

THE PUBLIC UTILITIES COMMISSION OF OHIO

ANNUAL ENERGY EFFICIENCY STATUS REPORT

OF DUKE ENERGY OHIO, INC.

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COMPLIANCE STATUS REPORT

This portfolio status report represents Duke Energy Ohio, Inc.'s, (Duke Energy Ohio) seventh filing of a status report on the load impacts achieved through implementation of its energy efficiency and demand response programs pursuant to Rule 4901:1-39-05 (C), O.A.C. This report is composed of the following two sections: (1) Compliance Benchmarks which provide information on load impact achievements relative to the baseline and (2) Program Performance Assessment which summarizes program activities and evaluation, measurement, and verification information. Following this report are seventeen appendices that fulfill the remaining requirements set forth in the Commission's regulations.

Compliance Benchmarks

4901:1-39-05 (A) and (B) Initial Benchmark Report

Pursuant to Rule 4901:1-39-05 (A), O.A.C., Duke Energy Ohio must file the following information in a benchmark report:

- (1) The energy and demand baselines for kilowatt-hour sales and kilowatt demand for the reporting year; including a description of the method of calculating the baseline, with supporting data.
- (2) The applicable statutory benchmarks for energy savings and electric utility peak-demand reduction.

In compliance with 4901:1-39-05(B), in preparing the baseline, Duke Energy Ohio is required to adjust the sales and/or demand baseline for normal weather as well as for changes in numbers of customers, sales, and peak demand to the extent such changes are outside its control.

This benchmark update report provides information on two areas. The first area involves the baseline for 2015, including a discussion of adjustments made to normalize for weather and to adjust for changes in numbers of customers, sales, and peak demand, where those changes are outside the control of Duke Energy Ohio. The second area involves an estimate of the statutory benchmarks for energy savings and electric utility peak-demand reduction.

In estimating the baseline for Duke Energy Ohio for the year 2015, the Company uses the three-year average of the actual level of total energy sold and peak demand, adjusted for differences from normal weather. Table 1 provides the historical level of total energy (kWh) for the years 2006 to 2014, the amount of the weather adjustment, and the weather normalized level of total energy.

Table 1 - Duke Energy Ohio Baseline and Benchmark for 2015

Year	Total Energy (MWh)	Weather Normalization Adjustment (MWh)	Weather Normal Level of Total Energy (MWh)	Baseline: Three Year Average (MWh)	Benchmark Percentage	Benchmark Requirement (MWh)
2006	22,402,660	262,896	22,665,556			
2007	23,510,777	(763,963)	22,746,814			
2008	22,321,489	(72,401)	22,249,088			
2009	20,405,122	320,494	20,725,616	22,553,819	0.3%	67,661
2010	22,545,823	(621,454)	21,924,369	21,907,173	0.5%	109,536
2011	20,238,172	(207,407)	20,030,765	21,633,024	0.7%	151,431
2012	19,919,494	(15,568)	19,903,926	20,893,583	0.8%	167,149
2013	19,992,587	92,375	20,084,961	20,619,687	0.9%	185,577
2014	20,286,737	173,384	20,460,120	20,006,551	1.0%	200,066
2015				20,149,669	1.0%	201,497

Year	Peak Demand (MW)	Weather Normalization Adjustment (MW)	Weather Normal Level of Peak Demand (MW)	Baseline: Three Year Average (MW)	Benchmark Percentage	Benchmark Requirement (MW)	Incremental Benchmark Percentage	Incremental Benchmark Requirement (MW)
2006	4,520	71	4,591					
2007	4,607	(279)	4,328					
2008	4,125	337	4,462					
2009	4,002	476	4,478	4,460	1.00%	45	1.00%	44.6
2010	4,114	330	4,444	4,423	1.75%	77	0.75%	33.2
2011	4,398	(28)	4,370	4,461	2.50%	112	0.75%	33.5
2012	4,020	281	4,301	4,431	3.25%	144	0.75%	33.2
2013	4,098	71	4,169	4,372	4.00%	175	0.75%	32.8
2014	4,053	166	4,219	4,280	4.75%	203	0.75%	32.1
2015				4,230	5.50%	232.6	0.75%	31.7

The Company employs the following process to normalize kWh and kW for differences in the weather: Using econometric equations for each customer class, from the load forecast process discussed in the Long-Term Forecast Report filing, the adjustment process for kWh is performed as follows:

$$\text{Let: } KWH(N) = f(W(N))g(E)$$

$$KWH(A) = f(W(A))g(E)$$

$$\text{Where: } KWH(N) = \text{electric sales - normalized}$$

$$W(N) = \text{weather variables - normal}$$

$$E = \text{economic variables}$$

$$KWH(A) = \text{electric sales - actual}$$

$$W(A) = \text{weather variables - actual}$$

$$\text{Then: } KWH(N) = KWH(A) * f(W(N))g(E)/f(W(A))g(E)$$

$$= KWH(A) * f(W(N))/f(W(A))$$

With this process, weather-normalized sales are computed by scaling actual monthly sales for each class by a factor from the econometric equation that accounts for the impact of deviations from monthly normal weather. Similarly, using an econometric equation for peak, the adjustment process for kW is performed as follows:

$$\text{Let: } KW(N) = f(W(N))g(E)$$

$$KW(A) = f(W(A))g(E)$$

Where: $KW(N)$ = electric peak demand - normalized

$W(N)$ = weather variables - normal

E = economic variable

$KW(A)$ = electric peak demand - actual

$W(A)$ = weather variables - actual

$$\begin{aligned} \text{Then: } KW(N) &= KW(A) * f(W(N))g(E)/f(W(A))g(E) \\ &= KW(A) * f(W(N))/f(W(A)) \end{aligned}$$

With this process, weather-normalized peak demand is computed by scaling actual peak demand by a factor from the econometric equation that accounts for the impact of deviations from normal weather.

Once total energy and peak demand have been adjusted for normal weather, the computation of the baseline for 2015 is simply the average of the load values for the three years 2012 to 2014. The baseline values for energy and demand are provided above in Table 1.

4901:1-39-05(C)(1)(a)-(c) Portfolio Status Report and Compliance Demonstration

In accordance with 4901:1-39-05(C)(1)(a), with the establishment of the baseline energy and peak demand, the level of the statutory benchmark is computed by applying the appropriate incremental percentage of achievement, as established in S.B. 221, to the baseline. The computation of the benchmark achievement level for 2015 is provided above on Table 1. The baseline for energy is 201,497 MWH and the baseline for peak loads is 31.7 MW. While the Company's calculation of the 2015 benchmark requirement is consistent with the requirements established by S.B. 221, the passage of S.B. 310 effectively established a freeze to the benchmarks for 2015 and 2016, meaning that the actual requirement was to simply maintain the

cumulative savings that were required at the end of 2014, which 4.2% and 4.75% for energy efficiency and peak demand respectively. Since the Company's cumulative energy savings and peak demand reduction were above the required amounts, under S.B. 310, the Company's annual benchmarks for 2015 was zero for both energy and peak demand reductions.

Duke Energy Ohio respectfully submits that this information is responsive to all of the baseline and benchmark calculations as set forth in Rule 4901:1-39-05(A), O.A.C., and requests that the Commission approve these baseline and benchmark calculations as submitted.

In response to 4901:1-39-05(C)(1)(b), which requires a comparison of the applicable benchmark of actual energy savings and peak-demand reductions achieved, as a result of the Company's 2015 efforts to promote customer participation in its energy efficiency and demand response programs, the Company has achieved incremental energy and demand impacts in 2015 as summarized below in Table 2. Details of impacts for each program are provided in **Appendix A**.

Table 2: Incremental Energy Efficiency and Demand Response Program Impact Summary				
		Participants / Measures	MWH	MW
<u>Demand Response Programs</u>	-			
Power Manager				(0.4)
PowerShare®				(46.4)
Home Energy Solutions - DR				2.3
Total Demand Response Programs				(44.5)
<u>Energy Efficiency Programs</u>	-			
Residential Programs		1,560,290	65,300	10.1
Non-Residential Programs		19,507,609	98,711	14.5
Total EE Programs		21,067,899	164,010	24.6
Prior Bank per SB-221	1		496,215	266.2
Total Load Impacts			660,225	246.3

1 - Prior bank adjusted to reflect impact adjustments for 2014 in the amount of (49.14) MWH.

Table 3a provides a comparison of the impacts relative to the benchmarks previously mentioned. This indicates that the Company has complied with the S.B. 221 statutory benchmarks for the year 2015.

Table 3a: Comparison of Achieved Impacts to the S.B. 221 2015 Benchmark			
	2015 Benchmark	Achievement	Variance Over / (Under)
MWH	201,497	660,225	458,728
MW	31.7	246.3	214.6

Table 3b provides a comparison of the impacts relative to the benchmarks previously mentioned. This indicates that the Company has complied with the statutory benchmarks as revised by S.B. 310 for the year 2015.

Table 3b: Comparison of Achieved Impacts to the S.B. 310 2015 Benchmark			
	2015 Benchmark	Achievement	Variance Over / (Under)
MWH	0	660,225	660,225
MW	0	246.3	246.3

In addition, since the Company's cumulative efforts continue to exceed the cumulative benchmark requirement, there is still a residual amount of load impacts that carry forward to support achievement of the benchmarks for 2016 and beyond.

In compliance with 4901:1-39-05(C)(1)(c), an affidavit indicating that the reported performance complies with the statutory benchmarks is provided in **Appendix B**.

4901:1-39-05(C)(2) Program Performance Assessment

As part of Duke Energy Ohio's Electric Security Plan (ESP) filing in 2008, the Company proposed a set of energy efficiency and demand response programs. These were subsequently approved on December 17, 2008 and reaffirmed (except for the Prepaid Meter Program) in the Commission's Order in Case No. 09-1999-EL-POR. Implementation of the Save-A-Watt programs began January 2009. On July 20, 2011, Duke Energy Ohio filed for a new recovery mechanism to replace Save-A-Watt due to expire on December 31, 2011. In Case No. 11-4393-EL-RDR, Duke Energy Ohio proposed a recovery mechanism as well as three new programs. The recovery mechanism and programs were approved on August 15, 2012. In compliance with the Commission's Order, after reviewing the market potential study conducted by Forefront Economics Inc, Duke Energy Ohio filed its three-year portfolio plan for 2014-2016 with the Commission on April 15, 2013. The Commission's approved the new portfolio proposed by the Company in its Opinion and Order in Case No. 13-0431-EL-POR on December 4, 2013.

Program Performance Assessment

Program descriptions and key activities for its current portfolio are provided below.

4901:1-39-05 (C)(2)(a)(i) Program Descriptions and Key Activities

Residential Programs

Smart Saver[®] Residential Program

The Smart Saver[®] Residential program offers a variety of programs and measures that allow customers to take action and reduce energy consumption. The program is available to residential customers served by Duke Energy Ohio.

Compact Fluorescent Lamps (CFL) Program

The CFL Program is designed to increase the energy efficiency of residential customers by offering customers CFLs to install in high-use fixtures within their homes. The CFLs are offered through an on-demand ordering platform, enabling eligible customers to request CFLs and have them shipped directly to their homes. Eligibility is based on past campaign participation (i.e. coupons, Business Reply Cards (BRCs) and other Duke Energy Ohio programs distributing CFLs). Bulbs are available in 3, 6, 8, 12 and 15 pack kits that have a mixture of 13 and 18 watt bulbs. The maximum number of bulbs available for each customer is 15, but customers may choose to order less.

Customers have the flexibility to order and track their shipment through three separate channels:

1) Telephone:

Customers may call a toll-free number to access the Interactive Voice Response (IVR) system which provides prompts to facilitate the ordering process. Both English and Spanish-speaking customers may easily validate their account, determine their eligibility and place their CFL order over the phone.

2) Duke Energy Web Site:

Customers can go online to complete the ordering process. Eligibility rules and frequently asked questions are also available.

3) Online Services (OLS):

Customers who participate in the Online Services program are encouraged to order their CFLs through the Duke Energy Ohio web site if they are eligible.

The benefits of providing these three distinct channels include:

- Improved customer experience
- Advanced inventory management
- Simplified program coordination
- Enhanced reporting
- Increased program participation
- Reduced program costs

Customers continue to utilize the simple ordering process and the convenience of bulbs being shipped directly to their home. Over 57,000 orders were placed in 2015; resulting in over 819,000 bulbs distributed. Fifty-seven percent of the orders were placed by calling the toll free phone number, seventeen percent of the orders were placed on the Duke Energy Ohio web site and twenty-six percent on the OLS platform.

The overall strategy of the program is to reach residential customers who have not adopted CFL bulbs. Duke Energy Ohio will continue to educate customers on the benefits of CFLs while addressing barriers for consumers who have not participated in the program. Additionally, the ease of program participation will also be highlighted to encourage use of the on-demand ordering platform.

In 2015, the Free CFL program utilized direct mail campaigns, the Duke Energy Website and online/phone intercepts to engage with customers. The direct mail campaigns consisted of quarterly letters to all customers who were new to Duke Energy Ohio to inform them of the program. The Duke Energy website contains pages explaining the program and portal through which the customer can check their eligibility and order free bulbs. Duke Energy also uses intercepts for customers calling or accessing their account online that informs customers if they

are eligible for the program and allows them to order. Duke Energy Ohio will continue to market the CFL program through various channels including Email, Bill Messages, Bill Envelopes, Direct Mail, Printed Collateral and other Duke Energy Program collaboration efforts. Response of each channel is tracked and monitored. Cross-promotion with the new online Savings Store was used to help offer lighting for specialty applications and promote LED technology to customers who are eligible for both lighting programs.

CFL Program Potential Changes

In November of 2015, the CFL Program in Duke Energy Ohio was shut down to provide a blackout period before the launch in early 2016 of a new technology in the program, LED's. The new LED program will operate just as the CFL program has in the past with two exceptions: 1) The 60W and 75W equivalent CFL bulbs will be replaced with a 60W equivalent 9W A-Line LED bulb that has been approved by Energy Star and 2) customers who have participated in the CFL program and have bulbs that have matured past their 5 year measure life, will get renewed eligibility in the program on a bulb for bulb bases as they pass the 5 year measure life with a limit of 12 bulbs.

Beginning in January 2016, the free LED program will offer six LEDs to eligible customers via a Business Reply Card (BRC) until the on-demand order platform can be updated for the new LED technology. Duke Energy Ohio will continue to target eligible customers utilizing the BRC for approximately six months. The on-demand platform will be available at the end of the second quarter, 2016. At that time, eligible customers will be able to order LEDs via the Duke Energy Public web, telephone, and OLS channels. Duke Energy Ohio will continue coding the platform to extend the offer of LEDs to customers who participated in the CFL offer

where the 5 year measure life that has been recognized has expired. This phase will likely be available by the end of the third quarter 2016.

Online Savings Store

Duke Energy Ohio expanded its lighting offer to include specialty bulbs such as recessed lights, candelabras, globe, three-way bulbs, capsules and dimmable bulbs. Purchase limits vary by category but customers may purchase additional bulbs without incentives if they choose. The web based ecommerce store launched on April 26th, 2013 and provides discounted specialty lights and ships directly to the home.

Utilizing the existing on-demand CFL platform, customers may participate in the online Saving Store via:

1) Duke Energy Web Site

Customers may go to the Savings Store landing page to learn more about the program, review frequently asked questions and CFL recycling information. A savings calculator is available to estimate how much money customers can save and how sustainable they can be by purchasing discounted energy bulbs from the Duke Energy Savings Store.

2) Online Services (OLS)

Customers who participate in the Online Services program are encouraged to visit the Savings Store to order discounted CFL and LED bulbs through the Duke Energy Ohio web site if they are eligible.

3) Order by Phone

Duke Energy offers phone ordering as an option for customers to order bulbs from the Duke Energy Savings Store. Customers may call the vendor directly for assistance in placing orders for discounted lighting.

4) Mail in Order

In October of 2015, Duke Energy tested a mail in order offer to customers. Customers receive a direct mail piece allowing them to choose specialty bulbs and mail their order and payment directly to the vendor, EFI. This channel will continue to be offered periodically with special marketing campaigns.

Customers who choose to shop at the Savings Store will see a wide variety of discounted CFL and LED bulbs for different fixtures around their home. Bulbs are available in single and multi-pack sizes and various wattages. A shopping assistant is available to help customers select the right bulb types for various applications, as well as resources to understand the difference between lumens versus watts and how to compare them. The savings calculator can show how much customers may save by switching to energy efficient lighting.

The Savings Store is managed by Energy Federations Incorporated (EFI). Customers can view special promotions and feature products as well as track order history. EFI, handles inquiries regarding products, payments, shipping and warranties.

Over 40,000 orders were placed in 2015; resulting in over 240,000 bulbs purchased. Twenty percent of orders were placed through OLS and eighty percent of orders were placed through the Duke Energy Ohio web site. The top five categories purchased on the Savings Store include; LED General Purpose bulbs, LED Reflectors, CFL Reflectors, CFL Globes and CFL Decorative bulbs.

Duke Energy Ohio will market the online Savings Store program through various channels including Email, Bill Messages, Bill Envelopes, Social Media, Direct Mail, Printed Collateral, Earned Media, and other Duke Energy Program collaboration efforts. Response of

each channel is tracked and monitored. Special shipping promotions including \$5 flat rate shipping and free shipping for orders of \$25 or more were offered in 2015 as incentives to improve participation.

Savings Store Program Potential Changes

Savings Store enhancements considered for 2016 include; additional shipping and discount options, product comparison, dynamic savings information, support for additional payment methods and improved customer experience and communication.

General Lighting Program Potential Changes

The Company continually evaluates the effectiveness of its overall lighting program to consider the addition of new delivery channels, in order to capture the potential customers who may not be prone to utilize the existing channels. In 2016, the Lighting program management team is considering the addition of a retail channel to provide incentives to its customers to purchase LEDs and other specialty bulbs.

Multifamily Energy Efficiency Program

The Multifamily Energy Efficiency Program is an extension of the CFL program and allows Duke Energy Ohio to target multifamily apartment complexes. Eligible units are Duke Energy Ohio served apartments on a residential rate and are located at properties that have four or more units. Franklin Energy is the program administrator. They are in charge of all aspects of the program which include outreach, direct installations and customer care.

The program helps property managers upgrade lighting with energy efficient 13 watt CFLs and also save energy by offering water measures such as bath and kitchen faucet aerators, water saving showerheads and pipe wrap. The water measures are available to eligible customers with electric water heating. The Program adopts a tiered structure to determine the number of

lighting measures installed in apartments. Franklin Energy may install up to 12 bulbs in a one bedroom apartment, up to 15 bulbs in a two bedroom apartment and up to 18 bulbs in a three bedroom apartment. These measures assist with reducing maintenance costs while improving tenant satisfaction by lowering energy bills.

The program offers properties the option of DI (direct install) service by Franklin Energy crews. However, Property Managers also have the ability to have their own property maintenance crews complete the installations.

The CFLs and water measures are installed during scheduled direct install visits by Franklin Energy crews or routine maintenance visits by property personnel. In the case of direct installs, crews carry tablets to keep track of what is installed in each apartment. In the case of DIY installations, the property maintenance crew tracks the number of measures installed and reports them back to Franklin Energy. Franklin Energy then validates this information and uploads the results to Duke Energy.

After installations are completed, Quality Assurance (QA) inspections are conducted on 20% of properties that completed installations in a given month. The QA inspections are conducted by an independent third party.

Franklin Energy uses outbound calling as the primary tactic to solicit initial interest in the program from Property Managers in Duke Energy Ohio. On-site visits by appointment are also used as a way to attract properties to participate in the program.

In addition to proactively marketing the program using the above methods, a Multifamily Energy Efficiency promo and public website landing page was developed for managers to learn more about the program. Here, a program brochure and a frequently asked question sheet are available for download. Once enrolled, Franklin Energy provides property managers with a

variety of marketing tools to create awareness of the program to their tenants. These include program posters to leave in common areas and letters to each tenant informing them of what is being installed and when the installation will take place. In addition, tenants are provided an educational leave-behind brochure when the installation is complete. This provides additional detail on the installed measures as well as tear-off customer satisfaction survey to fill out and mail back to Duke Energy to provide valuable program feedback.

Overall in 2015, the Program completed installation at 33 Multifamily properties in Ohio comprising of just over 4,000 units. From a measure perspective, these units accounted for 15,284 CFLs, 2,658 bath aerators, 1,714 kitchen aerators, 1,906 showerheads and 4,544 FT of pipe wrap.

Multifamily Energy Efficiency Program- Potential Changes

The only change being considered at this time is to transition from CFLs to LEDs. This change is currently being vetted on many levels internally at Duke Energy and from a regulatory standpoint however, the process to do this will be set in motion in early 2016 with the hope to begin offering later in 2016, if approved.

Save Energy and Water Kit Program (SEWKP)

The SEWKP Program was launched in April of 2014 and is designed to increase the energy efficiency of residential customers by offering customers Low Flow Water Fixtures and Insulated Pipe Tape to install in high-use fixtures within their homes. These energy saving devices are offered through a Direct Mail Campaign, enabling eligible customers to request to have these devices shipped directly to their homes, free of charge. Eligibility is based on past campaign participation (including this program and any other programs offering low flow

devices that Duke Energy has offered to Ohio customers) and the customer must have an electric water heater. Customers receive a kit with varying amounts of the following devices: low flow bath and kitchen aerators, low flow shower heads and insulated pipe tape. The kit also includes directions and items to help with installation.

Over 4,000 kits were shipped to Ohio customers in 2015; resulting in over 13,800 bath aerators, 4,000 kitchen aerators, 8,000 shower heads and 20,000 feet of insulated pipe wrap being distributed.

The overall strategy of the program is to reach residential customers who have not adopted low flow water devices and hot water pipe insulation. Duke Energy Ohio will continue to educate customers on the benefits of using low flow water devices and saving the energy used to heat water, while addressing barriers for consumers who have not participated in the program.

Duke Energy Ohio will continue to market the SEWKP program through Direct Mail and the response will continue to be tracked and monitored.

SEWKP Program Potential Changes

Innovative marketing campaigns and tactics will be utilized to improve awareness for hard to reach and late adopter¹ customers. An Online platform for the program will be pursued in 2016.

Heat Pump Water Heater Program (HPWH)

The HPWH Program was launched in August of 2014 and is designed to encourage the adoption of energy efficient water heating in new or existing residences. Duke Energy Ohio

¹ Customers who are slow to start using or buying a new product, technology, or idea.

served homeowners currently residing in or building a single family residence, condominium, or duplex home are eligible for this program. Installation of a high efficiency heat pump water heater will result in a \$350 incentive. Duke Energy program personnel establish relationships with home builders, plumbing contractors, and national home improvement retailers who interface directly with residential customers. All incentives are paid directly to customers upon approval of a completed application.

During 2015, program personnel focused on developing the contractor network, along with consumer awareness and education. A training workshop for plumbers was conducted to recruit and educate contractors on the technology and energy-saving benefits. In addition, customer awareness campaigns included direct mail, targeted email, bill inserts, product page on Duke Energy website, and in-store signage at home improvement retailers. The Program processed 40 customer rebates during 2015.

Heat pump water heaters are one of the most efficient technologies for domestic water heating introduced in the last decade, providing an energy and cost savings of up to 50 percent for the typical family over the life of the unit. Duke Energy Ohio will continue to educate customers on the benefits of heat pump water heaters, while addressing barriers for consumers who have not participated in the program.

Variable-Speed Pool Pump Program

The Variable-Speed Pool Pump Program was launched in August of 2014 and is designed to encourage the adoption of energy efficient, variable-speed pool pumps for the main filtration of in-ground residential swimming pools. Duke Energy Ohio served homeowners currently residing in, or building, a single family residence with an in-ground swimming pool are eligible

for this program. Installation of a high efficiency, variable-speed pool pump will result in a \$300 incentive. Duke Energy program personnel establish relationships with home builders and pool professionals who interface directly with residential customers. All incentives are paid directly to customers upon approval of a completed application.

During 2015, program personnel focused on developing the contractor network, along with consumer awareness and education. A training workshop for pool professionals was conducted to recruit and educate contractors on the program and energy-saving benefits. Recruitment efforts added 20 new participating contractors to the network during 2015. In addition, customer awareness campaigns included direct mail, targeted email, bill inserts, product page on Duke Energy website, and in-store signage. The Program processed 95 customer rebates during 2015. Duke Energy Ohio will continue to educate customers on the benefits of variable-speed pool pumps to continue the growth of the program during 2016.

Residential HVAC Program

Duke Energy Ohio served homeowners currently residing in, or building, a single family residence, condominium, duplex or mobile home are eligible for this program. Installation of a high efficiency heat pump or air conditioner will result in a \$300 incentive. GoodCents has served as the back office support for the program while Duke Energy program personnel establish relationships with home builders and HVAC contractors who interface directly with residential customers. These trade allies adhere to program requirements and submit the incentive application on behalf of the customer. Once the application is processed, GoodCents disburses the incentive funds. For replacement of an existing system, a Duke Energy Ohio customer receives \$200 and the HVAC contractor receives the remaining \$100. For new home

construction, the home builder receives the full \$300 incentive but has the option to pass the incentive on to the customer. For the additional complimentary measures offered through the HVAC program, eligible customers will receive a \$50 incentive for tuning up a heat pump or air conditioner, \$250 for the installation of attic insulation and completion of air sealing, \$75 for the installation of duct insulation, and \$100 for the completion of duct sealing. All incentives for these complimentary measures are paid directly to customers upon approval of a completed application.

Duke Energy Ohio has formed strong relationships with trade allies and continues to develop relationships with trades serving the new measures. These partnerships help application fulfillment and prompt payment of incentives as well as maintain top-of-mind awareness of the program and its benefits. The buy-in and participation of the trade ally network is vital to the success of the HVAC segment of the Program. During 2105 over 3,100 HVAC incentives, and 120 complimentary measures were processed for Duke Energy Ohio customers. .

Residential HVAC Program Updates

Duke Energy Ohio is continuously evaluating new ways to improve relationships with trade allies and customers while making the program both more cost effective and user friendly. In November 2015 the Program transitioned vendors moving from GoodCents to Blackhawk Engagement Solutions to provide the back office administration, application processing and call center support for the program. With this transition, a new platform has been introduced that offers our trade allies additional value and easier use of the rebate program while allowing Duke Energy Ohio to enhance the customer experience. Functionality of the IT platform includes program tools such as the trade ally portal which allows trade allies to register, submit applications online, a mobile application, check customer eligibility, and message boards.

Functionality for program personnel includes trade ally management process and performance dashboards, company scorecards and registration management.

Due to federal increases in HVAC efficiency standards, Duke Energy Ohio has been evaluating the current heat pump and air conditioner measures offered via the Smart \$aver[®] Program. An update to the heat pump measure is planned to be implemented in early 2016 to raise the minimum equipment eligibility for the rebate incentive from a SEER 14 to a SEER 15 in response to the increased federal efficiency standard. Other potential program changes that will be evaluated in the coming year may include refinement of program field requirements, improved trade ally tools and network management strategies, and distribution channels. Duke Energy Ohio will make changes in these areas when it is determined that the change will benefit customers and increase program value to the market and within the regulatory parameters set forth.

Residential Energy Assessments Program

The Residential Energy Assessments program includes Home Energy House Call (HEHC).

HEHC targets residential customers that own a single family home with at least four months of billing history. HEHC is a free in-home assessment designed to help customers reduce energy usage and save money. Duke Energy Ohio partners with several key vendors to administer the program in which an energy specialist completes a 60 to 90 minute walk through assessment of the home and analyzes energy usage to identify energy saving opportunities. The Building Performance Institute (BPI) certified energy specialist discusses behavioral and equipment modifications that can save energy and money with the customer. A customized

report is provided to the customer that identifies actions the customer can take to increase their home efficiency. Example recommendations might include the following:

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

Customers receive an Energy Efficiency Starter Kit with a variety of measures that can be directly installed by the energy specialist. The kit includes measures such as energy efficient lighting, low flow shower head, low flow faucet aerators, outlet/switch gaskets, weather stripping and energy saving tips booklet.

The Duke Energy Ohio Residential Energy Assessment Program conducted 2,589 assessments in 2015 reaching 87% of the 2015 goal. The program manager continues to explore enhancements to the program as well as test and consider new marketing channels to increase participation.

HEHC Program Potential Changes

- Upgrading kits to include LED bulbs beginning January 2016. Currently developing and preparing an enhanced online enrollment experience to enable the customer to select, schedule, cancel and or modify their appointment time.
- Propensity modeling to allow for more targeting
- Product training program to encourage cross sell or cross promotion of other relevant offers.

Energy Efficiency Education Program for Schools

The Energy Efficiency Education Program for Schools Program is an energy conservation program available in Ohio. The Energy Efficiency Education Program is available to K-12 students enrolled in public and private schools and who reside in households served by Duke Energy Ohio.

The Program provides principals and teachers with an innovative curriculum that educates students about energy, electricity, ways energy is wasted and how to use our resources wisely. The centerpiece of the curriculum is a live interactive theatrical production delivered by two professional actors to students in kindergarten through eighth grade. Performances differ for elementary and middle school students. Teachers also received educational materials focused on concepts such as energy, renewable fuels, and energy efficiency for classroom and student take home assignments. All workbooks, assignments and activities meet state curriculum requirements.

School principals are the main point of contact and will schedule the performance at their convenience for the entire school. Once the principal has confirmed the performance date and time, two weeks prior to the performance, all materials are delivered to the principal's attention for distribution. Materials include school posters, teacher guides, classroom and family activity books.

Students are encouraged to complete a home energy survey with their family (found in their activity book), so they can receive an Energy Efficiency Starter Kit. The kit contains specific energy efficiency measures to reduce home energy consumption. It is available at no cost to all student households at participating schools, including customers and non-customers.

Since 2011, The National Theatre for Children has partnered with Duke Energy Ohio to engage students in the Ohio service territory on energy and energy efficiency through live theatrical performances. For the 2014-2015 school year, two new productions were launched. The 25-minute program, *The Treasure Trove of Conservation Cove* was introduced to elementary students and teaches them how to use resources wisely through a fun pirate treasure hunt featuring a cast of colorful characters. *The Resource Raiders* is a 40-minute program introduced to Middle School students which combines sketch comedy with improvisation and audience participation to teach students about natural resources and compliment student studies in science and energy.

From January through December 2015, there were 197 participating schools hosting 283 performances to reach over 60,000 students. Fall 2015 performances started mid-October, rather than September, due to the Program's Request for Proposal process. A competitive bid review and contract negotiations resulted in a contract renewal with the current vendor, The National Theatre for Children.

Additionally, Duke Energy Ohio has enhanced the program by:

- Leveraging the program webpage at duke-energy.com to showcase the program and bring awareness to employees and other stakeholders through events and digital signage
- Partnering with Duke Energy Account and District Managers to leverage existing relationships in the community and develop positive PR
- Offering school, classroom and family contests for kit sign ups to stir additional excitement in the schools/classrooms throughout the school year
- Utilizing social media to encourage awareness and participation

- Offering teacher satisfaction survey evaluations after the performances for both the elementary and middle school shows. Average survey data from October and November indicated 92% of the teacher surveys had very high satisfaction ratings.

As the program goes into its fifth year, there will be a review to enhance the Energy Efficiency Starter Kit and customer satisfaction by upgrading the kit packaging design and reviewing the quality satisfaction of kit measures. There will also be a focus on reaching out to schools that have not previously participated in the Program with vendor visits to the schools to help make the Program available to all schools in Duke Energy Ohio territory. Additionally, increased communications to participating schools before and after the performances will encourage kit sign ups with the students, teachers and parents.

Low Income Services Program

The Low Income Services Program provides assistance to low income customers by providing funding energy efficiency measures. The upfront costs of high efficiency equipment are an especially difficult barrier for low income customers to overcome. The Weatherization and Refrigerator Replacement program is available to all customers within Duke Energy's service territory, with a household income up to 200% of the federal poverty level and who have not participated in the program within the past 10 years.

The Electric Maintenance Service program is available for low-income elderly and disabled customers up to 175% of poverty level. This program offers low-cost solutions for energy efficiency. Customers may receive energy efficiency products and services such as compact fluorescent bulbs, low flow showerheads and aerators, water heater wraps, HVAC cleaning, HVAC filters, and energy efficiency education.

The Electric Pilot program is offered to customers residing in the Duke Energy Ohio service territory. The program is offered through a partnership with People Working Cooperatively (PWC). The program targets low income customers and focuses on energy efficiency. Customers receive whole-house weatherization services which include installation of energy efficiency measures and education. Duke Energy Ohio will purchase and recognize the energy and demand savings achieved through the whole-home weatherization in the Duke Energy Ohio service territory that are currently funded by leveraged funds, funding from sources other than Duke that are not explicitly tied to efficiency. The pilot is intended to allow the Company to recognize efficiency impacts that were previously unrecognized, achieve these impacts in a cost-effective manner, and create a new funding stream for additional whole-home weatherization to be performed in the Duke Energy Ohio Service Territory. The pilot will continue in 2016. The evaluation report was finalized in 2015 and is included with this filing as Appendix E.

These programs are promoted through, but not limited to, Community Action Agencies, Non-Governmental Organizations (NGO's), and direct mail to customers.

Duke Energy Ohio partnered with Ohio Partners for Affordable Energy (OPAE) to provide refrigerator testing and replacement services within Duke Energy's Ohio service territory. The program launched January 1, 2014. OPAE worked with local agencies to provide additional marketing techniques to help drive participation. Due to the lack of administrative funds available to operate this program, the program did operate in 2015.

My Home Energy Report (formerly called Home Energy Comparison Report)

My Home Energy Report (MyHER or the Program) is a periodic comparative usage report that compares a customer's energy use to similar residences in the same geographical area

based upon the age, size and heating source of the home. Specific energy saving recommendations are included in the report to encourage energy saving behavior.

The reports are distributed up to 12 times per year (delivery may be interrupted during the off-peak energy usage months in the fall and spring). The report delivers energy savings by encouraging customers to alter their energy use. The monthly and annual energy usage of each home is compared to the average home (top 50%) in their area as well as the efficient home (top 25%). Suggested energy efficiency improvements given the usage profile for that home are also provided. In addition, measure-specific offers, rebates or audit follow-ups from other Company offered programs are offered to customers, based on the customer's energy profile.

Target customers reside in individually-metered, single-family residences with active account and 12 months of usage history. Analyzing only single-family residences eliminates the possibility of erroneous data caused by thermal transfer between adjacent units in multi-family structures.

The MyHER Interactive portal was rolled out in March 2015. The portal allows customers to see how they use energy, set and track energy saving goals, interact with calculators and ask an expert for advice. The portal also includes weekly email challenges. The portal was promoted on the paper report as well as email campaigns. While response to initial marketing efforts was positive, in October 2015 Duke Energy introduced a sweepstakes for a chance to win a \$500 VISA gift card to achieve an increase in the number of MyHER Interactive users. Offering the sweepstakes proved to be extremely effective with MyHER Interactive users.

In August 2015, a MyHER Customer Satisfaction Study was executed with very positive results. Three-fourths of customers say they always read MyHER. The primary reasons

customers read MyHER is to save money and electricity. About one-fourth of customers have talked about MyHER with family, friends or co-workers. Seven out of ten customers indicate high satisfaction with MyHER. Over half of customers say that MyHER has had a positive effect on their overall satisfaction with Duke Energy.

In October 2015, the independent third party evaluation, measurement and verification vendor approved decreasing the size of the control group with no negative effective on the accuracy of the verified savings. This allowed 14,000 additional Ohio customers to start receiving the report.

Appliance Recycling Program

The Duke Energy Ohio Appliance Recycling Program (ARP) launched on October 4, 2012 in cooperation with the selected program vendor, JACO Environmental, Inc. ARP encourages customers to responsibly dispose of functional refrigerators and freezers. Customers enroll in the program receive free in home appliance pick up and receive a \$30 incentive for participating in the program. Up to 95% of the appliance materials will be recycled in an environmentally responsible manner and the remaining materials are disposed of at landfills. Program marketing utilized a variety of methods to engage customers including the following:

- Direct mail
- Email blast
- Bill inserts & messages
- Digital, print, and broadcast media
- Social media
- Newsletters

The advertising strategy was diverse and effective as reflected in the “How Heard” responses from our customers provided in the table below. Some channels were clearly more memorable for customers, but there were often multiple outreach efforts taking place at the same time which could mean that multiple outreach methods could have influenced customer behavior.

The Duke Energy Ohio Appliance Recycle Program recycled 3,062 (2,583 refrigerators and 479 freezers) appliances in 2015 and ended the year 18% above annual participation goal.

Appliance Recycling Program Potential Changes

Program met goal though marketing campaigns.

Duke Energy Ohio residential customers received three bill inserts and three direct mail campaigns in 2015. Digital Media campaigns were launched promoting the Appliance Recycle Program from January – October 2015.

Of special note from April to November 2015 Home Energy House Call auditors promoted ARP. When auditors evaluated Duke Energy Ohio customers’ homes if they saw an old second refrigerator or freezer they explained the additional cost of having inefficient units running and how much they could save by disposing of the units. The auditors had pads with key talking points on ARP brochures which described the program and provided a toll free number and de.com website to find out additional information and to enroll. Brochures were left with customers that had secondary working units.

On November 19, 2015, JACO, the implementation vendor, abruptly discontinued operations. The impact included delayed and bounced incentive payments to customers who participated in the program and cancellations for customers with appointments scheduled through

December. Internal work continues to reissue incentive payments and reschedule pickup times for appliances for impacted customers. Additionally, Duke Energy will consider submitting an RFP to evaluate the future of the Program.

Low Income Neighborhood Program

The Low Income Neighborhood Program (“Program”) assists low-income customers in reducing energy costs through energy education and installation of energy efficient measures to qualified customers. The primary goal of the Residential Neighborhood Program is to empower low income customers to better manage their energy usage.

Duke Energy Ohio has partnered with GoodCents to administer the program. The Program targets neighborhoods with a significant low income customer base using a grassroots marketing approach to interact on an individual customer basis and gain trust. Participation is driven through a neighborhood kick-off event that includes community leaders supporting the benefits of the Program. The purpose of the kick-off event is to rally the neighborhood around energy efficiency and provide thorough and pertinent information on how the program will operate in their neighborhood. Customers will have the option to sign-up for an energy assessment at the time of the event.

In addition to the kick-off event, GoodCents uses the following channels to inform potential customers about the Program:

- Direct mail
- Door hangers
- Press releases
- Community presentations and partnerships
- Inclusion in community publications such as newsletters, etc.

Customers participating in the Program receive an energy assessment to identify energy efficiency opportunities in their home and one-on-one education on energy efficiency techniques. Additionally, the customer receives a comprehensive package of up to 16 energy efficient measures, installed by professionally trained technicians. Measures received are based on each home's individual walk-through assessment. For customers receiving furnace filters as part of their comprehensive kit, they will be provided a year's supply after the initial has been installed.

The Program is available only to individually-metered residential customers in neighborhoods selected by Duke Energy Ohio, at its sole discretion, which are considered low-income based on third party data, that includes income level and household size. Areas targeted for participation in this Program will have approximately 50% of the households at an income equal to or less than 200% of the federal poverty level as established by the Department of Energy.

The program launched in the second quarter of 2013. In 2015, a total of 1,373 homes were serviced, 34 homes over the annual goal of 1,339.

Low Income Neighborhood Program Potential Changes

To allow for consistency across all jurisdictions, we will be switching vendors at the end of 2015. Also starting January 2016, the name will be changed and marketed as the Neighborhood Energy Saver Program.

Home Energy Solutions (formerly called Home Energy Management) Program

Home Energy Solutions (HES), which is formally being marketed as HōM™ Energy Manager, provides customers with up to 2 free Wi-Fi enabled, programmable thermostats with professional installation. They also have full access to an online customer engagement portal that is accessible

through mobile devices, tablets and PCs with Internet access. The portal allows customers to control their energy usage by adjusting their temperature settings, viewing energy efficiency tips and reviewing their historical energy usage compared to similar homes and neighbors.

Customers also select from one of three demand response cycling levels: 50%, 75% and 100%. Based on the level selected, there is an annual fee assessed per thermostat install:

- 50%, \$5.99
- 75%, \$2.99
- 100%, \$0.00

HES marketing efforts focused on eligible Duke Energy Ohio residential customers that own and reside in a single family home. Additional eligibility requirements included customers with:

- Central A/C
- Secure wireless broadband Internet connection
- Certified smart meter
- Acceptable/Good/New credit status
- Residential rate

At the end of December 2015, there were 3,245 customers.

Home Energy Solutions Program Potential Changes

In order to increase participation and improve customer experience in the program, the following modifications were made to HES:

- Removed the 12 month billing history minimum
- Reduced the early termination fee from \$175 to \$99. Beginning March 1, 2016, the early termination fee is eliminated.

A new marketing campaign launched the last week of October, 2015. The campaign featured a new marketing brochure and email designed to drive prospects to the program web site to enroll. Each month, 25,000 prospects receive direct mail. Customers may also receive a follow-up email and/or phone call. Prior to this new campaign, the program averaged 4 enrollments per day. For the month of November, enrollments increased to an average of 24 per day. December is historically not a good month for marketing to customers and a significant decline in enrollments occurred after December 15th. Marketing efforts were stopped on December 21, 2015 and resumed January 4, 2016. The program is expected to meet the participation goal for 2016.

Power Manager[®] Program

The Power Manager Program provides incentives to residential consumers who allow the company to cycle their air conditioner's outdoor compressor and fan during peak energy periods between May and September. Participating customers of the Company who have a functioning outdoor A/C unit are eligible for the program.

Participants in the Power Manager program allow Duke Energy Ohio to control their air conditioners during peak summer demand periods. Customers receive a one-time enrollment incentive of \$25 or \$35 depending on the Power Manager option they choose. In addition, they receive credits for each Power Manager event. Following the end of the event season, which runs from May through September, if warranted, customers receive a credit that ensures their total credit for the season is a minimum of \$5 or \$8 depending on the option in which they enrolled.

The Power Manager program manager evaluates conditions to activate a Power Manager event including temperature, heat index, humidity and market conditions as communicated by the regional transmission organization, PJM. In 2015 Duke Energy activated the Power Manager

program on 4 separate occasions (3 times in July and once in September) in addition to the required 1 hour PJM test on September 1, 2015. In all the 4 events totaled 8 hours of reduced demand and helped Duke Energy meet peak summertime demand needs and contribute to the stability of the electric grid.

The Power Manager program was successfully promoted in 2015 through outbound calling and targeted email offers along with the company website. Marketing efforts were not as robust as in previous years to allow the Duke Energy HōM™ Energy Manager program an opportunity to establish a customer base in Ohio. The HōM™ Energy Manager program is a thermostat based program that is somewhat similar to the Power Manager program in that it allows customers to participate in demand response events. Ideally, Duke Energy wants to gain enough experience in marketing of HōM™ to identify customer segments that prefer the unobtrusive “don’t notice the cycling events” experience with Power Manager versus those who desire a “higher touch” experience via HōM™. The annual net number Duke Energy Power Manager participants dropped by 578 in 2015. Marketing efforts yielded approximately 960 new participants in 2015. Approximately 1,200 participants requested to have their switch removed, and about 100 of those requests were from Power Manager customers switching to the Duke Energy HōM™ program with the remainder of the requests coming after events in 2015. All device installations and removals on customers’ AC units were completed by a third party vendor.

Power Manager Program Potential Changes

There are no plans to change the operation of the Power Manager program in 2016.

Non-Residential Programs

Smart Saver[®] Non-Residential Prescriptive Program

The Smart Saver[®] Non-residential Prescriptive Incentive Program provides incentives to commercial and industrial consumers to install energy efficient equipment in applications involving new construction, retrofit, and replacement of failed equipment. The program also uses incentives to encourage maintenance of existing equipment in order to reduce energy usage. Incentives are provided based on Duke Energy Ohio's cost effectiveness modeling to assure cost effectiveness over the life of the measure.

Commercial and industrial consumers can have significant energy consumption, but may lack knowledge and understanding of the benefits of high efficiency alternatives. Duke Energy Ohio's program provides financial incentives to customers to reduce the cost of high efficiency equipment, offer a quicker return on investment, save money on customers' utility bills that can be reinvested in their business, and foster a cleaner environment. In addition, the Program encourages dealers and distributors (or market providers) to stock and provide these high efficiency alternatives to meet increasing demand for the products.

The program promotes prescriptive incentives for the following technologies – lighting, HVAC, pumps, variable frequency drives, food services, process equipment, and information technology equipment. Equipment and incentives are predefined based on current market assumptions and Duke Energy's engineering analysis. The eligible measures, incentives and requirements for both equipment and customer eligibility are listed in the applications posted on Duke Energy's Business and Large Business websites for each technology type.

Duke Energy is in the final stages of testing of an online application portal, which will be available to customers and trade allies to submit and track applications.

All non-residential customers served by Duke Energy and pay the EE rider in Ohio are eligible for the Smart \$aver[®] program.

Getting the Trade Allies (TA) to support the program has proven to be the most effective way to promote the program to our business customers. The Smart \$aver outreach team builds and maintains relationships with trade allies associated with the technologies in and around Duke Energy Ohio's service territory. Trade ally company names and contact information appear on the TA search tool located on the Smart \$aver[®] website. This tool was designed to help customers who do not already work with a TA, to find someone in their location who can serve their needs.

Duke Energy Ohio continues to look for ways to engage the trade allies in promotion of the program, including the utilization of focus groups. Duke Energy Ohio developed a collateral tool kit to allow the use of the Smart \$aver[®] logo along with white papers, case studies, and other types of collateral developed by Duke Energy Ohio. Originally, a tool kit was available for Variable Frequency Drives. Toolkits are now available for Lighting and HVAC. In 2013, Duke Energy Ohio offered co-funding to trade allies for approved marketing supplies and activities for promoting the Smart \$aver program. Funds were available on a first come first serve basis. Duke Energy Ohio is continuing co-funding in 2016.

The Company is currently launching a mid-stream marketing channel. Many trade allies participating in the traditional application process reduce their invoice to the customer by the amount of the incentive and then receive reimbursement from Duke Energy when the incentive

is paid. Many customers prefer this rather than paying the full cost upfront and receiving an incentive check from the Company. Many TAs, such as distributors, are not staffed to handle the paperwork involved in this process. The midstream marketing channel removes this barrier. TAs reduce the customer's invoice by the amount of the Smart \$aver Prescriptive incentive. TAs then provide the sales information to the Company electronically for reimbursement. Duke Energy currently has one TA signed up for the midstream channel and many more have expressed interest. The Company continues to work with TAs to launch the channel. Based on the experience of other utilities, Duke Energy expects this channel to increase participation in the Smart \$aver Prescriptive program.

The Company added two business energy advisors to focus on the unassigned small and medium business customers. These team members will focus on marketing and program support.

The Company continues to offer the Energy Efficiency Store on the Company's website. The site provides customers the opportunity to take advantage of a limited number of incentive measures by purchasing qualified products from an on-line store and receiving an instant incentive that reduces the purchase price of the product. The incentives offered in the store are consistent with current program incentive levels.

Duke Energy Ohio's website is a great source of program information. Customers and trade allies can visit the website and learn about the program, program benefits, search for participating vendors, ask questions on-line, and complete application forms. The website includes a video for programmable thermostats.

Duke continues to develop case studies and testimonials from customers who have participated in the program to be used to help promote the program – showing actual savings and benefits for each technology type.

Smart Saver[®] Non-Residential Prescriptive Program Potential Changes

Standards continue to change and new more efficient technologies continue to emerge in the market. The Company will continue evaluating the opportunity to add measures to the approved Program that provide incentives for a broader suite of energy efficient products.

Smart Saver[®] Custom Rebate Program

Duke Energy Ohio's Smart Saver[®] Nonresidential Custom Incentive Program offers financial assistance to qualifying commercial, industrial and institutional customers (that have not opted out) to enhance their ability to adopt and install cost-effective electrical energy efficiency projects.

The Smart Saver[®] Custom Incentive program is designed to meet the needs of Duke Energy Ohio customers with electrical energy saving projects involving more complicated or alternative technologies, or those measures not covered by standard Prescriptive Smart Saver[®] Incentives.

The Custom Incentive application is for projects that are not listed on the applications for Smart Saver[®] Prescriptive Incentives. Unlike the Prescriptive Incentives, Custom Incentives require approval prior to the customer's decision to implement the project. Proposed energy efficiency measures may be eligible for Custom Incentives if they clearly reduce electrical consumption and/or demand. There are two approaches for applying for Custom Incentives,

Classic Custom and Custom to Go. Application documents vary slightly. The difference between the two approaches focuses on the method by which energy savings are calculated.

Currently there are the following application forms that are located on the Duke Energy Ohio website under the Smart \$aver[®] Incentives (Business and Large Business tabs).

- Custom Application – Administrative Information
- Energy Savings Calculations & Basis
 - Classic Custom approach (> 700,000 kWh or no Applicable Custom to Go calculator)
 - Variable Frequency Drives
 - Energy Management Systems
 - Compressed Air
 - Lighting
 - General
 - Custom to Go Calculators (< 700,000 kWh and Applicable Custom to Go Calculator)
 - HVAC (including Energy Management Systems)
 - Lighting
 - Compressed Air
 - Process VFDs

The program is promoted through but not limited to the following;

- Trade ally outreach
- Duke Energy Ohio Business Relations Managers

- Duke Energy Ohio segment specific workshops
- Company website

Smart Saver[®] Custom Rebate Program Potential Changes

In 2015, Duke Energy Ohio launched additional user-friendly energy savings calculation tools for HVAC (EMS), Lighting, Compressed Air, and Process VFDs, which are intended to streamline the application process and boost participation for small to medium sized EE projects. For 2016, Duke Energy Ohio will continue to offer these tools. The entire suite is referred to as “Custom-to-Go”. Additionally, the Custom Program implemented the application of a “flat rate” incentive rate value for Custom applications. The Smart Saver Custom webpage has been updated to accommodate the aforementioned additions.

Furthermore, the Custom program continues to evaluate additional improvement to enhance participation and program efficiency.

Non-Residential Energy Assessments Program

The purpose of the Non-Residential Energy Assessment Program is to assist non-residential customers in assessing their energy usage and providing recommendations for more efficient use of energy. The program will also help identify those customers who could benefit from other Duke Energy Ohio Energy Efficiency non-residential programs.

Duke Energy Ohio offers various types of On-Site Assessments wherein an assessor will spend one or more days at a customer’s site identifying opportunities for increased energy efficiency. The various types of assessments include those defined by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (Level II and Level III) as well as assessments focused on specific market segments or systems (i.e. commercial real estate, data

centers, hospitals, compressed air systems, and industrial refrigeration systems). After the audit is completed, the customer receives a written report of the audit findings as well as assistance applying for Smart \$aver Incentives if desired. The cost of the On-Site Assessment varies depending on the complexity, size of the facility, and length of time required. Customers determined eligible may receive financial assistance with a subsidy of up to 50% of the total assessments cost.

Impacts captured as a result of Energy Assessment recommendations are recorded in Duke Energy Ohio's non-residential incentive programs.

Non-Residential Energy Assessment Program Changes

Duke Energy is now offering an ancillary service Energy Design Assistance (EDA). Similar to the current assessment program, EDA offers energy savings recommendations for non-residential customers. However, the focus is assisting customers designing new construction, major renovations, or additions to ensure the most energy efficient structures are built. As part of the service, Duke Energy provides computer software energy modeling that gives the capability for innumerable efficient building designs to be considered by the customer. Both Duke Energy and the customer would cost share for the service. Impacts captured as a result of Energy Design Assistance recommendations are recorded in Duke Energy Ohio's non-residential incentive programs.

Mercantile Self-Direct Rebates Program

The Duke Energy Ohio Mercantile Self-Direct program was enacted in accordance with Public Utilities Commission of Ohio (Commission) Rule 4901:1-39-05(G).A.C., and the

Commission's Opinion and Order in Case No. 10-834-EL-POR. Customers who use 700,000 kWh or greater annually and national accounts are eligible for the program.

These customers may elect to commit energy savings or demand reductions from projects completed in the prior three calendar years that did not receive Smart Saver[®] incentives to Duke Energy Ohio's benchmark achievements. In return, Duke Energy Ohio will assist the customer in filing an application with PUCO for approval of a portion of the incentive the customer would have received had they participated in Duke Energy Ohio's standard Smart Saver[®] Non-Residential programs.

Any customers that paid a reduced rider amount as the result of a negotiated settlement and wish to receive a Self-Direct rebate will be invoiced for the differential from the date of project completion until the last effective date of the negotiated settlement.

The marketing channels for Mercantile Self-Direct project applications closely resemble those of the Smart Saver[®] Prescriptive and Smart Saver[®] Custom programs, based on applicability, as described in previous sections of this filing.

Rebates for Self-Direct projects eligible for a cash rebate reasonable arrangement will be a maximum of 50% of the dollar amount that would apply to the same project if evaluated in the Smart Saver[®] Prescriptive & Custom programs.

Self-Direct Prescriptive Program

The Self-Direct Prescriptive program provides rebates for mercantile customers who implement energy efficiency and/or demand reductions projects to install higher efficiency equipment. Major categories include lighting, motors, pumps, VFD's, food service, information

technology, HVAC and process equipment. Eligible measures are reflective of the Smart \$aver[®] Prescriptive Incentive portfolio. While many of the measures recorded under the Smart \$aver[®] Prescriptive program will remain Prescriptive in nature under the Self-Direct program, in accordance with Commission rules and orders on the mercantile program, certain measures may be evaluated under the Self-Direct Custom program to enable the use of as-found baseline.

Self-Direct Custom Program

The Self-Direct Custom program offers rebates for completed mercantile projects involving more complicated scopes, or unique technologies that resulted in improvements upon facility electrical energy efficiency. A proposed energy efficiency measure may be eligible for a Self-Direct Custom rebate if it clearly reduces electrical consumption and/or demand. Unlike the Smart \$aver[®] Custom program, measurable and verifiable behavioral and operational measures are eligible in the Mercantile Self Direct program.

PowerShare[®] Program

The PowerShare[®] program is Duke Energy Ohio's demand side management (or demand response) program geared toward Commercial and Industrial customers. The primary offering under PowerShare[®] is named CallOption and it provides customers a variety of offers that are based on their willingness to shed load during times of peak system usage. These credits are received regardless of whether an event is called or not. Energy credits are also available for participation (shedding load) during curtailment events. The notice to curtail under these offers is between 30 minutes (emergency) and day-ahead (economic) and there are penalties for non-compliance during an event.

The program is promoted through but not limited to the following;

- Duke Energy Ohio Business Relations Managers

- Email to customers
- Duke Energy Ohio website

Customer targets in 2015 continued to be large manufacturers, water/wastewater facilities and school systems. The market is very competitive with other Curtailment Service Providers acquiring customers during 2015 that had previously been PowerShare[®] participants.

The largest change in 2015 was to meet the new requirement by PJM to change the notification time for emergency events to 30 minutes before the customer must reach full curtailment level. PJM created an exemption process for manufacturers who cannot curtail that quickly due to potential damage costs to equipment, product or feedstock, or customers with backup generation that cannot ramp up to full capacity that quickly. These customers may request that they be notified either 1 or 2 hours prior to an event. Duke Energy worked with customers and PJM to navigate through this change and to secure exemptions for five customers who met the PJM parameters for exemption.

PowerShare[®] Program Potential Changes

For 2016-2017 program year, there are no changes to the program structure. PJM rules will require a shift to meet their “Capacity Performance” construct starting in 2018-2019 planning year, which will require a change program parameters (such as removing the maximum number of interruption) and may impact future participation. Duke Energy Ohio program management staff is working with customers to explore ways to navigate these future changes.

PJM Pilot

As agreed to by the signatory parties in the Stipulation and Recommendation for Case No. 13-0431-EL-POR, Duke Energy Ohio created a PJM Interconnection, Inc. (PJM) Pilot program capturing all the costs and benefits of PJM Reliability Pricing Model (RPM)

participation. Duke Energy Ohio agreed to bid at least 80% of eligible², projected cost effective³, approved Program Portfolio resources⁴ into the PJM Base Residual Auctions (BRA) occurring during the term of the 2014 – 2016 Program Portfolio. All cost effective, PJM approved MW resources were bid into the 2018/2019 BRA. This resulted in 18.1 Capacity Performance MWs of energy efficiency clearing in the 2018/2019 auction.

Clearing MW revenue is allocated back to programs after all administrative and M&V costs are covered. Revenue offset is allocated back to program based on percentage of MWs clearing each auction and customer class.

Duke Energy Ohio continues to keep the Duke Energy Community Partnership (the Collaborative) updated regarding the auction process.

Small Business Energy Saver Program

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

² “Eligible” is defined for purposes of the Stipulation as existing and planned energy efficiency savings and demand response that comply with PJM Manuals 18 and 18b.

³ “Cost effective” is defined for purposes of Duke Energy Ohio’s PJM Pilot Program as the projected auction revenues are greater than the projected costs for existing and planned energy efficiency and demand response, where the phrase “projected auction revenues” is defined as the estimated kW multiplied by the previous BRA clearing price for the Duke zone and “projected costs” are defined as the costs necessary to fully qualify and bid the resources into the PJM capacity auctions.

⁴ “Program Portfolio resources” is defined as the energy efficiency and demand response resources, both existing and planned, that are expected to be created under Duke’s 2014 – 2016 Program Portfolio application in Case No. 13-0431-EL-POR. Program Portfolio resources specifically exclude mercantile self-direct resources, unless a self-direct mercantile customer affirmatively and explicitly chooses to grant its energy efficiency capacity resources to Duke Energy Ohio, by separate agreement.

Program participants receive a free, no-obligation energy assessment of their facility followed by a recommendation of energy efficiency measures to be installed in their facility along with the projected energy savings, costs of all materials and installation, and up-front incentive amount from Duke Energy. Upon receiving the results of the energy assessment, if the customer decides to move forward with the proposed energy efficiency project, the customer makes the final determination of which measures will be installed. The energy efficiency measure installation is then scheduled at a convenient time for the customer and the measures are installed by electrical subcontractors of the Duke Energy-authorized vendor.

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

The Program is available to existing Duke Energy Ohio non-residential customer accounts with an actual average annual electric demand of 100 kilowatts or less. An individual business entity's participation is limited to no more than five premises on the Company's system during a calendar year.

The Program launched in late November 2014, after receiving the Order of Approval⁵ from the Public Utilities Commission of Ohio on September 10, 2014. SmartWatt Energy Inc. (SmartWatt), a company that specializes in administering utility energy efficiency programs nationwide similar to Small Business Energy Saver, was awarded the contract to administer the Program in the Duke Energy Ohio & Kentucky territories after a lengthy competitive bid and vendor evaluation process.

⁵ Case No. 14-964-EL-POR

Due to the Program launching in late 2014, no customers participated in the Program during 2014. However, the Program experienced a significant amount of customer interest in 2015, its first full year of operation. There were 753 Small Business Energy Saver projects completed for eligible Duke Energy Ohio customers in 2015.

Small Business Energy Saver Program Potential Changes

Standards continue to change and new more efficient technologies continue to emerge in the market. This continuing market progress led to the addition of Design Lights Consortium-Qualified T8 LED tubes as an incentivized Program measure in 2015. Currently, the Company is evaluating the opportunity to add programmable Wi-Fi enabled thermostats to the Program as an incentivized measure in 2016.

The Company will continue to evaluate the opportunity to add incentivized measures suitable for the small business market to the approved Program which fit the direct install program model. The Company would ultimately like to ensure that small business customers are given the opportunity to maximize their energy savings by being offered a comprehensive energy efficiency project through the Program wherever possible.

4901:1-39-05(C)(2)(a)(i) Cont'd... Number and Type of Participants and Comparison of Forecasted Savings to Achieved Savings

The number of participants or measures installed by customer type is summarized above in Table 2. Details on participation by measure are provided in Appendix A.

A new portfolio filing seeking program approval for January 1, 2014 – December 31, 2016 was filed on April 15, 2013⁶ and approved on December 4, 2013. Table 4 provides a comparison of achieved impacts for 2015 as well as the forecasted impacts for 2016.

Table 4: Comparison of Achievement to Forecasted Impacts and Trend Projection Through 2016									
	1, 2	Achieved Load Impacts		Forecasted Load Impacts					
		MWH 2015	MW 2015	MWH 2015	MWH 2016	MWH Total	MW 2015	MW 2016	MW Total
<u>Other Programs</u>									
Low Income Weatherization		392	0.1	0	0	0	0.0	0.0	0.0
<u>Residential Programs</u>									
Appliance Recycling Program		1,713	0.2	957	872	1,829	0.1	0.1	0.2
Home Energy Solutions		1,248	0.8	2,885	2,810	5,695	1.8	1.8	3.6
Home Energy Solutions - Demand Response		0	2.3	0	0	0	0.0	5.4	5.4
Low Income Neighborhood Program		769	0.2	1,262	598	1,860	0.3	0.2	0.5
Energy Efficiency Education Program for Schools		1,821	0.4	2,026	4,665	6,691	0.2	1.3	1.5
Home Energy Comparison Report	3	5,814	1.8	(860)	5,002	4,142	(0.3)	1.5	1.3
Low Income Services		0	0.0	107	107	215	0.0	0.0	0.0
Power Manager	3	0	(0.4)	0	0	0	7.5	(2.2)	5.3
Residential Energy Assessments		1,847	0.2	2,032	2,935	4,967	0.2	0.4	0.6
Smart Saver Residential		50,324	6.2	20,520	24,342	44,863	3.3	3.9	7.2
Weatherization Pilot		1,371	0.2	70	2,621	2,691	0.0	0.4	0.4
<u>Non Residential Programs</u>									
Smart Saver Non Residential Custom		33,496	3.3	24,428	27,606	52,034	2.8	3.2	5.9
Smart Saver Non Residential Prescriptive		40,078	6.3	64,441	74,978	139,419	12.3	15.0	27.3
PowerShare®	3	0	(46.4)	0	0	0	(30.1)	(9.9)	(40.0)
Mercantile Self-Direct		5,492	0.6	2,817	9,045	11,861	0.6	1.7	2.3
Small Business Energy Saver	4	19,646	4.3	16,905	20,490	37,395	4.1	4.6	8.7
Total for All Programs		164,010	(19.9)	137,590	176,071	313,662	3.0	27.3	30.2

1. 2015 forecasted impacts from the previous SB221 filing.

2. 2016 forecasted impacts have been updated with more recent estimates to align with updated projection filing.

3. HECR and DR are shown as incremental to be consistent with achievements.

4. 2015 forecast value reflects a correction from previously filed.

This table indicates that the achieved MWH impacts through 2015 are above the 2015 forecasted load impacts.

⁶ Case No. 13-0431-EL-POR

4901:1-39-05(C)(2)(a)(ii) Energy Savings Counted Toward Benchmark as a Result of Mercantile Customers

The energy savings counted towards the benchmark for 2015 as a result of energy efficiency improvements and implemented by mercantile customers and committed to the Company are 5,492 MWH.

4901:1-39-05(C)(2)(a)(iii) Peak Demand Reduction Counted Toward Benchmark as a Result of Mercantile Customers

The peak-demand reductions counted towards the benchmark for 2015 as a result of energy efficiency improvements and implemented by mercantile customers and committed to the Company are 0.6 MW.

4901:1-39-05(C)(2)(a)(iv) Peak-Demand Reductions Claimed Due to Transmission and Distribution Infrastructure Improvements

The Company is not claiming any impacts from transmission and distribution infrastructure improvements at this time, but is working to identify verified saving to be recognized in future annual compliance filings at the same time the other provisions of S.B. 310 become effective, particularly those pertaining to accounting for savings.

4901:1-39-05(C)(2)(b) Evaluation, Measurement, and Verification (EM&V)

In its Order in Case Number 09-512-GE-UNC, July 31, 2013, the Commission stated an intention to treat the 2010 Draft TRM and those comments agreed to by VEIC as a “safe harbor” rather than a mandate. As a result of this Commission direction Duke Energy Ohio has directed third-party evaluators to consider guidelines presented by the TRM in evaluations going forward into the 2016 program evaluation year. For the current compliance filing the independent EM&V was generally conducted consistent with the most current draft of the TRM. It should be

noted however, that the TRM provides no specific methodologies for behavior programs or direct load control.

Energy savings and peak-demand reduction values are documented in the individual program EM&V studies in the appendices. The following studies have been completed.

Process and Impact Evaluation for the Residential Neighborhood Program (February 27, 2015)	Appendix D
Low Income People Working Cooperatively Pilot Program Evaluation (November 2015)	Appendix E
My Home Energy Report Evaluation (September 30, 2015)	Appendix F
Energy Efficiency in Schools Program Evaluation (November 2, 2015)	Appendix G
Residential Energy Assessments Program Evaluation (November 30, 2015)	Appendix H
Smart Saver [®] Residential CFLs Evaluation (November 5, 2015)	Appendix I
Smart Saver [®] Residential HVAC Evaluation (September 21, 2015)	Appendix J
Smart Saver [®] Residential Specialty Bulbs Evaluation (May 13, 2015)	Appendix K
Smart Saver [®] Residential Multi-Family Evaluation (September 30, 2015)	Appendix L
Power Manager Process Evaluation (February 17, 2015)	Appendix M
Power Manager Impact Evaluation (August 27, 2015)	Appendix N
Smart Saver [®] Custom Evaluation (November 15, 2015)	Appendix O
Smart Saver [®] Prescriptive Evaluation (January 8, 2016)	Appendix P
PowerShare Impact Evaluation (October 5, 2015)	Appendix Q

Appendix C provides an up-to-date summary EM&V methodologies and protocols.

The cost effectiveness of the current programs is provided below in Table 5.

Table 5	Program Cost Effectiveness Test Results**			
	Utility Test	TRC Test	RIM Test	Participant Test
RESIDENTIAL CUSTOMER PROGRAMS				
Appliance Recycling Program	5.06	6.98	2.40	NA
Energy Education Program for Schools	0.75	0.98	0.65	NA
Home Energy Solutions	1.37	1.93	1.26	4.31
Low Income Neighborhood	1.64	2.43	1.21	NA
Low Income Services	0.60	1.66	0.52	NA
My Home Energy Report	2.10	2.10	1.44	NA
Residential Energy Assessments	2.44	2.63	1.55	NA
Smart Saver® Residential	2.34	2.32	1.52	4.76
Power Manager	4.18	5.05	4.18	NA
NON-RESIDENTIAL CUSTOMER PROGRAMS				
Smart Saver® Non-Residential Custom	3.35	1.15	2.24	1.45
Smart Saver® Non-Residential Prescriptive	5.41	2.35	3.27	2.26
Power Share®	2.50	10.77	2.50	NA
NEW PROGRAM				
Small Business Energy Saver	3.12	2.51	2.34	2.78

**Cost Effectiveness is calculated on NPV for life of measure

4901:1-39-05(C)(2)(c) Continuation of Programs

Based on the success experienced and feedback from customers and trade allies, Duke Energy Ohio proposes continuing with the existing portfolio of programs as approved in Case No. 13-0431-EL-POR, the current portfolio, including Small Business Energy Saver as approved in Case No. 14-964-EL-POR. The portfolio is subject to annual adjustments for changes in efficiency levels or market conditions.

The Company also filed for a non-residential pilot, Smart Energy in Offices⁷. Smart Energy in Offices is a community engagement based program designed to increase the energy efficiency of targeted customers by engaging building occupants, tenants, property managers and facility teams with information, education, and data to drive behavior change and reduce energy consumption. The Commission stated that Senate Bill 310 prohibited action resulting in a dismissal of the application.

The Company is continually researching other energy efficiency opportunities for both the residential and non-residential customer classes.

Duke Energy Ohio's portfolio is approved through December 31, 2016. The procedural record in this case clearly establishes that within this approved portfolio plan the Company has the ability and will modify existing programs and add new programs for the purposes of responding to changing market conditions, meeting its customers' efficiency needs and allowing it to meet its annual energy efficiency benchmarks over the period.

The Company's portfolio plan, including its shared savings incentive mechanism, was approved incorporating the same banking principles that were established by the Commission's

⁷ Case No. 14-1575-EL-POR

rules with respect to its energy efficiency benchmark compliance. As agreed to in its portfolio plan stipulation and approved by the Commission, the Company does not double count the net benefit of energy savings achieved in a particular year for the purposes of calculating the incentive, and once energy savings are recognized in determining the Company's allowed shared savings percentage, the impacts are exhausted for the purpose of determining its annual incentive achievement level in the future. A Stipulation that contains provisions related to certain parameters around the Company's potential shared savings incentive mechanism in 2017 and beyond is currently pending with the Commission, which will likely alter this structure in the future.

The provisions of newly enacted Senate Bill 310, R.C. 4928.6616, Sections 6 and 7 contain provisions relating to the continuance of an existing portfolio. Pursuant to that statute, Duke Energy Ohio has notified the Commission of its election to continue with its existing portfolio plan and maintain its approved cost recovery and shared savings incentive mechanism through 2016.⁸ A new DSM portfolio will be filed by December 31, 2016, prior to the Commission's ability to consider or take any action related to a portfolio filing.

⁸ Case No. 14-1580-EL-RDR

4901:1-39-05(D) Independent Program Evaluator Report

Appendix C, provides an up-to-date summary of EM&V methodologies and protocols. Individual reports have been provided as appendices D through Q.

4901:1-39-05 (E)(1) and (2)(a-b) Peak Demand Reductions

Duke Energy Ohio has satisfied its peak-demand reduction benchmarks through energy efficiency and peak-demand response programs implemented by the Company and programs implemented on mercantile customer sites where the mercantile program is committed to the electric utility.

4901:1-39-05(F) and (G)(1-5) Mercantile Customers

Duke Energy Ohio's Mercantile Self Direct program is the avenue through which mercantile customers commit energy and demand impacts from their energy efficiency projects to Duke Energy Ohio in exchange for cash rebates or commitment payments. The program uses the constructs for calculating and deeming energy and demand savings that are present in the Custom Incentive and Prescriptive Incentive programs, respectively.

Upon approval of the customer's application, Duke Energy Ohio tenders an offer letter agreement to the customer which outlines the cash rebate or commitment payment offered. After the customer signs the offer letter agreement, Duke Energy Ohio submits a mercantile application to the Commission on behalf of the customer. Upon Commission approval of the application or the passing of 60 days, Duke Energy Ohio remits payment to the customer for the agreed dollar amount.

The offer letter provided to applicants pursuant to each project submitted to Duke Energy Ohio requires the customer to affirm its intention to commit and integrate the energy efficiency

projects listed in the offer into Duke Energy Ohio's peak demand reduction, demand response and/or energy efficiency programs. The offer letter agreement also requires the customer to agree to serve as joint applicant in any future filings necessary to secure approval of this arrangement as required by the Commission and to comply with any information and reporting requirements imposed by rule or as part of that approval. Noncompliance by the customer with the terms of the commitment is not applicable at this time.

The attached offer letter agreement template, used for each mercantile application provides for formal declaration. Additionally, the application documents located on Duke Energy Ohio's website request that the applicant allow Duke Energy Ohio to share information only with vendors associated with program administration. The release is limited to use of the information contained within the application and other relevant data solely for the purposes of reviewing the application, providing a rebate offer, submitting documentation to the Commission for approval and payment of the rebate. All program administration vendor contracts strictly prohibit the sharing of customer information for other purposes.

Upon customer request, Duke Energy Ohio will agree, as it is able to do so, to provide information to the Commission in the proper format such that confidential customer information is redacted from the public record.

With regard to the customers in Duke Energy's Ohio territory who have undertaken self-directed energy efficiency projects, these initiatives will not be evaluated by the Company's independent evaluation contactor. These efforts have been implemented in the past and were self-directed by our mercantile customers without involvement in Duke Energy Ohio's energy efficiency or demand reduction programs under Duke Energy Ohio's Shared Savings Cost

Recovery mechanism. As a result they will not be included in the evaluations of Duke Energy Ohio programs.

As of December 31, 2015, one customer requested rider exemption in exchange for commitment of energy and demand savings to Duke Energy Ohio.

4901:1-39-05(H) Prohibition Against Counting Measures Required by Law Toward Meeting the Statutory Benchmark

Duke Energy Ohio did not count, in meeting its statutory benchmark, the adoption of measures that were required to comply with energy performance standards set by law or regulation, including but not limited to, those embodied in the Energy Independence and Security Act of 2007, or an applicable building code.

4901:1-39-05 (I) and (J) Benchmarks Not Reasonably Achievable

The above referenced sections do not apply to Duke Energy Ohio as it has met its statutory benchmarks.

Conclusion

With this status report, Duke Energy Ohio has demonstrated that it is in compliance with the statutory load impact requirements as measured and reported in its Benchmark Report. Duke Energy Ohio respectfully requests that the Commission find that the Company has met its compliance requirements for the 2015 compliance year.

Respectfully submitted,

DUKE ENERGY OHIO, INC

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APPENDIX A-

Deliverable – Impacts by Program

SB 221 Appendix A

2015 Total Reported Achievement

Program	Customer	Product Code	Measure	Annual KW Gross FR, @ Plant Total	Annual KWH Gross FR, @ Plant Total	Participants
Grand Total				(19,867)	164,010,308	21,067,899

Other EE Programs and Impacts

Program	Customer	Product Code	Measure	Annual KW Gross FR, @ Plant Total	Annual KWH Gross FR, @ Plant Total	Participants
Low Income Weatherization	Res		Low Income Weatherization	106	392,285	372
Grand Total				106	392,285	372

Shared Savings and Mercantile Portfolios

Program	Customer	Product Code	New Short Name	Annual KW Gross FR, @ Plant Total	Annual KWH Gross FR, @ Plant Total	Participants
Appliance Recycling Program	Residential	FRCYCL	Freezer Recycle	52	368,988	479
		FRCYCL Total		52	368,988	479
Appliance Recycling Program	Residential	RRCYCL	Fridge Recycle	141	1,343,988	2,583
		RRCYCL Total		141	1,343,988	2,583
Appliance Recycling Program Total				193	1,712,976	3,062
Energy Efficiency Education Program for Schools	Residential	K12PRF	K-12 Education Program- Curriculum Pre EMV	60	533,272	2,106
Energy Efficiency Education Program for Schools	Residential	K12PRF	K-12 Education Program- Curriculum Post EMV	347	1,288,070	2,416
		K12PRF Total		407	1,821,342	4,522
Energy Efficiency Education Program for Schools Total				407	1,821,342	4,522
Home Energy Comparison Report	Residential	HECR	Home Energy Comparison Report - Commercialized Pre EMV	560	1,828,303	225,703
Home Energy Comparison Report	Residential	HECR	Home Energy Comparison Report - Commercialized Post EMV	1,147	3,739,439	78,391
Home Energy Comparison Report	Residential	HECR	My Home Energy Report - Online	75	246,374	806
		HECR Total		1,783	5,814,116	304,900
Home Energy Comparison Report Total				1,783	5,814,116	304,900
Home Energy Solutions	Residential	HES	Home Energy Manager EE	788	1,247,688	2,131
		HES Total		788	1,247,688	2,131
Home Energy Solutions Total				788	1,247,688	2,131
Home Energy Solutions - Demand Response	Residential	HOM	HOM	2,290		
		HOM Total		2,290	-	-
Home Energy Solutions - Demand Response Total				2,290	-	-
Low Income Neighborhood Program	Residential	HWLI	Low Income Neighborhood Pre EMV	64	237,471	252
Low Income Neighborhood Program	Residential	HWLI	Low Income Neighborhood Post EMV	163	531,900	1,191
		HWLI Total		227	769,371	1,443
Low Income Neighborhood Program Total				227	769,371	1,443
Power Manager	Residential	PWRMGR	PowerManager -Midwest	(372)		
		PWRMGR Total		(372)	-	-
Power Manager Total				(372)	-	-
PowerShare®	Non Residential	PWRSHR	PS Air Products	7,614		
PowerShare®	Non Residential	PWRSHR	PS AK Steel	(69,589)		
PowerShare®	Non Residential	PWRSHR	PS CallOption 0_5	(13,058)		
PowerShare®	Non Residential	PWRSHR	PS CallOption 1/10	29,214		
PowerShare®	Non Residential	PWRSHR	PS CallOption 10_5	(568)		
		PWRSHR Total		(46,387)	-	-
PowerShare® Total				(46,387)	-	-
Residential Energy Assessments	Residential	HEHC	Home Energy House Call - Energy Efficiency Starter KIT Pre EMV	173	1,581,001	2,334
Residential Energy Assessments	Residential	HEHC	Home Energy House Call - Energy Efficiency Starter KIT Post EMV	33	265,636	255
		HEHC Total		206	1,846,637	2,589
Residential Energy Assessments Total				206	1,846,637	2,589
Small Business Energy Saver	Non Residential	SSBDIR	SBES Lighting 8760	261	2,288,144	2,141,474
Small Business Energy Saver	Non Residential	SSBDIR	SBES Lighting Daylighting	3,845	14,263,656	13,510,255
Small Business Energy Saver	Non Residential	SSBDIR	SBES Lighting DusktoDawn		1,791,067	1,675,118

Small Business Energy Saver	Non Residential	SSBDIR	SBES OccSensors	11	39,946	37,836
Small Business Energy Saver	Non Residential	SSBDIR	SBES Refrigeration	144	1,263,123	1,182,157
		SSBDIR Total		4,261	19,645,935	18,546,840
Small Business Energy Saver Total				4,261	19,645,935	18,546,840
Smart Šaver Non Residential Custom	Non Residential	NRPRSC	Custom	3,303	33,495,638	8,842
		NRPRSC Total		3,303	33,495,638	8,842
Smart Šaver Non Residential Custom Total				3,303	33,495,638	8,842
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	Anti-sweat Heater Controls Pre EMV	0	7,154	4
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	Combination Oven (90 lbs_hr) Pre EMV	4	19,692	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ECM Case Motors Pre EMV	1	9,509	25
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ECM Case Motors Post EMV	0	2,138	6
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ECM Cooler and Freezer Motors - ECM replacing PSC Pre EMV	2	24,404	13
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ECM Cooler and Freezer Motors - ECM replacing SP Pre EMV	6	66,420	107
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ECM Cooler and Freezer Motors - ECM replacing SP Post EMV	2	18,002	29
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ENERGY STAR Commercial Glass Door Freezers 30 to 50ft3 - var Pre EMV	2	20,654	5
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ENERGY STAR Commercial Glass Door Freezers more than 50ft3 - var Pre EMV	2	22,799	3
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ENERGY STAR Commercial Glass Door Refrigerators 30 to 50ft3 - var Pre EMV	1	7,773	10
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ENERGY STAR Commercial Glass Door Refrigerators more than 50ft3 - var Pre EMV	0	1,918	2
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ENERGY STAR Commercial Solid Door Refrigerators < 15ft3 - var Post EMV	0	288	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ENERGY STAR Commercial Solid Door Refrigerators 15 to 30 ft3 - var Pre EMV	0	502	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	ENERGY STAR Commercial Solid Door Refrigerators 30 to 50ft3 - var Pre EMV	0	843	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	Fryer Pre EMV	1	4,981	4
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	HT ES Sngl Tank - CNV DW w-Boost Htr (Elec) New -repl on BO Post EMV	1	10,679	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	Icemaker (> 1000 lbs_day) Pre EMV	1	13,727	10
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	Icemaker (100 to 500 lbs_day) Post EMV	0	603	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	Low-Temp ES sngl Tank - CNV DW New -repl on BO Pre EMV		13,411	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRFS	Steamer_3 pan Pre EMV	5	23,906	2
		NRFS Total		27	269,403	227
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	0.5 gpm Faucet Aerator (DI) - COMM, pvt use Pre EMV	0	479	2
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	1.0 Faucet Aerator (DI) - Commercial, public use Pre EMV	0	1,199	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	1.5 gpm Low Flow Showerhead (DI) - COMM, pvt use Pre EMV	0	2,112	5
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	AC < 65,000 1 Ph per ton Pre EMV	4	3,405	56
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	AC < 65,000 3 Ph per ton Pre EMV	0	228	5
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	AC > 760,000 per ton Pre EMV	5	3,908	70
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	AC > 760,000 per ton Post EMV	5	3,908	70
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	AC 135,000 - 240,000 per ton Pre EMV	46	36,350	508
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	AC 240,000 - 760,000 per ton Pre EMV	21	16,357	224
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	AC 65,000 - 135,000 per ton Pre EMV	25	20,258	346
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	AC 65,000 - 135,000 per ton Post EMV	8	6,323	108
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Air-Cooled Screw Chiller COP = 2.86, IPLV = 3.97 per ton Pre EMV	33	69,232	304
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Air-Cooled Screw Chiller COP = 2.86, IPLV = 4.33 per ton Pre EMV	36	76,705	186
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Air-Cooled Screw Chiller COP = 2.86, IPLV = 4.33 per ton Post EMV	14	29,280	71
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Air-Cooled Screw Chiller COP = 3.36, IPLV = 4.15 per ton Pre EMV	51	114,695	234
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Air-Cooled Screw Chiller COP = 3.36, IPLV = 4.42 per ton Pre EMV	83	187,688	352
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	CEE Tier 1 Room AC less than 14,000 Btu per hr Pre EMV	0	138	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	CoolRoof New Replace on Burnout Large Office-sq ft Pre EMV	4	24,049	88,242
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	CoolRoof New Replace on Burnout Large Office-sq ft Post EMV	2	8,994	33,000
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	CoolRoof New Replace on Burnout Other-sq ft Pre EMV	20	147,741	431,927
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	CoolRoof New Replace on Burnout Retail-sq ft Post EMV		37,068	61,000
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	CoolRoof New Replace on Burnout School-sq ft Pre EMV		42,858	96,850
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Ductless Mini-Split AC, Other vs room AC Pre EMV	2	1,600	7
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Ductless Mini-Split AC, Other vs room AC Post EMV	1	1,372	6
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Ductless Mini-Split Heat Pump, Other vs room AC Post EMV	0	13,103	2
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Energy Star Room AC over 14,000 Btu hr Pre EMV	0	227	1
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Guest Room Energy Management, Electric Heating Pre EMV	24	139,542	200
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	HP 65,000 - 135,000 per ton Pre EMV	1	937	8
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Setback Programmable Thermostat Pre EMV	(0)	71,794	58
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Water-Cooled cent Chiller 150 - 300 ton 0.57 kW_ton w/ 0.34 kW_ton IPLV per ton Pre EMV	25	94,851	300
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Water-Cooled cent Chiller 150 - 300 ton 0.57 kW_ton w/ 0.4 kW_ton IPLV per ton Pre EMV	21	72,256	275

Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Water-Cooled cent Chiller 150 - 300 ton 0.63 kW _ton w/ 0.38 kW _ton IPLV per ton Pre EM\	20	171,436	856
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Water-cooled screw chiller < 150 ton 0.79 kW _ton with 0.59 kW _ton IPLV per ton Pre EM\	2	11,920	103
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Window Film Pre EMV	104	237,993	54,431
Smart Šaver Non Residential Prescriptive	Non Residential	NRHVAC	Window Film Post EMV	6	12,868	2,943
		NRHVAC Total		563	1,662,876	772,752
Smart Šaver Non Residential Prescriptive	Non Residential	NRIT	Controlled Plug Strip Pre EMV		5,342	50
Smart Šaver Non Residential Prescriptive	Non Residential	NRIT	Controlled Plug Strip Post EMV		106	1
		NRIT Total		-	5,448	51
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS 2 High Bay 6L T-5 High Output replacing 1000W HID Pre EMV	12	57,727	34
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Bay 3L T-5 High Output Pre EMV	5	26,763	55
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Bay 4L T-5 High Output Pre EMV	80	431,424	452
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Bay 6L T-5 High Output Pre EMV	52	282,469	702
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Bay Fluorescent 4 Lamp (F32 Watt T8) Pre EMV	175	945,429	1,423
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Bay Fluorescent 4 Lamp (F32 Watt T8) Post EMV	3	14,617	22
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Bay Fluorescent 6 Lamp (F32 Watt T8) Pre EMV	394	2,132,445	2,053
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Bay Fluorescent 6 Lamp (F32 Watt T8) Post EMV	28	151,650	146
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Bay Fluorescent 8 Lamp (F32 Watt T8) Pre EMV	5	28,073	40
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance Low Watt T8 4ft 1 lamp, replacing standard T8 Pre EMV	1	5,561	85
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance Low Watt T8 4ft 2 lamp, replacing standard T8 Pre EMV	156	917,867	9,821
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance Low Watt T8 4ft 3 lamp, replacing standard T8 Pre EMV	41	240,070	1,511
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance Low Watt T8 4ft 4 lamp, replacing standard T8 Pre EMV	88	520,664	3,095
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T8 4ft 1 lamp, replacing standard T8 Pre EMV	0	483	10
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T8 4ft 1 lamp, replacing T12-HPT8 Pre EMV	0	439	4
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T-8 4ft 2 lamp replacing T-12 High Output 8ft 1 lamp Pre EMV	0	2,173	7
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T8 4ft 2 lamp, replacing standard T8 Pre EMV	21	124,851	1,586
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T8 4ft 2 lamp, replacing standard T8 Post EMV	0	2,991	38
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T8 4ft 2 lamp, replacing T12-HPT8 Pre EMV	3	15,942	108
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T8 4ft 3 lamp, replacing standard T8 Pre EMV	1	8,800	99
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T8 4ft 3 lamp, replacing T12-HPT8 Post EMV	0	2,471	10
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T-8 4ft 4 lamp replacing T-12 High Output 8ft 2 lamp Pre EMV	114	678,221	1,191
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T-8 4ft 4 lamp replacing T-12 High Output 8ft 2 lamp Post EMV	12	72,890	128
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS High Performance T8 4ft 4 lamp, replacing standard T8 Pre EMV	51	303,739	2,300
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS Low Watt T8 lamps replacing standard 32 Watt T-8's Pre EMV	195	1,170,122	30,720
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS Low Watt T8 lamps replacing standard 32 Watt T-8's Post EMV	13	79,989	2,100
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS Occupancy Sensors over 500 Watts Pre EMV	265	604,554	822
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS Occupancy Sensors under 500 Watts Pre EMV	488	1,093,198	3,716
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS Occupancy Sensors under 500 Watts Post EMV	52	116,204	395
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	BONUS Pulse Start Metal Halide (retrofit only) Pre EMV	8	41,054	91
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	CFL Reflector Flood Pre EMV	56	274,082	1,130
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	CFL Reflector Flood Post EMV	1	6,549	27
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	CFL Screw high wattage Pre EMV	42	204,510	416
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	CFL Screw in, Specialty Pre EMV	3	14,740	97
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Compact Fluorescent Fixture Pre EMV	2	11,121	27
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Compact Fluorescent Fixture Post EMV	0	1,236	3
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Compact Fluorescent Screw in Pre EMV	72	355,789	2,211
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Compact Fluorescent Screw in Post EMV	3	13,678	85
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior HID replacement above 175W to 250W HID retrofit Pre EMV		296,102	671
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior HID replacement above 175W to 250W HID retrofit Post EMV		92,124	109
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior HID replacement above 250W to 400W HID retrofit Pre EMV		1,850,712	2,443
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior HID replacement above 250W to 400W HID retrofit Post EMV		155,305	102
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior HID replacement above 400W HID retrofit Pre EMV		1,987,821	1,458
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior HID replacement above 400W HID retrofit Post EMV		89,041	38
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior HID replacement to 175W HID retrofit Pre EMV		345,249	1,154
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior HID replacement to 175W HID retrofit Post EMV		23,874	38
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Exterior LED Lighting Motion-Sensor Control Pre EMV		5,698	39
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Garage HID replacement above 175W to 250W HID retrofit Pre EMV	41	358,704	356
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Garage HID replacement above 175W to 250W HID retrofit Post EMV	3	23,650	14
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Garage HID replacement above 250W to 400W HID retrofit Pre EMV	21	185,326	107
Smart Šaver Non Residential Prescriptive	Non Residential	NRLTG	Garage HID replacement to 175W HID retrofit Pre EMV	440	3,852,851	5,643

Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Bollards (rplcng or ILO INCD, CFL, or HID bollards) Pre EMV		3,919	24
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Bollards (rplcng or ILO INCD, CFL, or HID bollards) Post EMV		1,306	8
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Canopy replacing 176-250W HID Pre EMV		29,215	44
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Canopy replacing 251-400W HID Pre EMV		1,216,948	1,225
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Canopy replacing 251-400W HID Post EMV		56,708	55
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Canopy replacing up to 175W HID Pre EMV		10,366	25
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Canopy replacing up to 175W HID Post EMV		1,784	4
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Case lighting Pre EMV	9	112,903	230
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Case lighting Post EMV	1	8,345	17
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Downlight Pre EMV	96	469,630	1,827
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Downlight Post EMV	4	19,217	68
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Exit Signs Electronic Fixtures (Retrofit Only) Pre EMV	30	222,229	909
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Exit Signs Electronic Fixtures (Retrofit Only) Post EMV	2	11,735	48
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED FLD rplcng or ILO GRT 100W HAL, INCD, or HID Pre EMV		923,256	1,452
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED FLD rplcng or ILO GRT 100W HAL, INCD, or HID Post EMV		33,313	60
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED FLD rplcng or ILO up to 100W HAL, INCD, or HID Pre EMV		12,544	69
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Highbay replacing 251-400W HID Pre EMV	593	2,948,003	2,960
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Highbay replacing 251-400W HID Post EMV	166	823,013	740
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Highbay replacing greater than 400W HID Pre EMV	48	237,654	126
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Highbay replacing greater than 400W HID Post EMV	40	200,245	98
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Lamps Pre EMV	753	3,719,216	24,737
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Lamps Post EMV	32	181,648	589
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Lowbay replacing 176W-250W HID Pre EMV	26	128,851	187
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Lowbay replacing 176W-250W HID Post EMV	23	113,432	143
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Lowbay replacing up to 175W HID Pre EMV	38	187,772	426
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Panel 1x4 replacing or in lieu of T8 FL Pre EMV	33	161,212	1,744
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Panel 1x4 replacing or in lieu of T8 FL Post EMV	8	35,258	412
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Panel 2x2 replacing or in lieu of T8 FL Pre EMV	14	66,611	1,268
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Panel 2x2 replacing or in lieu of T8 FL Post EMV	2	9,421	175
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Panel 2x4 replacing or in lieu of T8 FL Pre EMV	353	1,688,635	10,325
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Panel 2x4 replacing or in lieu of T8 FL Post EMV	85	396,859	1,993
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Shelf-mounted Task Lights (rplcng or ILO FL task Ltng) Pre EMV	1	2,268	104
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Track Ltng (rplcng or ILO INCD, HAL, CFL, or HID track Ltng) Pre EMV	0	1,688	8
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LED Track Ltng (rplcng or ILO INCD, HAL, CFL, or HID track Ltng) Post EMV	3	14,140	67
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LW HPT8 4ft 1 lamp, Replace T12 Pre EMV	0	234	2
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LW HPT8 4ft 1 lamp, Replace T12 Post EMV	0	234	2
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LW HPT8 4ft 2 lamp, Replace T12 Pre EMV	33	192,585	1,249
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LW HPT8 4ft 2 lamp, Replace T12 Post EMV	1	7,864	51
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LW HPT8 4ft 3 lamp, Replace T12 Pre EMV	2	10,656	38
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LW HPT8 4ft 4 lamp, Replace T12 Pre EMV	40	233,929	736
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	LW HPT8 4ft 4 lamp, Replace T12 Post EMV	0	1,589	5
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	Remote-Mounted Daylight Sensor Pre EMV	5	20,755	51
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	Switch or Fixture-Mounted Daylight Sensor Pre EMV	1	5,447	60
Smart \$aver Non Residential Prescriptive	Non Residential	NRLTG	T8 HB 4ft 2L rplcng 150-249W HID (retrofit only) Pre EMV	6	31,699	58
		NRLTG Total		5,399	34,775,375	133,351
Smart \$aver Non Residential Prescriptive	Non Residential	NRP&M	15 Horse Power High Efficiency Pumps Pre EMV	4	19,344	6
Smart \$aver Non Residential Prescriptive	Non Residential	NRP&M	20 Horse Power High Efficiency Pumps Pre EMV	5	25,792	6
Smart \$aver Non Residential Prescriptive	Non Residential	NRP&M	VFD HVAC Fan Pre EMV	140	2,023,483	1,872
Smart \$aver Non Residential Prescriptive	Non Residential	NRP&M	VFD HVAC Pump Pre EMV	125	940,498	565
Smart \$aver Non Residential Prescriptive	Non Residential	NRP&M	VFD Process Pump 1-50 HP Pre EMV	12	98,153	340
		NRP&M Total		287	3,107,270	2,789
Smart \$aver Non Residential Prescriptive	Non Residential	NRPROC	VSD Air COMP replacing load no load COMP Pre EMV	17	69,592	130
Smart \$aver Non Residential Prescriptive	Non Residential	NRPROC	VSD Air Compressors Pre EMV	45	187,554	279
		NRPROC Total		62	257,146	409
Smart \$aver Non Residential Prescriptive Total				6,337	40,077,519	909,579
Smart \$aver Residential	Residential	HPWH	Heat Pump Water Heater	6	73,461	39
		HPWH Total		6	73,461	39
Smart \$aver Residential	Residential	MFEEAR	Faucet Aerators MF Direct 1.0 GPM - bath Pre EMV	26	328,277	2,119
Smart \$aver Residential	Residential	MFEEAR	Faucet Aerators MF Direct 1.0 GPM - bath Post EMV	4	33,830	539

Smart \$aver Residential	Residential	MFEEAR	Faucet Aerators MF Direct 1.0 GPM - kitchen Pre EMV	14	171,812	1,329
Smart \$aver Residential	Residential	MFEEAR	Faucet Aerators MF Direct 1.0 GPM - kitchen Post EMV	6	48,048	385
		MFEEAR Total		51	581,967	4,372
Smart \$aver Residential	Residential	MFEEPW	Pipe Wrap MF Direct Pre EMV	19	239,666	3,802
Smart \$aver Residential	Residential	MFEEPW	Pipe Wrap MF Direct Post EMV	5	40,812	742
		MFEEPW Total		24	280,477	4,544
Smart \$aver Residential	Residential	MFEEESH	LF Showerhead MF Direct 1.5 GPM Pre EMV	36	453,843	1,585
Smart \$aver Residential	Residential	MFEEESH	LF Showerhead MF Direct 1.5 GPM Post EMV	10	116,281	321
		MFEEESH Total		46	570,124	1,906
Smart \$aver Residential	Residential	PEEPVS	Pool Pump	57	153,831	91
		PEEPVS Total		57	153,831	91
Smart \$aver Residential	Residential	RCFL	RCFL Opt-In Free CFLs Pre EMV	3,345	30,192,127	820,918
Smart \$aver Residential	Residential	RCFL	RCFL Opt-In Free CFLs Post EMV	(6)	(45,440)	(1,773)
		RCFL Total		3,340	30,146,687	819,145
Smart \$aver Residential	Residential	RCFLPM	Property Manager 13WCFL Pre EMV	64	577,767	11,825
Smart \$aver Residential	Residential	RCFLPM	Property Manager 13WCFL Post EMV	18	166,206	3,459
		RCFLPM Total		82	743,973	15,284
Smart \$aver Residential	Residential	RCFLSP	RCFLSP - Specialty Bulbs Candelabra LED	12	61,557	3,170
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs 3 Way Pre EMV	20	179,789	2,883
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs 3 Way Post EMV	20	198,456	5,413
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs A Line Pre EMV	31	275,628	6,488
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs A Line Post EMV	18	175,980	7,428
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs A Line Dimmable Pre EMV	20	173,975	2,512
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs A Line Dimmable Post EMV	1	5,948	146
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs A Line LED Pre EMV	150	1,333,454	31,211
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs A Line LED Post EMV	134	1,340,320	51,032
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Candelabra Pre EMV	35	173,243	7,522
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Candelabra Post EMV	11	109,712	8,458
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Globe Pre EMV	26	226,672	8,369
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Globe Post EMV	14	138,917	8,999
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Recessed Pre EMV	47	416,930	9,333
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Recessed Post EMV	18	175,703	6,556
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Recessed Dimmable Pre EMV	21	185,415	4,207
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Recessed Dimmable Post EMV	16	160,355	3,570
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Recessed LED Pre EMV	56	496,199	15,762
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Recessed LED Post EMV	236	2,363,347	50,797
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Recessed Outdoor Pre EMV	6	345,271	2,898
Smart \$aver Residential	Residential	RCFLSP	Specialty Bulbs Recessed Outdoor Post EMV	24	240,720	3,476
		RCFLSP Total		913	8,777,590	240,230
Smart \$aver Residential	Residential	SFEEAR	Faucet Aerators SF DIY 1.0 GPM - bath	128	1,628,477	15,877
Smart \$aver Residential	Residential	SFEEAR	Faucet Aerators SF DIY 1.0 GPM - kitchen	28	353,573	4,189
		SFEEAR Total		156	1,982,051	20,066
Smart \$aver Residential	Residential	SFEEPW	Pipe Wrap SF DIY	83	1,029,391	20,945
		SFEEPW Total		83	1,029,391	20,945
Smart \$aver Residential	Residential	SFEEESH	LF Showerhead SF DIY 1.5 GPM	122	1,522,255	8,332
		SFEEESH Total		122	1,522,255	8,332
Smart \$aver Residential	Residential	SSAC	Smart Saver - Central Air Conditioner Pre EMV	539	1,006,157	1,554
Smart \$aver Residential	Residential	SSAC	Smart Saver - Central Air Conditioner Post EMV	178	290,577	347
		SSAC Total		717	1,296,733	1,901
Smart \$aver Residential	Residential	SSACTU	Smart Saver - Central Air Conditioner Tune UP	0	160	1
		SSACTU Total		0	160	1
Smart \$aver Residential	Residential	SSAIAS	Smart Saver - Attic Insul & Air Seal	31	100,562	81
		SSAIAS Total		31	100,562	81
Smart \$aver Residential	Residential	SSDINS	Smart Saver - Duct Insulation	2	1,872	2
		SSDINS Total		2	1,872	2
Smart \$aver Residential	Residential	SSDSEA	Smart Saver - Duct Sealing	8	8,761	20
		SSDSEA Total		8	8,761	20
Smart \$aver Residential	Residential	SSHHP	Smart Saver - Heat Pump Pre EMV	467	2,875,195	1,024
Smart \$aver Residential	Residential	SSHHP	Smart Saver - Heat Pump Post EMV	61	173,648	146

		SSHP Total		528	3,048,843	1,170
Smart Šaver Residential	Residential	SSHPTU	Smart Saver - Heat Pump Tune UP	1	5,487	8
		SSHPTU Total		1	5,487	8
Smart Šaver Residential Total				6,166	50,324,227	1,138,137
Weatherization Pilot	Residential	WTZKWH	WTZKWH - ACR Insulation SC Only_EH Pre EMV	0	75	2,466
Weatherization Pilot	Residential	WTZKWH	WTZKWH - ACR Insulation SC Only_NonEH Pre EMV	0	369	12,136
Weatherization Pilot	Residential	WTZKWH	WTZKWH - ACR Insulation SH Only_EH Pre EMV	2	7,309	3,416
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Air Sealing SC Only_EH Pre EMV	0	74	3,470
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Air Sealing SC Only_NonEH Pre EMV	0	1,123	52,872
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Air Sealing SH Only_EH Pre EMV	2	7,244	6,585
Weatherization Pilot	Residential	WTZKWH	WTZKWH - CFL_EH Pre EMV	21	181,519	4,666
Weatherization Pilot	Residential	WTZKWH	WTZKWH - CFL_NonEH Pre EMV	42	363,700	9,349
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Energy Efficient Shower Head_EH Pre EMV	1	3,627	23
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Energy Efficient Shower Head_NonEH Pre EMV	1	4,888	31
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Faucet Aerator_EH Pre EMV	0	1,215	65
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Faucet Aerator_NonEH Pre EMV	0	1,496	80
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Floor Insulation SH Only_EH Pre EMV	0	588	840
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Refrigerator Replacement_EH Pre EMV	38	248,811	197
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Refrigerator Replacement_NonEH Pre EMV	83	540,564	428
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Wall Insulation SC Only_NonEH Pre EMV	0	418	6,427
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Water Heater Pipe Insulation_EH Pre EMV	0	1,597	16
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Water Heater Pipe Insulation_NonEH Pre EMV	1	4,092	41
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Water Heater Replacement Electric_EH Pre EMV	0	820	7
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Water Heater Replacement Electric_NonEH Pre EMV	0	586	5
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Water Heater Tank Wrap_EH Pre EMV	0	415	7
Weatherization Pilot	Residential	WTZKWH	WTZKWH - Water Heater Tank Wrap_NonEH Pre EMV	0	415	7
		WTZKWH Total		193	1,370,946	103,134
Weatherization Pilot Total				193	1,370,946	103,134
Mercantile Self-Direct	Non Residential	NRCSSD	SD Custom	571	5,346,309	78
		NRCSSD Total		571	5,346,309	78
Mercantile Self-Direct	Non Residential	NRPRSD	SD Air Cooled Chiller Tune Up per ton	16	33,655	420
Mercantile Self-Direct	Non Residential	NRPRSD	SD Water Cooled Chiller Tune Up per ton	45	96,158	2,250
Mercantile Self-Direct	Non Residential	NRPRSD	SelfDirect CoolRoof New Repl Burnout Other-sq ft	1	6,875	20,100
Mercantile Self-Direct	Non Residential	NRPRSD	SelfDirect CoolRoof New Repl Burnout School-sq ft		8,629	19,500
		NRPRSD Total		62	145,317	42,270
Mercantile Self-Direct Total				633	5,491,627	42,348
Grand Total				(19,973)	163,618,023	21,067,527

APPENDIX B-

Affidavit of Trisha A.
Haemmerle

**AFFIDAVIT
OF
TRISHA A. HAEMMERLE**

COMES NOW Trisha A. Haemmerle being duly sworn, deposes and says:

1. My name is Trisha A. Haemmerle. I am employed by Duke Energy Business Services, Inc. as Senior Strategy and Collaboration Manager.

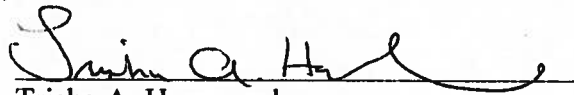
2. This Affidavit will be filed with the Ohio Public Utilities Commission in support of Duke Energy Ohio's Annual Energy Efficiency Portfolio Status Report (the Report) which is required by Ohio Administrative Code §4901:1-39-05(C).

3. As Senior Strategy and Collaboration Manager, I have responsibility for overseeing the demand side management regulatory requirements for Ohio. As part of my professional responsibilities I assisted with the underlying analysis and preparation of Duke Energy Ohio's Report.

4. The information contained within the Report is true and accurate to the best of my knowledge.

5. The performance detailed in the Report demonstrates that Duke Energy Ohio has complied with the statutory benchmarks contained in Ohio Revised Code 4928.66.

FURTHER AFFIANT SAITH NOT.

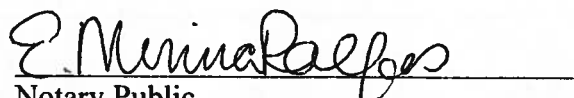

Trisha A. Haemmerle

State of Ohio)
) SS:
County of Hamilton)

Subscribed to and sworn to before me this 10th day of March 2016.



E. MINNA ROLFES
Notary Public, State of Ohio
My Commission Expires
July 8, 2017


Notary Public

APPENDIX C-

Duke Energy Ohio Schedule and Description of Planned Evaluation Activities, March 2016

Schedule of Planned¹ Evaluation Activities and Reports

Residential Customer Programs	Program/Measure	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017
Appliance Recycling	Refrigerator Freezer	On hold							
Energy Education Program for Schools	K12 Curriculum								M&V
Home Energy Solutions	HōM	M&V	EE & DR Report			M&V	DR Report		
Low Income Neighborhood		M&V					Report		
Low Income Services	PWC Pilot								
My Home Energy Report	MyHER								
Residential Energy Assessments	HEHC								
Residential Smart Saver®	HVAC						M&V	Report	
	Lighting						M&V	Report	
	Multi-Family								
Power Manager		M&V	Report	M&V			Report		

Non-Residential Customer Programs	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017
Small Business Energy Saver		M&V			Report			
Smart Saver® Custom	M&V							
Smart Saver® Prescriptive							M&V	
PowerShare®	M&V	Report			M&V	Report		

LEGEND	
M&V	Plan Development and Data collection (surveys, interviews, onsite visits, billing data) and analysis
Report	Evaluation Report

¹ Note: evaluation report dates are subject to change. Those programs without reports scheduled in 2016 and 2017 have EM&V activities planned for 2018.

Description of Planned Evaluation Activities by Program

Duke Energy Ohio has contracted with several independent, third-party evaluation consultants for each program in the portfolio to provide the appropriate Evaluation, Measurement & Verification support for planned evaluations. The work performed by the evaluation consultant varies by program and includes the development of a complete evaluation plan and the implementation of that plan to collect data and conduct impact evaluation analysis to estimate energy and demand savings resulting from the program. If included in the plan, the evaluation consultant conducts data collection and analysis for process evaluation to provide unbiased information on past program performance, current implementation strategies and opportunities for future improvements. The following section provides general descriptions of the current plans, which are subject to change in the complete evaluation plans.

Residential Programs

Appliance Recycling

The evaluation of the Appliance Recycling program is on hold, pending program plans to replace the administrator. If the program resumes activity in 2016 or 2017, then evaluation schedules will be revised accordingly and follow this plan.

Energy Education Program for Schools

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The process evaluation is planned to include program manager, implementer and teacher surveys/interviews to assess program operations, and student family surveys to assess program awareness, satisfaction, and compliance with installations and recommendations. For the theater component, the process evaluation is planned to consist of interviews with school administrators and a review of the theatrical presentation and program operations. A statistically representative sample of participants will be selected for the analysis.

The impact analysis is planned to consist of a billing analysis to determine program impacts. An engineering analysis is also planned to be conducted using data collected through the participant survey. This analysis will provide measure level savings to offer insight into individual measure contributions to overall program impacts. While the billing analysis approach provides net savings, net-to-gross estimates are planned to be calculated for program

management and information purposes using customer responses from the participant surveys at the measure level. Free-ridership and spillover are expected to be part of the net-to-gross analysis.

Home Energy Solutions (HōM)

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The demand response impact analysis is planned to consist of a regression model to estimate the DR event impacts of the air conditioning cycling, and include an operability rate analysis on installed load control devices.

The energy efficiency impact analysis is planned to consist of billing analysis regression with pre-program matching to develop a nonparticipant comparison group. In essence, a non-participant comparison group is developed that looks similar to the participant group with respect to variables known to have a high correlation with post-program energy use. The difference between the energy usage between the participant group and the non-participant group is attributed to the program. The billing analysis inherently estimates “net” savings and therefore no additional analysis is necessary for net-to-gross adjustment.

The process evaluation is planned to include interviews with program staff and implementation contractors, and a participant survey to collect information usability and benefits of the thermostat, awareness of demand response events, and behavior changes. A statistically representative sample of participants will be selected for analysis.

Low Income Neighborhood

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impact analysis is planned to consist of engineering estimates and/or billing analysis to determine the energy and demand savings. A statistically representative sample of participants will be selected for analysis.

The process evaluation is planned to include a participant survey to collect information on energy efficiency actions taken as a result of the program, prior intentions, and changes in

other major end uses, changes in household occupancy, persistence and program satisfaction. A statistically representative sample of participants will be selected for analysis.

Low Income Services (PWC Pilot)

The pilot evaluation, measurement and verification report provided an independent, third-party report of energy savings attributable to the program including an impact evaluation.

The impact analysis consisted of a review of program tracking data, measure installation verification reports from the independent inspector, and work-papers supporting the deemed energy savings values assigned to each measure. The program will be filed in 2017. No evaluation is planned for 2016.

My Home Energy Report (MyHER)

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The MyHER program involves a control group of customers that is randomly assigned to be used in the impact analysis. The impact evaluation is planned to consist of a billing analysis, specifically a difference in differences regression model to estimate impacts of the treatment group versus the control group. Differences in impacts between the two groups are attributed to the MyHER program. Incremental uptake of energy efficiency measures will be used to adjust savings to be net of other Duke Energy energy efficiency programs.

The process evaluation is planned to include program manager and implementer interviews to assess program effectiveness. A participant survey will be used to collect information on energy efficiency actions taken as a result of the program, prior intentions, and changes in other major end uses, changes in household occupancy, persistence and program satisfaction. A statistically representative sample of participants will be selected for analysis.

Residential Energy Assessments

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impacts analysis includes the verification of deemed savings estimates via an engineering analysis of savings assumptions and calculations. Participant surveys are used to verify installation and in-service rates for each measure. The evaluators use a billing analysis to

estimate energy savings and a combination of billing analysis results and engineering analysis to estimate peak demand savings.

The process evaluation is planned to employ program staff interviews and participant surveys. Participant survey questions include perceived barriers to program participation, marketing and outreach tactics, and program satisfaction.

Residential Smart \$aver®: HVAC

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impact evaluation utilizes a multi-faceted technique for estimating savings:

- **Engineering Calculations:** The evaluation team may utilize engineering algorithms with field measurement and verification parameters to estimate energy consumption and savings.
- **Billing Analysis:** Comparison of consumption interval data in a baseline environment (prior to program influence) to post-program engagement, utilizing the collected interval data at the premise level. Model specifications derived from statistical regressions will consider normalized temperatures and occupancy, where practical.
- **Deemed Savings:** In some limited cases, the evaluation team may utilize deemed per-unit savings estimates from Ohio technical reference manual, as needed.

The process evaluation includes participant and non-participant surveys, along with vendor satisfaction surveys or interviews, to estimate free-ridership and uncover potential issues that might impact customer satisfaction or program effectiveness. A statistically representative sample of participants will be selected for the analysis.

Residential Smart \$aver®: Residential Lighting

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impact analysis is planned to use an engineering analysis to determine program savings, utilizing the savings algorithms and parameters provided by the Ohio TRM, with updated values

of some parameters using data collected through a participant survey and an engineering analysis. A statistically representative sample of participants will be selected for the analysis.

The process evaluation is planned to include program staff interviews and participant and non-participant surveys, to estimate net-to-gross and uncover potential issues that might impact customer satisfaction or program effectiveness. A statistically representative sample of participants will be selected for the analysis.

Residential Smart \$aver®: Multi-Family

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impact analysis is planned to consist of an engineering analysis, utilizing data collected during on-site field verification of program measures. The analysis will stratify the field verification sample by measure type, and include a sufficient number of properties and housing units within each property to gather representative information for the program.

The process evaluation is planned to include program manager, implementer interviews to assess program operations, and property manager and tenant surveys to estimate net-to-gross, assess program awareness and satisfaction. A statistically representative sample of participants will be selected for analysis.

Power Manager (Demand Response)

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impact analysis is planned to develop AC duty cycle models for each AC unit in a sample of Power Manager (PM) participants in the Ohio System. This duty cycle model is then used to simulate the expected natural duty cycle for load control technologies under two different conditions: 1) during the PM event days; and 2) under peak normal weather conditions. The results of these simulations are used to produce estimates of the potential load reduction. These estimates are then updated with the results of various operability studies to give estimates of the realized and potential load reductions. In addition, an operability study is conducted on a regularly scheduled basis to determine the percentage of fully functioning Power Manager devices.

The process evaluation is planned to include program manager interviews to assess program operations and participant interviews to assess program options, communications, satisfaction

and operational effectiveness. A statistically representative sample of participants will be selected for the analysis

Non-Residential Programs

Small Business Energy Saver

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impact analysis is planned to consist of a detailed engineering analysis to estimate impacts. Depending on the distribution of installed measure types, the projects may be stratified into groups and then a sample selected for on-site verification of equipment installation and inputs to the engineering savings estimates.

The process evaluation is planned to include program staff interviews, implementation contractor interviews, and participant surveys to assess correlations between reductions in consumption and certain behavior changes and equipment purchases. The participant survey will be used collect data to estimate net-to-gross for the program.

Smart \$aver® Non-Residential Custom

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impact analysis for the Smart \$aver Custom program is planned to use a statistically representative sample of participating projects. A blend of selective monitoring and site visits will be performed at each of the selected sample set projects, with engineering-based estimation.

The Process evaluation is planned to include participant surveys to collect information needed to estimate net impacts and participants will be asked about equipment that was replaced, energy efficiency actions taken, prior intentions regarding these measures, changes in other major end uses that impact energy consumption, hours of facility operation, persistence and program satisfaction. A statistically representative sample of participants will be selected for the analysis.

Smart \$aver® Non-Residential Prescriptive

Evaluation, measurement and verification actions will provide an independent, third-party report of energy savings attributable to the program including an impact analysis and process evaluation.

The impact analysis for the Smart \$aver Prescriptive program is planned to use a statistically representative samples of participants. A sample of facilities will receive a combination of selective monitoring and site visits to develop an engineering-based estimation

The process evaluation is planned to include participant surveys to collect information needed to estimate net impacts, as well as to ask about equipment that was replaced, energy efficiency actions taken, prior intentions regarding these measures, changes in other major end uses that impact energy consumption, hours of facility operation, persistence and program satisfaction. A statistically representative sample of participants will be selected for the analysis.

PowerShare® (Demand Response)

The impact analysis is planned to measure and evaluate the short-term changes in load due to the potential and actual interruption of activity or start of on-site generation. The evaluation research includes the collection and processing of interval consumption data and analysis of actual event day load response by program participants.

The process evaluation is planned to employ surveys to ascertain customer satisfaction. The evaluation will include interviews with Duke Energy program staff and telephone surveys with participants. A statistically representative sample of participants will be selected for the analysis.

APPENDIX D-

Process and Impact Evaluation of the Residential Neighborhood Program

Final

Process and Impact Evaluation of the 2013-2014 Residential Neighborhood Program In Ohio

**Prepared for
Duke Energy**

139 East Fourth Street
Cincinnati, OH 45201

February 27, 2015

Submitted by

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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 Ohio. This evaluation covers program participation from July, 2013 through August, 2014 (n= 1,224 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 estimate¹ by employing a quasi-experimental analysis design.

Table 1. Estimated Overall Impacts

	Net Savings
Annual Savings Per Participant Per Year	
kWh	412
kW	0.1260

The billing analysis gives the estimated overall net kWh savings per participant, but is incapable of estimating coincident kW reduction. As a result, the kWh results from the billing analysis are utilized in the DSMore model which employs a residential load shape analysis to produce the estimate of kW savings. Additionally, program per participant savings as reported in Table 1 include 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 M: 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

- The most common sources of awareness for Ohio participants are home visits (24.3%), door hangers (18.6%) and mailings (15.7%).
- When participants were asked what they understood this program was about, 57.1% mentioned the installation of energy-saving measures, which is the top response. "Saving

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.

energy” was the second-most mentioned thing about the program (34.3%), followed by mentions of the home audit (28.6%) and saving money on utility bills (22.9%).

- When asked for reasons they chose to participate in this program, the most common answer is saving money on utility bills (64.3%), followed by receiving energy efficiency measures and weatherization and repair services (both 34.3%).
- Nearly half of participants (48.6%) had to wait less than two weeks from enrollment to audit, including 30.0% who waited a week or less. No participants surveyed in Ohio (0.0%) thought the length of time between enrollment and audit was too long or too short. Only one participant (1.4%) thought the amount of time the auditor spent in the home was too long, while another participant (1.4%) thought the auditor’s visit was too short and 97.1% thought it was “about right”.
- About a quarter of surveyed participants in Ohio (25.7%) attended the community meeting kick-off event in their neighborhood. Customers who attended meetings were very satisfied with the staff and presenters at the meeting (mean satisfaction rating 9.9 on a ten-point scale) and the information presented at the meeting (mean satisfaction rating 9.8).
- Participants are generally quite satisfied with the measures they received during the audit; the most highly-rated measures in Ohio are the HVAC filters and calendar, door sweeps, foam insulation spray, HVAC winterization kit and water heater tank wrap, all receiving mean satisfaction ratings of 9.5 or higher on a ten-point scale. The lowest-rated measures are vinyl weather stripping for doors (8.9) and the low-flow showerheads (8.6); while these are not low satisfaction scores, there is room for improvement relative to customer satisfaction with the other measures.
- Program satisfaction is quite high, with the program receiving a mean satisfaction rating of 9.6 out of 10 from Ohio participants. The program also receives high scores for convenience of enrollment, the knowledge of the auditors, and the helpfulness of the auditors (all higher than 9.6 out of 10). Relative to the Residential Neighborhood program, participants’ satisfaction with Duke Energy is about one point lower than their mean satisfaction with the program at 8.7.
- Two-thirds of surveyed participants (70.0%) report that this program has made their attitude towards Duke Energy more positive, while none (0.0%) say it has made their attitude towards Duke Energy more negative. Two-thirds (68.6%) also report that the program has increased their knowledge of how to save energy.
- Half of surveyed participants (50.0%) report that their utility bills have decreased since they participated in this program, though another 14.3% report that their bills have increased. Ohio customers’ median estimate for their utility bill savings since participating in the program is \$9 per month.
- According to auditor records, the percentage of participating customers receiving measures ranges from 98.6% for CFLs down to 2.9% for vinyl weather stripping and kits for window air conditioning units. Surveyed customers received between three and fourteen types of measure during their home audits, with the average and median number of measures received being eight.
- Surveyed participants were asked to confirm the installation of measures from auditor records. Some measure installations were confirmed at high rates (such as 92.6% of customers confirming that they received the switch plate wall thermometer reported in auditor records), while other measures were confirmed at much lower rates (only 41.7%

of customers receiving foam insulation spray according to auditor records were able to confirm this installation).

- Some participants report that auditors have left measures behind for the customer to install themselves; in particular, 13.0% 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 at least 49 CFLs out of 798 confirmed received by participants (6.1%) remained uninstalled at the time of this survey. The impact section of this report does not count savings for measures that are not installed.
- When asked what they learned from participating in this program, most customers (90.0%) were able to name something that they learned. The most-mentioned lessons include learning about efficient lighting (27.1%), general measures to save energy (21.4%) and the importance of weatherization and plugging drafts (17.1%).
- Nearly half of surveyed participants (42.9%) 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 air conditioners less often.
- Survey participants' favorite things about this program include conserving energy (32.9%), the fact that participation and the measures are cost-free for customers (28.6%) and saving money through lower bills (28.6%).
- Three-quarters of participants (78.6%) could not name a least favorite aspect of the program. The most frequently-mentioned customer complaints about the program are about problems with specific measures received (8.6%).
- When asked for their suggestions to improve the program, the top suggestions are about including additional measures and services in the program (12.9%), followed by more or better advertising to increase awareness (7.1%). Most of the suggestions for adding measures to the program involve insulation and sealing leaks.

From the Non-Participant Surveys

- Only about a third of Ohio non-participants are aware of the Residential Neighborhoods program (36.6%). Non-participants were only invited to complete the remaining parts of the survey if they were aware of the program.
- Non-participants who are aware of the program most often learned about it through mailings (41.1%), followed by home visits (29.4%). Ohio non-participants are more likely to mention learning about the program from mailings (41.2%) than Ohio customers who actually participated in the program (15.7%).
- When asked what they understood the Residential Neighborhoods program to be about, non-participants are most likely to mention receiving free measures (23.5%) and weatherization services (21.6%). Only 13.7% of non-participants who are aware of the program were unable to answer this question.
- Three-quarters of surveyed non-participants (74.5%) are certain that they would have been eligible to participate in the program, while one in five (19.6%) are not sure and only 5.9% believe that they would not have been eligible.
- When asked for their suggestions for improving program participation, non-participants' top responses are improving communications about the program (21.6%) and giving customers more information about the program (15.7%), followed by concerns involving landlord and renter issues (9.8%).

- Two-thirds of surveyed non-participants (70.6%) report that they have taken steps to save energy on their own in the past year. The most common actions are using efficient light bulbs (25.5%) and sealing leaks around windows and doors (21.6%).
- Non-participants' mean satisfaction rating with Duke Energy overall is 7.0 on a ten-point scale, which is significantly lower than the 8.7 mean rating given by program participants in Ohio. This may indicate that having a lower opinion of Duke Energy is a barrier to participation in Duke Energy programs, even when they are available to all customers.
- In spite of not having participated in this program, almost a third of Ohio non-participants (29.4%) report that their opinion of Duke Energy has become more positive based on what they know about the Residential Neighborhoods program, compared to only 2.0% who say that their attitude towards Duke Energy has become more negative.

Recommendations

Suggestions for improving program participation were provided in the evaluation report completed for the program in the Carolina System². Those recommendations have been incorporated. This program is operating well, therefore the evaluation team has no further recommendations.

² TecMarket Works et al. "Process and Impact Evaluation of the 2013-2014 Residential Neighborhood Program in the Carolina System". November 14, 2014.

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 Ohio. 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 August 15, 2014 to September 16, 2014
Non-Participant Surveys	Surveyed from February 24, 2014 to March 10, 2014
Management Interviews	Conducted in February and May of 2014
Engineering Estimates	September through November 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 Ohio.

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 (HVAC) 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. Seventy (70) surveys were completed with Residential Neighborhoods participants in Ohio whose home audits were completed between July 10, 2013 and July 1, 2014 according to auditor records.

Non-Participant Surveys

TecMarket Works fielded a phone survey with randomly selected non-participants in order to identify barriers to program participation. One hundred and forty-five non-participants were contacted, and 51 surveys were completed with Residential Neighborhood non-participants in Ohio who are aware of the program.

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 July 2013 and August 2014. There were a total of 1,224 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-measurable factors that vary over time (such as economic conditions and season loads).

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 1,059 records of program participants in Ohio. 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 603 contactable customers. The survey was conducted by telephone by TecMarket Works staff from the list of 603 participant customers, and 70 respondents completed the survey. The survey instrument can be found in *Appendix F: Participant Survey Instrument*.

Non-Participant Surveys

Duke Energy provided TecMarket Works with a list of 1,771 records of non-participants in Ohio 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 1,023 contactable customers. The survey was conducted by telephone by TecMarket Works staff from the list of 1,023 non-participant customers in Ohio; 145 respondents were surveyed, of which 51 were aware of the program and completed the entire survey.

Engineering Estimates

The engineering analysis relied on primary data collected through the participant phone survey, which was conducted with a random sample of 70 participants.

Billing Analysis

The billing analysis used consumption data from all complete data provided for the participants in Ohio that participated between July, 2013 and August 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 603 participating customers, all 603 were called between August 15, 2014 and September 20, 2014, and a total of 70 usable telephone surveys were completed, yielding a response rate of 11.6% (70 out of 603).

Non-Participant Surveys

From the sample list of 1,023 non-participants, 747 customers were called between February 22 and March 10, 2014, and a total of 145 telephone surveys were completed, yielding a response rate of 19.4% (145 out of 747). Only 51 of these 145 non-participants were aware of the program and completed the entire survey.

Engineering Estimates

The engineering analysis relied on primary data collected through the participant phone survey, which was conducted with a random sample of 70 participants.

Billing Analysis

The billing analysis used consumption data from all complete data provided for the participants in Ohio that participated between July, 2013 and August 2014. There were a total of 1,224 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	603	70	11.6%
Non-Participant Surveys	1,023	145	14.2%
Engineering Estimates	603	70	11.6%
Billing Analysis	1,224 participants		

Expected and achieved precision

Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 8.6% and an achieved precision of 90% +/- 9.3%.

Non-Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 8.8% and an achieved precision of 90% +/- 6.3% for all 145 customers contacted (awareness question) and a precision of 90% +/- 11.2% for the 51 customers who were aware of the program and completed the entire survey.

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 simulations and represent the weighted average value across all HVAC system types according to their prevalence.

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 CFLs
- Up to fifteen 13-watt CFLs

- Up to two low flow showerheads
- Up to three faucet aerators
- One switch plate wall thermometer
- One year 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.

See *Appendix N: Deemed vs. Evaluated Engineering Parameters* for a comparison of deemed (TRM) values and the values used in this report.

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 measure unit distributed adjusted downward for the ISR computed from participants' survey responses. The savings per measure distributed are shown for each energy saving item offered through the program and, in the final row, savings resulting from the all measures together. For this table, the in service rate (ISR) has been factored into the gross kWh/unit so that the product of the measure quantity and the gross savings per unit is total gross savings.

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	798	bulb	93.8%	34.36	0.00393	27,420	3.136
Low-Flow Showerhead	37	showerhead	94.6%	139.6	0.01029	5,165	0.381
Faucet Aerator	108	aerator	98.1%	10.75	0.00134	1,161	0.145
Weather Stripping	868	linear foot	96.2%	0.40	0.00014	343	0.121
Caulking	1,560	linear foot	95.4%	0.21	0.00007	323	0.114
Door Sweep	30	each	90.0%	1.25	0.00044	37	0.013
Foam Insulation Spray	84	sink	95.8%	2.66	0.00094	223	0.079
DHW Pipe Insulation	501	linear foot	100.0%	26.70	0.00305	13,377	1.527
DHW Tank Wrap	8	tank wrap	100.0%	136.2	0.01555	1,090	0.124
DHW Temp Adjust	35	adjustment	100.0%	81.63	0.00932	2,857	0.326
HVAC Filters/Calendar	56	participant	91.1%	35.63	0.00150	1,995	0.084
Overall Savings	70	Survey participant		771	0.08644	53,992	6.051

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 eight years as seen in Table 5.

Table 5. Effective Useful life of Program Measures

Measure	Weight	EUL
CFL	50.8%	5
Low-Flow Showerhead	9.6%	10
Faucet Aerator	2.2%	10
Weather Stripping	0.6%	5
Caulking	0.6%	15
Door Sweep	0.1%	5
Foam Insulation Spray	0.4%	15
DHW Pipe Insulation	24.8%	15
DHW Tank Wrap	2.0%	5
DHW Temp Adjust	5.3%	4
HVAC Filters/Calendar	3.7%	1
Overall Effective Useful Life		8

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 HVAC 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, 92.3% of 13-Watt and 90.5% 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:

$$\text{ISR} = \text{first year ISR} + (43\% * \text{remainder}) = 90.5\% + (43\% * 6.5\%) = 93.3\%$$

The remainder is the percentage of bulbs that are not installed in the first year ($100\% - 90.5\% = 9.5\%$) less 3% for the 97% lifetime ISR³. In this case, the remainder is 6.5%. The 43% represents the percentage of the remainder that will replace an incandescent bulb rather than a CFL⁴. 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 (93.8%).

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	4.15	3.97
Self-Reporting Bias	27%	3.03	2.90

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	31	3.14	3.11
Kitchen	33	5.08	4.97
Living/Family Room	47	3.05	2.94
Dining Room	13	2.49	2.39
Master Bedroom	36	1.90	1.92
Other Bedroom	8	0.89	0.89
Closet	2	0.23	0.23
Hall	6	1.90	1.64
Other	18	3.30	2.56
Overall	194	3.03	2.90

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 M: 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	59	48	46	45	44	48
Kitchen	55	45	44	43	42	46
Living/Family Room	58	48	46	45	44	48
Dining Room	67	54	51	50	49	54
Master Bedroom	59	48	46	45	44	49
Other Bedroom	61	50	48	47	46	51
Closet	70	56	53	52	52	57
Hall	63	51	49	48	47	51
Other	60	49	47	46	45	49
Overall	59	48	46	45	44	49

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 and Table 10 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	46.3	34.4	32.1	31.1	30.3	34.8
Kitchen	68.4	51.5	48.3	46.6	45.2	52.0
Living/Family Room	44.8	33.5	31.4	30.3	29.5	33.9
Dining Room	43.8	32.6	30.5	29.5	28.7	33.0
Master Bedroom	27.6	20.8	19.6	18.9	18.3	21.1
Other Bedroom	13.8	10.4	9.8	9.4	9.1	10.5
Closet	4.2	3.1	2.9	2.8	2.8	3.2
Hall	31.7	23.9	22.5	21.9	21.3	24.3
Other	52.9	40.6	38.3	37.1	36.1	41.0
Overall	45.2	34.0	31.9	30.8	29.9	34.4

Coincident peak demand savings were calculated based on the lamp wattage difference across each room and parameters from *Appendix D: 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	0.0052	0.0039	0.0036	0.0035	0.0034	0.0039
Kitchen	0.0047	0.0035	0.0033	0.0032	0.0031	0.0036
Living/Family Room	0.0051	0.0038	0.0036	0.0034	0.0033	0.0039
Dining Room	0.0061	0.0046	0.0043	0.0041	0.0040	0.0046
Master Bedroom	0.0052	0.0039	0.0037	0.0035	0.0034	0.0039
Other Bedroom	0.0055	0.0041	0.0039	0.0037	0.0036	0.0042
Closet	0.0065	0.0048	0.0045	0.0044	0.0043	0.0049
Hall	0.0056	0.0042	0.0039	0.0038	0.0037	0.0043
Other	0.0052	0.0039	0.0037	0.0036	0.0034	0.0040
Overall	0.0052	0.0039	0.0036	0.0035	0.0034	0.0039

Low-Flow Showerheads and Faucet Aerators

A total of 35 low-flow showerheads and 106 faucet aerators were installed in the homes of survey respondents. According to customer self-reported data, nearly all of these units (94.6% and 98.1% respectively) 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 D: Engineering Algorithms*.

This measure produces zero kW or kWh savings in households that use gas water heaters. Approximately 38% of households in Ohio 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	37	94.6%	2.87	1.75	139.6	0.0103
Faucet Aerator	108	98.1%	2.20	1.50	10.7	0.0013

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 (5.37 kWh/cfm and 0.00237 kW/cfm). 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 D: 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	868	linear foot	96.2%	0.0766	0.40	0.00014
Caulking	1560	linear foot	95.4%	0.0404	0.21	0.00007
Door Sweep	30	each	90.0%	0.2580	1.25	0.00044
Foam Insulation Spray	84	sink	95.8%	0.5161	2.66	0.00094

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 D: 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	501	linear foot	100.0%	26.70	0.0030
DHW Tank Wrap	8	tank wrap	100.0%	136.2	0.0156
DHW Temp Adjust	35	adjustment	100.0%	81.63	0.0093

HVAC Filters and Calendar

Participants were left with a year's supply of HVAC 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 are estimated using a yearly change out as a baseline. Annual fan energy consumption was estimated at 1,096 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
HVAC Filters/Calendar	56	Participant	91.1%	35.63	0.0015

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. 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:

- 12.9% (9 out of 70) of the surveyed participant households are above the 200% Federal Poverty Level,
- 41.4% (29 out of 70) of the surveyed participant households are below the 200% Federal Poverty Level, and
- 45.7% (32 out of 70) 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 70 program participants surveyed in Ohio, 38 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 32 participants could not be definitively categorized, including 20 participants who did not answer the question about household income. Thus the ratio of standard-income households in the program population is estimated at 23.7% (9 out of 38 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 nine 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 (23.7% of program population) with low income freeridership (76.3% 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	7	5.4%	1.3%
Low-flow showerheads	4	0.0%	0.0%
Faucet aerators	7	0.0%	0.0%
Foam insulation spray	0	NA ⁷	0.0%
Weather stripping	3	33.3%	7.9%
Window AC kit	0	NA	0.0%
Caulking doors	0	NA	0.0%
Caulking windows	0	NA	0.0%
Door sweeps	3	0.0%	0.0%
Glass patch tape	0	NA	0.0%
Water pipe wrap	4	12.5%	3.0%
Water tank wrap	1	0.0%	0.0%
Water temp adjustment*	N/A	0.0%	0.0%
Filter changes/calendar*	N/A	0.0%	0.0%

*Freeridership for these measures is assumed to be 0%.

Only one of the nine survey participants who are identified as standard income households gave responses indicating program spillover, purchasing a total of eight CFLs. However, installation of these bulbs was not confirmed and thus program-level spillover is assumed to be zero. This is 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	27,420	3.1361	27,063	3.0954
Low-Flow Showerhead	5,165	0.3808	5,165	0.3808
Faucet Aerator	1,161	0.1451	1,161	0.1451
Weather Stripping	343	0.1211	316	0.1116
Caulking	323	0.1139	323	0.1139
Door Sweep	37	0.0132	37	0.0132
Foam Insulation Spray	223	0.0788	223	0.0788
DHW Pipe Insulation	13,377	1.5271	12,976	1.4813
DHW Tank Wrap	1,090	0.1244	1,090	0.1244
DHW Temp Adjust	2,857	0.3262	2,857	0.3262
HVAC Filters/Calendar	1,995	0.0842	1,995	0.0842
Overall Savings	53,992	6.0509	53,207	5.9547

⁷ Since no surveyed standard income households in Ohio received foam insulation spray, window AC kits, caulking for doors or windows or glass patch tape, the program-level freeridership for these measures is based on low income households only (zero percent freeridership).

The final overall freeridership for the program is set at 1.5% (1-53,207/53,992) for a program NTGR of 0.985.

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 Ohio. Billing data were obtained for all participants in the program between July, 2013 and August, 2014 that had accounts with Duke Energy (after processing, there were a total of 1,224 accounts from Ohio)⁸. A panel model was used to determine program impacts, where the dependent variable was monthly electricity consumption from February 2011 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	Upper Bound
Per Participant Annual Savings kWh	213	469	725

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 occur 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 of 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 is 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. However, the number of months of post-participation billing data were available for the participants in the billing analysis sample and are presented in Table 109 of *Appendix C: Impacts by Post Participation Usage Months*.

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

$$y_{it} = \alpha_i + \beta(x_{it} * T) + \phi P_t + \delta DP_{it} + \varepsilon_{it}$$

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, February 2011 through August 2014 (savings are negative).

Independent Variable	Coefficient (Daily kWh Savings)	t-value
Participation	-1.28	-3.60
Sample Size	39,992 observations (1,224 homes)	
R-Squared	67%	

The complete estimate model, showing the weather and time factors, is presented in *Appendix B: Estimated Model*.

In addition, the team further examined the impact of customers with various post participation usage months available. The results can be found in *Appendix C: Impacts by Post Participation Usage Months*.

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 M: EISA Schedule and CFL Baseline*). From Table 9, first year annual CFL savings is 45.2 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 34.4 kWh per bulb, a reduction of 24.0%. $[(45.2-34.4)/45.2]$.

From Table 20, engineering estimates show that CFLs contribute 50.9% of net program kWh savings. In terms of the unadjusted billing analysis savings of 469 kWh per participant, from Table 17, this represents 239 kWh ($0.509 * 469$). This portion of the billing savings is adjusted downward 24.0% to account for EISA, resulting in the overall net savings from the billing analysis of 412 kWh per participant seen in Table 20 ($469 - 0.240 * 239$).

Table 19. EISA Adjustments to Billing Analysis by year

Billing Analysis	2014	2015	2016	2017	2018	Average
Adjustment	0.0%	24.8%	29.5%	31.9%	33.8%	24.0%
kWh	469	410	399	393	388	412

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 kWh Allocation	Billing Analysis kW Allocation
CFLs	50.9%	52.0%	209.4	0.0655
Low-Flow Showerhead	9.7%	6.4%	40.0	0.0081
Faucet Aerator	2.2%	2.4%	9.0	0.0031
Weather Stripping	0.6%	1.9%	2.4	0.0024
Caulking	0.6%	1.9%	2.5	0.0024
Door Sweep	0.1%	0.2%	0.3	0.0003
Foam Insulation Spray	0.4%	1.3%	1.7	0.0017
DHW Pipe Insulation	24.4%	24.9%	100.4	0.0313
DHW Tank Wrap	2.0%	2.1%	8.4	0.0026
DHW Temp Adjust	5.4%	5.5%	22.1	0.0069
HVAC Filters/Calendar	3.8%	1.4%	15.4	0.0018
Overall Savings			412	0.1260

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 appropriate⁹. Duke Energy provides administrative oversight for the program, including vendor management and 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 wear 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 L: Flyer at Kick-off Event*.



Figure 1. Sign for the Kick-off Event¹⁰

¹⁰ This picture was taken in North Carolina, but it is similar in size and visibility to the signs found around the location of the Ohio event.

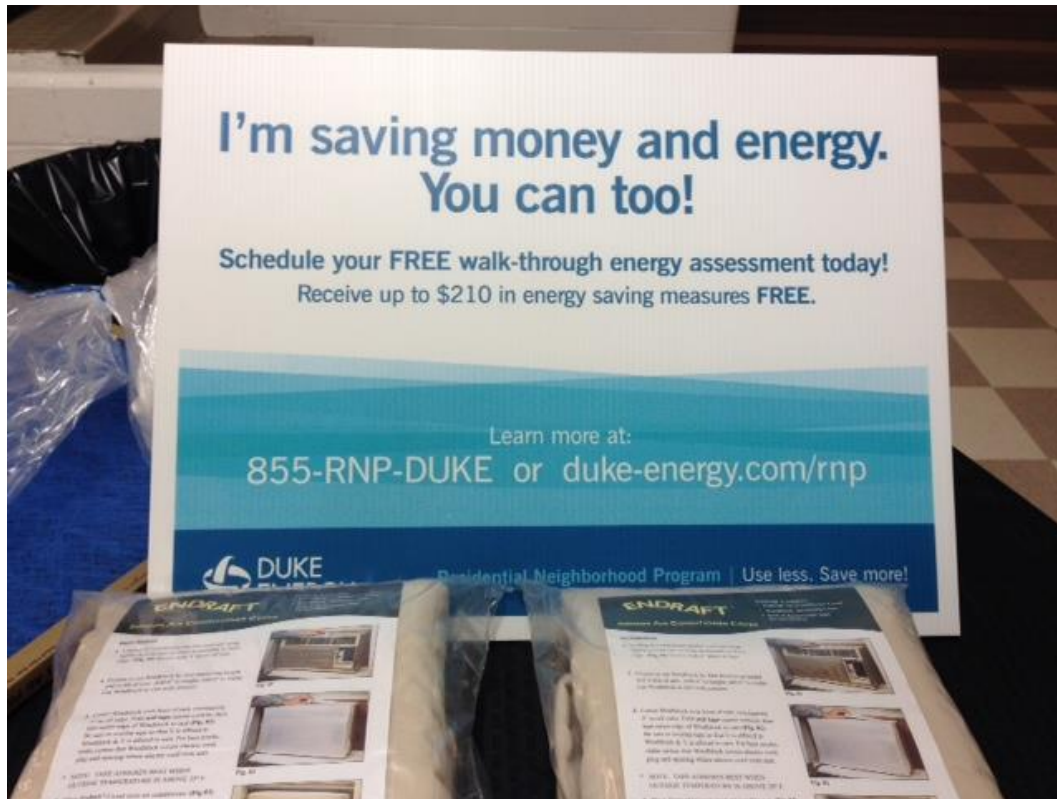


Figure 2. Table at the Kick-off Event with the Measures Available to Participants

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 8 a.m. to 7 p.m. Monday¹¹ through Friday, and from 10 a.m. to 3 p.m. on Saturdays. The auditors are available to make appointments at any time for the following week (auditors found that some appointments scheduled more than one week in advance are not kept by the customer).

¹¹ Monday appointments are not available during the winter months.



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 K: 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. 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 weekly 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

Ohio program participants found out about the Residential Neighborhoods Program from several different sources, as seen in Figure 4. About one participant in four first learned about the program when someone visited their home (24.3% of 70), and one in five received a door hanger (18.6% of 70); mailings (15.7% of 70) and phone calls (11.4% of 70) were also mentioned by more than 10% of surveyed participants. Only one surveyed participant (1.4% of 70) learned about the program online, and only one customer mentioned traditional media outlets (see a summary of customer comments following Figure 4).

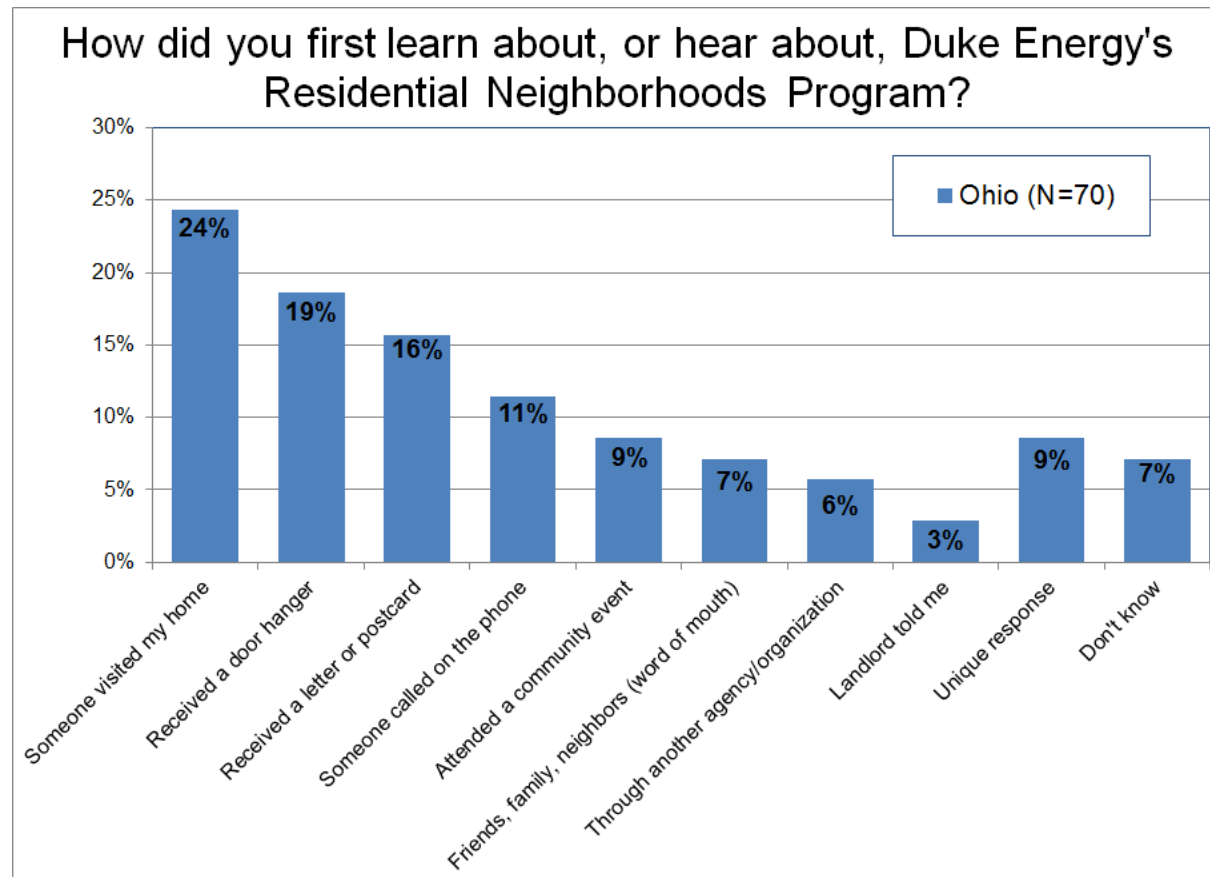


Figure 4. Source of Program Awareness for Residential Neighborhood Participants in the Ohio (N=70)

Percentages total to more than 100% because participants could name multiple sources of awareness.

Among customers who mentioned finding about the program through the mail, 81.8% (9 out of 11) identified Duke Energy as the organization that sent the mailings (including one customer who said they received a notice with their bill¹²). One Ohio customer said their mailing came

¹² The program used bill inserts to market to participants in the People Working Cooperatively Home Weatherization Assistance Program.

from “*People Working Cooperatively, I think*”, and one customer could not recall the source of their mailings.

Among customers who learned about this program when someone visited their home, 82.4% (14 out of 17) identified Duke Energy as the organization that sent the representatives to their home, while one customer said their visitors were “*sub-contractors maybe*”, one customer was visited by “*my building manager*” and a third customer could not recall. Among customers who learned about the program from door hangers, 84.6% (11 out of 13) identified Duke Energy as the source of these communications while the rest were not sure.

Among customers who received phone calls about the program, 75.0% (6 out of 8) identified Duke Energy as the organization calling, while 25.0% (2 out of 8) were not sure.

Four customers heard about the program from assistance agencies and organizations, including the Home Energy Assistance Program, People Working Cooperatively and the Middletown Area Senior Center.

Six participants mentioned unique methods of learning about the program: these include through word-of-mouth from other members of the community and from newspaper reports, church bulletins and online resources.

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 (57.1%), and more than a quarter mentioned saving energy (34.3%) and the home audit (28.6%), followed by saving money on bills (22.9%).

Table 21. Participants' Understanding of the Program (N=70)

	Ohio customers (count)	Ohio customers (percent)
Install measures	40	57.1%
Save energy	24	34.3%
Home audit	20	28.6%
Save money on bills	16	22.9%
Information / education about saving energy	12	17.1%
Participation is free	10	14.3%
Must be present during home audit	8	11.4%
Weatherize home	8	11.4%
Attend a community meeting	6	8.6%
Must be a Duke Energy customer	2	2.9%
Renters must notify landlord	2	2.9%
Make home more comfortable / fix things	1	1.4%
Everyone in the neighborhood is eligible	1	1.4%
Must be a home owner to participate	1	1.4%
Good for the environment	0	0.0%
Unique comments, listed below	9	12.9%
Don't know	11	15.7%

Percentages total to more than 100% because respondents could mention multiple aspects of the program.

Nine participants gave unique comments when asked to describe the program; more than half of these comments mention enrollment requirements that do not apply to, and/or benefits that are not offered by, the Duke Energy Residential Neighborhoods program. These responses include having to provide documentation of income and being provided with attic insulation and CO2 detectors. It is likely that these customers have participated in multiple energy assistance programs in the past and are confusing aspects of the different programs they have participated in, such as LIHEAP and the Payment Plus Program.

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 27.1% of customers and a secondary reason for participating for another 37.1%, and thus is the only reason for participation mentioned by a majority of surveyed customers (overall 64.3%). The next most-mentioned reasons for participating in the program are for the efficiency measures (mentioned by 34.3% overall), for the weatherization and repair services (also 34.3%) and to save energy in the home (32.9%).

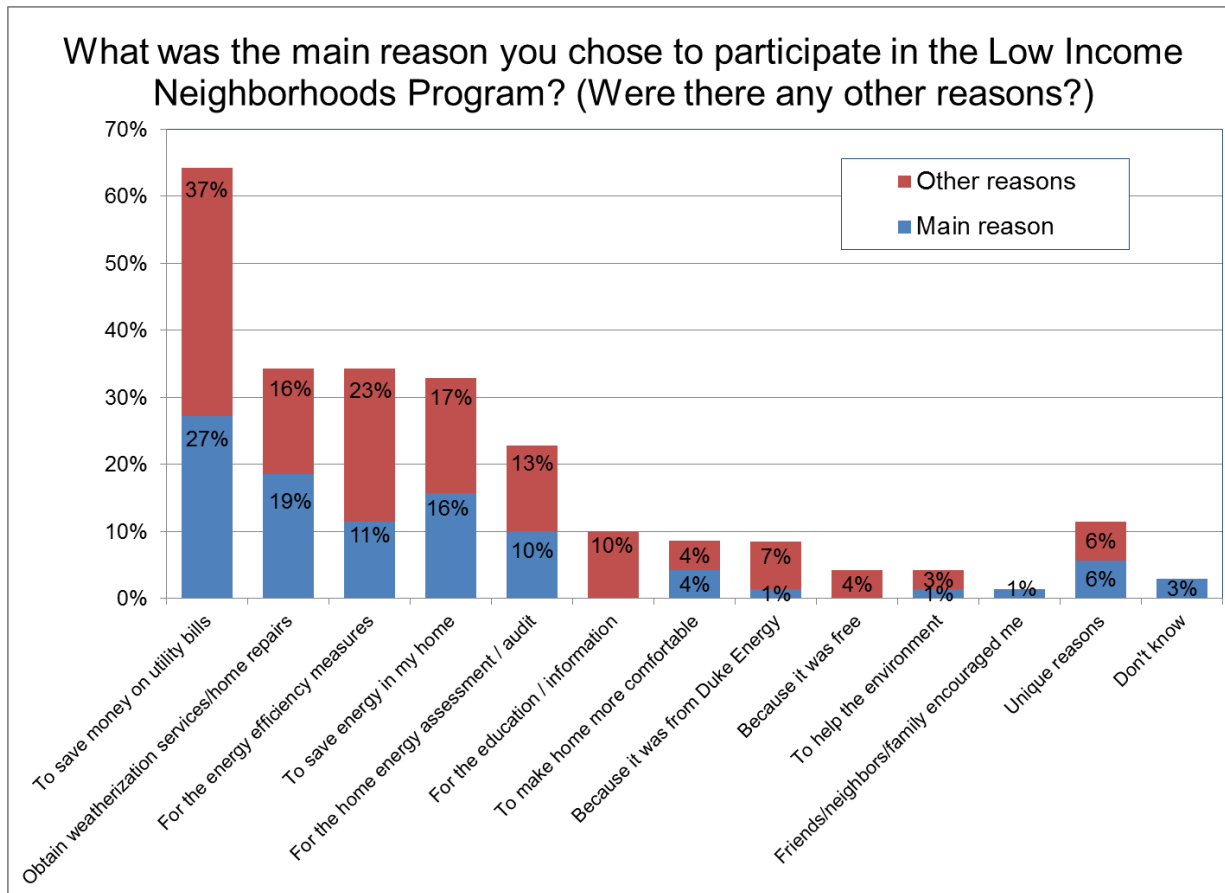


Figure 5. Factors Motivating Participation in the Residential Neighborhoods Program in the Midwest (N=70)

“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.

Eight participants gave unique reasons for participating in the Residential Neighborhoods program; three of these participants mentioned the community meetings held to announce the program, one said their landlord made the arrangements for them and the rest merely expressed curiosity about the program’s offerings.

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 two weeks (48.6% or 34 out of 70) and about a third cannot recall (34.3% or 24 out of 70). Only 11.4% (8 out of 70) reported that they had to wait for three weeks or longer. 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=70)

	Ohio customers (count)	Ohio customers (percent)
Same day	1	1.4%
Next day up to one week	20	28.6%
One week up to two weeks	13	18.6%
Two weeks up to three weeks	4	5.7%
Three weeks up to six weeks	5	7.1%
Six weeks or longer	3	4.3%
Don't know / can't recall	24	34.3%

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 four out of five surveyed participants (81.4%) feel that the time from sign-up to audit is “about right” while 18.6% are not sure; no surveyed participants said the time was either too long or too short.

Participants were asked a similar question about the length of time the auditor was in their home, and 97.1% reported that this was also “about right.” Only one customer felt that the auditor spent too long in their home, and another customer was not sure.

Table 23. Customer Perception of Home Audit Timing (N=70)

	Ohio customers (count)	Ohio customers (percent)
<i>Time between signing up and audit was....</i>		
Too long	0	0.0%
About right	57	81.4%
Too short	0	0.0%
Don't know	13	18.6%
<i>Length of time auditor was in the home was....</i>		
Too long	1	1.4%
About right	68	97.1%
Too short	0	0.0%
Don't know	1	1.4%

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 four Ohio participants (25.7%) 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. Overall, four out of five surveyed participants (81.4%) reported that they did recommend the program. Surveyed participants who recommended the program to others recommended it to an average of 5.4 people apiece, with a

median of four others informed per participant; the range of recommendations per survey participant is from one to thirty-five other people.

Participant Satisfaction

Participants were asked for their levels of satisfaction on a one-to-ten 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 of “9” or higher on a ten-point scale, indicating high levels of satisfaction. The highest satisfaction ratings for measures rated by at least ten participants are for the door sweeps (9.64 with 22 customers rating this measure), filter change calendar (9.60 based on 25 ratings) and HVAC filters (9.51 based on 41 ratings). The lowest satisfaction ratings are for low-flow showerheads (8.63 based on 30 ratings) and the vinyl weather stripping for doors (8.85 based on 33 ratings). None of the surveyed participants in Ohio gave ratings for vinyl weather stripping for window HVAC units, and only two participants rated the clear glass patch tape.

Table 24. Mean Satisfaction Ratings for Measures (N=70)

Measure	Ohio	
	Valid N (not including don't know)	Average Rating
CFLs	63	9.37
Switch Plate Wall Thermometer	59	9.08
Faucet Aerators	44	8.98
HVAC Filters Year Supply	41	9.51
Vinyl Weather Stripping Doors	33	8.85
Low-flow Showerheads	30	8.63
Change Filter Calendar	25	9.60
Water Heater Pipe Wrap	24	9.42
Door Sweeps	22	9.64
Water Heater Temperature Adjustment	15	9.40
Caulking Doors	15	9.13
Caulking Windows	10	9.40
Foam Insulation Spray	9	9.78
HVAC Winter Kit for Wall/Window Unit	7	9.71
Water Heater Tank Insulation Wrap	7	9.57
Clear Glass Patch Tape	2	10.00
Vinyl Weather Stripping for window HVAC units	0	NA

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 summarized 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. Figure 6 below shows the respondents’ mean satisfaction scores with various aspects of the program.

Overall program satisfaction among participants in Ohio is very high, averaging 9.63 on a ten-point scale where “10” is most satisfied. Surveyed participants also rated their satisfaction with the auditors who came to their homes and performed the audit: on the same ten-point scale, the auditors’ knowledge was rated at 9.68, and their helpfulness was rated at 9.79.

The community meeting also received high satisfaction scores, averaging 9.76 for the information presented at the meeting and 9.89 for the staff and presenters. However these ratings are based on the much smaller group of participants who attended these community meetings; only 18 Ohio customers provided satisfaction ratings for the meetings.

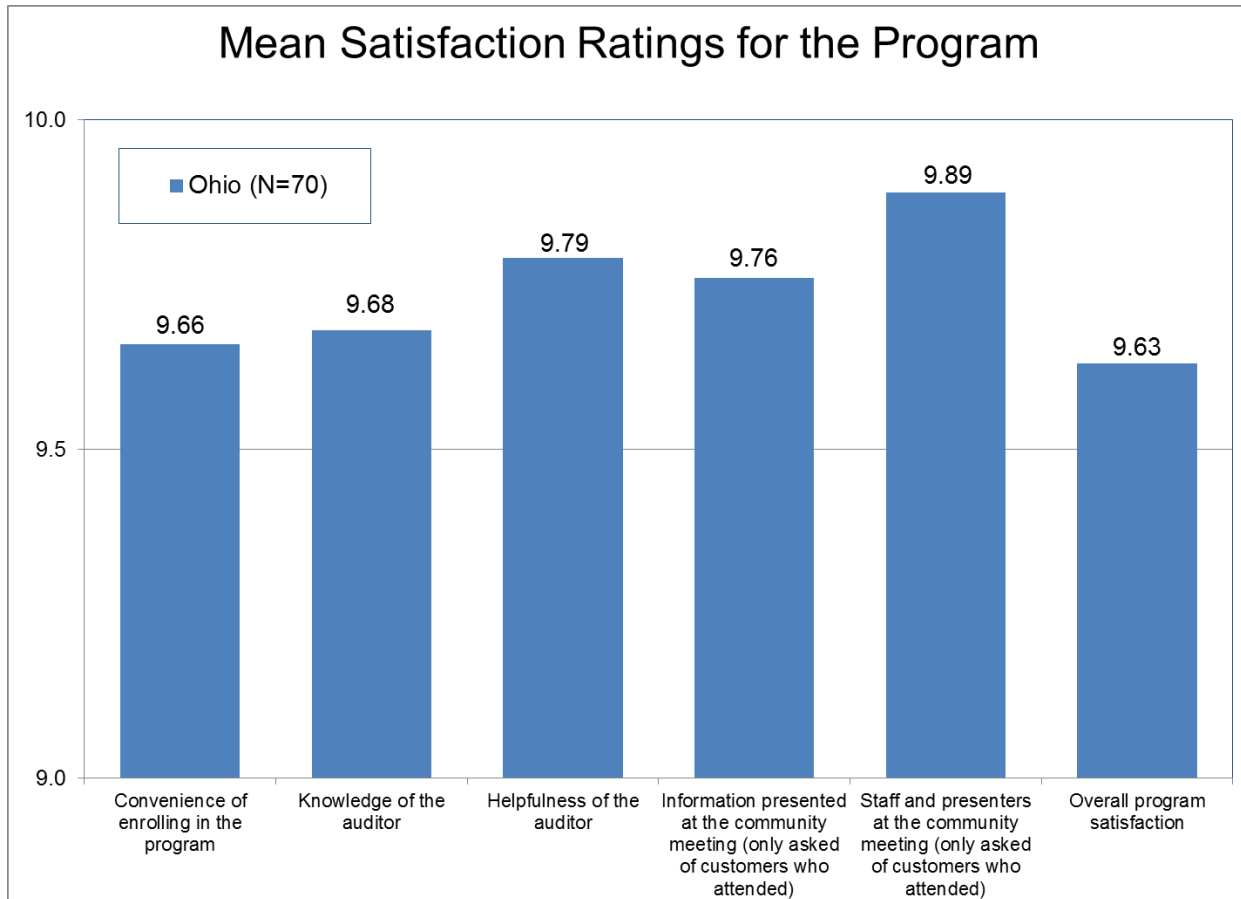


Figure 6. Mean Satisfaction with the Program and Components (N=70)

For questions receiving satisfaction ratings of “7” or lower, participants were asked what could be done to improve the situation; however only two of the ratings questions shown above received any ratings of “7” or lower, and these questions only received one or two low ratings apiece. One customer who gave low ratings to auditors specified that the auditor was unprepared and could have done a more thorough job. Two participants who gave low ratings for the convenience of enrollment are not informative (“*could have provided better information*” and “*I don’t know.*”)

Ohio participants were also asked to rate their satisfaction with the program overall using a five-point Likert scale. Figure 7 indicates that an overwhelming majority of 84.3% surveyed participants in Ohio are “very satisfied” with this program while an additional 11.4% are “somewhat satisfied.” No customers surveyed in Ohio are “very” or “somewhat dissatisfied” with the program.

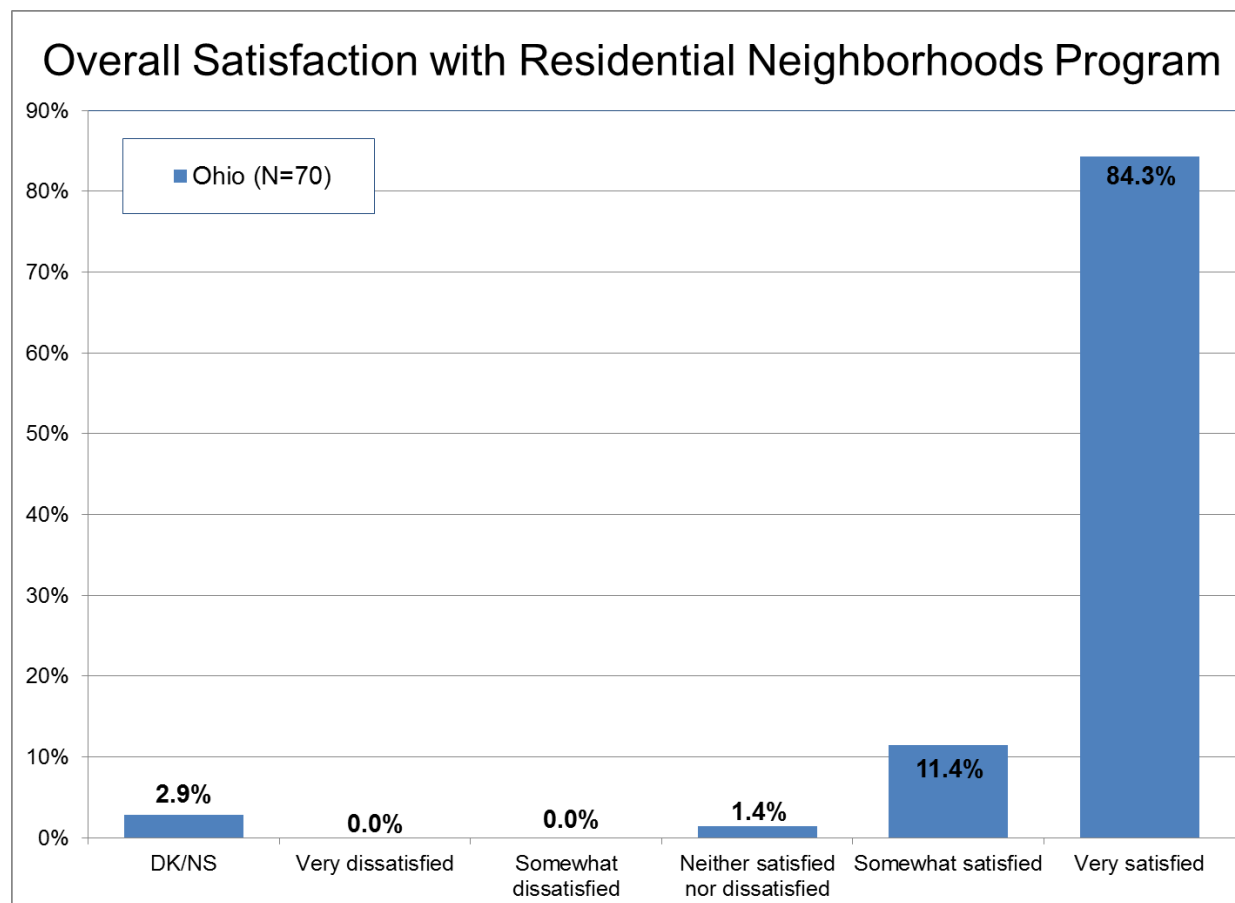


Figure 7. Overall Program Satisfaction in Ohio (N=70)

Program participants in Ohio were asked why they rated their satisfaction with the program as they did; these responses are listed in *Appendix I: Predicting Overall Program Satisfaction*.

Satisfaction with Duke Energy

Satisfaction with Duke Energy is generally high among these program participants, with a mean rating of 8.72 on a ten-point scale where “10” means “very satisfied”, and nearly half of surveyed participants (42.9%) rate their satisfaction with Duke Energy at “10 out of 10”, the highest possible score. The full distribution of responses is shown in Figure 8.

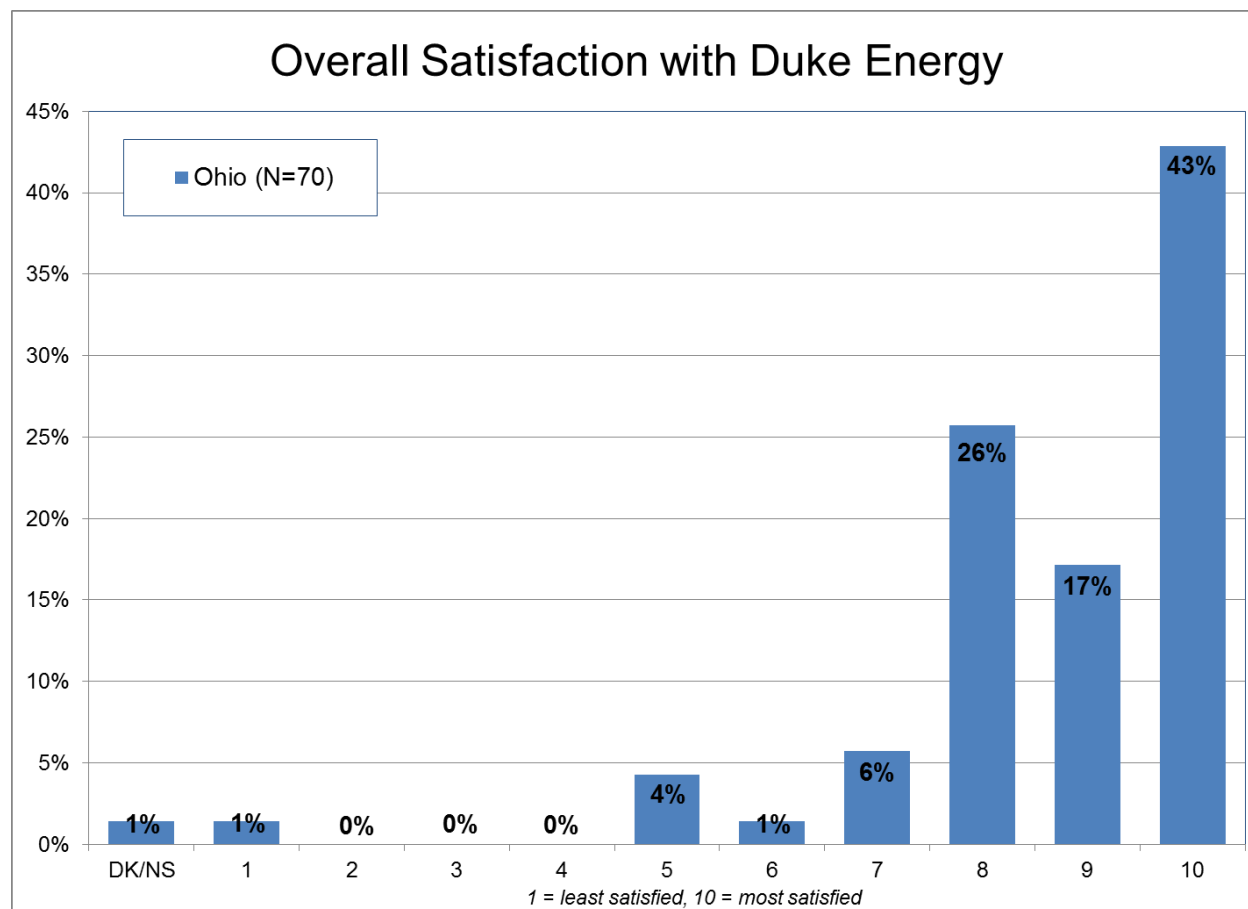


Figure 8. Program Participants' Overall Satisfaction with Duke Energy (N=70)

Nine participants (12.9%) rated their satisfaction with Duke Energy at “7” or less on a ten-point scale and were asked how this situation could be improved. The most common responses to this question have to do with service issues and energy rates, as seen in the list below (more than nine responses are listed because respondents could mention more than one issue).

Customers rating overall satisfaction with Duke Energy at “7” or less (N=9)

- Rates are too high / too many fees (n=3)
- Customer service complaints (n=3)
- Late payments and service being shut off (n=2)
- Pollution concerns
- Issues with switching service providers
- Concerns about tree-trimming and power lines
- Duke Energy should do more to promote energy efficiency

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 25 shows that a clear majority say that the program has made them more positive towards Duke Energy (70.0%), and a similar number report that their knowledge of how to save energy has

increased (68.6%). None of the customers surveyed in Ohio report that their attitude towards Duke Energy has grown more negative due to their participation in the program, or that their knowledge of how to save energy has decreased.

Table 25. Changes in Attitude and Knowledge due to Program Participation (N=70)

	Ohio customers (count)	Ohio customers (percent)
<i>This program has made my attitude towards Duke Energy....</i>		
Much more positive	18	25.7%
Somewhat more positive	31	44.3%
About the same	20	28.6%
Somewhat more negative	0	0.0%
Much more negative	0	0.0%
Don't know	1	1.4%
<i>Has your knowledge of how to save energy</i>		
Increased a lot	19	27.1%
Increased somewhat	29	41.4%
Stayed the same	20	28.6%
Decreased somewhat	0	0.0%
Decreased a lot	0	0.0%
Don't know	2	2.9%

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. Overwhelmingly, customers who are more positive towards Duke Energy because of this program attribute this to the perception that Duke Energy cares about their customers and the community. Saving customers' money is the second-most mentioned reason for an improved attitude towards Duke Energy, followed by a few mentions of conservation and education about energy efficiency (there are more responses than respondents listed because participants could give more than one reason for their change in attitude).

Much more positive towards Duke Energy (N=18)

- This program shows that Duke Energy cares about and wants to help their customers / gives back to the community (n=13)
- Duke Energy is helping customers save money / giving free measures (n=4)
- Duke Energy is saving energy (and water) / conservation (n=3)
- This program taught me about energy efficiency / education (n=2)
- Appreciate home improvements / help with things I could not do myself (n=2)

Somewhat more positive towards Duke Energy (N=31)

- This program shows that Duke Energy cares about and wants to help their customers / gives back to the community (n=19)
- Duke Energy is helping customers save money / giving free measures (n=11)
- Duke Energy is saving energy (and water) / conservation (n=5)

- This program taught me about energy efficiency / education (n=3)
- Qualified comments: this program is good but there are other things I still do not like about Duke Energy (n=2)
- I was already positive towards Duke Energy

Half of surveyed participants (50.0%) report that their utility bills have decreased since participating in the program, though one in seven (14.3%) report that their bills have actually increased. Nearly a quarter of these participants (21.4%) have seen no change, and 14.3% are not sure if their bills have gone up or down. Table 26 also shows participants' estimates for the monthly change in their bills; the eight customers who say their bills "decreased a lot" report saving an average of about \$85 per month, while those who say their bills "decreased somewhat" report saving an average of about \$24 per month. Overall, the average savings of the 52 participants¹³ who were able to estimate the change in their bill is about \$15 per month and the median savings is about \$9 per month.

Table 26. Changes in Energy Bills due to Program Participation (N=70)

	Ohio customers (count)	Ohio customers (percent)	Estimated dollars per month savings (negative means increase in bill)
<i>Have your monthly utility bills</i>			
Decreased a lot	8	11.4%	\$85
Decreased somewhat	27	38.6%	\$24
Stayed about the same	15	21.4%	\$0
Increased somewhat	7	10.0%	-\$37
Increased a lot	3	4.3%	-\$75
Don't know	10	14.3%	NA
Total average savings per month			\$15

Predicting Overall Program Satisfaction

Correlations and simple linear regression analysis were used to determine what drives overall satisfaction in this program. The conclusions from this analysis are listed below, and the statistical analyses which support these conclusions can be found in *Appendix I: Predicting Overall Program Satisfaction*.

- Consistently, satisfaction with the measures received is the most important predictor of program satisfaction. Since satisfaction ratings skew very high (most customers give "9" or "10 out of 10" ratings), this indicates that customers who received measures they are not satisfied with are significantly less satisfied with the program as a whole.
- Satisfaction with the convenience of enrollment also has a significant relationship with program satisfaction; again, this indicates that customers who had less than satisfactory enrollment experiences tend to be less satisfied with the program.

¹³ Out of 70 participants surveyed, ten participants were not sure if their bills had changed, so were not asked to estimate the amount of the change. Eight 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.

- Ratings of the auditors and Duke Energy overall are not significant in the presence of the two significant predictors listed above, nor is the number of measures received, nor whether or not the customer attended the community meeting.
- In conclusion, if there is a need to improve program satisfaction, priority should be given to improving the quality of measures followed by improving the enrollment process.

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 Ohio participants who received each measure according to these records is shown in Table 27. Out of the sixteen categories of measures shown in this table, all customers who were surveyed received between three and fourteen measures, and on average customers received eight of these measures (the mean is 8.1 types of measures received and the median is eight measures).

All but one surveyed program participant in Ohio received CFLs (of either wattage: 98.6% or 69 out of 70), and all but two received switch plate wall thermometers (97.1% or 68 out of 70). A majority of surveyed customers also received faucet aerators (87.1%), HVAC filters and filter change calendars (72.9%), vinyl weather stripping for doors (58.6%) and water heater pipe wrap (51.4%). The least-common measures received through this program are water heater tank insulation wrap¹⁴ (11.4%), clear glass patch tape (7.1%) and weatherstripping and kits for window air conditioning units (2.9%).

¹⁴ Water heater measures are only provided to households with electric water heaters; only 40.0% of surveyed Ohio participants confirmed having electric water heaters, although 14.3% were not sure what kind of fuel their water heaters use. In contrast, only 13.7% of Ohio non-participants surveyed confirmed that they have electric water heaters while 39.2% of non-participants were not sure what kind of fuel their water heaters use. See *Appendix H: Demographics and Household Characteristics*.

Table 27. Installation of Energy Efficiency Measures from Auditor Records (N=70)

	Ohio customers (count)	Ohio customers (percent)
Any CFL(s)	69	98.6%
13-watt CFL(s)	58	82.9%
18-watt CFL(s)	66	94.3%
Switch plate wall thermometer	68	97.1%
Faucet aerator(s)	61	87.1%
HVAC filters and filter change calendar	51	72.9%
Vinyl weather stripping doors	41	58.6%
Water heater pipe wrap	36	51.4%
Low-flow showerhead(s)	35	50.0%
Water heater temperature adjustment	35	50.0%
Caulking doors	26	37.1%
Door sweeps	24	34.3%
Foam insulation spray	24	34.3%
Caulking windows	14	20.0%
HVAC winter kit for wall/window unit	12	17.1%
Water heater tank insulation wrap	8	11.4%
Clear glass patch tape	5	7.1%
Vinyl weather stripping HVAC window units	2	2.9%

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. Among measures installed in at least ten surveyed participant households, confirmation rates range as high as 92.6% for the switchplate wall thermometer to as low as 41.7% for foam insulation spray. 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 2.9% were unsure if they had received these measures) up to 45.7% who were not sure if they received a hot water temperature adjustment.

Table 28. Customer-Confirmed Installation of Energy Efficiency Measures (N=70)

	Valid count (# receiving according to auditor records)	All measures installed %	Partially installed %	Not installed %	Don't know %
Any CFL(s) (<i>partial = only some bulbs installed</i>)	69	84.1%	13.0%	0.0%	2.9%
13-watt CFL(s)	58	NA	NA	NA	NA
18-watt CFL(s)	66	NA	NA	NA	NA
Switch plate wall thermometer	68	92.6%	NA	2.9%	4.4%
Faucet aerator(s)	61	72.1%	NA	13.1%	14.8%
HVAC filters and filter change calendar (<i>partial = received filters or calendar</i>)	51	54.9%	29.4%	11.8%	3.9%
Vinyl weather stripping doors	41	82.9%	NA	12.2%	4.9%
Water heater pipe wrap	36	66.7%	NA	19.4%	13.9%
Low-flow showerhead(s)	35	91.4%	NA	2.9%	5.7%
Water heater temperature adjustment	35	51.4%	NA	2.9%	45.7%
Caulking doors	26	53.8%	NA	26.9%	19.2%
Door sweeps	24	91.7%	NA	4.2%	4.2%
Foam insulation spray	24	41.7%	NA	29.2%	29.2%
Caulking windows	14	71.4%	NA	14.3%	14.3%
HVAC winter kit for wall/window unit	12	58.3%	NA	33.3%	8.3%
Water heater tank insulation wrap	8	87.5%	NA	12.5%	0.0%
Clear glass patch tape	5	40.0%	NA	20.0%	40.0%
Vinyl weather stripping HVAC window units	2	0.0%	NA	50.0%	50.0%

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 generally assumes that the auditor records are correct and the measure was installed when a customer cannot confirm auditor records ("don't know"). Further, 5% of auditor records are confirmed by Duke Energy's contractor that conducts Quality Control on the program's installations.

CFL Installations

Although auditors are supposed to install all measures, customers report that this does not always happen. As seen in Table 29, a clear majority of customers who received CFLs according to auditor records confirmed that the auditor installed all of the bulbs (71.0%), and another 13.0% reported that all of the bulbs they received were installed by a combination of auditor and customer efforts. However, another 13.0% of participants report that the auditor left CFLs behind which have not been installed yet.

Table 29. Measure Installation: CFLs (N=69)

<i>69 participants received CFLs according to auditor records</i>	Ohio customers (count)	Ohio customers (percent)
Auditor installed all bulbs	49	71.0%
Auditor installed some bulbs, left other bulbs which customer installed	9	13.0%
Auditor gave bulbs to customer, customer installed all of them	0	0.0%
Auditor installed some bulbs, left other bulbs which customer has NOT installed	7	10.1%
Auditor gave bulbs to customer, customer installed some of them	2	2.9%
Auditor gave bulbs to customer, customer has not installed any of them	0	0.0%
Don't know / not specified	2	2.9%

The nine 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 nine customers report having a total of eleven 13-watt and 35 18-watt bulbs left over (an average of 1.2 13-watt and 3.9 18-watt CFLs apiece among customers with leftover program CFLs).

Table 30 compares auditor records of CFL installation with customer recollections. Auditor records report that 372 13-watt CFLs and 438 18-watt CFLs were installed across the 70 surveyed participant households in Ohio. When asked to confirm the auditor bulb totals, in aggregate customers reported receiving only slightly fewer bulbs than the program records showed (366 13-watt CFLs and 432 18-watt CFLs). However, after taking into account 49 program bulbs that customers report had not been installed as of the time of this survey, the number of bulbs confirmed installed by customers is 350 13-watt CFLs (94.1% of the auditor-recorded total) and 399 18-watt CFLs (91.1% if the auditor-recorded total). Overall, the total number of customer-confirmed bulb installations is 92.5% of the auditor-reported total (749 out of 810 bulbs installed). While this is designed to be a “direct install” program, and having the auditors install light bulbs is considered a best practice, TecMarket Works considers it acceptable for a portion of light bulbs to be installed by the customers themselves; in most cases, it is the customer who requests that light bulbs be given to them rather than installed by auditors.

Table 30. Customer Confirmation of CFL Installations

	Ohio Count of CFLs
Auditor records: 13w CFLs installed	372
Customer confirmation: 13w CFLs received	366
Customer confirmation: 13w CFLs installed	350
Percent of 13w CFLs from auditor records confirmed installed by customers	94.1%
Auditor records: 18w CFLs installed	438
Customer confirmation: 18w CFLs received	432
Customer confirmation: 18w CFLs installed	399
Percent of 18w CFLs from auditor records confirmed installed by customers	91.1%
Auditor records: Total CFLs installed	810
Customer confirmation: Total CFLs received	798
Customer confirmation: Total CFLs installed	749
Percent of Total CFLs from auditor records confirmed installed by customers	92.5%

As indicated in Table 31, about one in seven customers who received CFLs from this program still has some program bulbs in storage (13.0% who confirmed that they received CFLs from the program), though confirmed stored bulbs only account for 5.8% (46 out of 798) of the bulbs that customers confirm were given to them. No surveyed customers reported giving away any program bulbs, and none reported disposing of any functional program bulbs. Three bulbs shown in this table (0.4% of 798 bulbs confirmed received) are apparently stored program bulbs that replaced other program bulbs that had burned out in between installation and the time of this survey (these three bulbs are all in households where the customer installed some of the program bulbs themselves).

Table 31. Customers with Uninstalled CFLs and Number of Uninstalled CFLs

	Customers (N)	Customers (%)
Customers who received bulbs (customer confirmed)	69	100.0%
Customers with bulbs not installed yet	9	13.0%
Uninstalled bulbs in storage	9	13.0%
Uninstalled bulbs given away	0	0.0%
Uninstalled bulbs don't know	0	0.0%
	CFLs (N)	CFLs (%)
Number of bulbs received (customer confirmed)	798	100.0%
Number of bulbs not installed yet	49	6.1%
Uninstalled bulbs in storage	46	5.8%
Uninstalled bulbs given away	0	0.0%
Uninstalled bulbs already used to replace other program bulbs that burned out	3	0.4%
Uninstalled bulbs don't know	0	0.0%

Customers with confirmed 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 32, overall 77.8% (7 out of 9) of customers who confirmed that they have program CFLs in storage plan to use them all, while two customers (22.2% of 9) did not answer the question. A quarter of

customers with stored program CFLs (22.2%) think they will have installed all of the program bulbs within a year.

Table 32. Customer Plans for Uninstalled Program CFLs

	Customers (N)	Customers (%)
Customers with confirmed program CFLs in storage	9	100.0%
Yes, plan on eventually installing all uninstalled CFLs	7	77.8%
Yes – will install all within a year	2	22.2%
Yes – will install all in 1-2 years	2	22.2%
Yes – will install all in 2-3 years	1	11.1%
Yes – will install all in 3-5 years	0	0.0%
Yes – will install all in more than 5 years	0	0.0%
Yes – will install all, not sure how long it will take	2	22.2%
Maybe, might eventually install all uninstalled CFLs	0	0.0%
No, do not plan to eventually install all uninstalled CFLs	0	0.0%
Don't know if all uninstalled CFLs will eventually be installed	2	22.2%

Customers who received CFLs from the Residential Neighborhoods program were asked a series of questions about up to three CFL installations.¹⁵ Table 33 indicates that program CFLs are most frequently installed in living/family rooms, kitchens, bedrooms and bathrooms; these correspond to the rooms in a home that generally have the highest occupancy time and thus highest lighting usage. The distribution of program bulbs installed by room is very similar for Ohio and Kentucky (no statistically significant differences between states).

¹⁵ The 69 customers surveyed who confirmed that they have program CFLs installed in their homes were asked about up to three installations apiece, yielding data on 194 installations in total. This does not represent all installed bulbs, but rather a customer-selected sample of installations. There were a total of 749 CFLs confirmed installed by survey participants, though many of 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 749 bulbs distributed).

Table 33. Installation of Program CFLs by Room

<i>Room where program CFLs were installed</i>	13w CFLs count	18w CFLs count	Bulb wattage not recalled	Total CFLs count	% of CFL installations (N=194)
Living/family room	18	21	8	47	24.2%
Kitchen	5	23	5	33	17.0%
Master bedroom	14	13	9	36	18.6%
Bathroom	11	18	2	31	16.0%
Dining room/dinette	5	5	3	13	6.7%
Other bedroom	2	4	2	8	4.1%
Hall	0	6	1	7	3.6%
Basement	2	2	3	7	3.6%
Den/computer room	0	1	0	1	0.5%
Porch/exterior	1	0	1	2	1.0%
Closet	1	1	0	2	1.0%
Utility room	1	1	0	2	1.0%
Garage	0	0	0	0	0.0%
Unique locations, listed below	2	0	0	2	1.0%
Don't know	0	3	0	3	1.5%

Respondents who have program CFLs installed are asked about up to three bulb installations.

Two of the program bulbs installed in participant households are in unique locations, described by participants as a “*spare room*” and a “*play room/solarium*”.

Table 35 shows the bulb type and wattage of the light bulbs which were replaced by program CFLs, according to customers’ recollections. Customers report that 10.3% of the installations consisted of a program CFL replacing a pre-existing CFL, while the remaining nine out of ten program bulbs installed (89.7%) replaced standard incandescent bulbs. A plurality of replaced incandescent bulbs were 45 to 70 watt bulbs (44.4% of installations replacing incandescent bulbs where the customer was able to give a wattage for the previous bulb).

For the 141 program bulb installations in Ohio where the customer was able to state the wattage of replaced bulbs, the average wattage of the replaced bulb was 61 watts; the average replaced bulb wattages reported in this section include replaced CFLs as well as replaced incandescent bulbs.

Table 34. Installation of Program CFLs: Replaced Bulb Type and Wattage (N=194 installed bulbs)

	CFL installations (count)	CFL installations (percent)
<i>What type of bulb was previously in the socket where the CFL was installed?</i>		
Standard incandescent	174	89.7%
CFL	20	10.3%
Other type (fluorescent tube)	0	0.0%
No bulb in the socket	0	0.0%
Don't know	0	0.0%
<i>How many watts was the bulb that was replaced by the CFL?</i>		
Replaced CFL: 30 watts or less	8	4.1%
Replaced CFL: don't know wattage	12	6.2%
Replaced incandescent: 44 watts or less	20	10.3%
Replaced incandescent: 45 to 70 watts	68	35.1%
Replaced incandescent: 71 to 99 watts	36	18.6%
Replaced incandescent: 100 watts or more	9	4.6%
Replaced incandescent: don't know wattage	41	21.1%
No bulb in socket / bulb type unknown	0	0.0%

Respondents who have program CFLs installed are asked about up to three bulb installations.

Table 35 shows the hours of use for lighting where program CFLs were installed, based on customers' reporting. A majority of lights where program CFLs were installed are used for less than four hours per day (57.2%), but about one in six are used for eight or more hours per day (15.5%). Program 13-watt bulbs are used an average of 4.5 hours per day and program 18-watt bulbs are used an average of 4.2 hours per day, while program bulbs where customers can't recall the wattage are used 3.5 hours per day; overall, the average program bulb installed in Ohio is used 4.2 hours per day.

For more than nine out of ten installations (93.3% of 194), customers report that hours of use has not changed since participating in the program; however 3.1% reported that hours of use increased while 1.5% reported that their usage decreased.

Table 35. Installation of Program CFLs: Hours of Use (N=194 installed bulbs)

	CFL installations (count)	CFL installations (percent)
<i>How many hours per day is this light used?</i>		
Less than 1 hours	25	12.9%
1 up to 2 hours	29	14.9%
2 up to 4 hours	57	29.4%
4 up to 8 hours	53	27.3%
8 up to 12 hours	10	5.2%
12 up to 24 hours	11	5.7%
Don't know	9	4.6%
<i>Did the hours of use for this light change since installing the CFL?</i>		
Stayed the same	181	93.3%
Increased	6	3.1%
Decreased	3	1.5%
Don't know	4	2.1%

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 nine installations where usage went up or down after the program. Among the six installations where usage increased, the average increase is 2.2 hours per day and all six of these installations involve a CFL replacing an incandescent bulb. Among the three installations where usage decreased, the average decrease is 1.2 hours per day and all three of these installations involve a CFL replacing an incandescent bulb.

Table 36 shows that nearly half of previously installed bulbs were retained by customers and are being stored for potential future use (43.3% or 84 out of 194 installations). Most of the other half of installations in Ohio (46.4%) resulted in the old bulbs being thrown away, recycled or taken by the auditor. In four of these 194 installations (2.1%), the old bulbs are still in use in the customer's home (1.5% of installations "installed elsewhere in the home") or could be in use in another person's home (0.5% of 1 were "given to somebody"). For almost one installation in ten (8.2%) the customer could not recall what happened to the previous bulb.

Table 36. Installation of Program CFLs: Disposal of Old Bulbs (N=194 installed bulbs)

	CFL installations (count)	CFL installations (percent)
<i>What happened to the old bulb that was removed?</i>		
Threw it away	61	31.4%
Stored it	84	43.3%
Auditor took it with them	23	11.9%
Recycled it	6	3.1%
Gave it to somebody in another household	1	0.5%
Installed it elsewhere in my home	3	1.5%
Don't know what happened to it	16	8.2%
No bulb previously in socket	0	0.0%

Respondents who have program CFLs installed are asked about up to three bulb installations.

About one in six participants who confirmed that they have program CFLs installed has since removed at least one program bulb (15.9%), as seen in Table 37. The eleven customers who removed program bulbs uninstalled a total of 16 CFLs (an average of 1.5 CFLs per household that removed CFLs), or 2.1% of the 749 program CFLs which were confirmed installed.

Table 37. Removing Installed Program CFLs

	Ohio participants (count)	Ohio participants (percent)
Number of customers who confirmed that they have program CFLs installed	N=69	N=69
Yes, removed program CFL(s)	11	15.9%
No, all program CFLs are still installed	54	78.3%
Don't know	5	5.8%
	Ohio CFLs installed (count)	Ohio CFLs installed (percent)
Number of bulbs installed (customer confirmed)	N=749	N=749
Total number of bulbs uninstalled	16	2.1%
Number of 13w bulbs uninstalled	8	1.1%
Number of 18w bulbs uninstalled	6	0.8%
Number of bulbs uninstalled, wattage unknown	2	0.3%

The eleven survey participants who removed program CFLs were asked why they did so. These responses are listed below; in most cases bulbs were removed because they burned out.

- Bulb burned out (n=8)
- Bulb broken by accident
- One bulb broke and another one burned out
- Bulb was flickering

Sixty-three (63) 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 9.37, and only 4.8% gave ratings of “7” or lower. The three customers with ratings of “7” or lower were asked the reason for their relatively low satisfaction with the CFLs; all of these participants referred to the brightness of the program bulbs, with two stating explicitly that the CFLs are not bright enough and the third allowing that the their brightness is merely adequate.

CFLs and LEDs Installed Before Participating in the Program

Table 38 indicates that most participants (62.3%) 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 7.8 CFLs apiece before the program; including the 21 customers who did not have any CFLs installed before the program, the average number of CFLs installed before the program is 5.2 per household.

About one in three participants who confirmed the installation of program CFLs has previously acquired CFLs from another Duke Energy program (31.9%), and another one in four have purchased bulbs from a store (23.2%).

Nearly half of surveyed participants have been using CFLs for more than two years (43.5%), and another 17.4% started using CFLs in the past two years but prior to their participation in the Residential Neighborhoods program.

Table 38. Preinstalled CFLs (N=69)

<i>Base: 69 participants who confirmed program CFLs were installed</i>	Ohio participants (count)	Ohio participants (percent)
<i>Did you have any CFLs installed before participating in this program?</i>		
No	21	30.4%
Yes, from 1 to 5	22	31.9%
Yes, from 6 to 11	11	15.9%
Yes, 12 or more	10	14.5%
Yes, don't know how many	0	0.0%
Don't know	5	7.2%
<i>Where did you get the CFLs you were using in your home before participating in this program?</i>		
Purchased at a store	16	23.2%
Another Duke Energy program	22	31.9%
A program from a company other than Duke Energy	1	1.4%
From a Community Assistance Program	3	4.3%
Another source, listed below	3	4.3%
Don't know	1	1.4%
<i>How long have you been using CFLs?</i>		
One year or less (but previous to program participation)	3	4.3%
One to two years	9	13.0%
Two to three years	13	18.8%
Three to four years	7	10.1%
Four years or more	10	14.5%
Don't know	1	1.4%

Although 43 participants reported having CFLs installed before participating in the program, there are 46 responses shown for the source of these CFLs; this is because participants could give multiple responses if they acquired CFLs from multiple sources.

Three surveyed participants said they acquired CFLs from “another source”: one received CFLs from their family, one received CFLs from their landlord and one received CFLs from another program but could not recall the name or sponsor of the program.

The 22 customers who said they received CFLs from “another Duke Energy program” were asked to describe or name the program: 21 customers mentioned variations on “free CFLs by mail” and one customer that they received a coupon from Duke Energy for five free CFLs.

The one Ohio customer who said that they received CFLs from “a program from a company other than Duke Energy” was asked what company; this customer identified the program that supplied their CFLs as People Working Cooperatively.

The 16 customers who purchased CFLs at a store were asked to name the store; these responses are listed below.

Stores where participants purchased CFLs before the program (N=16)

- Walmart (n=5)
- Lowe's (n=4)

- Home Depot (n=2)
- “Lowe’s or Home Depot”
- One mention apiece: Kroger’s, Dollar Store
- Don’t know (n=2)

Only a third of surveyed participants (33.3%) were already intending to buy CFLs before participating in the program, while another 15.9% said they “maybe” were going to buy CFLs before participating in the program and one customer said they were not intending to buy CFLs because they already have these bulbs installed in all available sockets. A plurality of 40.6% had not intended to purchase any CFLs.

Two participants (2.9%) have purchased additional CFLs since participating in the program. These participants purchased ten additional bulbs, an average of 5.0 CFLs per household that purchased additional CFLs.

Table 39. Intent to Purchase CFLs Before the Program and Additional CFLs Purchased since the Program (N=69)

<i>Base: 69 participants who confirmed program CFLs were installed</i>	Ohio participants (count)	Ohio participants (percent)
<i>Were you planning on buying CFLs for your home before participating in this program?</i>		
Yes	23	33.3%
Maybe	11	15.9%
No	28	40.6%
No, already installed in all available outlets	1	1.4%
Don’t know	6	8.7%
<i>Have you purchased any CFLs since participating in this program?</i>		
No	63	91.3%
Yes, from 1 to 5	1	1.4%
Yes, from 6 to 11	1	1.4%
Yes, 12 or more	0	0.0%
Don’t know	4	5.8%

Table 40 indicates that only 4.3% of surveyed customers in the Midwest confirmed that they had LEDs installed before participating in the Residential Neighborhoods program. The three customers with LEDs installed before the program had an average of 1.7 LEDs installed per household; across all 69 surveyed households with installed program CFLs, the average number of pre-installed LEDs is only 0.1 per household.

Two of the three customers who had LEDs before the program have been using LEDs for less than a year, and the third has been using LEDs for between one and two years; none of the surveyed participants in Ohio have been using LEDs for longer than two years.

Table 40. Preinstalled LEDs (N=69)

<i>Base: 69 participants who confirmed program CFLs were installed</i>	Ohio participants (count)	Ohio participants (percent)
<i>Did you have any LEDs installed before participating in this program?</i>		
No	62	89.9%
Yes, from 1 to 5	3	4.3%
Yes, from 6 to 11	0	0.0%
Yes, 12 or more	0	0.0%
Yes, don't know how many	0	0.0%
Don't know	4	5.8%
<i>Where did you get the LEDs you were using in your home before participating in this program?</i>		
Another Duke Energy program	0	0.0%
Purchased at a store	2	2.9%
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	1	1.4%
<i>How long have you been using LEDs?</i>		
One year or less (but previous to program participation)	2	2.9%
One to two years	1	1.4%
Two to three years	0	0.0%
Three to four years	0	0.0%
Four years or more	0	0.0%
Don't know	0	0.0%

Among the three customers with LEDs installed before the program, one purchased their LED bulbs at Home Depot, one purchased them at Lowe's, and the third customer did not recall where they acquired their LEDs.

Only three surveyed participants (4.3%) were intending to purchase LED bulbs before participating in the program, while an additional three participants (4.3%) said they "maybe" were intending to purchase LEDs before the program. None of the surveyed participants have purchased any additional LEDs since participating in the program.

Table 41. Intent to Purchase LEDs Before the Program and Additional LEDs Purchased since the Program (N=69)

<i>Base: 69 participants who confirmed program CFLs were installed</i>	Ohio % participants (N=69)	Ohio % participants (N=69)
<i>Were you planning on buying LEDs for your home before participating in this program?</i>		
Yes	3	4.3%
Maybe	3	4.3%
No	57	82.6%
No, already installed in all available outlets	0	0.0%
Don't know	6	8.7%
<i>Have you purchased any LEDs since participating in this program?</i>		
No	65	94.2%
Yes, from 1 to 5	0	0.0%
Yes, from 6 to 11	0	0.0%
Yes, 12 or more	0	0.0%
Don't know	4	5.8%

Replacing Program CFLs and Spare Light Bulbs In Storage

Table 42 indicates two-thirds of participants surveyed (67.7% or 44 out of 65 customers with program bulbs installed who answered questions about spare bulbs) have extra CFLs in storage, while about half (52.3%) currently have spare incandescent bulbs in storage, and none of the customers in this survey has any spare LEDs. Across all surveyed customers, there are an average of 3.4 spare CFLs and 3.8 spare incandescent bulbs per participant household (and zero spare LEDs).

Table 42. Types of Light Bulbs in Storage (N=65)

	All Surveyed Participants with Confirmed Program CFLs Installed who answered these questions (Valid N=65)
% of customers with CFLs in storage	67.7%
% of customers with LEDs in storage	0.0%
% of customers with incandescent bulbs in storage	52.3%
	Total Number of Bulbs¹⁶
Number of CFL bulbs in storage	233.5
Number of LED bulbs in storage	0
Number of incandescent bulbs in storage	246.5
	Average Bulbs per Participant
Average number of CFL bulbs in storage	3.4
Average number of LED bulbs in storage	0.0
Average number of incandescent bulbs in storage	3.8

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 43. One in six participants with

¹⁶ 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).

spare CFLs in storage (15.9%) report that all of their spare bulbs came from the program. Overall, 12.8% of the spare CFLs in storage in participant households were identified as CFLs provided by the Residential Neighborhoods program.¹⁷

Table 43. CFLs in Storage Which Were Provided by the Residential Neighborhoods Program (N=44)

	Participants with Spare CFLs in Storage	
	Ohio (count)	Ohio (percent)
None of the spare CFLs in storage are from the program	37	84.1%
Some of the spare CFLs in storage are from the program	0	0.0%
All of the CFLs in storage are from the program	7	15.9%
Don't know if any spare bulbs are from the program	0	0.0%

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 44, about three-quarters of participants with incandescent bulbs in storage (73.5%) say they will replace program CFLs with other CFLs when they burn out. Only one of these surveyed participants (2.9% of 34) intends to replace a program CFL with an incandescent bulb, and none intend to replace their CFLs with LEDs. If it is assumed that the 35 participants with program CFLs installed who did not confirm having any incandescent bulbs in storage will not replace their program-provided CFLs with incandescent bulbs, then the estimated rate of participants who will replace program CFLs with incandescent bulbs would be only 1.4%.

Table 44. Replacing Program CFLs (N=34)

<i>Base: 34 participants with program CFLs confirmed installed and incandescent light bulbs in storage</i>	Ohio (count)	Ohio (percent)
<i>If one of the free CFLs that was installed through the Residential Neighborhood Program burns out, will you replace it with . . . ?</i>		
A CFL	25	73.5%
An LED	0	0.0%
An incandescent bulb	1	2.9%
It depends on the socket or other factors (listed below)	2	5.9%
Don't know	6	17.6%

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. One of these customers say they will use whatever bulbs are convenient and available at that time and one says it depends on how much money they have to spend.

Surveyed customers with installed program CFLs 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

¹⁷ In addition to the 30 stored program CFLs confirmed by participants with spare CFLs in storage, there are another 16 program bulbs in storage in two households which did not answer these questions. These cases are not included in **Error! Reference source not found.** since the total number of stored CFLs in these households (including non-program bulbs) is unknown.

Table 45, 98.3% of participants surveyed report that they intend to buy CFLs, but fewer than one in ten says they intend to buy any standard incandescent or halogen bulbs (8.6%), and an even lower number of participants intend to buy LED bulbs (5.2%). The majority of bulbs these customers intend to purchase in the future will be CFLs (94.3% or 547 out of 580 bulbs), while only 4.7% will be standard incandescent or halogen bulbs and just 1.0% will be LEDs.

Table 45. 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=58)
% of surveyed customers who intend to buy at least one incandescent and/or halogen bulb	8.6%
% of surveyed customers who intend to buy at least one CFL bulb	98.3%
% of surveyed customers who intend to buy at least one LED bulb	5.2%
	All Bulbs To Be Purchased (N=580)
Percentage of next ten bulbs that will be incandescent and/or halogen bulbs	4.7%
Percentage of next ten bulbs that will be CFL bulbs	94.3%
Percentage of next ten bulbs that will be LED bulbs	1.0%

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 9 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 58 valid responses sorted by the distribution of bulb types. The chart shows that a large majority of customers surveyed (86.2%) say they intend to purchase exclusively CFLs for their next ten bulbs (the center area of the chart that is green from top to bottom), while a miniscule percent of participants (1.7%) intend to purchase all standard incandescent and halogen bulbs for their next ten bulbs (the far right of the chart which is red from top to bottom). None of the surveyed participants in Ohio intend to purchase exclusively LEDs (the blue section on the far left of the chart does not extend from top to bottom), and no participants intend to purchase all three types of bulb (there are no combinations of red, blue and green areas together).

This area chart visually indicates that participants in this program are overwhelmingly interested in CFLs over other lighting options, with only small numbers of customers in the program still intending to purchase “old-fashioned” incandescent light bulbs (8.6%) and intending to purchase “cutting-edge” LED lighting (5.2%).

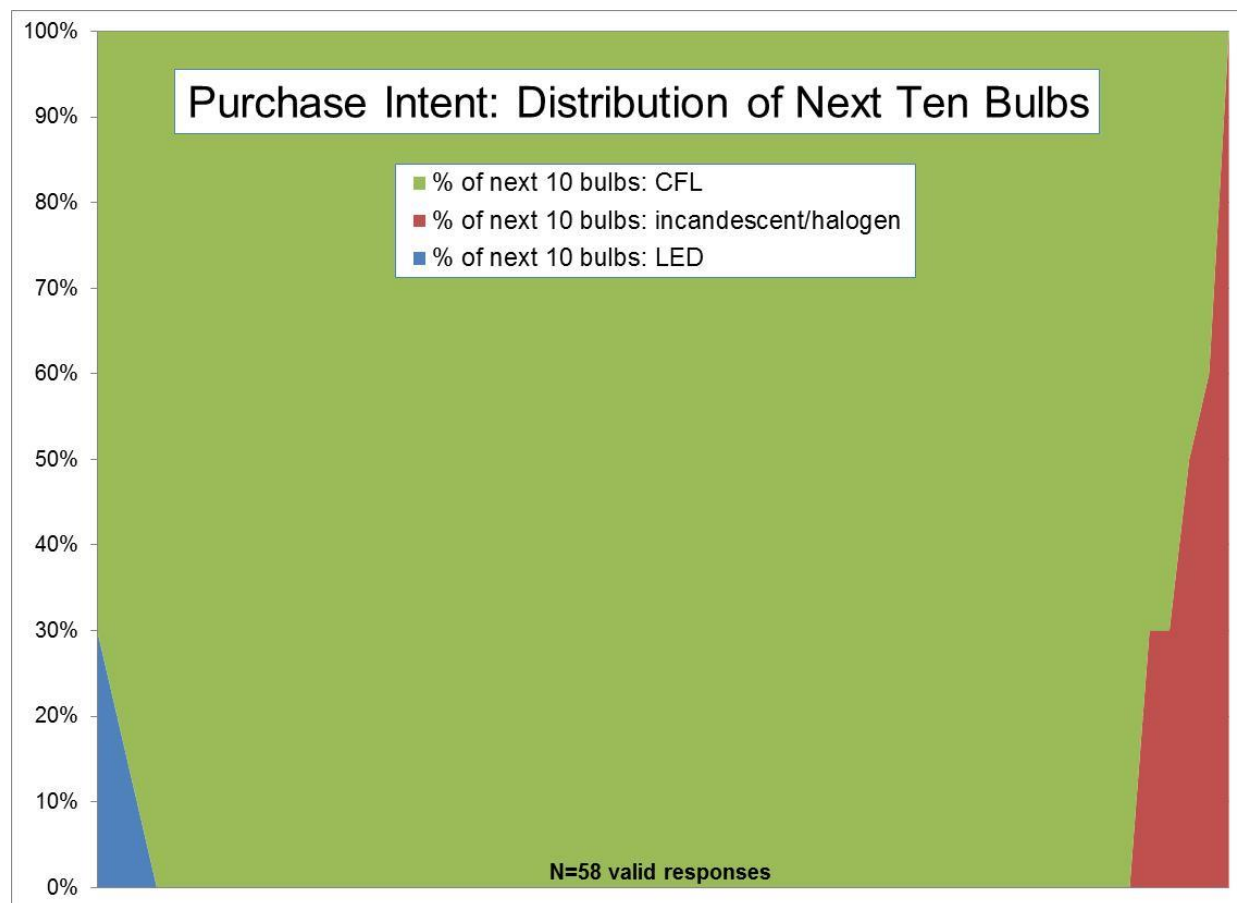


Figure 9. Area Chart of Intentions for Next Ten Bulbs Purchased (N=58)

Seven survey participants (10.8% of 65 who confirmed the installation of program CFLs and answered all CFL-related questions) “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 46, the 35 surveyed participants who received showerheads according to customer records confirmed the installation of 36 low-flow showerheads provided by the program¹⁸, which is 97.3% of the 37 installations recorded by auditors. One of the installed program showerheads (2.8%) was installed by the customer rather than the auditor; no surveyed participants report that they received program showerheads which have not been installed yet.

¹⁸ One customer who installed a showerhead themselves should have received two measures according to auditor records. Another customer who should have received one showerhead according to auditor records reported that the auditor installed two showerheads in their home.

Table 46. Measure Installation: Low-Flow Showerheads

35 participants received low-flow showerheads according to auditor records	Customer count (N=35)	Measures installed count according to auditor records (N=37)	Confirmed measures installed count (N=36)
Auditor installed showerhead(s)	88.6%	86.5%	91.7%
Auditor gave showerhead(s) to customer, customer installed them	2.9%	5.4%	2.8%
Auditor gave showerhead to customer, customer has NOT installed it	0.0%	0.0%	0.0%
Did not receive a showerhead	2.9%	2.7%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	5.7%	5.4%	5.6%

One customer who installed the showerhead on their own confirmed that one program-provided showerhead has been installed (5.6% of 36 measures confirmed installed), although auditor records showed that this customer should have received two showerheads. This customer reported that the showerhead was “easy” to install.

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 47, two surveyed participants (5.9% of 34 who confirmed installations) uninstalled one showerhead apiece (accounting for 5.6% of 36 measures confirmed installed).

Table 47. Removing Program-Provided Low-Flow Showerheads

	Customers who confirmed installation percent (N=34)	Confirmed measures installed percent (N=36)
<i>Have any of the low-flow showerheads that were installed through the Residential Neighborhood Program since been uninstalled or removed?</i>		
No, all showerheads are currently installed	88.2%	88.9%
Yes, one showerhead removed	5.9%	5.6%
Yes, two showerheads removed	0.0%	0.0%
Not sure if showerhead installed (did not answer questions about installation)	5.9%	5.6%

The two customers who removed program showerheads were asked who did so and why; both of these participants removed the showerheads themselves because they preferred to have a handheld showerhead.

Table 48 shows how many showers are taken per week using the showers where program-provided showerheads were confirmed installed. Among the 32 installations described¹⁹, two out

¹⁹ Customers confirmed 34 showerheads installed, plus two customers were unable to confirm auditor records showing that they received showerheads (thus the total confirmed is 36 showerheads based on the assumption that auditor records are correct when customers cannot confirm). However, two customers uninstalled their showerheads after the audit and thus were not asked questions about shower usage, in addition to the two customers who could not confirm receiving showerheads. Thus the total number of installations reported here is 32 (36 confirmed minus two uninstalled and two not asked because their installation could not be confirmed).

of five (40.6%) are used for ten or fewer shower per week, while about a quarter (28.1%) are used for sixteen or more showers per week. Nearly two out of five of the program-provided showerheads are reported as having a lower water flow than the previously-installed previous showerheads (37.5%), while a similar number report that the water flow is about the same (40.6%), and for one program showerhead in five (18.8%) the customer reported that the water flow actually seems to have increased.

Table 48. Shower Usage for Low-Flow Showerhead Installations (N=32)

	Installations described (N)	Installations described (%)
<i>How many showers per week are taken using this showerhead</i>		
0 to 4	7	21.9%
5 to 10	6	18.8%
11 to 15	9	28.1%
16 to 20	2	6.3%
21 or more	7	21.9%
Don't know	1	3.1%
<i>Flow of water after replacing showerhead</i>		
Less than the old unit	12	37.5%
About the same as the old unit	13	40.6%
More than the old unit	6	18.8%
Don't know / not specified	1	3.1%

Thirty 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 8.63, and only 20.0% 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 showerheads. Four of these customers (13.3% of customers with showerheads currently installed) state that they prefer a stronger water flow; another customer preferred their previous showerhead to the program-provided one, and one customer was less than satisfied because they have not seen a reduction in their water bill. None of the six customers giving satisfaction ratings of “7” or less for this measure report uninstalling their program showerheads.

Only one in eight surveyed participants (12.5%) already had any low-flow showerheads installed before the program, as seen in Table 49 (the four participants with previously installed showerheads had a total of five low-flow showerheads installed before the program). Only two respondents (6.3%) had intended to purchase a low-flow showerhead prior to participation, while another two respondents (6.3%) said they “maybe” would have installed a new showerhead before participating in the program, and a large majority of 81.3% did not intend to purchase low-flow showerheads. One surveyed program participant (3.1%) purchased one additional showerhead since the receiving measures from the program audit.

Table 49. Showerheads Installed Before the Program and Additional Showerheads Purchased (N=32)

	Customers (N)	Customers (%)
<i>Previously installed showerheads</i>		
Already had low-flow showerhead(s) installed	4	12.5%
Did not already have low-flow showerhead(s) installed	25	78.1%
Don't know / not specified	3	9.4%
<i>Were you planning on purchasing a low-flow showerhead before participating in the program?</i>		
No	26	81.3%
No, already installed in all available showers	0	0.0%
Maybe	2	6.3%
Yes	2	6.3%
Don't know / not specified	2	6.3%
<i>Additional showerheads purchased since program</i>		
Have not purchased additional showerhead(s)	31	96.9%
Purchased additional showerhead(s)	1	3.1%

Faucet Aerator Installations

Table 50 shows that 61 surveyed participants confirmed the installation of 96 faucet aerators provided by the program, which is 88.9% of the 108 installations recorded by auditors; 11.5% of participants who received aerators according to auditor records reported that they did not receive any aerators, and another 14.8% were not sure if they had received this measure. None of the surveyed participants installed aerators themselves.

Table 50. Measure Installation: Faucet Aerators

<i>61 participants received faucet aerators according to auditor records</i>	Customer count (N=61)	Measures installed count according to auditor records (N=108)	Confirmed measures installed count (N=96)
Auditor installed aerator(s)	72.1%	74.1%	85.4%
Auditor gave aerator(s) to customer, customer installed them	0.0%	0.0%	0.0%
Auditor gave aerator(s) to customer, customer has NOT installed them	1.6%	0.9%	0.0%
Did not receive aerators	11.5%	12.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	14.8%	13.0%	14.6%

One respondent reported that the auditor gave them one faucet aerator which has not been installed yet: this respondent reports that they plan to install the aerator they were provided.

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 51, only two surveyed participants (3.8% of 53 who confirmed installations) uninstalled one aerator apiece (2.1% of 96 measures confirmed installed).

Table 51. Removing Program-Provided Faucet Aerators

	Customers who confirmed installations (N=53)	Confirmed measures installed (N=96)
<i>Have any of the aerators that were installed through the Residential Neighborhood Program since been uninstalled or removed?</i>		
No, all aerators are currently installed	79.2%	83.3%
Yes, one aerator removed	3.8%	2.1%
Yes, two or more aerators removed	0.0%	0.0%
Not sure if aerators installed (did not answer questions about installation)	17.0%	14.6%

The two participants who removed aerators were asked who did so and why; one removed the aerator because they felt it was restricting the water flow too much, while the other reported that a family member removed the aerator because of a leak in the base of the faucet.

Surveyed participants answered questions about the usage of program-provided faucet aerators for 46 kitchen installations and 34 bathroom installations.²⁰ Table 52 shows that most kitchen installations involved a single aerator (78.3%). Customers confirmed that 52.2% of program-provided faucet aerators installed in kitchens replaced other faucet aerators that were already installed. Two out of five kitchen installations are described as providing lower water flow than before the program aerators were installed (39.1%) and a similar number are described as having “about the same” water flow (41.3%).

²⁰ Customers confirmed 96 aerators installed (including nine 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 80 (96 confirmed installed minus two removed and 14 not asked).

Table 52. Usage of Faucet Aerators in the Kitchen (N=46)

	Kitchen Installations described (count)	Kitchen Installations described (percent)
<i>Program aerators installed in kitchen</i>		
One	36	78.3%
Two	10	21.7%
Three	0	0.0%
<i>Was there an aerator previously installed on this faucet that had to be removed?</i>		
Yes	24	52.2%
No	15	32.6%
Don't know / not specified	7	15.2%
<i>Flow of water after installing program aerator</i>		
Less than the old unit	18	39.1%
About the same as the old unit	19	41.3%
More than the old unit	8	17.4%
Don't know how compares to old unit	1	2.2%

Table 53 shows that most faucet aerator installations in bathrooms involved a single aerator (82.4%). Customers confirmed that 52.9% of program-provided faucet aerators installed in bathrooms replaced other faucet aerators that were already installed. A plurality of installations are described as providing lower water flow than before the program aerators were installed (47.1%).

Table 53. Usage of Faucet Aerators in the Bathroom (N=34)

	Bathroom Installations described (count)	Bathroom Installations described (percent)
<i>Program aerators installed in bathrooms</i>		
One	28	82.4%
Two	6	17.6%
Three	0	0.0%
<i>Was there an aerator previously installed on this faucet that had to be removed?</i>		
Yes	18	52.9%
No	8	23.5%
Don't know / not specified	8	23.5%
<i>Flow of water after installing program aerator</i>		
Less than the old unit	16	47.1%
About the same as the old unit	12	35.3%
More than the old unit	5	14.7%
Don't know how compares to old unit	1	2.9%

Forty-four participants who confirmed that they 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 aerators is quite high at 8.98, and only 18.2% gave ratings of “7” or lower.

The eight customers with ratings of “7” or lower were asked the reason for their relatively low satisfaction with the aerators. Four of these eight customers (50.0%) 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 one of their program-provided aerators. Another customer was dissatisfied with the aerators because they have not noticed a decrease in their energy bill, and the other three customers did not notice any improvements due to this measure (“*that faucet is not doing anything any better than before.*”)

Table 54 shows information about participants’ previously installed aerators and intentions to purchase additional aerators. About half of participants surveyed (54.5%) said they already had aerators installed before participating in the program, but only 9.1% said that they intended to purchase aerators before receiving them from the program. One surveyed participant (2.3%) has purchased one additional aerator since participating in the Residential Neighborhoods program.

Table 54. Faucet Aerators Installed Before the Program and Additional Aerators Purchased (N=44)

	Customers (N)	Customers (%)
<i>Previously installed aerators</i>		
Already had low-flow showerhead(s) installed	24	54.5%
Did not already have low-flow showerhead(s) installed	16	36.4%
Don't know / not specified	4	9.1%
<i>Were you planning on purchasing faucet aerators before participating in the program?</i>		
No	39	88.6%
No, already installed in all available showers	0	0.0%
Maybe	1	2.3%
Yes	4	9.1%
Don't know / not specified	0	0.0%
<i>Additional showerheads purchased since program</i>		
Have not purchased additional showerhead(s)	43	97.7%
Purchased additional showerhead(s)	1	2.3%

Twenty-four participants reported having faucet aerators installed in their homes before participating in the program: four of these participants had only one aerator before the program, 15 participants had two aerators installed before the program, four participants had three aerators apiece and one participant had four aerators. In total, there were 50 aerators installed across the 24 participant households that confirmed having aerators before the program.

Door Sweep Installations

As seen in Table 55, the 24 surveyed participants confirmed the installation of 33 door sweeps provided by the program, which is 110.0% of the 30 installations recorded by auditors.²¹ None of the door sweeps were installed by the customers themselves.

²¹ The 22 participants who confirmed that the auditor installed door sweeps should have received 27 sweeps according to auditor records, however the customers claimed to have 31 sweeps installed. Four customers (18.2% of 22) reported a different number of sweeps installed than auditor records: all four said they received two door sweeps where program records said they should have received one. In addition, one customer did not know if he received door sweeps, and according to program records this customers should have received two door sweeps. Thus the total

Table 55. Measure Installation: Door Sweeps

24 participants received door sweeps according to auditor records	Customer count (N=24)	Measures installed count according to auditor records (N=30)	Confirmed measures installed count (N=33)
Auditor installed door sweep(s)	91.7%	90.0%	93.9%
Auditor gave door sweep(s) to customer, customer installed them	0.0%	0.0%	0.0%
Auditor gave door sweep(s) to customer, customer has NOT installed them	0.0%	0.0%	0.0%
Did not receive door sweep(s)	4.2%	3.3%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	4.2%	6.7%	6.1%

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 56, one surveyed participant (4.3% of 23 with confirmed installations) reported that one program-installed door sweep was removed (3.0% of 33 measures confirmed installed).

Table 56. Removing Program-Provided Door Sweeps

	Customers with confirmed installation percent (N=23)	Confirmed measures installed percent (N=33)
<i>Have any of the door sweeps that were installed through the Residential Neighborhood Program since been uninstalled or removed?</i>		
No, all door sweeps are currently installed	91.3%	90.9% installed
Yes, one door sweep removed	4.3%	3.0% removed
Yes, two door sweeps removed	0.0%	0.0% removed
Not sure if door sweeps installed (did not answer questions about installation)	4.3%	6.1% assume installed

One Ohio customer who removed a door sweep was asked who removed it and why; they explained “*The auditor removed it because it wasn’t enough.*”

Twenty-two 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 9.64, and no surveyed participants gave a rating of “7” or lower (thus none of the surveyed participants were asked to explain their low satisfaction ratings for this measure).

About one in four surveyed participants (22.7%) already had door sweeps installed before participating in the Residential Neighborhoods program, as seen in Table 57 (these five

confirmed installed is 31 confirmed and corrected by customers plus two where auditor records are assumed correct equals 33 door sweeps.

participants with previously installed door sweeps had a total of seven doors with sweeps previously installed). Prior to the program, seven respondents (31.8%) say they intended to purchase and install door sweeps, while another three respondents (13.6%) said they “maybe” would have installed door sweeps before participating in the program, while a majority of 54.5% did not intend to purchase any door sweeps. None of the surveyed program participants have purchased any additional door sweeps since receiving measures from the program audit.

Table 57. Door Sweeps Installed Before the Program and Additional Door Sweeps Purchased (N=22)

	Customers (N)	Customers (%)
<i>Previously installed door sweeps</i>		
Already had door sweep installed – one door	3	13.6%
Already had door sweep installed – two doors	2	9.1%
Did not already have door sweep(s) installed	17	77.3%
Don’t know / not specified	0	0.0%
<i>Were you planning on purchasing door sweep before participating in the program?</i>		
No	12	54.5%
No, already installed on all available doors	0	0.0%
Maybe	3	13.6%
Yes	7	31.8%
Don’t know / not specified	0	0.0%
<i>Additional door sweeps purchased since program</i>		
Have not purchased additional door sweep(s)	22	100.0%
Purchased additional door sweep(s)	0	0.0%

Vinyl Weather Stripping for Doors Installations

As seen in Table 58, the 41 surveyed participants confirmed the installation of vinyl weather stripping on 54 doors, which is 108.0% of the 50 installations recorded by auditors.²² None of these customers installed weather stripping themselves, and none report that they received weather stripping from the auditor but have not installed it yet.

²² The 34 participants who confirmed that the auditor installed vinyl weather stripping for doors should have received vinyl weather stripping for 42 doors according to auditor records, however the customers claimed to have 52 doors weather stripped by the program. Sixteen of these customers (39.0% of 41) reported a different number of doors with weather stripping installed than auditor records: thirteen claim to have received measures for one door more than auditors recorded, and three customers claim to have received measures for one door fewer than auditors recorded. In addition, two 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 two doors. Thus the total confirmed number of doors weather stripped is 52 confirmed and corrected by customers plus two where auditor records are assumed correct equals 54 doors with vinyl weather stripping provided by the program.

Table 58. Measure Installation: Vinyl Weather Stripping for Doors

41 participants received vinyl weather stripping for doors according to auditor records	Customer count (N=41)	Measures installed count according to auditor records (N=50 doors)	Confirmed measures installed count (N=54 doors)
Auditor installed vinyl weather stripping for doors	82.9%	84.0%	96.3%
Auditor gave vinyl weather stripping for doors to customer, customer installed it	0.0%	0.0%	0.0%
Auditor gave vinyl weather stripping for doors to customer, customer has NOT installed it	0.0%	0.0%	0.0%
Did not receive vinyl weather stripping for doors	12.2%	12.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	4.9%	4.0%	3.7%

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 59, the program-provided weather stripping has been removed in two households (5.6% of 36) where it was installed, representing 3.7% of doors that were weather-stripped by the program.

Table 59. Removing Program-Provided Vinyl Weather Stripping for Doors

	Customers with confirmed installation percent (N=36)	Confirmed measures installed percent (N=54)
<i>Has any of the vinyl weather stripping for doors that was installed through the Residential Neighborhood Program since been uninstalled or removed?</i>		
No, all vinyl weather stripping for doors is currently installed	88.9%	92.6% installed
Yes, vinyl weather stripping for one door removed	5.6%	3.7% removed
Yes, vinyl weather stripping for two doors removed (none remains installed)	0.0%	0.0% removed
Not sure if vinyl weather stripping for doors installed (did not answer questions about installation)	5.6%	3.7% assumed installed

The two customers with a combined two doors that had their weather stripping removed were asked who removed it and why: in one case the participant had their entire door replaced and in the other case the participant's grandchildren removed the measure while playing (*"they thought it was fun to peel off."*)

Thirty-three 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 8.85, and 12.1% gave ratings of "7" or lower.

The four customers with ratings of "7" or lower were asked the reason for their relatively low satisfaction with this measure; two participants report issues with doors not closing properly, one

complained about the quality of the installation (they still have drafts), and one participant said the measure was only useful during the winter. None of the participants giving low satisfaction scores for this measure actually had the weather stripping removed from where it was installed.

Nearly half of surveyed participants (44.1%) already had doors with vinyl weather stripping installed before participating in the Residential Neighborhoods program, as seen in Table 60 (these 15 participants with previously installed weather stripping had a total of 22 doors with weather stripping previously installed). Prior to the program, 15 respondents say they intended to purchase and install vinyl weather stripping for doors, while another six respondents (17.6%) said they “maybe” would have installed vinyl weather stripping on their doors before participating in the program. Two of the surveyed program participants (5.9%) have purchased enough additional measures to apply vinyl weather stripping to a total of four more doors since receiving measures from the program audit.

Table 60. Vinyl Weather Stripping for Doors Installed Before the Program and Additional Vinyl Weather Stripping Purchased (N=34)

	Customers (count)	Customers (percent)
<i>Previously installed vinyl weather stripping for doors</i>		
Already had vinyl weather stripping for doors installed – one door	8	23.5%
Already had vinyl weather stripping for doors – two or more doors	7	20.6%
Did not already have vinyl weather stripping for doors installed	18	52.9%
Don't know / not specified	1	2.9%
<i>Were you planning on purchasing vinyl weather stripping for doors before participating in the program?</i>		
No	13	38.2%
No, already installed on all available doors	0	0.0%
Maybe	6	17.6%
Yes	15	44.1%
Don't know / not specified	0	0.0%
<i>Additional vinyl weather stripping for doors purchased since program</i>		
Have not purchased additional vinyl weather stripping for doors	32	94.1%
Purchased additional vinyl weather stripping for doors	2	5.9%

Caulking Doors Installations

As seen in Table 61, the 26 surveyed participants confirmed that 32 doors were caulked by the program, which is 88.9% of the 36 installations recorded by auditors.²³ Nearly a quarter of surveyed participants (26.9%) who received this measure according to auditor records reported that they did not have any doors caulked by the program, and another one customer in five

²³ The 14 participants who confirmed that the auditor caulked doors should have had 19 doors caulked according to auditor records, however the customers claimed to have had 24 doors caulked. Nine of these customers (34.6% of 26) reported a different number of doors caulked than auditor records: six reported more doors caulked than recorded by auditors, and three reported fewer doors caulked. In addition, five customers did not know if they had any doors caulked, and according to program records these customers should have had eight of their doors caulked. Thus the total confirmed installed is 24 doors caulked confirmed and corrected by customers plus eight doors where auditor records are assumed correct equals 32 doors caulked.

(19.2%) were not sure if any of their doors had been caulked. None of the doors were caulked by the customers themselves, and no customers report that the auditor left caulk with them that has not been installed yet.

Table 61. Measure Installation: Caulking Doors

26 participants received door caulk according to auditor records	Customer count (N=26)	Measures installed count according to auditor records (N=36)	Confirmed measures installed count (N=32)
Auditor caulked door(s)	53.8%	52.8%	75.0%
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	26.9%	25.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	19.2%	22.2%	25.0%

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 62, one surveyed participant (5.0% of 20 with confirmed installations) reported that caulking was removed from one of their two caulked doors (3.1% of 32 measures confirmed installed).

Table 62. Removing Program-Provided Door Caulking

	Customers with confirmed installation percent (N=20)	Confirmed measures installed percent (N=32)
<i>Have any of the door caulking that was installed through the Residential Neighborhood Program since been removed?</i>		
No, all caulked doors are currently caulked	70.0%	68.8% installed
Yes, caulk removed from one door (one door remains caulked)	5.0%	3.1% installed 3.1% removed
Not sure if doors were caulked (did not answer questions about installation)	25.0%	25.0% assumed installed

The only Ohio customer whose door had caulking removed was asked who removed it and why; they explained *“I had a local contractor remove the old door and replace it with a new one.”*

Fifteen 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 9.13, and only 6.7% gave ratings of “7” or lower.

The only customer with a rating of “7” or lower gave a rating of “5 out of 10” for their satisfaction with this measure. This customer was asked the reason for their relatively low satisfaction with the door caulking, and explained *“I was disappointed that the auditor was unable to caulk the doorway. It was great that he tried, but he told me that he wasn't able to do*

the caulking because the gap was too big and the caulk was just dripping down into the crack. He explained to me that we would need some sort of expanding foam to plug up the crack.”

Only one out of seven surveyed participants (14.3%) already had doors caulked before participating in the Residential Neighborhoods program, as seen in Table 63 (these two participants with previously caulked doors had a total of four doors with caulking installed). Prior to the program, five respondents (35.7%) say they intended to purchase caulk and install it on their doors, while another respondent (7.1%) said they “maybe” would have intended to caulk their doors before participating in the program. None of the surveyed program participants have caulked any additional doors since receiving measures from the program audit.

Table 63. Doors Caulked Before the Program and Additional Caulk Purchased (N=14)

	Customers (count)	Customers (percent)
<i>Previously installed door caulk</i>		
Already had one door caulked	0	0.0%
Already had two doors caulked	2	14.3%
Already had three or more doors caulked	0	0.0%
Did not already have doors caulked	10	71.4%
Don't know / not specified	2	14.3%
<i>Were you planning on purchasing door caulk before participating in the program?</i>		
No	7	50.0%
No, already installed on all available doors	0	0.0%
Maybe	1	7.1%
Yes	5	35.7%
Don't know / not specified	1	7.1%
<i>Additional door caulk purchased since program</i>		
Have not purchased additional door caulk	14	100.0%
Purchased additional door caulk	0	0.0%

HVAC Winterization Kit Installations

As seen in Table 64, the twelve surveyed participants who should have received winter kits for wall or window HVAC units confirmed that twelve units were installed, which is only 63.2% of the 19 installations recorded by auditors.²⁴ A quarter (25.0%) of participants who confirmed the installation of this measure reported that the auditor gave them the measures and they installed them themselves, accounting for 41.7% of the measures that were confirmed installed by surveyed participants.²⁵

²⁴ Four 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 seven participants who confirmed that winter kits were installed should have had eleven kits installed according to auditor records, and these customers confirmed having a total of eleven kits installed. In addition, one customer did not know if they had any winter kits installed, and according to program records these customers should have had one kit installed. Thus the total confirmed kits installed is eleven confirmed and corrected by customers plus one kit where auditor records are assumed correct equals twelve kits installed.

²⁵ Participants surveyed for this evaluation had their homes audited by the program between July of 2013 and July of 2014, and this participant survey was conducted in August and September of 2014. 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

Table 64. Measure Installation: Winter Kit for Wall or Window HVAC

<i>12 participants received door caulk according to auditor records</i>	Customer count (N=12)	Measures installed count according to auditor records (N=19)	Confirmed measures installed count (N=12)
Auditor installed kit(s)	33.3%	31.6%	50.0%
Auditor gave kit(s) to customer, customer installed	25.0%	26.3%	41.7%
Auditor gave kit(s) to customer, customer has NOT installed	25.0%	31.6%	0.0%
Did not receive winter kit	8.3%	5.3%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	8.3%	5.3%	8.3%

The three customers who installed their winter kits themselves were asked if this was easy to do; all three confirmed that it was easy.

The three customers who reported that they received winter kits from auditors which have not been installed yet report that they received a combined seven kits, and all three of these customers 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 65, 75.0% of surveyed participants who confirmed installations report that kits have since been uninstalled: The six participants whose measures were uninstalled accounted for 83.3% of measures that were confirmed installed. This result is not surprising, in that this survey was conducted in August and September at the end of the cooling season, and this measure is intended for wintertime use.

Table 65. Removing Program-Provided Winter Kit for Wall or Window HVAC

	Customers with confirmed installation percent (N=8)	Confirmed measures installed percent (N=12)
<i>Have any of the door caulking that was installed through the Residential Neighborhood Program since been removed?</i>		
No, all kits installed kits are still installed	12.5%	8.3% installed
Yes, kit removed from one unit	25.0%	16.7% removed
Yes, kit removed from two units	50.0%	66.7% removed
Not sure if kits were installed (did not answer questions about installation)	12.5%	8.3% assumed installed

themselves (during the summer AC units are being used and are not winterized) and why relatively few measures are currently installed (the survey happened at the end of cooling season). Participants who received audits after the winter of 2013-2014 have not had an opportunity to use this measure in winter yet, and participants who received audits before or during the previous winter likely removed the kit for summer and probably had not re-installed it by September of this year.

The six customers whose kits were removed from HVAC units were asked who removed them and why; all six mentioned that they removed the kit because the weather was hotter in the summertime and they wanted to use their air conditioning. All six of these customers uninstalled these measures by themselves.

Seven 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 winter kit is very high at 9.71, and none gave ratings of “7” or lower (thus none of the surveyed participants were asked to explain their low satisfaction ratings for this measure).

None of the surveyed participants who confirmed the installation of this measure already had winter kits before participating in the Residential Neighborhoods program, as seen in Table 66. Prior to the program, only one respondent (14.3%) reports that they intended to purchase and install a winter kit, while the other 85.7% did not intend to. None of the surveyed program participants have purchased or installed any additional kits since receiving measures from the program audit.

Table 66. HVAC Window Kits Installed Before the Program and Additional Kits Purchased (N=7)

	Customers (count)	Customers (percent)
<i>Previously installed HVAC winter kits</i>		
Already had one kit installed	0	0.0%
Already had two or more kits installed	0	0.0%
Did not have any HVAC winter kits	7	100.0%
Don't know / not specified	0	0.0%
<i>Were you planning on purchasing HVAC winter kits before participating in the program?</i>		
No	6	85.7%
No, already installed on all units	0	0.0%
Maybe	0	0.0%
Yes	1	14.3%
Don't know / not specified	0	0.0%
<i>Additional kits purchased since program</i>		
Have not purchased additional HVAC winter kits	7	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 67, most respondents' winterized wall and window HVAC units can be removed for winter (85.7%).

Nearly half of participants (42.9%) who confirmed the installation of winter kits said that they always removed their HVAC units in winter during past years, compared to none saying that they removed their unit during the most recent winter. This is not surprising, since the purpose of this measure is to insulate removable HVAC units that are left in place for the winter (i.e., if a customer is going to remove the unit during winter, then this measure will not help them).

However, of the seven participants who left their units in place for the most recent winter, only two (28.6%) said that they would have removed the unit without the program, while five (71.4%) said they would have left the unit in place with or without the program (including the customer who has units which are not removable).

Table 67. Removing HVAC Units for Winter and Leaving Them in Place (N=7)

	Customers (N)	Customers (%)
<i>Are any of the window or wall units winterized with the kit removable?</i>		
No, all are permanently installed	1	14.3%
Yes, there is one removable unit	2	28.6%
Yes, there are two removable units	4	57.1%
Not sure	0	0.0%
<i>In previous years, did you remove units for the winter or leave them in place?</i>		
Always left in place during winter	3	42.9%
Sometimes removed, sometimes left in place	1	14.3%
Always removed for winter	2	28.6%
Unit is not removable (therefore units are left in place for winter)	1	14.3%
<i>What did you do with your units during the most recent winter?</i>		
Left units in place for winter, and would have done this regardless of the program	4	57.1%
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	2	28.6%
Took units out for winter, but would have left them in place without the program	0	0.0%
Unit is not removable (therefore units are left in place for winter)	1	14.3%

Vinyl Weather Stripping for HVAC Window Units Installations

As seen in Table 68, only two surveyed participants received this measure according to auditor records, and one said they did not receive it while the other was not sure. Participants thus confirmed that one window unit was weather stripped by the program, which is only 50.0% of the two installations recorded by auditors.²⁶

²⁶ The two participants who had this measure installed according to program records should have had two window units weather stripped, and they did not affirmatively confirm the installation of either. However, for the purposes of reporting installation rates in this section of this report, when a participant does not recall if a measure was performed, TecMarket Works assumes the auditor's record is correct. Thus the only case of this measure that is considered installed is one customer who does not recall whether they received the measure or not.

Table 68. Measure Installation: Vinyl Weather Stripping for HVAC Window Units

<i>Two participants received weather stripping for window units according to auditor records</i>	Customer count (N=2)	Measures installed count according to auditor records (N=2)	Confirmed measures installed count (N=1)
Auditor installed weather stripping for window units	0.0%	0.0%	0.0%
Auditor gave weather stripping for window units to customer, customer installed	0.0%	0.0%	0.0%
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	50.0%	50.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	50.0%	50.0%	100.0%

Since none of the weather stripping for window units measures were affirmatively confirmed by surveyed participants (one said they did not receive the measure and one did not recall), none of the follow-up questions for this measure were asked; these customers would not be able to answer questions about a measure if they do not believe, or are not sure if, they have received it.

Caulking Windows Installations

As seen in Table 69, the fourteen surveyed participants who received this measure according to auditor records confirmed that 26 windows were caulked by the program, which is 89.7% of the 29 installations recorded by auditors.²⁷ A majority of customers who received this measure according to auditor records confirmed that it was installed by the auditor (71.4%); no surveyed customers installed this measure themselves or have leftover measures yet to be installed.

²⁷ Fourteen participants confirmed that auditors caulked 24 windows in total, which is the same total number of windows caulked in these households according to auditor records. However, six of the fourteen customers (42.9%) who were able to report the number of windows caulked reported a different number of measures received than what was recorded by auditors: four participants reported more measures than auditor records and two reported receiving fewer measures than auditor records. In addition, two customers did not know if they had any windows caulked, and according to program records these customers should have had a combined total of two of their windows caulked. Thus the total confirmed installed is 24 measures confirmed and corrected by customers plus twelve windows where auditor records are assumed correct equals 26 windows caulked.

Table 69. Measure Installation: Caulking Windows

14 participants received door caulk according to auditor records	Customer count (N=14)	Measures installed count according to auditor records (N=29)	Confirmed measures installed count (N=26)
Auditor caulked window(s)	71.4%	82.8%	92.3%
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	14.3%	10.3%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	14.3%	6.9%	7.7%

One of the ten participants who confirmed the installation of this measure reported that it has been removed from both of the windows where it was installed (though auditor records only showed one measure installed for this customer). When asked who removed the measure and why, this customer responded: *“we had those windows replaced”*.

Ten participants who confirmed that they had windows caulked 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 window caulking is quite high at 9.40, and only one participant gave a rating of “7” or lower for this measure. The customer who rated their satisfaction a “6 out of 10” was asked the reason for their relatively low rating, and they explained: *“We still need to put plastic on that window to keep the draft out; basically, that window just needs to be replaced.”*

Table 70 shows that six surveyed participants who confirmed this measure was installed (60.0%) report having a total of 38 windows caulked before the program (though this includes one participant who reports 20 windows caulked; the median number of previously caulked windows is about four per household with windows caulked before the program). About a third (30.0% or 3 out of 10) of these participants report that they had been intending to purchase window caulk before the program and another 10.0% said they “maybe” would have bought window caulk in the absence of the program. One customer reported that they purchased and installed caulking for two more windows since participating in the program.

Table 70. Window Caulking Installed Before the Program and Additional Window Caulk Purchased (N=10)

	Customers (N)	Customers (%)
<i>Previously installed window caulk</i>		
Already had 1 to 3 windows caulked	2	20.0%
Already had 4 or more windows caulked	4	40.0%
Did not have any windows caulked	4	40.0%
Don't know / not specified	0	0.0%
<i>Were you planning on purchasing window caulk before participating in the program?</i>		
No	5	50.0%
No, already installed on all windows	0	0.0%
Maybe	1	10.0%
Yes	3	30.0%
Don't know / not specified	1	10.0%
<i>Additional window caulk purchased since program</i>		
Have not purchased additional windows caulk	9	90.0%
Purchased additional windows caulk	1	10.0%

Clear Glass Patch Tape Installations

As seen in Table 71, the five surveyed participants who received this measure according to auditor records confirmed that five windows were patched by the program, which is 71.4% of the seven installations recorded by auditors.²⁸ Two customers (40.0%) confirmed that auditors patched windows, two customers (40.0%) were not sure if their windows had been patched, and one (20.0%) reported that they did not receive this measure. None of the window patch tape was installed by the customers themselves.

²⁸ The two participants who confirmed that the auditor installed glass patch tape should have had four windows patched according to auditor records, though they only confirmed that three windows were patched. In addition, two customers did not know if they had any windows patched, and according to program records these customers should have had two of their windows patched. Thus the total confirmed installed is three windows patched confirmed and corrected by customers plus two windows where auditor records are assumed correct equals five windows patched.

Table 71. Measure Installation: Clear Glass Patch Tape

<i>Five participants received clear glass patch tape according to auditor records</i>	Customer count (N=5)	Measures installed count according to auditor records (N=7)	Confirmed measures installed count (N=5)
Auditor patched windows	40.0%	57.1%	60.0%
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	20.0%	14.3%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	40.0%	28.6%	40.0%

The two 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. One customer reported that the patch tape was still on their window and the other customer reported that the patch tape had been removed from the two windows where it was installed because “*we replaced the window glass.*”

Both of the 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 clear glass patch tape is thus 10.0, and nobody surveyed gave ratings of “7” or lower for this measure.

As seen in Table 72, both customers 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, and neither of these customers have purchased any additional patch tape since the program. One customer reported that they “maybe” would have been intending to install this measure in the absence of the program, and the other had not been intending to patch their windows before the program.

Table 72. Windows Patched with Clear Glass Tape Before the Program and Additional Patch Tape Purchased (N=2)

	Customers (N)	Customers (%)
<i>Previously installed patch tape</i>		
Already had one or more windows patched	0	0.0%
Did not already have windows patched	2	100.0%
Don't know / not specified	0	0.0%
<i>Were you planning on purchasing patch tape before participating in the program?</i>		
No	1	50.0%
No, already installed on all windows	0	0.0%
Maybe	1	50.0%
Yes	0	0.0%
Don't know / not specified	0	0.0%
<i>Additional patch tape purchased since program</i>		
Have not purchased additional patch tape	2	100.0%
Purchased additional patch tape	0	0.0%

Water Heater Pipe Wrap Installations

As seen in Table 73, the 36 surveyed participants who received pipe wrapping confirmed that 332 linear feet of pipe were wrapped by the program, which is 66.3% of the 501 linear feet installed recorded by auditors.²⁹ About a fifth of participants report that they did not receive this measure (19.4% or 7 out of 36 receiving the measure according to program records). None of the pipe wrap was installed by the customers themselves, and no measures were left behind for customers to install themselves.

²⁹ The 24 participants who confirmed that the auditor wrapped pipes should have had 336 feet of wrapping installed according to auditor records, however all ten surveyed participants who were able to answer the question about how many feet the auditor installed reported fewer linear feet than auditors. The other fourteen of these survey participants confirmed that their pipes were wrapped but did not know how many feet had been wrapped; for these participants, auditor records of linear footage are assumed to be correct. In addition, five customers did not know if they had any pipes wrapped, and according to program records these customers should have had 75 feet of pipe wrap installed. Thus the total confirmed installed is 257 feet confirmed and corrected by customers plus 75 feet of wrap where auditor records are assumed correct equals 332 linear feet of pipe wrapped.

Table 73. 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=501)	Confirmed linear feet of measure installed (N=332)
Auditor wrapped pipes	66.7%	67.1%	77.4%
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	19.4%	18.0%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	13.9%	15.0%	22.6%

One participant (4.2%) reported that the auditor left additional pipe wrap behind which has not been installed, however the amount was only one-half of a linear foot.

Customers who confirmed that pipe wrap installed by the program were asked if there was previously any wrap on these hot water pipes that was replaced: 95.8% said there was not, while one surveyed participant (4.2%) did not know and no one surveyed confirmed that there was previously insulation on their water pipes.

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 74, none of the surveyed participants report that wrap was removed from pipes.

Table 74. Removing Program-Provided Hot Water Pipe Wrap

	Customers with confirmed installation percent (N=29)	Confirmed linear feet of measure installed percent (N=164)
<i>Have any of the pipe wrap that was installed through the Residential Neighborhood Program since been removed?</i>		
No, all pipes wrapped are currently wrapped	82.8%	84.8% 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)	17.2%	15.2% assumed installed

Twenty-four 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 9.42, and none of the customers rating this measure gave ratings of “7” or lower.

Only one surveyed participant (4.2%) already had hot water pipes wrapped before participating in the Residential Neighborhoods program, as seen in Table 75. Prior to the program, three respondents (12.5%) say they intended to purchase and install pipe wrap, while another two respondents (8.3%) said they “maybe” would have intended to wrap their pipes before

participating in the program, while the remaining 79.2% did not intend to wrap any pipes. None of the surveyed program participants have wrapped any additional hot water pipes since receiving measures from the program audit.

Table 75. Hot Water Pipes Wrapped Before the Program and Additional Wrap Purchased (N=24)

	Customers (N)	Customers (%)
<i>Previously installed hot water pipe wrap</i>		
Already had pipes wrapped	1	4.2%
Did not already have pipes wrapped	21	87.5%
Don't know / not specified	2	8.3%
<i>Were you planning on purchasing pipe wrap before participating in the program?</i>		
No	19	79.2%
No, already installed on all available pipe	0	0.0%
Maybe	2	8.3%
Yes	3	12.5%
Don't know / not specified	0	0.0%
<i>Additional pipe wrap purchased since program</i>		
Have not purchased additional pipe wrap	24	100.0%
Purchased additional pipe wrap	0	0.0%

Water Heater Tank Insulation Wrap Installations

As seen in Table 76, the eight surveyed participants confirmed that seven water heaters were insulated by the program, which is 87.5% of the eight installations recorded by auditors. One customer (12.5%) reported that they did not receive this measure.

Table 76. Measure Installation: Water Heater Tank Insulation Wrap

<i>Eight participants received door caulk according to auditor records</i>	Customer count (N=8)	Measures installed count according to auditor records (N=8)	Confirmed measures installed count (N=7)
Auditor insulated water tank	87.5%	87.5%	100.0%
Auditor gave insulated water tank to customer, customer insulated water tank	0.0%	0.0%	0.0%
Auditor gave tank wrap to customer, customer has NOT insulated water tank	0.0%	0.0%	0.0%
Did not receive water tank wrap	12.5%	12.5%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	0.0%	0.0%	0.0%

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 77, none of the surveyed participants reported that insulation was removed.

Table 77. Removing Program-Provided Water Heater Tank Insulation

	Customers with confirmed installation percent (N=7)	Confirmed measures installed percent (N=7)
<i>Have the water heater tank insulation that was installed through the Residential Neighborhood Program since been removed?</i>		
No, insulation currently installed	100.0%	100.0% installed
Yes, insulation removed	0.0%	0.0% removed
Not sure if insulation was installed (did not answer questions about installation)	0.0%	0.0% assumed installed

Seven 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 water heater tank insulation is quite high at 9.57, and none gave this measure a rating of “7” or lower.

None of the surveyed participants who confirmed the installation of this measure already had insulation wrap on their water heater tanks before participating in the Residential Neighborhoods program, as seen in Table 78. Prior to the program, one respondent (14.3%) said they “maybe” would have intended to insulate their water heater before participating in the program, while the remaining 85.7% did not intend to insulate their water heaters before the program.³⁰

Table 78. Water Heater Tank Insulation Wrap Installed before the Program (N=7)

	Customers (N)	Customers (%)
<i>Previously installed water heater tank insulation</i>		
Already had insulation on tank	0	0.0%
Did not already have insulation on tank	7	100.0%
Don't know / not specified	0	0.0%
<i>Were you planning on purchasing water heater tank insulation before participating in the program?</i>		
No	6	85.7%
No, already installed on water heater	0	0.0%
Maybe	1	14.3%
Yes	0	0.0%
Don't know / not specified	0	0.0%

Water Heater Temperature Adjustments

As seen in Table 79, the 35 surveyed participants whose water temperature was checked according to auditor records confirmed that their water temperature was checked in 34 cases

³⁰ 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.

(97.1%).³¹ Only 2.9% of these participants report that they did not receive a check of their water heater temperature and none of the participants checked the temperature themselves.

Table 79. Checking Water Heater Temperature

35 participants had their water temperature checked according to auditor records	Customer count (N=35)	Temps checked according to auditor records (N=35)	Confirmed temps checked (N=34)
Auditor checked temperature	51.4%	51.4%	52.9%
Customer checked temperature	0.0%	0.0%	0.0%
Did not receive temperature check	2.9%	2.9%	0.0%
Don't know (assuming auditor record is correct and temperature was checked)	45.7%	45.7%	47.1%

The 18 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 80, a little over half (55.6%) report that their temperature was adjusted, while 27.8% report that there was no adjustment and 16.7% are not sure.

Table 80. Adjusting Water Heater Temperature

18 participants confirmed that the auditor checked their water heater temperature	Customer count (N=18)
Auditor adjusted temperature	55.6%
Auditor did not make an adjustment	27.8%
Not sure if the temperature was adjusted or not	16.7%

The 18 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; none were aware of their temperature setting before the auditor checked it. Two customers who confirmed their temperatures were adjusted (20.0%) were able to report the temperature after adjustment but not before: one customer reported that the auditor set their temperature to 120 degrees, and the other said “*I don't know the number, but it is lower than before.*”

Customers whose water heater temperature was checked were asked if any further adjustments have been made since the program audit. Table 81 shows that 94.4% of participants report no further adjustments, while one participant (5.6%) was not sure and no one surveyed reported further adjustments to their water heater temperature.

³¹ Eighteen participants confirmed that the auditor checked the temperature of a total of 18 water heaters, and 16 participants were not sure if this had been done or not. Thus the total confirmed temperature checks is 18 confirmed by customers plus 16 where auditor records are assumed correct equals 34 water heater temperatures checked.

Table 81. Undoing Water Heater Temperature Adjustments (N=18)

<i>18 participants confirmed that the auditor checked their water heater temperature</i>	Customer count (N=18)
<i>Has anyone made any further changes to the temperature setting since the home audit?</i>	
No, temperature has not been adjusted since audit	94.4%
Yes, temperature has been adjusted since audit	0.0%
Not sure if temperature has been adjusted since audit or not	5.6%

Fifteen 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 9.40, and only 6.7% gave a rating of “7” or lower. One participant rated their satisfaction at “6 out of 10” and explained why by saying “my water is not hot enough”.

Only 38.9% of program participants who confirmed that the auditor checked their water temperature report that they ever checked their water temperature before the program, and only 16.7% report checking their water temperature on a regular basis. More than half of surveyed participants (55.6%) have never checked the temperature on their water heaters.

Table 82. Checking Water Temperature before the Program (N=18)

	Customers (N)	Customers (%)
<i>How often did you check the temperature on your water heater before participating in the program?</i>		
Never checked	10	55.6%
Checked once or twice / a few times	4	22.2%
Checked regularly, but less than once a year	2	11.1%
Checked regularly, once per year or more often	1	5.6%
Don't know	1	5.6%

Foam Insulation Spray Installations

As seen in Table 83, a minority of participants were able to positively confirm the installation of foam insulation spray measures. Only two out of five participants (41.7%) who received this measure according to program records verified that the auditor installed foam insulation spray, while nearly a third (29.2%) claim they did not receive the measure and another third (29.2%) are not sure. The 24 surveyed participants confirmed the installation of only 17 cans of insulation spray, which is 70.8% of the 24 installations³² recorded by auditors; this includes seven cans

³² Twenty-four surveyed participants received one can of insulation spray apiece according to auditor records. Only two out of ten participants (20.0%) who confirmed that the auditor installed this measure were able to report the number of cans of spray installed: one of these customers reported one can installed and the other reported “more than one can” (rounded down to one can in the installation total). Since auditor records are assumed correct for customers who don't know how many cans of spray were installed, eight customers who confirmed the auditor installed the measure but didn't know the quantity installed and seven customers who weren't sure if the measure was installed at all are assumed to have had a total of 15 measures installed. Thus the total number of measures installed is two confirmed by participants plus 15 where auditor records are assumed correct equals 17 measures.

(41.2%) which are counted as installed according to auditor records because the customer did not know if they had received the measure or not. None of the surveyed participants reported installing this measure themselves, or receiving any spare measures to install later.

Table 83. Measure Installation: Foam Insulation Spray

24 participants received foam insulation spray according to auditor records	Customer count (N=24)	Measures installed count according to auditor records (N=24 cans of spray)	Confirmed measures installed count (N=17 cans of spray)
Auditor installed insulation spray	41.7%	41.7%	58.8%
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	29.2%	29.2%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	29.2%	29.2%	41.2%

The ten customers who confirmed that the auditor installed foam insulation spray were asked where this insulation was installed in their homes. Four of these ten responses (40.0%) identify somewhere in the basement as the place where this measure was installed, while another four (40.0%) mention doors.

Customers who confirmed the installation of foam insulation spray were asked if any of this insulation has been removed from where it was installed; 90.0% confirmed that the measure is still installed, while one participant reported *“all of it was removed; I had a contractor remove the old door and replace it with a new one.”*

Nine 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 9.78, and none of these participants gave ratings of “7” or lower.

Only one surveyed participant who confirmed the installation of program-provided foam insulation spray (10.0%) already had foam insulation in their homes, as seen in Table 84. Prior to the program, only one respondent had intended to purchase foam insulation spray, while another respondent said they “maybe” would have installed foam insulation spray before participating in the program, but a majority of 70.0% did not intend to purchase foam insulation spray. Two of the surveyed program participants have purchased a combined total of three additional cans of foam insulation spray on their own since receiving this measure from the program audit.

Table 84. Foam Insulation Spray Installed Before the Program and Additional Insulation Spray Purchased (N=19)

	Customers (N)	Customers (%)
<i>Previously installed showerheads</i>		
Already had foam insulation spray installed	1	10.0%
Did not already have foam insulation spray installed	9	90.0%
Don't know / not specified	0	0.0%
<i>Were you planning on purchasing any foam insulation spray before participating in the program?</i>		
No	7	70.0%
Maybe	1	10.0%
Yes	1	10.0%
Don't know / not specified	1	10.0%
<i>Additional foam insulation spray purchased since program</i>		
Have not purchased additional foam spray	8	80.0%
Purchased additional foam insulation spray	2	20.0%

HVAC Filters and Filter Change Calendar Installations

As seen in Table 85, the 51 surveyed participants who received a year's supply of HVAC filters and/or the filter change calendar according to auditor records confirmed that 43 of them received filters from the program, which is 84.3% of the 51 measures recorded by auditors. Only 65.1% of customers confirming that 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 it³³). No surveyed customers report receiving the calendar but not the filters.

Table 85. Measure Installation: HVAC Filters and Filter Change Calendar

<i>51 participants received filters and/or calendar according to auditor records</i>	Customer count (N=51)	Confirmed filters received count (N=43)
Received filters and calendar	54.9%	65.1%
Received filters but not calendar	21.6%	25.6%
Received filters, not sure if received calendar	7.8%	9.3%
Received calendar but not filters	0.0%	0.0%
Did not receive filters or calendar	11.8%	0.0%
Not sure if received filters or calendar ³⁴	3.9%	0.0%

³³ 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 (54.9%) than the filters (84.3%), 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.

³⁴ Measures that are installed by auditors are assumed installed when the participating customer can not recall if they received the measure. However, the filter change measure requires the participant to actively change their filters to have any effect on energy efficiency. Therefore, for this measure customers who can not recall the receipt of the program filters are assumed to not be using them, and these measures are reported as "not confirmed".

Customers who confirmed the receipt of either of these measures were asked if the auditor changed their filter during the audit. As indicated in Table 86, more than nine out of ten surveyed participants who reported receiving filters say that either the auditor changed filters during the audit (93.0%) or the participant changed the filter themselves during the audit (2.3%). The customer who changed the filter himself confirmed that this was “easy” to do.

Table 86. Changing Filters During the Home Audit (N=43)

	Confirmed filters received (N=43)	Percentage
<i>Did you or the auditor change your A/C or heater filter during their visit to your home?</i>		
Yes, auditor changed filter	40	93.0%
Yes, I changed the filter	1	2.3%
No, filter was not changed	1	2.3%
Don't know	1	2.3%

As seen in Table 87, three-quarters of participants who confirmed that they received the filters and the calendar (78.6%) report that they are using the calendar and changing filters though only a little more than half (57.1%) confirm that they are changing the filters at least as often as suggested, while 17.9% are changing them less frequently than the calendar suggests and one surveyed participant (3.6%) reports using the calendar but is not sure if they are changing filters as often as suggested. Another customer (3.6%) reports that he is changing his filter regularly without using the calendar, and only 10.7% report that they are not changing their filters at all. Finally, 7.1% are not sure if their filters are being changed or not (perhaps indicating that someone else in the household is responsible for changing filters). Combining responses, 82.1% of these customers report that they are changing their filters, even if not as often as recommended by the calendar.

Among the 15 participants who confirmed receiving the filters but not the calendar, about three-quarters (80.0%) confirm that they are regularly changing filters, which is not significantly different than the percentage of customers with calendars who confirm that they are changing filters regularly. Only 13.3% of participants with filters but not the calendar report that they are not using the filters at all, and another participant (6.7%) is not sure if the filters are being used (perhaps indicating that someone else in the household is responsible for changing filters).

Table 87. Using the Filter Change Calendar (N=43)

	Confirmed calendar and filters received (N=28)	Confirmed filters received but not calendar (N=15)
<i>Have you been using the filter change calendar and changing your filters regularly since the Residential Neighborhood Program audit?</i>		
Yes, I am using the calendar and changing filters as the calendar suggests	53.6%	0.0%
Yes, I am using the calendar and changing filters more often than the calendar suggests	3.6%	0.0%
Yes, I am using the calendar and changing filters less often than the calendar suggests	17.9%	0.0%
Yes, I am using the calendar and changing filters, don't know if more or less often than suggested	3.6%	0.0%
Yes, I have been changing filters but not using the calendar	3.6%	80.0%
No, not using calendar or changing filters	10.7%	13.3%
Don't know	7.1%	6.7%

One surveyed participant reports changing filters more often than the calendar suggests: “*once every three weeks.*”

Five participants who report that they use the calendar but change their filters less often than suggested were asked how often they do change their filters: Three of these responses mention specific periods of time (the average length between filter changes for these participants is about 2.7 months or 80 days) and two participants report that they have not changed their filters as often due to not using their equipment very often.

One customer who confirmed that they received the calendar but is changing filters without using it was asked why they are not using the calendar; this customer explained, “*I already had a schedule.*”

Twenty-five participants who confirmed that they received the filter change calendar provided by the program rated their satisfaction with the calendar, and 41 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 9.60 and 9.51 respectively, and only 8.0% of calendar raters and 7.3% of filter raters gave satisfaction ratings of “7” or lower for these measures.

Participants who rated these measures at “7” or lower were asked to explain their relatively low satisfaction ratings; one of the two customers to give low ratings for the calendar reports that they were already changing filters regularly and they do not need a reminder while the other

customer believes that the calendar suggests replacing filters too frequently. Among the three participants who gave low ratings for the HVAC filters, two report that they find the filters to be of low quality and one prefers to use “allergy filters” instead.

About half of surveyed participants who confirmed receiving the calendar or filters (48.8%) report that they were already planning to purchase HVAC filters before participating in the Residential Neighborhoods program, however 32.6% had not been intending to purchase any filters, as seen in Table 88. Only two participants (4.7%) have purchased additional filters since participating in the program; one of these participants reported purchasing three filters on their own, and the other customer could not recall exactly how many filters they purchased (“*I’m not sure, but it was the biggest pack you can get.*”)

Table 88. Purchasing HVAC Filters Before and After Participating in the Program

	Confirmed calendar and filters received (N=28)	Confirmed filters received but not calendar (N=15)	Total confirmed either measure received (N=43)
<i>Were you planning to purchase HVAC filters before receiving filters from the program</i>			
Yes	50.0%	46.7%	48.8%
Maybe	14.3%	13.3%	14.0%
No	32.1%	33.3%	32.6%
Don't know / not specified	3.6%	6.7%	4.7%
<i>Have you purchased any additional HVAC filters since participating in the program?</i>			
Yes	3.6%	6.7%	4.7%
No	96.4%	93.3%	95.3%

Before participating in the program, only 37.2% of participants who confirmed the receipt of these measures were already changing their filters on a near-monthly basis, though 20.9% were changing them less often than every three months and 7.0% “never” or “almost never” changed their filters. Overall, the 36 participants³⁵ who were able to provide an estimate on the length of time between filter changes reported changing their filters every 83 days on average (though the median time between changes is only 55 days).

Table 89. Changing HVAC Filters Before and After Participating in the Program

	Total confirmed calendar and/or filters received (N=43)
<i>How often were you changing your filters before you participated in this program?</i>	
More often than every other month	37.2%
Every other month up to every three months	25.6%
Less often than every three months	20.9%
Never / almost never	7.0%
Other response, listed below	2.3%
Don't know	7.0%

One surveyed participant gave a unique response when asked how often they changed their filters before participating in the program; “*Monthly during the winter, but not at all during the summer because we do not have central air conditioning.*”

Among participants who used these measures and reported specific time periods for changing their filters both before and after the program, 27.8% report changing their filters more frequently after the program; these ten customers went from changing their filters an average of once every 129 days before the program to an average of once every 30 days afterwards. Only one participant (2.8%) reported changing their filters less frequently after the program; this customer said they used to change their filters “*every six weeks, because there was a lot of dust in the neighborhood*” but since participating in the program they have changed their filters “*twice since January, or about once every three months.*”

Switch Plate Wall Thermometer Installations

As seen in Table 90, 68 participants confirmed the installation of 98.5% of thermostats received according to auditor records.³⁶ All of the surveyed participants should have received one

³⁵ Three participants who said they “never” or “almost never” changed their filters before the program are not included when calculating the average and median time between filter changes (because their time between filter changes is undefined). Four participants who do not know how often their filters were changed are not included for a similar reason (including one participant who said they “rarely” change filters; this participant is reported as “less often than every three months” in Table 89, but is not included in the mean or median calculations). Participants who do not change filters in the summer because they do not have central air conditioning are included only for the winter months when they do change filters.

³⁶ Sixty-three participants confirmed that the auditors installed 64 thermostats (one participant confirmed the installation of two measures though auditor records only showed one measure). Three participants did not recall if they received a thermostat. Thus the total confirmed thermostats installed is 64 confirmed and corrected by customers plus three where auditor records are assumed correct equals 67 installed.

measure apiece. None of the surveyed participants installed this measure themselves or have any measures left over which have not been installed yet.

Table 90. Measure Installation: Switch Plate Wall Thermometer

<i>68 participants received wall thermometers according to auditor records</i>	Customer count (N=68)	Measures installed count according to auditor records (N=68)	Confirmed measures installed count (N=67)
Auditor installed thermometer	92.6%	92.6%	95.5%
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	2.9%	2.9%	0.0%
Don't know (assuming auditor record is correct and measure was installed)	4.4%	4.4%	4.5%

Table 91 shows where in the home switch plate wall thermometers were installed: about a third are installed in hallways (33.3%), with bedrooms (19.7%) and kitchens (16.7%) being the next most-mentioned rooms where this measure was installed.

Table 91. Switch Plate Wall Thermometer: Room Installed (N=66)

<i>66 participants confirmed the installation of thermometers</i>	Count	Percent
Hallway / stairwell / landing	22	33.3%
Bedroom	13	19.7%
Kitchen	11	16.7%
Living room / family room	5	7.6%
Dining room	5	7.6%
Den / computer room / office	2	3.0%
Utility room / laundry room	2	3.0%
Bathroom	2	3.0%
Garage	1	1.5%
Unknown / not asked	3	4.5%

Only about a quarter of participants surveyed (28.8% of confirmed installations of thermometers) did not have any thermometers in their home before the program, as seen in Table 92. Most participants (66.7%) already had at least one thermometer before the program.

Table 92. 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)	19	28.8%
Two thermometers (one before the program)	39	59.1%
Three thermometers (two before the program)	2	3.0%
Four or more thermometers (at least three before program)	2	3.0%
Four or more thermometers (at least two before program)	1	1.5%
Unknown / not asked	3	4.5%

None of the thermometers confirmed installed by program participants have been moved or removed from the original installation location, as seen in Table 93.

Table 93. Removing Program-Provided Switch Plate Wall Thermometer

	Customers with confirmed installation percent (N=66)	Confirmed measures installed percent (N=67)
<i>Has the thermometer that was installed through the program since been removed?</i>		
No, installation is still in place	95.5%	95.5% installed
Yes, moved to somewhere else in the home	0.0%	0.0% installed
Yes, thermometer is no longer installed	0.0%	0.0% removed
Not sure if thermometer was installed (did not answer questions about installation)	4.5%	4.5% assumed installed

Customers who confirmed receiving wall thermometers from the program were asked how often they use them. Table 94 indicates that about two-thirds of participants with this measure (63.5%) check their thermometers at least once a week. Customers who did not previously have thermometers in their homes are somewhat more likely to check at least daily (47.4%) compared to customers who already had thermometers (29.5%; this difference is significant at $p < .10$ using Student's t-test).

Table 94. Frequency of Checking the Program-Provided Thermometer (N=63)

	Customers with no thermometer before audit (N=19)	Customers with thermometers before audit (N=44)	Total confirming thermometer installed (N=63)
<i>How often do you check the thermometer that was installed through this program?</i>			
More than once a day	21.1%	9.1%	12.7%
About once a day	26.3%	20.5%	22.2%
Once every few days	10.5%	20.5%	17.5%
About once a week	15.8%	9.1%	11.1%
Less often than once a week	15.8%	22.7%	20.6%
Never	10.5%	18.2%	15.9%

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 95 indicates that only 3.2% turned their heat down in the winter, while twice as many turned their cooling temperature up in the summer (7.9%).

Customers who did not previously have a thermometer in their home are more likely to adjust their temperatures down in winter (10.5%) compared to those who had thermometers before the program (0.0%; this difference is significant at $p < .05$ using Student's t-test). However there is no significant difference between these two groups in terms of cooling adjustments in the summertime.

Table 95. Heating and Cooling Adjustments since Installation of the Thermometer (N=63)

	Customers with no thermometer before audit (N=19)	Customers with thermometers before audit (N=44)	Total confirming thermometer installed (N=63)
<i>Have you made any adjustments to your heating settings in the <u>winter</u> since the thermometer was installed?</i>			
No changes	73.7%	75.0%	74.6%
Yes, turned temperature up	0.0%	0.0%	0.0%
Yes, turned temperature down	10.5%	0.0%	3.2%
Yes, with no effect or unexplained	5.3%	4.5%	4.8%
Don't know	10.5%	20.5%	17.5%
<i>Have you made any adjustments to your heating settings in the <u>summer</u> since the thermometer was installed?</i>			
No changes	78.9%	79.5%	79.4%
Yes, turned temperature up	5.3%	9.1%	7.9%
Yes, turned temperature down	5.3%	6.8%	6.3%
Yes, with no effect or unexplained	5.3%	4.5%	4.8%
Don't know	5.3%	0.0%	1.6%
Not applicable (no air conditioning)	0.0%	0.0%	0.0%

The five customers who reported adjusting their heating temperatures in the winter (7.9% of 63 with thermometers installed) were asked what changes were made; on average, these customers turned their heating down by 5.0 degrees Fahrenheit (based on the responses of the two of these five customers who answered the question with a specific numbers of degrees).

The twelve customers who reported adjusting their cooling temperatures in the summer (19.0%) were also asked what changes were made; the average adjustment made by these customers is to set the cooling back (raise the temperature) by less than 0.1 degrees Fahrenheit (based on the responses of the eight of these twelve customers who answered the question with a specific numbers of degrees).

Fifty-nine 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 thermometers is high at 9.08, and only 11.9% gave a rating of “7” or lower. The seven participants who gave lower ratings were asked the reasons for their relatively low ratings: Three of these customers report that they have trouble reading the display (due to small digits and/or poor eyesight), two say they never check it, one questions the accuracy of their readings and one customer said *“I wish they would have provided more information about how to use the thermometer and what its benefits are.”*

Additional Actions to Save Energy in the Home

Nearly half of surveyed participants in Ohio (42.9%) report that they have taken additional steps to save energy since participating in the Residential Neighborhoods Program. These actions are categorized in Table 96; the only actions mentioned by at least 10% of surveyed participants are turning off lights when not in use (14.3%), turning off and/or unplugging electronic devices (11.4%) and using less heating and cooling in the home (10.0%).

Table 96. Additional Actions to Save Energy since Participating in the Program (N=70)

	Ohio participants (count)	Ohio participants (percent)
Have not taken any additional actions	40	57.1%
Have taken additional actions	30	42.9%
Actions taken:		
Turn off lights when not in use	10	14.3%
Turn electronics off / unplug	8	11.4%
Use less cooling / turn down or turn off AC	7	10.0%
Caulk / tape / seal doors & windows	6	8.6%
Conserving water (other than clothes washing)	4	5.7%
Use less heat / turn down thermostat	3	4.3%
Use curtains / shades to control heat & light	2	2.9%
Regular HVAC maintenance	2	2.9%
Add insulation to walls, floors, ceilings, attics	2	2.9%
Use fans to circulate air better	2	2.9%
Unique actions, listed below	10	14.3%

Percentages total to more than 100% because respondents could take multiple actions.

Ten respondents reported taking unique actions to save energy, including running appliances during off-peak hours, consolidating laundry loads, cooking outdoors, turning down the hot water temperature, using fewer space heaters and closing vents and doors.

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 97; the lessons learned cover a broad range of topics, with the most-mentioned being about CFLs and the benefits of efficient lighting (27.1%), “saving energy” in general (21.4%), the need to weatherize and plug leaks (17.1%) and about changing HVAC filters regularly (12.9%). Only one participant in ten could not name anything that they learned by participating in this program (10.0%).

Table 97. What Participants Learned by Participating in the Residential Neighborhoods Program (N=70)

<i>What are the most important things you learned from this program?</i>	Ohio participants (count)	Ohio participants (percent)
About CFLs / efficient lighting	19	27.1%
About saving energy (general measures)	15	21.4%
Need to plug drafts / weatherize	12	17.1%
Change HVAC filters regularly	9	12.9%
Duke Energy has programs to help customers / Duke cares	8	11.4%
Measures save money on bills / cost effective over time	6	8.6%
About insulating water heater and pipes	6	8.6%
Use less heating and cooling / how to use a thermostat	4	5.7%
Save energy by hot water adjustment	3	4.3%
Turn off / unplug unused electronics	3	4.3%
Turn off lights when not in use	3	4.3%
About saving water (aerators & showerheads)	2	2.9%
Unique responses, listed below	8	11.4%
Don't know / nothing	7	10.0%

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

Eight participants gave unique responses when asked what were the most important things they learned from the program. Most of these responses involve miscellaneous tips provided by auditors (conserve hot water, keep furnace maintained, upgrade appliances); two participants gave general responses (“*change your way of thinking*”) and one participant reported that they learned that “*we thought we were being more efficient than we were.*”

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 98. Overall, positive comments about conserving energy are the most frequently mentioned (by 32.9%), followed by the fact the program is free (no cost to participants) and saving money on energy bills (both mentioned by 28.6%), followed by comments about specific measures and the information and education received from the program (both 22.9%).

Table 98. What Participants Liked Most About the Residential Neighborhoods Program (N=70)

<i>What was your favorite thing about participating in this program?</i>	Ohio participants (count)	Ohio participants (percent)
Saving energy / conservation	23	32.9%
Free program / free measures	20	28.6%
Saving money on energy bills	20	28.6%
Like measures received, listed below	16	22.9%
Education and information gained	16	22.9%
Home audit / advice and assistance from auditor	12	17.1%
Improvements to the home	6	8.6%
Duke Energy wants to help customers	3	4.3%
Attending the community meeting	3	4.3%
Participation was easy / convenient	1	1.4%
Enjoyed interactions with auditors / Duke Energy representatives	1	1.4%
Don't know / nothing	4	5.7%

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

Sixteen participants mentioned specific measures received as being their favorite aspect of the program; these are listed below (the list totals to more than 16 responses because participants could name more than one measure). Half of these participants mentioned the CFLs (50.0%), while a quarter (25.0%) mentioned the sealing and insulation measures.

- CFLs (n=8)
- Air sealing and insulation: doors, windows and/or foam spray (n=4)
- HVAC filters (n=3)
- Switchplate thermometer
- Showerheads
- Aerators
- Winter HVAC kit
- Hot water insulation: heater and/or pipes

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 99. Three-quarters of participants (78.6%) could not name a least favorite aspect of the program. The only other response categories mentioned by as many as 5% of participants are that they disliked some of the measures they received (8.6%).

Table 99. What Participants Liked Least About Residential Neighborhoods (N=70)

<i>What was your least favorite thing about this program?</i>	Ohio participants (count)	Ohio participants (percent)
Did not like measures, listed below	6	8.6%
Did not receive measures, listed below	2	2.9%
Wanted more free items	2	2.9%
Not comfortable letting auditor into my home / negative interactions with auditors and Duke Energy staff	1	1.4%
The program did not receive enough promotion	1	1.4%
The program did not do enough to lower my water bill	1	1.4%
No complaints / nothing / don't know	57	81.4%

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

Six participants said their least favorite thing about this program was a measure or measures they received: Four of these comments involve complaints about low water pressure from program aerators and/or showerheads, and there was one complaint apiece about the thermometer, CFLs and water heater temperature change (this list totals to more than six responses because one respondent mentioned two measures).

Two participants said their least favorite thing about this program is that they did not receive measures that they were promised or expected; one customer complained that they did not receive an adequate inspection and sealing of their doors and windows, while the other customer wished that the auditor could have fixed their ductwork and vents.

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 100 below. The most common recommendations are to provide more measures and services through the program (12.9%). No other category of response was mentioned by more than 10% of participants, and a majority of surveyed customers (65.7%) did not have any suggestions.

Table 100. Participants' Suggestions for Increasing Program Participation (N=70)

	Ohio participants (count)	Ohio participants (percent)
Include additional measures / services, listed below	9	12.9%
More advertising	5	7.1%
Provide more information about the program ahead of time	3	4.3%
Partner with community organizations for more exposure	2	2.9%
Provide bill credits or gift cards as part of program	2	2.9%
Auditor should provide more information / explanation during audit	2	2.9%
More mailings and flyers	1	1.4%
Highlight no cost to customer (free)	1	1.4%
More recruiting and auditing on evenings and weekends to get working people	1	1.4%
Need security assurance (strangers in the home)	1	1.4%
Highlight utility bill savings	1	1.4%
Don't know / nothing / fine as is	46	65.7%

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

Nine respondents suggested additional measures and services: Five of these responses (55.6%) involve insulation and sealing leaky doors and windows, while two participants requested more of measures already offered by the program (CFLs and HVAC window kits). Three miscellaneous requests are listed below (more than nine responses are presented here because participants could make multiple suggestions).

- *Provide a before and after energy savings and cost savings estimate.*
- *Install duct work and vents for homes that don't have them.*
- *They could send somebody out once a month to change my filter in the storm cellar.*

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?” Three surveyed participants (4.3%) offered suggestions for new services, which are listed below.

- *I really think the program should include exterior examinations of the home for energy efficiency.*
- *Installation of duct work and vents and window replacement.*
- *Have attic and wall insulation; that would be a big thing and save a lot of energy.*

Non-Participant Survey Results

Non-Participant Program Awareness

TecMarket Works contacted 145 non-participating customers in Ohio, and overall about a third (36.6%) said they recalled hearing something about the Residential Neighborhood program in their community, as shown in Table 101.

Table 101. Awareness of the Residential Neighborhood Program (N=145 contacted)

<i>Base: all contacted non-participants</i>	Ohio (count)	Ohio (percent)
Aware of program	53	36.6%
Not aware of program	92	63.4%

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 102. Overall, the three most frequently-mentioned sources of program awareness for non-participants are letters and postcards from Duke Energy (37.3%), home visits from Duke Energy representatives (15.7%) and word-of-mouth from friends, family and neighbors (11.8%).

There are some significant differences between Ohio program participants and non-participants in terms of how they first learned about the program (see *Awareness and Understanding of the Program* on page 34). Two out of five non-participants in Ohio who are aware of the program (41.2%) learned about it from mailings, however only 15.7% of the Ohio customers who actually participated learned about the program through mailings. Conversely, very few Ohio non-participants recall door hangers (3.9%) compared to Ohio participants (18.6%) Both of these differences are significant at $p < .05$ using Student's t-test.

Table 102. Source of Awareness of the Residential Neighborhood Program (N=51)

Base: non-participants who are aware of the program	Ohio (count)	Ohio (percent)
Received a letter or postcard in the mail from Duke Energy	19	37.3%
Received a letter or postcard in the mail from someone else	0	0.0%
Received a letter or postcard in the mail but not sure who it was from	2	3.9%
Received a door-hanger from Duke Energy	2	3.9%
Received a door-hanger from someone else (<i>Community Action Center</i>)	0	0.0%
Received a door-hanger but not sure who it was from	0	0.0%
Someone from Duke Energy (or contracted by Duke Energy) visited my home to tell me about it	8	15.7%
Someone from another company visited my home to tell me about it (<i>Just Energy</i>)	1	2.0%
Someone visited my home to tell me about it, not sure what organization	6	11.8%
Saw Duke Energy personnel and/or van in the neighborhood and they told me about the program	2	3.9%
Someone from Duke Energy called to tell me about the program	1	2.0%
Can't recall who called to tell me about the program	1	2.0%
I called Duke Energy (or someone else) for information or help	0	0.0%
Heard about a community event promoting the program but did NOT attend	0	0.0%
Attended a community event promoting the program	0	0.0%
Through another agency or organization (<i>People Working Cooperatively</i>)	1	2.0%
Friends / Family / Neighbors (word of mouth)	6	11.8%
Media (" <i>a flyer in the Tribune</i> ")	1	2.0%
E-mail from Duke Energy	1	2.0%
Online (Duke Energy or other websites)	0	0.0%
Some other way (listed below)	2	3.9%
Don't know / not specified	1	2.0%

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

Two non-participants mentioned becoming aware of the program “some other way”: one participant claims there was information on their utility bill and one customer is a landlord who was informed by their tenant.

None of the surveyed non-participants in Ohio said that they had heard about or attended the community meeting to promote the program. Therefore none of these customers were asked to rate their satisfaction the community meeting, nor were they asked to give suggestions for improving the meetings.

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 103.

The aspects of the program that are most likely to be recalled by non-participants are “receiving free energy-saving measures” (mentioned by 23.5%), “receiving home weatherization” (21.6%) and “visiting the home for a free energy audit” (17.6%); all three of these are “correct” responses that accurately describe the program. Three more categories of response were mentioned by at least 10% of surveyed non-respondents: “Saving money on energy bills” (11.8%) is also an accurate responses, while “participation requires landlord permission / program is for homeowners only” (13.7%) is an accurate description of a potential barrier to participation, and “visiting the home to inspect systems and measure energy usage” (11.8%) is only partially correct (there is a home inspection although not for the stated purpose). Only 13.7% of surveyed non-participants could not answer this question (“don’t know / not specified”).

Table 103. Non-Participants’ Understanding of the Residential Neighborhood Program (N=51)

Base: non-participants who are aware of the program	Ohio (count)	Ohio (percent)
Receive free energy-saving measures (bulbs, aerators, sweeps, etc.)	12	23.5%
Receive home weatherization / seal leaks (doors, windows, insulation, etc.)	11	21.6%
Visit home for free energy audit and energy-saving information	9	17.6%
Participation would require my landlord's permission / for homeowners only	7	13.7%
Saving money on energy bills	6	11.8%
Visit home to inspect systems / measure energy usage	6	11.8%
Attending community meeting to discuss energy issues & learn about energy efficiency	5	9.8%
Learning how to save energy (other than through audit or meeting)	3	5.9%
We are already efficient / don't need what this program offers / not interested	0	0.0%
Other responses (listed below)	14	27.5%
Don't know / not specified	7	13.7%

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

Fourteen non-participants surveyed in the Midwest system gave “other” responses when asked to describe the program. Most of these responses are either vague (“*make the neighborhood better*”, “*they wanted to come into my house and do something*”) or inaccurate (“*the program offers prize giveaways like free trips and casino credits*”, “*you have to be a home owner to participate.*”) Four of these customers made comments relating to income requirements (believing that their income had to be under a limit to qualify) and assistance programs provided by other organizations.

The top responses for non-participants’ understanding of the program mirror the top responses for program participants (reported in Table 21 on page 36), 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 57.1% of participants but only 35.4% of 51 non-participants, a difference which is significant at $p < .05$ using Student’s t-test. However, non-participants are more likely to mention landlord and rental issues (13.7% of non-participants and 1.4% of participants, also significant at $p < .05$ using Student’s t-test).

As indicated by Table 104, about three-quarters of non-participants who were aware of the program believe that they would have been eligible to participate (74.5%). Only 5.9% believe

that they would not have been eligible, while another 19.6% are not sure if they were eligible or not.

Table 104. Non-Participants' Understanding of Their Eligibility to Participate in the Residential Neighborhood Program

<i>Base: non-participants who are aware of the program</i>	Ohio (count)	Ohio (percent)
Think I would have been eligible	38	74.5%
Do not think I would have been eligible	3	5.9%
Don't know if I would have been eligible	10	19.6%

The 38 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. The largest number of these customers (28.9%) did not participate due to issues with availability and scheduling, while seven customers (18.4%) referred to issues with applications and paperwork and miscommunications about enrollment, another seven customers (18.4%) said they lacked enough information to make a decision, six (15.8%) felt they were already efficient and did not need this program, five (13.2%) could not participate due to issues involving landlord permission and one (2.6%) did not want to let strangers into their home.

The ten 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. The most frequent category of response again has to do with scheduling and availability (40.0%), while three participants (30.0%) felt they were already efficient and did not need this program, one felt they could not participate due to issues involving landlord permission and one was concerned about sharing personal information with “strangers.”

All non-participants were next asked if there were “any other reasons” why they did not participate in the program.

Twenty non-participants (39.2%) made additional comments about why they did not participate, most of which are restatements of their primary reasons for not participating and expressions of future interest (“*I still want to participate.*”) However, two of these participants indicate that they are not concerned about utility bills because they do not pay them directly (“*government assistance pays my electric bill*”, “*heat is included with the rent*”) and one participant said “*this program seems geared towards people who don't have a lot of money and I am very comfortable financially.*”

Non-Participants Recommending the Program to Others

Non-participants who believe they would have qualified for the Residential Neighborhood program are somewhat more likely to report that they recommended this program to others (34.5%) compared to non-participants who did not believe (or were not sure) that they qualified for the program (16.7%, though this difference is not statistically significant due to small sample sizes).

Table 105. Non-Participants Recommending the Program to Other People

Base: non-participants who are aware of the program ³⁷	Believe they qualify (N=29)	Believe they do not qualify or not sure (N=12)	Total (N=41)
Recommended program to friends, neighbors or relatives (total)	34.5%	16.7%	29.3%
Recommended to 1-4 other people	31.0%	8.3%	24.4%
Recommended to 5 or more other people	3.4%	8.3%	4.9%
Recommended, don't know how many other people	0.0%	0.0%	0.0%
Did not recommend program	65.5%	83.3%	70.7%
Don't know / not specified	0.0%	0.0%	0.0%
Mean number of recommendations (among customers who made recommendations)	1.9	3.5	2.2
Median number of recommendations (among customers who made recommendations)	1.0	3.5	1.0
Maximum number of recommendations	5	6	6

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 106; only about a quarter of survey respondents had no suggestions (23.5% or 12 out of 51). Overall, the two most frequently-mentioned categories of response have to do with communications (21.6% or 11 out of 51) and information about the program (15.7% or 8 out of 51).

Table 106. Non-Participants’ Suggestions for Improving Program Participation (N=51)

Base: non-participants who are aware of the program	Ohio (count)	Ohio (percent)
Suggestions for improving communications about program (listed below)	11	21.6%
Give customers more / better information about this program	9	17.6%
Landlord would not allow me to participate / renter issues	5	9.8%
Focus on weatherization / winterization	3	5.9%
Give more advance notice ahead of the program being available	3	5.9%
Lower the rates / payment issues (not program related)	3	5.9%
Give out more light bulbs / measures / emphasize free measures	2	3.9%
Make it easier to sign-up / enroll	2	3.9%
Security concerns about letting people into the home	1	2.0%
Make more weekend and evening hours available for audits	1	2.0%
Comments about participation and income requirements	1	2.0%
Other program-related suggestions or comments (listed below)	9	17.6%
No suggestions / don't know	12	23.5%

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

³⁷ Due to a survey programming error, the first ten non-participant customers interviewed in 8Ohio were not asked about recommending the program to other people. Results are reported based only on the responses of the 41 customers who were asked these questions.

Eleven non-participants in Ohio made suggestions about improving communications about the program to improve participation; these responses are categorized below (there are more responses listed than respondents since customers could make multiple suggestions).

- More or better advertising in traditional media (n=4)
- Door-to-door solicitation so customers can ask questions in person (n=3)
- Improve door hangers so they are more noticeable (n=2)
- Advertise the program by email (n=2)
- Mail out example measures and/or examples of typical savings that can be expected with measures (n=2)

One non-participant had a comment about participation requirements: *“Let people know that this program is for people who rent.”*

Nine non-participant customers in Ohio gave miscellaneous suggestions or comments that did not fit into the categories listed in Table 106; these responses are categorized below.

- Offer assistance purchasing major upgrades: HVAC systems, water heaters, refrigerators, carpeting, roofs, windows, doors (n=3)
- Offer to arrange transportation to and from the community meeting (n=2)
- Lower rates as an incentive / provide direct financial assistance
- Offer HVAC tune-ups and duct inspections
- Offer a guarantee that the program will save money on my utility bill
- Make it clearer that Duke Energy is offering the program (thought this program was from People Working Cooperatively)

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, 70.6% (36 out of 51) said that they have taken actions to save energy, and the actions they took are categorized in Table 107. The most frequently mentioned actions are using efficient light bulbs (25.5% or 13 out of 51) and sealing door and window leaks (21.6% or 11 out of 51).

Table 107. Non-Participants' Steps Taken to Save Energy in the Past Year

Base: non-participants who are aware of the program	Ohio (count)	Ohio (percent)
Did not take steps to save energy	14	27.5%
Took steps to save energy (total)	36	70.6%
Use more efficient light bulbs / CFL, LED	13	25.5%
Seal leaks / caulk, tape, plastic on windows, doors	11	21.6%
Turn off lights when not in use / use less light	8	15.7%
Upgrade windows, doors	7	13.7%
Turn items off when not in use / unplug, use power strips	6	11.8%
Upgrade HVAC system	5	9.8%
Use less heating (turn down thermostat, dress warmly)	4	7.8%
Added insulation to walls, ceilings, attic, floor	2	3.9%
Do not adjust thermostat (maintain steady temperature)	2	3.9%
Regular HVAC maintenance	2	3.9%
Upgrade water heater	2	3.9%
Unique actions (listed below)	6	11.8%
Don't know / not specified	1	2.0%

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

Six non-participants in Ohio mentioned unique actions they have taken to save energy: these include replacing a roof, replacing kitchen appliances, installing a new thermostat, using night lights³⁸, closing windows and adding mulch around the home foundation.

Non-Participant Satisfaction with Duke Energy

Surveyed non-participants are generally satisfied with Duke Energy; Figure 10 shows the distribution of satisfaction ratings scores. The mean satisfaction rating among all surveyed non-participants in Ohio is 7.04 on a ten-point scale where “10” is the most satisfied, and the median and mode rating is “8 out of 10”.³⁹

³⁸ LED night lights were provided to attendees at some of the community meeting “kick off” events.

³⁹ Among 70 surveyed program participants in Ohio, the mean satisfaction rating for Duke Energy is 8.72 (as seen in *Error! Reference source not found.* on page 25); the mean satisfaction rating of 7.04 among non-participants is significantly lower ($p < .05$ using Student's t-test). Satisfaction with Duke Energy is significantly correlated with satisfaction with the program (see *Error! Reference source not found.* 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 with Duke Energy are less likely to participate in programs).

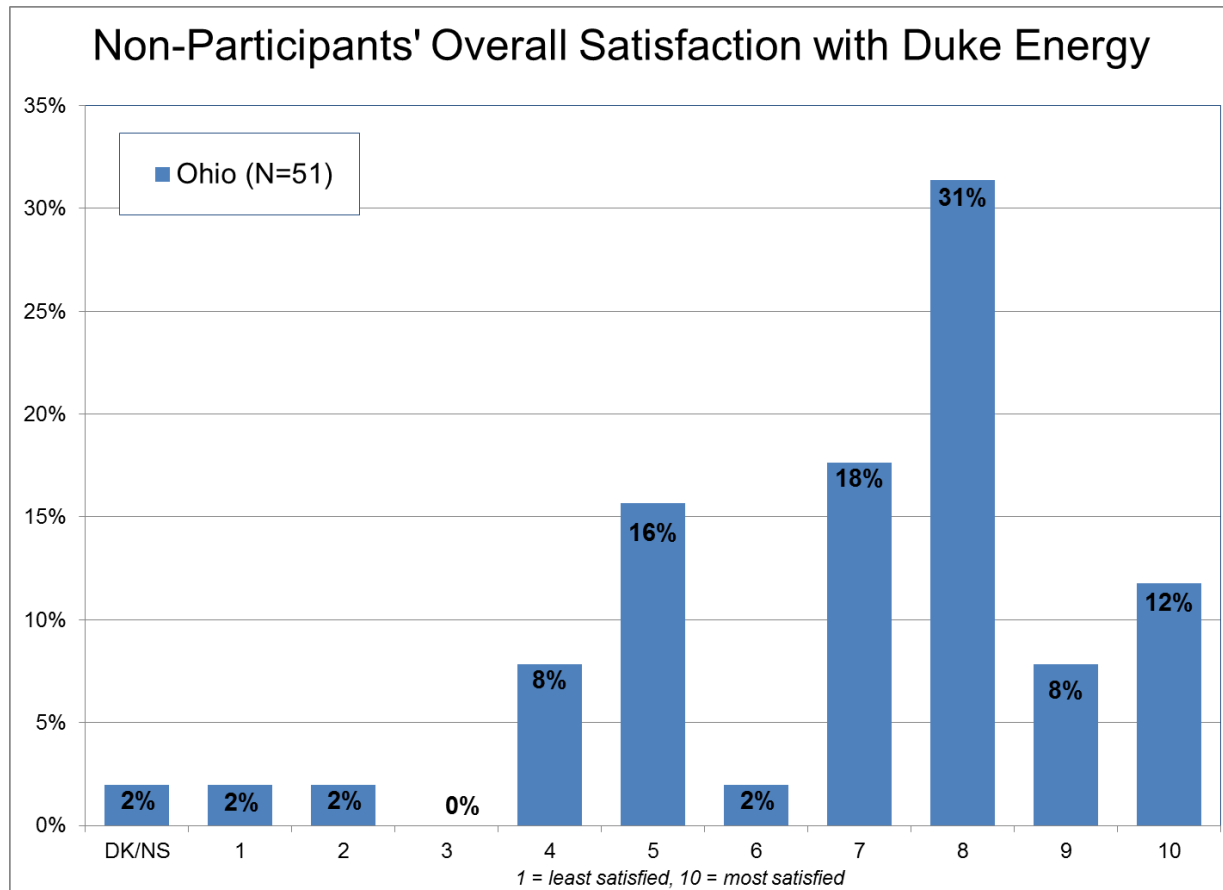


Figure 10. Non-Participant Satisfaction with Duke Energy Overall

Twenty-four non-participants (47.1% of 51 surveyed) rated their satisfaction with Duke Energy at “7” or less, and these customers were asked how their satisfaction could be improved. Their responses are listed by state below; most of these comments have to do with rates and billing (there are more responses listed than respondents because customers could mention multiple issues).

- Lower my bills / rates are too high (n=10)
- Be more understanding of customers who fall behind on their bills (n=4)
- Do a better job communicating with customers (n=4)
- Increase / improve energy efficiency programs (n=2)
- Reduce billing errors / better explain billing fluctuations (n=2)
- Compel landlords to participate in this program
- Don’t know (n=4)

Table 108 indicates about a third of Ohio non-participants (29.4% or 15 out of 51) said the program made them feel more positive toward Duke Energy, including nearly one non-participant in five who reported feeling “much more positive” toward Duke Energy (17.6% or 9 out of 51). Only one non-participant (2.0% of 51 surveyed) said that the program made them feel

more negative towards Duke Energy, while a majority of non-participants (62.7% or 32 out of 51) said they felt about the same toward Duke Energy based on what they know about this program.

Table 108. 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	Ohio (count)	Ohio (percent)
Much more positive toward Duke Energy	9	17.6%
Somewhat more positive	6	11.8%
About the same	32	62.7%
Somewhat more negative	0	0.0%
Much more negative	1	2.0%
Don't know / not specified	3	5.9%

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. Only one customer's attitude became more negative; this customer explained: "*I made an honest effort to sign up for the program but did not receive a call back nor an explanation.*" There are fifteen customers whose attitude toward Duke Energy improved based on what they know about this program; their explanations are categorized below (there are more responses than respondents because customers could give multiple reasons). Most customers who became more positive cite the idea that Duke Energy is "giving back to the community" and that the utility "cares about helping" its customers, with customers saving money and receiving free items being the second-most mentioned reason for a more positive view of Duke Energy.

Much more positive towards Duke Energy (N=9)

- This program shows that Duke Energy cares about and wants to help their customers / gives back to the community (n=5)
- This program teaches people about energy efficiency / education (n=2)
- Duke Energy is saving energy (and water) / conservation (n=2)
- Duke Energy is helping customers save money / giving free measures

Somewhat more positive towards Duke Energy (N=6)

- Duke Energy is helping customers save money / giving free measures (n=4)
- This program shows that Duke Energy cares about and wants to help their customers / gives back to the community (n=4)
- This program teaches people about energy efficiency / education (n=2)
- Duke Energy is saving energy (and water) / conservation

Appendix A: Counts of Participants for Billing Analysis

Participant Since YYYYMM	Number of New Participants in Each Month
201307	26
201308	65
201309	39
201310	47
201311	50
201312	41
201401	87
201402	115
201403	168
201404	129
201405	123
201406	175
201407	142
201408	17

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:
 - 201102 – 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

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Appendices

Number of Observations Read 39992
Number of Observations Used 39992

Dependent Variable: kwhd

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1318	16749130.43	12707.99	60.62	<.0001
Error	38673	8106808.17	209.62		
Corrected Total	39991	24855938.60			

R-Square 0.673848
Coeff Var 50.49728
Root MSE 14.47841
kwhd Mean 28.67167

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Account_Id	1223	14599280.07	11937.27	56.95	<.0001
cdd*monthID	36	1110115.34	30836.54	147.10	<.0001
hdd*monthID	46	1031444.24	22422.70	106.97	<.0001
k12_date	1	23.80	23.80	0.11	0.7362
Insul_Seal_date	0	0.00	.	.	.
HVAC_tuneup_date	0	0.00	.	.	.
Free_CFL	1	69.74	69.74	0.33	0.5641
cfl_promo	1	41.70	41.70	0.20	0.6556
cfl_special	1	72.40	72.40	0.35	0.5568
HEHC	1	59.38	59.38	0.28	0.5946
lowinc_weath	1	335.14	335.14	1.60	0.2061
PER_OHEC	1	88.46	88.46	0.42	0.5159
SmSvr_HVAC	1	15.94	15.94	0.08	0.7827
Appl_Recycle	1	49.51	49.51	0.24	0.6270
Refrige_Replace	1	1988.05	1988.05	9.48	0.0021
furnace_replace	1	1202.36	1202.36	5.74	0.0166
Property_Mgr	0	0.00	.	.	.
MyHER	1	1634.08	1634.08	7.80	0.0052
part	1	2710.24	2710.24	12.93	0.0003

Source	DF	Type III SS	Mean Square	F Value	Pr > F
cdd*monthID	36	727881.329	20218.926	96.45	<.0001
hdd*monthID	46	1023173.682	22242.906	106.11	<.0001
k12_date	1	37.824	37.824	0.18	0.6710
Insul_Seal_date	0	0.000	.	.	.
HVAC_tuneup_date	0	0.000	.	.	.
Free_CFL	1	32.665	32.665	0.16	0.6930
cfl_promo	1	64.848	64.848	0.31	0.5781

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Source	DF	Type III SS	Mean Square	F Value	Pr > F
cfl_special	1	69.748	69.748	0.33	0.5641
HEHC	1	93.628	93.628	0.45	0.5039
lowinc_weath	1	33.335	33.335	0.16	0.6901
PER_OHEC	1	145.351	145.351	0.69	0.4050
SmSvr_HVAC	1	24.553	24.553	0.12	0.7322
Appl_Recycle	1	37.702	37.702	0.18	0.6715
Refrige_Replace	1	2015.770	2015.770	9.62	0.0019
furnace_replace	1	1264.284	1264.284	6.03	0.0141
Property_Mgr	0	0.000	.	.	.
MyHER	1	1607.583	1607.583	7.67	0.0056
part	1	2710.236	2710.236	12.93	0.0003

Parameter		Estimate	Standard Error	t Value	Pr > t
cdd*monthID	201102	76.78903319 B	7.07316197	10.86	<.0001
cdd*monthID	201103	0.95787509 B	0.55527076	1.73	0.0845
cdd*monthID	201104	0.14178646 B	0.11160766	1.27	0.2039
cdd*monthID	201105	0.09696536 B	0.01634165	5.93	<.0001
cdd*monthID	201106	0.07174409 B	0.00638954	11.23	<.0001
cdd*monthID	201107	0.07697797 B	0.00214502	35.89	<.0001
cdd*monthID	201108	0.10315693 B	0.00284048	36.32	<.0001
cdd*monthID	201109	0.04907280 B	0.01442403	3.40	0.0007
cdd*monthID	201110	-0.05444038 B	0.15222536	-0.36	0.7206
cdd*monthID	201111	3.17536573 B	1.29631171	2.45	0.0143
cdd*monthID	201112	6.10345773 B	9.70636830	0.63	0.5295
cdd*monthID	201201	0.00000000 B	.	.	.
cdd*monthID	201202	6.21078592 B	0.76653751	8.10	<.0001
cdd*monthID	201203	0.22400625 B	0.05793704	3.87	0.0001
cdd*monthID	201204	-0.05741646 B	0.04760592	-1.21	0.2278
cdd*monthID	201205	0.10707477 B	0.00833963	12.84	<.0001
cdd*monthID	201206	0.06249908 B	0.00495462	12.61	<.0001
cdd*monthID	201207	0.07723008 B	0.00202933	38.06	<.0001
cdd*monthID	201208	0.10730877 B	0.00328927	32.62	<.0001
cdd*monthID	201209	0.07202171 B	0.01339531	5.38	<.0001
cdd*monthID	201210	0.11313784 B	0.10259798	1.10	0.2702
cdd*monthID	201211	2.62076251 B	0.98294262	2.67	0.0077
cdd*monthID	201303	1.48813866 B	0.12316901	12.08	<.0001

Parameter		Estimate	Standard Error	t Value	Pr > t
cdd*monthID	201304	0.09639687 B	0.06938748	1.39	0.1648
cdd*monthID	201305	0.07937010 B	0.01517485	5.23	<.0001
cdd*monthID	201306	0.08106843 B	0.00516562	15.69	<.0001
cdd*monthID	201307	0.08346367 B	0.00438077	19.05	<.0001
cdd*monthID	201308	0.08194349 B	0.00781350	10.49	<.0001
cdd*monthID	201309	0.03249068 B	0.01203010	2.70	0.0069
cdd*monthID	201310	0.07371340 B	0.06492109	1.14	0.2562
cdd*monthID	201311	-2.49691129 B	1.63000895	-1.53	0.1256
cdd*monthID	201403	3.55805629 B	0.30257546	11.76	<.0001
cdd*monthID	201404	-0.08105296 B	0.06247978	-1.30	0.1945
cdd*monthID	201405	0.00816228 B	0.01432751	0.57	0.5689
cdd*monthID	201406	0.10355765 B	0.00458660	22.58	<.0001
cdd*monthID	201407	0.04916060 B	0.00656152	7.49	<.0001
cdd*monthID	201408	0.28628505 B	0.12920110	2.22	0.0267
hdd*monthID	201011	0.07351141	0.07132211	1.03	0.3027
hdd*monthID	201012	0.02359832	0.00089916	26.24	<.0001
hdd*monthID	201101	0.02539820	0.00065476	38.79	<.0001
hdd*monthID	201102	0.02627167	0.00091600	28.68	<.0001
hdd*monthID	201103	0.03183262	0.00148529	21.43	<.0001
hdd*monthID	201104	0.04811293	0.00439868	10.94	<.0001
hdd*monthID	201105	0.05108463	0.01564886	3.26	0.0011
hdd*monthID	201106	0.52138628	0.09190301	5.67	<.0001
hdd*monthID	201107	6.86672189	1.32973393	5.16	<.0001
hdd*monthID	201108	-0.25743061	0.09211217	-2.79	0.0052
hdd*monthID	201109	0.13304522	0.01230408	10.81	<.0001
hdd*monthID	201110	0.05415687	0.00348868	15.52	<.0001
hdd*monthID	201111	0.03333585	0.00162802	20.48	<.0001
hdd*monthID	201112	0.02998895	0.00110348	27.18	<.0001
hdd*monthID	201201	0.03516537	0.00077667	45.28	<.0001
hdd*monthID	201202	0.02590594	0.00090806	28.53	<.0001
hdd*monthID	201203	0.03946561	0.00235507	16.76	<.0001
hdd*monthID	201204	0.05358141	0.00314861	17.02	<.0001
hdd*monthID	201205	0.09623489	0.00756689	12.72	<.0001
hdd*monthID	201206	0.66208719	0.06500145	10.19	<.0001
hdd*monthID	201207	7.56178696	0.98213458	7.70	<.0001
hdd*monthID	201208	0.12936148	0.15759006	0.82	0.4117
hdd*monthID	201209	0.10249137	0.01063866	9.63	<.0001
hdd*monthID	201210	0.04047474	0.00227169	17.82	<.0001
hdd*monthID	201211	0.02892988	0.00101357	28.54	<.0001
hdd*monthID	201212	0.02969811	0.00075659	39.25	<.0001
hdd*monthID	201301	0.02733308	0.00064828	42.16	<.0001

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Parameter	Estimate	Standard Error	t Value	Pr > t
hdd*monthID 201302	0.02773222	0.00071996	38.52	<.0001
hdd*monthID 201303	0.02585808	0.00076814	33.66	<.0001
hdd*monthID 201304	0.04108041	0.00326460	12.58	<.0001
hdd*monthID 201305	0.10363920	0.01215817	8.52	<.0001
hdd*monthID 201306	0.34604930	0.04774986	7.25	<.0001
hdd*monthID 201307	1.80637355	0.27699295	6.52	<.0001
hdd*monthID 201308	0.67598819	0.14703160	4.60	<.0001
hdd*monthID 201309	0.26078275	0.02461130	10.60	<.0001
hdd*monthID 201310	0.04439606	0.00442848	10.03	<.0001
hdd*monthID 201311	0.03117037	0.00094055	33.14	<.0001
hdd*monthID 201312	0.02914397	0.00064531	45.16	<.0001
hdd*monthID 201401	0.02904680	0.00052248	55.59	<.0001
hdd*monthID 201402	0.02860718	0.00059287	48.25	<.0001
hdd*monthID 201403	0.02915164	0.00085046	34.28	<.0001
hdd*monthID 201404	0.05013528	0.00254677	19.69	<.0001
hdd*monthID 201405	0.12993231	0.01025500	12.67	<.0001
hdd*monthID 201406	0.03595772	0.04021796	0.89	0.3713
hdd*monthID 201407	2.09668547	0.17447413	12.02	<.0001
hdd*monthID 201408	-7.09845243	2.95373858	-2.40	0.0163
k12_date	0.44283904	1.04251808	0.42	0.6710
Insul_Seal_date	0.00000000 B	.	.	.
HVAC_tuneup_date	0.00000000 B	.	.	.
Free_CFL	-0.11389344	0.28852037	-0.39	0.6930
cfl_promo	-4.30807489	7.74562663	-0.56	0.5781
cfl_special	2.74431196	4.75761241	0.58	0.5641
HEHC	0.90032670	1.34715559	0.67	0.5039
lowinc_weath	-0.29779076	0.74676423	-0.40	0.6901
PER_OHEC	2.11519212	2.54016053	0.83	0.4050
SmSvr_HVAC	0.82970252	2.42431267	0.34	0.7322
Appl_Recycle	-0.92849732	2.18936316	-0.42	0.6715
Refrige_Replace	-5.50016761	1.77368469	-3.10	0.0019
furnace_replace	-25.76552491	10.49150217	-2.46	0.0141
Property_Mgr	0.00000000 B	.	.	.
MyHER	-0.80202580	0.28961606	-2.77	0.0056
part	-1.28474691	0.35730169	-3.60	0.0003

Appendix C: Impacts by Post Participation Usage Months

The team further examined the impact of customers with various post participation usage months available. The result can be found in Table 109. As described above, the evaluation team supports using all available data and the reported results for this program are in the top row, with the estimated savings of 469 annual kWh savings. In addition, segmenting impact estimates based upon months of participation is an artificial construct that ignores the fact that every participant does not receive the same set of measures. If measures with larger impacts (e.g., water heater measures and low flow shower heads) are not evenly spread across the participants, one could get unusual results like those shown in Table 19.

Table 109. Unadjusted Results of Billing Analysis Using Varying Post-Participation Data Availability

Per Participant Annual kWh Savings	95% Confidence Interval (kWh / year)			# of homes in model	Are results Significant?
	Lower Bound	Estimate	Upper Bound		
Per Participant, Using All Data	213	469	725	1,224	Significant
Per Participant for those with Less Than Three Months Post Participation Data	-1,458	24	1,506	536	Not Significant
Per Participant for those with More Than Three Months Post Participation Data	-167	99	364	688	Not Significant
Per Participant for those with Less Than Six Months Post Participation Data	-1,529	-1,084	-639	882	Significant
Per Participant for those with More Than Six Months Post Participation Data	-245	197	639	342	Not Significant

Appendix D: Engineering Algorithms

CFLs

General Algorithm

Gross Summer Coincident Demand Savings

$$\Delta kW = \text{ISR} \times \text{units} \times \left[\frac{\text{Watts}_{\text{base}} - \text{Watts}_{\text{ee}}}{1000} \right] \times \text{CF} \times \text{WHF}_d$$

Gross Annual Energy Savings

$$\Delta kWh = \text{ISR} \times \text{units} \times \frac{(\text{Watts} \times \text{HOURS})_{\text{base}} - (\text{Watts} \times \text{HOURS})_{\text{ee}}}{1000} \times 365 \times \text{WHF}_e$$

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 = 15.96
$\text{Watts}_{\text{base}}$	= connected load of baseline lamp
HOURS	= Average daily hours of use
CF	= coincidence factor = 0.11 (taken from Draft Ohio TRM)
WHF_e	= Waste heat factor for annual electricity consumption = 0.9942
WHF_d	= Waste heat factor for demand = 1.167

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.

Cincinnati, OH

Heating Fuel	Heating System	Cooling System	Weight	WHFe
Other	Any except Heat Pump	Any except Heat Pump	0.0029	1.079
		None	0.0002	0
Any	Heat Pump	Heat Pump	0.0760	0.84
Gas Propane Oil	Central Furnace	None	0.0111	0
		Room/Window	0.7571	1.079
		Central AC		1.079
Electricity	Electric baseboard/ central furnace	None	0.0046	0.55
		Room/Window	0.1433	0.64
		Central AC		0.64
None	None	Any	0.0049	1
Total Weighted Average			1	0.9942

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.

Cincinnati, OH

Cooling System	Weight	WHFd
None	0.0159	1
All other	0.9841	1.17
Total Weighted Average		1.167

Air Sealing – Reduce Infiltration Measures

Gross Summer Coincident Demand Savings

$$\Delta kW_S = \text{units} \times (\Delta \text{cfm}/\text{unit}) \times (kW / \text{cfm}) \times DF_S \times CF_S$$

Gross Annual Energy Savings

$$\Delta kWh = \text{units} \times (\Delta \text{cfm}/\text{unit}) \times (kWh / \text{cfm})$$

$$\Delta \text{therm} = \text{units} \times (\Delta \text{cfm} / \text{unit}) \times (\text{therm} / \text{cfm})$$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
units	= number of buildings sealed under the program
$\Delta \text{cfm}/\text{unit}$	= 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 (ft³/min-in⁴-°F)
= 0.015 for one-story house
- ΔT = average indoor/outdoor temperature difference over the time interval of interest (°F)
- B = wind coefficient (ft³/min-in⁴-mph²)
= 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)
Cincinnati	53	15	8.9	0.86

Measure ELA impact and cfm reductions are as follows:

Measure	Unit	ELA change (in ² /unit)	ΔCfm/unit
Weather stripping	Linear foot	0.089	0.0766
Caulking	linear foot	0.047	0.0404
Door Sweeps	each	0.3	0.2580
Foam Insulation Spray	sink	0.6	0.5161

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.

Cincinnati, OH;

Heating Fuel	Heating System	Cooling System	Weight	kWh/cfm	kW/cfm
Other	Any except Heat Pump	Any except Heat Pump	0.0029	1.14	0
		None	0.0002	0	0
Any	Heat Pump	Heat Pump	0.0760	12.85	0.00248
Gas Propane Oil	Central Furnace	None	0.0111	0	0
		Room/Window	0.7571	1.14	0
		Central AC			
Electricity	Electric baseboard/ central furnace	None	0.0046	23.27	0.01238
		Room/Window	0.1433	23.84	0.01485
		Central AC			
None	None	Any	0.0049	0	0
Total Weighted Average			1	5.37	0.00237

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

$$\text{GPD}_{\text{base}} = \text{showers/week} / 7 \times 2.87 \text{ gpm} \times 5 \text{ minutes/shower}$$

$$\text{GPD}_{\text{ee}} = \text{showers/week} / 7 \times 1.75 \text{ gpm} \times 5 \text{ minutes/shower}$$

$$\text{Showers/wk} = 10.9 \text{ per showerhead (from survey data)}$$

ΔT

City	Average cold water temperature	Shower use temperature	Average ΔT
Cincinnati	53.9°F	100°F	46.1°F

$$\text{Demand diversity factor} = 0.1$$

$$\text{Coincidence factor} = 0.4$$

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

$$\Delta \text{kWh} = \text{ISR} * (((\text{GPM}_{\text{base}} - \text{GPM}_{\text{low}}) / \text{GPM}_{\text{base}}) * \# \text{ people} * \text{gals/day} * \text{days/year} * \text{DR}) / \text{F/home}) * 8.3 * (\text{T}_{\text{ft}} - \text{T}_{\text{mains}}) / 1,000,000) / \text{DHW Recovery Efficiency} / 0.003412$$

Where:

ISR = In Service Rate or fraction of units that get installed

GPM_{base} = Gallons Per Minute of baseline faucet = 2.2

GPM_{low} = 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

T_{ft} = Assumed temperature of water used by faucet = 80

T_{mains} = Assumed temperature of water entering house = 53.9

DHW Recovery Efficiency = Recovery efficiency of electric hot water heater = 0.98

0.003412 = Constant to convert MMBtu to kWh

$$\Delta \text{kW} = \Delta \text{kWh/hours} * \text{CF}$$

Where:

$$\begin{aligned}\text{Hours} &= \text{Average number of hours per year spent using faucet} \\ &= (\text{Gal/person} * \# \text{ people} * 365) / \text{F/home} / \text{GPM} / 60 \\ &= (10.9 * 2.46 * 365) / 3.5 / 2.2 / 60 \\ &= 21 \text{ hours}\end{aligned}$$

$$\text{CF} = \text{Summer Peak Coincidence Factor for measure} = 0.00262$$

Hot Water Pipe Wrap

For electric DHW systems:

$$\Delta \text{kWh} = ((1/\text{R}_{\text{exist}} - 1/\text{R}_{\text{new}}) * (\text{L} * \text{C}) * \Delta \text{T} * 8,760) / \eta_{\text{DHW}} / 3412$$

Where:

$$\text{R}_{\text{exist}} = \text{Pipe heat loss coefficient of uninsulated pipe (existing) (Btu/hr-}^{\circ}\text{F-ft)} = 1.0$$

$$\text{R}_{\text{new}} = \text{Pipe heat loss coefficient of insulated pipe (new) (Btu/hr-}^{\circ}\text{F-ft)} = 5$$

$$\text{L} = \text{Length of pipe from water heating source covered by pipe wrap (ft)}$$

$$\text{C} = \text{Circumference of pipe (ft) (Diameter (in)} * \pi * 0.083) = 0.196\text{ft}$$

$$\Delta \text{T} = \text{Average temperature difference between supplied water and outside air temperature (}^{\circ}\text{F)} = 65^{\circ}\text{F}$$

$$8,760 = \text{Hours per year}$$

$$\eta_{\text{DHW}} = \text{Recovery efficiency of electric hot water heater} = 0.98$$

$$3412 = \text{Conversion from Btu to kWh}$$

$$\Delta \text{kW} = \Delta \text{kWh} / 8760$$

Where:

$$\Delta \text{kWh} = \text{kWh savings from pipe wrap installation}$$

$$8760 = \text{Number of hours in a year (since savings are assumed to be constant over year)}.$$

Water Heater Tank Wrap and Temperature Turn-Down

$$\Delta \text{kWh} = \text{units} * \frac{(\text{UA}_{\text{base}} - \text{UA}_{\text{ee}}) * \overline{\Delta \text{T}}}{3413 * \eta_{\text{elec}}} * 8760$$

$$\Delta \text{kW} = \Delta \text{kWh} / 8760$$

Where:

$$\Delta \text{kW} = \text{gross coincident peak demand savings}$$

$$\Delta \text{kWh} = \text{gross annual electricity savings}$$

$$\text{units} = \text{number of water heaters installed under the program}$$

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) = 65

3413 = conversion factor (Btu/kWh)

8760 = conversion factor (hr/yr)

ηelec= electric water heater recovery efficiency = 0.98

% Elec = 26% of OH and KY homes have electric water heaters. These are the only homes savings electricity (used for temperature turn-down only)

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.

HVAC Filter Replacement

$$\Delta kWh = ISR * 1,096 * [(1 + P_{dirty}) - (1 + P_{clean})]$$

$$\Delta kW = ISR * 500 * P_{clean} / 1000$$

Where:

ΔkWh = gross annual electricity savings

ISR = In Service Rate or fraction of units that get installed

1,096 = Annual fan energy consumption

500 = Fan wattage

P_{dirty} = Percent increase in power consumption after 12 months = 3.9%

P_{clean} = Percent increase in power consumption after one month = 0.33%

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 made 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 11.

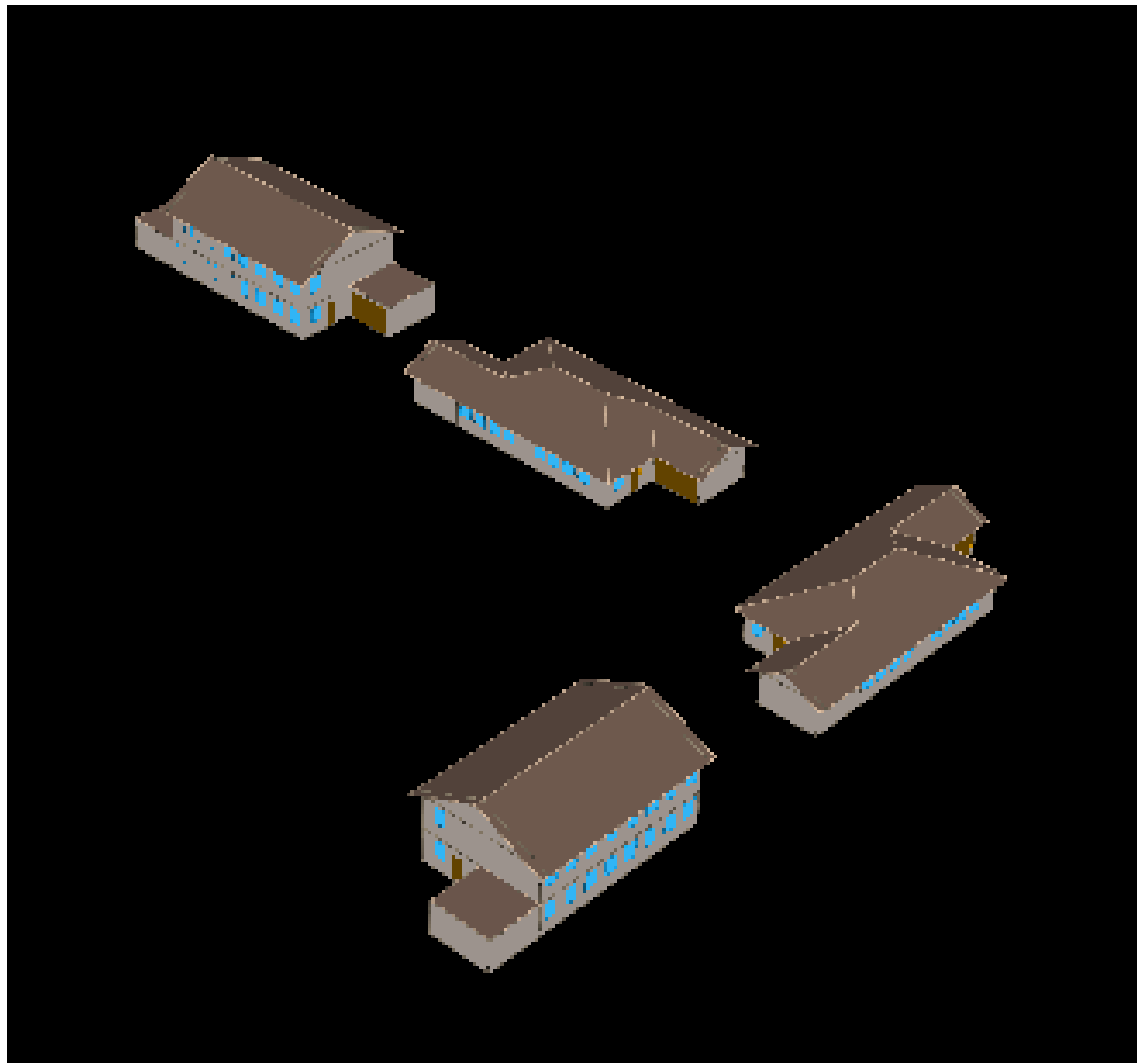


Figure 11. Computer Rendering of Residential Building Prototype Model

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 mean
HVAC system type	Packaged single zone AC or heat pump
HVAC system size	Based on peak load with 20% oversizing. Mean 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
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	Cincinnati – April 27 th to October 12 th
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 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	<hr/>
B. Aerators	<hr/>
C. Caulking Doors	<hr/>
D. Caulking Windows	<hr/>
E. Clear Glass Patch Tape	<hr/>
F. CFL, 13 Watt	<hr/>

	number
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?	<hr/> <hr/>
17a. How many 18-watt CFLs did you receive?	<hr/> <hr/>

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 Bulb⁴⁰

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...

1st Installed 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: _____*

⁴⁰ 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).

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.

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 old 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 been removed 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" and 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 heating settings in the winter 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 cooling settings in the summer 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 filter change calendar 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 A/C and heater filters 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 A/C and heater filters?*

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 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 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.

Note: Only read words in bold type. Italics are instructions.

State

☐ Ohio

☐ Kentucky

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, because 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 information presented 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 staff and presenters 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 overall satisfaction 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

One surveyed participant from Ohio did not answer all of the demographic questions; this customers' responses are included for the questions they answered (which show 70 total surveys) and is not included for questions they did not answer (which show 69 total surveys).

In what type of building do you live?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Single-family home, detached construction	52	74.3	74.3	74.3
Single family home, factory manufactured/modular	2	2.9	2.9	77.1
Single family, mobile home	1	1.4	1.4	78.6
Two or Three family attached residence-traditional structure	6	8.6	8.6	87.1
Apartment (4 + families)--- traditional structure	8	11.4	11.4	98.6
Other: <i>converted store front, detached construction</i>	1	1.4	1.4	100.0
Total	70	100.0	100.0	

What year was your residence built?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1959 and before	46	65.7	65.7	65.7
1960-1979	9	12.9	12.9	78.6
1980-1989	1	1.4	1.4	80.0
1990-1997	4	5.7	5.7	85.7
DK/NS	10	14.3	14.3	100.0
Total	70	100.0	100.0	

How many rooms are in your home (excluding bathrooms, but including finished basements)?

	Frequency	Percent	Valid Percent	Cumulative Percent
4	11	15.7	15.7	15.7
5	22	31.4	31.4	47.1
6	16	22.9	22.9	70.0
7	7	10.0	10.0	80.0
Valid 8	4	5.7	5.7	85.7
9	3	4.3	4.3	90.0
1-3	4	5.7	5.7	95.7
10 or more	3	4.3	4.3	100.0
Total	70	100.0	100.0	

Which of the following best describes your home's heating system?	Ohio N=70	
None	0	0.0%
Central forced air furnace	58	82.9%
Electric Baseboard	5	7.1%
Heat Pump	2	2.9%
Geothermal Heat Pump	0	0.0%
Space heater / personal furnace	3	4.3%
Other: boiler	1	1.4%
Other: wood burning stove	1	1.4%
Don't know	4	5.7%

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

How old is your heating system?

	Frequency	Percent	Valid Percent	Cumulative Percent
0-4 years	13	18.6	18.8	18.8
5-9 years	15	21.4	21.7	40.6
10-14 years	2	2.9	2.9	43.5
Valid 15-19 years	1	1.4	1.4	44.9
19 years or older	12	17.1	17.4	62.3
DK/NS	26	37.1	37.7	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

What is the primary fuel used in your heating system?

	Frequency	Percent	Valid Percent	Cumulative Percent
Electricity	16	22.9	22.9	22.9
Natural Gas	47	67.1	67.1	90.0
Oil	1	1.4	1.4	91.4
Valid Propane	1	1.4	1.4	92.9
Other: wood	1	1.4	1.4	94.3
DK/NS	4	5.7	5.7	100.0
Total	70	100.0	100.0	

What is the secondary fuel used in your primary heating system, if any?

	Frequency	Percent	Valid Percent	Cumulative Percent
Electricity	24	34.3	34.3	34.3
Natural Gas	1	1.4	1.4	35.7
Propane	1	1.4	1.4	37.1
Valid Other	6	8.6	8.6	45.7
None	30	42.9	42.9	88.6
DK/NS	8	11.4	11.4	100.0
Total	70	100.0	100.0	

Six respondents mentioned "other" types of heating fuel; these are listed below.

- *Two electric space heaters*
- *Electric for blower on stove and a gas furnace*
- *Water*
- *Wood Fireplace*
- *Not specified (N=2)*

Do you use one or more of the following to cool your home?	Ohio N=70	
None, do not cool the home	2	2.9%
Heat pump for cooling	1	1.4%
Central air conditioning	41	58.6%
Through the wall or window air conditioning unit	25	35.7%
Geothermal Heat pump	0	0.0%
Fans (ceiling, window, portable)	1	1.4%
Don't know	1	1.4%

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?

	Frequency	Percent	Valid Percent	Cumulative Percent
1	9	12.9	13.0	13.0
2	12	17.1	17.4	30.4
3	8	11.4	11.6	42.0
5	1	1.4	1.4	43.5
None	39	55.7	56.5	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

What is the fuel used in your cooling system?	Ohio N=70	
Electricity	66	94.3%
Natural Gas	0	0.0%
Oil	0	0.0%
Propane	0	0.0%
None (no cooling system)	2	2.9%
DK/NS	2	2.9%

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

How old is your cooling system?

	Frequency	Percent	Valid Percent	Cumulative Percent
0-4 years	19	27.1	27.5	27.5
5-9 years	15	21.4	21.7	49.3
10-14 years	2	2.9	2.9	52.2
15-19 years	1	1.4	1.4	53.6
19 years or older	8	11.4	11.6	65.2
DK/NS	22	31.4	31.9	97.1
Do not have	2	2.9	2.9	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

What is the fuel used by your water heater?	Ohio N=70	
Electricity	28	40.0%
Natural Gas	33	47.1%
Oil	0	0.0%
Propane	0	0.0%
No water heater	0	0.0%
DK/NS	10	14.3%

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

How old is your water heater?

	Frequency	Percent	Valid Percent	Cumulative Percent
0-4 years	13	18.6	18.8	18.8
5-9 years	12	17.1	17.4	36.2
10-14 years	9	12.9	13.0	49.3
Valid 15-19 years	5	7.1	7.2	56.5
More than 19 years	8	11.4	11.6	68.1
DK/NS	22	31.4	31.9	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

What type of fuel do you use for indoor cooking on the stovetop or range?	Ohio N=70	
Electricity	44	62.9%
Natural Gas	25	35.7%
Oil	0	0.0%
Propane	0	0.0%
None (no stove)	0	0.0%
DK/NS	1	1.4%

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?	Ohio N=70	
Electricity	44	62.9%
Natural Gas	25	35.7%
Oil	0	0.0%
Propane	0	0.0%
None (no oven)	0	0.0%
DK/NS	1	1.4%

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

What type of fuel do you use for clothes drying?	Ohio N=70	
Electricity	58	82.9%
Natural Gas	3	4.3%
Oil	0	0.0%
Propane	0	0.0%
None (no dryer)	7	10.0%
DK/NS	2	2.9%

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

About how many square feet of living space are in your home?

	Frequency	Percent	Valid Percent	Cumulative Percent
500 to 999	12	17.1	17.1	17.1
1000 to 1499	11	15.7	15.7	32.9
1500 to 1999	11	15.7	15.7	48.6
Valid 2000 to 2499	3	4.3	4.3	52.9
2500 to 2999	2	2.9	2.9	55.7
DK/NS	31	44.3	44.3	100.0
Total	70	100.0	100.0	

Do you own or rent your home?

	Frequency	Percent	Valid Percent	Cumulative Percent
Own	39	55.7	56.5	56.5
Valid Rent	30	42.9	43.5	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

How many levels are in your home (not including your basement)?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid One	39	55.7	55.7	55.7
Two	30	42.9	42.9	98.6
Three	1	1.4	1.4	100.0
Total	70	100.0	100.0	

Does your home have a heated or unheated basement?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Heated	28	40.0	40.6	40.6
Unheated	13	18.6	18.8	59.4
No basement	28	40.0	40.6	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

Does your home have an attic?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	44	62.9	63.8	63.8
No	23	32.9	33.3	97.1
DK/NS	2	2.9	2.9	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

Are your central air/heat ducts located in the attic?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	4.3	4.3	4.3
	No	41	58.6	59.4	63.8
	N/A	19	27.1	27.5	91.3
	DK/NS	6	8.6	8.7	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

Does your house have cold drafts in the winter?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	38	54.3	55.1	55.1
	No	29	41.4	42.0	97.1
	DK/NS	2	2.9	2.9	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

Does your house have sweaty windows in the winter?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	24.3	24.6	24.6
	No	49	70.0	71.0	95.7
	DK/NS	3	4.3	4.3	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

Do you notice uneven temperatures between the rooms in your home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	40	57.1	58.0	58.0
	No	27	38.6	39.1	97.1
	DK/NS	2	2.9	2.9	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

Does your heating system keep your home comfortable in winter?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	60	85.7	87.0	87.0
	No	8	11.4	11.6	98.6
	DK/NS	1	1.4	1.4	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

Does your cooling system keep your home comfortable in summer?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	63	90.0	91.3	91.3
	No	4	5.7	5.8	97.1
	DK/NS	2	2.9	2.9	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

Do you have a programmable thermostat?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	44.3	44.9	44.9
	No	35	50.0	50.7	95.7
	DK/NS	3	4.3	4.3	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

How many thermostats are there in your home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	1.4	1.4	1.4
	1	57	81.4	81.4	82.9
	2	9	12.9	12.9	95.7
	4 or more	2	2.9	2.9	98.6
	DK/NS	1	1.4	1.4	100.0
	Total	70	100.0	100.0	

What temperature is your thermostat set to on a typical summer weekday afternoon?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 69 degrees	6	8.6	8.7	8.7
	69-72 degrees	22	31.4	31.9	40.6
	73-78 degrees	18	25.7	26.1	66.7
	Higher than 78 degrees	6	8.6	8.7	75.4
	Off	13	18.6	18.8	94.2
	DK/NS	4	5.7	5.8	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

What temperature is your thermostat set to on a typical winter weekday afternoon?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 67 degrees	2	2.9	2.9	2.9
67-70 degrees	26	37.1	37.7	40.6
71-73 degrees	17	24.3	24.6	65.2
74-77 degrees	12	17.1	17.4	82.6
78 degrees or higher	6	8.6	8.7	91.3
Off	1	1.4	1.4	92.8
DK/NS	5	7.1	7.2	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

Do you have a swimming pool, hot-tub or spa?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	4	5.7	5.7	5.7
No	66	94.3	94.3	100.0
Total	70	100.0	100.0	

Would a two-degree increase in the summer afternoon temperature in your home affect your comfort

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not at all	32	45.7	46.4	46.4
Slightly	17	24.3	24.6	71.0
Moderately, or	13	18.6	18.8	89.9
Greatly	5	7.1	7.2	97.1
DK/NS	2	2.9	2.9	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

How many people live in this home?

	Frequency	Percent	Valid Percent	Cumulative Percent
1	27	38.6	39.1	39.1
2	16	22.9	23.2	62.3
3	9	12.9	13.0	75.4
4	12	17.1	17.4	92.8
5	2	2.9	2.9	95.7
6	1	1.4	1.4	97.1
8 or more	2	2.9	2.9	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

How many of them are teenagers?

	Frequency	Percent	Valid Percent	Cumulative Percent
0	59	84.3	85.5	85.5
1	7	10.0	10.1	95.7
2	2	2.9	2.9	98.6
3	1	1.4	1.4	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

How many persons are usually home on a weekday afternoon?

	Frequency	Percent	Valid Percent	Cumulative Percent
0	2	2.9	2.9	2.9
1	31	44.3	44.9	47.8
2	25	35.7	36.2	84.1
3	5	7.1	7.2	91.3
4	2	2.9	2.9	94.2
5	3	4.3	4.3	98.6
Prefer not to answer	1	1.4	1.4	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

Are you planning on making any large purchases to improve energy efficiency in the next 3 years?

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	10	14.3	14.5	14.5
No	54	77.1	78.3	92.8
DK/NS	5	7.1	7.2	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

What is your age group?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18-34	4	5.7	5.8	5.8
35-49	12	17.1	17.4	23.2
50-59	18	25.7	26.1	49.3
60-64	8	11.4	11.6	60.9
65-74	14	20.0	20.3	81.2
Over 74	13	18.6	18.8	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

Please indicate your annual household income

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Under \$15,000	21	30.0	30.4	30.4
\$15,000-\$29,999	12	17.1	17.4	47.8
\$30,000-\$49,999	8	11.4	11.6	59.4
\$50,000-\$74,999	5	7.1	7.2	66.7
\$75,000-\$100,000	3	4.3	4.3	71.0
Prefer Not to Answer	15	21.4	21.7	92.8
DK/NS	5	7.1	7.2	100.0
Total	69	98.6	100.0	
Missing System	1	1.4		
Total	70	100.0		

Non-Participant Survey Households

In what type of building do you live?

	Frequency	Percent	Valid Percent	Cumulative Percent
Single-family home, detached construction	16	31.4	31.4	31.4
Two or Three family attached residence-traditional structure	14	27.5	27.5	58.8
Valid Apartment (4 + families)---traditional structure	18	35.3	35.3	94.1
Other: <i>duplex</i>	1	2.0	2.0	96.1
Other: <i>townhouse</i>	1	2.0	2.0	98.0
Not specified	1	2.0	2.0	100.0
Total	51	100.0	100.0	

What year was your residence built?

	Frequency	Percent	Valid Percent	Cumulative Percent
1959 and before	22	43.1	43.1	43.1
1960-1979	5	9.8	9.8	52.9
Valid 1990-1997	1	2.0	2.0	54.9
2008-present	1	2.0	2.0	56.9
DK/NS	22	43.1	43.1	100.0
Total	51	100.0	100.0	

How many rooms are in your home (excluding bathrooms, but including finished
basements)?

	Frequency	Percent	Valid Percent	Cumulative Percent
1 to 3	12	23.5	23.5	23.5
4	11	21.6	21.6	45.1
5	8	15.7	15.7	60.8
6	7	13.7	13.7	74.5
7	3	5.9	5.9	80.4
10 or more	9	17.6	17.6	98.0
DK/NS	1	2.0	2.0	100.0
Total	51	100.0	100.0	

Which of the following best describes your home's heating system?	Ohio N=51	
None	0	0.0%
Central forced air furnace	35	68.6%
Electric Baseboard	7	13.7%
Heat Pump	2	3.9%
Geothermal Heat Pump	0	0.0%
Radiators / hot water heat	6	11.8%
Space heater / personal furnace	3	5.9%
Other: listed below	2	3.9%
Don't know	1	2.0%

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

Two respondents mentioned "other" types of heating system; these are listed below.

- Electric furnace
- Two furnaces

How old is your heating system?

	Frequency	Percent	Valid Percent	Cumulative Percent
0-4 years	6	11.8	11.8	11.8
5-9 years	6	11.8	11.8	23.5
10-14 years	3	5.9	5.9	29.4
Valid 15-19 years	5	9.8	9.8	39.2
19 years or older	8	15.7	15.7	54.9
DK/NS	23	45.1	45.1	100.0
Total	51	100.0	100.0	

What is the primary fuel used in your heating system?

	Frequency	Percent	Valid Percent	Cumulative Percent
Electricity	9	17.6	17.6	17.6
Valid Natural Gas	35	68.6	68.6	86.3
DK/NS	7	13.7	13.7	100.0
Total	51	100.0	100.0	

What is the secondary fuel used in your primary heating system, if any?

	Frequency	Percent	Valid Percent	Cumulative Percent
Electricity	12	23.5	23.5	23.5
Valid None	31	60.8	60.8	84.3
DK/NS	8	15.7	15.7	100.0
Total	51	100.0	100.0	

Do you use one or more of the following to cool your home?	Ohio N=51	
None, do not cool the home	4	7.8%
Heat pump for cooling	1	2.0%
Central air conditioning	18	35.3%
Through the wall or window air conditioning unit	29	56.9%
Geothermal Heat pump	0	0.0%
Fans (ceiling, window, portable)	3	5.9%
Don't know	0	0.0%

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

How many window-unit or through the wall air conditioner(s) do you use?

	Frequency	Percent	Valid Percent	Cumulative Percent
1	15	29.4	29.4	29.4
2	8	15.7	15.7	45.1
3	4	7.8	7.8	52.9
4	3	5.9	5.9	58.8
10210	21	41.2	41.2	100.0
Total	51	100.0	100.0	

What is the fuel used in your cooling system?	Ohio N=51	
Electricity	40	78.4%
Natural Gas	3	5.9%
Oil	0	0.0%
Propane	0	0.0%
None (no cooling system)	3	5.9%
DK/NS	6	11.8%

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

How old is your cooling system?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0-4 years	15	29.4	29.4	29.4
5-9 years	11	21.6	21.6	51.0
10-14 years	2	3.9	3.9	54.9
15-19 years	4	7.8	7.8	62.7
19 years or older	1	2.0	2.0	64.7
DK/NS	14	27.5	27.5	92.2
Do not have	4	7.8	7.8	100.0
Total	51	100.0	100.0	

What is the fuel used by your water heater?	Ohio N=51	
Electricity	7	13.7%
Natural Gas	24	47.1%
Oil	0	0.0%
Propane	0	0.0%
Other: <i>two water heaters</i>	1	2.0%
No water heater	0	0.0%
DK/NS	20	39.2%

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

How old is your water heater?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0-4 years	7	13.7	13.7	13.7
5-9 years	6	11.8	11.8	25.5
10-14 years	4	7.8	7.8	33.3
15-19 years	2	3.9	3.9	37.3
More than 19 years	3	5.9	5.9	43.1
DK/NS	29	56.9	56.9	100.0
Total	51	100.0	100.0	

What type of fuel do you use for indoor cooking on the stovetop or range?	Ohio N=51	
Electricity	25	49.0%
Natural Gas	27	52.9%
Oil	0	0.0%
Propane	0	0.0%
None (no stove)	0	0.0%
DK/NS	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?	Ohio N=51	
Electricity	25	49.0%
Natural Gas	27	52.9%
Oil	0	0.0%
Propane	0	0.0%
None (no oven)	0	0.0%
DK/NS	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?	Ohio N=51	
Electricity	25	49.0%
Natural Gas	7	13.7%
Oil	0	0.0%
Propane	0	0.0%
None (no dryer)	19	37.3%
DK/NS	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?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 500	2	3.9	3.9	3.9
500 to 999	7	13.7	13.7	17.6
1000 to 1499	2	3.9	3.9	21.6
1500 to 1999	2	3.9	3.9	25.5
2000 to 2499	3	5.9	5.9	31.4
2500 to 2999	3	5.9	5.9	37.3
3500 to 3999	1	2.0	2.0	39.2
4000 or more	1	2.0	2.0	41.2
DK/NS	30	58.8	58.8	100.0
Total	51	100.0	100.0	

Do you own or rent your home?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Own	17	33.3	33.3	33.3
Rent	34	66.7	66.7	100.0
Total	51	100.0	100.0	

How many levels are in your home (not including your basement)?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid One	22	43.1	43.1	43.1
Two	15	29.4	29.4	72.5
Three	14	27.5	27.5	100.0
Total	51	100.0	100.0	

Does your home have a heated or unheated basement?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Heated	25	49.0	49.0	49.0
Valid Unheated	13	25.5	25.5	74.5
Valid No basement	13	25.5	25.5	100.0
Total	51	100.0	100.0	

Does your home have an attic?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	16	31.4	31.4	31.4
Valid No	35	68.6	68.6	100.0
Total	51	100.0	100.0	

Are your central air/heat ducts located in the attic?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	5	9.8	9.8	9.8
Valid No	9	17.6	17.6	27.5
Valid N/A	30	58.8	58.8	86.3
Valid DK/NS	7	13.7	13.7	100.0
Total	51	100.0	100.0	

Does your house have cold drafts in the winter?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	39	76.5	76.5	76.5
Valid No	12	23.5	23.5	100.0
Total	51	100.0	100.0	

Does your house have sweaty windows in the winter?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	18	35.3	35.3	35.3
No	32	62.7	62.7	98.0
DK/NS	1	2.0	2.0	100.0
Total	51	100.0	100.0	

Do you notice uneven temperatures between the rooms in your home?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	36	70.6	70.6	70.6
No	15	29.4	29.4	100.0
Total	51	100.0	100.0	

Does your heating system keep your home comfortable in winter?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	35	68.6	68.6	68.6
No	14	27.5	27.5	96.1
DK/NS	2	3.9	3.9	100.0
Total	51	100.0	100.0	

Does your cooling system keep your home comfortable in summer?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	39	76.5	76.5	76.5
No	10	19.6	19.6	96.1
DK/NS	2	3.9	3.9	100.0
Total	51	100.0	100.0	

Do you have a programmable thermostat?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	31	60.8	60.8	60.8
No	18	35.3	35.3	96.1
DK/NS	2	3.9	3.9	100.0
Total	51	100.0	100.0	

How many thermostats are there in your home?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0	8	15.7	15.7	15.7
1	34	66.7	66.7	82.4
2	4	7.8	7.8	90.2
3	3	5.9	5.9	96.1
4 or more	2	3.9	3.9	100.0
Total	51	100.0	100.0	

What temperature is your thermostat set to on a typical summer weekday afternoon?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 69 degrees	7	13.7	13.7	13.7
69-72 degrees	8	15.7	15.7	29.4
73-78 degrees	3	5.9	5.9	35.3
Off	23	45.1	45.1	80.4
DK/NS	10	19.6	19.6	100.0
Total	51	100.0	100.0	

What temperature is your thermostat set to on a typical winter weekday afternoon?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 67 degrees	3	5.9	5.9	5.9
67-70 degrees	15	29.4	29.4	35.3
71-73 degrees	6	11.8	11.8	47.1
74-77 degrees	6	11.8	11.8	58.8
78 degrees or higher	9	17.6	17.6	76.5
Off	1	2.0	2.0	78.4
DK/NS	11	21.6	21.6	100.0
Total	51	100.0	100.0	

Do you have a swimming pool, hot-tub or spa?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No	51	100.0	100.0	100.0

Would a two-degree increase in the summer afternoon temperature in your home affect your comfort

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not at all	28	54.9	54.9	54.9
Slightly	11	21.6	21.6	76.5
Moderately	7	13.7	13.7	90.2
Greatly	4	7.8	7.8	98.0
DK/NS	1	2.0	2.0	100.0
Total	51	100.0	100.0	

How many people live in this home?

	Frequency	Percent	Valid Percent	Cumulative Percent
1	21	41.2	41.2	41.2
2	14	27.5	27.5	68.6
3	6	11.8	11.8	80.4
4	1	2.0	2.0	82.4
5	6	11.8	11.8	94.1
6	1	2.0	2.0	96.1
7	2	3.9	3.9	100.0
Total	51	100.0	100.0	

How many of them are teenagers?

	Frequency	Percent	Valid Percent	Cumulative Percent
0	37	72.5	72.5	72.5
1	10	19.6	19.6	92.2
2	2	3.9	3.9	96.1
3	1	2.0	2.0	98.0
4	1	2.0	2.0	100.0
Total	51	100.0	100.0	

How many persons are usually home on a weekday afternoon?

	Frequency	Percent	Valid Percent	Cumulative Percent
0	7	13.7	13.7	13.7
1	22	43.1	43.1	56.9
2	12	23.5	23.5	80.4
3	4	7.8	7.8	88.2
4	1	2.0	2.0	90.2
5	4	7.8	7.8	98.0
7	1	2.0	2.0	100.0
Total	51	100.0	100.0	

**Are you planning on making any large purchases to improve energy efficiency
in the next 3 years?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	9	17.6	17.6	17.6
No	39	76.5	76.5	94.1
DK/NS	3	5.9	5.9	100.0
Total	51	100.0	100.0	

What is your age group?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18-34	12	23.5	23.5	23.5
35-49	9	17.6	17.6	41.2
50-59	8	15.7	15.7	56.9
60-64	10	19.6	19.6	76.5
65-74	4	7.8	7.8	84.3
Over 74	4	7.8	7.8	92.2
Prefer not to answer	4	7.8	7.8	100.0
Total	51	100.0	100.0	

Please indicate your annual household income

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Under \$15,000	22	43.1	43.1	43.1
\$15,000-\$29,999	8	15.7	15.7	58.8
\$30,000-\$49,999	5	9.8	9.8	68.6
\$50,000-\$74,999	4	7.8	7.8	76.5
Prefer Not to Answer	12	23.5	23.5	100.0
Total	51	100.0	100.0	

Appendix I: Predicting Overall Program Satisfaction

Correlations and simple linear regression analysis were used to determine what drives overall satisfaction in this program. The conclusions from this analysis are listed below, followed by the statistical analyses which support these conclusions.

- Consistently, satisfaction with the measures received is the most important predictor of program satisfaction. Since satisfaction ratings skew very high (most customers give “9” or “10 out of 10” ratings), this indicates that customers who received measures they are not satisfied with are significantly less satisfied with the program as a whole.
- Satisfaction with the convenience of enrollment also has a significant relationship with program satisfaction; again, this indicates that customers who had less than satisfactory enrollment experiences tend to be less satisfied with the program.
- Ratings of the auditors and Duke Energy overall are not significant in the presence of the two significant predictors listed above, nor is the number of measures received, nor whether or not the customer attended the community meeting.
- In conclusion, if there is a need to improve program satisfaction, priority should be given to improving the quality of measures followed by improving the enrollment process.

Table 110 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 and the measures received are highly correlated to satisfaction with the program at the $p < .01$ level (Pearson’s r), while satisfaction with Duke Energy correlates with program satisfaction at the $p < .05$ level. The number of measures received and whether the customer attended the community meeting are not significantly correlated with overall program satisfaction.

Table 110. Correlations with Overall Program Satisfaction

	Correlation with program satisfaction (Pearson’s r)	Significance
Mean satisfaction with measures received	.626	$p < .01$
Knowledge of the auditor	.531	$p < .01$
Helpfulness of the auditor	.453	$p < .01$
Convenience of enrolling in the program	.448	$p < .01$
Satisfaction with Duke Energy	.301	$p < .05$
Number of measures received	.107	-
Attended community meeting	.087	-

Next, simple linear regressions were performed to predict overall participant satisfaction with the program using ratings of satisfaction for eight 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 consistent results, as both indicate the aspects of the program that have the most influence on overall program satisfaction are being satisfied with the measures received and being satisfied 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 111, 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 multicollinearity⁴¹ 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 two predictors (and removed none) in order to arrive at the final regression equation in two steps.

Table 111. Stepwise Regression to Predict Overall Program Satisfaction (N=60⁴²)

Predictor	Beta coefficient	Significance
Mean satisfaction with measures received	.527	$p < .01$
Convenience of enrolling in the program	.283	$p < .05$

The two-predictor regression model produced using the stepwise method predicts 52.9% 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.

Table 112. “Complete” Regression to Predict Overall Program Satisfaction (N=60)

Predictor	Beta coefficient	Significance
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⁴¹ Multicollinearity is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a non-trivial degree of accuracy.

⁴² Though there are 70 participants in this survey, the number of valid cases used for regression models is 60 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; ten customers who are missing one or more ratings were excluded.

Predictor	Beta coefficient	Significance
Mean satisfaction with measures received	.462	p<.01
Convenience of enrolling in the program	.224	p<.10
Satisfaction with Duke Energy	.146	-
Knowledge of the auditor	.139	-
Attended community meeting	.107	-
Number of measures received	.058	-
Helpfulness of the auditor	-.049	-

The “complete” eight-predictor regression model predicts 56.4% 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 3.5% over the stepwise model. The negative beta coefficient seen in this model is not significantly different from zero at p<.10 or better.

Comparing the correlations in Table 110 (relationship between predictors and program satisfaction one-at-a-time) with the regression model in Table 112 (relationship between predictors and program satisfaction all-at-once) indicates that most of these predictors become non-significant in the presence of the most significant predictors in the regression model: satisfaction with the measures received and the convenience of enrollment.

Appendix J: Explanations of Participant Satisfaction Ratings

Very Satisfied (n=59)

- *I am very satisfied because the auditor was so nice. He graciously took the time to answer all questions and provide information.*
- *I am very grateful to have these new things free of cost.*
- *I received an education on how to save energy. I learned some tricks of the trade.*
- *The auditors did what they said they would and everything they installed works.*
- *I was satisfied with everything that they done, everything they showed us, and everything they told us: all of the instructions they gave us were good.*
- *I don't think I could ask for more, they told us and showed us what they were going to do, some things we could do ourselves, others we couldn't. The whole program helped us as far as giving us some products that our home could benefit from in an energy efficient manner.*
- *I was very satisfied because the auditor was helpful, congenial, and explained what he was there to do.*
- *Overall, participating in the program was the easiest thing to do. I am saving money on my energy bills as a result of participating in the program and I'm saving up to replace the ancient hot water heater.*
- *I was very happy when they came to the house to do things that will help conserve energy, which our house really needed. It was great that they are helping me conserve.*
- *I really needed these things and the auditor was really helpful.*
- *I was very satisfied because it made me happy and I was grateful for the help.*
- *I was very satisfied because it's such a good program. The auditor did a commendable job and provided useful information about energy efficiency. I was grateful for all the help.*
- *We really appreciated learning about the newer energy efficiency items that are on the market. We were unaware of low flow shower heads, switch plate wall thermometers, and winter kits for window air conditioners. The auditor was so nice and kind and very helpful.*
- *It was a nonprofit benefit program to me that was offered educational-wise, assistance-wise, and environmental-wise. My energy company is offering me new technology that helps me with my bills. In this world, we can complain, but it's nice for companies to work with you. It was a great program. It's still working for me and I have no complaints. I can still reap the benefits. It's been comfortable. It's made it simpler. I don't have to get that ladder out and change light bulbs. I wish they'd offer me more programs like this one!*

- *I'm real satisfied because everything went well and I liked talking to the auditor.*
- *Everyone was nice and they wanted to help us make the home more efficient.*
- *Because they did everything I expected them to do in and around my home. Plus, I really think that these things are helping me save energy and money.*
- *I thought it was really nice for them to have a community setting where we could talk to the representatives and ask questions. The dinner thing they had was nice. As far as the products, we can really tell the difference in our water, gas, and electric bill. The light bulbs do seem to help. The basement isn't as drafty since they put the foam around the pipes.*
- *I am very satisfied because the Program helped reduce my heating and cooling costs.*
- *It was well run program. There were never any problems. Everything was easy and effortless. I liked getting all the free items that are helping keep my bill lower.*
- *The person who was handing out the door hangings fully explained the program to me even though I was reluctant to listen to what he was offering and he then set up a date for the auditor to come back to the house. The auditor explained everything that he was doing and why so I would know how to do them myself.*
- *I am very satisfied because the Program gave me free stuff, reduced my energy bill, and helped the environment.*
- *There wasn't anything to dislike so I'm very satisfied.*
- *I am very satisfied because the Program was informative, the auditor provided identification, and he was courteous, kind, and prompt.*
- *It was nice because the auditor was very helpful. He told us about vampiric power loss and how to prevent it. Some of the newer energy saving items we probably should have known about but it's hard to find out all that stuff with dealing with day-to-day life. It was great that the auditor was there to do the install of the stuff for us so there were no mistakes.*
- *I am very satisfied because of the difference it made in reducing the draftiness and the electric bill.*
- *It was very convenient and it was helpful.*
- *The personnel at the meeting were very informative and there were experienced people who did the work. The personnel who came into the home were very courteous and informative.*
- *I'm very satisfied because of the information that they offered and making you aware of just small things that you could do to save energy.*
- *It was fine. What can I complain about?*
- *I needed those things and am grateful Duke provided them free of charge.*
- *The improvements have just changed the whole atmosphere with the house, I can definitely tell a difference with the energy bill. Also, the light bulbs are not producing as*

much heat as the incandescent bulbs, which helps with the overall cooling comfort of the home.

- *I don't have any complaints about the program. Duke Energy made the investment to do the program and it is saving energy and I am happy as a citizen of this region to be helping in the efforts of saving energy.*
- *I like that my apartment is even more energy efficient than it had been. I think it's a great thing.*
- *It was a good program. I got a lot done not only with the house we live in but with some rental properties we own.*
- *It was a great program and the people were extremely nice which made it easy to have them in our home.*
- *I am very satisfied because of what they did for me. I was trying to get everything working and keep my water hot. I didn't know how to fix anything or what I was going to do. He just made everything work well again. I like what they did and how they explained everything to me. They were some great guys that came out here. Don't get rid of them!*
- *They've helped lower the cost of the bulbs, which is going to lower my expense. I got the aerators checked and replaced. They did everything they were able to do with this program.*
- *The program helped me out with my electric stuff.*
- *I didn't know before about changing showerheads or sink faucets to help on energy savings. Also, the air filters were a lot better than what we were buying. If the program hadn't taken care of the windows they would not have been done. The same goes for the foam stuff under the door.*
- *I've been real pleased with the program, I have absolutely no complaints.*
- *The program did what they said it was going to do. The auditor knew what he was doing. I did not have to stand over him and keep an eye on him.*
- *This is an old neighborhood and I'm very grateful for anything they do to help.*
- *It's a good program. They lowered my gas and electric bill and it's helpful for everybody, even if you're not on a fixed income.*
- *I think it's an excellent program and everyone was very nice.*
- *I learned more about how to weatherize my house. My home is now more comfortable. It's warmer in the winter and cooler in the summer.*
- *It was great to have someone check the energy efficiency of the house and actually do the things that needed to be done. My landlord wouldn't and I can't afford it and I'm not physically able to do those things on my own.*
- *All of the people involved in the program were just very informational; the auditor took his time and talked to me about the program and what sorts of things he was doing in my home and he shared with me some valuable information about saving energy in my home.*
- *They did a good job making the house more efficient.*

- *It's a well-run program that can help save people money on their bills. They came out when they said they would and the auditor cleaned up after himself. While he was here, he even convinced one of my neighbors to participate in the program.*
- *I needed all of those things to save money on my bill, this is a very good program.*
- *I got a bunch of free stuff that will help with saving energy in my home. The program was well run. The meeting was very informative and the auditor was friendly and knowledgeable.*
- *I believe it's a good program to help single moms and dads be able to budget and provide for their children. I believe it's a good program to help save money.*
- *The program seemed helpful. The guys who came to the house seemed to know what they were doing; they were not clueless.*
- *I thought the program was very helpful and I gained a lot of information about how to save energy. It's good that Duke Energy is providing the program to their customers.*
- *I don't have any complaints about the program. I'm happy all around. They helped me with making my apartment more energy efficient and I'm grateful for the free stuff.*
- *Well, they did me good, I can't complain about the services I got for free and are now helping me save money.*
- *They did so much and the gentleman who came out was so nice. He explained everything to me. Everybody was just very caring and very nice. Even the person I talked to when I signed up was nice. I just thought everybody was very nice.*
- *It was a benefit to me; it helped reduce my energy bill and provided me with things that I needed for free.*

Somewhat Satisfied (n=8)

- *They don't really give you the basic, necessary information you need to move forward. They just tell you what they need to and that it's free, then you get there and it's a whole different thing.*
- *It's a great and helpful program but I think it could be an even better program if the CFL bulbs were brighter and the auditor used better tape on the hot water heater.*
- *The water pressure in the kitchen isn't as good after the aerator was installed and the water isn't hot enough since the water heater temperature has been turned down. The auditor could only caulk two windows but we needed more done. I'm still satisfied because the entire service was free.*
- *I like that they offered the program in the first place. The auditor was a nice guy who checked all this stuff in my home for energy efficiency, even though I already have done most of this stuff myself. The installations that the auditor did were clean and done in a timely manner.*
- *The auditors were very courteous and helpful.*
- *I think they did a good job.*

- *I am happy to have things that save money.*
- *I am satisfied, that's all.*

Neither Satisfied nor Dissatisfied (n=1)

- *It didn't make any difference compared to what I was already using. These light bulbs last a little longer, I guess.*

Somewhat Dissatisfied (n=0)

Very Dissatisfied (n=0)

Don't know / not specified (n=2)


- No comments provided

Appendix K: Auditor Training Guide



Duke RNP 2014
Technican Manual.pdf

Appendix L: Flyer at Kick-off Event



We want to help you and your neighbors in the Village of New Miami save money and energy at home.

Please join us to learn more about the **FREE** walk-through energy assessments we'll be performing in your neighborhood through our Residential Neighborhood Program. There will be demonstrations of our **FREE energy-saving products**, a **FREE meal** and a chance to **WIN** a **\$25 gift card**.

New Miami High School Cafeteria
600 Seven Mile Avenue
Hamilton, OH 45011

Tuesday, February 18, 2014
6 - 7:30 p.m.


RSVP by calling 855-RNP-DUKE

The Residential Neighborhood Program is a **FREE** walk-through energy assessment and improvement program for qualified customers.

In the days following this neighborhood event, an Energy Specialist will visit your house to perform a walk-through assessment that will show you where your home is wasting energy.

During the **FREE** walk-through assessment, we'll also provide you with up to 16 energy-saving products and services that could help you save money on your electric bill. These energy-saving measures can cost up to \$210, but we'll give them to you for free – and we'll install them, too. Services provided are based on your home's specific energy usage and needs.

Learn more at duke-energy.com/rnp



Residential Neighborhood Program | Use less. Save more!

Appendix M: EISA Schedule and CFL Baseline

As stipulated in the Energy Independence and Security Act (EISA) of 2007, manufacturers of standard incandescent screw-based light bulbs must begin producing bulbs which use at least 27% less energy for a similar lumen output. The law is being phased in as seen in Table 113. As a result, it is necessary to adjust the baseline wattage that a CFL should be evaluated against throughout its effective useful life (EUL).

Table 113. EISA Schedule

Current Bulb Wattage	New EISA Compliant Wattage	Standard Effective Date
100	72	1/1/2012
75	53	1/1/2013
60	43	1/1/2014
40	29	1/1/2014

TecMarket Works has developed a dynamic approach to estimating future CFL baseline wattages wherein each year of a CFL's EUL is prescribed a baseline value based on the most current research on the availability of standard incandescent light bulbs in the marketplace. Much of this research, to this point, has focused on 100-watt bulbs as they were the first to phase out and therefore offer the most robust data. The effect of EISA on the availability of other incandescent bulb wattages as they are phased out is expected to be similar.

Such an approach is necessary because of the difference in EUL between the efficient and baseline technologies in question (one year for an incandescent and five years for a CFL). In the absence of the program, it is assumed that each year a new incandescent bulb would have to be purchased. The average wattage of this purchase decreases each year with the eroding availability of the standard incandescent bulbs due to EISA. Table 114 contains the baseline wattages from which savings are estimated.

Table 114. Baselines by Year and Wattage

100-watt			75-watt			60-watt			40-watt		
Year	Phase	Baseline	Year	Phase	Baseline	Year	Phase	Baseline	Year	Phase	Baseline
2012	0%	100	2012	0%	75	2012	0%	60	2012	0%	40
2013	55%	84.6	2013	0%	75	2013	0%	60	2013	0%	40
2014	60%	83.2	2014	60%	61.8	2014	0%	60	2014	0%	40
2015	70%	80.4	2015	80%	57.4	2015	55%	50.65	2015	60%	33.4
2016	80%	77.6	2016	100%	53	2016	60%	49.8	2016	80%	31.2
2017	90%	74.8	2017	100%	53	2017	70%	48.1	2017	100%	29
2018	100%	72	2018	100%	53	2018	80%	46.4	2018	100%	29

A study completed in January of 2013 found that nearly half of retailers surveyed (44.6% or 45 out of 101) still have a supply of 100-watt incandescent light bulbs in stock⁴³. The primary conclusion of this study was that 100-watt bulb availability for 2012 was not substantially impacted by EISA to the degree that energy impact baseline calculations should be adjusted for savings estimations in 2012, but that a phased-in calculation approach for 2013 and beyond is warranted. Accordingly, baselines are discounted starting in the year following the standard effective date of the respective wattage's phase out per EISA, not in the same year.

An additional adjustment was considered that would further delay the effects of EISA to account for standard wattage incandescent bulbs that remain in storage beyond the time that they are no longer available for purchase. A review of Duke Energy's residential efficiency program evaluations for 2012 and 2013 revealed that the number of incandescent bulbs stored in a typical home is insufficient to justify the use of such an adjustment.

A more recent study has found that 100-watt bulbs reached 24% availability seven quarters after the EISA standard took effect⁴⁴. This approach assumes a 10% reduction in availability, for each year after the second until 100-watt bulbs are completely phased out. At this point, baseline wattage is set at EISA's minimally compliant wattage, taken from Table 113.

⁴³ Indiana Statewide Core Program Evaluation Team. "Indiana 2012 EISA Bulb Availability Study." June 20, 2013. Pg. 3.

⁴⁴ Cadmus Group. "Summary of EISA2007 Lighting Survey Results for DP&L Q1, Q2, &Q3 2013." Memorandum. October 11, 2013. Pg. 2.

Appendix N: Deemed vs. Evaluated Engineering Parameters



Measure	Parameter	Deemed Value	Report Value	Reason for Difference and Data Source
CFL	ISR	86%	94%	participant survey data
CFL	Watts _{base}	13,18	13,18	
CFL	Watts _{ee}	55.25,76.5	59.16	average from participant survey data
CFL	HOURS	2.85	2.90	average from participant survey data
CFL	CF	0.11	0.11	
CFL	WHF _e	1.07	0.9942	appliance saturation data and DOE2 simulation
CFL	WHF _d	1.21	1.167	appliance saturation data and DOE2 simulation
Low-Flow Showerhead	ISR	100%	94.6%	participant survey data
Low-Flow Showerhead	GPM _{base}	2.87	2.87	
Low-Flow Showerhead	GPM _{ee}	2.00	1.75	actual flowrate of unit distributed
Low-Flow Showerhead	ΔT	46.1	46.1	
Low-Flow Showerhead	RE	0.98	0.98	
Low-Flow Showerhead	CF	0.00371	0.00371	
Faucet Aerator	ISR	100%	98.1%	participant survey data
Faucet Aerator	GPM _{base}	2.2	2.2	
Faucet Aerator	GPM _{ee}	1.5	1.5	
Faucet Aerator	#people	2.46	2.46	
Faucet Aerator	gals/day	10.9	10.9	
Faucet Aerator	DR	50%	50%	
Faucet Aerator	F/home	3.5	3.5	
Faucet Aerator	Tft	80	80	
Faucet Aerator	Tmains	53.9	53.9	
Faucet Aerator	RE	0.98	0.98	

TecMarket Works

Faucet Aerator	CF	0.00262	0.00262	
Hot Water Pipe Wrap	ISR	100%	100.0%	
Hot Water Pipe Wrap	Rexist	1	1	
Hot Water Pipe Wrap	Rnew	5	5	
Hot Water Pipe Wrap	L	5	7.16	average from installation data
Hot Water Pipe Wrap	C	0.196	0.196	
Hot Water Pipe Wrap	ΔT	65	65	
Hot Water Pipe Wrap	RE	0.98	0.98	
DHW Tank Wrap and Temp Turn-Down	ISR	100%	100.0%	
DHW Tank Wrap and Temp Turn-Down	UAbase	4.1	4.1	
DHW Tank Wrap and Temp Turn-Down	UAee	3.3	3.3	
DHW Tank Wrap and Temp Turn-Down	ΔT	65	65	
DHW Tank Wrap and Temp Turn-Down	RE	0.98	0.98	
Air Filter Replacement	ISR	N/A	91.1%	participant survey data
Air Filter Replacement	Pdirty	3.9%	3.9%	
Air Filter Replacement	Pclean	0.33%	0.33%	

Air sealing and infiltration reduction measures do not appear in the above table. The TRM approach to estimating impact for these measures requires that initial and final leakage rates be tested using a blower door, with the differential accounting for energy savings. As this testing was not performed, the ASHRAE tables, equations, and calculation methods were used described in the 2005 ASHRAE Fundamentals Handbook, Chapter 27, “Ventilation and Infiltration.” Tables S3.1, S3.2, S3.3, and S3.4 and shown in the *Air Sealing – Reduce Infiltration Measures* section.

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)
Residential Neighborhood Program		OH	418	0.1279	0.1380	participant	1.5%	412	0.1260	0.1360	no	8
Program wide			418	0.1279	0.1380		1.5%	412	0.1260	0.1360		8

APPENDIX E-

Low Income People Working Cooperatively Pilot Program Evaluation



People Working Cooperatively Low Income Pilot Program Evaluation Report

November 2015

Evaluation, Measurement & Verification for Duke Energy Ohio

The Cadmus Group, Inc.

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CADMUS

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Evaluation Summary

As part of a multi-program evaluation, the Cadmus team evaluated the People Working Cooperatively (PWC) Low Income (LI) Pilot Program (PWC LI Program). This report presents the findings from this evaluation, which will inform program and implementation staff about any areas for improvement for future program implementation, customer satisfaction with the program, and estimated energy savings. This report covers the process and impact evaluation findings for the evaluation period from May 28, 2013, through January 30, 2015, within the Duke Energy Ohio (DEO) jurisdiction only.

Program Description

The PWC LI Pilot Program, launched in 2013, provides whole-house weatherization services, efficient lighting, water-saving measures, and refrigerator and water heater replacement to low-income customers in DEO's service territory. PWC is also the organization that implements the PWC LI Program. To qualify, participants must live within Duke Energy's Ohio service territory, be at or below 200% of the federal poverty guideline, and pay for their own energy bill; additional requirements include receiving bills in the household member's name and having natural gas or electric heat supplied by Duke Energy. Both homeowners and renters may qualify for this program.

Evaluation Objectives

The Cadmus team's objectives for the evaluation were to estimate energy savings, document program operations, and identify any areas of improvement for future program implementation and customer experience with the program. Specifically, we conducted the following activities:

- Assessed participation level;
- Determined the installation rates for various measures and participants' satisfaction with these measures;
- Estimated program savings;
- Determined the program net-to-gross (NTG) ratio (freeridership and spillover);
- Provided recommendations for program improvement in terms of impacts; and
- Provided recommendations for program improvement in terms of process and impacts.

On April 15, 2015, the Cadmus team launched the PWC LI Program evaluation with a kick-off meeting where we discussed and confirmed the evaluation goals, clarified basic research and analyses methods, identified data required from Duke Energy, and finalized the project timeframe. We then collected program data using the following research activities, completing the work in September 2015:

- Stakeholder interviews
- Participant surveys
- Site visit data analysis
- Program data review and analysis



High-Level Impact Findings

This section summarizes the Cadmus team's key impact findings for the evaluation period.

Program Savings

The program achieved a 95% realization rate in electrically heated homes (as shown in Table 1) for a total of 455,462 kWh of verified net savings. For non-electrically heated homes (as shown in Table 1), the program achieved a 97% realization rate and a total 859,607 kWh of verified net savings. Overall, the program achieved a realization rate 96%.

Table 1. Overall PWC LI Program Savings

Measure	Expected Savings (kWh)*	Verified Savings (kWh)	Realization Rate
Electrically Heated Homes	477,809	455,462	95%
Non Electrically Heated Homes	885,356	859,607	97%
Total	1,363,165	1,315,069	96%

*Calculated based on measure installations from the PWC participant tracking database and deemed energy savings values from Attachment A in PWC's Statement of Work (Appendix E: Attachment A – Impact Assumptions for PWC Pilot). The impact values includes line losses of 6.84%, i.e., are the expected savings at the plant.

Measure Savings

Table 2 presents the total savings by measure installed for the program. Because the primary impact activity was the verification of equipment installation during site visits, the realization rate is the same as the ISR.

Table 2. Measure-Level PWC LI Program Savings

Measure - Electrically and Non-Electrically Heated Homes Combined	Reported Quantity	Expected Savings** (kWh)	Verified Savings (kWh)	Realization Rate
Refrigerator Replacement	566	714,858	714,858	100%
CFL	13,875	539,738	503,514	93%
Faucet Aerator	272	5,086	3,815	75%
Showerhead	87	13,718	8,231	60%
Tank Wrap	23	1,364	2,046	150%
Pipe Insulation	86	8,583	6,602	77%*
Water Heater Replacement	37	4,102	4,102	100%
Attic Insulation	183,536	39,237	36,715	94%
Wall Insulation	61,863	8,642	7,349	85%
Floor Insulation	26,890	4,463	4,463	100%
Air Sealing	263,417	23,374	23,374	100%
Total	N/A	1,363,165	1,315,069	96%

* Adjusted from 100% to 77% to ensure energy savings are attributed to hot water pipe insulation only.

** The impact values includes line losses of 6.84%, i.e., are the expected savings at the plant.

Net Impacts

Because this is a low-income program and the net-to-gross is defined as 100%, gross savings and net savings are equal. As shown in Table 3, based on expected savings of the program, PWC LI did not meet its net energy savings goals.

Table 3. Program Projected, Claimed, and Evaluated Net Energy Impacts

Program	Net Reported Savings (kWh)	Net Evaluated Savings (kWh)
PWC LI	1,363,165	1,315,069

As shown in Table 4, the average household achieved 853 kWh of energy savings during the evaluation period.

Table 4. Household Net Average Energy Savings

Program Year Evaluated	Average Annual Energy Savings Per Participant (kWh)
2015	853

Evaluation Parameters

The Cadmus team used a deemed savings analysis to conduct the impact evaluation of the PWC LI program. Table 5 lists parameters for these activities, along with the estimated precision values.

Table 5. Evaluated Parameters with Value, Units, and Precision and Confidence

Program	Parameter	Value	Units	Confidence/Precision
PWC LI Pilot	Participant survey responses	Varies by question	Varies by question	±9% precision at the 90% confidence interval

Evaluation Parameters

Table 6 lists the start and end dates for activities conducted for the impact evaluation.



Table 6. Sample Period Start and End Dates

Evaluation Component	Dates	Total
Stakeholder Interviews	May – June, 2015	3
Participant Surveys	August 6 – 13, 2015	80
Participant Site Visits	August – September, 2015	20
Program Participants	May 2013 - January 2015	1,541

High-Level Process Findings

The section summarizes Cadmus’ key process findings for the evaluation period.

Process Methods

Cadmus interviewed the following staff from Duke Energy Ohio, WIN, and PWC:

- Duke Energy Ohio program staff
 - Former Program Manager (5/4/15)
- WIN
 - Home Ownership Trainer (5/29/15)
- PWC
 - President & CEO (6/4/15)

The Cadmus team conducted surveys with 80 randomly selected Duke Energy Ohio’s customers who received measures through the program. We fielded the survey from August 6 to August 13, 2015.

Stakeholder Feedback

The Cadmus team focused the interviews with program stakeholders (program staff, implementer, and implementer verifier) on elements of the program process and delivery, communication, challenges faced and opportunities for future program improvement. Stakeholders reported that the program has been running smoothly, although there have been some gaps in communication.

Stakeholders reported minimal barriers to the program; however, stakeholders were unclear on how to take the program beyond the pilot stage. All stakeholders reported that the program is operating as planned and that it is likely to run smoothly next year.

Participant Survey

Cadmus asked survey respondents a series of questions designed to understand their satisfaction with the program, degree of measure installation, and recommendations on how to improve the program. As shown in Table 7, the survey focused on participant awareness, measure verification, satisfaction, feedback, and demographics.

Table 7. Survey Instrument Detail

Survey Topic	Question Set Description	Percentage
Awareness	Reasons for participation	17%
Measure Verification	Installation of measures installed by PWC	30%
Participant Satisfaction	Program features and delivery	30%
Participant Feedback	Recommendations to improve the program	3%
Demographics	Household and customer characteristics	20%

Participant Awareness

Survey respondents most often heard about the program from a friend or relative, or on television or radio (50% and 16%, respectively). Nearly half of the survey respondents (45%) stated that a comfort issue (e.g., controlling the home temperature or making the house less drafty) prompted their participation.

Survey respondents most frequently said that the best way to learn more about how to save money on their energy bill is by mail (55%). A telephone call was next (24%), which was followed by e-mail (12%).

Participant Satisfaction

Survey respondents reported high satisfaction levels across all categories:¹

- Overall satisfaction with the visit from PWC (94% satisfied);
- Overall satisfaction with the program (87% satisfied); and
- Overall satisfaction with Duke Energy (82% satisfied).

Installation Rates

All 80 surveyed participants stated that all of the equipment installed by the PWC representative is still installed, and none of the participants reported removing any of the items installed through the program.

Conclusions and Recommendations

The Cadmus team’s evaluation revealed a few areas for potential improvements. This section summarizes our conclusions from process and impact evaluation activities and provides potential areas Duke Energy could explore to further refine program operations or expand program benefits.

¹ Satisfaction was measured on a 5-point scale, with 1 being *very dissatisfied* and 5 being *very satisfied*.



Conclusion: While participants are satisfied with the program overall, adjustments to the program may improve the customer experience. Participants were satisfied with their visit from PWC, the program, and Duke Energy. However, feedback indicated there may be opportunities to increase satisfaction with customers, program measures, and site visit protocols.

Recommendation: Consider program modifications designed to enhance customer experience. Potential options that may increase customer satisfaction that should be considered include:

- Inclusion of additional measures in the program, as requested by customers such as doors and windows, if cost-effective and feasible
- Follow-up calls or visits with customers to provide an opportunity to address any issues with site visit or equipment

Conclusion: Overall, the energy saving measures are being installed correctly and resulted in a verified realization rate of 96%. Because the savings per measure were deemed, the basis for evaluation was on the verification site visits to determine an ISR. Generally, the measures were found to be installed correctly and consistent with program record keeping, though it may be possible to achieve an even higher realization rate.

Recommendation: Modify guidance provided to PWC. Consider tracking insulation installed on cold and hot water pipes separately, so that only hot water pipes are used in energy savings estimates. While non-energy benefits of cold water pipe insulation may exist, including potentially making water pipes less prone to freezing in cold climates, cold water pipe insulation does not generate energy savings.

Recommendation: Perform additional site visits during the next round of evaluation. Because there were some discrepancies found with the recorded data, another round of site visits is recommended. Site visits will also provide valuable information on measure persistence. An increased sample size is also recommended to provide improved statistical significance.

Conclusion: Energy savings were determined using deemed values. It is common for evaluations to use deemed savings values that match the program assumptions for reporting, especially for low income programs. However, it is good practice to re-evaluate those deemed savings periodically to accurately reflect market conditions and updated codes and standards.

Recommendation: Consider updating deemed values. Consider updating deemed values based on the recommended savings values conveyed in the desk review memo Attachment A: Desk Review of the PWC Low Income Pilot Program (Appendix E in this report) and the verified realization rate findings. Consider another third-party update of the deemed values in future program planning.

Conclusion: The pilot program successfully reached 1,541 participants in the first program cycle. Current marketing efforts generated reasonable participation for the pilot program.

Recommendation: Consider participation goals for future program years and align marketing mechanisms to raise awareness about this program. Because of the unique nature of this program, effective marketing is a challenge. Cadmus recommends further investigation for target marketing other opportunities to raise awareness about this program.

Conclusion: Increased communication may improve program efficacy. Stakeholders were unclear on the factors used to determine whether the pilot program should continue as a pilot or be expanded into a more permanent program.

Recommendation: Consider communicating factors used to determine pilot program success to program stakeholders. Providing additional information on what factors will determine whether the pilot is continued may help stakeholders prioritize their efforts.



Introduction

Program Description

The People Working Cooperatively (PWC) Low Income (LI) Pilot Program (PWC LI Program), launched in 2013, provides whole-house weatherization services, efficient lighting, water-saving measures, and refrigerator and water heater replacement to low-income customers in Duke Energy Ohio's (DEO's) service territory. To qualify, participants must live within Duke Energy's Ohio service territory and be at or below 200% of the federal poverty guideline; additional requirements include receiving bills in the household member's name and having natural gas or electric heat supplied by DEO (income requirements are different for natural gas and electric homes). Both homeowners and renters qualify for this program.

DEO and its predecessor companies have contracted with PWC, a 501(C)(3) charity, for more than 30 years. PWC operates the program and DEO purchases the kWh savings based on the contractual agreement. PWC provide services such as energy conservation, home repair, home maintenance, and mobility modification services to low-income, elderly, and disabled clients. The DEO contract includes the following measures:

- Refrigerator replacement
- Air sealing
- CFLs
- Energy-efficient shower head (1.6 gpm)
- Faucet aerator (1.5 gpm)
- Insulation (floor)
- Insulation (attic, ceiling, and roof)
- Insulation (foundation)
- Insulation (wall)
- Water heater pipe insulation
- Water heater replacement
- Water heater tank wrap

Program Design and Goals

The PWC LI Pilot Program has operated as a pilot program for three years. According to PWC, this is the only program in the country where energy credits support low-income customers and help them stay in their homes while providing energy efficiency upgrades. Additionally, PWC states that keeping low-income customers in their homes reduces the societal costs.

The objectives for the PWC LI Pilot Program are to reduce energy use and increase comfort for low-income customers through the installation of energy saving measures. The Ohio Consumers Counsel (a

residential utility consumer advocate) has put a capped goal of two million dollars in purchased kWh savings for the three-year pilot period. The PWC LI Pilot Program stakeholders may request the commercialization of the pilot no sooner than after the second year of the pilot. At the time of this report, no stakeholders have requested the commercialization of the pilot. The status of this pilot may be terminated upon notice from the Public Utilities Commission of Ohio in the event that they deem the pilot to be no longer necessary or warranted.

The contract between PWC and DEO uses a fixed price of \$0.255 per kWh. The cap for what the PWC LI Pilot Program may achieve is approximately 7,843,000 kWh (\$2,000,000.00 divided by \$0.255).

WIN acts as a third-party evaluator and receives program tracking data from PWC. WIN samples a minimum of 5% of all of PWC's work and provides energy efficiency education to program participants while on site.



Evaluation Methodology

The Cadmus team relied on primary and secondary data to evaluate the program. Table 8 list the key research questions we investigated in the process and impact evaluations.

Table 8. Key Evaluation Questions and Methods and Data Collection

Process: Key Research Questions	Methods and Data Collection
What is the level of participation?	Analysis of program participation records (provided by DEO)
What are the installation rates for various measures and participants' satisfaction with these measures?	Analysis of participant survey data, except for installation rates for weatherization and insulation measures, which were verified through on-site visits
Are there any recommendations for program improvement in terms of process?	Analysis of implementer and program management interviews and participant survey data
Impact: Key Research Questions	Methods and Data Collection
What are the program savings?	Engineering analysis using the desk review memo, on-site verification, and participant survey results
What is the program NTG ratio (freeridership and spillover)?	NTG was deemed at 1.0 since all participants had to meet a low-income qualification
Are there any recommendations for program improvement in terms of impacts?	Based on findings from previous research questions

Stakeholder Interview Methodology

The Cadmus team interviewed the following program stakeholders to capture insights about program operations and challenges:

- DEO program staff, former Program Manager (5/4/15)
- PWC, President & CEO (6/4/15)
- WIN, Home Ownership Trainer (5/29/15)

Participant Survey Methodology

The Cadmus team designed participant surveys to cover process and impact evaluation topics, including the following:

- Program Awareness
- Measure Verification

- Participant Satisfaction
- Participant Feedback
- Demographics

The Cadmus team conducted surveys (Appendix C: Survey Instrument) by telephone and analyzed the survey responses. The data collection subcontractor, Thoroughbred Research, completed 80 surveys with a randomly selected group of DEO customers who received measures installed by PWC between May 28, 2013, and January 30, 2015, according to program records. Overall, we attempted to reach a total of 445 customers, which resulted in a response rate of 18%. The survey sampling methodology achieved precision of $\pm 8.96\%$ at the 90% confidence interval, which is based on the total of 1,541 PWC participants during the evaluation period. The survey was fielded from August 6 to August 13, 2015. This report section presents a review of the results by topic. Please note that the Cadmus team excluded “don’t know” and “refused” responses from the n-values (Appendix D: Survey Frequencies).

The survey did not include questions for freeridership and spillover because this program requires participants to meet low-income criteria; thus, the NTG ratio is deemed at 1.0. This is standard industry practice for evaluating low-income programs. The Net-to-Gross chapter outlines our NTG methodology and survey findings.

Savings Analysis

The primary savings analysis activity conducted for this program was participant site visits to verify measure installation which resulted in an in-service rate (ISR) value. Cadmus also conducted a review of the tracking database to determine the quantity of each measure installed. Deemed energy savings values were taken from the Attachment A from PWC’s Statement of Work² (Appendix E: Attachment A – Impact Assumptions for PWC Pilot) and utilized to determine the expected program savings by multiplying the deemed savings with the number of measures. The ISR percentage was applied to these expected savings to derive the verified savings for the program.

Net-to-Gross Analysis

Since this program requires participants to meet low-income criteria, the Cadmus team used an NTG ratio of 1.0. This is a standard industry practice for evaluating low-income programs.

² Referenced in the Public Utilities Commission of Ohio Case No. 13-662-EL-UNC



Process Evaluation Findings

This chapter presents the Cadmus teams’ process evaluation findings for the PWC LI Pilot Program and divides the findings into two sections: stakeholder interviews and participant surveys. Table 9 lists the primary evaluation activities and the dates the Cadmus team conducted them.

Table 9. Process Evaluation Data Collection and Analysis

Evaluation Component	Dates of Data Collection	Total Conducted
Stakeholder Interviews	5/4/15 – 6/4/15	3
Participant Surveys	8/6/15 – 8/13/15	80

Stakeholder Interviews

The Cadmus team conducted interviews with the program, implementation, and verification staff to gain an in-depth understanding of the program and its operations, and to identify successes and challenges. Results of these discussions are presented below by topic. See Appendix B for additional details on the program staff interview guide.

Communication

Communication between the three primary stakeholders is suitable for the program and much of the communication is *ad hoc*, via e-mail and phone calls. PWC and WIN have a long working relationship that dates back to 1986. Improved communication is a topic that DEO and PWC noted as being a priority that they are actively working on.

Program Delivery

Customers who meet the low-income requirements and pay their own energy bills can request to receive energy saving measures in their home from PWC. Upon request, PWC will sign up a customer for one of its programs and a technician will schedule an appointment to visit the customer’s home and determine if measures need to be installed through a home audit. PWC technicians specialize in energy conservation and decide at the audit, which measures to install primarily based on the goal of helping to keep people in their homes through reduced energy costs to avoid home foreclosure. After the home audit, the technicians install the measures, perform weatherization improvements, or provide safety equipment to the home. If PWC installs measures included in DEO’s contract in a DEO customer’s home, the technician records the customer information and the measures installed into a spreadsheet, which is sent to DEO via a secure FTP site. DEO reviews the spreadsheet to confirm that the customer is a customer in its territory (through the customer account numbers) and that the measures installed are those that have been contractually agreed upon. After verifying the data in the spreadsheet, DEO purchases kWh savings.

DEO contracts WIN for two purposes: to educate participants on energy efficiency and to provide measure verification. As part of the PWC LI Pilot Program, WIN highly encourages all participants to receive energy education from a WIN representation after PWC makes the upgrades. During the visit,

the WIN representative does a complete walk-through of the home, much like an educational audit, and then prints out a usage report that includes charts conveying energy usage at the address. WIN then helps the participant create an action plan where they can commit to making three behavioral changes and calls the participants 60 days after the visits to see if there has been a change in energy use. The representative from WIN said the company's philosophy is grounded in education because education is what results in the greatest energy savings in conjunction with weatherization improvements.

In addition to energy education, WIN provides measure verification for at least 5% of the projects completed by PWC, randomly selecting sites for verification. After PWC sends the work orders to WIN, WIN schedules home visits to verify measures and couples that visit with the education piece as described above. WIN uses a weatherization protocol to guide their verification of the work that PWC completes. WIN staff stated that over 90% of the time they do not find problems with PWC's work. If WIN identifies a safety issue or determines that the improvements are not complete or satisfactory, they notify PWC and make arrangements to resolve the issue. For added quality control, WIN also has a protocol to inspect three additional sites for PWC technicians who do not satisfactorily complete work at one site.

Promotion and Marketing

WIN promotes PWC programs and energy efficiency at community events, where staff distributes PWC fliers and provides information to counselors who assist customers with mortgage issues. However, PWC does not use direct marketing to reach participants for the LI Pilot Program, and instead enrolls participants through other programs.

Data Tracking

PWC tracks the equipment installed through the program and generates an invoice for DEO that reports only the measures specified in the contract. PWC presents the invoice to Duke Energy as a kWh bill of sale. Upon DEO's approval, DEO pays for the kWh savings.

WIN collects participant characteristic data while performing verification or education services in the home. This data includes the following information:

- Dwelling type
- Home ownership
- Zip code
- Household size
- Heat source

WIN staff stated that they use this data in monthly reports, annual reports, and to provide information to organizations funding the program. The program manager also said that the program had two issues with regard to data tracking during the evaluation period. The first issue was an initial delay of data in the transition systems from 2013 to 2014. The data delay stemmed from an update and reconfiguration of PWC's systems and databases. WIN staff said there has not been a delay in data since the update. The



second issue involved negative numbers found in the workbooks, which caused a discrepancy in the monthly reports. For example, negative numbers would occur when a technician anticipated installing 10 CFLs, but upon arrival at the participants home only installed six CFLs. This situation caused data issues because in one month the workbooks showed positive 10 CFLs, and in the next month showed negative four CFLs to make up the difference for the six lightbulbs actually installed. The issue of recording negative numbers in workbooks has not been resolved, but since PWC and WIN discussed it and WIN understands the reason for it, it is no longer an issue.

Barriers and Challenges

The Cadmus team asked stakeholders to identify any challenges that they have encountered over the last year. DEO stated that this is a unique type of program and not common to other utilities; therefore, they expressed that there is some difficulty in explaining the program to others not familiar with the program. The representative from DEO also described the initial delay in data and the negative numbers found in the workbooks (as described above) as a barrier.

The PWC representative highlighted the challenges faced by low-income home owners, who have limited resources and potentially higher energy use due to inefficiency in their homes and lack of energy-use education.

The representative from WIN said that the biggest challenge of the program is getting into participants' homes. Many low-income participants are reluctant to schedule another visit after the PWC visits, in part because they tend to experience a lot of interaction from agencies or organizations (often for other reasons beyond energy efficiency). The representative from WIN believes that the participants may be fatigued from frequent visits from the staff of various agencies and organizations. WIN's strategy to overcome this barrier is to raffle an incentive to participants who allow WIN staff members in their homes.

Participants

All three of the interviewed stakeholders said there was no shortage of participants for this program. While this program helps those who are at or below 200% the federal poverty line and pay their own energy bill, the representative at WIN stated that there are those who are very near that threshold that do need help but do not qualify for this program. The representative also said that those who do not qualify for this program, but still have low incomes have limited options to participate in other programs due to limited finances.

Pilot Program Development

The representative from DEO believes that the pilot program is clear cut and will continue as planned. DEO has not yet determined a timeframe or decision-making metrics for taking the program out of the pilot phase and plans to keep it as a pilot for an indeterminate period of time.

The representative from PWC speculated that the future of the program depends on the legislative initiatives in Ohio. While the PWC representative stated that the program has merit for DEO as long as

there is value in energy credits, the political climate can change and remove that value quickly. Conversely, at the time of the interview, PWC reported that state legislation was being discussed to increase required energy conservation, although nothing has been passed to date.

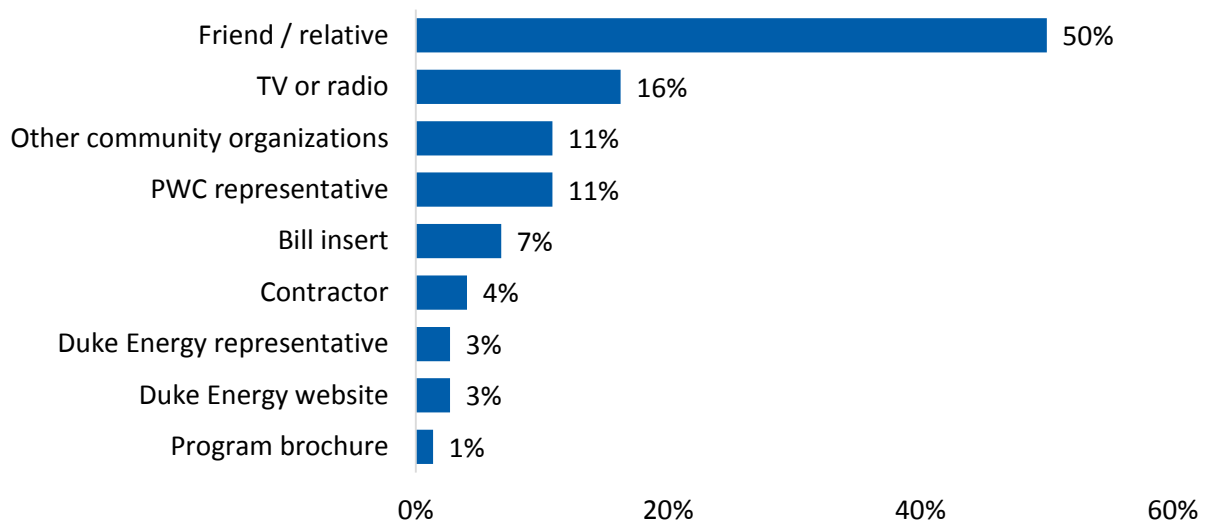
Participant Surveys

The Cadmus team conducted surveys with 80 DEO customers who had measures installed by PWC. This section presents the results of this review by topic. Except where noted, the Cadmus team excluded “don’t know” and “refused” responses, which is reflected in accompanying n-values.

Program Awareness and Participation

The Cadmus team asked surveyed participants to identify how they heard about the program. Half of the surveyed participants (50%, n=74) heard about the program by word of mouth, followed by a television or radio ad (16%). Respondents were split evenly between hearing about the program from other organizations in the community (11%) or directly from a PWC representative (11%). Figure 1 shows further information on the methods that participants heard about the PWC LI Program.

Figure 1. Methods of Hearing about the Program*

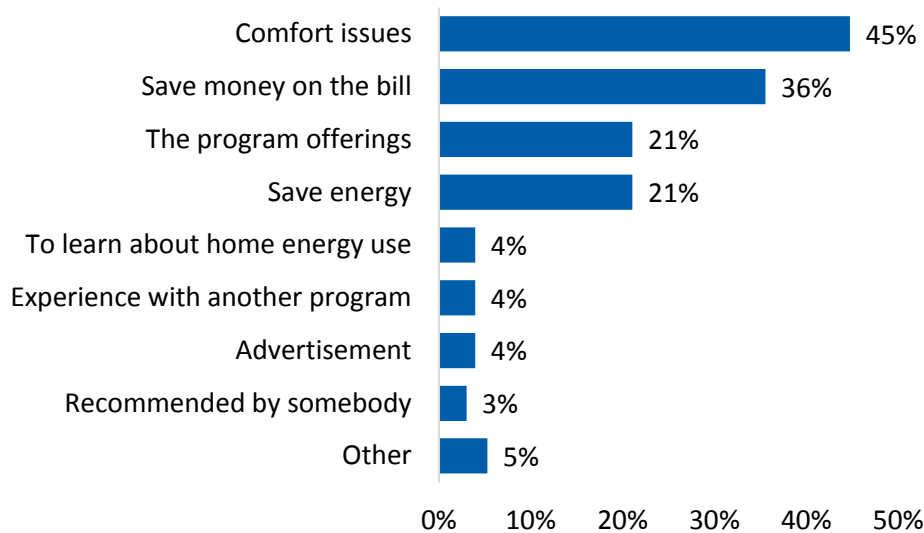


Source: Survey question C1: “How did you hear about the Weatherization Program?” (n=74). *Multiple responses allowed. Percentages are of total number of survey customer respondents and exceed 100%.

When asked what prompted them to participate in the PWC LI Program, nearly half of the respondents (45%; n=76) stated that it was a comfort issue in their home that prompted their participation. Other common responses included a desire to save money on their monthly bill (36%), the offerings of the program (21%), and saving energy (21%). Figure 2 provides further information on the reasons participants decided to participate in the program.



Figure 2. Reasons for Participation*

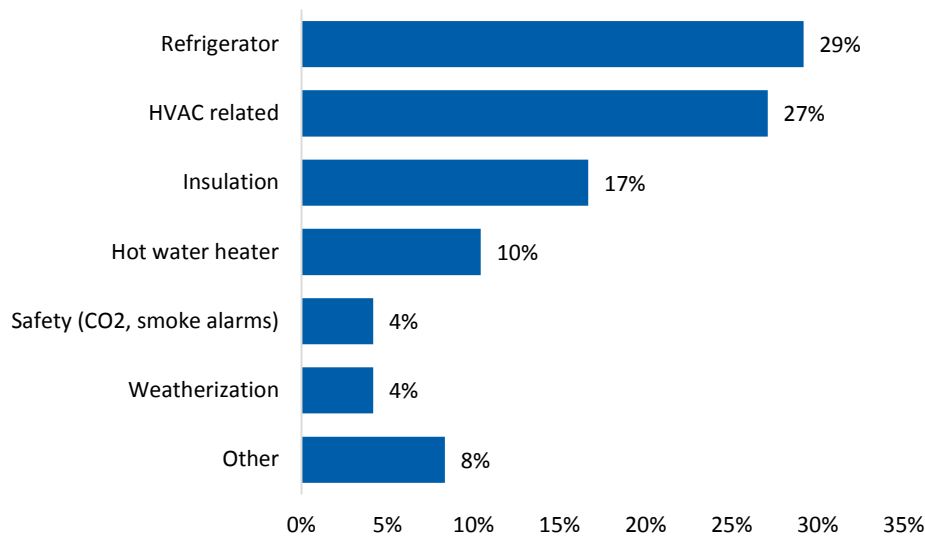


Source: Survey question C2: “What prompted you to participate in the Weatherization Program?” (n=76).

*Multiple responses allowed. Percentages are of total number of survey customer respondents and exceed 100%.

In the survey, the Cadmus team asked participants if there were any specific pieces of equipment offered through the program that stood out when they were initially deciding to participate. Over half of the respondents (61%; n= 79) indicated that a specific piece of equipment stood out. Among participants recalling specific pieces of equipment, the most frequently mentioned were the replacement refrigerator (29%) and items associated with HVAC upgrades and repairs (27%). Other common responses included insulation (17%) and a hot water heater (10%). Other items (8%) included responses such as a handicap ramp or further information on energy efficiency from a professional. Figure 3 conveys more information on the services that stood out to the participants. Lastly, of those that provided specifics on the services or installations that stood out to them (n=48), all but one participant indicated that they received the service or installation as part of the weatherization visit (98%; n=45).

Figure 3. Services or Items that Stood Out for Participants When Deciding to Participate

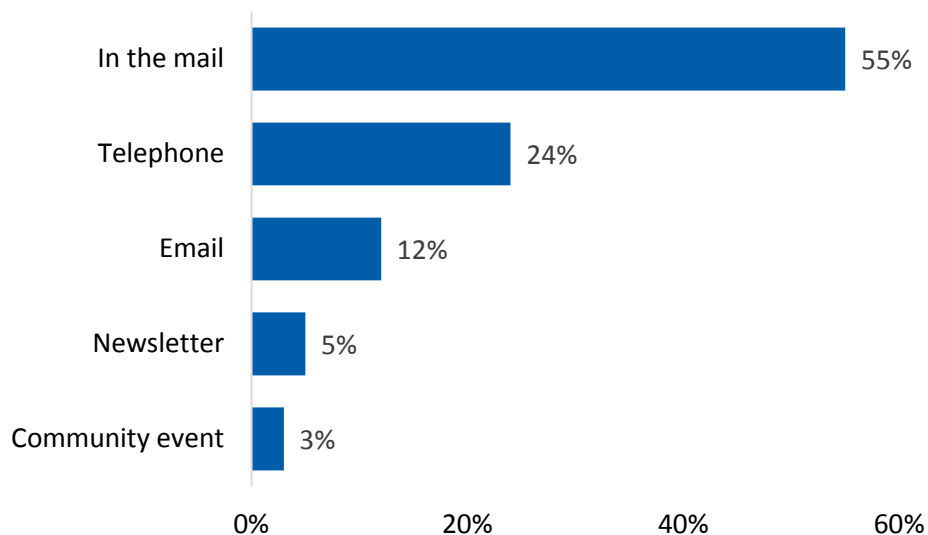


Source: Survey question C3: “Was there and specific service or piece of equipment offered through the program that initially stood out to you as you were deciding to participate in the program? If yes, what specifically stood out to you?” (n=48).

When asked their preferred method for receiving additional information about how to save money on their bill, over half of the respondents indicated that mail is the best method (55%; n=76), followed by a telephone call (24%), and then e-mail (12%). Figure 4 shows more information on preferred methods of receiving information. A follow-up question was asked to those who answered ‘in the mail’ (n=41) to specify the format of mail. A large majority of these 41 participants stated that they would prefer a regular letter (90%), while a few others mentioned receiving information with their bill (5%), through a postcard (2%), or a flyer (2%).



Figure 4. Preferred Method of Receiving Information



Source: Survey question C6: “If you were interested in receiving additional information that could help you save money on your bill, what is your most preferred method to receive the information?” (n=74).

Energy-Efficient Equipment Installed through the Program

This section of the report provides information on the measure installation, satisfaction of the measures installed, overall program satisfaction, and the benefits that participants received from the program.

Measure Installation and Satisfaction

The Cadmus team asked participants about the measures installed by PWC, their experiences with the installation visit, and their satisfaction with the measures and the visit. Although PWC installs equipment in addition to what is agreed contractually through DEO, our survey focused on the measures for which DEO claims energy savings. Table 10 presents the energy saving measures specific to DEO’s program, the reported installations for the surveyed sample, the percentage of survey respondents who recall having these measures installed, and the difference between reported installations and the recollections of surveyed participants. As shown in Table 10, most participants recall measure installations, although in some cases there were participants that indicated the installation of items that were not included in the records or conversely, did not recall some of the items included in the records Cadmus reviewed.

Table 10 . Measures for the PWC LI Program*

Measure	Program Records	Participant Recollection	Confirmation Rate
Air sealing	22	21	95%
CFLs	56	54	96%
Insulation: attic	5	5	100%
Insulation: floor	1	0	0%
Insulation: wall	2	3	100% **
Kitchen and bathroom faucet aerators	10	7	70%
Energy-efficient showerheads	5	6	100% **
Refrigerator replacement	33	32	97%
Water heater replacement	0	1	100% **
Water heater pipe wrap	6	6	100%
Water heater tank insulator	2	1	50%

Source: Survey question D1: “Just to confirm, the program records indicate that you received the following: [INSERT NAME OF MEASURE]” (n=80).

*Multiple responses allowed.

**Participants reported receiving more measures than what was recorded in program records.

All 80 surveyed participants (100%) stated that all of the equipment installed by the PWC representative is still installed, and none reported removing any of the items installed through the program. The research team also asked if the PWC representative left any additional energy-saving items in the home which were not installed. Fifteen respondents indicated that the PWC representative left uninstalled items in the home: 12 reported that CFLs were left uninstalled, and 3 reported that insulation was left uninstalled. Other measures left uninstalled with participants include furnace filters and carbon monoxide sensors, which are not measures contracted between PWC and DEO. A majority of the participants who received measures not installed at the time of the PWC visit reported that they have since installed items that the PWC representative left behind (87%; n=15).

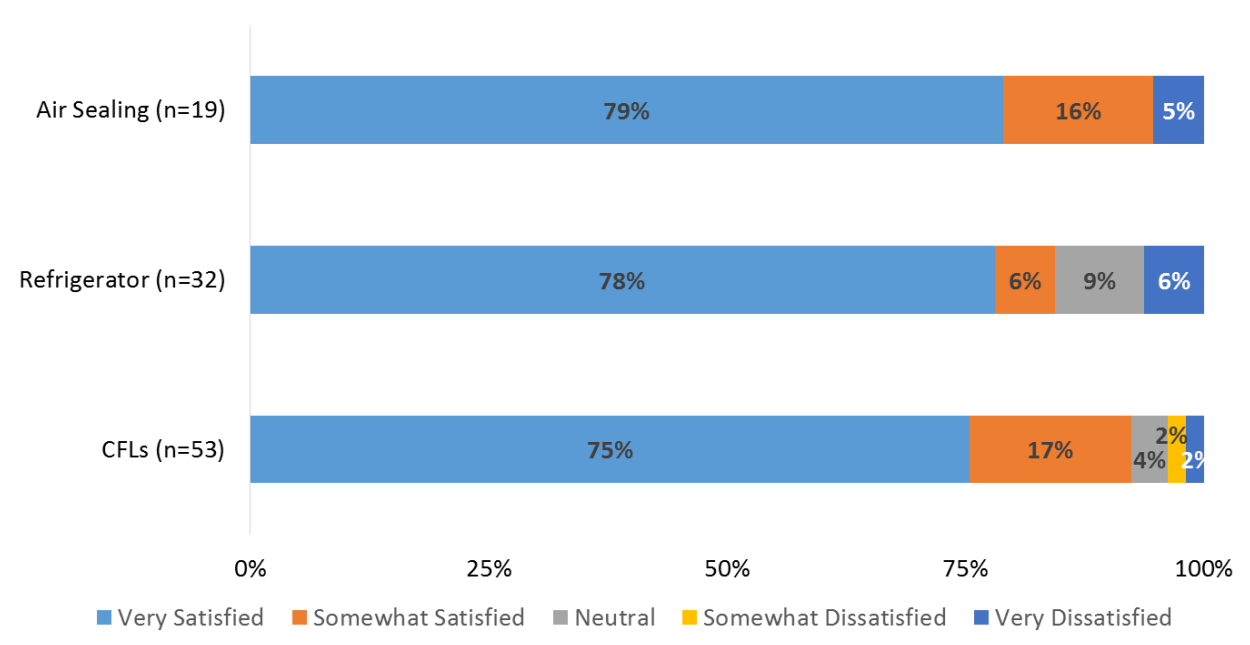
When participants were asked to rate their overall satisfaction with the measures installed by the PWC representative on a 5-point scale, where 1 is *very dissatisfied* and 5 is *very satisfied*, 89% stated that they were either satisfied or very satisfied (n=80). Only seven participants reported they were not satisfied with the measures. When these seven participants were asked a follow-up question as to why they reported that they were not satisfied, five of the respondents indicated that they did not receive all of the measures or services that they had expected or desired and two did not provide reasons to support the satisfaction rating.

The Cadmus team also asked participants to rate their satisfaction with specific items they remembered being installed through the program. Respondents who indicated more than one item had been installed were asked to rate up to three, randomly selected items. Air sealing, refrigerators, and CFLs were the items participants were most frequently asked to rate. As shown in Figure 5, 92% of respondents who



rated CFLs (n=53), 85% of respondents who rated refrigerators, and 95% of respondents (n=19) indicated they were very or somewhat satisfied with the measures.

Figure 5. Satisfaction with Most Frequently Rated Measures*



Source: Survey question E5, E6, E7: “You stated that the Weatherization Program representative installed [MEASURE 1]. How satisfied are you with [MEASURE 1]? Would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?” (n=80). *Participants were only asked to rate up to three items that they recalled receiving, so counts for each item rated are less than the total number of participants surveyed.

Table 11 presents the other measures for which participants provided satisfaction ratings.

Table 11 . Satisfaction with Additional Measures (count)*

Measure	Total Answering	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Very Dissatisfied
Aerators	7	3	1	1	0	2
Insulation	6	5	0	1	0	0
Showerhead	6	3	0	2	0	1
Water Heater Tank Wrap	5	5	0	0	0	0
Water Heater	1	1	0	0	0	0
Pipe Wrap	1	0	1	0	0	0
Total	26	17	2	4	0	3

In total, seven participants provided satisfaction ratings of *somewhat dissatisfied* or *very dissatisfied* for the items received. Three of these participants rated multiple measures. While the survey did not ask

participants to give specific reasons for dissatisfaction, Cadmus reviewed the other survey responses provided by these seven participants in order to investigate reasons for dissatisfaction. Of the seven respondents, one indicated that they were still experiencing drafts in the home. Another mentioned that they believe they should have received a refrigerator. The remaining five respondents indicated issues with the contractor performing the installations.

Program Satisfaction

The research team also asked participants to rate their satisfaction with the visit from the PWC representative, the program overall, and DEO as an energy provider, using the 5-point scale indicated earlier in the report. These ratings are summarized in Figure 6 below.

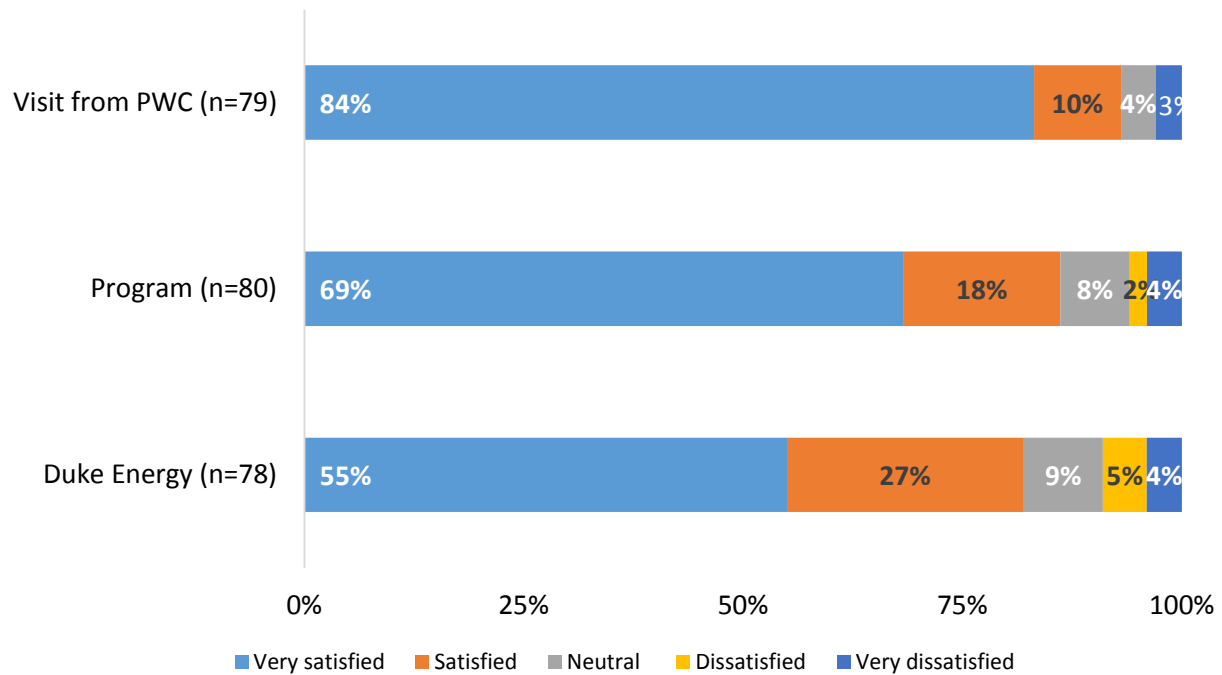
A large majority of 94% of participants who answered (n=79) were satisfied with the visit from the PWC representative. The two participants who reported they were dissatisfied (either dissatisfied or very dissatisfied) were asked to provide an explanation for their rating. One participant stated that they received “bad customer service,” while another stated that the representative “was very unprofessional.”

Figure 6 also shows that a majority of participants (87%) are satisfied with the PWC LI Program overall. The Cadmus team asked the five participants that were less than satisfied (either dissatisfied or very dissatisfied) to provide examples for their dissatisfaction. Of the five respondents that were less than satisfied, three participants provided responses. One indicated that the representatives were loud, another stated that they needed to have someone else come and fix what the representatives installed, while the other indicated that PWC had not completed the project that was started fully.

The Cadmus team also asked participants to rate their overall satisfaction with DEO as an energy provider. Of those that responded (n=78), a majority (82%) are satisfied. Of the seven that responded with either dissatisfied or very dissatisfied, three mentioned the expense of DEO’s energy rates, three participants mentioned issues with customer service, and one respondent did not provide a reason for their dissatisfaction.



Figure 6. Comparison of Satisfaction Levels

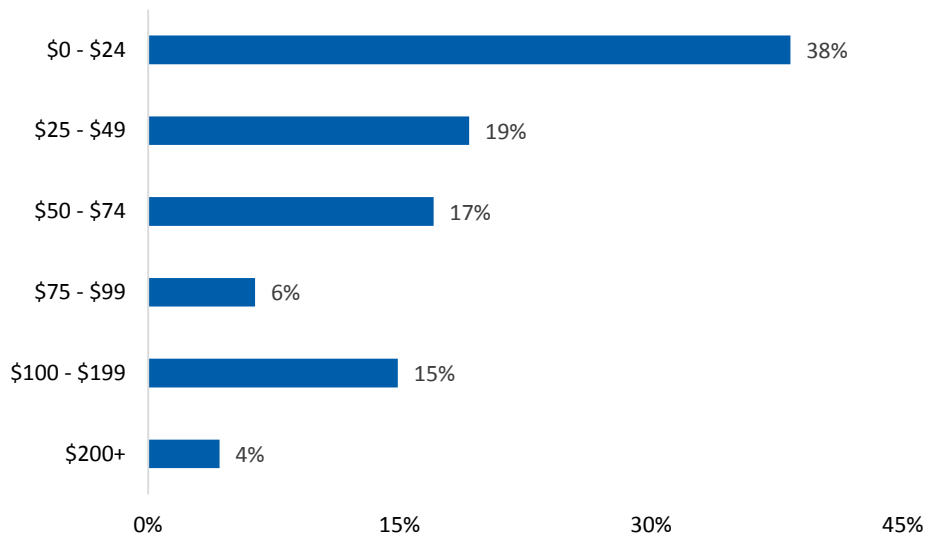


Source: Survey question E3: On the same scale, how satisfied are with the visit you received from the Weatherization Program representative who came to your home and installed the energy-efficiency program upgrades?" (n=79). Survey question E8: "On the same scale, how would you rate your overall satisfaction with the Weatherization Program?" (n = 80). Survey question E10: Finally, using the same scale, how would you rate your overall satisfaction with Duke Energy as your energy provider?" (n=78)

Program Benefits

The Cadmus team asked participants about the benefits that they have experienced since participating in the program. Over three quarters of the participants (77%; n=74) stated that they have noticed savings in their electric bill since participating. Of the participants that did notice savings on their electric bill, 47 of 57 respondents were able to provide an estimate of their monthly savings. The estimated savings ranged from \$5 to \$200, with an average estimate of \$49 and a median estimate of \$40. The distribution of estimated monthly savings is shown in Figure 7. Nearly all of the participants who noticed savings on their bills (95%; n=57) stated that they were satisfied with their electric bill savings.

Figure 7. Participant Estimated Monthly Savings after Program Participation

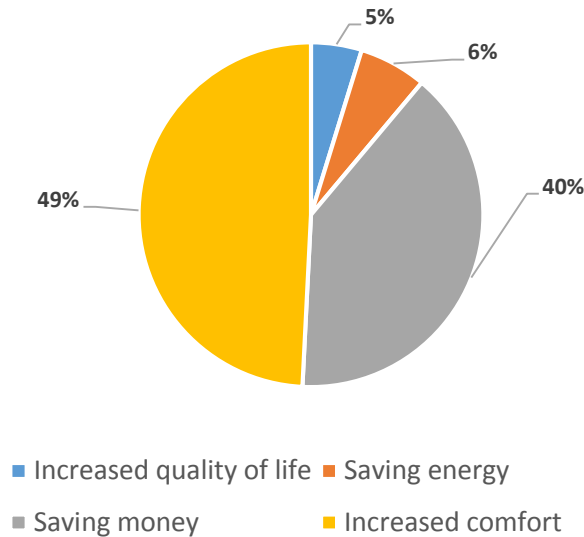


Source: Survey question D10: “Since your weatherization improvements were installed, have you noticed any savings in your electric bill? How Much savings have you noticed on our monthly bill in dollars?” (n=47).

The Cadmus team also asked participants about any changes in household comfort since participating in the program. A majority (83%; n=76) stated that they have noticed a change in their homes’ comfort compared to before the weatherization improvements were installed. When the 63 participants who reported noticing a change were asked to specify what they noticed, nearly half of the participants (49%) reported improved temperature comfort in the home. Forty-percent of the respondents reported that they noticed that they are saving money each month after the visit (Figure 8).



Figure 8. Changes Noticed by Participants after Program Participation



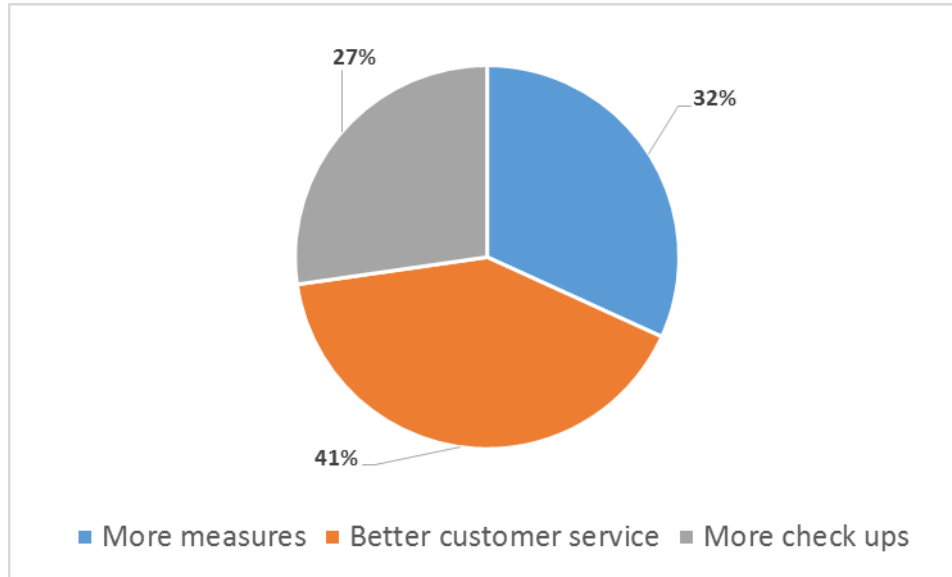
Source: Survey question D8: “Since your weatherization improvements were installed, have you noticed any changes in your home's comfort compared to before the weatherization improvements were installed?” If yes, please specify (n=76).

We also asked participants to rate the ease of maintaining a comfortable temperature in their home since the PWC representative made the improvements. A majority of participants (71%; n=70) stated that it was easier to maintain a comfortable temperature after these improvements, while 16% stated that there was no change, and 13% stated that had become more difficult.

Participant Recommendations

The research team asked participants if they had any recommendations to improve the program, and about a quarter (28%; n=80) offered suggestions. These recommendations fell into three primary categories: more measures, better customer service, and more checkups. Figure 9 shows the breakdown of participant response.

Figure 9. Participant Recommendations for Improvement



Source: Survey question F1: “Do you have any recommendations on how to improve the Weatherization Program that have not already been expressed? Please Specify” (n=22).



Impact Evaluation Findings

This chapter presents the Cadmus team's impact evaluation findings for the PWC LI Pilot Program.

In-Service Rate (ISR)

The ISR for the PWC LI Pilot Program measures, as shown in Table 12, conveys the percentage of measures still in service after installation. The top measures that remain in service and records confirmed as accurate are the refrigerators, floor insulation, and the various air sealing measures (door weather stripping, expanding spray foam, and caulking). Measures such as CFLs (93%), faucet aerators (75%), and showerheads (60%) had lower ISRs due in part to the ease with which participants can remove and replace them. This is in contrast to the survey participants who reported all of the PWC installed equipment is still in service. This difference in ISRs may be due to a combination of factors including survey participants' reluctance to report they've removed equipment and potential errors in installment tracking. Hot water tank wrap has a high ISR of 150% because an additional unit was verified as installed in a home whose records did not indicate one was installed.

The lower ISRs for attic insulation (94%) and wall insulation (85%) are mainly the result of the PWC technicians overestimating the square footage of the area treated, since technician estimates did not account for areas inappropriate for insulation such as windows. PWC technicians reported an ISR of 100% for pipe insulation, including three instances where both the hot water and cold water pipes were insulated. Although Duke Energy provided guidance to PWC to insulate both hot water and cold water pipes, for the purpose of providing non-energy benefits to customers in addition to energy savings, insulating the cold water intake pipe does not generate energy savings. As a result, Cadmus adjusted the ISR (77%) to ensure energy savings are only attributed to hot water pipes.

Table 12. Program Measure ISR

Measure	Participants	Expected Quantity	Verified Quantity	ISR
Refrigerator Replacement	3	4	4	100%
CFL	9	149	139	93%
Faucet Aerator	7	16	12	75%
Showerhead	4	5	3	60%
Tank Wrap	2	2	3	150%
Pipe Insulation	9	13	10	77%*
Water Heater Replacement	N/A	N/A	N/A	N/A
Attic Insulation	15	13,628	12,752	94%
Wall Insulation	7	5,766	4,904	85%
Floor Insulation	2	1,302	1,302	100%
Foundation Insulation	N/A	N/A	N/A	N/A
Air Sealing	19	16,847	16,847	100%

* Adjusted pipe insulation ISR from 100% to 77% to ensure energy savings are attributed to hot water pipe insulation only.

The Cadmus team did note several discrepancies in the recorded PWC data compared to WIN's site visit forms. The following provide a detailed account:

- **CFLs:** There were many instances where the resident reported the CFLs burned out and were replaced by a different type of bulb.
- **Faucet Aerators:** Not all of the faucet aerators were present for the site visit.
- **Showerheads:** Not all of the energy-efficient showerheads were present for the site visit.
- **Hot Water Heater Pipe Wrap:** Hot water heater pipe wrap has been installed on both the outgoing hot water heater pipe, as well as the incoming cold water pipe.
- **Tank Wrap:** During the site visit, WIN identified an extra hot water heater tank wrap that the participant claimed was installed by PWC.
- **Attic Insulation:** Discrepancies between reported and verified attic insulation were due to different square footage estimates by the technician and the installer.
- **Wall Insulation:** Discrepancies between reported and verified wall insulation arose because the homeowner reported fewer walls were treated than reported, or the square footage estimate by the technician differed from the installer, which in some cases included the square footage of the window in addition to the wall area.
- **Air Sealing:** Technicians did not perform blower door testing during their site visits. Technicians instead verified air sealing measures by documenting the presence of infiltration improvements such as weather stripping, caulking, and expanding spray foam.



No water heater replacement measures were evaluated during the site visits, and, therefore, we were unable to verify an ISR for this measure and therefore it receives a 100% pass through.

Verified Savings

This evaluation utilizes deemed savings values per measure that Cadmus did not change, and because it is a low-income program, the net-to-gross is defined as 100%. Therefore, the only factor influencing the verified net savings are the per measure ISR values from the site visits as shown in the tables below.

The program achieved a 95% realization rate for verified net savings in electrically heated homes (as shown in Table 13) for a total of 455,462 kWh of verified savings. For non-electrically heated homes (as shown in Table 14), the program achieved a 97% realization rate and a total 859,607 kWh of verified savings. Deemed demand savings were not provided for this program, nor are they required at this time and have thus been omitted from this evaluation.

Table 13. Verified Savings for Electrically Heated Homes

Measure - Electrically Heated Homes	Deemed Savings (kWh)	Quantity (reported)	Expected Savings* (kWh)	Verified Savings (kWh)	Realization Rate
Refrigerator Replacement	1,263	169	213,447	213,447	100%
CFL	39	4,158	161,746	150,891	93%
Faucet Aerator	19	272	5,086	3,815	75%
Showerhead	158	87	13,718	8,231	60%
Tank Wrap	59	23	1,364	2,046	150%
Pipe Insulation	100	86	8,583	6,602	77%
Water Heater Replacement	117	35	4,102	4,102	100%
Attic Insulation (Space Heating Only)	2.14	17,269	36,956	34,580	94%
Attic Insulation (Space Cooling Only)	0.03	10,656	320	299	94%
Wall Insulation (Space Heating Only)	4.36	1,578	6,880	5,851	85%
Wall Insulation (Space Cooling Only)	0.07	896	63	53	85%
Floor Insulation (Space Heating Only)	0.7	6,376	4,463	4,463	100%
Floor Insulation (Space Cooling Only)	0	6,376	0	0	N/A
Air Sealing (Space Heating Only)	1.1	18,980	20,878	20,878	100%
Air Sealing (Space Cooling Only)	0.02	10,159	203	203	100%
Total	N/A	N/A	477,809	455,462	95%

*The impact values includes line losses of 6.84%, i.e., are the expected savings at the plant.

Table 14. Verified Savings for Non-Electrically Heated Homes

Measure - Non-Electrically Heated Homes	Deemed Savings (kWh)	Quantity (reported)	Expected Savings** (kWh)	Verified Savings (kWh)	Realization Rate
Refrigerator Replacement	1,263	397	501,411	501,411	100%
CFL	39	9,717	377,991	352,623	93%
Water Heater Replacement*	0	2	0	N/A	N/A
Attic Insulation (Space Heating Only)	0	90,218	0	0	N/A
Attic Insulation (Space Cooling Only)	0.03	65,393	1,962	1,836	94%
Wall Insulation (Space Heating Only)	0	35,116	0	0	N/A
Wall Insulation (Space Cooling Only)	0.07	24,273	1,699	1,445	85%
Floor Insulation (Space Heating Only)	0	8,392	0	0	N/A
Floor Insulation (Space Cooling Only)	0	5,746	0	0	N/A
Air Sealing (Space Heating Only)	0	119,648	0	0	N/A
Air Sealing (Space Cooling Only)	0.02	114,630	2,293	2,293	100%
Total	N/A	N/A	885,356	859,607	97%

*PWC confirmed that 2 water heater replacement measures were incorrectly coded and billed as electric water heaters instead of gas water heaters.

**The impact values includes line losses of 6.84%, i.e., are the expected savings at the plant.

Combining the savings from both electrically and non-electrically heated homes, the overall program achieved a realization rate of 96% and saved a total of 1,315,069 kWh (as shown in Table 15).

Table 15. Overall Verified PWC Low Income Program Savings

Measure - Electrically and Non-Electrically Heated Homes Combined	Quantity (reported)	Expected Savings* (kWh)	Verified Savings (kWh)	Realization Rate
Refrigerator Replacement	566	714,858	714,858	100%
CFL	13,875	539,738	503,514	93%
Faucet Aerator	272	5,086	3,815	75%
Showerhead	87	13,718	8,231	60%
Tank Wrap	23	1,364	2,046	150%
Pipe Insulation	86	8,583	6,602	77%
Water Heater Replacement	37	4,102	4,102	100%
Attic Insulation	183,536	39,237	36,715	94%
Wall Insulation	61,863	8,642	7,349	85%
Floor Insulation	26,890	4,463	4,463	100%
Foundation Insulation	0	0	0	N/A
Air Sealing	263,417	23,374	23,374	100%
Total	N/A	1,363,165	1,315,069	96%



*The impact values includes line losses of 6.84%, i.e., are the expected savings at the plant.

Notes from the Field

When conducting the 20 site visits, WIN technicians also took notes on participants' comments. These notes echo some of the same comments made by surveyed participants. Two of the 20 audited participants mentioned PWC leaving the work in their home incomplete. One participant stated that "PWC cut a hole in the ceiling for an opening to fix a water leak in the garage but did not fix it" which then was blamed for causing mold problems. According to the client, they have made attempts to have "...someone from PWC come and fix it without success." Another audited participant said, "...PWC cut a hole to blow in the insulation into the attic but left it like that." The technician noted that the participant now has to cover the hole herself with drywall and paint it.

Summary Form



People Working Cooperatively Low Income Pilot Program Evaluation Report

Completed EMV Fact Sheet
2015 Evaluation – Cadmus

Program Description

The PWC LI Pilot Program, launched in 2013, provides whole-house weatherization services, efficient lighting, water-saving measures, and refrigerator and water heater replacement to low-income customers in DEO's service territory. To qualify, participants must live within Duke Energy's Ohio service territory, be at or below 200% of the federal poverty guideline, and pay for their own energy bill; additional requirements include receiving bills in the household member's name and having natural gas or electric heat supplied by Duke Energy for both homeowners and renters.

Date	October 2, 2015
Region(s)	Ohio
Evaluation Period	May 28, 2013, to January 30, 2015
Gross Energy Savings (kWh)	1,315,069
Coincident kW impact	n/a
Measure life	Various
Net Verified Energy Savings (kWh)	1,315,069
Process Evaluation	Yes
Previous Evaluation(s)	No

Evaluation Methodology

To estimate net and gross energy savings resulting from installing energy efficient measures through participant surveys and savings analyses.

Impact Evaluation Details

- A. Baseline Description: Baseline condition not recorded.
- B. Eligibility: Low income homeowners or renters within the Duke Energy Ohio territory who have received energy efficiency improvements from a PWC program yielding savings that were then purchased by Duke Energy Ohio.
- C. Savings Calculation: Cadmus calculated verified savings through participant site visits and reviewing the tracking database to determine the quantity of each measure installed. Deemed energy savings values were taken from the Attachment A from PWC's Statement of Work and utilized to determine the expected program savings by multiplying the deemed savings with the number of measures. The ISR percentage was applied to these expected savings to derive the verified savings for the program.