw it away
( ) Stored it
( ) Auditor took it with them
( ) Other: _____*
( ) DK/NS

21e. On average, approximately how many hours per day is this light used?*
( ) Less than 1
( ) 1 to 2
( ) 3 to 4
( ) 5 to 10
( ) 11 to 12
( ) 13 to 24
( ) DK/NS

21f. Did the hours of use for this fixture increase, decrease or stay the same since the old bulb was replaced with the CFL?*
( ) Increased
( ) Decreased
( ) Stayed the same
( ) DK/NS

If Increased ask
21g. How many hours per day more?*
_____

If decreased, ask
21h. How many hours per day less?*

_____

2nd Installed Bulb - 13 watt

22. Please tell me about one of the 13-watt bulbs that was installed; that is, the less-bright, lower-wattage bulbs that were installed. In which room was this bulb installed?*
( ) Living/family room
( ) Dining room
( ) Kitchen
( ) Master bedroom
( ) Bedroom 2
( ) Bedroom 3 or other bedroom
( ) Hall
( ) Closet
( ) Basement
( ) Garage
( ) Bathroom
( ) Other: _____*

22a. Are you sure this bulb that was installed by the Residential Neighborhood Program was an 13-watt bulb?*
( ) Yes, it is an 13-watt bulb
( ) No, it is a 18-watt bulb
( ) DK/NS

If "No, it is an 18-watt bulb", ask them to pick a 13-watt bulb and go back to Q22; if they cannot, then check "No, it is an 18-watt bulb" and continue.

If "DK/NS", ask them if there are any installed bulbs that they know for sure are 13-watt bulbs and go back to Q22; if they cannot, then check "DK/NS" and continue.

22b. Was the bulb that was previously installed in this fixture or lamp a standard bulb or a CFL?*
( ) Standard Incandescent
( ) CFL
( ) Other: _____*
( ) There was no bulb in the socket
( ) DK/NS

22c. How many watts was the old bulb that was removed?*
( ) Less than 44
( ) 45-70
( ) 71-99
( ) 100 or more
( ) DK/NS

22d. What happened to the old bulb that was removed?*
( ) Recycled It
( ) Threw it away
( ) Stored it
( ) Auditor took it with them
( ) Other: _____*
( ) DK/NS

22e. On average, approximately how many hours per day is this light used?*
( ) Less than 1
( ) 1 to 2
( ) 3 to 4
( ) 5 to 10
( ) 11 to 12
( ) 13 to 24
( ) DK/NS

22f. Did the hours of use for this fixture increase, decrease or stay the same since the old bulb was replaced with the CFL?*
( ) Increased
( ) Decreased
( ) Stayed the same
( ) DK/NS

If Increased ask
22g. How many hours per day more?*
_____

If decreased, ask
22h. How many hours per day less?*
_____

3rd Installed Bulb - either 18-watt or 13-watt
Note: let customer choose which bulb to discuss, depending upon what they received.

23. For the third CFL, please choose either a 13-watt or 18-watt bulb that was installed in your home. In which room was this bulb installed?*
( ) Living/family room
( ) Dining room
( ) Kitchen
( ) Master bedroom
( ) Bedroom 2
( ) Bedroom 3 or other bedroom
( ) Hall

( ) Closet
( ) Basement
( ) Garage
( ) Bathroom
( ) Other: _____*

23a. Was this bulb that was installed one of the 13 watt bulbs or one of the 18 watt bulbs?*
( ) 13 watt
( ) 18 watt
( ) DK/NS

If "DK/NS", ask them if they can choose another bulb where they do know the wattage and go back to Q23; if they cannot identify the wattage of any other bulbs, check "DK/NS" and continue.

23b. Was the bulb that was previously installed in this fixture or lamp a standard bulb or a CFL?*
( ) Standard Incandescent
( ) CFL
( ) Other: _____*
( ) There was no bulb in the socket
( ) DK/NS

23c. How many watts was the old bulb that was removed?*
( ) Less than 44
( ) 45-70
( ) 71-99
( ) 100 or more
( ) DK/NS

23d. What happened to the old bulb that was removed?*
( ) Recycled It
( ) Threw it away
( ) Stored it
( ) Auditor took it with them
( ) Other: _____*
( ) DK/NS

23e. On average, approximately how many hours per day is this light used?*
( ) Less than 1
( ) 1 to 2
( ) 3 to 4
( ) 5 to 10
( ) 11 to 12
( ) 13 to 24
( ) DK/NS

23f. Did the hours of use for this fixture increase, decrease or stay the same since the old bulb was replaced with the CFL?*
( ) Increased
( ) Decreased
( ) Stayed the same
( ) DK/NS

If Increased ask
23g. How many hours per day more?*
_____

If decreased, ask
23h. How many hours per day less?*
_____

24. How many standard incandescent bulbs do you have in storage to replace bulbs that burn out?*
( ) None
( ) One or more *(record number)*: _____*
( ) DK/NS

If they have one or more incandescent bulbs in storage in Q24, ask Q24a:

24a. If one of the free CFLs that was installed through the Residential Neighborhood Program burns out, will you replace it with an incandescent bulb, another CFL, or some other type of bulb?*
(check all that apply)
[ ] CFL
[ ] Incandescent bulb
[ ] Halogen
[ ] LED
[ ] It depends on which socket burns out (or other factors)
[ ] DK/NS

If "It depends on which socket burns out (or other factors)", ask:

24b. Why do you say that?*
_____
_____
_____
_____

25. Have you removed any of the CFLs that were installed through the Residential Neighborhood Program?*
( ) Yes

( ) No
( ) DK/NS

If Yes to q25, ask 25a, 25b and 25c
25a. How many?*
_____

25b. Why did you remove them?*
(Select all that apply)
[ ] Not bright enough
[ ] Did not like the color of the light
[ ] The light was too bright
[ ] Too slow to start
[ ] Burned out
[ ] Not working properly
[ ] Did not like appearance/shape of the bulbs
[ ] Other *specify* : _____*

25c. What are the wattages of the bulbs you removed?*
(Enter the number of bulbs disposed for each wattage – the total number of bulbs should match Q25a)
# of 13-watt bulbs: _____
# of 18-watt bulbs: _____
# of DK/NS bulbs: _____

26. On a scale of 1 to 10 with 1 being very dissatisfied and 10 being very satisfied, please rate your satisfaction with the free CFLs bulbs you received.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less
26a. Why were you less than satisfied with the CFLs?*
_____
_____
_____
_____

Q27 bulb descriptions if needed:

Incandescent bulbs are the most common type of light bulb. It features a screw-base and is known for providing bright, warm light instantly.

Halogen light bulbs are similar to incandescent bulbs, but are known to be more energy-efficient than standard incandescent bulbs; they tend to be used in indoor and outdoor flood lighting, indoor recessed lighting, tracked lighting, and in floor and desk lamps.

CFLs, also known as compact fluorescent light bulbs, are energy-saving light bulbs that have a "twisty" shape, like a soft-serve ice cream cone.

LEDs, also known as "light-emitting diodes", are a type of lighting that uses multiple tiny bulbs, or diodes, that are wired together on one lamp.

27. Currently, there are a number of types of light bulbs available for purchase in the market, like CFL bulbs, Halogen bulbs, standard incandescent bulbs, and LED bulbs among others. Thinking about the next ten light bulbs you will purchase, how many will be…*
Interviewer: read descriptions of the types of bulb if respondents seem unclear on anything about them.

Total MUST equal 10. use DK/NS to balance total if needed
_____**Standard incandescent light bulbs**
_____**Halogen light bulbs**
_____**CFL light bulbs**
_____**LED light bulbs**
_____"Other" bulb types
_____DK/NS

27a. *if "other" is more than Zero, specify what "other" type(s) of bulb.*
_____

28. Did you have any CFLs installed in your home before receiving CFL bulbs from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If yes to Q28, ask Q28a to Q28c:
28a. How many?*
_____

28b. Where did you get the CFLs you were using in your home before receiving the bulbs from the Residential Neighborhood Program?*
(Do not read list, check all that apply)
[ ] Assistance office (CAP Agency, Energy Assistance Program)
[ ] Another Duke Energy program *Ask:* What program?:
_____*
[ ] A program from a company other than Duke Energy *Ask:* What program?:
_____*
[ ] Purchased at a store *Ask:* What store?:
_____*
[ ] Some other way *Ask:* What way?:
_____*

[ ] DK/NS

28c. How many years have you been using CFLs?*
( ) Never used until recently (first time user)
( ) 1 year or less (but not first time)
( ) 1 to 2 years
( ) 2 to 3 years
( ) 3 to 4 years
( ) 4 or more years
( ) Other *specify*: _____*
( ) DK/NS

28d. Do you currently have any CFL bulbs in storage to replace bulbs that burn out?*
( ) None
( ) One or more *record number*: _____*
( ) DK/NS

28e. How many of these spare CFL bulbs that you currently have in storage are CFLs that you received from the Residential Neighborhood Program? Please include any spare bulbs the auditor left behind, and any bulbs installed by you or the auditor that may have been removed.*
( ) None
( ) One or more *record number*: _____*
( ) DK/NS

29a. Were you planning on buying CFLs for your home before you received light bulbs from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already have them installed in all available sockets

29b. Have you purchased any additional CFLs since receiving some from the Residential Neighborhood Program?*
( ) Yes *29c.* How Many?: _____*
( ) No
( ) DK/NS

30. Before you received the free CFLs from the Residential Neighborhood Program, did you have any LED light bulbs installed in your home?*
( ) Yes
( ) No
( ) DK/NS

If yes to Q30, ask Q30a, b, c and d

30a. How many?*

_____

30b. Where did you get the LEDs were you using in your home before receiving CFLs from the Residential Neighborhood Program?*
(Do not read list, check all that apply)
[ ] Assistance office (CAP Agency, Energy Assistance Program)
[ ] Another Duke Energy program :
_____*
[ ] A program from a company other than Duke Energy :
_____*
[ ] Purchased at a store : _____*
[ ] Some other way : _____*
[ ] DK/NS

30c. How many years have you been using LEDs?*
( ) Have never used LED light bulbs at all
( ) Never used until recently (first time user)
( ) 1 year or less (but not first time)
( ) 1 to 2 years
( ) 2 to 3 years
( ) 3 to 4 years
( ) 4 or more years
( ) Other: _____*
( ) DK/NS

30d. Do you have any LED bulbs in storage to replace bulbs that burn out?*
( ) None
( ) One or more *record number*: _____*
( ) DK/NS

31. Were you planning on buying LEDs for your home before you received the CFL bulbs from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) No, already have LEDs installed in all available sockets
( ) Maybe
( ) Don't Know

LFS. Low-flow Showerhead

LFS-1. Did you or the auditor install any low-flow showerheads provided through the program?*
( ) Yes, I installed
( ) Yes, auditor installed

( ) No, I received a showerhead, but it has not been installed yet
( ) No, I did not receive a showerhead
( ) DK/NS
If "No' or "DK/NS" skip to next measure.

If "yes, I installed"
LFS-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install"
LFS-1b. Do you plan on using this item?*
( ) Yes
( ) No
( ) DK/NS
If "no" or "DK/NS"

LFS-1c. Why not?*
_____
If "yes, I installed" or "yes, auditor installed" in LFS-1, ask LFS-2 to LFS-4:

LFS-2a. How many low-flow showerheads did you receive from the Residential Neighborhood Program?*
( ) 1
( ) 2
( ) 3 or more: _____*

LFS-2b. Have any of the low-flow showerheads that were installed through the Residential Neighborhood Program since been uninstalled or removed?*
( ) Yes, one uninstalled
( ) Yes, two uninstalled
( ) No, all showerheads are still currently installed
( ) other: _____*
( ) DK/NS

If "yes" to LFS-2b, ask LFS-2c-d:
LFS-2c. Why were the low-flow showerheads removed?*
_____
LFS-2d. Who removed them?*
_____

Interviewer: answer LFS-2e., based on previous responses (# of units installed in 2a, minus units removed in 2b).
This is not a question for participant.

*LFS-2e. Number of low-flow showerheads provided by the program which are currently installed in the home**
( ) 0
( ) 1
( ) 2

If "one" in LFS-2e., ask LFS-3a:
LFS-3a. Typically how many showers per week are taken using this showerhead?*
( ) 0 to 4
( ) 5 to 10
( ) 11 to 15
( ) 16 to 20
( ) 21 or more
( ) DK/NS

If "two" in LFS-2e., ask LFS-3b-c:
LFS-3b. Typically how many showers per week are taken using the showerhead that gets used most often?*
( ) 0 to 4
( ) 5 to 10
( ) 11 to 15
( ) 16 to 20
( ) 21 or more
( ) DK/NS

If "two" in LFS-2e., ask LFS-3b-c:
LFS-3c. And how many showers per week are typically taken using the second showerhead?*
( ) 0 to 4
( ) 5 to 10
( ) 11 to 15
( ) 16 to 20
( ) 21 or more
( ) DK/NS

If "one" in LFS-2e., ask LFS-3d:
LFS-3d. Would you estimate that the amount of water coming out of this showerhead is…*
( ) Less than it was with the old showerhead
( ) About the same as with the old showerhead
( ) More than with the old showerhead

If "two" in LFS-2e., ask LFS-3e-f:
LFS-3e. For the showerhead that gets used most often, would you estimate that the amount of water coming out of this showerhead is…*
( ) Less than it was with the old showerhead
( ) About the same as with the old showerhead

( ) More than with the old showerhead

LFS-3f. For the second showerhead, would you estimate that the amount of water coming out of this showerhead is…*
( ) Less than it was with the old showerhead
( ) About the same as with the old showerhead
( ) More than with the old showerhead

Everyone continues with LFS-4:
LFS-4. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the low-flow showerhead(s).*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in LFS-4, ask LFS-4a:
LFS-4a. Why were you less than satisfied with the low-flow showerhead?*
_____
_____
_____
_____

LFS-4b. Did you have any low-flow showerheads installed in your home before participating in the Residential Neighborhood Program?*
( ) Yes
LFS-4c. How many? : _____*
( ) No
( ) DK/NS

LFS-4d. Were you planning on buying a new low-flow showerhead for your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already have them installed in all showers

LFS-4e. Have you purchased any additional low-flow showerheads since participating in the Residential Neighborhood Program?*
( ) Yes
LFS-4f. How many? : _____*
( ) No
( ) DK/NS

FA. Faucet Aerators

FA-1. Did you or the auditor install any faucet aerators provided through the program?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received aerator(s) but they have not been installed yet
( ) No, I did not receive aerator(s)
( ) DK/NS

If "No" or "DK/NS", skip to next measure.

If "yes, I installed"
FA-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install"
FA-1b. Do you plan on using this item?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS"
FA-1c. Why not?*
_____

If "yes, I installed" or "yes, auditor installed" in FA-1, ask FA-2a, FA-3a and FA-4a (and any applicable follow-up questions), then continue from FA-5:

FA-2a. How many aerators were installed on faucets in your kitchen?*
( ) 0
( ) 1
( ) 2
( ) 3
( ) DK/NS

If "one or more" in FA-2a, ask FA-2b-g:
FA-2b. Did the faucets in your kitchen already have aerators on them that had to be removed before installing the aerators provided by the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES in FA-2b and "two" or "three" in FA-2a then ask:
FA-2c. How many old aerators were removed?*

_____

FA-2d. Have any of the kitchen aerators that were installed through the Residential Neighborhood Program since been uninstalled or removed?*
( ) Yes, one uninstalled
( ) Yes, two uninstalled
( ) Yes, three uninstalled
( ) No, all kitchen aerators are still currently installed
( ) DK/NS

If "yes" to FA-2d, ask FA-2e-f
FA-2e. Why were the kitchen aerators removed?*

_____

FA-2f. Who removed them?*

_____

FA-2g. Would you estimate that the amount of water coming out of your kitchen faucets with newly-installed aerators is…*
( ) Less than before installing the aerator
( ) About the same as before installing the aerator
( ) More than before installing the aerator
( ) DK/NS

FA-3a. How many aerators were installed on faucets in your bathroom(s)?*
( ) 0
( ) 1
( ) 2
( ) 3
( ) DK/NS

If "one or more" in FA-3a, ask FA-3b-g:
FA-3b. Did the faucets in your bathroom already have aerators on them that had to be removed before installing the aerators provided by the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES to 3b and "two" or "three" in FA-3a then ask:
FA-3c. How many old aerators were removed?

_____

FA-3d. Have any of the bathroom aerators that were installed through the Residential Neighborhood Program since been uninstalled or removed?*
( ) Yes, one uninstalled
( ) Yes, two uninstalled
( ) Yes, three uninstalled
( ) No, all bathroom aerators are still currently installed
( ) DK/NS

If "yes" to FA-2d, ask FA-2e-f
FA-3e. Why were the bathroom aerators removed?*

_____

FA-3f. Who removed them?*

_____

FA-3g. Would you estimate that the amount of water coming out of your bathroom faucets with newly-installed aerators is…*
( ) Less than before installing the aerator
( ) About the same as before installing the aerator
( ) More than before installing the aerator
( ) DK/NS

FA-4a. How many aerators were installed on faucets in your home in places other than the kitchen and bathroom?*
( ) 0
( ) 1
( ) 2
( ) 3
( ) DK/NS

If "one or more" in FA-4a, ask FA-4b to h:
FA-4b. In which room(s) was this (were these) aerator(s) installed?*

_____

FA-4c. Did the faucets located in rooms other than bathrooms and the kitchen already have aerators on them that had to be removed before installing the aerators provided by the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

if Yes:
FA-4d. How many <u>old</u> aerators were removed?*

_____

FA-4e. Have any of the aerators that were installed someplace other than a bathroom or kitchen been uninstalled or removed?*
( ) Yes, one uninstalled
( ) Yes, two uninstalled
( ) Yes, three uninstalled
( ) No, all aerators are still currently installed
( ) DK/NS

If "yes" to FA-4e, ask FA-4f-g:
FA-4f. Why were the aerators removed?*
_____

FA-4g. Who removed them?*
_____

FA-4h. Would you estimate that the amount of water coming out of these faucets with newly-installed aerators is…*
( ) Less than before installing the aerator
( ) About the same as before installing the aerator
( ) More than before installing the aerator
( ) DK/NS

FA-5. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the faucet aerators.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS ( ) N/A

If 7 or less in LFS-4, ask LFS-4a:
FA-5a. Why were you less than satisfied with the aerator(s)?*
_____
_____
_____
_____

FA-5b. Did you have any faucet aerators installed in your home before you received some from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
FA-5c. How many aerators were in your home, and in which rooms were they located?*
_____

FA-5d. Were you planning on buying any faucet aerators for your home before you received some from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already have them installed in all available faucets

FA-5e. Have you purchased any additional faucet aerators since receiving aerators from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
FA-5f. How many?*
_____

FIS. Foam Insulation Spray

FIS-1. Did you or the auditor install any foam insulation spray provided through the program?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received foam insulation spray but it has not been installed yet
( ) No, I did not receive foam insulation spray
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" in FIS-1, ask FIS-1a
FIS-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in FIS-1, ask FIS-1b:
FIS-1b. Do you plan on using the foam insulation spray?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in FIS-1b, ask FIS-1c:
FIS-1c. Why not?*
_____

If "yes, I installed" or "yes, auditor installed" in FIS-1, ask QFIS-2a-QFIS-3e:
FIS-2a. Where in your home was the foam insulation spray used?*
_____

FIS-2b. Do you know how much foam insulation spray was used?*
( ) Yes *specify*: _____*
( ) No or DK/NS

FIS-2c. Did the installer from the Residential Neighborhood Program leave you with any extra foam insulation spray that was not installed at the time?*
( ) Yes
( ) No
( ) DK/NS

FIS-2d. Has any of the foam insulation spray provided by the Residential Neighborhood Program been removed from where it was installed?*
( ) Yes
( ) No, all installations are still in place
( ) DK/NS

If "yes" to QFIS-2d, ask QFIS-2e-g:
FIS-2e. How much of the foam insulation spray was removed? Would you say . . .*
( ) All of it,
( ) Most of it,
( ) Some of it, or
( ) Only a small portion?
( ) DK/NS

FIS-2f. Why was the foam insulation spray removed?*
_____
_____
_____
_____

FIS-2g. Who removed it?*
_____
_____
_____
_____

FIS-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the foam insulation spray.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in QFIS-3, ask QFIS-3a:
FIS-3a. Why were you less than satisfied with the foam insulation spray?*
_____
_____
_____
_____

FIS-3b. Did you have foam insulation spray installed in your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

FIS-3c. Were you planning on buying any foam insulation spray for your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already installed every place possible

FIS-3d. Have you purchased any additional foam insulation spray since participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
FIS-3e. How many cans did you purchase?*
_____

WSD. Vinyl Weather Stripping – Doors

WSD-1. Did you or the auditor install any foam vinyl weather stripping tape, provided through the program, around doors?*
If participant is uncertain about what this is, explain that it is a foam "spongy" peel and stick tape that goes around doors.
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received weather stripping tape for doors, but it has not been installed yet

( ) No, I did not receive weather stripping tape for doors
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

If "yes, I installed" in WSD-1, ask WSD-1a:
WSD-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in WSD-1, ask WSD-1b:
WSD-1b. Do you plan on using this item?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in WSD-1b, ask WSD-1c:
WSD-1c. Why not?*
_____

If "yes, I installed" or "yes, auditor installed" in WSD-1, ask WSD-2a-WSD-3f:
WSD-2a. How many doors in your home were weather stripped with the foam vinyl tape provided by the Residential Neighborhood Program?*
( ) One or more *specify number of doors*:
_____*
( ) None
( ) DK/NS

WSD-2b. Has the foam vinyl tape provided by the Residential Neighborhood Program been removed from any of the doors where it was installed?*
( ) Yes
( ) No, all installations are still in place
( ) DK/NS

If "yes" to WSD-2b, ask WSD-2c-e:
WSD-2c. How many doors had the foam vinyl weather stripping tape installed but then removed?*
_____

WSD-2d. Why was the weather stripping tape removed?*
_____

WSD-2e. Who removed it?*
_____

WSD-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with weather stripping tape for doors.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in WSD-3, ask WSD-3a:
WSD-3a. Why were you less than satisfied with the weather stripping tape for doors?*
_____
_____
_____
_____

WSD-3b. Did you have any weather stripping tape installed around doors in your home before you received some from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
WSD-3c. For how many doors?*
_____

WSD-3d. Were you planning on buying any weather stripping tape for your home's doors before you received some from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already have tape installed around all available doors

WSD-3e. Have you purchased any additional weather stripping tape for doors since receiving some from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
WSD-3f. For how many doors?*
_____

WW. Vinyl Weather Stripping – HVAC window units

WW-1. Did you or the auditor install any foam vinyl weather stripping tape, provided through the program, around window air conditioning units?*

If participant is uncertain about what this is, explain that it is a foam "spongy" peel and stick tape that goes around their air conditioners.
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received weather stripping tape for window A/C but it has not been installed yet
( ) No, I did not receive weather stripping tape for window A/C
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

If "yes, I installed" in WW-1, ask WW-1a:
WW-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in WW-1, ask WW-1b:
WW-1b. Do you plan on using this item?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in WW-1b, ask WW-1c:
WW-1c. Why not?*
_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in WW-1, ask WW-2a-WW-3f:
WW-2a. How many windows in your home with A/C units were weather stripped with the foam vinyl tape provided by the Residential Neighborhood Program?*
( ) One or more, specify number of windows:
_____*
( ) None
( ) DK/NS

WW-2b. Has the foam vinyl tape provided by the Residential Neighborhood Program been removed from any of the window A/C units where it was installed?*
( ) Yes
( ) No, all installations are still in place
( ) DK/NS

If "yes" to WW-2b, ask WW-2c-e:
WW-2c. How many window A/C units had the foam vinyl weather stripping tape installed but then removed?*

_____

WW-2d. Why was the weather stripping tape removed?*

_____

WW-2e. Who removed it?*

_____

WW-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the weather stripping tape for window air conditioning units.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in WW-3, ask WW-3a:
WW-3a. Why were you less than satisfied with the weather stripping tape for window air conditioning units?*

_____
_____
_____
_____

WW-3b. Did you have any weather stripping tape installed around windows with A/C units in your home before you received some from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
WW-3c. For how many A/C units?*

_____

WW-3d. Were you planning on buying any weather stripping tape for your home's windows with A/C units before you received some from the Residential Neighborhood Program?*
( ) Yes
( ) Maybe
( ) No
( ) DK/NS
( ) No, already have tape installed around all available windows

WW-3e. Have you purchased any additional weather stripping tape for windows with A/C units since receiving some from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
WW-3f. For how many A/C units?*
_____

WK. HVAC Winter Kit for Wall/Window Unit

WK-1. Did you or the auditor install the winter kit for wall or window air conditioning units that was provided through the program?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received the kit but it has not been installed yet
( ) No, I did not receive the winter kit for A/C units
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" in WK-1, ask WK-1a
WK-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in WK-1, ask WK-1b-c:
WK-1b. How many kits did you receive? (*if needed*: That is, how many wall or window air conditioning units did the auditor leave you winter insulation kits for?)*
( ) one
( ) two
( ) three
( ) DK/NS

WK-1c. Do you plan on using this item/these items?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in WK-1c, ask WK-1d:
WK-1d. Why not?*
_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in WK-1, ask WK-2a to WK-3g
WK-2a. How many wall or window air conditioning units in your home were winterized using the kit provided by the Residential Neighborhood Program?*

( ) One or more winterized using kit *specify number of units*:
_____*
( ) None
( ) DK/NS

WK-2b. Has the winter kit for wall or window air conditioning units provided by the Residential Neighborhood Program <u>been removed</u> from any of the A/C units where it was installed?*
( ) Yes
( ) No, all installations are still in place
( ) DK/NS

If "yes" to WK-2b, ask WK-2c-e:
WK-2c. How many window A/C units had the winter kit installed but then removed?*
_____

WK-2d. Why was it removed?*
_____

WK-2e. Who removed it?*
_____

WK-2f. Are any of the window or wall units winterized with the kit removable? In other words, is the A/C unit permanently attached, or can it be taken out of the wall or window in winter?*
( ) One or more removable units, *specify number of units:*:
_____*
( ) None are removable / all are permanently installed *SKIP TO WK-3a*
( ) DK/NS *SKIP TO WK-3a*

If "one or more" to WK-2f, ask WK-2g
WK-2g. In previous years, have you removed any A/C units from walls or windows for the winter, or do you leave the units in place all year round?*
( ) Always removed units during winter
( ) Sometimes removed units during winter, sometimes left them in
( ) Always left units in place during winter
( ) DK/NS

If "one or more" to WK-2f, ask WK-2h
WK-2h. Which of the following statements best describes the situation with your wall or window A/C units during the most recent winter?
*(READ RESPONSES)**
( ) I left the units in place through the winter, and would have done so whether or not I participated in the Residential Neighborhood Program.
( ) I took the units out for the winter, and would have done so whether or not I participated in the Residential Neighborhood Program.

( ) I left the units in place through the winter, though if I had not participated in the Residential Neighborhood Program, I probably would have taken them out for the winter.
( ) I took the units out for winter, though if I had not participated in the Residential Neighborhood Program, I probably would have left them in place for the winter.
( ) DK/NS *(Do Not Read)*

WK-3a. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the winter kit for wall or window air conditioning units.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in WK-3a, ask WK-3b:
WK-3b. Why were you less than satisfied with the winter kit for wall or window air conditioning units?*

_____
_____
_____
_____

WK-3c. Did you have a winter kit for wall or window air conditioning units installed in your home before you received one by participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
WK-3d. For how many A/C units?*

_____

WK-3e. Were you planning on buying a new winter kit for wall or window air conditioning units for your home before you received one by participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already installed every place possible

WK-3f. Have you purchased any additional winter kits for wall or window air conditioning units since participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:

WK-3g. For how many A/C units?*

_____

CD. Caulking Doors

CD-1. Did you or the auditor install any caulking, provided through the program, around doors?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received caulk for doors but it has not been installed yet
( ) No, I did not receive caulk for doors
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" in CD-1, ask CD-1a
CD-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in CD-1, ask CD-1b:
CD-1b. Do you plan on using the caulk for your doors?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in CD-1b, ask CD-1c:
CD-1c. Why not?*
_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in CD-1, ask CD-2a-e:
CD-2a. How many doors in your home were caulked using the supplies provided by the Residential Neighborhood Program?*
( ) One or more *specify number of doors*:
_____*
( ) None
( ) DK/NS

CD-2b. Has the caulking provided by the Residential Neighborhood Program been removed from any of the doors where it was installed?*
( ) Yes

( ) No, all installations are still in place
( ) DK/NS

If "yes" to CD-2b, ask CD-2c-e:
CD-2c. How many doors had the caulking installed but then removed?*

_____

CD-2d. Why was the caulk removed?*

_____

CD-2e. Who removed it?*

_____

CD-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the door caulking.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in CD-3, ask CD-3a:
CD-3a. Why were you less than satisfied with the door caulking?*

_____
_____
_____
_____

CD-3b. Did you have caulking installed on any doors in your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
CD-3c. For how many doors?*

_____

CD-3d. Were you planning on buying any door caulking for your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already installed every place possible

CD-3e. Have you purchased any additional caulking for doors since participating in the Residential Neighborhood Program?*

( ) Yes
( ) No
( ) DK/NS

If YES, ask:
CD-3f. For how many doors?*
_____

CW. Caulking Windows

CW-1. Did you or the auditor install any caulking, provided through the program, around windows?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received caulk for windows but it has not been installed yet
( ) No, I did not receive caulk for windows
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" in CW-1, ask CW-1a
CW-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in CW-1, ask CW-1b
CW-1b. Do you plan on using the caulk for your windows?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in CW-1b, ask CW-1c:
CW-1c. Why not?*
_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in CW-1, ask CW-2a to CW-3f
CW-2a. How many windows in your home were caulked using the supplies provided by the Residential Neighborhood Program?*
( ) One or more *specify number of windows*:
_____*
( ) None

( ) DK/NS

CW-2b. Has the caulking provided by the Residential Neighborhood Program been removed from any of the windows where it was installed?*
( ) Yes
( ) No, all installations are still in place
( ) DK/NS

If "yes" to CW-2b, ask CW-2c-e:
CW-2c. How many windows had the caulking installed but then removed?*
_____

CW-2d. Why was the caulk removed?*
_____
_____
_____
_____

CW-2e. Who removed it?*
_____
_____
_____
_____

CW-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the window caulking.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in CW-3, ask CW-3a:
CW-3a. Why were you less than satisfied with the window caulking?*
_____
_____
_____
_____

CW-3b. Did you have caulking installed on any windows in your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
CW-3c. For how many windows?*
_____

CW-3d. Were you planning on buying any window caulking for your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already installed every place possible

CW-3e. Have you purchased any additional caulking for windows since participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
CW-3f. For how many windows?*
_____

DS. Door Sweeps

DS-1. Did you or the auditor install any door sweeps, provided through the program, under your doors?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received door sweeps but they have not been installed yet
( ) No, I did not receive door sweeps
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" in DS-1, ask DS-1a

DS-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in 1, ask 1b
DS-1b. Do you plan on using the door sweeps?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in DS-1b, ask DS-1c
DS-1c. Why not?*

_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in DS-1, ask DS-2a to DS-3f
DS-2a. How many doors in your home currently have door sweeps provided by the Residential Neighborhood Program?*
( ) One or more *specify number of doors*:
_____*
( ) None
( ) DK/NS

DS-2b. Have any of the door sweeps that were installed through the Residential Neighborhood Program been uninstalled or removed?*
( ) Yes
( ) No, all installations are still in place
( ) DK/NS

If "yes" to DS-2b, ask DS-2c to DS-2e
DS-2c. How many doors had door sweeps installed but then removed?*
_____

DS-2d. Why was the door sweep removed?*
_____
_____
_____
_____

DS-2e. Who removed it?*
_____
_____
_____
_____

DS-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the door sweeps.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in DS-3, ask DS-3a
DS-3a. Why were you less than satisfied with the door sweeps?*
_____
_____
_____
_____

DS-3b. Did you have sweeps installed on any doors in your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
DS-3c. For how many doors?*
_____

DS-3d. Were you planning on buying any door sweeps for your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already installed every place possible

DS-3e. Have you purchased any additional door sweeps since participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
DS-3f. For how many doors?*
_____

GT. Clear Glass Patch Tape

GT-1. Did you or the auditor install the clear glass patch tape, provided through the program, on any windows in your home?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received clear glass patch tape but it has not been installed yet
( ) No, I did not receive clear glass patch tape
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" in GT-1, ask GT-1a
GT-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in 1, ask 1b
GT-1b. Do you plan on using the clear glass patch tape?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in GT-1b, ask GT-1c
GT-1c. Why not?*
_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in GT-1, ask GT-2a to GT-3f
GT-2a. How many windows in your home were patched using clear glass patch tape provided by the Residential Neighborhood Program?*
( ) One or more *specify number of windows*:
_____*
( ) None
( ) DK/NS

GT-2b. Has the clear glass patch tape provided by the Residential Neighborhood Program been removed from any of the windows where it was installed?*
( ) Yes
( ) No, all installations are still in place
( ) DK/NS

If "yes" to GT-2b, ask 2c to 2e
GT-2c. How many windows had the clear glass patch tape installed but then removed?*
_____

GT-2d. Why was the clear glass patch tape removed?*
_____
_____
_____
_____

GT-2e. Who removed it?*
_____
_____
_____
_____

GT-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the clear glass patch tape.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in GT-3, ask 3a
GT-3a. Why were you less than satisfied with the clear glass patch tape?*
_____
_____
_____
_____

GT-3b. Did you have clear glass patch tape installed on any windows in your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
GT-3c. For how many windows?*
_____

GT-3d. Were you planning on buying any clear glass patch tape for your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already installed every place possible

GT-3e. Have you purchased any additional clear glass patch tape for windows since participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
GT-3f. For how many windows?*
_____

PW. Water Heater Pipe Wrap

PW-1. Did you or the auditor wrap any insulation, provided through the program, around hot water pipes?*
( ) Yes, I installed
( ) Yes, auditor installed

( ) No, I received hot water pipe wrap but it has not been installed yet
( ) No, I did not receive hot water pipe wrap
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" in PW-1, ask 1a
PW-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" in 1, ask 1b
PW-1b. Do you plan on using the hot water pipe insulation wrap?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in PW-1b, ask 1c
PW-1c. Why not?*
_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in PW-1, ask 2a to 3f
PW-2a. Was there any old insulation that had to be removed before installing the new hot water pipe insulation wrap?*
( ) Yes
( ) No
( ) DK/NS

PW-2b. Do you know about how many feet of hot water pipe was wrapped with insulation?*
( ) Yes *Specify number of feet*: _____*
( ) No / DK/NS

PW-2c. Did the installer from the Residential Neighborhood Program leave you with any extra hot water pipe insulation wrap that was not installed at the time?*
( ) Yes
( ) No
( ) DK/NS

If "yes" to PW-2c:
PW-2d. About how many extra feet of hot water pipe insulation wrap did they leave you with?*

_____

PW-2e. Has any of the hot water pipe insulation wrap that was provided by the Residential Neighborhood Program been removed from where it was installed?*
( ) Yes
( ) No, all installations are still in place
( ) DK/NS

If "yes" to PW-2e, ask PW-2f-h:
PW-2f. About how many feet of hot water pipe insulation wrap was removed?*
_____

PW-2g. Why was the hot water pipe insulation wrap removed?*
_____
_____
_____
_____

PW-2h. Who removed it?*
_____
_____
_____
_____

PW-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the hot water pipe insulation wrap.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in PW-3, ask 3a
PW-3a. Why were you less than satisfied with the hot water pipe insulation wrap?*
_____
_____
_____
_____

PW-3b. Did you have hot water pipe insulation wrap installed in your home before participating in the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

PW-3c. Were you planning on buying any insulation for your hot water pipes before participating in the Residential Neighborhood Program?**
( ) Yes
( ) No

( ) Maybe
( ) DK/NS
( ) No, already installed every place possible

PW-3d. Have you purchased any additional hot water pipe insulation wrap since participating in the Residential Neighborhood Program?**
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
PW-3e. How many feet of hot water pipe insulation wrap did you purchase?*
_____

TW. Water Heater Tank Insulation Wrap

TW-1. Did you or the auditor install any insulation, provided through the program, on your hot water heater tank?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received hot water tank insulation wrap but it has not been installed yet
( ) No, I did not receive hot water tank insulation wrap
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" ask
TW-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

If "no, I received but did not install" , ask
TW-1b. Do you plan on using the hot water tank insulation wrap?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in TW-1b, ask TW-1c
TW-1c. Why not?*
_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in TW-1, ask TW-2a to TW-3c

TW-2a. Has the hot water tank insulation wrap that was provided by the Residential Neighborhood Program been removed from where it was installed?*

( ) Yes
( ) No, all installations are still in place
( ) DK/NS

TW-2b. Why was the hot water tank insulation wrap removed?*

_____

TW-2c. Who removed it?*

_____

TW-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the hot water tank insulation wrap.*

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in TW-3, ask 3a

TW-3a. Why were you less than satisfied with the hot water tank insulation wrap? (specify:)*

_____
_____
_____
_____

TW-3b. Did you have any insulation wrap installed on your hot water tank before participating in the Residential Neighborhood Program?*

( ) Yes
( ) No
( ) DK/NS

TW-3c. Were you planning on buying insulation to wrap your hot water tank before participating in the Residential Neighborhood Program?*

( ) Yes
( ) No
( ) Maybe
( ) DK/NS
( ) No, already installed every place possible

TA. Water Heater Temperature Adjustment

TA-1. During the Residential Neighborhood Program audit, did you or the auditor check the temperature of your hot water heater?*

( ) Yes, I did

( ) Yes, auditor did
( ) No, the auditor left tool/instructions for checking the temperature but I haven't done it yet
( ) No, the water temperature was not checked
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I checked" in TA-1, ask TA-1a
TA-1a. Was it easy to check the temperature?*
( ) Yes
( ) No
( ) DK/NS

TA-2a. Do you recall what temperature your hot water heater was set at when it was first checked during the Residential Neighborhood Program audit?*
( ) Yes
specify temperature: _____*
( ) No or DK/NS

TA-2b. After checking the temperature of your hot water heater, were any adjustments made to the temperature setting during the Residential Neighborhood Program audit?*
( ) Yes
( ) No
( ) DK/NS

If "yes" in TA-2b, ask 2c:
TA-2c. Do you know what temperature your hot water heater was set to after being adjusted?*
( ) Yes
specify temperature: _____*
( ) No or DK/NS

TA-2d. Has anyone made any further changes to the temperature setting on your hot water heater since the auditor from the Residential Neighborhood Program visited your home?*
( ) Yes
( ) No
( ) DK/NS

If YES to 2d, ask 2e and 2f
TA-2e. Who adjusted your temperature settings after the visit from the auditor?*
_____

TA-2f. What adjustment was made to the temperature setting?*
Record "up" or "down" <u>and</u> the number of degrees changed.
_____

TA-3. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the adjustments made to your hot water heater temperature settings.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in TA-3, ask TA-3a:
TA-3a. Why were you less than satisfied with the adjustments made to your hot water heater temperature settings?*
_____
_____
_____
_____

TA-3b. How often did you check the temperature on your water heater before participating in the Residential Neighborhood Program?*
( ) Never checked
( ) Checked once or twice / a few times
( ) Regularly, but less often than once per year
( ) Regularly, once per year or more frequently
( ) DK/NS

SP. Switch Plate Wall Thermometer

SP-1. During the Residential Neighborhood Program audit, did you or the auditor install the switch plate wall thermometer that was provided through the program?*
( ) Yes, I installed
( ) Yes, auditor installed
( ) No, I received the wall thermometer but it has not been installed yet
( ) No, did not receive wall thermometer
( ) DK/NS

If "No, I did not receive ' or "DK/NS" skip to next measure.

if "Yes, I installed" in SP-1, ask SP-1a
SP-1a. Was it easy to install?*
( ) Yes
( ) No
( ) DK/NS

if "Yes, I installed" in SP-1, ask SP-1a
SP-1b. Do you plan on using the switch plate wall thermometer?*
( ) Yes
( ) No
( ) DK/NS

If "no" or "DK/NS" in SP-1b, ask 1c:

SP-1c. Why not?*

_____
_____
_____
_____

If "yes, I installed" or "yes, auditor installed" in SP-1, ask SP-2a to SP-2c
SP-2a. Where was the switch plate wall thermometer installed in your home? (Which room?)*

_____
_____
_____
_____

SP-2b. Including the switch plate wall thermometer you received from the Residential Neighborhood Program, how many thermometers are there in your home now?*
This includes the thermometer that is part of a Thermostat
( ) 1
( ) 2
( ) 3
( ) 4 or more
( ) DK/NS

SP-2c. Has the switch plate wall thermometer that was provided by the Residential Neighborhood Program been removed from where it was installed?*
( ) Yes, moved to somewhere else in the home
( ) Yes, no longer installed in the home
( ) No, installation is still in place
( ) DK/NS

If "yes, moved elsewhere" to SP-2c, ask SP-2d-e then continue from SP-3a:
SP-2d. Where was the switch plate wall thermometer moved to?*

_____

SP-2e. Why was the switch plate wall thermometer moved?*

_____
_____
_____
_____

If "yes, no longer installed" to SP-2c, ask SP-2f-g then skip to SP-4:
SP-2f. Why was the switch plate wall thermometer removed?*

_____
_____
_____
_____

SP-2g. Who removed it?*

_____

SP-3a. About how often would you say you check the temperature reading on the new switch plate wall thermometer you received from the Residential Neighborhood Program?*
( ) More often than once a day
( ) About once a day
( ) Once every few days
( ) About once a week
( ) Less often than once a week
( ) Never
( ) DK/NS

SP-3b. Have you made any adjustments to your <u>heating settings in the winter</u> since the new switch plate wall thermometer was installed?*
( ) Yes *Ask 3c*
( ) No
( ) DK/NS

SP-3c. What adjustments have you made to the temperature setting?*
(If applicable, record "up" or "down" and the number of degrees changed.)

_____

SP-3d. Have you made any adjustments to your <u>cooling settings in the summer</u> since the new switch plate wall thermometer was installed?*
( ) Yes *Ask 3e*
( ) No
( ) DK/NS
( ) NA

SP-3e. What adjustments have you made to the temperature setting?*
(If applicable, record "up" or "down" and the number of degrees changed.)

_____

SP-4. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the switch plate wall thermometer.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less in SP-4, ask 4a:
SP-4a. Why were you less than satisfied with the switch plate wall thermometer?*

_____
_____
_____
_____

F. A/C and Heat Filters / Change Filter Calendar

F-1a. Did the auditor from the Residential Neighborhood Program give you a year's supply of air conditioner and heater filters?*
( ) Yes
( ) No, did not receive filters
( ) DK/NS

F-1b. Did the auditor from the Residential Neighborhood Program give you a calendar for keeping track of when to change the filters?*
( ) Yes
( ) No, did not receive calendar
( ) DK/NS

If "No" or "DK/NS" responses to both F-1a and F-1b, then skip ahead to next measure now.

If "yes" to either F-1a or F-1b, then continue with F-1c to F-2d:

F-1c. Did you or the auditor from the Residential Neighborhood Program change your A/C or heater filter during their visit to your home?*
( ) Yes, auditor changed filter
( ) Yes, I changed filter
( ) No, did not change filter during audit
( ) DK/NS

If "yes, I changed filter" in F-1c, ask F-1d
F-1d. Was changing the filter easy to do?*
( ) Yes
( ) No
( ) DK/NS

F-1e. Have you been using the filter change calendar and changing your filters regularly since the Residential Neighborhood Program audit?*
( ) Yes, I am using the calendar and changing filters
( ) Yes I have been changing filters, but I am not using the calendar
( ) No, not using calendar or changing filters
( ) DK/NS

If "yes, I am using the calendar and changing filters" in F-1e, ask F-1f:
F-1f. Have you been changing the filters every time the calendar suggests, more frequently, or less frequently?*
( ) As calendar suggests
( ) More frequently
ask: **How much more frequently?** :
_____*

( ) Less frequently
ask: **How much less frequently?** :
_____*
( ) Other *specify*: _____*
( ) DK/NS

If "yes, changing filters but not using calendar" in F-1e, ask F-1g-h
F-1g. Why are you not using the filter change calendar?*
_____

F-1h. How often do you change the filter?*
_____

If "no, not using calendar or changing filters" in F-1e, ask F-1i:
F-1i. Why are you not using the A/C and heater filters that were provided by the Residential Neighborhood Program?*
_____

F-2. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the <u>filter change calendar</u> that was provided by the program.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS ( ) NA

If 7 or less in F-2, ask F-2a
F-2a. Why were you less than satisfied with the filter change calendar?*
_____
_____
_____
_____

F-2b. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the <u>A/C and heater filters</u> that were provided by the program.*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS ( ) NA

If 7 or less in F-2b, ask F-2c
F-2c. Why were you less than satisfied with the <u>A/C and heater filters</u>?*
_____
_____
_____
_____

F-2d. How often were you changing your A/C and heater filters before you participated in the Residential Neighborhood Program?*
_____

F-2e. Were you planning on buying any A/C or heater filters before you received some from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) Maybe
( ) DK/NS

F-2f. Have you purchased any additional A/C or heater filters since receiving a year's supply from the Residential Neighborhood Program?*
( ) Yes
( ) No
( ) DK/NS

If YES, ask:
F-2g. For how many filters did you purchase?*
_____

Interviewer: Ask q120 to the end of the survey for all respondents.

120. We are interested in learning what Duke Energy might offer in order to convince people like yourself to participate in programs like the Residential Neighborhood Program. Are there things that this program could have provided that you think would have made more people want to participate?*
_____
_____
_____
_____

I would now like to ask about your satisfaction with different aspects of the Residential Neighborhood Program. I will read a list of items, after I read each item please tell me how satisfied you are with that item. Please indicate on a 1 to 10 scale with a 10 meaning you are very satisfied and a 1 meaning you are very dissatisfied.

121. How satisfied are you with the convenience of enrolling in the Residential Neighborhood Program?*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
121a. How could this be improved?*
_____
_____
_____
_____

122. How satisfied are you with the knowledge of the auditor who visited your home?*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
122a. How could this be improved?*

_____
_____
_____
_____

123. How satisfied are you with the helpfulness of the auditor who visited your home?*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
123a. How could this be improved?*

_____
_____
_____
_____

124. Now I'm going to ask you about community meetings. Did you attend the community meeting in your neighborhood for the Residential Neighborhoods Program?*
( ) Yes
( ) No
( ) DK/NS

125. Next I am going to read you some more statements about the community meeting. As before, please rate your satisfaction with each aspect of the community meeting on a 1 to 10 scale, where 10 means very satisfied and 1 means very dissatisfied. How satisfied are you with the information presented about the Residential Neighborhood Program at the community meeting?*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
125a. How could this be improved?*

_____
_____
_____
_____

If Yes to q124, ask q126 and q127
126. Using the same 1-to-10 rating scale, how satisfied are you with the staff and presenters at the community meeting?*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
126a. How could this be improved?*

_____

_____
_____
_____

127. How would you rate your overall satisfaction with the Residential Neighborhood Program?*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
127a. How could this be improved?*
_____
_____
_____
_____

(Ohio only)
128. If you were rating your overall satisfaction with the Residential Neighborhood Program, would you say you were…*
( ) Very Satisfied,
( ) Somewhat Satisfied,
( ) Neither Satisfied nor Dissatisfied,
( ) Somewhat Dissatisfied, or
( ) Very Dissatisfied?
( ) Refused
( ) DK/NS

(Ohio only)
128a. Why do you give it that rating?*
_____
_____
_____
_____

129. And, overall how would you rate your satisfaction with Duke Energy?*
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
129a. How could this be improved?*
_____
_____
_____
_____

130. How much time was there between the day you signed up for the Residential Neighborhood Program and the day the auditor visited your home to install energy efficiency measures?*

_____

131. Would you say that the time between signing up and the auditor's visit was …*
( ) Too long,
( ) About right, or
( ) Too short?
( ) DK/NS

132. How about the length of time the auditor was at your home, was it …*
( ) Too long,
( ) About right, or
( ) Too short?
( ) DK/NS

133. What was your favorite thing about participating in the Residential Neighborhood Program?*
_____
_____
_____
_____

134. What was your least favorite thing about participating in the Residential Neighborhood Program?*
_____
_____
_____
_____

135. What would you say are the most important things you learned from the Residential Neighborhood Program?*
After each response, ask Anything else? *if No, go to q136*
a: _____
b: _____
c: _____

136. Have you taken any additional steps to save energy in your home since participating in the Residential Neighborhood Program?*
( ) Yes *ask q137*
( ) No
( ) DK/NS

137. What actions have you taken to save energy?*
After each response, ask Anything else? *if No, go to q138*
a: _____
b: _____

c: _____
d: _____

138. Are there any additional services that you would like the Residential Neighborhood Program to provide that it does not currently provide?*

_____
_____
_____
_____

139. Are there any other things that you would like to see changed about the Residential Neighborhood Program?*

_____
_____
_____
_____

140. Did you recommend this program to any of your friends, neighbors, or relatives?*
( ) Yes
( ) No
( ) DK/NS

If yes,
140a. How many people have you recommended the program to?*

_____

141. The Residential Neighborhood Program was provided by Duke Energy. As a result of this program, would you say your attitude toward Duke Energy is more positive, more negative, or about the same?*
(If more positive/negative, ask if "much more" positive/negative or "somewhat more" positive/negative.)
( ) Much more positive
( ) Somewhat more positive
( ) About the same *Skip to Q142*
( ) Somewhat more negative
( ) Much more negative
( ) DK/NS *Skip to Q142*

If "more positive" or "more negative" in Q141, then ask Q141a:
141a. Why do you say that?*

_____
_____
_____
_____

The next set of questions deal with some effects that the program may have had on you and your household.

As a result of your participation in this program….

142. Has your knowledge of how to save energy and reduce your utility bill increased, stayed the same, or decreased?*
(If increased or decreased, ask if a lot or somewhat)
( ) Increased a lot
( ) Increased somewhat
( ) Stayed about the same
( ) Decreased somewhat
( ) Decreased a lot
( ) DK/NS

143. Have your monthly utility bills increased, stayed the same, or decreased?*
(If increased or decreased, ask if a lot or somewhat)
( ) Increased a lot
( ) Increased somewhat
( ) Stayed about the same
( ) Decreased somewhat
( ) Decreased a lot
( ) DK/NS

If "increased" or "decreased" in Q143, then ask Q143a
143a. Could you provide an estimate of how much your monthly utility bill, on average, has changed per month since you participated in this program?

*We are not asking for the total amount of their bills, just the amount of CHANGE in their bills.**
_____

Finally, we have some general demographic questions…

d1. In what type of building do you live?*
( ) Single-family home, detached construction
( ) Single family home, factory manufactured/modular
( ) Single family, mobile home
( ) Row House
( ) Two or Three family attached residence-traditional structure
( ) Apartment (4 + families)---traditional structure
( ) Condominium---traditional structure
( ) Other: _____
( ) Refused
( ) DK/NS

d2. What year was your residence built?*
( ) 1959 and before
( ) 1960-1979
( ) 1980-1989
( ) 1990-1997
( ) 1998-2000
( ) 2001-2007
( ) 2008-present
( ) DK/NS

d3. How many rooms are in your home (excluding bathrooms, but including finished basements)?*
( ) 1-3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 or more
( ) DK/NS

d4. Which of the following best describes your home's heating system?*
Check all that apply
[ ] None
[ ] Central forced air furnace
[ ] Electric Baseboard
[ ] Heat Pump
[ ] Geothermal Heat Pump
[ ] Other: _____
[ ] DK/NS

d5. How old is your heating system?*
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) 19 years or older
( ) DK/NS
( ) Do not have

d6. What is the primary fuel used in your heating system?*
( ) Electricity
( ) Natural Gas
( ) Oil
( ) Propane

( ) Other: _____
( ) DK/NS

d7. What is the secondary fuel used in your primary heating system, if any?*
( ) Electricity
( ) Natural Gas
( ) Oil
( ) Propane
( ) Other: _____
( ) None
( ) DK/NS

d8. Do you use one or more of the following to cool your home?*
(Mark all that apply)
[ ] None, do not cool the home
[ ] Heat pump for cooling
[ ] Central air conditioning
[ ] Through the wall or window air conditioning unit
[ ] Geothermal Heat pump
[ ] Other *(please specify?)*: _____
[ ] DK/NS

d9. How many window-unit or "through the wall" air conditioner(s) do you use?*
( ) None
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) DK/NS

d10. What is the fuel used in your cooling system?*
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other: _____
[ ] None
[ ] DK/NS

d11. How old is your cooling system?*
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) 19 years or older
( ) DK/NS
( ) Do not have

d12. What is the fuel used by your water heater?*
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other: _____
[ ] No water heater
[ ] DK/NS

d13. How old is your water heater?*
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) More than 19 years
( ) DK/NS

d14. What type of fuel do you use for indoor cooking on the stovetop or range?*
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other: _____
[ ] No stovetop or range
[ ] DK/NS

d15. What type of fuel do you use for indoor cooking in the oven?*
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other: _____
[ ] No oven

[ ] DK/NS

d16. What type of fuel do you use for clothes drying?*
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other: _____
[ ] No clothes dryer
[ ] DK/NS

d17. About how many square feet of living space are in your home?*
(Do not include garages or other unheated areas)
Note: A 10-foot by 12 foot room is 120 square feet
( ) Less than 500
( ) 500 to 999
( ) 1000 to 1499
( ) 1500 to 1999
( ) 2000 to 2499
( ) 2500 to 2999
( ) 3000 to 3499
( ) 3500 to 3999
( ) 4000 or more
( ) DK/NS

d18. Do you own or rent your home?*
( ) Own
( ) Rent

d19. How many levels are in your home (not including your basement)?*
( ) One
( ) Two
( ) Three

d20. Does your home have a heated or unheated basement?*
( ) Heated
( ) Unheated
( ) No basement
( ) DK/NS

d21. Does your home have an attic?*
( ) Yes
( ) No
( ) DK/NS

d22. Are your central air/heat ducts located in the attic?*
( ) Yes
( ) No
( ) DK/NS
( ) N/A

d23. Does your house have cold drafts in the winter?*
( ) Yes
( ) No
( ) DK/NS

d24. Does your house have sweaty windows in the winter?*
( ) Yes
( ) No
( ) DK/NS

d25. Do you notice uneven temperatures between the rooms in your home?*
( ) Yes
( ) No
( ) DK/NS

d26. Does your heating system keep your home comfortable in winter?*
( ) Yes
( ) No
( ) DK/NS

d27. Does your cooling system keep your home comfortable in summer?*
( ) Yes
( ) No
( ) DK/NS

d28. Do you have a programmable thermostat?*
( ) Yes
( ) No
( ) DK/NS

d28b. How many thermostats are there in your home?*
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4 or more
( ) DK/NS

d29. What temperature is your thermostat set to on a typical summer weekday afternoon?*
( ) Less than 69 degrees
( ) 69-72 degrees
( ) 73-78 degrees
( ) Higher than 78 degrees
( ) Off
( ) DK/NS

d30. What temperature is your thermostat set to on a typical winter weekday afternoon?*
( ) Less than 67 degrees
( ) 67-70 degrees
( ) 71-73 degrees
( ) 74-77 degrees
( ) 78 degrees or higher
( ) Off
( ) DK/NS

d31. Do you have a swimming pool, hot-tub or spa?*
( ) Yes
( ) No

Read all answers until they reply
d32. Would a two-degree increase in the summer afternoon temperature in your home affect your comfort..*
( ) Not at all
( ) Slightly
( ) Moderately, or
( ) Greatly
( ) DK/NS

d33. How many people live in this home?*
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d34. How many of them are teenagers?* *(age 13-19)*
If they ask why: Explain that teenagers are generally associated with higher energy use.
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d35. How many persons are usually home on a weekday afternoon?*
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d36. Are you planning on making any large purchases to improve energy efficiency in the <u>next 3 years</u>?*
( ) Yes
( ) No
( ) DK/NS

The following questions are for classification purposes only and will not be used for any other purpose than to help Duke Energy continue to improve service.

d37. What is your age group?*
Read all.
( ) 18-34
( ) 35-49
( ) 50-59
( ) 60-64
( ) 65-74
( ) Over 74
( ) Prefer not to answer

d38. Please indicate your annual household income.*
Read all in bold.
( ) Under $15,000
( ) $15,000-$29,999
( ) $30,000-$49,999
( ) $50,000-$74,999
( ) $75,000-$100,000
( ) Over $100,000
( ) Prefer Not to Answer
( ) DK/NS

We've reached the end of the survey. As I mentioned earlier, we will send you a $25 check for your time and feedback today. Should we send the $25 to *{address on calling sheet}***, or would a different address be better?**

Confirm Name & complete address from calling sheet. If needed, make any changes to Name or Address on calling sheet, and mark "Changed Info" column.
You should receive your $25 check in about 4-6 weeks. It will come in an envelope from our company: TecMarket Works.

(politely end call)
Thank you for taking our survey. Your response is very important to us.

Appendix G: Non-Participant Survey Instrument

Use four attempts at different times of the day and different days before dropping from contact list. Call times are from 10:00 a.m. to 8:00 p.m. EPT Monday through Saturday. No calls on Sunday. (Sample size N = 80 per state)

Note: Only read words in bold type. Italics are instructions.

State
( ) North Carolina
( ) South Carolina

Hello, my name is *(full name)* . I am calling from TecMarket Works on behalf of Duke Energy to conduct a customer survey about the Residential Neighborhood Program. May I speak with _____ please?

If person talking, proceed. If person is called to the phone reintroduce.
If not home, ask when would be a good time to call and schedule the call-back:

We are conducting this survey to obtain your opinions about an energy efficiency program that took place recently in your neighborhood. We are not selling anything. If you qualify, the survey will take about 10 minutes and when we are done with the survey I will confirm your address and we will send you $15 for your time. Your answers will be confidential, and will help us to make improvements to the program to better serve others. May we begin the survey?
Note: If this is not a good time, ask if there is a better time to schedule a callback.

for answering machine 1st through penultimate attempts:
Hello, my name is [*name*] and I am calling on behalf of Duke Energy to conduct a customer survey about energy efficiency. I am sorry I missed you. I will try again another time.

for answering machine - Final Attempt:
Hello, my name is [*name*] and I am calling on behalf of Duke Energy to conduct a customer survey about energy efficiency. This is my last attempt at reaching you, my apologies for any inconvenience.

1. **Do you recall hearing anything about Duke Energy's Residential Neighborhood Program?**
( ) Yes
( ) No
( ) DK/NS

If NO or DK/NS to q1
2. **This program was provided through Duke Energy and provided residents in your area with free home energy assessments and, if needed, the free installation of energy-saving home improvements.**
Were you aware of this program's existence before now
( ) Yes
( ) No
( ) DK/NS

If NO or DK/NS to q2
Sorry, you do not qualify to take this survey, becuase you are not aware of the program.
Politely terminate interview.

3. **Did anyone in your household participate in this program?**
( ) Yes
( ) No
( ) DK/NS

If YES to q3, ask q3a-b, then politely terminate interview.
3a. **Who in your household signed up for the program? What is your relationship to this person? _____**

3b. **What was done to your home through this program? _____**

If YES to q3,
Sorry, you do not qualify to take this survey, because somebody in your home participated in the program.

4. **How did you first learn about or hear about Duke Energy's Residential Neighborhood Program?**
(Check all that apply)

[ ] Received a letter or postcard in the mail describing the program
4a. **Who sent the letter or postcard?** _____
[ ] Received a "door hanger" describing the program
4b. **Who left the door hanger?** _____
[ ] Heard about a community event promoting the program, though did not attend
[ ] Attended a community event promoting the program
[ ] Someone visited my home to tell me about the program
4c. **What organization was this person from?** _____
[ ] Someone from Duke Energy called to tell me about the program
[ ] Someone else called to tell me about the program
4d. *Specify person/organization* _____
[ ] I called Duke Energy for information or help
[ ] I called someone else for information or help
4e. *Specify person/organization* _____
[ ] Friends, family or neighbors (word of mouth)
[ ] Media (TV, radio, newspapers, news reports, advertising, etc.)
4f. *Specify sources* _____
[ ] Online (Duke Energy or any other websites)
4g. *Specify sites* _____
[ ] Through another agency or organization (Church, CAP, Energy Assistance, etc.)
4h. *Specify organizations* _____
[ ] Some other way
4i. *specify* _____
[ ] DK/NS

If "Attended a community event promoting the program" is checked in Q4, ask Q5a-h; otherwise skip ahead to Q6.

5a. **Next I am going to read you some statements about the community meeting you attended. Please rate your satisfaction with each aspect of the community meeting on a 1 to 10 scale, where 10 means very satisfied and 1 means very dissatisfied. How satisfied are you with the <u>information presented</u> about the Residential Neighborhood Program at the event?**
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
5b. **How could this be improved?** _____

5c. **Using the same 1-to-10 rating scale, how satisfied are you with the <u>staff and presenters</u> at the community meeting?**
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,

5d. **How could this be improved? _____**

5e. **And how would you rate your <u>overall satisfaction</u> with the community meeting for the Residential Neighborhood Program?**
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
5f. **How could this be improved? _____**

6. **We are interested in learning what people understood about how this program operated, including people who did not participate. Please describe what you understood was required of participants in this program, and what you could have received in return had you participated in Duke Energy's Residential Neighborhood Program? (What is this program about / what would they do?)**
Probe for details and record response _____

7. **Do you think you would have been eligible to participate in this program?**
( ) Yes
( ) No
( ) DK/NS

If Yes,
7a. **Why didn't you participate in Duke Energy's Residential Neighborhood Program?**
_____

If DK/NS,
7b. **Why didn't you apply or inquire about participating in Duke Energy's Residential Neighborhood Program? _____**

8a. **Were there any other reasons you chose not to participate in this program? _____**

8b. **Even though you did not participate, did you recommend this program to any of your friends, neighbors or relatives?**
( ) Yes
( ) No
( ) DK/NS

If yes,
8c. **How many people have you recommended the program to?**
( ) Number _____
( ) DK/NS

9. **We are interested in learning what we might offer in order to convince people like yourself to participate in programs like the Residential Neighborhood Program. Are there things that this program could have provided that you think would have caused more people such as yourself to want to participate? _____**

10. **Have you taken any steps to save energy in your home in the past year?**
( ) Yes
( ) No
( ) DK/NS

10a-d. **What actions have you taken to save energy?**
After each response, ask: **Anything else?**
Response: 10a. _____
Response: 10b. _____
Response: 10c. _____
Response: 10d. _____

11. **The Residential Neighborhood Program was provided by Duke Energy. As a result of what you know about this program, would you say your attitude toward Duke Energy is more positive, more negative, or about the same?**
(If more positive/negative, ask if "much more" positive/negative' or "somewhat more" positive/negative.)
( ) Much more positive
( ) Somewhat more positive
( ) About the same
( ) Somewhat more negative
( ) Much more negative
( ) DK/NS

If "more positive" or "more negative" in Q11, then ask Q11a:
11a. **Why do you say that? _____**

12. **Next, please rate your overall satisfaction with Duke Energy on a 1 to 10 scale, where 10 means very satisfied and 1 means very dissatisfied.**
( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) DK/NS

If 7 or less,
12a. **How could this be improved? _____**

The last set of questions deal with household characteristics. These questions are optional and you do not need to give any information that you are uncomfortable with, but please keep in mind that any and all information you provide will remain confidential.

d1. **In what type of building do you live?**
( ) Single-family home, detached construction
( ) Single family home, factory manufactured/modular
( ) Single family, mobile home
( ) Row House
( ) Two or Three family attached residence-traditional structure
( ) Apartment (4 + families)---traditional structure

( ) Condominium---traditional structure
( ) Other _____
( ) Refused
( ) DK/NS

d2. **What year was your residence built?**
( ) 1959 and before
( ) 1960-1979
( ) 1980-1989
( ) 1990-1997
( ) 1998-2000
( ) 2001-2007
( ) 2008-present
( ) DK/NS

d3. **How many rooms are in your home (excluding bathrooms, but including finished basements)?**
( ) 1-3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 or more
( ) DK/NS

d4. **Which of the following best describes your home's heating system?**
Check all that apply
[ ] None
[ ] Central forced air furnace
[ ] Electric Baseboard
[ ] Heat Pump
[ ] Geothermal Heat Pump
[ ] Other _____
[ ] DK/NS

d5. **How old is your heating system?**
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) 19 years or older
( ) DK/NS
( ) Do not have

d6. **What is the primary fuel used in your heating system?**

( ) Electricity
( ) Natural Gas
( ) Oil
( ) Propane
( ) Other _____
( ) DK/NS

d7. **What is the secondary fuel used in your primary heating system, if any?**

( ) Electricity
( ) Natural Gas
( ) Oil
( ) Propane
( ) Other _____
( ) None
( ) DK/NS

d8. **Do you use one or more of the following to cool your home?**
(Mark all that apply)

[ ] None, do not cool the home
[ ] Heat pump for cooling
[ ] Central air conditioning
[ ] Through the wall or window air conditioning unit
[ ] Geothermal Heat pump
[ ] Other *(please specify)* _____
[ ] DK/NS

d9. **How many window-unit or "through the wall" air conditioner(s) do you use?**

( ) None
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) DK/NS

d10. **What is the fuel used in your cooling system?**

[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other _____
[ ] None

[ ] DK/NS

d11. **How old is your cooling system?**
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) 19 years or older
( ) DK/NS
( ) Do not have

d12. **What is the fuel used by your water heater?**
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other _____
[ ] No water heater
[ ] DK/NS

d13. **How old is your water heater?**
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) More than 19 years
( ) DK/NS

d14. **What type of fuel do you use for indoor cooking on the stovetop or range?**
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other _____
[ ] No stovetop or range
[ ] DK/NS

d15. **What type of fuel do you use for indoor cooking in the oven?**
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other _____

[ ] No oven
[ ] DK/NS

d16. **What type of fuel do you use for clothes drying?**
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other _____
[ ] No clothes dryer
[ ] DK/NS

d17. **About how many square feet of living space are in your home?**
(Do not include garages or other unheated areas)
Note: A 10-foot by 12 foot room is 120 square feet
( ) Less than 500
( ) 500 to 999
( ) 1000 to 1499
( ) 1500 to 1999
( ) 2000 to 2499
( ) 2500 to 2999
( ) 3000 to 3499
( ) 3500 to 3999
( ) 4000 or more
( ) DK/NS

d18. **Do you own or rent your home?**
( ) Own
( ) Rent

d19. **How many levels are in your home (not including your basement)?**
( ) One
( ) Two
( ) Three

d20. **Does your home have a heated or unheated basement?**
( ) Heated
( ) Unheated
( ) No basement

d21. **Does your home have an attic?**
( ) Yes
( ) No

d22. **Are your central air/heat ducts located in the attic?**

( ) Yes
( ) No
( ) N/A
( ) DK/NS

d23. **Does your house have cold drafts in the winter?**
( ) Yes
( ) No
( ) DK/NS

d24. **Does your house have sweaty windows in the winter?**
( ) Yes
( ) No
( ) DK/NS

d25. **Do you notice uneven temperatures between the rooms in your home?**
( ) Yes
( ) No
( ) DK/NS

d26. **Does your heating system keep your home comfortable in winter?**
( ) Yes
( ) No
( ) DK/NS

d27. **Does your cooling system keep your home comfortable in summer?**
( ) Yes
( ) No
( ) DK/NS

d28. **Do you have a programmable thermostat?**
( ) Yes
( ) No
( ) DK/NS

d28b. **How many thermostats are there in your home?**
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4 or more
( ) DK/NS

d29. **What temperature is your thermostat set to on a typical summer weekday afternoon?**
( ) Less than 69 degrees
( ) 69-72 degrees

( ) 73-78 degrees
( ) Higher than 78 degrees
( ) Off
( ) DK/NS

d30. **What temperature is your thermostat set to on a typical winter weekday afternoon?**
( ) Less than 67 degrees
( ) 67-70 degrees
( ) 71-73 degrees
( ) 74-77 degrees
( ) 78 degrees or higher
( ) Off
( ) DK/NS

d31. **Do you have a swimming pool, hot-tub or spa?**
( ) Yes
( ) No

Read all answers until they reply
d32. **Would a two-degree increase in the summer afternoon temperature in your home affect your comfort..**
( ) **Not at all**
( ) **Slightly**
( ) **Moderately, or**
( ) **Greatly**
( ) DK/NS

d33. **How many people live in this home?**
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d34. **How many of them are teenagers?** *(age 13-19)*
If they ask why: Explain that teenagers are generally associated with higher energy use.
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5

( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d35. **How many persons are usually home on a weekday afternoon?**
( ) 0
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8 or more
( ) Prefer not to answer

d36. **Are you planning on making any large purchases to improve energy efficiency in the next 3 years?**
( ) Yes
( ) No
( ) DK/NS

The following questions are for classification purposes only and will not be used for any other purpose than to help Duke Energy continue to improve service.

d37. **What is your age group?**
Read all.
( ) **18-34**
( ) **35-49**
( ) **50-59**
( ) **60-64**
( ) **65-74**
( ) **Over 74**
( ) Prefer not to answer

d38. **Please indicate your annual household income.**
Read all.
( ) **Under $15,000**
( ) **$15,000-$29,999**
( ) **$30,000-$49,999**
( ) **$50,000-$74,999**
( ) **$75,000-$100,000**
( ) **Over $100,000**
( ) Prefer Not to Answer
( ) DK/NS

We've reached the end of the survey. As I mentioned earlier, we would like to send you $15 for your time and feedback today. Should we send it to {*address on calling sheet*}, or would a different address be better?

Confirm Name & complete address from calling sheet. If needed, make any changes to Name or Address on calling sheet, and mark "Changed Info" column.

You should receive your $15 check in about 4-6 weeks. It will come in an envelope from our company: TecMarket Works.

(politely end call)

Thank you for taking our survey. Your response is very important to us.

Appendix H: Demographics and Household Characteristics

Participant Survey Households

In what type of building do you live? * State

			State		Total
			North Carolina	South Carolina	
In what type of building do you live?	Single-family home, detached construction	Count	36	33	69
		% within State	81.8%	91.7%	86.3%
	Single family home, factory manufactured/modular	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	Two or Three family attached residence-traditional structure	Count	3	1	4
		% within State	6.8%	2.8%	5.0%
	Apartment (4 + families)---traditional structure	Count	4	1	5
		% within State	9.1%	2.8%	6.3%
	Other: *Side-by-side duplex*	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What year was your residence built? * State

			State		Total
			North Carolina	South Carolina	
What year was your residence built?	1959 and before	Count	19	9	28
		% within State	43.2%	25.0%	35.0%
	1960-1979	Count	11	8	19
		% within State	25.0%	22.2%	23.8%
	1980-1989	Count	0	2	2
		% within State	0.0%	5.6%	2.5%
	1990-1997	Count	2	2	4
		% within State	4.5%	5.6%	5.0%
	1998-2000	Count	1	3	4
		% within State	2.3%	8.3%	5.0%
	2001-2007	Count	2	6	8
		% within State	4.5%	16.7%	10.0%
	2008-present	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
	DK/NS	Count	8	6	14
		% within State	18.2%	16.7%	17.5%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

How many rooms are in your home (excluding bathrooms, but including finished basements)? * State

			State		Total
			North Carolina	South Carolina	
How many rooms are in your home (excluding bathrooms, but including finished basements)?	4	Count	13	8	21
		% within State	29.5%	22.2%	26.3%
	5	Count	13	13	26
		% within State	29.5%	36.1%	32.5%
	6	Count	12	8	20
		% within State	27.3%	22.2%	25.0%
	7	Count	1	5	6
		% within State	2.3%	13.9%	7.5%
	8	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	9	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
	1-3	Count	3	1	4
		% within State	6.8%	2.8%	5.0%
	10 or more	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Which of the following best describes your home's heating system?	**North Carolina N=44**		**South Carolina N=36**		**Total N=80**	
None	0	0.0%	0	0.0%	0	0.0%
Central forced air furnace	32	72.7%	20	55.6%	52	65.0%
Electric Baseboard	7	15.9%	0	0.0%	7	8.8%
Heat Pump	1	2.3%	12	33.3%	13	16.3%
Geothermal Heat Pump	0	0.0%	0	0.0%	0	0.0%
Gas pack / gas log fireplace	2	4.5%	0	0.0%	2	2.5%
Other: listed below	2	4.5%	2	5.6%	4	5.0%
Don't know	0	0.0%	2	5.6%	2	2.5%

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

Four respondents mentioned "other" types of heating system; these are listed below.

- *Electric fireplace*
- *Kerosene heater*
- *Infrared propane space heater*
- *Thermal ceiling cable heat*

How old is your heating system? * State

			State		Total
			North Carolina	South Carolina	
How old is your heating system?	0-4 years	Count	11	10	21
		% within State	25.0%	27.8%	26.3%
	5-9 years	Count	4	3	7
		% within State	9.1%	8.3%	8.8%
	10-14 years	Count	7	5	12
		% within State	15.9%	13.9%	15.0%
	15-19 years	Count	1	7	8
		% within State	2.3%	19.4%	10.0%
	19 years or older	Count	5	3	8
		% within State	11.4%	8.3%	10.0%
	DK/NS	Count	16	8	24
		% within State	36.4%	22.2%	30.0%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What is the primary fuel used in your heating system? * State

			State		Total
			North Carolina	South Carolina	
What is the primary fuel used in your heating system?	Electricity	Count	14	16	30
		% within State	31.8%	44.4%	37.5%
	Natural Gas	Count	30	16	46
		% within State	68.2%	44.4%	57.5%
	Propane	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	Other: *gas pack natural gas*	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	Other: *kerosene*	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	DK/NS	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What is the secondary fuel used in your primary heating system, if any? * State

			State		Total
			North Carolina	South Carolina	
What is the secondary fuel used in your primary heating system, if any?	Electricity	Count	2	6	8
		% within State	4.5%	16.7%	10.0%
	Natural Gas	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	Other: *space heaters*	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
	Other: *wood fire place*	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	Don't know	Count	0	2	2
		% within State	0.0%	5.6%	2.5%
	None	Count	41	26	67
		% within State	93.2%	72.2%	83.8%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Do you use one or more of the following to cool your home?	**North Carolina N=44**		**South Carolina N=36**		**Total N=80**	
None, do not cool the home	0	0.0%	0	0.0%	0	0.0%
Heat pump for cooling	1	2.3%	9	25.0%	10	12.5%
Central air conditioning	28	63.6%	18	50.0%	46	57.5%
Through the wall or window air conditioning unit	16	36.4%	8	22.2%	24	30.0%
Geothermal Heat pump	0	0.0%	0	0.0%	0	0.0%
Fans (ceiling, window, portable)	0	0.0%	0	0.0%	0	0.0%
Gas pack for cooling	2	4.5%	1	2.8%	3	3.8%
Don't know	0	0.0%	1	2.8%	1	1.3%

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

How many window-unit or through the wall air conditioner(s) do you use? * State

			State		Total
			North Carolina	South Carolina	
How many window-unit or through the wall air conditioner(s) do you use?	1	Count	10	5	15
		% within State	22.7%	13.9%	18.8%
	2	Count	5	3	8
		% within State	11.4%	8.3%	10.0%
	3	Count	2	0	2
		% within State	4.5%	0.0%	2.5%
	None	Count	27	28	55
		% within State	61.4%	77.8%	68.8%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What is the fuel used in your cooling system?	North Carolina N=44		South Carolina N=36		Total N=80	
Electricity	42	95.5%	32	88.9%	74	92.5%
Natural Gas	2	4.5%	3	8.3%	5	6.3%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
None (no cooling system)	0	0.0%	0	0.0%	0	0.0%
DK/NS	0	0.0%	1	2.8%	1	1.3%

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

How old is your cooling system? * State

			State		Total
			North Carolina	South Carolina	
How old is your cooling system?	0-4 years	Count	11	12	23
		% within State	25.0%	33.3%	28.8%
	5-9 years	Count	8	6	14
		% within State	18.2%	16.7%	17.5%
	10-14 years	Count	7	4	11
		% within State	15.9%	11.1%	13.8%
	15-19 years	Count	0	8	8
		% within State	0.0%	22.2%	10.0%
	19 years or older	Count	5	2	7
		% within State	11.4%	5.6%	8.8%
	DK/NS	Count	13	4	17
		% within State	29.5%	11.1%	21.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What is the fuel used by your water heater?	North Carolina N=44		South Carolina N=36		Total N=80	
Electricity	27	61.4%	30	83.3%	57	71.3%
Natural Gas	14	31.8%	5	13.9%	19	23.8%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
No water heater	0	0.0%	0	0.0%	0	0.0%
DK/NS	3	6.8%	1	2.8%	4	5.0%

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

How old is your water heater? * State

			State		Total
			North Carolina	South Carolina	
How old is your water heater?	0-4 years	Count	11	8	19
		% within State	25.0%	22.2%	23.8%
	5-9 years	Count	9	6	15
		% within State	20.5%	16.7%	18.8%
	10-14 years	Count	5	10	15
		% within State	11.4%	27.8%	18.8%
	15-19 years	Count	1	1	2
		% within State	2.3%	2.8%	2.5%
	More than 19 years	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	DK/NS	Count	18	10	28
		% within State	40.9%	27.8%	35.0%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What type of fuel do you use for indoor cooking on the stovetop or range?	North Carolina N=44		South Carolina N=36		Total N=80	
Electricity	35	79.5%	32	88.9%	67	83.8%
Natural Gas	9	20.5%	4	11.1%	13	16.3%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
None (no stove)	0	0.0%	0	0.0%	0	0.0%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

What type of fuel do you use for indoor cooking in the oven?	North Carolina N=44		South Carolina N=36		Total N=80	
Electricity	35	79.5%	34	94.4%	69	86.3%
Natural Gas	9	20.5%	2	5.6%	11	13.8%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane						
None (no oven)	0	0.0%	0	0.0%	0	0.0%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

What type of fuel do you use for clothes drying?	North Carolina N=44		South Carolina N=36		Total N=80	
Electricity	30	68.2%	29	80.6%	59	73.8%
Natural Gas	2	4.5%	3	8.3%	5	6.3%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
None (no dryer)	12	27.3%	4	11.1%	16	20.0%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

About how many square feet of living space are in your home? * State

			State		Total
			North Carolina	South Carolina	
About how many square feet of living space are in your home?	Less than 500	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
	500 to 999	Count	8	0	8
		% within State	18.2%	0.0%	10.0%
	1000 to 1499	Count	10	11	21
		% within State	22.7%	30.6%	26.3%
	1500 to 1999	Count	4	2	6
		% within State	9.1%	5.6%	7.5%
	2000 to 2499	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
	DK/NS	Count	20	23	43
		% within State	45.5%	63.9%	53.8%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Do you own or rent your home? * State

			State		Total
			North Carolina	South Carolina	
Do you own or rent your home?	Own	Count	29	29	58
		% within State	65.9%	80.6%	72.5%
	Rent	Count	15	7	22
		% within State	34.1%	19.4%	27.5%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

How many levels are in your home (not including your basement)? * State

			State		Total
			North Carolina	South Carolina	
d19 How many levels are in your home (not including your basement)?	One	Count	38	34	72
		% within State	86.4%	94.4%	90.0%
	Two	Count	6	2	8
		% within State	13.6%	5.6%	10.0%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Does your home have a heated or unheated basement? * State

			State		Total
			North Carolina	South Carolina	
Does your home have a heated or unheated basement?	Heated	Count	1	2	3
		% within State	2.3%	5.6%	3.8%
	Unheated	Count	5	2	7
		% within State	11.4%	5.6%	8.8%
	No basement	Count	38	31	69
		% within State	86.4%	86.1%	86.3%
	DK/NS	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Does your home have an attic? * State

			State		Total
			North Carolina	South Carolina	
Does your home have an attic?	Yes	Count	35	25	60
		% within State	79.5%	69.4%	75.0%
	No	Count	7	10	17
		% within State	15.9%	27.8%	21.3%
	DK/NS	Count	2	1	3
		% within State	4.5%	2.8%	3.8%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Are your central air/heat ducts located in the attic? * State

			State		Total
			North Carolina	South Carolina	
Are your central air/heat ducts located in the attic?	Yes	Count	13	5	18
		% within State	29.5%	13.9%	22.5%
	No	Count	20	17	37
		% within State	45.5%	47.2%	46.3%
	N/A	Count	4	9	13
		% within State	9.1%	25.0%	16.3%
	DK/NS	Count	7	5	12
		% within State	15.9%	13.9%	15.0%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Does your house have cold drafts in the winter? * State

			State		Total
			North Carolina	South Carolina	
Does your house have cold drafts in the winter?	Yes	Count	26	17	43
		% within State	59.1%	47.2%	53.8%
	No	Count	18	19	37
		% within State	40.9%	52.8%	46.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Does your house have sweaty windows in the winter? * State

			State		Total
			North Carolina	South Carolina	
Does your house have sweaty windows in the winter?	Yes	Count	16	10	26
		% within State	36.4%	27.8%	32.5%
	No	Count	28	26	54
		% within State	63.6%	72.2%	67.5%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Do you notice uneven temperatures between the rooms in your home? * State

			State		Total
			North Carolina	South Carolina	
Do you notice uneven temperatures between the rooms in your home?	Yes	Count	27	19	46
		% within State	61.4%	52.8%	57.5%
	No	Count	17	17	34
		% within State	38.6%	47.2%	42.5%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Does your heating system keep your home comfortable in winter? * State

			State		Total
			North Carolina	South Carolina	
Does your heating system keep your home comfortable in winter?	Yes	Count	37	33	70
		% within State	84.1%	91.7%	87.5%
	No	Count	7	3	10
		% within State	15.9%	8.3%	12.5%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Does your cooling system keep your home comfortable in summer? * State

			State		Total
			North Carolina	South Carolina	
Does your cooling system keep your home comfortable in summer?	Yes	Count	37	32	69
		% within State	84.1%	88.9%	86.3%
	No	Count	4	4	8
		% within State	9.1%	11.1%	10.0%
	DK/NS	Count	3	0	3
		% within State	6.8%	0.0%	3.8%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Do you have a programmable thermostat? * State

			State		Total
			North Carolina	South Carolina	
Do you have a programmable thermostat?	Yes	Count	23	20	43
		% within State	52.3%	55.6%	53.8%
	No	Count	19	16	35
		% within State	43.2%	44.4%	43.8%
	DK/NS	Count	2	0	2
		% within State	4.5%	0.0%	2.5%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

How many thermostats are there in your home? * State

			State		Total
			North Carolina	South Carolina	
How many thermostats are there in your home?	0	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
	1	Count	30	29	59
		% within State	68.2%	80.6%	73.8%
	2	Count	9	5	14
		% within State	20.5%	13.9%	17.5%
	3	Count	3	1	4
		% within State	6.8%	2.8%	5.0%
	4 or more	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
	DK/NS	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What temperature is your thermostat set to on a typical summer weekday afternoon? * State

			State		Total
			North Carolina	South Carolina	
What temperature is your thermostat set to on a typical summer weekday afternoon?	Less than 69 degrees	Count	4	5	9
		% within State	9.1%	13.9%	11.3%
	69-72 degrees	Count	17	18	35
		% within State	38.6%	50.0%	43.8%
	73-78 degrees	Count	9	7	16
		% within State	20.5%	19.4%	20.0%
	Off	Count	9	2	11
		% within State	20.5%	5.6%	13.8%
	DK/NS	Count	5	4	9
		% within State	11.4%	11.1%	11.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What temperature is your thermostat set to on a typical winter weekday afternoon? * State

			State		Total
			North Carolina	South Carolina	
What temperature is your thermostat set to on a typical winter weekday afternoon?	Less than 67 degrees	Count	7	4	11
		% within State	15.9%	11.1%	13.8%
	67-70 degrees	Count	12	5	17
		% within State	27.3%	13.9%	21.3%
	71-73 degrees	Count	7	10	17
		% within State	15.9%	27.8%	21.3%
	74-77 degrees	Count	8	11	19
		% within State	18.2%	30.6%	23.8%
	78 degrees or higher	Count	3	3	6
		% within State	6.8%	8.3%	7.5%
	Off	Count	2	1	3
		% within State	4.5%	2.8%	3.8%
	DK/NS	Count	5	2	7
		% within State	11.4%	5.6%	8.8%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Do you have a swimming pool, hot-tub or spa? * State

			State		Total
			North Carolina	South Carolina	
Do you have a swimming pool, hot-tub or spa?	Yes	Count	0	3	3
		% within State	0.0%	8.3%	3.8%
	No	Count	44	33	77
		% within State	100.0%	91.7%	96.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Would a two-degree increase in the summer afternoon temperature in your home affect your comfort * State

			State		Total
			North Carolina	South Carolina	
Would a two-degree increase in the summer afternoon temperature in your home affect your comfort	Not at all	Count	24	16	40
		% within State	54.5%	44.4%	50.0%
	Slightly	Count	11	11	22
		% within State	25.0%	30.6%	27.5%
	Moderately, or	Count	4	2	6
		% within State	9.1%	5.6%	7.5%
	Greatly	Count	2	3	5
		% within State	4.5%	8.3%	6.3%
	DK/NS	Count	3	4	7
		% within State	6.8%	11.1%	8.8%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

How many people live in this home? * State

			State		Total
			North Carolina	South Carolina	
How many people live in this home?	1	Count	25	10	35
		% within State	56.8%	27.8%	43.8%
	2	Count	8	11	19
		% within State	18.2%	30.6%	23.8%
	3	Count	7	9	16
		% within State	15.9%	25.0%	20.0%
	4	Count	0	3	3
		% within State	0.0%	8.3%	3.8%
	5	Count	3	3	6
		% within State	6.8%	8.3%	7.5%
	Prefer not to answer	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

How many of them are teenagers? * State

			State		Total
			North Carolina	South Carolina	
How many of them are teenagers?	0	Count	40	27	67
		% within State	90.9%	75.0%	83.8%
	1	Count	1	6	7
		% within State	2.3%	16.7%	8.8%
	2	Count	0	2	2
		% within State	0.0%	5.6%	2.5%
	3	Count	2	0	2
		% within State	4.5%	0.0%	2.5%
	4	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	Prefer not to answer	Count	1	0	1
		% within State	2.3%	0.0%	1.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

How many persons are usually home on a weekday afternoon? * State

			State		Total
			North Carolina	South Carolina	
How many persons are usually home on a weekday afternoon?	0	Count	7	5	12
		% within State	15.9%	13.9%	15.0%
	1	Count	27	15	42
		% within State	61.4%	41.7%	52.5%
	2	Count	6	9	15
		% within State	13.6%	25.0%	18.8%
	3	Count	2	6	8
		% within State	4.5%	16.7%	10.0%
	5	Count	0	1	1
		% within State	0.0%	2.8%	1.3%
	Prefer not to answer	Count	2	0	2
		% within State	4.5%	0.0%	2.5%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Are you planning on making any large purchases to improve energy efficiency in the next 3 years? * State

			State		Total
			North Carolina	South Carolina	
Are you planning on making any large purchases to improve energy efficiency in the next 3 years?	Yes	Count	3	11	14
		% within State	6.8%	30.6%	17.5%
	No	Count	34	21	55
		% within State	77.3%	58.3%	68.8%
	DK/NS	Count	7	4	11
		% within State	15.9%	11.1%	13.8%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

What is your age group? * State

			State		Total
			North Carolina	South Carolina	
What is your age group?	18-34	Count	2	3	5
		% within State	4.5%	8.3%	6.3%
	35-49	Count	6	8	14
		% within State	13.6%	22.2%	17.5%
	50-59	Count	12	1	13
		% within State	27.3%	2.8%	16.3%
	60-64	Count	6	6	12
		% within State	13.6%	16.7%	15.0%
	65-74	Count	12	11	23
		% within State	27.3%	30.6%	28.8%
	Over 74	Count	5	6	11
		% within State	11.4%	16.7%	13.8%
	Prefer not to answer	Count	1	1	2
		% within State	2.3%	2.8%	2.5%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Please indicate your annual household income * State

			State		Total
			North Carolina	South Carolina	
Please indicate your annual household income	Under $15,000	Count	17	14	31
		% within State	38.6%	38.9%	38.8%
	$15,000-$29,999	Count	7	10	17
		% within State	15.9%	27.8%	21.3%
	$30,000-$49,999	Count	6	5	11
		% within State	13.6%	13.9%	13.8%
	$50,000-$74,999	Count	4	1	5
		% within State	9.1%	2.8%	6.3%
	Prefer Not to Answer	Count	8	3	11
		% within State	18.2%	8.3%	13.8%
	DK/NS	Count	2	3	5
		% within State	4.5%	8.3%	6.3%
Total		Count	44	36	80
		% within State	100.0%	100.0%	100.0%

Non-Participant Survey Households

In what type of building do you live? * State Crosstabulation

			State		Total
			North Carolina	South Carolina	
In what type of building do you live?	Single-family home, detached construction	Count	23	42	65
		% within State	74.2%	85.7%	81.3%
	Single family home, factory manufactured/modular	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
	Single family, mobile home	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
	Two or Three family attached residence-traditional structure	Count	4	4	8
		% within State	12.9%	8.2%	10.0%
	Apartment (4 + families)---traditional structure	Count	4	1	5
		% within State	12.9%	2.0%	6.3%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

What year was your residence built? * State Crosstabulation

			State		Total
			North Carolina	South Carolina	
What year was your residence built?	1959 and before	Count	11	16	27
		% within State	35.5%	32.7%	33.8%
	1960-1979	Count	7	10	17
		% within State	22.6%	20.4%	21.3%
	1980-1989	Count	0	2	2
		% within State	0.0%	4.1%	2.5%
	1990-1997	Count	1	3	4
		% within State	3.2%	6.1%	5.0%
	1998-2000	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
	2001-2007	Count	0	5	5
		% within State	0.0%	10.2%	6.3%
	2008-present	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
	DK/NS	Count	12	11	23
		% within State	38.7%	22.4%	28.8%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

How many rooms are in your home (excluding bathrooms, but including finished basements)? * State

			State		Total
			North Carolina	South Carolina	
How many rooms are in your home (excluding bathrooms, but including finished basements)?	1 to 3	Count	3	0	3
		% within State	9.7%	0.0%	3.8%
	4	Count	5	10	15
		% within State	16.1%	20.4%	18.8%
	5	Count	14	18	32
		% within State	45.2%	36.7%	40.0%
	6	Count	5	14	19
		% within State	16.1%	28.6%	23.8%
	7	Count	2	6	8
		% within State	6.5%	12.2%	10.0%
	10 or more	Count	1	1	2
		% within State	3.2%	2.0%	2.5%
	DK/NS	Count	1	0	1
		% within State	3.2%	0.0%	1.3%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Which of the following best describes your home's heating system?	North Carolina N=31		South Carolina N=49		Total N=80	
None	0	0.0%	0	0.0%	0	0.0%
Central forced air furnace	22	71.0%	24	49.0%	46	57.5%
Electric Baseboard	5	16.1%	4	8.2%	9	11.3%
Heat Pump	1	3.2%	13	26.5%	14	17.5%
Geothermal Heat Pump	0	0.0%	0	0.0%	0	0.0%
Gas pack / gas log fireplace	1	3.2%	0	0.0%	1	1.3%
Other: listed below	1	3.2%	8	16.3%	9	11.3%
Don't know	1	3.2%	3	6.1%	4	5.0%

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

Nine respondents mentioned "other" types of heating system; these are listed below.

- *Heat pump is broken, using space heaters* (N=2)
- *Space heaters* (N=2)
- *Portable plug-in heaters*
- *Portable oil heater*
- *Freestanding natural gas heater with a blower*
- *Wall-mounted interior natural gas furnace in the living room*

- *Refused to answer*

How old is your heating system? * State

			State		Total
			North Carolina	South Carolina	
How old is your heating system?	0-4 years	Count	5	11	16
		% within State	16.1%	22.4%	20.0%
	5-9 years	Count	6	7	13
		% within State	19.4%	14.3%	16.3%
	10-14 years	Count	1	6	7
		% within State	3.2%	12.2%	8.8%
	15-19 years	Count	2	3	5
		% within State	6.5%	6.1%	6.3%
	19 years or older	Count	5	5	10
		% within State	16.1%	10.2%	12.5%
	DK/NS	Count	12	17	29
		% within State	38.7%	34.7%	36.3%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

What is the primary fuel used in your heating system? * State

			State		Total
			North Carolina	South Carolina	
What is the primary fuel used in your heating system?	Electricity	Count	9	27	36
		% within State	29.0%	55.1%	45.0%
	Natural Gas	Count	20	19	39
		% within State	64.5%	38.8%	48.8%
	Oil	Count	1	1	2
		% within State	3.2%	2.0%	2.5%
	Propane	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
	Refused	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
	DK/NS	Count	1	0	1
		% within State	3.2%	0.0%	1.3%
Total		Count	31	49	80

		% within State	100.0%	100.0%	100.0%

What is the secondary fuel used in your primary heating system, if any? * State

			State		Total
			North Carolina	South Carolina	
What is the secondary fuel used in your primary heating system, if any?	Electricity	Count	5	3	8
		% within State	16.1%	6.1%	10.0%
	Natural Gas	Count	1	0	1
		% within State	3.2%	0.0%	1.3%
	None	Count	24	45	69
		% within State	77.4%	91.8%	86.3%
	DK/NS	Count	1	1	2
		% within State	3.2%	2.0%	2.5%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Do you use one or more of the following to cool your home?	**North Carolina N=31**		**South Carolina N=49**		**Total N=80**	
None, do not cool the home	0	0.0%	0	0.0%	0	0.0%
Heat pump for cooling	2	6.5%	10	20.4%	12	15.0%
Central air conditioning	17	54.8%	22	44.9%	39	48.8%
Through the wall or window air conditioning unit	9	29.0%	17	34.7%	26	32.5%
Geothermal Heat pump	0	0.0%	0	0.0%	0	0.0%
Fans (ceiling, window, portable)	0	0.0%	1	2.0%	1	1.3%
Gas pack for cooling	1	3.2%	0	0.0%	1	1.3%
Don't know	2	6.5%	0	0.0%	2	2.5%

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

How many window-unit or through the wall air conditioner(s) do you use? * State

			State		Total
			North Carolina	South Carolina	
How many window-unit or through the wall air conditioner(s) do you use?	1	Count	5	8	13
		% within State	16.1%	16.3%	16.3%
	2	Count	4	6	10
		% within State	12.9%	12.2%	12.5%
	3	Count	0	3	3
		% within State	0.0%	6.1%	3.8%
	4	Count	0	2	2
		% within State	0.0%	4.1%	2.5%
	DK/NS	Count	1	0	1
		% within State	3.2%	0.0%	1.3%
	10210	Count	21	30	51
		% within State	67.7%	61.2%	63.8%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

What is the fuel used in your cooling system?	North Carolina N=31		South Carolina N=49		Total N=80	
Electricity	30	96.8%	48	98.0%	78	97.5%
Natural Gas	0	0.0%	0	0.0%	0	0.0%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
None (no cooling system)	0	0.0%	1	2.0%	1	1.3%
DK/NS	1	3.2%	0	0.0%	1	1.3%

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

How old is your cooling system? * State

			State		Total
			North Carolina	South Carolina	
How old is your cooling system?	0-4 years	Count	9	15	24
		% within State	29.0%	30.6%	30.0%
	5-9 years	Count	7	12	19
		% within State	22.6%	24.5%	23.8%
	10-14 years	Count	1	6	7
		% within State	3.2%	12.2%	8.8%
	15-19 years	Count	3	2	5
		% within State	9.7%	4.1%	6.3%
	19 years or older	Count	2	3	5
		% within State	6.5%	6.1%	6.3%
	DK/NS	Count	9	11	20
		% within State	29.0%	22.4%	25.0%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

What is the fuel used by your water heater?	North Carolina N=31		South Carolina N=49		Total N=80	
Electricity	18	58.1%	39	79.6%	57	71.3%
Natural Gas	10	32.3%	8	16.3%	18	22.5%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
No water heater	0	0.0%	0	0.0%	0	0.0%
DK/NS	3	9.7%	4	8.2%	7	8.8%

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

How old is your water heater? * State Crosstabulation

			State		Total
			North Carolina	South Carolina	
How old is your water heater?	0-4 years	Count	7	12	19
		% within State	22.6%	24.5%	23.8%
	5-9 years	Count	4	7	11
		% within State	12.9%	14.3%	13.8%
	10-14 years	Count	1	7	8
		% within State	3.2%	14.3%	10.0%
	15-19 years	Count	2	4	6
		% within State	6.5%	8.2%	7.5%
	More than 19 years	Count	2	1	3
		% within State	6.5%	2.0%	3.8%
	DK/NS	Count	15	18	33
		% within State	48.4%	36.7%	41.3%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

What type of fuel do you use for indoor cooking on the stovetop or range?	North Carolina N=31		South Carolina N=49		Total N=80	
Electricity	28	90.3%	44	89.8%	72	90.0%
Natural Gas	3	9.7%	5	10.2%	8	10.0%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
None (no stove)	0	0.0%	0	0.0%	0	0.0%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

What type of fuel do you use for indoor cooking in the oven?	North Carolina N=31		South Carolina N=49		Total N=80	
Electricity	27	87.1%	44	89.8%	71	88.8%
Natural Gas	3	9.7%	5	10.2%	8	10.0%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
None (no oven)	1	3.2%	0	0.0%	1	1.3%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

What type of fuel do you use for clothes drying?	North Carolina N=31		South Carolina N=49		Total N=80	
Electricity	25	80.6%	42	85.7%	67	83.8%
Natural Gas	0	0.0%	2	4.1%	2	2.5%
Oil	0	0.0%	0	0.0%	0	0.0%
Propane	0	0.0%	0	0.0%	0	0.0%
None (no dryer)	6	19.4%	6	12.2%	12	15.0%
DK/NS	0	0.0%	0	0.0%	0	0.0%

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

About how many square feet of living space are in your home? * State

			State		Total
			North Carolina	South Carolina	
About how many square feet of living space are in your home?	500 to 999	Count	2	6	8
		% within State	6.5%	12.2%	10.0%
	1000 to 1499	Count	10	19	29
		% within State	32.3%	38.8%	36.3%
	1500 to 1999	Count	0	3	3
		% within State	0.0%	6.1%	3.8%
	2500 to 2999	Count	2	0	2
		% within State	6.5%	0.0%	2.5%
	DK/NS	Count	17	21	38
		% within State	54.8%	42.9%	47.5%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Do you own or rent your home? * State

			State		Total
			North Carolina	South Carolina	
Do you own or rent your home?	Own	Count	14	30	44
		% within State	45.2%	61.2%	55.0%
	Rent	Count	17	19	36
		% within State	54.8%	38.8%	45.0%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

How many levels are in your home (not including your basement)? * State

			State		Total
			North Carolina	South Carolina	
How many levels are in your home (not including your basement)?	One	Count	26	43	69
		% within State	83.9%	87.8%	86.3%
	Two	Count	5	6	11
		% within State	16.1%	12.2%	13.8%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Does your home have a heated or unheated basement? * State

			State		Total
			North Carolina	South Carolina	
Does your home have a heated or unheated basement?	Heated	Count	1	1	2
		% within State	3.2%	2.0%	2.5%
	Unheated	Count	4	3	7
		% within State	12.9%	6.1%	8.8%
	No basement	Count	26	45	71
		% within State	83.9%	91.8%	88.8%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Does your home have an attic? * State

			State		Total
			North Carolina	South Carolina	
Does your home have an attic?	Yes	Count	18	24	42
		% within State	58.1%	49.0%	52.5%
	No	Count	13	25	38
		% within State	41.9%	51.0%	47.5%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Are your central air/heat ducts located in the attic? * State

			State		Total
			North Carolina	South Carolina	
Are your central air/heat ducts located in the attic?	Yes	Count	3	4	7
		% within State	9.7%	8.2%	8.8%
	No	Count	14	19	33
		% within State	45.2%	38.8%	41.3%
	N/A	Count	13	23	36
		% within State	41.9%	46.9%	45.0%
	DK/NS	Count	1	3	4
		% within State	3.2%	6.1%	5.0%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Does your house have cold drafts in the winter? * State

			State		Total
			North Carolina	South Carolina	
Does your house have cold drafts in the winter?	Yes	Count	20	22	42
		% within State	64.5%	44.9%	52.5%
	No	Count	11	27	38
		% within State	35.5%	55.1%	47.5%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Does your house have sweaty windows in the winter? * State

			State		Total
			North Carolina	South Carolina	
Does your house have sweaty windows in the winter?	Yes	Count	8	15	23
		% within State	25.8%	30.6%	28.8%
	No	Count	22	33	55
		% within State	71.0%	67.3%	68.8%
	DK/NS	Count	1	1	2
		% within State	3.2%	2.0%	2.5%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Do you notice uneven temperatures between the rooms in your home? * State

			State		Total
			North Carolina	South Carolina	
Do you notice uneven temperatures between the rooms in your home?	Yes	Count	20	29	49
		% within State	64.5%	59.2%	61.3%
	No	Count	11	19	30
		% within State	35.5%	38.8%	37.5%
	DK/NS	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Does your heating system keep your home comfortable in winter? * State

			State		Total
			North Carolina	South Carolina	
Does your heating system keep your home comfortable in winter?	Yes	Count	23	42	65
		% within State	74.2%	85.7%	81.3%
	No	Count	6	7	13
		% within State	19.4%	14.3%	16.3%
	DK/NS	Count	2	0	2
		% within State	6.5%	0.0%	2.5%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Does your cooling system keep your home comfortable in summer? * State

			State		Total
			North Carolina	South Carolina	
Does your cooling system keep your home comfortable in summer?	Yes	Count	28	42	70
		% within State	90.3%	85.7%	87.5%
	No	Count	3	6	9
		% within State	9.7%	12.2%	11.3%
	DK/NS	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Do you have a programmable thermostat? * State

			State		Total
			North Carolina	South Carolina	
Do you have a programmable thermostat?	Yes	Count	15	21	36
		% within State	48.4%	42.9%	45.0%
	No	Count	15	27	42
		% within State	48.4%	55.1%	52.5%
	DK/NS	Count	1	1	2
		% within State	3.2%	2.0%	2.5%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

How many thermostats are there in your home? * State

			State		Total
			North Carolina	South Carolina	
How many thermostats are there in your home?	0	Count	0	3	3
		% within State	0.0%	6.1%	3.8%
	1	Count	28	41	69
		% within State	90.3%	83.7%	86.3%
	2	Count	2	3	5
		% within State	6.5%	6.1%	6.3%
	3	Count	0	1	1
		% within State	0.0%	2.0%	1.3%
	4 or more	Count	1	1	2
		% within State	3.2%	2.0%	2.5%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

What temperature is your thermostat set to on a typical summer weekday afternoon? * State

			State		Total
			North Carolina	South Carolina	
What temperature is your thermostat set to on a typical summer weekday afternoon?	Less than 69 degrees	Count	9	12	21
		% within State	29.0%	24.5%	26.3%
	69-72 degrees	Count	7	19	26
		% within State	22.6%	38.8%	32.5%
	73-78 degrees	Count	10	11	21
		% within State	32.3%	22.4%	26.3%
	Off	Count	4	1	5
		% within State	12.9%	2.0%	6.3%
	DK/NS	Count	1	6	7
		% within State	3.2%	12.2%	8.8%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

What temperature is your thermostat set to on a typical winter weekday afternoon? * State

			State		Total
			North Carolina	South Carolina	
What temperature is your thermostat set to on a typical winter weekday afternoon?	Less than 67 degrees	Count	3	3	6
		% within State	9.7%	6.1%	7.5%
	67-70 degrees	Count	8	17	25
		% within State	25.8%	34.7%	31.3%
	71-73 degrees	Count	7	10	17
		% within State	22.6%	20.4%	21.3%
	74-77 degrees	Count	7	13	20
		% within State	22.6%	26.5%	25.0%
	78 degrees or higher	Count	2	1	3
		% within State	6.5%	2.0%	3.8%
	Off	Count	1	0	1
		% within State	3.2%	0.0%	1.3%
	DK/NS	Count	3	5	8
		% within State	9.7%	10.2%	10.0%
Total		Count	31	49	80

		% within State	100.0%	100.0%	100.0%

Do you have a swimming pool, hot-tub or spa? * State

			State		Total
			North Carolina	South Carolina	
Do you have a swimming pool, hot-tub or spa?	Yes	Count	0	3	3
		% within State	0.0%	6.1%	3.8%
	No	Count	31	46	77
		% within State	100.0%	93.9%	96.3%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%

Would a two-degree increase in the summer afternoon temperature in your home affect your comfort * State

			State		Total
			North Carolina	South Carolina	
Would a two-degree increase in the summer afternoon temperature in your home affect your comfort	Not at all	Count	14	17	31
		% within State	45.2%	34.7%	38.8%
	Slightly	Count	4	10	14
		% within State	12.9%	20.4%	17.5%
	Moderately	Count	7	11	18
		% within State	22.6%	22.4%	22.5%
	Greatly	Count	4	8	12
		% within State	12.9%	16.3%	15.0%
	DK/NS	Count	2	3	5
		% within State	6.5%	6.1%	6.3%
Total		Count	31	49	80
		% within State	100.0%	100.0%	100.0%