

# Energy Efficient Products Program Evaluation, Measurement, and Verification Report 2018

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Prepared for FirstEnergy Ohio Companies:

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# 1 Executive Summary

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In 2018, FirstEnergy's Ohio Utilities, The Cleveland Electric Illuminating Company (CEI), Ohio Edison Company (OE) and The Toledo Edison Company (TE) (collectively "Companies") offered the Energy Efficient Products Program (EEP). This program offered residential customers rebates and/or incentives for the purchase of energy-efficient appliances. In addition, midstream methods were utilized to reduce the cost and encourage the stocking and sales of energy efficient products in the lighting, and consumer electronics portion of the program. The goal of the program is to have the Companies' customers purchase more energy efficient products when they have the option to do so. During the 2018 program year, Consumer Electronics, Lighting, Appliances, and HVAC measures were offered in the program. The program was administered by Honeywell as the Conservation Service Partner (CSP), which worked with manufacturers, distributors, and retailers to implement the program.

The Companies contracted, ADM Associates, Inc. (ADM) to perform the evaluation, measurement and verification (EM&V) activities described in this report. The procedures used to perform the EM&V activities described in this report were informed by the State of Ohio Energy Efficiency Technical Reference Manual (Ohio TRM<sup>1</sup>) and the State of Pennsylvania Energy Efficiency Technical Reference Manual (PA TRM<sup>2</sup>).

This report describes the methodologies, procedures, data tracking systems utilized to conduct program evaluation activities, analysis methods and results. The four sub-program descriptions, the methodology of evaluations, methodology, and detailed evaluation findings will be summarized in the following chapters contained in this report.

A total of 714,576 rebates/incentives were issued in the service territories of the Companies through the Energy Efficient Products program in 2018. The number of rebates/incentives by measure type and utility are detailed below.

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<sup>1</sup> Vermont Energy Investment Corporation (VEIC), State of Ohio Energy Efficiency Technical Reference Manual, Prepared for Public Utilities Commission of Ohio, Draft of August 6,2010, Revised September 30, 2013.

<sup>2</sup> Pennsylvania Public Utility Commission, Technical Reference Manual 2016.



*Table 1-1: Program Rebates/Incentives by Measure and Utility*

Measure Type	CEI	OE	TE	All Companies
Clothes Washers	2,821	3,643	1,044	7,508
Clothes Dryers	1,141	1,537	481	3,159
Refrigerators	1,659	2,102	566	4,327
Dehumidifiers	8,418	16,082	2,566	27,066
Freezers	786	2034	503	3,323
Heat Pump Water Heaters	3	51	16	70
LED Fixtures	1,794	3,903	896	6,593
LED Bulbs	240,768	270,672	79,881	591,321
Televisions	15,580	13,639	3,404	32,623
Computers	1,115	1,135	247	2,497
Computer Monitors	1,487	1,469	412	3,368
Imaging	5,776	5,403	1,090	12,269
Central Air Conditioners	358	151	20	529
Circulation Pumps	30	43	0	73
Ductless Mini-Splits	162	122	31	315
Furnace Fans	1,173	713	122	2,008
Heat Pumps	61	87	5	153
H2O & Geothermal (Heat Pump)	5	11	0	16
Thermostats	2,027	1,797	395	4,219
Room Air Conditioners	2,345	1,823	693	4,861
HVAC Tune-Ups	3,926	3,637	709	8,272
Packaged Terminal Air Conditioners (PTACs)	0	2	0	2
Packaged Terminal Heat Pump (PTHPs)	1	3	0	4
<b>Total</b>	<b>291,436</b>	<b>330,059</b>	<b>93,081</b>	<b>714,576</b>

Ex-post electric savings were calculated through detailed analysis of program tracking data and participant survey data. For all measure types listed in the Ohio TRM; all installation rates, deemed savings, and hours of use were calculated per the Ohio TRM (“Deemed”). For all measure types not listed in the Ohio TRM, the savings algorithms from the Pennsylvania TRM were used. In addition, ADM calculated gross savings for

measures in the program with “as found” baseline conditions, hours of use, and installation rates. As specified in Ohio R.C. §4928.662, the values reported for energy savings (kWh) and peak demand reduction (kW) represent the higher calculated value obtained from both methodologies, for both ex-ante and ex-post energy savings.

Annual ex-post verified electric savings were 91,463,891 kWh (a realization rate of 95.73 percent). Ex-post verified peak demand reduction was 12,118.08 kW (a realization rate of 96.78 percent). Variation in between ex-ante and ex-post results can be attributed to the lower in-service rates (ISRs) for LED bulbs and fixtures identified in a general population survey. Additionally, accurate data inputs for savings algorithms allowed for more precise savings calculations than the ex-ante savings values. Detailed tables listing energy savings and demand reductions by measure type can be found in Appendix A: Required Savings Tables. Ex-post gross energy savings (kWh) and peak demand reduction (kW) for the program in the three service territories are compared to ex-ante estimates in Table 1-2.

*Table 1-2: Overall Evaluation Results*

Utility	Ex-Ante		Ex-Post		Realization Rate	
	Expected Gross Savings		Verified Gross Savings			
	Gross kWh	Gross kW	Gross kWh	Gross kW	kWh	kW
CEI	40,041,769.23	5,201.73	38,399,545.89	5,074.30	95.90%	97.55%
OE	41,862,914.61	5,586.08	40,086,434.18	5,391.70	95.76%	96.52%
TE	13,639,222.03	1,733.49	12,977,911.25	1,652.09	95.15%	95.30%
All Companies	95,543,905.87	12,521.30	91,463,891.32	12,118.08	95.73%	96.78%

A comprehensive process evaluation was performed during the 2018 program year, and the key findings can be found in the following subsections.

## 1.1 Program Operations Conclusions

The following section summarizes the conclusions related to program operations and program performance.

- The Lighting and Appliance sub-programs contributed a significant portion of the savings for 2018. Savings from the Appliance sub-program increased significantly from 2017, despite no changes in appliance measure incentive levels.
- Honeywell reports that they continue to have difficulty recruiting retail partners and distributors for the program, particularly for the HVAC and Consumer Electronics sub-programs.

## 1.2 Retailer Feedback Conclusions

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The following section summarizes the key findings from the retailer interviews.

- Retailers are motivated to participate in the program because it requires little effort on their part; helps their customers; and provides retailers with money back.
- Honeywell maintains regular communication with participating retailers, and most retailers say they know who to reach out to with program questions or concerns—their Honeywell representative. However, a subset of retailers said that they were not sure who to speak to with about program questions or were confused about the relationship between the Honeywell representative and the Companies.
- Retailer outreach and training continues to be an opportunity for the Companies to consider. Specifically, retailers want to learn more about the program and qualifying products. Retailers report that they often must go online to learn about which products qualify. To enhance retailer support during 2018, Honeywell implemented a new retail binder for all participating retailers; however, retailers generally are not aware this resource is available within their own store. This may indicate an opportunity for ongoing engagement and more personalized support from Honeywell staff, and a chance to remind retailers of available program resources.
- Retailers either do not know that the Companies fund the program or associate the program directly with the Companies in conversation. Retailers often refer to the program as a Honeywell program; not a FirstEnergy Companies program. This may have implications for how retailers message the program, and program sponsors, to customers. Overall, retailers are highly satisfied with their participation in the program, noting that it provides their customers with benefits, is easy to participate in, and it gives money back to the store. Retailers are also satisfied with the signage and thought that it was well designed and drew attention to qualified products.
- None of the retailers mentioned any drawbacks or barriers to participating in the program.

## 1.3 HVAC Contractor Feedback Conclusions

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The following section summarizes the key findings from the HVAC contractor interviews.

- HVAC contractors report learning about the program through two major channels: (1) from their customers, when customers call to request a rebated tune-up or; (2) from a Honeywell representative.
- HVAC contractors said they participate in the program because it allows them to reduce their customers' costs without decreasing their own profit margins.
- Most HVAC contractors do not actively advertise the program to their customers. Instead, they discuss the rebate with customers when they go on-site to customers' homes to perform the tune-up itself.

- HVAC contractors may be confused on their role in advertising and the rules around using the Companies name in marketing collateral. They would like more support and/or information about how to advertise for the program, including specific rules about what they can and cannot do to advertise it.
- Overall, HVAC contractors are satisfied with the program. However, contractors also noted that they had not been participating for that long. As the HVAC contractor network grows, this is an opportunity for future research.

#### **1.4 Customer Research Conclusions**

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The following section provides key findings based on the customer research.

- Respondents typically learned about the Energy Efficiency Products program through the retailer; they found out about the program in-store from the store associate or the program signage.
- When choosing a preferred store, customers look for the best prices, convenient locations, and a good variety of products and brands. The current store selection meets customers' needs.
- The majority of customers did not choose a Company's product sign as their "preferred" sign during the mobile in-store survey. Many customers said they chose their preferred sign because it was the only sign in the aisle to which they were directed. This implies that the Companies' signs are not prominently placed or may be missing from qualifying products.
- Customers that responded to the mobile in-store survey reported the sales associates and clear, informative signage is important in their purchasing decisions. Respondents said that they are looking for knowledgeable store associates; however, the majority of mobile in-store respondents who spoke with an associate were not directed to energy efficient items. Additionally, respondents were most responsive to signs that mention savings (either cost or energy).
- Overall, customers are satisfied with their experience in the Energy Efficient Product program. They like the qualified product they purchased, and they are satisfied with the rebate amount and time it took to receive the rebate.

#### **1.5 Recommendations**

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The evaluation team offers the following recommendations for continued improvement of the Residential Energy Efficient Products Program.

- Continue to identify opportunities to enhance retailer engagement, particularly related to outreach and training. These opportunities will also allow the Companies and Honeywell to remind retailers about available program resources, such as the newly launched retailer binder, and where they should direct program-related questions. Enhancing retailer engagement may also provide an opportunity to help retailers understand the relationship between Honeywell and the Companies' sponsorship of the program. This may be important, given that retailers often refer

to the program as a Honeywell program; not a FirstEnergy Company's program, and there appears to be a disconnect between retailers and their understanding of sponsorship of the program. This may impact how retailers message the program, and the Companies' sponsorship of the program, to customers.

- Identify opportunities to further train and educate the HVAC contractor network. Specifically, per interviews, it may benefit Honeywell to engage HVAC contractors during the shoulder seasons, when they are less busy, and their customers may be more responsive. In addition, there would be value in enhanced training about marketing guidelines and opportunities. Honeywell may want to consider creating a HVAC contractor binder, similar to the resource they implemented for the retailers this past year. This may help HVAC contractors to advertise the HVAC tune-up rebate to their customers, which in turn, may aid in increasing participation by customers who otherwise might not participate (and not just customers who have already scheduled HVAC maintenance appointments with their contractors.)
- Identify strategies to improve retailer placement of program signage within the stores, in order to improve customer awareness of program-qualifying products. Per mobile survey responses, it appears that most signs that customers viewed were not Company signs, but instead, general ENERGY STAR® signs. In addition, some retailers stated that they do not place signs, or only place them for short periods of time before moving them off the floor and into a back room.

## 2 Introduction and Purpose of Study

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Under contract with the FirstEnergy's Ohio Utilities, The Cleveland Electric Illuminating Company (CEI), Ohio Edison Company (OE), and The Toledo Edison Company (TE) (collectively "Companies"), ADM Associates, Inc. (ADM) has performed evaluation, measurement, and verification (EM&V) activities to confirm the energy savings (kWh) and demand reduction (kW) achieved through the energy efficiency programs that the Company is implementing in Ohio in 2018. The purpose of this report is to present the results of the impact evaluation effort undertaken by ADM to verify the energy savings and peak demand reductions that resulted from the program, as further described in Section 3, through the Energy Efficient Products Program during 2018. Additionally, this report presents the results of the process evaluation of the program completed by ADM and ILLUME focusing on participant and program staff perspectives regarding the program's implementation.

### 2.1 Description of the Program

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The primary objectives of the Energy Efficient Products Program are to encourage retailers to stock qualifying high efficiency equipment, and to encourage customers to purchase program qualifying equipment. The program provides incentives at various levels (downstream, midstream, and upstream point of sale). For downstream measures, customers apply for the rebate using an application often provided by the retailer; midstream and upstream incentives provided to retailers and/or manufacturers. Customers receive discounted prices on midstream and upstream incentivized products – that is, the incentives can be passed down to the customer.

**Downstream incentives** are paid directly to the customer, intended to encourage customers to purchase an efficient qualifying product over a non-qualifying product. The Companies provides downstream incentives for most measures offered through the Appliances sub-program, and for the HVAC tune-up measure offered within the HVAC sub-program.

**Midstream incentives** are paid directly to the retailer or distributor. According to program staff, the midstream incentives are designed to assist in market transformation by incentivizing retailers to stock more energy efficient products. The Companies provide midstream incentives for all measures offered through the Consumer Electronics sub-program, select measures in the Appliances sub-program, and all measures in the HVAC products sub-program (excluding HVAC tune-ups.)

**Upstream** incentives are offered for all Lighting sub-program measures. Customers receive these as point-of-purchase instant rebates on lighting products.

Table 2-1 details the rebate incentive structures and rebate amounts for all program qualifying measures.

*Table 2-1: Program Rebate Measures and Incentives*

Measure	Sub-Program	Incentive Type	Incentive Amount
Freezer	Appliances	Mid-stream	\$10.00
Dehumidifier	Appliances	Mid-stream	\$10.00
Heat pump water heater	Appliances	Mid-stream	\$250.00
Refrigerator – tier 1	Appliances	Downstream	\$25.00
Refrigerator – tier 2	Appliances	Downstream	\$50.00
Refrigerator – tier 3	Appliances	Downstream	\$75.00
Clothes washer	Appliances	Downstream	\$50.00
Clothes dryer	Appliances	Downstream	\$50.00
Solar water heater	Appliances	Downstream	\$375.00
ENERGY STAR® televisions ( $\geq 40"$ )	Consumer Electronics	Mid-stream	\$4.00
ENERGY STAR® televisions ( $< 40"$ )	Consumer Electronics	Mid-stream	\$3.00
Computers	Consumer Electronics	Mid-stream	\$3.00
Computer monitors	Consumer Electronics	Mid-stream	\$1.00
Imaging equipment	Consumer Electronics	Mid-stream	\$2.00
LED fixtures	Lighting	Upstream	\$3.00
LED bulbs (ENERGY STAR®)	Lighting	Upstream	\$1.50 - \$6.00 /bulb
LED specialty bulbs (ENERGY STAR®)	Lighting	Upstream	\$1.50 - \$6.00 /bulb
Heat pump	HVAC	Midstream	\$250.00
Central air conditioner	HVAC	Midstream	\$100.00
Room air conditioner	HVAC	Midstream	\$20.00
Ductless min-split heat pump	HVAC	Midstream	\$125.00
Packaged Terminal Air Conditioners (PTAC)	HVAC	Midstream	\$50.00
Packaged Terminal Heat Pump (PTHP)	HVAC	Midstream	\$100.00
Heat pump – water and geothermal	HVAC	Midstream	\$300.00
Furnace fans	HVAC	Midstream	\$150.00
Circulation pumps	HVAC	Midstream	\$30.00
Smart thermostats	HVAC	Midstream	\$30.00
HVAC tune-up	HVAC	Downstream	\$50.00

Honeywell implements the Energy Efficient Products Program. They are responsible for all elements of implementation, including recruiting and managing the retailer network; recruiting and managing the HVAC sub-program contractor network; delivering trainings; developing marketing materials; and incentive processing.

The Energy Efficient Products Program relies on three networks: (1) an HVAC contractor network for the HVAC sub-program, which was launched during 2018; (2) a retailer and manufacturer network, and (3) a distributor network.

HVAC contractors who agree to participate in the program are eligible to market a \$50 rebate to eligible customers for an HVAC tune-up. Contractors also benefit from marketing support and being listed on the Companies' website as a participating contractor.

Retailers stock and sell qualifying products and increase customer awareness about the program through in-store signage and interactions with sales associates. Manufacturers receive program incentives for specific sub-program measures, including Lighting program measures; and heat pump water heaters.

Given the new nature of this program the evaluation focused on tune-up measures; however, the team recommends expanding the research groups to contractors and distributors in the next evaluation year.



### 3 Impact Evaluation Objectives

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The impact evaluation component of this report estimates annual gross energy savings (kWh) and peak demand reduction (kW) as framed by the following five research questions:

- How many customers participated in the program?
- How many and which measure types were installed through the program?
- What percentage of each measure type can be verified as installed?
- What are the kWh savings achieved by the program?
- What was the kW reduction achieved by the program?

The primary deemed savings and/or engineering algorithm source for determining program impacts was the Ohio TRM. The Pennsylvania TRM version 5 (“PA TRM”) was used as a secondary calculation source for all measures not listed in the Ohio TRM.

Per Ohio RC §4928.662, for all measure types listed in the Ohio TRM; all installation rates, deemed savings, and hours of use were calculated per the Ohio TRM (“Deemed”). In addition, ADM calculated gross savings for measures in the program with “as found” baseline conditions, hours of use, and installation rates. The values reported for both ex-ante and ex-post energy savings (kWh) and peak demand reduction (kW) represent the higher calculated value obtained from both methodologies.

The specific methodologies used to evaluate each sub-program is described in detail in chapters 5, 6, 7, and 8.

#### 3.1 Percent of Savings from Income Qualified Customers

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Questions were added to the evaluation and general population surveys to assess low income participation in this subprogram. The surveys were administered so that the customer disclosed their annual income range from a series of categories. Customers also reported the number of occupants in the household. This information was used to support the determination of whether the household is above or below 150% of Federal Poverty Level (FPL). Respondents were low income qualified if the stated incomes were below 150% of FPL (Table 3-1).

*Table 3-1: 2018 Federal poverty levels and 150% of poverty levels.*

Persons in Household	2018 Federal Poverty Level	150% Federal Poverty Level
1	\$12,140	\$18,210
2	\$16,460	\$24,690
3	\$20,780	\$31,170
4	\$25,100	\$37,650
5	\$29,420	\$44,130
6	\$33,740	\$50,610
7	\$38,060	\$57,090
8	\$42,380	\$63,570

The participant survey results were sorted by the number of people reported in each household and the household income ranges that fall below the 150% Federal Poverty Level shown in Table 3-1. For each of these groupings of occupants and incomes, ADM further broke down the data by reported participants in each Electric Distribution Company (EDC) by measure type. Once these counts of low-income participants are calculated for each group in Table 3-1, they are summed up to get the number of low-income participants in each EDC by measure type. Because the survey represents a statistically valid sample for the program population, we can use the percentages calculated from the numbers of low-income participants relative to the number of participants in the entire survey, to assess the savings for low income participants in the program. To calculate the savings for the low-income portion of the program participants, the ex-post energy and demand savings are multiplied by the percentage of low-income participants by EDC.

## 4 Process Evaluation Objectives

The overarching objectives of the 2018 Residential Energy Efficient Products Program process evaluation is to capture and record program delivery and progress towards contracted targets, document program successes, and inform implementation strategies for the future. Table 4-1 provides a summary of the research questions and corresponding data collection activities.

*Table 4-1: Energy Efficient Program Research Questions*

Research question <sup>3</sup>	Activities
Is the program being administered effectively in terms of program oversight, communication, staffing, training, and/or reporting?	<ul style="list-style-type: none"><li>■ Interviews with Company and Honeywell Program Managers</li><li>■ Retailer Interviews</li></ul>
Has the program and each sub-program performed as expected and, if not, why not?	<ul style="list-style-type: none"><li>■ Tracking Data Review</li><li>■ Interviews with Company and Honeywell Program Managers</li><li>■ Retailer Interviews</li></ul>
What changes have been made to the program's design or delivery since 2017 to improve the effectiveness of retailer training and communication? How are these changes working for retailers?	<ul style="list-style-type: none"><li>■ Interviews with Company and Honeywell Program Managers</li><li>■ Retailer Interviews</li><li>■ Documentation Review</li></ul>
How is the program working for HVAC contractors, including their level of engagement in the program, key program processes, opportunities for improvement, and overall satisfaction? What, if anything, can be improved?	<ul style="list-style-type: none"><li>■ Interviews with HVAC Contractors</li></ul>
How effective are the signage and retailer staff in communicating benefits and encouraging purchase of program qualifying equipment?	<ul style="list-style-type: none"><li>■ Mobile In-Store Survey</li><li>■ General Population and Downstream Customer Surveys</li></ul>
How satisfied are retailers and customers with their program experiences?	<ul style="list-style-type: none"><li>■ Retailer Interviews</li><li>■ Mobile In-Store Survey</li><li>■ General Population and Downstream Customer Surveys</li></ul>
How consistently is the program being delivered across retail partners?	<ul style="list-style-type: none"><li>■ Retailer and store partner interviews; mobile in-store survey</li></ul>
Are customers aware of FirstEnergy's sponsorship of the program? How does this awareness impact customer satisfaction with FirstEnergy?	<ul style="list-style-type: none"><li>■ Mobile in-store survey; upstream and downstream surveys</li></ul>

<sup>3</sup> FirstEnergy approved all research questions on November 21, 2018 in the document "ADM\_First\_energy\_Revised\_Resarch\_QuestionsMemo\_Final\_21November2018".

To address these researchable issues, ILLUME conducted seven primary and secondary activities from November 2018 to February 2019:

- **Interviews with the Company and implementer, Honeywell.** These interviews helped us to understand program operations, design, implementation, processes, and any changes to the program since 2017. We also used these interviews to identify key research needs for the 2018 evaluation.
- **Documentation and materials analysis.** To understand program design and offerings, and messaging tailored to customers and retailers, we reviewed key program documents, such as the 2018 marketing plan, 2018 marketing collateral for all four sub-programs, the Residential Energy Efficient Products Program website, and the newly designed retail marketing binder that was launched in 2018 for retail staff. In addition, we reviewed materials designed for contractors in the HVAC sub-program, including the HVAC participating contractor agreement and website information on participating contractors.
- **Tracking data analysis.** The Companies provided program participation data, captured measures rebated by individual retailers and HVAC contractors (midstream and point-of-purchase) and customer rebates (downstream). We used these data to analyze progress towards savings contracted targets and retailer participation.
- **Telephone interviews with participating retailers.** During January 2019, we completed telephone interviews with 10 program-participating retailers. The goal of the interviews was to understand the retailer perspective on the Energy Efficient Products Program. During the interviews, we assessed retailer engagement with the program, retailer perceptions about customer awareness of the program and discounts/rebates, the effectiveness of in-store signage, retailer perceptions of the impact of financial support on purchasing decisions, the value of the program to retailers, and opportunities for improvement.
- **Telephone interviews with participating HVAC contractors.** During January 2019, our team completed telephone interviews with five program-participating HVAC contractors that provided tune-up services. During the interviews, we discussed contractor program experience, motivations to participate, interactions with and needs from the Companies, as well as overall contractor satisfaction with the program.
- **Mobile in-store survey.** During January 2019, our team fielded a mobile in-store customer survey targeting respondents while they visited participating retailer. The mobile in-store survey allowed our team to cost-effectively reach 51 customers to obtain information about the customer experience while in-store. It assessed customer experience with program signage, interactions with sales associates, motivations and decision-making related to purchases, experience with program products while in-store, and the overall shopping experience.

- **General population and downstream customer surveys.** A general population survey was fielded among a general population of the Companies' residential customers to assess the current state of customer's light bulb and appliance purchases in Ohio and their knowledge of energy efficiency standards (n = 3,710). The downstream survey was fielded among participants who had received program rebates to assess customer's experience in the Energy Efficiency Product program (n = 211).

## 5 Appliances

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The purpose of this chapter is to present the findings of the Appliance measures from the impact and process evaluation effort undertaken by ADM to verify the energy savings and peak demand reduction.

### 5.1 Description of Appliances Sub-program

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The program provides rebates to residential customers as well as financial incentives and support to retailers that sell ENERGY STAR® qualified appliances. The rebates are designed to encourage the purchase and installation of energy-efficient appliances that will reduce electricity consumption and reduce summer peak load demands.

Energy efficient appliances that are rebated in 2018 through the downstream channel include:

- ENERGY STAR® Clothes Dryers
- ENERGY STAR® Clothes Washers
- ENERGY STAR® Refrigerators
- Solar water heaters

Energy efficient appliances that are rebated in 2018 through the midstream channel include:

- ENERGY STAR® Water Heaters
- ENERGY STAR® Freezers
- ENERGY STAR® Dehumidifier

Table 5-1 presents the appliances rebates by EDC and measure, Table 5-2 presents ex-ante kWh savings by EDC and measure, and Table 5-3 present ex-ante kW savings by EDC and measure.

*Table 5-1: Appliances Rebates by EDC and Measure*

Measure	CEI	OE	TE	Total
Clothes Washer	2,821	3,643	1,044	7,508
Clothes Dryer	1,141	1,537	481	3,159
Refrigerators	1,659	2,102	566	4,327
Dehumidifiers	8,418	16,082	2,566	27,066
Freezers	786	2,034	503	3,323
Water Heater (Heat Pump)	3	51	16	70
<b>Totals</b>	<b>14,828</b>	<b>25,449</b>	<b>5,176</b>	<b>45,453</b>

*Table 5-2: Ex-Ante Appliances kWh Savings by EDC and Measure*

Measure	CEI	OE	TE	Total
Clothes Washer	569,842.00	735,886.00	210,888.00	1,516,616.00
Clothes Dryer	31,240.58	42,083.06	13,169.78	86,493.42
Refrigerators	198,444.00	252,553.00	67,474.00	518,471.00
Dehumidifiers	2,067,940.00	3,889,950.00	616,745.00	6,574,635.00
Freezers	103,752.00	268,878.00	66,396.00	439,026.00
Water Heater (Heat Pump)	5,064.00	86,088.00	27,008.00	118,160.00
<b>Totals</b>	<b>2,976,282.58</b>	<b>5,275,438.06</b>	<b>1,001,680.78</b>	<b>9,253,401.42</b>

*Table 5-3: Ex-Ante Appliances kW Savings by EDC and Measure*

Measure	CEI	OE	TE	Total
Clothes Washer	65.17	84.15	24.12	173.43
Clothes Dryer	5.48	7.38	2.31	15.16
Refrigerators	34.70	44.17	11.80	90.67
Dehumidifiers	486.54	915.67	145.50	1,547.71
Freezers	15.72	40.68	10.06	66.46
Water Heater (Heat Pump)	0.69	11.78	3.70	16.17
<b>Totals</b>	<b>608.30</b>	<b>1,103.83</b>	<b>197.48</b>	<b>1,909.61</b>

## 5.2 Impact Evaluation Methodology

The following section details the methods used to calculate energy savings and demand reductions for the Appliances sub-program.

### 5.2.1 Sampling Plan

ADM completed a census review of all measures listed in the tracking system to ensure appropriate use of deemed savings values.

The sample size for the follow-up surveys in each service territory achieved a relative precision of  $\pm 10\%$  at the 90% confidence interval. The sample size calculation for achieving 90% confidence with 10% precision is shown in Equation 5-1 below.

*Equation 5-1: Minimum Sample Size Formula for 90 percent Confidence Interval*

$$n_0 = \frac{N \times \frac{1}{4}}{(N - 1) \times \frac{D^2}{Z_{\alpha/2}^2}}$$

Where:

**$n_0$**  = Minimum sample size

**$N$**  = Population size, assumed to be 100,000 or greater

**$Z_{\alpha/2}$**  = Z value at 90% confidence interval, 1.645

**$\frac{1}{4}$**  = The maximum value of  $p(1-p)$  at  $p=1/2$ , a conservative estimate for sample size

**$D$**  = Relative Precision (0.10)



ADM successfully surveyed 211 respondents in the downstream participant survey. This number was chosen to ensure 70 completed surveys per EDC.

### **5.2.2 Ex-ante Review**

ADM conducted an ex-ante review of the Program's final 2018 appliance database. In this review, ADM carried out the necessary data cleaning and data editing steps in preparing the data for analysis, including:

- Verification of rebate status as completed;
- Verification of measure rebate requirements (e.g., ENERGY STAR® qualified status) for completed rebate applications;
- Elimination of duplicate data entries;
- Elimination of cases with incomplete data (e.g., no model number provided); and
- Verification that all rebates paid for ENERGY STAR® qualified clothes washers are from homes with electric hot water heaters.<sup>4</sup>

Appliances verified as passing ADM's rebate screening process were analyzed further for energy and demand savings using the procedures described below. The final measure count per appliance category is the total number of appliances that pass all the applicable screens in qualifying as a rebated product for which savings is claimed by the 2018 Program.

### **5.2.3 Customer Surveys**

Data collected via program participant surveys informed both the impact and process evaluations. The evaluation team administered participant surveys online and/or by telephone; the chosen method was dependent on the availability of contact information and progress toward achieving the required sample size. We designed survey instruments to collect useful and detailed information while minimizing respondent burden.

ADM also included questions to gather information on low-income participation within the EE Products program. This was done by obtaining a gross household income and the number of people living in each household to obtain the percentage of Federal Poverty Level (FPL) for each household.

For the Appliance sub-programs, the evaluation team administered participant surveys to a random sample of program participants across the three EDCs. Surveys addressed

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<sup>4</sup> This check was carried out through a combination of procedures, including desk review of Honeywell documentation, and customer surveys.

program awareness, the application process, their experiences with contractors, and satisfaction with the energy efficient appliance or equipment they purchased and the program overall.

#### 5.2.4 Energy Savings and Peak Demand Reduction Calculations

Deemed savings values from the Ohio TRM were used to analyze the energy savings and demand reductions for:

- ENERGY STAR® Refrigerators
- ENERGY STAR® Clothes Washers
- ENERGY STAR® Dehumidifiers

Deemed savings values based on freezer types from models reported in the SQL Server Reporting Services (SSRS) database were used to analyze the energy savings and demand reductions for:

- ENERGY STAR® Freezers

The engineering algorithm from the Ohio TRM was used to analyze the energy savings and demand reductions for:

- ENERGY STAR® Heat Pump Water Heaters

The engineering algorithm from the Pennsylvania TRM was used to analyze the energy savings and demand reductions for:

- ENERGY STAR® Clothes Dryers

The detail of the calculations is provided below.

#### ENERGY STAR® Refrigerators

Annual energy savings and peak demand reduction are deemed based on the refrigerator door configuration, which is recorded in the Honeywell appliance database. Table 5-4 shows the deemed savings values for ENERGY STAR® qualified refrigerators specified in the TRM for the purchase of ENERGY STAR® Refrigerators.

*Table 5-4: Deemed Savings Values for ENERGY STAR® Refrigerators*

Refrigerator Configuration	Average Annual kWh Savings Per Unit	Average Summer Coincident Peak kW Savings Per Unit
Bottom Freezer	119	0.021
Top Freezer	100	0.018
Side by Side	142	0.025

ADM checked the AEG database for any other refrigerator configurations that were rebated (e.g., single door refrigerators). ADM looked up the appropriate deemed savings

values in the ENERGY STAR® refrigerator database for any other listed models that were rebated. ADM also checked for misclassification of rebated refrigerators. Any misclassified refrigerators identified were re-assigned to their proper refrigerator configuration categories and deemed savings values were based on these re-assigned classifications.

### ENERGY STAR® Freezers

Annual energy savings and peak demand reduction are calculated based on freezer type which was determined based on the model numbers in the Honeywell appliance database. The 2008 federal standard baseline for max consumption is applicable base on language in RC §4928.662.

*Table 5-5: Deemed Savings Values for ENERGY STAR® Freezers*

Freezer Type	Average of Annual Energy Use (kWh/yr)	Average of Adjusted Volume (ft <sup>3</sup> )	2008 Federal Standard for Max kWh Consumption	Average of Percent Less Energy Use than 2008 Federal Standard	kWh Savings Per Unit
Chest Freezer	192	12	258.11	26%	67
Upright Freezer Automatic	451	26	647.49	30%	197
Upright Freezer Manual	229	5	293.87	22%	65

### ENERGY STAR® Clothes Washers

ADM verified the rebated clothes washers and ENERGY STAR®. Deemed savings were specified in the OH TRM and applied as outlined in the table below.

*Table 5-6: Deemed Savings Values for ENERGY STAR® Clothes Washers*

Measure	Hours	CF	Energy Savings (kWh)	Demand Reductions (kW)
ENERGY STAR® Clothes Washer	320	0.033 <sup>5</sup>	202	0.021
CEE TIER 3 Washer	320	0.033	233	0.024

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<sup>5</sup> The OH TRM calculation uses a CF of 0.045 instead of the specified value of 0.033. ADM used the TRM specified value in our calculations.

## ENERGY STAR® Clothes Dryers

ADM verified the rebated clothes dryers and ENERGY STAR® qualification and ensured the moisture sensor feature on the dryers as stated on the Portfolio Plan for the rebate on dryers. The algorithm used to calculate the dryer annual kWh savings is derived from the PA TRM (p. 152).

### *Equation 5-2: Annual Energy Savings – Clothes Dryer w/moisture sensor*

$$kWh\ Savings = Cycles_{wash} \times \% \frac{dry}{wash} \times Load_{avg} \times \left( \frac{1}{CEF_{base}} - \frac{1}{CEF_{ee}} \right)$$

Where:

Cycles <sub>wash</sub>	= Number of washing machine cycles per year = 250
% dry/wash	= Percentage of homes with a dryer that use the dryer every time clothes are washed
Load <sub>avg</sub>	= weight of average dryer load in pounds per load = 8.45(standard); 3.0 (compact dryer)
CEF <sub>base</sub>	= Combined Energy Factor of baseline dryer, in lbs/kWh
CEF <sub>ee</sub>	= Combined Energy Factor of ENERGY STAR® dryer, in lbs/kWh

### *Equation 5-3: Annual Demand Savings – Clothes Dryers w/moisture sensor*

$$kW\ Savings = \frac{\left( \frac{1}{CEF_{base}} - \frac{1}{CEF_{ee}} \right) \times Load_{avg}}{Time_{cycle}} \times CF$$

Where:

Load <sub>avg</sub>	= weight of average dryer load in pounds per load = 8.45 (standard); 3.0 (compact dryer)
CEF <sub>base</sub>	= Combined Energy Factor of baseline dryer, in lbs/kWh
CEF <sub>ee</sub>	= Combined Energy Factor of ENERGY STAR® dryer, in lbs/kWh
Time <sub>cycle</sub>	= Duration of average drying cycle in hours = 1 Hour
CF	= Coincidence Factor = 0.042

## ENERGY STAR® Heat Pump Water Heaters

ADM verified the rebated heat pump water heaters through the invoice review process and calculated the savings per the Ohio TRM algorithm listed below.

### *Equation 5-4: Annual Energy Savings – Heat Pump Water Heaters*

$$\Delta kWh = KWH_{base} * ((COP_{new} - COP_{base})/COP_{new}) + KWH_{cooling} - KWH_{heating}$$

Where:

$KWH_{base}$  = Average electric DHW consumption = 3460

$COP_{new}$  = Coefficient of Performance of Heat Pump water heater = 2.0

$COP_{base}$  = Coefficient of Performance of standard electric water heater = 0.904

$KWH_{cooling}$  = savings from conversion of heat in home to water heat = 180

$KWH_{heating}$  = Heating cost from conversion of heat in home to water heat. Dependent on heating fuel as follows:

electric resistance = 1,577

heat pump COP 2.0 = 779

fossil fuel = 0

### ENERGY STAR® Dehumidifiers

ADM verified the rebated dehumidifiers through the invoice review process and calculated the savings using the Ohio TRM deemed values in the table below.

#### *Equation 5-5: Annual Energy Savings Dehumidifiers*

$$\Delta kWh = \frac{Av\ Capacity * 0.473}{24} * \frac{\frac{Hours}{L}}{kWh}$$

Where:

0.473 = Constant to convert Pints to Liters

Hours = Run hours per year

L/kWh = Liters of water per kWh consumed  
= As provided in tables above

Av Capacity = Average electric DHW consumption = 3460

#### *Equation 5-6: Peak Demand Savings for Dehumidifiers*

$$\Delta kW = \frac{\Delta kWh}{Hours} * CF$$

Where:

CF = Summer Peak Coincidence Factor for measure  
= 0.37

*Table 5-7: Deemed Savings Values for ENERGY STAR® Dehumidifiers*

Capacity	Energy Savings (kWh)	Demand Reductions (kW)
<25	130	0.01
>25 to 35	120	0.03
>35 to 45	149	0.05
>45 to 54	266	0.07
>54 to 75	249	0.04
>75 to 185	179	0.09

### 5.3 Impact Evaluation Findings

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The ex-post energy savings for the Appliances sub-program totaled 9,253,965 kWh and ex-post peak load demand reduction totaled 1,846.26 kW. The ex-ante estimates by measure were highly accurate and the overall realization rates for this sub-program to 100.01% and 96.68% respectively. Explanations for variation from the ex-ante values by measure are below.

#### **Clothes Washers**

The ex-ante calculations used (0.0231 kW). for demand reduction while ex-post uses the OH TRM (0.0208 kW). There is an error in the OH TRM, with the coincidence factor for this measure shown as 0.045 on page 60, while showing 0.033 on page 61. ADM used 0.033CF in the demand reduction algorithm. This resulted in ex-post kW reductions of 0.0208 kW for ENERGY STAR® units and 0.0240 kW for CEE Advanced Tier units. Realization rates for energy savings and peak demand reduction are 100.00% and 90.18% respectively.

## **Clothes Dryers**

The differences in realization rates are due to rounding. Realization rates for energy savings and peak demand reduction are 99.91% and 100.78% respectively.

## **Refrigerators**

There are several refrigerators that do not fall within the configurations listed in the OH TRM (bottom freezer, top freezer, side by side) and are classified as French Door. The energy use for each model was taken directly from the ENERGY STAR® database and used in the savings algorithms. This resulted in energy savings and peak demand reduction of 99.43% and 99.57% respectively.

## **Dehumidifiers**

Ex-ante values in SSRS data is rounded to the nearest whole number for kWh and the kW values are rounded to the second digit. This resulted in energy savings and peak demand reduction realization rates of 100.02% and 96.34% respectively.

## **Freezers**

Ex-ante values in SQL Server Reporting Services (SSRS) data is rounded to the nearest whole number for kWh and the kW values are rounded to the second digit. The ex-post values ADM utilized are four decimals long for kWh and six decimals for kW. This resulted in energy savings and peak demand reduction of 100.45% and 116.05% respectively.

## **Water Heaters**

Ex-ante values in SSRS data is rounded to the nearest whole number for kWh and the kW values are rounded to the second digit. The ex-post values ADM utilized are four decimals long for kWh and six decimals for kW. This resulted in energy savings and peak demand reduction of 100.03% and 99.84% respectively.

Table 5-8, Table 5-9, and Table 5-10, below show ex-post kWh and kW savings per measure across each EDC and the totals.

*Table 5-8: Appliances Ex-Post Energy (kWh) Savings by Measure and EDC*

Measure	CEI	OE	TE	Total
Clothes Washer	569,842.00	735,886.00	210,888.00	1,516,616.00
Clothes Dryer	31,209.67	42,052.54	13,154.24	86,416.44
Refrigerators	196,649.00	251,874.00	67,005.00	515,528.00
Dehumidifiers	2,068,498.45	3,890,772.12	616,928.44	6,576,199.01
Freezers	104,220.63	270,098.51	66,695.90	441,015.04
Water Heater (Heat Pump)	5,065.33	86,110.54	27,015.07	118,190.94
<b>Total</b>	<b>2,975,485.08</b>	<b>5,276,793.70</b>	<b>1,001,686.65</b>	<b>9,253,965.43</b>

*Table 5-9: Appliances Ex-Post Peak Demand (kW) Savings by Measure and EDC*

Measure	CEI	OE	TE	Total
Clothes Washer	58.76	75.89	21.75	156.40
Clothes Dryer	5.52	7.44	2.33	15.28
Refrigerators	34.44	44.11	11.73	90.28
Dehumidifiers	468.96	882.10	139.87	1,490.93
Freezers	18.25	47.30	11.68	77.23
Water Heater (Heat Pump)	0.69	11.76	3.69	16.14
<b>Total</b>	<b>586.62</b>	<b>1,068.59</b>	<b>191.04</b>	<b>1,846.26</b>



*Table 5-10: Appliances Ex-Post Totals*

Measure	Ex-Ante kWh	Ex-Ante kW	Ex-Post kWh	Ex-Post kW	kWh RR	kW RR
Clothes Washer	1,516,616.00	173.43	1,516,616.00	156.40	100.00%	90.18%
Clothes Dryer	86,493.42	15.16	86,416.44	15.28	99.91%	100.78%
Refrigerators	518,471.00	90.67	515,528.00	90.28	99.43%	99.57%
Dehumidifiers	6,574,635.00	1,547.62	6,576,199.01	1,490.93	100.02%	96.34%
Freezers	439,026.00	66.55	441,015.04	77.23	100.45%	116.05%
Water Heater (Heat Pump)	118,160.00	16.17	118,190.94	16.14	100.03%	99.84%
<b>Total</b>	<b>9,253,401.42</b>	<b>1,909.61</b>	<b>9,253,965.43</b>	<b>1,846.26</b>	<b>100.01%</b>	<b>96.68%</b>

#### 5.4 Detailed Process Evaluation Findings

The Appliances sub-program provides customer rebates and mid-stream incentives. The type of incentive received depends on the measure.

- Downstream incentive measures: refrigerators (tier 1, tier 2, tier 3), clothes washers, clothes dryers, and solar water heaters.
- Midstream incentive measures: freezers, dehumidifiers, and heat pump water heaters.

Several retail stores participate in the Appliances sub-program. Program data shows that retail stores stocking measures with downstream customer rebates include ABC Warehouse™, Appliance Center, Appliance Smart™, Best Buy®, Costco®, Grove Appliance, Hartville Hardware and Lumber, Home Appliance, The Home Depot®, JCPenney™, Kmart®, Lowe's Home Improvement®, Menard's™, Sears™, and Wooster Appliance.<sup>6</sup>

According to the Companies' Appliance Finder Tool on the program website, customers can choose from many eligible appliances across a variety of manufacturers, as follows:

- Clothes dryers: 14 total manufacturers;
- Clothes washers: 25 total manufacturers (26 including a duplicated listing on the program website);

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<sup>6</sup> The evaluation team manipulated and cleaned the tracking database to calculate the types of participating retailers. However, due to data issues and how the tracking system captured store names, the list of total participating retailers may be slightly different than the number identified by the evaluation team.

- Refrigerators: 57 CEE manufacturers; thousands of Energy Star® models on the Energy Star® website.

In addition, anywhere from one to 59 different appliance models appear to be eligible from different manufacturers.

The program website lists Best Buy®, The Home Depot®, and Sears™ as participating retailers for dehumidifiers, freezers, and heat pump water heaters. It does not include a listing of participating retailers for clothes washers, clothes dryers, and refrigerators.

### 5.4.1 Signage

The program provides a variety of signage for placement in retail stores. Honeywell field staff are responsible for placing signage on qualifying products during in-store visits.

**Downstream program signage** focuses on encouraging customers to purchase ENERGY STAR-certified appliances in order to earn rebates. For example, program signage tells customers that they can earn rebates that add up to \$550 on ENERGY STAR-certified appliances, including rebates for ENERGY STAR® clothes dryers and washers (\$50); ENERGY STAR® refrigerators (up to \$75); and solar water heaters (\$375).

A slightly modified message related to saving money was implemented during 2018: some downstream signage pieces contain messaging about annual home energy use, directing customers to choose ENERGY STAR® appliances to save money on their energy bills.

**Midstream program signage** asks customers if they are in the market for new appliances only, and then encourages customers to upgrade to energy efficient items to save money and energy on ENERGY STAR®-certified appliances. For example, program signage notes that ENERGY STAR® dehumidifiers use nearly 30% less energy; ENERGY STAR® freezers use 10% less energy; and ENERGY STAR® heat pump water heaters can result in an average savings of \$330 per year.

**Point of sale program signage** tells customers about “instant discounts” on qualifying products, made possible by FirstEnergy Companies.

According to retailers, signage is important for the following reasons:

- It engages customers and increases awareness
- Signage makes people aware of the Companies involvement in the programs
- Signs direct customers to qualified products and/or pique customer interest in products
- Stickers signal to customers which items they should choose
- Provide a purchasing guide for customers that do not ask sales associates for help

In summary, as one retailer said, “the signage is very important. If you have proper signage, [that is] clear, concise, gets to the point people read signs and helps make a decision.”

Signs do not replace the importance of the retailers’ sales force, however. Some retailers specifically mentioned that it was the sales team that was more effective at increasing sales. They said that the customers may not notice the signs on their own, but associates will point them out as they discuss qualifying items. On more expensive items, associates will use the signage and rebates to help customers make the decision to purchase a more energy efficient product.

The 2018 Marketing Plan states that the goal of retail signage is to, “Educate customers on energy saving that drive brand awareness with retail signage.” The examples they use in the Marketing Plan include information on appliance energy use and the rebate amount for midstream and downstream measures. In addition to retail signage, the Market Plan describes online buying guides and retail finders as ways to inform customers about the program and efficient products. The Marketing Plan also states that Honeywell hosts community events, like home shows and community fairs, as well as store training events.

#### Sub-Program Signage

The following sections include findings from the materials review and the mobile in-store survey. We interviewed 51 customers in the mobile in-store survey.

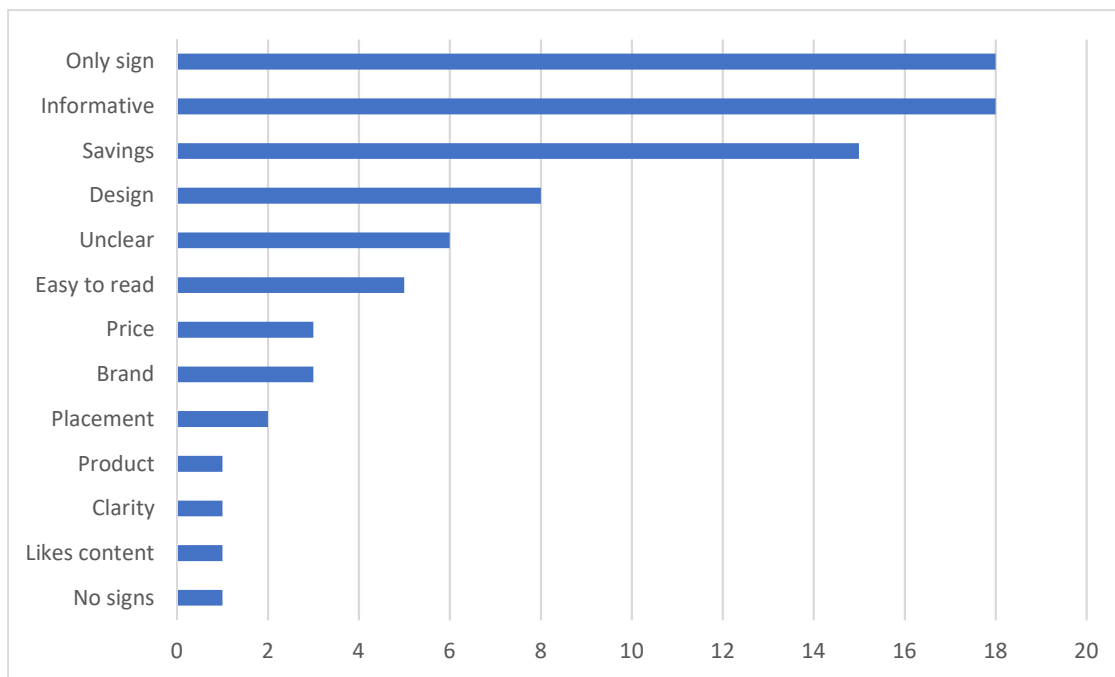
- Lighting: 20
- Midstream Appliances: 22
- Downstream Appliances: 17
- Consumer Electronics: 16
- HVAC – Thermostats: 6
- HVAC – Other equipment: 9

Based on the Mobile Survey we found that customers are responsive to signs that show savings (either reduction in price or percent decrease)—they did not necessarily find the program signs or take photos of them when asked “*Please take a picture of the rebate, instant discount, or energy savings sign that you like the most?*” The top reasons people chose to photograph a sign were having plenty of information, it was the only sign available in the aisle, or it highlighted savings of energy or money.<sup>7</sup> Figure 5-1 below describes all reasons mentioned by respondents for liking product signs. Only 23 of the 77 photos uploaded are of a program sign. This implies that customers may be more drawn to non-program signs or could not find a program sign.

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<sup>7</sup> Note that we did not ask customers to photograph a program sign but instead *any* sign that they preferred.

Figure 5-1: Reasons for Liking Product Signage



Given that rebate recipients are finding out about the program in-store the store associates and the program signage need to adequately inform customers about the program and the benefits. 82% of Mobile Survey respondents said they would purchase their surveyed item based on the program signage; but only five respondents said that store associates showed them energy efficient products in store.

#### 5.4.2 Appliance Signage

The evaluation team reviewed 11 different pieces of signage for the appliances sub-program. Appliance signage messaging differs depending on whether the product has a downstream customer rebate or is a midstream incentive product. All downstream and midstream appliance signage pieces contain the Companies' logo and ENERGY STAR® logo.<sup>8</sup>

Downstream appliance signage focuses messaging on rebates that customers can earn for purchasing ENERGY STAR® appliances:

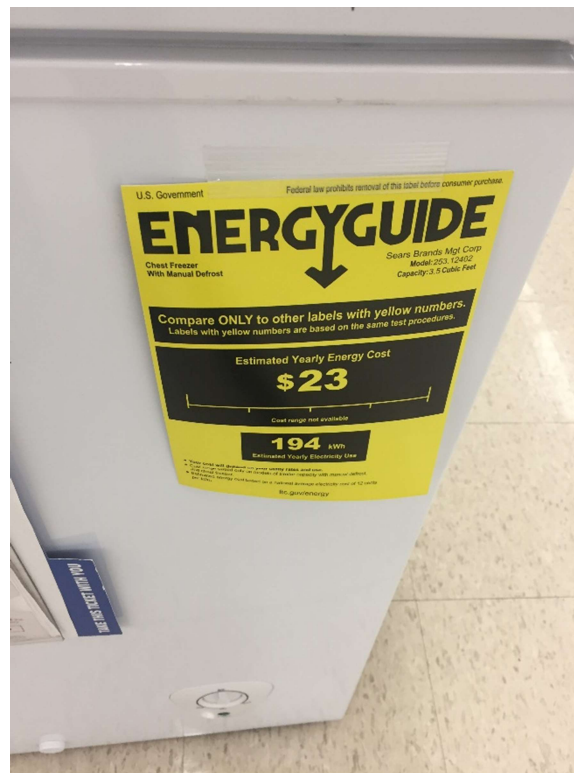
- Up to a total of \$550 in rebates, including:
  - \$50 rebate for clothes dryers;
  - \$50 rebate for clothes washers;
  - Up to \$75 rebate for refrigerators; and
  - \$375 rebate for solar water heaters.

<sup>8</sup> During 2018, the evaluation team again reviewed all program marketing and messaging.

Midstream appliance focuses on “saving money and energy” with ENERGY STAR®-certified appliances.

There were 51 mobile survey respondents for the appliance sub-program. They took photos of 29 signs for midstream and downstream appliances. Few photographs were of program signage (eight photos total). Most of the photographs that respondents took were of large yellow “ENERGYGUIDE®” signs produced by the federal government (seen in Figure 5-2). They are bold and contain messages focused directly on energy savings. Customers said they chose their photographed sign because it was informative (6), highlighted dollar or energy savings (5), or was the only sign in the area (5).

*Figure 5-2: ENERGY GUIDE Sign*



When customers find program signs, they generally respond positively to them. Approximately half of all customers who reviewed appliances thought that the signs they reviewed (including program and non-program signs) were:

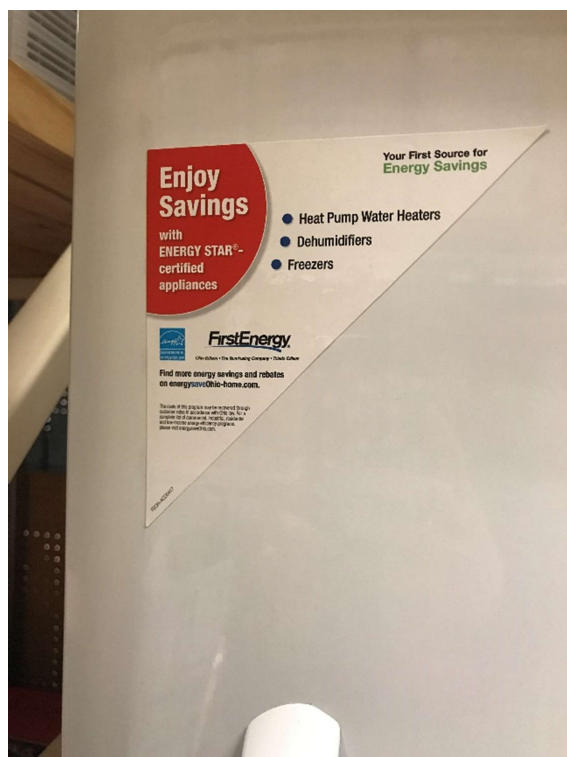
- Attention grabbing (21);
- Easy to understand (26);
- Informative (28); and
- Clearly showed the program sponsor (20).

However, customers did not always have an easy time finding signs for appliances. Of customers who reviewed appliances and appliance signage, only about one-third said that the signs for appliances were easy to find (16). There were no differences in ease of

finding midstream versus downstream program signs. This may imply an opportunity to place program signs more prominently, in order to direct customers to program-qualifying equipment.

The images below (Figure 5-3 and Figure 5-4) provide examples of program versus non-program signs that customers saw during their shopping experience:

*Figure 5-3: Uploaded Image of a Company Sign for Mid-Stream Appliances*



*Figure 5-4: Uploaded Image of a Non-Company Sign for Appliances*



All respondents who reviewed midstream appliances reported that after reviewing the program signage, they are likely or extremely likely to purchase a more efficient option for the product they reviewed (8).<sup>9</sup>

### 5.4.3 Retailer Feedback

Our team spoke with retailers representing three of the four sub-programs. In total, we spoke with 7 retailers who participate in the Appliances sub-program. The table below

<sup>9</sup> Primary survey respondents are those who took the Midstream Appliance portion of the survey first – they were only asked one battery of questions on the secondary survey.

portrays the types of retailers we spoke with. The retail categories are defined in 5.4.7 Program Networks.

*Table 5-11: Breakdown of Retailers by Retail Category*

	Appliances
Large Chains	3
Discount Stores	-
Smaller Retailers	1
Smaller EE Only Retailers	3
<b>Totals by Sub-program</b>	<b>7</b>

Among retailers who we interviewed, there were generally high levels of satisfaction with the program. Specifically, retailers described being satisfied with how simple it was for their store to participate, the benefits it provided to their customers, and the potential for increased business.

Retailers may continue to present an opportunity for the Companies, specifically related to outreach, education and training. These opportunities are discussed in more detail in the following sections.

### **Awareness and Motivation to Participate in the Program**

Retailers are primarily motivated to participate in the program because the program helps their customers, provides retailers with money back (either in profits or as mid-stream incentives) and is *“hands off” and easy to do*.

Several retailers described how they were happy to participate in order to help their customers purchase items at a lower cost—especially because it would not affect their profits. Retailers also described the program as a *“win-win”* program that required little effort on their part. These reasons are shown in Figure 5-5.



*Figure 5-5: Retailer Motivations for Participating*



### **Communication with Retailers**

The program maintains regular communication with participating retailers and distributors through its implementer, Honeywell. Honeywell maintains a network of field staff that is responsible for visiting participating retailers and distributors in-person. According to Honeywell staff, the field staff complete retailer and distributor visits approximately every four to six weeks.

During retail visits, Honeywell staff place point-of-purchase signage in the stores and educate retail sales staff about the program and qualifying products. Goals during the store visits include ensuring that signage is visible, and that signage shows the correct price of qualifying equipment. Honeywell also holds in-store events at retail stores in order to educate customers on the program, promote qualifying products, and serve as an educational resource to both customers and retail staff. This typically includes setting up a table with a utility tablecloth; putting up additional point-of-purchase signage, having rebate forms on-hand, and doing some small giveaways to customers. Finally, Honeywell developed a retail binder resource for retailers during the 2018 program year, to make it easier for retail staff to identify which products are eligible for the program.

Four of the retailers that we spoke with confirmed the visits they receive by Honeywell staff, saying that a Honeywell representative visits their store monthly to check in on their store's needs. Of these, three described their interactions with program staff as positive. They said the Honeywell representative came often enough, brought program materials and replenished rebate applications, and that they "took care of" the retailers.

Some retailers could not recall receiving visits by Honeywell and expressed confusion about who they should contact about the program.



Honeywell also implements “distributor days.” On these days, the distributor hosts lunch and Honeywell brings in a variety of vendors to educate them about the program and its benefits.

## **Training**

Retailers would like to have more training about the program and eligible products. Seven retailers we spoke with unequivocally said that they would like to have more trainings by program staff. We did find that there is some internal training and on-the-spot learning that occurs in the stores.

## **Retailer Awareness of Qualifying Products**

Generally, it seemed as though retailers were aware of qualifying products and could direct customers to them. If they were uncertain of which products qualified for customer rebates, retailers either go to the FirstEnergy website or rely on program signage to indicate which items qualify.

Some retailers expressed confusion about the program and who sponsors the program, identifying or referring to the program as a Honeywell program

These retailer responses indicate that the Companies’ sponsorship of the program may need to be promoted to the retailers, as there may be a disconnect between the Honeywell representative, with whom retailers interact, and the program itself.

## **Retailer Perspectives Regarding Influence on Sales and Stocking Qualifying Products**

When it came to motivations related to stocking qualifying products, we found that Smaller Retailers had more decision-making power in the store inventory as compared to Large Chain retailers.

Small Energy Efficient Only Retailers said that carrying energy efficient equipment was part of their store’s mission. One retailer said that their customers know that they’ll get energy efficient equipment by going to their store. When asked about the effect of the program on selling qualified products and what other products they would like to see the program cover, Small Energy Efficient Only Retailers said that all items in their store were energy efficient. The retailers equated general energy efficiency with EEP qualifying equipment. They implied that all efficient units were equal and therefore did not use the rebate as a way of upselling higher efficiency units (i.e., tier 1 refrigerator vs. tier 2 refrigerator) or selling a qualified product over a non-qualified product.

Generally, retailers thought that the program had a positive influence on their sales. However, this depended on the sub-program and the store type.

Six retailers said that the rebate did make the difference when customers were choosing between units. They said that for expensive equipment any money saving was important.

Therefore, even a low rebate could influence the purchase of the qualifying product over a non-qualifying.

### Overall Retailer Satisfaction and Benefits

Overall, retailers were highly satisfied with their participation in the program. Ultimately, they said that it provided their customers with benefits, it was easy to participate, and it gave money back to the store. These reasons also align with their key motivations for participating.

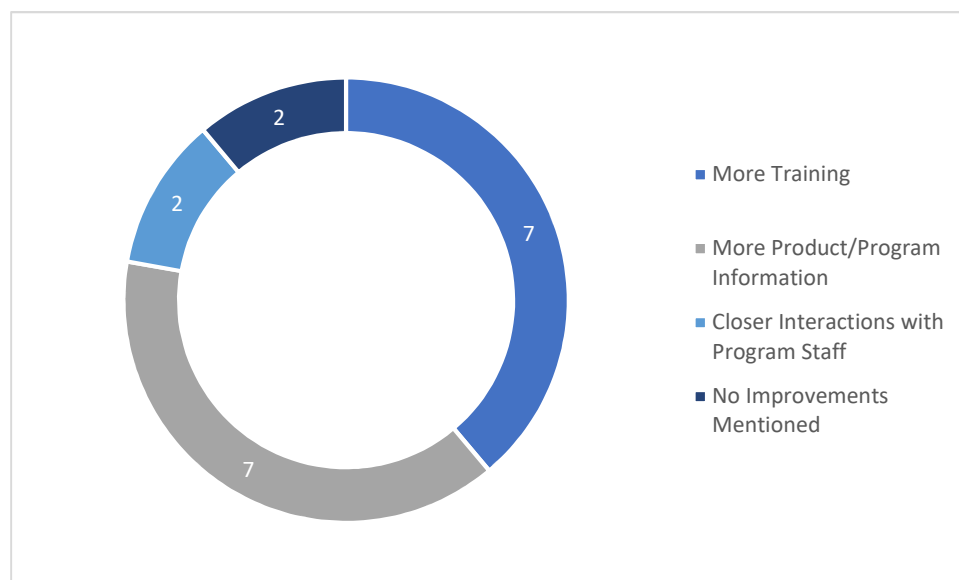
Retailers said they were satisfied with the signage and thought that it was well designed and drew attention to qualified products.

None of the retailers we spoke with mentioned any drawbacks or barriers to participating in the program.

While they are satisfied with the program, retailers did provide suggestions for program improvement (provided in Figure 5-6):

- More training opportunities;
- More information on products and program details (i.e. lists of eligible products and their rebates); and
- Closer interactions between the Companies/Honeywell and customers (i.e. tabling in the front of the store).

*Figure 5-6: Retailer Requests of Program*



Retailers said that they would recommend participating in this program to other retailers. One retailer said that he asked his fellow appliance store owners about their experience in the program before made the decision to participate.

#### 5.4.4 Customer Feedback

The research team conducted three customer surveys: the general population survey to assess the market more broadly, the downstream survey for rebate recipients, and the mobile in-store survey to assess the in-store experience.<sup>10</sup> In total we surveyed:

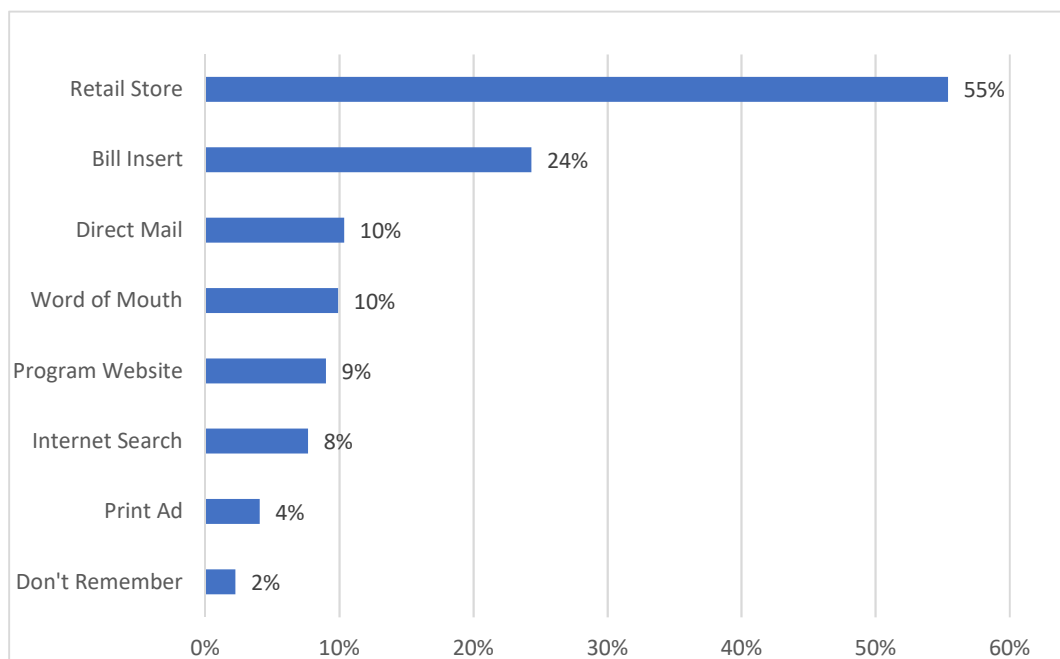
- General Population: 3,710 customers;
- Downstream: 211 customers;
- Mobile In-Store: 51 customers.

This section presents overarching themes from all survey efforts.

#### Awareness and Motivation to Participate

Most Downstream respondents found out about the program at the retail location where they purchased their product (Figure 5-7). Of those who found about the rebates in the retail location, 29% found out from a store associate and 26% found out from the program signage.

*Figure 5-7: Where Did Respondents Learn about Rebate<sup>11</sup>*



We found that the majority of Mobile Survey respondents shop for their surveyed product at the store in which they took the survey (41). The majority of these respondents said that it was their preferred store for purchasing their surveyed product (29). This implies that when customers are looking for a product that is included in the Energy Efficiency

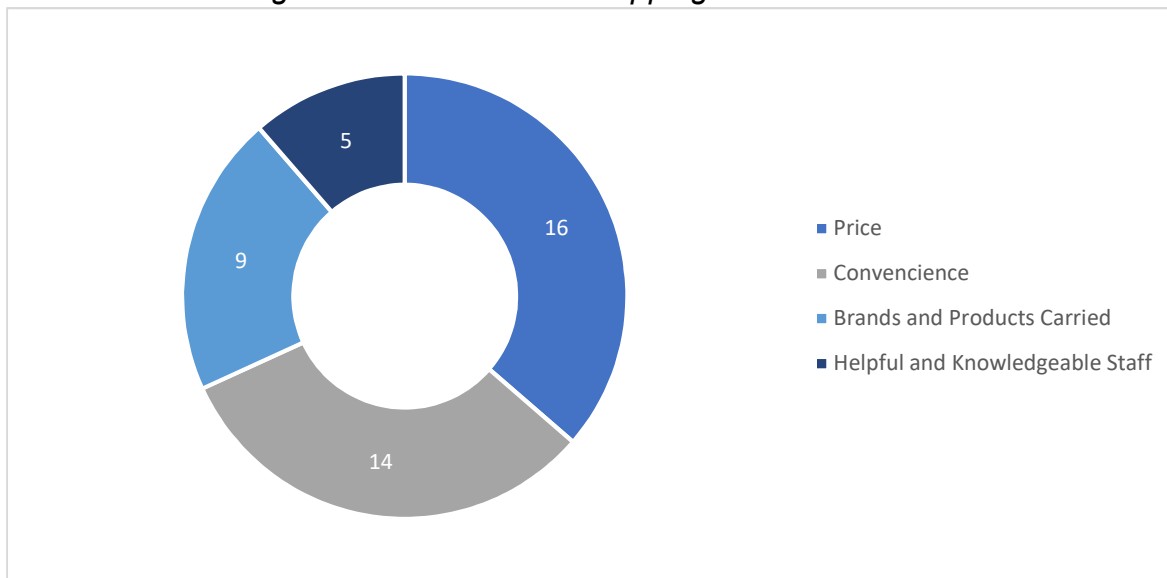
<sup>10</sup> ADM called this survey, “2018 Customer Action Program / EE Products Online Survey (Upstream)”.

<sup>11</sup> Note that percentages will add up to more than 100% because the question was a select all that apply.

Products program, they will see qualified products during their shopping trips. 43% of respondents have purchased their surveyed product online and 41% of respondents had purchased a qualifying product online in the past.

As shown in Figure 5-8 the top reasons for shopping at their preferred store were price (mentioned 16 times), convenience (mentioned 14 times), and variety of brands and products (mentioned 9 times). Helpful and knowledgeable staff was mentioned five times.

*Figure 5-8: Reason for Shopping at Preferred Store*



### **Overall Satisfaction**

The majority of Downstream respondents were satisfied with their overall experience in the Energy Efficient Products program (83%). On average 83% of customers who received rebates were satisfied with their purchased product; on average 78% were satisfied with the rebate amount; and on average 77% were satisfied with the time it took to receive the rebate.

### 5.4.5 Mobile In-Store Survey Results

We surveyed 51 customers who reviewed products in all four of the sub-programs. The table below is a breakdown of responses in the Appliances program and the measures reviewed.<sup>12</sup>

*Table 5-12: Survey Respondents by Reviewed Measure*

Sub-Program	Measure	N
Appliances	Freezers	9
	Refrigerators	10
	Clothes washers and/or clothes dryers	9
	Heat pump water heater	1
	Dehumidifiers	4
	Respondents who didn't specify	6
	<b>TOTAL</b>	<b>39</b>

The majority of mobile respondents said that they had not interacted with the program previously. This include previously purchasing a sponsored product, receiving program collateral, or seeing program signs in stores.

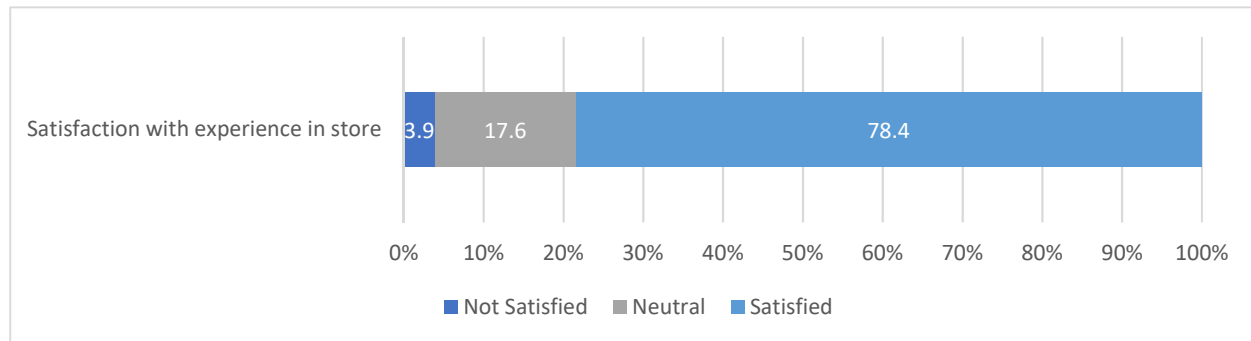
Only 15 respondents spoke with a store associate during their store visit. Five appliance mobile survey respondents spoke with a sales associate during their retail store visit. These respondents said that sales associates seem knowledgeable and can properly guide customers to the eligible products.

The majority of Mobile In-Store respondents were satisfied with their overall experience at the store (40) (Figure 5-9).

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<sup>12</sup> The total of those who reviewed each measure does not equal the total n of the sub-program. The number of mobile in-store survey participants who reviewed appliances equals 39.

*Figure 5-9: Mobile Survey Respondents' Satisfaction*



#### 5.4.6 Downstream Survey Results

The evaluation team conducted a web-based survey with 258 customers who received rebates for the downstream incentives representing 304 purchased clothes washers, refrigerators, clothes dryers, and received an HVAC tune-up. As noted in the table below, a portion of customers received rebates for more than one measure (not surprisingly, most frequently clothes washers and dryers); therefore, the total exceeds 100%.

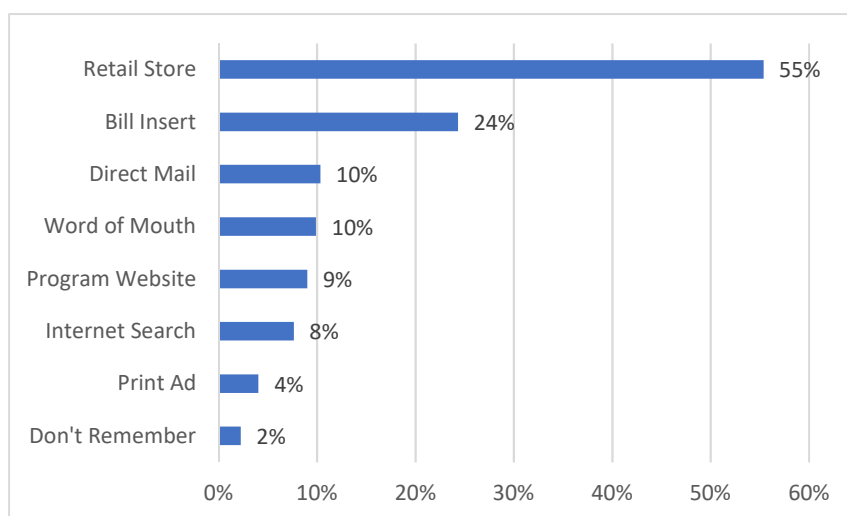
*Table 5-13: Appliance Program Participation among Survey Respondents Who Received Rebates in 2018*

Measure	% Survey Respondents Who Received Rebate <sup>13</sup>	# Survey Respondents Who Received Rebate
Clothes washers	57.5%	138
Refrigerators	59.8%	96
Clothes dryers	29.2%	70

Customers primarily learn about the appliance rebates when at the retailer or through the Companies' communications. Among survey respondents who had received an appliance rebate during 2018, nearly half reported that they learned about program rebates while at a retail store (55%) and a third from a utility contact (33% total; 10 % from direct mail from utility and 24% from a bill insert). Figure 5-10 shows all sources of customer awareness for the appliance sub-programs of the Efficient Products Program. While in-store, the majority of these customers report that they learned about program rebates from a store employee (30%) or through store signage (29%).

<sup>13</sup> Percent does not total 100% since customers can receive rebates on multiple measures.

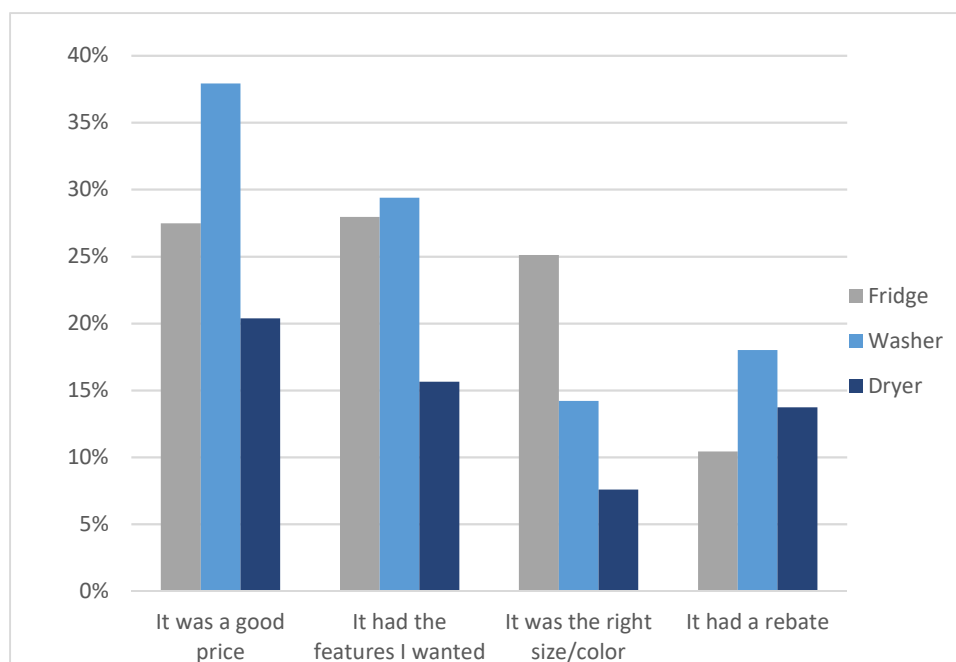
*Figure 5-10. Source of Customer Awareness of Appliance Program Rebates*



While energy efficiency is a benefit of program-qualifying appliances, the top two motivators for purchases were price and the features of the unit. Between 20%–38% of respondents (depending on appliance type) said that price was a motivation; and between 16% - 28% (depending on appliance type) responded that the features of the unit were a motivation. Size and color were the third most popular motivator for refrigerators purchases (25%) and the rebate was the third most popular for washers and clothes dryers (18% and 14%, respectively).

Other motivations included operation costs, environmental impact, availability, retailer recommendation, and brand loyalty, though these all appear to be far less impactful. Figure 5-11 shows the top reasons for purchasing an appliance, by product type. Overall, receiving a rebate was not the primary motivator; however, among clothes washer respondents, nearly 20% said that a top reason for purchasing their product was because it had a rebate.

*Figure 5-11: Top Reasons for Purchase*



The majority of appliance rebate customers report that they are satisfied with their experience with the Energy Efficient Products Program (90%). Of the 28 people who responded about satisfaction with communications with program staff about their appliance, 20 said that they were either satisfied or highly satisfied. Figure 5-12 shows the satisfaction with program staff communications and overall with their program experience.

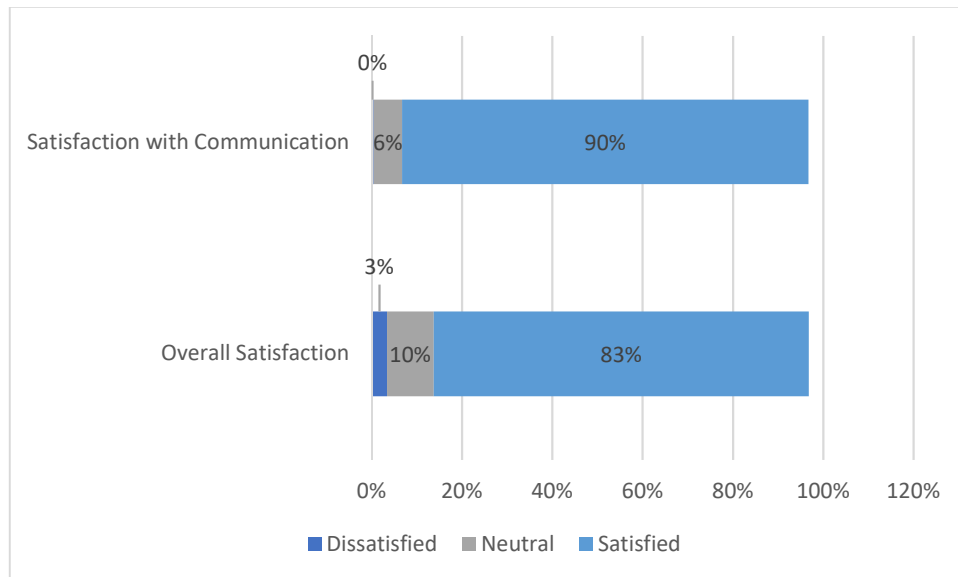
The majority of appliance rebate customers received their rebate within two to three weeks of submittal; 22% could not recall how long it took to receive the rebate.

The following figures below, (Figure 5-13, Figure 5-14, and

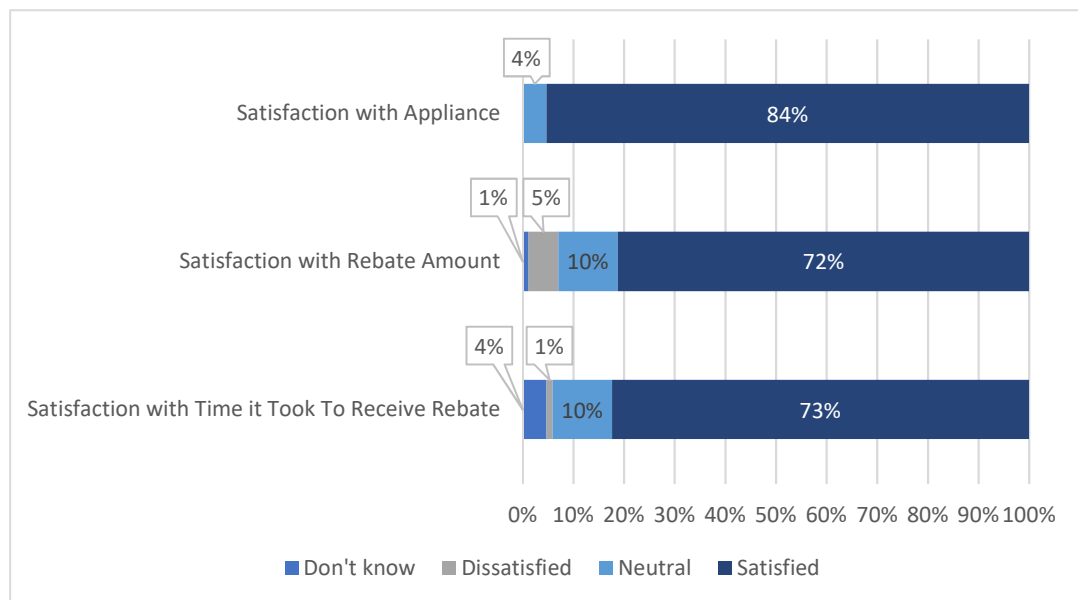
Figure 5-15) show the breakdown in satisfaction with the appliance, rebate amount, and time it took to receive rebate by appliance type. Overall, all respondents were highly satisfied with their appliance, the rebate amount, and the time it took to receive the rebate amount. Of respondents, 84% of those who purchased a refrigerator were satisfied; 84% of those who purchased a clothes washer were satisfied; and 81% who purchased a clothes dryer were satisfied with their appliance.



**Figure 5-12: Survey Respondent Satisfaction with Program and Communications**

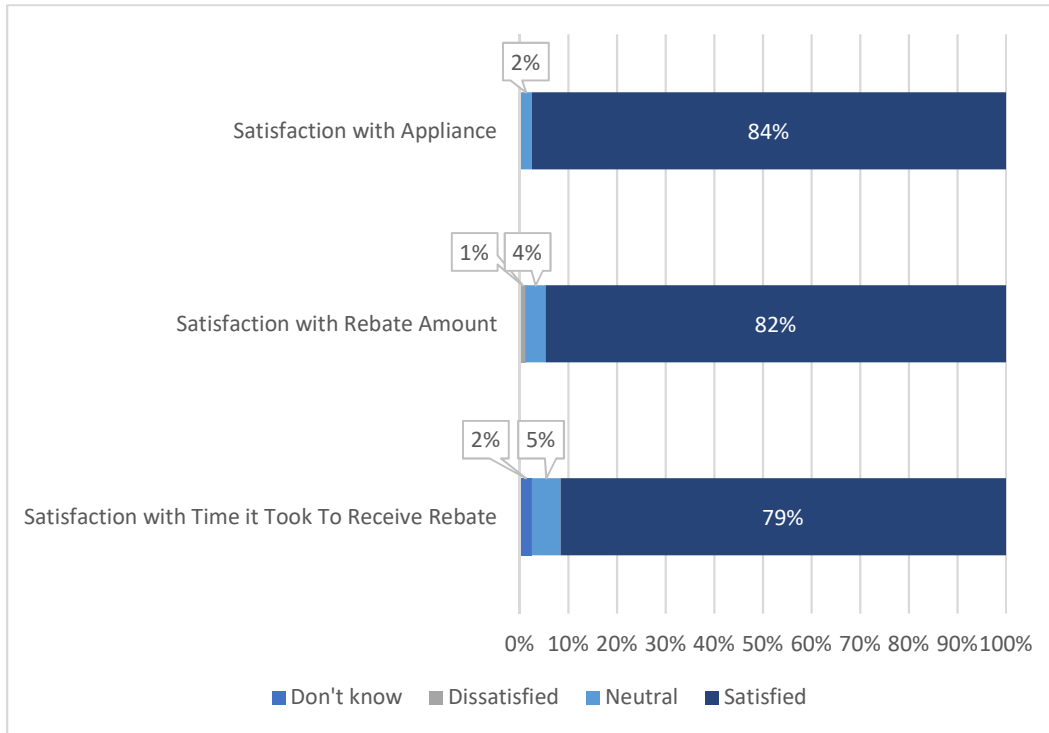


**Figure 5-13: Refrigerator Satisfaction<sup>14</sup>**

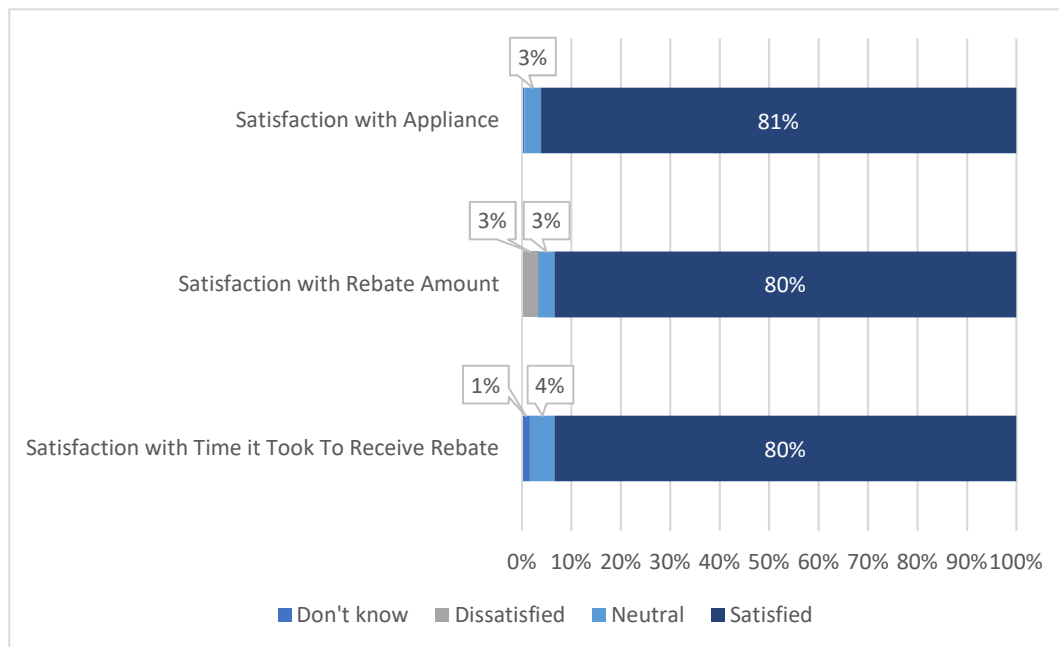


<sup>14</sup> Figures 5-12 to 5-14 notes: denominator for satisfaction is the number of respondents who reported receiving a rebate for each measure; refrigerator n = 96; washer n = 138; dryer n = 70).

**Figure 5-14: Clothes Washer Satisfaction**



**Figure 5-15: Clothes Dryer Satisfaction**



## 5.4.7 Program Networks

### Retailer Network

Retailers stock and sell qualifying products and increase customer awareness about the program through in-store signage about qualifying products and interactions with sales associates.

From the interviews our team conducted with retailers and the tracking data analysis, we identified three main retailer categories: large chains, smaller retailers, and smaller energy efficient only retailers.<sup>15</sup> The following is a description of the retailer types.<sup>16</sup>

**Large Chains:** these stores (e.g. Best Buy®, Lowe's®, Home Depot®, Sears, Kmart®, JC Penny, Menard's™, Costco®, and Walmart) sell many brands of each of the participating products within each of the four sub-programs. Prices on products in these stores are competitive; the rebate on qualifying products could, and does, decrease the price of these goods relative to the non-qualifying products. Walmart is the exception – they sell non-qualified products for lower than the qualifying products.

**Smaller Retailers:** these stores (fewer than three locations in the state) are more niche and may have a more limited selection of products than the large chains. Their store associates may be more well-versed with the program because there are fewer products to interact with. For example, when calling these stores the person who answered the phone, regardless of their job role, was more likely to recognize the program name than those in the larger chain stores.

**Smaller Energy Efficient Only Retailers:** these stores (like the smaller retailers, described above) said that they only sell ENERGY STAR® rated items. When speaking with these retailers, they said that they did not think the program influenced purchasing because every item in their store is energy efficient.

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<sup>15</sup> Our team created these retailer categories; these were not provided by the program or implementer.

<sup>16</sup> We provide general descriptions of retailer types, which we believe provides a more useful picture of the retailer network.

## 6 Consumer Electronics

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The purpose of this chapter is to present the consumer electronics findings of the impact and process evaluation effort undertaken by ADM to verify the energy savings and peak demand reduction.

### 6.1 Description of Consumer Electronics Program

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The Consumer Electronics (CE) sub-program provides financial incentives and support to retailers that sell energy efficient products such as ENERGY STAR® qualified consumer electronics. The rebates are designed to encourage the purchase and installation of energy efficient televisions, computers, computer monitors and imaging equipment.

Consumer electronic products that were rebated in 2018 include:

- Televisions
- Computers
- Computer Monitors
- Imaging

Table 6-1: presents the number of rebates issued by EDC and measure, Table 6-2 presents kWh savings by EDC and measure, and Table 6-3 presents kW savings by EDC and measure.

*Table 6-1: Consumer Electronics Rebates by EDC and Measure*

Measure	CEIC	OE	TE	Total
Televisions	15,580	13,639	3,404	32,623
Computers	1,115	1,135	247	2,497
Computer Monitors	1,487	1,469	412	3,368
Imaging	5,776	5,403	1,090	12,269
<b>Totals</b>	<b>23,958</b>	<b>21,646</b>	<b>5,153</b>	<b>50,757</b>

*Table 6-2: Ex-Ante Consumer Electronics kWh Savings by EDC and Measure*

Measure	CEI	OE	TE	Total
Televisions	828,574.00	713,469.00	180,738.00	1,722,781.00
Computers	132,685.00	135,065.00	29,393.00	297,143.00
Computer Monitors	35,688.00	35,256.00	9,888.00	80,832.00
Imaging	84,907.20	79,424.10	16,023.00	180,354.30
<b>Totals</b>	<b>1,081,854.20</b>	<b>963,214.10</b>	<b>236,042.00</b>	<b>2,281,110.30</b>

*Table 6-3: Ex-Ante Consumer Electronics kW Savings by EDC and Measure*

Measure	CEI	OE	TE	Total
Televisions	77.26	66.51	16.86	160.62
Computers	17.95	18.27	3.98	40.20
Computer Monitors	4.76	4.70	1.32	10.78
Imaging	17.33	16.21	3.27	36.81
<b>Totals</b>	<b>117.30</b>	<b>105.69</b>	<b>25.43</b>	<b>248.41</b>

## 6.2 Impact Evaluation Methodology

The following section details the methods used to calculate energy savings and demand reductions for the Consumer Electronics sub-program.

### 6.2.1 Sampling Plan

A general population survey was conducted online via email with a sample of 40,000 customers across all three Companies. The customers were randomly selected using a stratified sample based on the percentage of the Companies customers per EDC.

The final sample size meets Ohio's standards for achieving a relative precision of  $\pm 10\%$  at the 90% confidence interval for each service territory. The sample size calculation for achieving 90% confidence with 10% precision is shown in Equation 5-1.

ADM collected a sample size of 3,710 surveys completed to ensure adequate respondents across the various distribution channels, program types, and measure categories. The survey data was used across multiple programs including the consumer electronics and Lighting components of the EE Products program.

### **6.2.2 Ex-ante Review**

ADM conducted an ex-ante review of the program's final 2018 database. In this review, the following activities were performed.

- Verification of rebate status as completed
- Verification of measure rebate requirements (e.g., ENERGY STAR® qualified status)
- Verification that data set does not include duplicate or erroneous data entries
- Confirming data entries include all necessary fields for savings calculations

ADM verified all measure data to be accurate and consistent with program requirements.

- The energy savings and demand reductions are claimed in accordance with the applicable TRM

### **6.2.3 Customer Surveys and Field Verification**

The M&V data collection process consists of customer surveys and visual verification of measures with a subset of customers. Participants were asked if they purchased a television, computer monitor, scanner, or printer and asked if the purchased item is in use.

### **6.2.4 Review of Consumer Electronics Invoices**

ADM completed a review of a census of SSRS records and their associated invoices. This review determined the level of correlation between SSRS records and associated invoices from participating Consumer Electronics manufacturers. ADM determined that all invoiced equipment was accounted for in the SSRS database.

### **6.2.5 Energy Savings and Peak Demand Reduction Calculations**

ADM used the deemed values for energy savings and peak demand reduction from the PA TRM for all measures except scanners which was obtained using the department of energy calculator. Deemed saving values are shown in Table 6-4 and Table 6-5.

#### ***Computers***

ADM verified all model numbers in the AEG database were listed in the ENERGY STAR® computer database. The computer type was verified and used to apply the appropriate deemed savings, which can be found in Table 6-4: kWh & kW Values for Office Equipment.

## **Imaging**

Imaging includes several measures revolving around imaging technology for the home office. Measures for the 2018 project year include scanners, printers, and multi-function devices. The savings values are all deemed values in the PA TRM and listed below.

Imaging equipment was checked based on the ENERGY STAR® database for its specific rating and the type of imaging equipment. Specifications were also checked using the ENERGY STAR® database and from these findings, the appropriate savings were chosen.

## **Scanners**

The only notable difference in savings calculation between imaging equipment measures is that scanners deemed savings were pulled from energy.gov since there were no OH TRM or PA TRM deemed savings listed for this measure. The ENERGY STAR® savings algorithm is below.

### *Equation 6-1: Annual Energy savings - Scanners*

$$\Delta kWh = kWh_{base} - kWh_{ee}$$

$$kWh_{\frac{base}{ee}} = \left( (P_{\frac{base}{ee}} + P_{add}) * Hrs_{sleep} + Standby_{\frac{base}{ee}} * Hrs_{stdby} \right) * \frac{W}{1000}$$

Where:

$P_{base}$  = wattage of baseline equipment

$P_{ee}$  = wattage of efficient equipment

$P_{add}$  = Add 2 watts to equipment that has wireless capability

$Hrs_{sleep}$  = weekly sleep operation in hours

$Hrs_{stdby}$  = weekly standby operation in hours

$Standby_{base}$  = Standby multiplier for baseline equipment (1.0).

$Standby_{ee}$  = Standby multiplier for energy efficient equipment (0.5).

$W$  = weeks per year (52.1).

## **Monitors**

Computer monitor savings are deemed from the PA TRM.

Monitors on the Company's database were researched via ENERGY STAR® database to verify their rating. Verified monitors were given the deemed savings.

*Table 6-4: kWh & kW Values for Office Equipment*

Measure	Energy Savings kWh	Peak Demand Savings kW
Computer (Desktop)	119	0.0161
Computer (Laptop)	22	0.0030
Fax Machine (laser)	16	0.0022
Copier (monochrome)		
images/min $\leq 5$	37	0.0050
$5 < \text{images/min} \leq 15$	26	0.0035
$15 < \text{images/min} \leq 20$	9	0.0012
$20 < \text{images/min} \leq 30$	42	0.0057
$30 < \text{images/min} \leq 40$	50	0.0068
$40 < \text{images/min} \leq 65$	186	0.0251
$65 < \text{images/min} \leq 82$	372	0.0502
$82 < \text{images/min} \leq 90$	469	0.0633
images/min $> 90$	686	0.0926
Printer (laser, monochrome)		
images/min $\leq 5$	37	0.0050
$5 < \text{images/min} \leq 15$	26	0.0035
$15 < \text{images/min} \leq 20$	23	0.0031
$20 < \text{images/min} \leq 30$	42	0.0057
$30 < \text{images/min} \leq 40$	50	0.0068
$40 < \text{images/min} \leq 65$	181	0.0244
$65 < \text{images/min} \leq 82$	372	0.0502
$82 < \text{images/min} \leq 90$	542	0.0732
images/min $> 90$	686	0.0926
Printer (Ink Jet)	6	0.0008
Multifunction (laser, monochrome)		
$s \leq 5$	57	0.0077
$5 < s \leq 10$	48	0.0065
$10 < s \leq 26$	52	0.0070



Measure	Energy Savings kWh	Peak Demand Savings kW
26 < s ≤ 30	93	0.0126
30 < s ≤ 50	248	0.0335
50 < s ≤ 68	420	0.0567
68 < s ≤ 80	597	0.0806
s > 80	764	0.1031
Multifunction (Ink Jet)	6	0.0008
Monitor	24	0.0032
Scanner <sup>17</sup>	10	0.0000

### Televisions

Television savings are deemed from the PA TRM.

Television savings are based on deemed values from the PA TRM. The savings depend on the size of the television. The Company's listed models were researched via the ENERGY STAR® database where their ENERGY STAR® rating was verified and the diagonal screen sizes were reviewed. Models that were not found through a lookup were verified manually through ENERGY STAR®, manufacturer, and credible third-party online sites. Within the deemed savings for televisions is a second rating where the PA TRM gives models meeting maximum power loads ( $P_{Max}$ ), which are calculated using diagonal sizes to find the area, additional deemed savings. The equation is given below.

*Equation 6-2:  $P_{Max}$  for Most Energy Efficient Rating<sup>18</sup>*

$$P_{Max} = 65.5 \times \tanh(0.00046(Area - 140) + 0.01) + 14.5$$

If a television's power consumption during 'On Mode' is higher than the calculated  $P_{Max}$  value, then it does not qualify for the additional savings.

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<sup>17</sup> Used for Scanner Savings since there are no deemed values in the OH TRM or PA TRM for this measure. The calculator is provided by the department of energy in the following web address: <https://energy.gov/eere/femp/energy-and-cost-savings-calculators-energy-efficient-products>

<sup>18</sup> The recognition criteria for the 'Most Energy Efficient TVs' from ENERGY STAR® can be found on the following link [https://www.energystar.gov/ia/partners/downloads/most\\_efficient/2015/Final\\_ENERGY\\_STAR\\_Most\\_Efficient\\_2015\\_Recognition\\_Criteria\\_Televisions.pdf?60be-105c](https://www.energystar.gov/ia/partners/downloads/most_efficient/2015/Final_ENERGY_STAR_Most_Efficient_2015_Recognition_Criteria_Televisions.pdf?60be-105c).

Table 6-5: kWh & kW Values for Televisions

Diagonal Screen Size (inches) [1]	TV kWh		TV kW	
	Energy Savings ENERGY STAR® V. 6.0 TVs (kWh/year)	Energy Savings ENERGY STAR® Most Efficient TVs (kWh/yr)	Coincident Demand Savings ENERGY STAR® V. 6.0 (kW)	Coincident Demand Savings ENERGY STAR® Most Efficient (kW)
< 20	1	3	0.00005	0.0003
20 < 30	15	20	0.0014	0.0019
30 < 40	34	43	0.0031	0.0040
40 < 50	52	66	0.0049	0.0062
50 < 60	63	82	0.0059	0.0076
≥ 60	65	85	0.006	0.0079

### 6.3 Detailed Impact Evaluation Findings

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This section provides detailed evaluation findings based on the methodologies that were explained above.

The ex-post energy savings for the Consumer Electronics sub-program totaled 2,344,413 kWh and ex-post peak load demand reduction totaled 244 kW. Ex-ante estimates were highly accurate as the realization rates for this sub-program were 102.78% and 98.41% respectively. Explanations for variation from the ex-ante values by measure are below.

#### Televisions

The discrepancy in realization rates is due in part to rounding of ex-ante kW values to the fourth digit. The ex-post kW values ADM utilized are five decimals long. Furthermore, the assigned ex-ante values used only the Energy Savings ENERGY STAR® version 6.0 in columns two and four of Table 6-5. Whereas, ADM cross-checked the equipment in the most recent ENERGY STAR® database for its specific rating and assigned savings for TVs that met the ENERGY STAR® Most Efficient criteria in columns three and five of Table 6-5. This resulted in energy savings and peak demand reduction of 100.39% and 100.37% respectively.

#### Imaging

The imaging “measure” of the consumer electronics sub-channel includes the following sub-measures: scanners, printers, and multi-function devices. The discrepancy between ex-ante and ex-post values is caused by assigning a single deemed savings value (14.7 kWh and 0.003 kW) to all kinds of equipment (scanners, printers, and multi-function devices).

The ex-post savings values were taken directly from the PA TRM deemed savings for ENERGY STAR® Office Equipment, which is listed in Table 6-4. ADM assigned the appropriate savings for imaging equipment by cross-checking the equipment in the most recent ENERGY STAR® database for its specific rating, specification, and type. The realization rates of kWh and kW savings by equipment type is listed below:

- Multifunction devices: 128% for kWh and 84% for kW
- Printers: 230% for kWh and 153% for kW
- Scanners: 68% for kWh and 100% for kW

Table 6-6, Table 6-7, and Table 6-8 below show the ex-post kWh and kW savings per measure across each EDC and the totals.

*Table 6-6: Consumer Electronics Ex-Post Energy (kWh) Savings by Measure and EDC*

Measure	CEI	OE	TE	Total
Televisions	831,575.00	716,386.00	181,520.00	1,729,481.00
Computers	132,685.00	135,162.00	29,393.00	297,240.00
Computer Monitors	35,688.00	35,256.00	9,888.00	80,832.00
Imaging	113,330.00	96,983.00	26,547.00	236,860.00
<b>Totals</b>	<b>1,113,278.00</b>	<b>983,787.00</b>	<b>247,348.00</b>	<b>2,344,413.00</b>

*Table 6-7: Consumer Electronics Ex-Post Peak Demand (kW) Savings by Measure and EDC*

Measure	CEI	OE	TE	Total
Televisions	77.53	66.76	16.93	161.22
Computers	17.95	18.29	3.98	40.21
Computer Monitors	4.76	4.70	1.32	10.78
Imaging	15.43	13.22	3.61	32.26
<b>Totals</b>	<b>115.67</b>	<b>102.97</b>	<b>25.84</b>	<b>244.47</b>

*Table 6-8: Consumer Electronics Ex-Post Totals*

Measure	Ex-Ante kWh	Ex-Ante kW	Ex-Post kWh	Ex-Post kW	kWh RR	kW RR
Televisions	1,722,781.00	160.62	1,729,481.00	161.22	100.39%	100.37%
Computers	297,143.00	40.20	297,240.00	40.21	100.03%	100.03%
Computer Monitors	80,832.00	10.78	80,832.00	10.78	100.00%	100.00%
Imaging	180,354.30	36.81	236,860.00	32.26	131.33%	87.64%
<b>Totals</b>	<b>2,281,110.30</b>	<b>248.41</b>	<b>2,344,413.00</b>	<b>244.47</b>	<b>102.78%</b>	<b>98.41%</b>

## 6.4 Detailed Process Evaluation Findings

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The Consumer Electronics sub-program provides mid-stream incentives for qualifying products, including televisions; imaging/printing/scanning equipment; computers; and computer monitors.

According to the Companies' program website, qualifying appliances can be purchased from Best Buy® and Sears. The program data analysis reveals that Sears sold televisions during 2018, while Best Buy® sold products in all four categories (televisions; imaging/printing/scanning equipment; computers; and computer monitors). Unlike the program webpages for the Appliances and Lighting sub-programs, the webpage for the Consumer Electronics sub-program does not include a "Find" tool to locate participating retailers.

To learn more about energy efficient products within Consumer Electronics, customers are directed to the home page of the Energystar.gov website.

### 6.4.1 Consumer Electronics Signage

Among the 16 customers who reviewed consumer electronics products for the mobile in-store survey, all reported that they saw the Companies' flyers, signs, posters, or stickers advertising long-term energy savings.

Customers generally find the signs easy to find, attention-grabbing, informative and easy to understand. Specifically, of the customers who saw posted signage:

- 12 said it was easy to find;
- 11 said they were attention grabbing;
- 15 said that they were informative; and
- 14 said signs were easy to understand.

While the proportion of sign engagement appears to be high, customers continue to misidentify program signage. Among the 13 customers who photographed consumer electronics signs, only two photographed program signs (Figure 6-1). Similar to findings presented in the Appliance section, customers took photos of "ENERGYGUIDE" signs. Respondents said they chose these signs to photograph because they were informative (4) and highlighted energy and dollar savings (3).

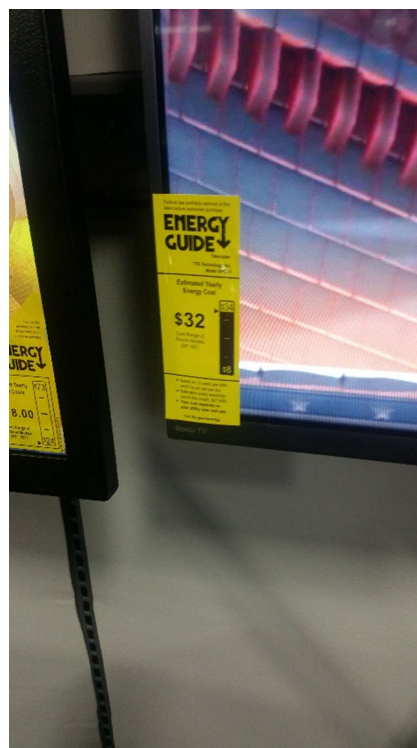
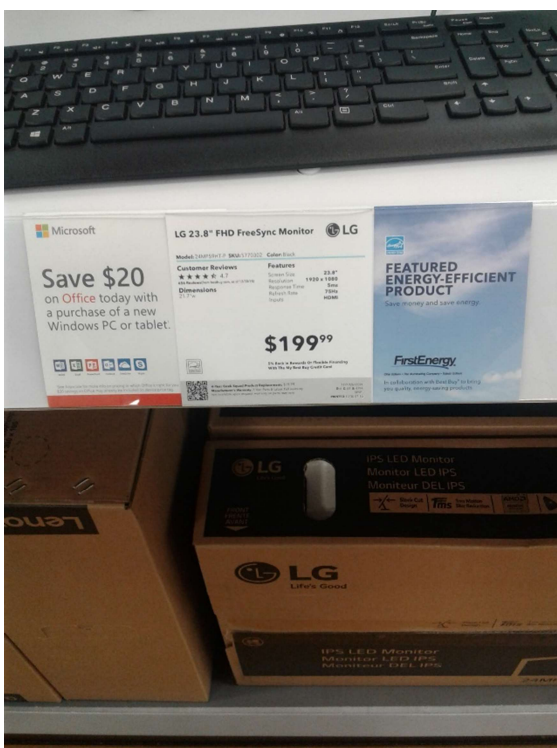
Despite the misidentification of program signs, 14 of the respondents said that the signs would be influential in their decision to purchase these products the next time they needed them.

Only five respondents spoke with associates during their store visit and none of these respondents were shown energy efficient products by the associates. Two respondents said that the associate was knowledgeable about qualifying products and that the

information was easy to understand; three said that the information provided by the associate was useful.

Given that customers were generally not observing program signage and that few respondents spoke with sales associates about qualifying products, it is hard to know whether shoppers attribute the program to the Companies.

*Figure 6-1: Company Sign (Left) and Non-Company Sign (Right)*



## 6.4.2 Retailer Feedback

Our team spoke with a single large retailer who participates in the Consumer Electronics program. The overall process evaluation retailer feedback results can be found in section 5.4.4.

## 6.4.3 Customer Feedback

The research team conducted three customer surveys: the general population survey to assess the market more broadly, the downstream survey for rebate recipients, and the mobile in-store survey to assess the in-store experience.<sup>19</sup> In total we surveyed:

- General Population: 3,710 customers;

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<sup>19</sup> ADM called this survey, “2018 Customer Action Program / EE Products Online Survey (Upstream)”. In this EM&V report we will refer to this as the “general population survey.”

- Downstream: 211 customers;
- Mobile In-Store: 51 customers.

This section presents overarching themes from all survey efforts. Detailed findings about customer feedback for each of the sub-programs can be found in sections 5.4.4, 6.4.3, and 7.4.3.

#### 6.4.4 Mobile In-Store Survey Results

We surveyed 51 customers who reviewed products in all four of the sub-programs.<sup>20</sup>

*Table 6-9: Survey Respondents by Reviewed Measure*

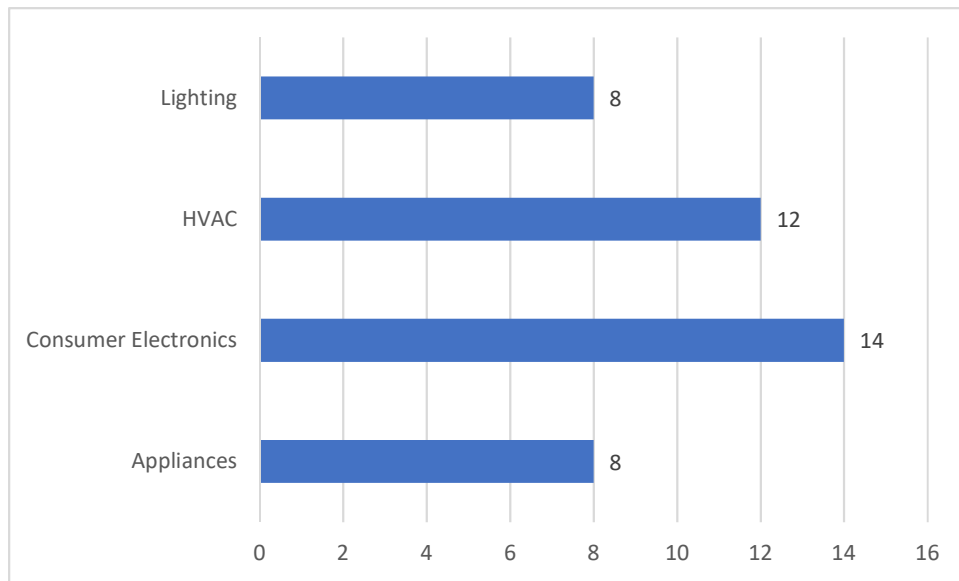
Sub-Program	Measure	N
Consumer Electronics	Computers	3
	Televisions	9
	Printers	1
	Computer monitor	1
	Respondents who didn't specify	2
	<b>TOTAL</b>	<b>16</b>

Generally, respondents said that they could easily find the advertised product within the store (Figure 6-2).

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<sup>20</sup> The total of those who reviewed each measure does not equal the total n of the sub-program. The number of mobile in-store survey participants who reviewed consumer electronics equals 16.

*Figure 6-2: Ease of Locating Products by Sub-Program*



Few mobile in-store survey respondents (9) said that they had interacted with the program previously (Table 6-10). This includes previously purchasing a sponsored product, receiving program collateral, or seeing program signs in stores.

*Table 6-10: Number of Sub-Program Interactions*

	Have purchased program sponsored products before.	Have received program collateral, such as a bill insert or email, before.	Have seen program signs in retail stores before.
Consumer Electronics	3	3	3



## 7 Lighting

The purpose of this chapter is to present the lighting sub-program findings of the impact and process evaluation effort undertaken by ADM to verify the energy savings and peak demand reduction.

### 7.1 Description of Lighting Program

The program provides financial incentives and support to retailers that sell energy-efficient lighting. The rebates are designed to encourage the purchase and installation of energy efficient lighting that will reduce electricity consumption and reduce summer peak load demands. Lighting measures that were rebated in 2018 include:

- LEDs
- LED Fixtures

Table 7-1 presents the number of lighting rebates by EDC and measure, Table 7-2 presents kWh savings by EDC and measure, and Table 7-3 present kW savings by EDC and measure.

*Table 7-1: Ex-Ante Lighting Rebates by EDC and Measure*

Measure	CEI	OE	TE	Total
LED Fixtures	1,794	3,903	896	6,593
LED Bulbs	240,768	270,672	79,881	591,321
<b>Totals</b>	<b>242,562</b>	<b>274,575</b>	<b>80,777</b>	<b>597,914</b>

*Table 7-2: Ex-Ante Lighting kWh Savings by EDC and Measure*

Measure	CEI	OE	TE	Total
LED Fixtures	112,699.10	192,126.30	40,191.90	345,017.30
LED Bulbs	34,090,886.30	33,987,959.00	12,093,903.80	80,172,749.10
<b>Totals</b>	<b>34,203,585.40</b>	<b>34,180,085.30</b>	<b>12,134,095.70</b>	<b>80,517,766.40</b>

*Table 7-3: Ex-Ante Lighting kW Savings by EDC and Measure*

Measure	CEI	OE	TE	Total
LED Fixtures	13.48	23.00	4.81	41.29
LED Bulbs	4,076.28	4,065.91	1,445.91	9,588.11
<b>Totals</b>	<b>4,089.76</b>	<b>4,088.92</b>	<b>1,450.72</b>	<b>9,629.40</b>

## **7.2 Impact Evaluation Methodology**

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The following section details the methods used to calculate energy savings and demand reductions for the Lighting sub-program.

### **7.2.1 Sampling Plan**

An online survey was conducted with a sample of 40,000 customers across all three Companies. The customers were randomly selected using a stratified sample based on the percentage of the Companies customers per EDC.

The final sample size meets Ohio's standards for achieving a relative precision of  $\pm 10\%$  at the 90% confidence interval for each service territory. The sample size calculation for achieving 90% confidence with 10% precision is shown in Equation 5-1.

ADM collected a sample size of 3,710 surveys completed to ensure adequate respondents across the various distribution channels, program types, and measure categories. The survey data was used across multiple programs including the consumer electronics and Lighting components of the EE Products program.

### **7.2.2 Ex-ante Review**

ADM conducted an ex-ante review of the program's final 2018 database. In this review, the following activities were performed.

- Verification of rebate status as completed.
- Verification of measure rebate requirements (e.g., ENERGY STAR® qualified status).
- Verification that data set does not include duplicate or erroneous data entries.
- Confirming data entries include all necessary fields for savings calculations.

### **7.2.3 Customer Surveys**

The M&V data collection process consists of customer surveys and visual verification of measures with a subset of customers. Visual verification of measures was conducted by one of ADM's field service technicians.

In-Service Rates (ISRs) were calculated for the program by analyzing the data from a general population survey conducted in the companies' service territory. Customers were asked if they purchased LED light bulbs or fixtures during 2018, how many they purchased, and how many they hadn't installed yet.

#### 7.2.4 Review of Consumer Electronics Invoices

ADM completed a review of SSRS records and their associated invoices. This review informed the level of correlation between SSRS records and associated invoices from participating Consumer Electronics manufacturers. ADM determined that all equipment listed in the SSRS database was accounted for by their associated invoices.

#### Energy Savings Calculation

ADM has analyzed data from the general population survey to verify annual ex-post energy savings associated with the various distribution channels. EDC customers from the retail channel were surveyed to determine installation rates, residential installation locations, characteristics of the light bulbs replaced, and dates of installation. This information was used to calculate annual energy ex-post savings in accordance with the formula specified in the PA TRM with adjustments to fit the Ohio area.

*Equation 7-1: Annual Energy Savings-LEDs*

$$kWh\ Savings = \frac{Watts_{base} - Watts_{EE}}{1000} \times HOU \times (1 + IE_{kW}) \times \frac{365.25days}{yr} \times ISR$$

Where:

Watts<sub>base</sub> = Effective baseline wattage

Watts<sub>EE</sub> = Watts of LED

ISR = In Service Rate or percentage of units rated that get installed

HOU = Average hours of use per day = 2.85 hrs per day (from Ohio TRM)

IE<sub>kWh</sub> = HVAC interactive effect for LEDs (from Ohio TRM), to account for effects on heating/cooling from efficient lighting

ADM checked bulb/fixture model numbers listed in the tracking databases maintained by Honeywell against ENERGY STAR® databases ([www.energystar.gov](http://www.energystar.gov)) to verify that each bulb distributed in 2018 is (i) ENERGY STAR® qualified and (ii) assigned the correct Watts per bulb by the implementer.

ADM used the determined Hours of Use for LED fixtures/bulbs from Ohio TRM deemed hours. While accounting for the quantity of the bulbs, ADM verified the items are installed.

Installing energy efficient lighting such as LEDs in air-conditioned spaces saves electricity in two ways: first by reducing lighting electrical loads; and second by introducing less heat in conditioned spaces, hence incrementally decreasing space cooling loads. Space

heating and cooling impacts of energy efficient lighting are described using a ratio that is referred to in the OH TRM as the HVAC interactive effect ( $IE_{kW_h}$ ).

### In Service Rate (ISR)

The Ohio TRM defines ISR as the “percentage of units rebated that get installed.” ADM measured the ISR using the following methodology:

Three data elements were collected through surveys which resulted in an ISR estimate for 2018. These elements are as follows:

- 1) The number of Bulbs/fixtures sold: The survey determined the number of bulbs/fixtures purchased by a customer.
- 2) The number of Bulbs/fixtures not installed by the end of the program year.

The ISRs for 2018 were calculated as one minus the sum of Data Element 2 divided by Data Element 1.

### Summer Peak Demand Savings Calculation

#### *Equation 7-2: Summer Peak Demand Savings*

$$\Delta kW_{peak} = \frac{Watts_{base} - Watts_{ee}}{1000} \times CF \times (1 + IE_{kW_h}) \times ISR$$

Where:

$Watts_{base}$  = Effective baseline wattage

$Watts_{ee}$  = Watts of LED

ISR = In Service Rate or percentage of units rated that get installed

CF = Summer Peak Coincidence Factor for measure = 0.11 (from Ohio TRM)

$IE_{kW}$  = HVAC interactive effect for LED demand = 0.21 (from Ohio TRM)

Values specified in the TRM will be used for  $WHF_d$  and CF in calculating summer coincident peak demand savings, with  $WHF_d = 1.21$  and  $CF = 0.11$ .

### 7.3 Detailed Impact Evaluation Findings

The ex-post energy savings for the Lighting sub-program totaled 76,885,415 kWh and ex-post peak load demand reduction totaled 9,187 kW. Realization rates for this sub-program were 95.49% and 95.41% respectively. Variation from the ex-ante value can be explained by the differences in the ISR applied to the savings calculations. An ISR of 92% from the PA TRM was utilized for ex-ante calculations and ISRs of 86% for LED bulbs and 93% for LED fixtures were identified via the general population survey.

Table 7-4, Table 7-5, and Table 7-6 below show the ex-post kWh and kW savings per measure across each EDC and the totals.

*Table 7-4: Lighting Ex-Post Energy (kWh) Savings by Measure and EDC*

Measure	CEI	OE	TE	Total
LED Fixtures	92,643.89	187,894.76	40,351.54	320,890.18
LED Bulbs	32,587,946.42	32,480,990.94	11,495,587.58	76,564,524.94
<b>Totals</b>	<b>32,680,590.31</b>	<b>32,668,885.70</b>	<b>11,535,939.12</b>	<b>76,885,415.12</b>

*Table 7-5: Lighting Ex-Post Peak Demand (kW) Savings by Measure and EDC*

Measure	CEI	OE	TE	Total
LED Fixtures	11.07	22.45	4.82	38.35
LED Bulbs	3,894.18	3,881.40	1,373.70	9,149.28
<b>Totals</b>	<b>3,905.25</b>	<b>3,903.85</b>	<b>1,378.52</b>	<b>9,187.62</b>

*Table 7-6: Lighting Ex-Post Totals*

Measure	Ex-Ante kWh	Ex-Ante kW	Ex-Post kWh	Ex-Post kW	kWh RR	kW RR
LED Fixtures	345,017.30	41.29	320,890.18	38.35	93.01%	92.86%
LED Bulbs	80,172,749.10	9,588.11	76,564,525.94	9,149.28	95.50%	95.42%
<b>Totals</b>	<b>80,517,767.40</b>	<b>9,629.40</b>	<b>76,885,415.12</b>	<b>9,187.62</b>	<b>95.49%</b>	<b>95.41%</b>

### 7.4 Detailed Process Evaluation Findings

The lighting program website contains several resources for customers to help them find program-eligible lighting products. It includes:

- An overview of the program, which tells customers how they can get instant discounts on ENERGY STAR® lighting.

- A page titled, “find a participating retailer”, where customers can search for participating retailers by lighting retailer name or distance from a city or zip code. Retailers listed include Costco®, Hartville Hardware and Lumber™, The Home Depot®, Lowe’s Home Improvement®, Menard’s™, and Walmart™.
- A lighting discount search tool, where customers can search for eligible lighting products by retail store, manufacturer, or item number/UPC code.
- Lighting educational resources, including a lighting worksheet that customers can download to help them determine the right LED bulb for their light fixture; and information on how much light customers might need, and how to choose the right color light (i.e., warm white/soft white, cool white/neutral/bright white, natural or daylight.)

According to the program website, specific retail stores stock bulbs by certain manufacturers, as follows:

- Costco®: FEIT™;
- The Home Depot®: Ecosmart™, Phillips™;
- Lowe’s®: GE™;
- Menard’s™: FEIT™; and
- Walmart: GE™; Great Value™; Hampton™; Phillips™.

While Hartville Hardware is listed as one of the participating retailers on the “find a participating retailer” page, they are not listed as a retailer on the lighting discount search tool page (and hence, it is unknown which manufacturer bulbs they may stock and provide to customers.)

#### **7.4.1 Lighting Signage**

Lighting signage focuses on the “instant discounts” available to customers and focused on encouraging customers to “make the switch and save” to ENERGY STAR®-certified bulbs, and educational information related to the longevity of ENERGY STAR® bulbs.

*Figure 7-1: 2018 Program In-Store Lighting Signage*



Instant Rebate Funded by Your Local Utility.  
Not for Resale.

Among the 20 customers who reviewed lighting products in the mobile survey, 13 reported that they saw the Companies' flyers, signs, posters, or stickers advertising rebates or instant discounts, while 6 said that they did not see signs contain this messaging. In addition, 12 respondents said they thought the signs clearly showed which products qualified for rebates and/or discounts.

Respondents uploaded 17 photos of the reviewed lighting products. Of those who uploaded photos, nine were of program signs and eight were not.

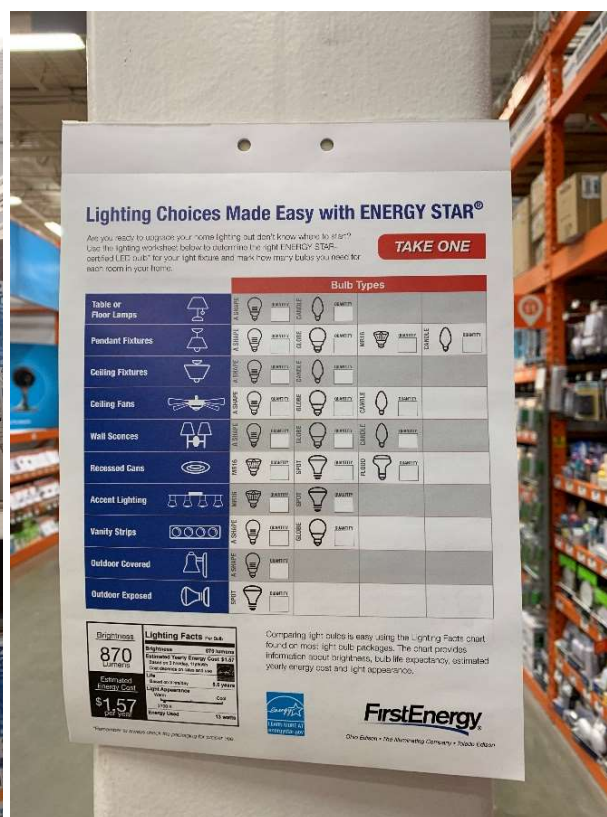


Figure 7-2 and Figure 7-3 are examples of a non-program and program sign that respondents saw during their shopping experience. Respondents said they chose these signs to photograph because it was the only sign in the aisle (7), it was informative (3), or it highlighted energy or dollar savings (3).

Figure 7-2: Uploaded Image of a Non-Company Sign for Lighting



Figure 7-3: Uploaded Image of Company Sign for Lighting



Customers generally thought the signage was easy to find (11); informative (9) easy to understand (10); attention grabbing (9); and clearly show the products that qualify for the discount/rebate (10). Six customers said that the signs clearly show the program.

It appears the Companies' signage has the potential to be influential on customers' lighting purchasing decisions. Nine of the 12 lighting mobile survey respondents state that after reviewing the program signage, they are likely or extremely likely to purchase a more efficient option for the product they reviewed the next time they need the product.<sup>21</sup> The

<sup>21</sup> Primary survey respondents are those who took the lighting portion of the survey first – they were only asked one battery of questions on the secondary survey.



majority of respondents (12) said that they were confident in their light bulb purchased based on the information they received in the store.

The below figure provides an example of lighting signage in-store, as seen by a mobile survey respondent. As can be seen, signage emphasizes instant discounts available for LED purchases.

*Figure 7-4. Lighting Signage*



#### **7.4.2 Retailer Feedback**

Our team spoke with two large retailers and one discount store who participated in the Lighting program. The overall process evaluation retailer feedback results can be found in section 5.4.4.

#### **7.4.3 Customer Feedback**

The research team conducted the general population survey to assess the lighting market inside the Companies territory. The general population survey consisted of 3,710 completes.

#### 7.4.4 Mobile In-Store Survey Results

We surveyed 51 customers who reviewed products in all four of the sub-programs.<sup>22</sup>

*Table 7-7: Survey Respondents by Reviewed Measure*

Sub-Program	Measure	N
Lighting <sup>23</sup>	LED Light Bulbs	18
	Lighting Fixtures	2
	<b>TOTAL</b>	<b>20</b>

Generally, respondents said that they could easily find the advertised product within the store (Figure 6-2).

The majority of mobile respondents said that they had not interacted with the program previously (Table 7-8). This include previously purchasing a sponsored product, receiving program collateral, or seeing program signs in stores. The highest frequency of any interaction with the program was from the lighting respondents—four recalled receiving program collateral in the past.

*Table 7-8: Number of Lighting Sub-Program Interactions*

	Have purchased program sponsored products before.	Have received program collateral, such as a bill insert or email, before.	Have seen program signs in retail stores before.
Lighting	2	4	1

#### Overall Satisfaction

The majority of Mobile In-Store respondents were satisfied with their overall experience at the store (40) (Figure 5-9).

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<sup>22</sup> The total of those who reviewed each measure does not equal the total n of the sub-program. The number of customers who reviewed lighting products equals 20.

<sup>23</sup> LED light bulbs included various brands and types of bulbs including smart lights and light sensors.

## 8 HVAC

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This chapter describes the impact evaluation methodology and results of the impact and process evaluations for the HVAC subprogram.

### 8.1 Description of the HVAC Program

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The Program provides rebates to residential customers as well as financial incentives and support to distributors and retailers that sell ENERGY STAR® qualified HVAC units. The rebates are designed to encourage the stocking and the purchase and installation energy efficient HVAC units that will reduce electricity consumption and reduce summer peak load demands.

Energy efficient HVAC units that are rebated in 2018 through the midstream channel include:

- ENERGY STAR® Room Air Conditioners
- ENERGY STAR® Furnace Fans
- ENERGY STAR® Central Air Conditioners
- Smart Thermostats
- ENERGY STAR® Air Source Heat Pumps
- ENERGY STAR® Geothermal Heat Pumps
- ENERGY STAR® Ductless Mini-Split Heat Pumps
- ENERGY STAR® Circulation Pumps
- Packaged Terminal Air Conditioner (PTAC) and Packaged Terminal Heat Pump (PTHP) – Multi Family

In addition to providing rebates for purchasing qualified HVAC equipment the Program provides financial incentives and support to customers who tune-up their heating and cooling equipment through a participating HVAC contractor. The rebates are designed to encourage regular maintenance of customers HVAC systems, which can reduce electricity consumption and reduce summer peak load demands.

To qualify for the \$50 rebate the service must be completed by a participating contractor and must meet all program requirements.

The HVAC 2018 participation by measure, ex-ante energy savings, and ex-ante demand savings are presented below.

*Table 8-1: HVAC Participation by Measure and EDC*

Measures	CEI	OE	TE	Total
Central Air Conditioner	358	151	20	529
Circulation Pump	30	43	0	73
Ductless Mini-Split	162	122	31	315
Furnace Fans	1,173	713	122	2,008
Heat Pump	61	87	5	153
H2O & Geothermal (Heat Pump)	5	11	0	16
Thermostats	2,027	1,797	395	4,219
Room Air Conditioner	2,345	1,823	693	4,861
HVAC Tune-Up	3,926	3,637	709	8,272
PTAC	0	2	0	2
PTHP	1	3	0	4
<b>Total</b>	<b>10,088</b>	<b>8,389</b>	<b>1,975</b>	<b>20,452</b>

*Table 8-2: HVAC Ex-Ante Energy kWh Savings by Measure and EDC*

Measures	CEI	OE	TE	Total
Central Air Conditioner	58,819.40	24,809.30	3,286.00	86,914.70
Circulation Pump	4,770.00	6,837.00	0.00	11,607.00
Ductless Mini-Split	150,400.80	113,264.80	28,780.40	292,446.00
Furnace Fans	523,158.00	317,998.00	54,412.00	895,568.00
Heat Pump	54,814.60	78,178.20	4,493.00	137,485.80
H2O & Geothermal (Heat Pump)	18,000.00	39,600.00	0.00	57,600.00
Thermostats	543,134.65	481,506.15	105,840.25	1,130,481.05
Room Air Conditioner	45,493.00	35,366.20	13,444.20	94,303.40
HVAC Tune-Up	380,848.30	344,402.60	57,147.70	782,398.60
PTAC	0.00	390.00	0.00	390.00
PTHP	608.30	1,824.90	0.00	2,433.20
<b>Total</b>	<b>1,780,047.05</b>	<b>1,444,177.15</b>	<b>267,403.55</b>	<b>3,491,627.75</b>

*Table 8-3: HVAC Ex-Ante Summer Peak Demand kW Savings by Measure and EDC*

Measures	CEI	OE	TE	Total
Central Air Conditioner	50.12	21.14	2.80	74.06
Circulation Pump	0.54	0.77	0.00	1.31
Ductless Mini-Split	25.92	19.52	4.96	50.40
Furnace Fans	123.17	74.86	12.81	210.84
Heat Pump	8.54	12.18	0.70	21.42
H2O & Geothermal (Heat Pump)	1.40	3.08	0.00	4.48
Thermostats	0.00	0.00	0.00	0.00
Room Air Conditioner	58.62	45.57	17.33	121.52
HVAC Tune-Up	117.78	109.11	21.27	248.16
PTAC	0.00	0.56	0.00	0.56
PTHP	0.28	0.84	0.00	1.12
<b>Total</b>	<b>386.37</b>	<b>287.64</b>	<b>59.86</b>	<b>733.88</b>

## 8.2 Impact Evaluation Methodology

The following section details the methods used to calculate energy savings and demand reductions for the HVAC sub-program.

### 8.2.1 Sampling Plan

#### Downstream Participant Survey

ADM completed a census review of all measures listed in the tracking system to ensure appropriate use of deemed savings values.

The sample size for the follow-up surveys in each service territory achieved a relative precision of  $\pm 10\%$  at the 90% confidence interval. The sample size calculation for achieving 90% confidence with 10% precision is shown in Equation 5-1.

ADM successfully surveyed 211 respondents in the downstream participant survey. This number was chosen to ensure 70 completed surveys per EDC.

#### General Population Survey

An online survey was conducted with a sample of 40,000 customers across all three Companies. The customers were randomly selected using a stratified sample based on the percentage of the Companies customers per EDC.

The final sample size meets Ohio's standards for achieving a relative precision of  $\pm 10\%$  at the 90% confidence interval for each service territory. The sample size calculation for achieving 90% confidence with 10% precision is shown in Equation 5-1.

ADM collected a sample size of 3,710 surveys completed to ensure adequate respondents across the various distribution channels, program types, and measure categories.

### **8.2.2 Ex-Ante Review**

ADM conducted an ex-ante review of the Program's final 2018 HVAC database. In this review, ADM carried out the necessary data cleaning and data editing steps in preparing the data for analysis, including:

- Verification of rebate status as completed
- Verification of measure rebate requirements (e.g., ENERGY STAR® qualified status and high efficiency level) for completed HVAC rebate applications
- Elimination of duplicate data entries
- Elimination of cases with incomplete data (e.g., no model number provided)

HVAC measures verified as passing ADM's rebate screening process will be analyzed further for energy savings and peak demand reduction using the procedures described below. The final measure count per HVAC category will be the total number of HVAC measures that pass all applicable screens to qualifying as a rebated product for which savings can be claimed by the Program. Prior to discounting any savings, a list of the items that are unable to be verified will be provided to the Companies for their review.

### **8.2.3 Customer Surveys**

Data collected via program participant surveys informed both the impact and process evaluations. The evaluation team administered participant surveys online and/or by telephone; the chosen method was dependent on the availability of contact information and progress toward achieving the required sample size. We designed survey instruments to collect useful and detailed information while minimizing respondent burden.

ADM also included questions to gather information on low income participation within the EE Products program. This was done by obtaining a gross household income and the number of people living in each household to obtain the percentage of Federal Poverty Level (FPL) for each household.

For the HVAC sub-programs, the evaluation team administered participant surveys to a random sample of program participants across the three EDCs. Surveys addressed program awareness, the application process, their experiences with contractors, and satisfaction with the energy efficient equipment they purchased and the program overall.

### **8.2.4 Energy Savings and Peak Demand Reductions**

Minimum efficiency requirements listed by Honeywell include the following:

- Central Air Conditioning: Seasonal Energy Efficiency Ratio (SEER) of 15 or higher
- Air Source Heat Pump: 15 SEER or higher; Heating Seasonal Performance Factor (HSPF) of 8.5 or higher
- Ground Source Heat Pump: ENERGY STAR® qualified

## ENERGY STAR® Room Air Conditioners

ADM used the deemed values for energy savings and peak demand reduction from the Ohio TRM.

### *Equation 8-1: Annual Energy Savings Room Air Conditioners*

$$\Delta kWh = \frac{Hours * BtuH * \left( \frac{1}{EER_{base}} - \frac{1}{EER_{ee}} \right)}{1000}$$

Where:

Hours = Full Load Hours of room air conditioning unit = 233

BtuH = Average size of rebated unit = 8500

EER<sub>base</sub> = Efficiency of baseline unit = 9.8

EER<sub>ee</sub> = Efficiency of ENERGY STAR® unit = 10.8 or Efficiency of CEE Tier 1 unit = 11.3

### *Equation 8-2: Peak Demand Savings Room Air Conditioners*

$$\Delta kW = \frac{BtuH * \left( \frac{1}{EER_{base}} - \frac{1}{EER_{ee}} \right)}{1000} * CF$$

Where:

CF = Summer Peak Coincidence Factor for Measure = 0.3

$\Delta kW_{ENERGY STAR®} = (8500 * (1/9.8 - 1/10.8)) / 1000 * 0.3 = 0.024 \text{ kW}$

$\Delta kW_{CEE TIER1} = \text{Efficiency of baseline unit} = 0.035 \text{ kW}$

## ENERGY STAR® Furnace Fans

ADM used the deemed values for energy savings and peak demand reduction from the Pennsylvania TRM.

*Equation 8-3: Annual Energy Savings Furnace Fan*

$$\Delta kWh = \frac{\Delta kWh}{yr_{heat}} + \frac{\Delta kWh}{yr_{cool}}$$
$$\frac{\Delta kWh}{yr_{heat}} = HFS$$
$$\frac{\Delta kWh}{yr_{cool}} = CFS$$

Where:

HFS = Assumed heating season savings per furnace high efficiency fan = 311 kWh

CFS = Assumed cooling season savings per furnace high efficiency fan = 135 kWh

*Equation 8-4: Peak Demand Savings Furnace Fan*

$$\Delta kW_{peak} = PDFS$$

Where:

PDFS = Assumed peak demand savings per furnace high efficiency fan = 0.105 kW

## ENERGY STAR® Central Air Conditioners

ADM used the deemed values for energy savings and peak demand reduction from the Ohio TRM.

*Equation 8-5: Annual Energy Savings Central Air Conditioners*

$$\Delta kWh = \frac{FLH_{cool} * BtuH * \left( \frac{1}{SEER_{base}} - \frac{1}{SEER_{ee}} \right)}{1000}$$

Where:

FLH<sub>cool</sub> = Full load cooling hours

Dependent on location as in Table 8-4.

*Table 8-4: Ohio EFLH<sub>cool</sub>*

Location	Run Hours
Akron	476
Cincinnati	664



Location	Run Hours
Cleveland	426
Columbus	552
Dayton	631
Mansfield	474
Toledo	433
Youngstown	369

BtuH = Size of equipment in BtuH (note 1 ton = 12,000BtuH) = Actual Installed

SEER<sub>base</sub> = Seasonal Energy Efficiency Ratio of baseline unit = 13

SEER<sub>ee</sub> = Seasonal Energy Efficiency Ratio of ENERGY STAR® unit = Actual Installed

*Equation 8-6: Peak Demand Savings Central Air Conditioner*

$$\Delta kW = \frac{BtuH * \left( \frac{1}{EER_{base}} - \frac{1}{EER_{ee}} \right)}{1000} * CF$$

Where:

EER<sub>base</sub> = Energy efficiency ratio for baseline unit = 11

EER<sub>ee</sub> = Energy efficiency ratio for ENERGY STAR® unit = Actual installed

CF = Summer Peak Coincidence Factor for measure = 0.5

## Smart Thermostats

ADM used the deemed values for energy savings and peak demand reduction from the Pennsylvania TRM.

*Equation 8-7: Annual Energy Savings Programmable/Smart Thermostats*

$$\frac{\Delta kWh}{yr} = \Delta kWh_{cool} + \Delta kWh_{heat}$$

$$\Delta kWh_{cool} = \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \frac{1}{SEER \times Eff_{duct}} \times EFLH_{cool} \times ESF_{cool}$$

$$\Delta kWh_{heat} = \frac{CAPY_{heat}}{1000 \frac{W}{kW}} \times \frac{1}{HSPF \times Eff_{duct}} \times EFLH_{heat} \times ESF_{heat}$$

Where:

CAPY<sub>cool</sub> = Capacity of air conditioning unit.  
= 32,000

CAPY<sub>heat</sub> = Normal heat capacity of Electric Furnace.  
= 32,000

SEER = Seasonal Energy Efficiency Ratio  
Default = 11.9

HSPF = Heating Seasonal Performance Factor of heat pump  
Default = 3.412 (equivalent to electric furnace COP of 1)

Eff<sub>duct</sub> = 0.8

ESF<sub>cool</sub> = 0.02

ESF<sub>heat</sub> = 0.036

EFLH<sub>cool</sub> = Full load cooling hours.  
Dependent on location as in Table 8-4.

EFLH<sub>heat</sub> = Full Load heating hours.  
Dependent on location as in Table 8-5.

*Equation 8-8: Peak Demand Savings Programmable/Smart Thermostats*  
 $\Delta kW_{peak} = 0$

## ENERGY STAR® Air Source Heat Pumps

ADM used the deemed values for energy savings and peak demand reduction from the Ohio TRM.

*Equation 8-9: Annual Energy Savings Air Source Heat Pumps*

$$\Delta kWh = \frac{FLH_{cool} * BtuH * \left( \frac{1}{SEER_{base}} - \frac{1}{SEER_{ee}} \right)}{1000} + \frac{FLH_{heat} * BtuH * \left( \frac{1}{HSPF_{base}} - \frac{1}{HSPF_{ee}} \right)}{1000}$$

Where:

FLH<sub>cool</sub> = Full load cooling hours  
Dependent on location as in Table 8-4.

BtuH = Size of equipment in BtuH (note 1 ton = 12,000BtuH)  
= Actual Installed

SEER<sub>base</sub> = Seasonal Energy Efficiency Ratio of baseline unit  
= 13

SEER<sub>ee</sub> = Seasonal Energy Efficiency Ratio of ENERGY STAR® unit  
= Actual Installed

FLH<sub>heat</sub> = Full load heating hours  
Dependent on location as in Table 8-5.

*Table 8-5: Ohio EFLH<sub>heat</sub>*

Location	Run Hours
Akron	1576
Cincinnati	1394
Cleveland	1567
Columbus	1272
Dayton	1438
Mansfield	1391
Toledo	1628

HSPF<sub>base</sub> = Heating Season Performance Factor for baseline unit  
= 7.7

HSPF<sub>ee</sub> = Heating Season Performance Factor for efficient unit  
= Actual Installed

*Equation 8-10: Peak Demand Savings Air Source Heat Pump*

$$\Delta kWh = \frac{BtuH * \left( \frac{1}{EER_{base}} - \frac{1}{EER_{ee}} \right)}{1000} * CF$$

Where:

EER<sub>base</sub> = Energy efficiency ratio for baseline unit  
= 11

EER<sub>ee</sub> = Energy efficiency ratio for ENERGY STAR® unit  
= Actual installed

CF = Summer Peak Coincidence Factor for measure  
= 0.5

## ENERGY STAR® Geothermal Heat Pumps

ADM used the deemed values for energy savings and peak demand reduction from the Ohio TRM.

*Equation 8-11: Annual Energy Savings Geothermal Heat Pumps*

$$\Delta kWh = \frac{FLH_{cool} * BtuH * \left( SEER_{base} - \left( \frac{1}{EER_{ee} * 1.02} \right) \right)}{1000} + \frac{FLH_{heat} * BtuH * \left( \frac{1}{HSPF_{base}} - \left( \frac{1}{COP_{ee} * 3.412} \right) \right)}{1000}$$

Where:

FLH<sub>cool</sub> = Full load cooling hours

Dependent on location as in Table 8-4.

BtuH = Size of equipment in BtuH (note 1 ton = 12,000BtuH)

= Actual Installed

SEER<sub>base</sub> = Seasonal energy efficiency ratio of baseline unit

= 13

SEER<sub>ee</sub> = Seasonal energy efficiency ratio of ENERGY STAR® unit

= Actual Installed

1.02 = Constant used to estimate the SEER based on the efficient unit's EER

FLH<sub>heat</sub> = Full load heating hours

= Dependent on location as in Table 8-5

HSPF<sub>base</sub> = Heating Season Performance Factor for baseline unit

= 7.7

COP<sub>ee</sub> = Coefficient of Performance of efficient unit

= Actual Installed

3.413 = Constant to convert the COP of the unit to the Heating Season Performance Factor

= Actual Installed

*Equation 8-12: Peak Demand Savings Geothermal Heat Pumps*

$$\Delta kW = BtuH * \left( \frac{1}{EER_{base}} - \frac{1}{\frac{((EER_{ee} * 1.02) * 0.37) + 6.43}{1000}} \right) * CF$$

Where:

EER<sub>base</sub> = Energy efficiency ratio of baseline unit  
= 11

EER<sub>ee</sub> = Energy efficiency ratio of ENERGY STAR® unit  
= Actual installed

1.02 = Constant used to estimate the unit's equivalent air conditioning SEER based on the Ground Source Heat Pump (GSHP) unit's EER

CF = Summer Peak Coincidence Factor for measure  
= 0.5

**ENERGY STAR® Ductless Mini Split Heat Pumps**

ADM calculated energy savings and peak demand reduction for both single and multi-zone residences using deemed values from the Pennsylvania TRM.

*Equation 8-13 Single Zone Energy Savings*

$$\Delta kWh/yr = \Delta kWh/yr_{cool} + \Delta kWh/yr_{heat}$$

*Equation 8-14 a.*

$$\Delta kWh/yr_{heat} = \frac{CAPY_{heat}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{HSPF_{base}} - \frac{1}{HSPF_{ee}} \right) \times EFLH_{hea}$$

*Equation 8-15 b.*

$$\Delta kWh/yr_{cool} = \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{SEER_{base}} - \frac{1}{SEER_{ee}} \right) \times EFLH_{cool}$$

*Equation 8-16 Single Zone Peak Demand Reduction*

$$\Delta kW_{peak} = \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{EER_{base}} - \frac{1}{EER_{ee}} \right) \times CF$$

*Equation 8-17 Multi-zone Energy Savings*

$$\Delta kWh/yr = \Delta kWh/yr_{cool} + \Delta kWh/yr_{heat}$$

Equation 8-18 a.

$$\Delta kWh/yr_{heat} = \left[ \frac{CAPY_{heat}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{HSPF_{base\ 1}} - \frac{1}{HSPF_{ee}} \right) \times EFLH_{heat} \right]_{zone\ 1} + \left[ \frac{CAPY_{heat}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{HSPF_{base\ 2}} - \frac{1}{HSPF_{ee}} \right) \times EFLH_{heat} \right]_{zone\ 2} + \dots + \left[ \frac{CAPY_{heat}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{HSPF_{base\ n}} - \frac{1}{HSPF_{ee}} \right) \times EFLH_{heat} \right]_{zone\ n}$$

Equation 8-19 b.

$$\Delta kWh/yr_{cool} = \left[ \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{SEER_{base\ 1}} - \frac{1}{SEER_{ee}} \right) \times EFLH_{cool} \right]_{zone\ 1} + \left[ \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{SEER_{base\ 2}} - \frac{1}{SEER_{ee}} \right) \times EFLH_{cool} \right]_{zone\ 2} + \dots + \left[ \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{SEER_{base\ n}} - \frac{1}{SEER_{ee}} \right) \times EFLH_{cool} \right]_{zone\ n}$$

Equation 8-20 Multi-zone Peak Demand Reduction

$$\Delta kW_{peak} = \left[ \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{EER_{base\ 1}} - \frac{1}{EER_{ee}} \right) \times CF \right]_{zone\ 1} + \left[ \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{EER_{base\ 2}} - \frac{1}{EER_{ee}} \right) \times CF \right]_{zone\ 2} + \dots + \left[ \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \left( \frac{OF \times DLF}{EER_{base\ n}} - \frac{1}{EER_{ee}} \right) \times CF \right]_{zone\ n}$$

Where:

CAPY<sub>cool</sub> = The cooling (at 47° F) capacity of the ductless heat pump unit

CAPY<sub>heat</sub> = The heating (at 47° F) capacity of the ductless heat pump unit

EFLH<sub>primary</sub> = Equivalent full load hours of the primary system – See Table 8-4: Ohio EFLH<sub>cool</sub> and Table 8-5: Ohio EFLH<sub>heat</sub>

EFLH<sub>secondary</sub> = Equivalent full load hours of the secondary system – If the unit is installed as the secondary heating or cooling system

HSPF<sub>base</sub> = Heating Seasonal Performance Factor (heating efficiency of baseline unit)

Standard DHP=8.2

Electric resistance of de-facto space heaters=3.412

ASHP=8.2.

Electric Furnace=3.242.

No existing or non-electric heating use standard DHP=8.2

HSPF<sub>ee</sub> = Heating Seasonal Performance Factor (heating efficiency of installed ductless heat pump)

SEER<sub>ee</sub> = Seasonal energy efficiency ratio of installed installed ductless heat pump

SEER<sub>base</sub> = Seasonal energy efficiency ratio of installed baseline unit

DHP or ASHP=14

Central AC=13

Room AC=11.3

No existing cooling for primary space: use Central AC=13

No existing cooling for secondary space: use Room AC=11.3

OF = Oversize factor to account for baseline units typically being 40% - 50% oversized.  
In the case of de-facto space heaters, the baseline capacity is typically undersized.

$$OF = \frac{CAPY_{base}}{CAPY_{ee}}$$

Default depends on baseline condition:

Central AC=1.5

Central ASHP=1.4

Electric Furnace=1.4

Electric Baseboard=1.4

De facto Space Heaters=0.6

Room AC=1.0

Ductless Heat Pump=1.0

CF = Peak coincidence factor

= 0.594

EER<sub>base</sub> = Energy efficiency ratio of the baseline unit

=(11.3/13)\*SEER<sub>base</sub> for central AC or no existing cooling

=(12/14)\*SEER<sub>base</sub> for DHP

=9.8 room AC

EER<sub>base</sub> = Energy efficiency ratio of the installed ductless heat pump

=(12/14)\*SEER<sub>ee</sub>

Based on nameplate information – should be at least ENERGY STAR®

### ENERGY STAR® Circulation Pumps

ADM calculated energy savings and peak demand reduction based upon the energy use of efficient circulation pumps in “Essentials of Hydronics for GSHP Professionals” industry text<sup>24</sup>. Where a base case circulation pump would use 125 watts and an efficient circulation pump would use 25 watts. Thus, the savings would be 100 watts multiplied by the full load heating hours which can be found in Table 8-5: Ohio EFLH<sub>heat</sub>. The resulting savings are listed in the table below.

*Table 8-6: Deemed Savings for Circulation Pumps*

Measure	EDC	kWh	kW	Measure Life	Measure Life Source
Circulation Pumps	OE	158	0.018037	10	EMV Consultant
Circulation Pumps	CEI	157	0.017922	10	EMV Consultant
Circulation Pumps	TE	163	0.018607	10	EMV Consultant

### HVAC Maintenance/Tune Ups

There are no minimum efficiency criteria listed for HVAC tune ups on the Honeywell rebate application. The methods used to verify rebate qualifications and the per-unit energy savings and peak demand reduction for the rebated HVAC measures are described in engineering algorithms specified in the Ohio TRM and VEIC Replies will be used to analyze the energy and demand savings for Residential HVAC Maintenance/Tune Up.

Per the TRM, energy savings per HVAC maintenance measure will be calculated using the following formulas and corresponding values:

*Equation 8-21: Annual Energy Savings-Central AC*

$$kWh \text{ Savings central AC} = \frac{FLH_{cool} * BtuH * \left( \frac{1}{SEER_{CAC}} \right)}{1000} * MFe$$

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<sup>24</sup> Revised document RP878 was published by ClimateMaster on 7 February 2011 (climatemaster.com)



*Equation 8-22: Annual Energy Savings-Heat Pump*

*kWh Savings AS Heat Pump*

$$= \left( \frac{FLH_{cool} * BtuH * \left( \frac{1}{SEER_{ASHP}} \right)}{1000} * MFe \right) + \left( \frac{FLH_{heat} * BtuH * \left( \frac{1}{HSPF_{ASHP}} \right)}{1000} * MFe \right)$$

Where:

FLH<sub>cool</sub> = Full load cooling hours, which depend on location

FLH<sub>heat</sub> = Full load heating hours, which depend on location

BtuH = Size of the HVAC equipment in tons (1 ton = 12,000 BtuH)

SEER<sub>CAC</sub> = SEER efficiency rating of the CAC unit receiving maintenance<sup>25</sup>

SEER<sub>ASHP</sub> = SEER efficiency rating of the ASHP receiving maintenance

MFe = Maintenance energy savings factor = 0.05

HSPF<sub>ASHP</sub> = Heating Season Performance Factor of the ASHP receiving maintenance<sup>26</sup>.

As specified in the TRM, the summer coincident peak demand savings per HVAC maintenance measure will be calculated using the following formula and corresponding values:

*Equation 8-23: Summer Coincident Peak Demand Savings*

$$kW Savings = BtuH * \left( \frac{1}{\frac{EER}{1000}} \right) * MFd * CF$$

Where:

EER = Energy efficiency ratio of the unit receiving maintenance = SEER \* 0.927

MF<sub>d</sub> = Maintenance demand savings factor = 0.02

CF = Summer peak coincidence factor = 0.594

<sup>25</sup> If unknown, a default value of SEER = 10 will be used

<sup>26</sup> If unknown, a default value of HSPF = 6.8 will be used.

<sup>27</sup> If unknown, a default value of EER = 9.0 will be used

Zip codes for determining customer location of HVAC maintenance events will be obtained from the Program's HVAC database. The needed BtuH, SEER, and HSPF values of the installed equipment receiving HVAC maintenance will be obtained from Honeywell through the desk review procedure.

For a sample of model numbers collected, ADM verified the BtuH, SEER, HSPF using the AHRI database, and for the remaining model numbers ADM assigned heating and cooling capacity based upon the type of unit (ASHP 29,200 or CAC 28,000). ADM calculated the minimum sample size for HVAC Tune-up customers using Equation 5-1. The minimum sample size for 90% confidence is 68. Then a random sample of the HVAC tune-up models was conducted to obtain the required inputs. For all models that could not be found ADM used the default values and used as-found inputs for all others. The average kWh savings and demand reduction was then applied to all units in the HVAC program.

### **8.3 Impact Evaluation Findings**

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The ex-post energy savings for the HVAC sub-program totaled 2,980,098 kWh and ex-post peak load demand reduction totaled 837.98 kW. Realization rates for this sub-program were 85.3% and 114.4% respectively. Explanations for variation from the ex-ante values by measure are listed below.

#### **Central Air conditioners**

The central air conditioner ex-ante values used the average of three savings which differed only in the  $FLH_{cool}$  hours used in the savings algorithm. The reason for the lower than 100% realization rate is that ADM used the actual FLH cool hours based upon the zip code provided in the program dataset. Furthermore, ADM used the actual BtuH,  $SEER_{ee}$ , and  $EER_{ee}$  of each model of CAC in the dataset. This information was obtained from the Air Conditioning, Heating, and Refrigeration Institute (AHRI) database or manufacturers spec sheets.

#### **Circulation pumps**

The ex-ante savings values came from the average of the three deemed values based on territory. The slight difference in realization rate comes from assigning a deemed savings value based upon the territory, matched from the installed measure's zip code in the tracking data.

#### **Ductless Mini-split**

ADM assigned heating and cooling hours based upon the zip code in the dataset. Furthermore, ADM collected the heating and cooling capacity,  $EER_{ee}$ ,  $SEER_{ee}$ , and  $HSPF_{ee}$  from the AHRI database for each ductless mini-split model in the dataset and used those values in the savings calculations. Finally, the heating and cooling type data from the Energy Information Administration was used to inform the baseline heating and

cooling conditions in the savings calculations. This resulted in realization rates for energy savings and demand reduction of 224% and 314% respectively.

### **Furnace fans**

The savings value for furnace fans is a deemed value from the Pennsylvania TRM. The RR was 100%.

### **Heat Pump**

The heat pump ex-ante values used the average of three savings which differed only the in the  $FLH_{cool}$  and  $FLH_{heat}$  hours used in the savings algorithm. ADM used the actual  $FLH_{cool}$  and  $FLH_{heat}$  hours based upon the zip provided in the dataset which resulted in realization rates for energy savings and demand reduction of 133% and 121% respectively. Furthermore, ADM used the actual heating and cooling capacity (BtuH),  $SEER_{ee}$ ,  $EER_{ee}$ , and  $HSPF_{ee}$  of each heat pump model in the dataset. This information was obtained from AHRI database or manufacturers specification sheets.

### **H2O & Geothermal Heat Pump**

The H2O & geothermal heat pump ex-ante savings values used the average of three values which differed only the in the  $FLH_{cool}$  and  $FLH_{heat}$  hours. ADM used the actual  $FLH_{cool}$  and  $FLH_{heat}$  hours based upon the zip provided in the dataset. Furthermore, ADM used the actual heating and cooling capacity (BtuH),  $EER_{ee}$ , and  $COP_{ee}$  of each heat pump model in the dataset. This information was obtained from AHRI database or manufacturers spec sheets. This resulted in realization rates for energy savings and demand reduction of 174% and 103% respectively.

### **Smart Thermostats**

The ex-ante savings calculations used the Pennsylvania TRM IMP default values for several inputs including:  $CAPY_{cool}$ ,  $CAPY_{heat}$ , SEER, HSPF,  $ESF_{cool}$ ,  $ESF_{heat}$ ,  $HP_{motor}$ ,  $N_{motor}$ , %programmable, %Manual, and DF. The ex-ante calculations used three different EFLH hours and performed a weighted average of the savings based upon installed heat type (electric furnace, heat pump, gas heat). The resultant savings were 267.95 kWh and 0 kW.

ADM used the results of the EE Products general population survey to justify the use of alternate input variable values for:  $EFLH_{cool}$ ,  $EFLH_{heat}$ ,  $EFLH_{fuel}$  furnace,  $ESF_{cool}$ , and  $ESF_{heat}$ . ADM then took the weighted average of savings based upon the surveys reported heat type to obtain savings values of 53.34 kWh and 0 kW. This resulted in a realization rate for energy savings of 20%.

## Room air conditioner

The ex-ante savings calculations assumed an efficiency level of ENERGY STAR® and an  $EER_{ee}$  of 12. ADM used the ENERGY STAR® data base to obtain the efficiency level and  $EER_{ee}$  of each of the models in the data set. Thus, the realization rates for energy savings and demand reduction of 100% and 104% respectively due to the use of exact efficiency level and  $EER_{ee}$ .

## HVAC Tune-Up

The ex-ante savings calculations assigned a heating and cooling capacity of 29,200 BtuH for air source heat pumps and 28,000 BtuH for central air conditioners, which were the averages of the 2016-2017 HVAC tune-up data for FE customers in Pennsylvania. The ex-ante calculations also used:  $SEER_{cac}$  (10),  $SEER_{ashp}$  (10), and HSPF (6.8), and took the average of the savings from three different cities ( $FLH_{cool}$  and  $FLH_{heat}$ ).

In the absence of AHRI data for much of the HVAC tune-up customers, ADM conducted a random sample of customers using Equation 5-1 to determine the appropriate in sample size (68). Then ADM found the actual inputs for as many models as could be found on the AHRI database and assigned heating and cooling capacity based upon the type of unit (ASHP 29,200 or CAC 28,000) when the actual inputs couldn't be found on the AHRI database. The  $FLH_{cool}$  and  $FLH_{heat}$  values were determined based upon zip code in the dataset. The 68 savings values from the sample were then averaged and the resultant kWh and kW savings were assigned to each unit in the dataset. This resulted in a kWh realization rate of 94% and a kW realization rate of 101%.

## PTAC

The ex-ante savings calculations used three assumptions: cooling capacity of 12,000 BtuH,  $EER_{base}$  (8.344), and  $EER_{ee}$  (12). Then the ex-ante took the average of the savings values from three different cities to arrive at 195 kWh and 0.2835 kW. ADM obtained the cooling capacity and  $EER_{ee}$  of the rebated units from the AHRI database and assumed the  $EER_{base}$  (8.344). Then ADM used the zip codes in the dataset to assign  $FLH_{cool}$  hours based on the OH TRM. This resulted in a realization rate for energy savings and demand reduction of 79% and 79% respectively.

## PTHP

The ex-ante savings calculations used six assumptions: cooling and heating capacity of 12,000 BtuH,  $EER_{base}$  (8.344),  $EER_{ee}$  (12),  $COP_{base}$  (2.588) and  $COP_{ee}$  (3.2). Then the average of savings for three different cities was taken to obtain 608.3 kWh and 0.28 kW. ADM obtained the cooling and heating capacity,  $EER_{ee}$ , and  $CO_{Pee}$  from the AHRI database. ADM assumed  $EER_{base}$  (8.344) and  $COP_{base}$  (2.588). Then ADM used the zip code from the data set to assign  $FLH_{cool}$  and  $FLH_{heat}$  hours according to the OH TRM. This resulted in a kWh realization rate of 79% and a kW realization rate of 114%.

Table 8-7, Table 8-8, and Table 8-9 below show ex-post kWh and kW savings per measure across each EDC and the totals.

*Table 8-7: Ex-Post kWh Savings by Measure and EDC*

Measures	CEI	OE	TE	Total
Central Air Conditioner	51,160.00	20,876.07	4,091.93	76,128.00
Circulation Pump	4,710.00	6,794.00	0.00	11,504.00
Ductless Mini-Split (Heat Pump)	447,904.71	167,008.98	40,079.45	654,993.13
Furnace Fans	523,158.00	317,998.00	54,412.00	895,568.00
Heat Pump	62,440.76	114,632.86	6,190.18	183,263.81
H2O & Geothermal (Heat Pump)	28,299.72	72,169.69	0.00	100,469.41
Smart Thermostats	108,127.31	95,858.30	21,070.69	225,056.29
Room Air Conditioner	45,629.60	35,655.18	13,470.25	94,755.04
HVAC Tune-Up	358,345.07	324,157.01	53,622.98	736,125.06
PTAC	0.00	308.72	0.00	308.72
PTHP	417.33	1,508.98	0.00	1,926.31
<b>Total</b>	<b>1,630,192.50</b>	<b>1,156,967.78</b>	<b>192,937.48</b>	<b>2,980,097.76</b>

*Table 8-8: Ex-Post kW Savings by Measures and EDC*

Measures	CEI	OE	TE	Total
Central Air Conditioner	37.71	19.75	3.34	60.80
Circulation Pump	0.54	0.78	0.00	1.31
Ductless Mini-Split (Heat Pump)	116.11	41.15	1.10	158.35
Furnace Fans	123.17	74.86	12.81	210.84
Heat Pump	8.06	17.80	0.13	25.99
H2O & Geothermal (Heat Pump)	1.57	3.05	0.00	4.61
Smart Thermostats	0.00	0.00	0.00	0.00
Room Air Conditioner	60.71	47.44	17.92	126.07
HVAC Tune-Up	118.71	109.91	21.39	250.00
PTAC	0.00	0.44	0.00	0.44
PTHP	0.19	1.11	0.00	1.30
<b>Total</b>	<b>466.76</b>	<b>316.28</b>	<b>56.69</b>	<b>839.73</b>

*Table 8-9: HVAC Savings Totals by Measure*

Measures	Ex-Ante kWh	Ex-Ante kW	Ex-Post kWh	Ex-Post kW	RR kWh	RR kW
Central Air Conditioner	86,914.70	74.06	76,128.00	60.80	87.59%	82.10%
Circulation Pump	11,607.00	1.31	11,504.00	1.31	99.11%	99.94%
Ductless Mini-Split (Heat Pump)	292,446.00	50.40	654,993.13	158.35	223.97%	314.19%
Furnace Fans	895,568.00	210.84	895,568.00	210.84	100.00%	100.00%
Heat Pump	137,485.80	21.42	183,263.81	25.99	133.30%	121.33%
H2O & Geothermal (Heat Pump)	57,600.00	4.48	100,469.41	4.61	174.43%	103.00%
Smart Thermostats	1,130,481.05	0.00	225,056.29	0.00	19.91%	-
Room Air Conditioner	94,303.40	121.52	94,755.04	126.07	100.48%	103.74%
HVAC Tune-Up	782,398.60	248.16	736,125.06	250.00	94.09%	100.74%
PTAC	390.00	0.56	308.72	0.44	79.16%	79.09%
PTHP	2,433.20	1.12	1,926.31	1.30	79.17%	116.21%
<b>Total</b>	<b>3,491,627.75</b>	<b>733.88</b>	<b>2,980,097.76</b>	<b>839.73</b>	<b>85.35%</b>	<b>114.42%</b>

## 8.4 Detailed Process Evaluation Findings

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All measures within the HVAC sub-program are offered as midstream product offerings through participating retailers and distributors. However, the HVAC tune-up is offered as a downstream program. For the HVAC tune-up, customers can receive a \$50 rebate if they use a qualified program contractor.

According to the Companies' staff, the HVAC sub-program has focused efforts this year on trying to reach customers who might not see the value of HVAC maintenance; for example, customers who have owned a house for 10 years, but never had an HVAC tune-up conducted; or customers who never knew about the benefits of HVAC maintenance.

Marketing efforts have therefore focused on conveying the benefits of HVAC maintenance; as opposed to messaging focused on saving money and saving energy. The HVAC tune-up was marketed during 2018 via bill inserts; direct mail; information on the Companies' website; and email.

The Companies' HVAC sub-program webpages contain information on:

- **HVAC tune-ups:** including why customers should have tune-ups conducted and what a typical maintenance check should include (i.e., checking thermostats, inspecting and cleaning air filters, inspecting all electrical connections, and inspecting drains on central AC units.) Customers can link directly to the online rebate application or can download a rebate application; a tool to find a participating contractor; and a resource on 10 tips for hiring a heating and cooling contractor.
- **Smart thermostats:** including information on the features and benefits of smart thermostats. Messaging focuses on convenience; control; and insights into usage. This webpage also lists Lowe's®, The Home Depot®, and Best Buy® as participating retailers for program-qualified smart thermostats.
- **Find a participating contractor:** a resource where customers can search for contractors by name, or within a certain distance of a city or zip code.
- **Energy-saving calculator:** a resource where customers can select an air conditioner size, input their existing unit SEER rating; and their new energy efficient model SEER rating, and get an output for expected annual savings in dollars.
- **Energy-saving ideas:** includes links to articles about scheduling an HVAC tune-up; when it's time to upgrade HVAC equipment; and links to articles about appliances offered in the program, including clothes washers, clothes dryers, and refrigerators.
- **Rebate applications:** includes an online HVAC tune-up rebate portal; a rebate application that can be downloaded; and an online portal for tracking rebate status.

### 8.4.1 HVAC Signage

The evaluation team reviewed two pieces of signage provided by the implementer, Honeywell, including: the 2018 final HVAC brochure and an ENERGY STAR® thermostat flyer.

The 2018 HVAC brochure is a 2-page customer-facing brochure that focuses on the HVAC tune-up rebate and other program rebates, including rebates for refrigerators, clothes washers, clothes dryers, heat pump water heaters, LED bulbs, and solar water heaters. The brochure also contains information about how to find a contractor; why customers should consider an HVAC tune-up; and a checklist to determine whether it is time to replace or tune-up a heating and cooling system.

The thermostat flyer is a one-page customer-facing brochure that highlights four messages about thermostats:

- Demonstrated energy savings;
- Reliable performance;
- Environmental benefits; and
- Convenience, insight, and control.

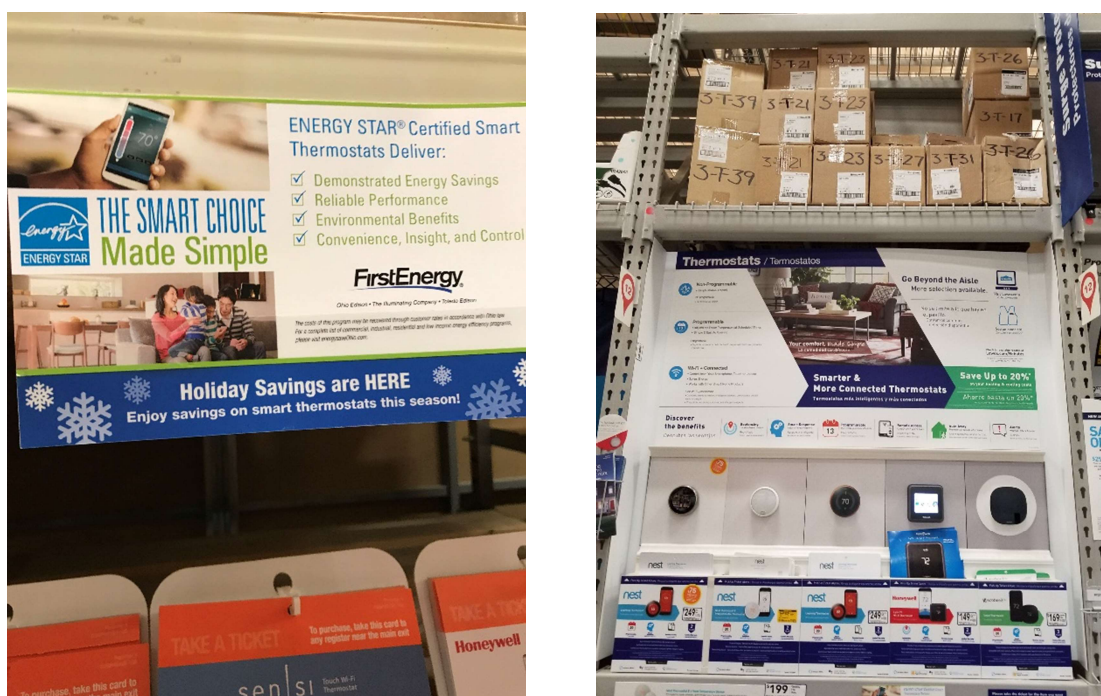
Among the 15 customers who reviewed HVAC products for the mobile in-store survey, all reported that they saw the Companies' product signs. Generally, respondents responded well to the store signage.

- 10 stated that the signs were easy to find (four of the thermostat respondents; six from other HVAC equipment).
- 9 thought that the signs were attention grabbing (three of the thermostat respondents; six from the other HVAC equipment)
- 11 thought that the signs were easy to understand (three of the thermostat respondents; six from the other HVAC equipment)
- 12 thought that the signs were informative (five of the thermostat respondents; seven from the other HVAC equipment)

Similar to the findings in the other sub-programs, only one of the 11 photographs of preferred signs were of program collateral (Figure 8-1). The majority of respondents did not think the signs clearly showed the program sponsors (three of the thermostat respondents; five from the other HVAC equipment).



Figure 8-1: Uploaded Photos of Company Signage (left) and Other Signage (Right)



The majority of the respondents who saw the signs said that they would be likely to purchase the equipment the next time they needed it based on the signs (10).

The majority of respondents from the Mobile In-Store survey said they could easily locate advertised products (12) and that they were easily accessible (14). Generally, HVAC respondents were unaware of the program before participating in the survey. They were split between seeing signs or advertisements more generally before (7 had seen signs and 8 had not). Three people said they purchase other HVAC equipment online.

Table 8-10: Number of HVAC Sub-Program Interactions

	Have purchased program sponsored products before.	Have received program collateral, such as a bill insert or email, before.	Have seen program signs in retail stores before.
HVAC	2	3	7

#### 8.4.2 HVAC Contractor Feedback

Our team spoke with participating contractors in the HVAC sub-program who are on the list of participating contractors for the tune-up portion of the program. In total, we spoke with 11 contractors:

- 5 complete 30-minute interviews

- 6 partial interviews<sup>28</sup>

## **Awareness and Motivation to Participate**

About half of the contractors we spoke with were approached by Honeywell to participate in the program (3); the other half were asked about it by their customers. Companies were excited to participate in the program because it would help their customers cover the cost of the tune-up (2). All contractors we spoke with said they signed up to participate in the program for their customers. Contractors said that they were already conducting tune-ups as part of their normal business and it would only help their customers to have a reduced cost. Contractors liked that this program was relatively hands-off and would benefit their customers without reducing their profit margins.

## **HVAC Contractor Perspectives Regarding Influence on Tune-Up Participation**

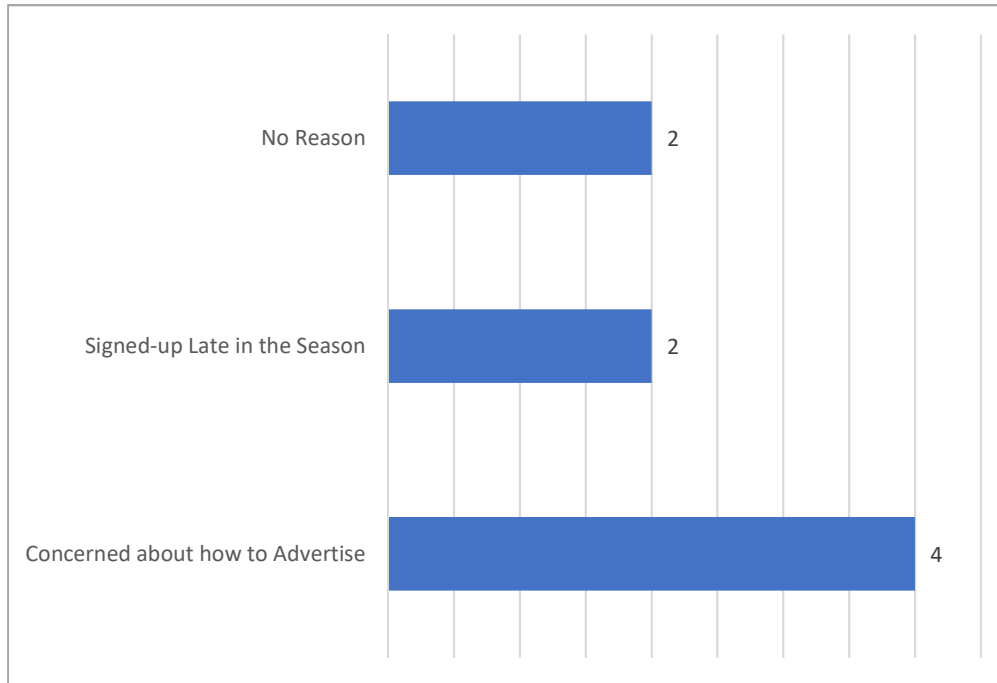
Generally, we found that tune-up customers who received a rebate were passive customers. They find out about the rebate when a contractor has come out to their house to perform a tune-up and not before. Most of the contractors (4) we spoke with said that their technicians will ask which electric utility the customer has while on-site at the customers' house and then inform them about the available rebate. Four of the contractors we spoke with said they only had one or two customers in 2018 who called them to schedule the tune-up. For these four contractors, all other tune-up rebates were completed on existing scheduled tune-ups. We only spoke with one contractor who actively recruits customers into the HVAC sub-program.

Companies were not actively recruiting for the HVAC sub program because they were concerned about advertising for the program (4), they had signed up late in the season and did not have time to advertise (2), or they just had not conducted any (2) (Figure 8-2).

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<sup>28</sup> The interviewer asked a few key questions of the person who answered the phone but could not complete a complete interview.

Figure 8-2: Reasons for Not Recruiting Customers



Those who were concerned about how they could advertise for the program weren't sure if they could use the FirstEnergy logo on their marketing. These companies also said that they would like the Companies to do more advertising for the program. They said that active recruitment from the utility itself would be an effective way of increasing participation.

The company that actively recruited customers also believed that the rebate was highly influential in their customer's decision to tune-up their systems. They said that for some of their customers the cost of the full tune-up was prohibitive; the \$50 rebate was the perfect amount to get people "*over the fence*." She said that nearly half of the company's tune-ups for 2018 were rebated. This was the only company we spoke with who actively advertised for the tune-ups. They said they make recruitment calls, send direct mail, and advertise over social media. This company did see a jump in their business. They said that the rebate was a way to inform future customers on the importance of regular HVAC maintenance because it made the cost manageable and made people dig into why the Companies would provide a rebate.

### Impact on HVAC Contractor's Business

For many businesses (4 full interviews and 6 partial-interviews), the program has not affected business sales because many of the tune-ups were scheduled outside of the program – they have not drawn in more business by advertising for the program.

Instead, these companies described the program to increase customer care and stewardship more than directly increase business. They signed up for the program because it was a way to help their customers. Ultimately, if it makes their customers happy

it is a valuable program to have even if they do not have a steady stream of FirstEnergy utility customer tune-ups.

### **Overall HVAC Contractor Satisfaction and Benefits**

Generally, the program has gone well for contractors and they are satisfied with their experience thus far. These companies are focused on customer service and they are excited to provide their customers with a lower cost HVAC tune-up. Companies said that the rebate process is simple, and they have had little to no issues with it.

However, many of the companies we spoke with have not conducted many tune-ups. Some companies said they signed up to late in the season, some said they were confused about the guidelines on advertising so were waiting for customers to approach them. Every company we spoke with said they are planning to participate in 2019 and are expecting more business than last year.

One company was disappointed about the program's retail partners selling HVAC equipment. They were worried that the customers who needed to purchase equipment would go to big box stores like Home Depot® instead of purchasing from their company.

### **8.4.3 Customer Feedback**

The research team conducted three customer surveys: the general population survey to assess the market more broadly, the downstream survey for rebate recipients, and the mobile in-store survey to assess the in-store experience.<sup>29</sup> In total we surveyed:

- General Population: 3,710 customers;<sup>30</sup>
- Downstream: 211 customers;
- Mobile In-Store: 51 customers.

### **Awareness and Motivation to Participate**

Most Downstream respondents found out about the program at the retail location where they purchased their product. Of those who found about the rebates in the retail location, 29% found out from a store associate and 26% found out from the program signage.

We found that the majority of Mobile Survey respondents shop for their surveyed product at the store in which they took the survey (41). The majority of these respondents said that it was their preferred store for purchasing their surveyed product (29). This implies that when customers are looking for a product that is included in the Energy Efficiency Products program, they will see qualified products during their shopping trips. 43% of

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<sup>29</sup> ADM called this survey, "2018 Customer Action Program / EE Products Online Survey (Upstream)".

<sup>30</sup> As previously stated, this section will only cover the Downstream and Mobile In-Store surveys.

respondents have purchased their surveyed product online and 41% of respondents had purchased a qualifying product online in the past.

The top reasons for shopping at their preferred store were price (mentioned 16 times), convenience (mentioned 14 times), and variety of brands and products (mentioned 9 times). Helpful and knowledgeable staff was mentioned five times. Given that customers are looking for knowledgeable staff, it would behoove store associates to have more information about qualifying products and the program at large.

### **Overall Satisfaction**

The majority of Downstream respondents were satisfied with their overall experience in the Energy Efficient Products program (83%). On average 83% of customers who received rebates were satisfied with their purchased product; on average 78% were satisfied with the rebate amount; and on average 77% were satisfied with the time it took to receive the rebate.

The majority of Mobile In-Store respondents were satisfied with their overall experience at the store (40) (Figure 5-9).

#### 8.4.4 Mobile In-Store Survey Results

We surveyed 51 customers who reviewed products in all four of the sub-programs.<sup>31</sup>

*Table 8-11: Survey Respondents by Reviewed Measure*

Sub-Program	Measure	N
HVAC	Thermostats	11
	Respondents who didn't specify	4
	<b>TOTAL</b>	<b>15</b>

The majority of mobile respondents said that they had not interacted with the program previously (Table 8-12). This include previously purchasing a sponsored product, receiving program collateral, or seeing program signs in stores.

*Table 8-12: Number of Sub-Program Interactions*

	Have purchased program sponsored products before.	Have received program collateral, such as a bill insert or email, before.	Have seen program signs in retail stores before.
HVAC	2	3	3

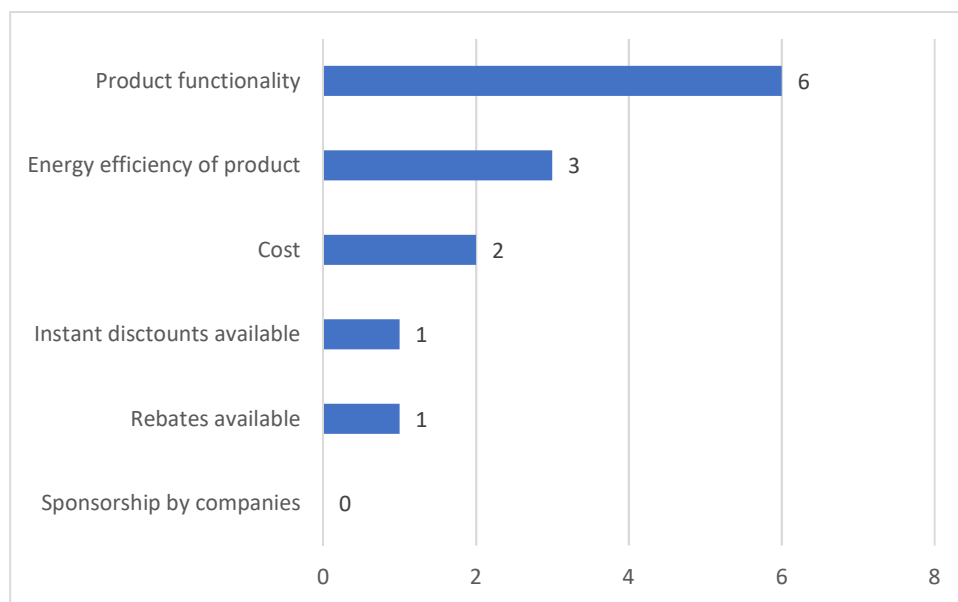
Only 15 respondents spoke with a store associate during their store visit. Only five appliance mobile survey respondents spoke with a sales associate during their retail store visit. These respondents said that sales associates seem knowledgeable and can properly guide customers to the eligible products.

Seven HVAC respondents spoke with a sales associate during their store visit; three of these respondents were not shown energy efficient products by the associate. The majority of respondents thought that the associate was knowledgeable about the products (6), that they provided information that was understandable (7), and that it was useful (6). Conversations are described in Figure 8-3.

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<sup>31</sup> The total of those who reviewed each measure may not equal the total n of the sub-program. Some customers did not state product being reviewed.

**Figure 8-3: Conversation Topics between HVAC Survey Respondent and Store Associate**



#### 8.4.5 Downstream Survey Results

The evaluation team conducted a web-based survey with 258 customers who received rebates for the downstream incentives representing 304 purchased clothes washers, refrigerators, clothes dryers, and received an HVAC tune-up.

**Table 8-13: HVAC Tune Up Participation Who Received Rebates in 2018**

Measure	% Survey Respondents Who Received Rebate <sup>32</sup>	# Survey Respondents Who Received Rebate
HVAC tune up	7.5%	18

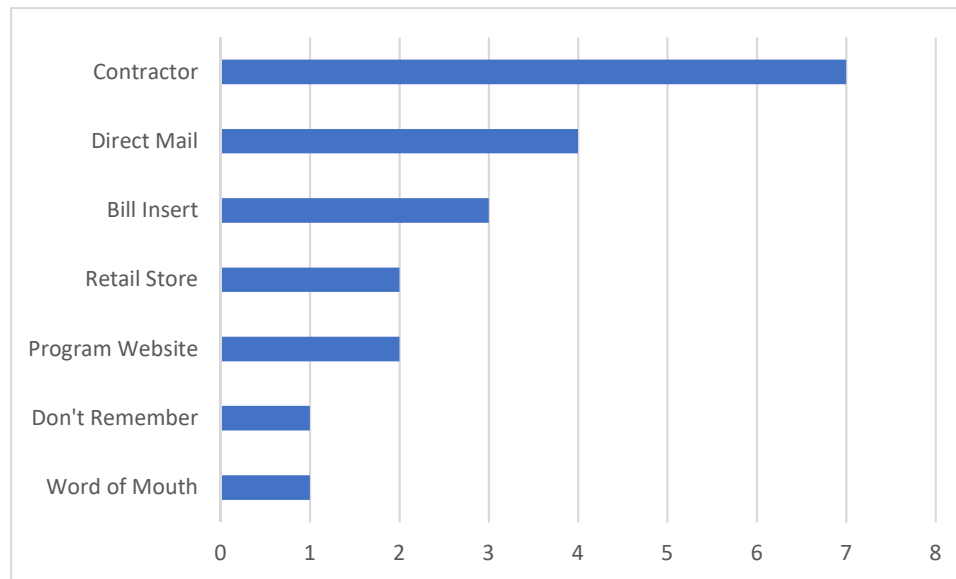
The top sources where respondents found out about the HVAC tune-ups are contractor (7) and utility communication (3 from a bill insert and 2 from direct mail). This is similar to what we heard from the contractors. The majority of survey respondents who had their HVAC systems tuned-up had previously tuned-up their units (14). Eight of the HVAC tune-up survey respondents have their units tuned-up every year. Although it should be noted that customers are not permitted to participate for two consecutive years.

While these are relatively small numbers, it may indicate that the HVAC sub-program is not reaching those customers it intends to: namely, those customers who might not see the value in HVAC maintenance or those customers who haven't previously prioritized

<sup>32</sup> Percent does not total 100% since customers can receive rebates on multiple measures.

HVAC maintenance. Given that customers who participated in this program found out from their contractors and they have their units tuned-up annually, the program may be primarily benefitting those who already know the impacts of tune-ups and not new customers. Figure 8-4 shows the sources for learning about the HVAC tune-ups rebates.

*Figure 8-4: Sources for Learning about HVAC Tune-Ups*



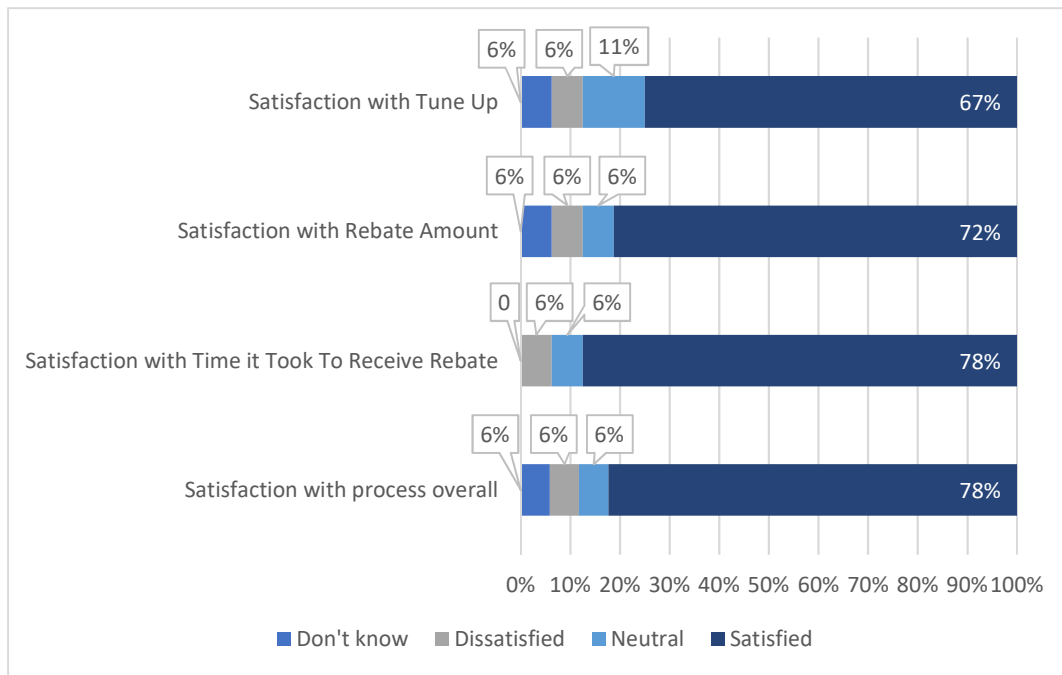
Overall, respondents are highly satisfied with their tune-up and the program. The majority of respondents also expressed satisfaction with:

- The tune-up itself (12);
- The rebate amount (13); and
- The time it took to receive the rebate (14).

Figure 8-5 shows the satisfaction with the tune-up portion of the HVAC sub-program.



*Figure 8-5: Satisfaction with HVAC Sub-Program*



#### **8.4.6 Program Networks**

The Energy Efficient Product program relies on two different networks: (1) an HVAC contractor network for the HVAC sub-program, which was launched in May 2018; (2) a retailer and manufacturer network, and (3) an HVAC distributor network.

##### **HVAC Contractor Network**

Honeywell staff report that contractors are the best channel for communicating to customers about the HVAC sub-program, particularly for the HVAC tune-up measure. Qualifying customers can submit for a \$50 for HVAC tune-ups.

Honeywell is responsible for all contractor outreach. Their process for identifying and recruiting contractors is multi-faceted. They use prior lists of HVAC contractor participation in the Companies' programs, conduct online searches to identify contractors in specific geographic areas, and conduct direct outreach and education to contractors who may be interested in participating.

Once contractors sign up to participate, they have access to program materials that they can co-brand. They can market the \$50 HVAC tune-up rebate to their customers, and they are listed on the program website. The participation agreement does not say anything about contractor involvement in promoting midstream product offerings to customers.

Customers can use the "find a contractor" tool on the website to identify participating contractors by name, geographic location (i.e., within 5, 10, 25, 50, 100, or 500 miles), or by city, state, or zip code. The website currently lists a total of 186 participating HVAC contractors.<sup>33</sup> After signing up to participate, Honeywell staff follow up with contractors periodically to ask if they have questions about the program or need any additional support.

For HVAC tune-ups, either contractors or customers can submit the rebate paperwork. Customers can download the rebate application directly from the FirstEnergy website. In addition, Honeywell educates contractors about the rebate application so that they are able to help customers complete it, particularly the sections that require technical information, such as condenser serial and model number, and cooling and heating capacity (in BTUs). Honeywell reports that contractors fill out the rebate application form for customers, and then customers add in their customer information (name, account number, service address, etc.) and submit the application.

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<sup>33</sup> Website last reviewed on February 18, 2019.

#### 8.4.7 Program Operations

One staff member at the Companies oversees the Energy Efficient Products Program. This individual is responsible for serving as the primary point of contact with the program implementer, Honeywell, in order to ensure they are implementing the program as described in the portfolio program, and as approved by the Public Utilities Commission. This individual oversees all marketing and ensures that messaging used in marketing collateral is consistent with the overall program marketing strategy. In addition, this individual is responsible for handling any escalated customer issues and approving all program invoices.

Honeywell implements the Energy Efficient Products Program. According to the FirstEnergy Program Manager, Honeywell is the “*boots on the ground*” for this program. They are responsible for several key functions, including, but not limited to:

- **Marketing:** including developing the program marketing plan and marketing creative to be used in retail stores, for approval by the Companies;
- **Recruitment:** including recruiting HVAC contractors to participate in the HVAC sub-program; and recruiting retailers and distributors to participate in all sub-programs;
- **Store Visits:** visiting retail outlets to put up program marketing collateral and provide training to retail staff;
- **Incentive Processing:** reviewing and processing all incentives, including customer and midstream incentives; and
- **Customer Service:** handling customer service issues, both from Call Center and web-based inquiries.

Honeywell sends data to the Companies when incentives are processed, typically once a month by sub-program. Both the Companies and Honeywell are satisfied with the tracking system.

#### 2018 Program Challenges

The HVAC sub-program was implemented beginning in 2018.

According to the Companies’ Program Manager, the HVAC sub-program was last implemented during 2014. However, in 2014, all HVAC measures were offered as downstream incentives to customers (unlike the current midstream model). The Companies made the decision to push all HVAC sub-program measures (except for the HVAC tune-up) to midstream measures in 2018 due to growing trends in utility programs across the country shifting HVAC programs to midstream measures. In addition, because the HVAC sub-program had been out of the market for a few years in Ohio, staff thought it made sense to make a major change to the program during its initial implementation (instead of offering measures as downstream for a certain period of time, and then switching to midstream). The program manager also attributes the shift toward a midstream program to the companies’ budget availability to incent HVAC measures

(generally, it is less expensive to incent midstream product offerings compared to downstream product offerings.)

Honeywell staff also note that it has been particularly challenging recruiting distributors to participate in the HVAC sub-program. According to a list of distributor contacts provided by Honeywell, eight distributors currently participate in the program. In addition, Honeywell staff note that some of the larger distributors who are participating have been difficult to engage. By comparison, some of the smaller distributors have been easier to engage, in part because it is easier to reach the decision-maker within the organization.

Recruiting participating distributors has also been challenging due to geography. For example, Honeywell staff report that there are fewer distributor partners within the TE territory simply because distributors are not located here. The HVAC tracking data confirms this, with just under about 1,00 HVAC products incentivized in the TE territory, compared to more than 4,700 in the OE territory and more than 6,000 in the CEI territory.

## 9 Conclusions and Recommendations

This chapter reports the conclusions and recommendations resulting from the impact and process evaluation of the 2018 Energy Efficient Products Program.

### 9.1 Energy and Demand Impact Findings

The number of rebated products in each service territory is detailed in Table 9-1. A total of 714,576 rebates were issued through the Energy Efficient Products program in 2018.

*Table 9-1: Qualifying Products Rebated in Each Service Territory*

Measure Type	CEI	OE	TE	All Companies
Clothes Washer	2,821	3,643	1,044	7,508
Clothes Dryer	1,141	1,537	481	3,159
Refrigerators	1,659	2,102	566	4,327
Dehumidifiers	8,418	16,082	2,566	27,066
Freezers	786	2034	503	3,323
Heat Pump Water Heaters	3	51	16	70
LED Fixtures	1,794	3,903	896	6,593
LED Bulbs	240,768	270,672	79,881	591,321
Televisions	15,580	13,639	3,404	32,623
Computer	1,115	1,135	247	2,497
Computer Monitor	1,487	1,469	412	3,368
Imaging	5,776	5,403	1,090	12,269
Central Air Conditioner	358	151	20	529
Circulation Pump	30	43	0	73
Ductless Mini-Split	162	122	31	315
Furnace Fans	1,173	713	122	2,008
Heat Pump	61	87	5	153
H2O & Geothermal (Heat Pump)	5	11	0	16
Thermostats	2,027	1,797	395	4,219
Room Air Conditioner	2,345	1,823	693	4,861
HVAC Tune-Up	3,926	3,637	709	8,272
PTAC	0	2	0	2
PTHP	1	3	0	4
<b>Totals</b>	<b>291,436</b>	<b>330,059</b>	<b>93,081</b>	<b>714,576</b>

Ex-post electric impacts were 91,463,891 kWh saved annually, which represents a realization rate of 95.73 percent. Average on-peak Ex-post demand reduction was estimated to be 12,118.08 kW annually, which represents a realization rate of 96.78 percent. For detailed tables listing energy savings and demand reductions by measure type, please refer to Appendix A: Required Savings Tables. The realization rates by appliance type, the estimates of annual gross energy savings (kWh) and on-peak demand reductions (kW) for the program in the three Companies are reported in Table 9-2 and Table 9-3 below.

*Table 9-2: Overall Gross kWh and kW Savings per EDC*

Utility	Ex-Ante		Ex-Post		Realization Rate	
	Expected Gross Savings		Verified Gross Savings			
	Gross kWh	Gross kW	Gross kWh	Gross kW	kWh	kW
CEI	40,041,769.23	5,201.73	38,399,545.89	5,074.30	95.90%	97.55%
OE	41,862,914.61	5,586.08	40,086,434.18	5,391.70	95.76%	96.52%
TE	13,639,222.03	1,733.49	12,977,911.25	1,652.09	95.15%	95.30%
All Companies	95,543,905.87	12,521.30	91,463,891.32	12,118.08	95.73%	96.78%

*Table 9-3: Overall Gross kWh and kW Savings by Subprogram*

Sub Program	Ex Ante Expected Savings		Ex Post Verified Savings		Realization Rates	
	kWh	kW	kWh	kW	kWh	kW
Appliances	9,253,401.42	1,909.61	9,253,965.43	1,846.26	100.01%	96.68%
Consumer Electronics	2,281,110.30	248.41	2,344,413.00	244.47	102.78%	98.41%
Lighting	80,517,766.40	9,629.40	76,885,415.12	9,187.62	95.49%	95.41%
HVAC	3,491,627.75	733.88	2,980,097.76	839.73	85.35%	114.42%
<b>Totals</b>	<b>95,543,905.87</b>	<b>12,521.30</b>	<b>91,463,891.32</b>	<b>12,118.08</b>	<b>95.73%</b>	<b>96.78%</b>

## 9.2 Low Income Participation

The Companies expanded their evaluation, measurement and verification effort to identify participation and savings from low income customers in the residential programs. A “low income” customer was defined by household income below 150% of Federal Poverty Level.

Table 9-4 shows the quantity of units, kWh, and kW that can be attributed to low-income population participant in the EE Products program.

*Table 9-4: Savings Attributable to Low-Income Customers*

Energy Efficient Products	Percentage of Low-Income Purchasers	Quantity	kWh Savings	kW Savings
CEI	11.22%	32,694.89	9,909,348.65	1,279.79
OE	17.80%	58,765.52	15,727,247.86	2,031.18
TE	4.36%	4,062.17	3,854,949.48	497.867
<b>Totals</b>	<b>33.39%</b>	<b>238,574.64</b>	<b>29,491,545.99</b>	<b>3,808.84</b>

*Table 9-5: Percentage of Low-Income Savings by Sub-Program*

	Utility			
Sub-Program	CEI	OE	TE	Total
Appliances	1.63%	3.11%	0.59%	5.33%
Consumer Electronics	4.50%	6.93%	1.55%	12.99%
Lighting	3.78%	5.46%	1.61%	10.84%
HVAC	1.31%	2.30%	0.62%	4.23%
<b>Totals</b>	<b>11.22%</b>	<b>17.80%</b>	<b>4.36%</b>	<b>33.39%</b>

*Table 9-6: kWh Savings of Low-Income Customers by Sub-Program*

	Utility			
Sub-Program	CEI	OE	TE	Total
Appliances	1,442,649.80	2,743,399.63	520,299.93	4,706,349.36
Consumer Electronics	3,973,199.46	6,125,349.17	1,371,699.81	11,470,248.44
Lighting	3,334,649.55	4,824,599.34	1,418,999.81	9,578,248.70
HVAC	1,158,849.84	2,033,899.72	543,949.93	3,736,699.49
<b>Totals</b>	<b>9,909,348.65</b>	<b>15,727,247.86</b>	<b>3,854,949.48</b>	<b>29,491,545.99</b>

*Table 9-7: kW Savings of Low-Income Customers by Sub-Program*

	Utility			
Sub-Program	CEI	OE	TE	Total
Appliances	186.32	354.31	67.20	607.83
Consumer Electronics	513.14	791.09	177.16	1,481.38
Lighting	430.67	623.10	183.26	1,237.03
HVAC	149.67	262.68	70.25	482.60
<b>Totals</b>	<b>1,279.79</b>	<b>2,031.18</b>	<b>497.87</b>	<b>3,808.84</b>

### 9.3 Process Findings

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The following sections detail process evaluation conclusions related to program operations, retailer feedback, and customer research.

### 9.4 Program Operations Conclusions

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The following section summarizes the conclusions related to program operations and program performance.

- Overall, the program exceeded its contracted targets for 2018, achieving 127% of its total contracted targets. The Lighting and Appliance sub-programs contributed to a significant portion of the savings. Savings from the Appliance sub-program increased significantly from 2017, despite no changes in appliance measure incentive levels.
- Honeywell reports that they continue to have difficulty recruiting retail partners and distributors for the program, particularly for the HVAC and Consumer Electronics sub-programs.

### 9.5 Retailer Feedback Conclusions

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The following section summarizes the key findings from the retailer interviews.

- Retailers are motivated to participate in the program because it requires little effort on their part; helps their customers; and provides retailers with money back.
- Honeywell maintains regular communication with participating retailers, and most retailers say they know who to reach out to with program questions or concerns—their Honeywell representative. However, a subset of retailers said that they were not sure who to speak to with about program questions or were confused about the relationship between the Honeywell representative and the Companies.
- Retailer outreach and training continues to be an opportunity for the Companies to consider. Specifically, retailers want to learn more about the program and qualifying products. Retailers report that they often must go online to learn about which products qualify. To enhance retailer support during 2018, Honeywell implemented a new retail binder for all participating retailers; however, retailers generally are not aware of this resource. This may indicate an opportunity for ongoing engagement and more personalized support from Honeywell staff, and a chance to remind retailers of available program resources.
- Retailers either do not know that the Companies fund the program or associate the program directly with the Companies in conversation. Retailers often refer to the program as a Honeywell program; not a FirstEnergy Companies program. This may have implications for how retailers message the program, and program sponsors, to customers. Overall, retailers are highly satisfied with their participation in the program, noting that it provides their customers with benefits, is easy to participate in, and it gives money back to the store. Retailers are also satisfied with



the signage and thought that it was well designed and drew attention to qualified products.

- None of the retailers mentioned any drawbacks or barriers to participating in the program.

## **9.6 Customer Research Conclusions**

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The following section provides key findings based on the customer research.

- Respondents typically learned about the Energy Efficiency Products program through the retailer; they found out about the program in-store from the store associate or the program signage.
- When choosing a preferred store, customers look for the best prices, convenient locations, and a good variety of products and brands. The current store selection meets customers' needs.
- The majority of customers did not choose a Company's product sign as their "preferred" sign during the mobile in-store survey. Many customers said they chose their preferred sign because it was the only sign in the aisle to which they were directed. This implies that the Companies' signs are not prominently placed or may be missing from qualifying products.
- Customers that responded to the mobile in-store survey reported the sales associates and clear, informative signage is important in their purchasing decisions. Respondents said that they are looking for knowledgeable store associates; however, the majority of mobile in-store respondents who spoke with an associate were not directed to energy efficient items. Additionally, respondents were most responsive to signs that mention savings (either cost or energy).
- Overall, customers are satisfied with their experience in the Energy Efficient Product program. They like the qualified product they purchased, and they are satisfied with the rebate amount and time it took to receive the rebate.

## **9.7 HVAC Contractor Feedback Conclusions**

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The following section summarizes the key findings from the HVAC contractor interviews.

- HVAC contractors report learning about the program through two major channels: (1) from their customers, when customers call to request a rebated tune-up or; (2) from a Honeywell representative.
- HVAC contractors said they participate in the program because it allows them to reduce their customers' costs without decreasing their own profit margins.
- Most HVAC contractors do not actively advertise the program to their customers. Instead, they discuss the rebate with customers when they go on-site to customers' homes to perform the tune-up itself.
- HVAC contractors may be confused on their role in advertising and the rules around using the Companies name in marketing collateral. They would like more

support and/or information about how to advertise for the program, including specific rules about what they can and cannot do to advertise it.

- Overall, HVAC contractors are satisfied with the program. However, contractors also noted that they had not been participating for that long. As the HVAC contractor network grows, this is an opportunity for future research.

## **9.8 Recommendations**

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The evaluation team offers the following recommendations for continued improvement of the Residential Energy Efficient Products Program.

- Continue to identify opportunities to enhance retailer engagement, particularly related to outreach and training. These opportunities will also allow the Companies and Honeywell to remind retailers about available program resources, such as the newly launched retailer binder, and where they should direct program-related questions. Enhancing retailer engagement may also provide an opportunity to help retailers understand the relationship between Honeywell and the Companies' sponsorship of the program. This may be important, given that retailers often refer to the program as a Honeywell program; not a FirstEnergy Company's program, and there appears to be a disconnect between retailers and their understanding of sponsorship of the program. This may impact how retailers message the program, and the Companies' sponsorship of the program, to customers.
- Identify opportunities to further train and educate the HVAC contractor network. Specifically, per interviews, it may benefit Honeywell to engage HVAC contractors during the shoulder seasons, when they are less busy, and their customers may be more responsive. In addition, there would be value in enhanced training about marketing guidelines and opportunities. Honeywell may want to consider creating a HVAC contractor binder, similar to the resource they implemented for the retailers this past year. This may help HVAC contractors to advertise the HVAC tune-up rebate to their customers, which in turn, may aid in increasing participation by customers who otherwise might not participate (and not just customers who have already scheduled HVAC maintenance appointments with their contractors.)
- Identify strategies to improve retailer placement of program signage within the stores, in order to improve customer awareness of program-qualifying products. Per mobile survey responses, it appears that most signs that customers viewed were not Company signs, but instead, general ENERGY STAR® signs. In addition, some retailers stated that they do not place signs, or only place them for short periods of time before moving them off the floor and into a back room.

## 10 Appendix A: Required Savings Tables

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Tables showing measure-level participation counts and savings for the 2018 Energy Efficient Products Program were provided in various locations throughout this report. This appendix provides additional tables summarizing savings results.

- Table 10-1 reports the annual ex-post kWh savings by EDC and measure.
- Table 10-2 reports the average annual ex-post on-peak kW reductions by EDC and measure.
- Table 10-3 reports the lifetime ex-post kWh savings by EDC and measure.

*Table 10-1: Annual Ex-Post Energy Savings (kWh)*

Measure Type	CEI	OE	TE	All Companies
Clothes Washer	569,842.00	735,886.00	210,888.00	1,516,616.00
Clothes Dryer	31,209.67	42,052.54	13,154.24	86,416.44
Refrigerators	196,649.00	251,874.00	67,005.00	515,528.00
Dehumidifiers	2,068,498.45	3,890,772.12	616,928.44	6,576,199.01
Freezers	104,220.63	270,098.51	66,695.90	441,015.04
Heat Pump Water Heaters	5,065.33	86,110.54	27,015.07	118,190.94
LED Fixtures	92,643.89	187,894.76	40,351.54	320,890.18
LED Bulbs	32,587,946.42	32,480,990.94	11,495,587.58	76,564,524.94
Televisions	831,575.00	716,386.00	181,520.00	1,729,481.00
Computer	132,685.00	135,162.00	29,393.00	297,240.00
Computer Monitor	35,688.00	35,256.00	9,888.00	80,832.00
Imaging	113,330.00	96,983.00	26,547.00	236,860.00
Central Air Conditioner	51,160.00	20,876.07	4,091.93	76,128.00
Circulation Pump	4,710.00	6,794.00	0.00	11,504.00
Ductless Mini-Split	447,904.71	167,008.98	40,079.45	654,993.13
Furnace Fans	523,158.00	317,998.00	54,412.00	895,568.00
Heat Pump	62,440.76	114,632.86	6,190.18	183,263.81
H2O & Geothermal (Heat Pump)	28,299.72	72,169.69	0.00	100,469.41
Thermostats	108,127.31	95,858.30	21,070.69	225,056.29
Room Air Conditioner	45,629.60	35,655.18	13,470.25	94,755.04
HVAC Tune-Up	358,345.07	324,157.01	53,622.98	736,125.06
PTAC	0.00	308.72	0.00	308.72
PTHP	417.33	1,508.98	0.00	1,926.31
<b>Totals</b>	<b>38,399,545.89</b>	<b>40,086,434.18</b>	<b>12,977,911.25</b>	<b>91,463,891.32</b>

*Table 10-2: Annual Ex-Post On-Peak Demand Reductions (kW)*

Measure Type	CEI	OE	TE	All Companies
Clothes Washer	58.76	75.89	21.75	156.40
Clothes Dryer	5.52	7.44	2.33	15.28
Refrigerators	34.44	44.11	11.73	90.28
Dehumidifiers	468.96	882.10	139.87	1,490.93
Freezers	18.25	47.30	11.68	77.23
Heat Pump Water Heaters	0.69	11.76	3.69	16.14
LED Fixtures	11.07	22.45	4.82	38.35
LED Bulbs	3,894.18	3,881.40	1,373.70	9,149.28
Televisions	77.53	66.76	16.93	161.22
Computer	17.95	18.29	3.98	40.21
Computer Monitor	4.76	4.70	1.32	10.78
Imaging	15.43	13.22	3.61	32.26
Central Air Conditioner	37.71	19.75	3.34	60.80
Circulation Pump	0.54	0.78	0.00	1.31
Ductless Mini-Split	116.11	41.15	1.10	158.35
Furnace Fans	123.17	74.86	12.81	210.84
Heat Pump	8.06	17.80	0.13	25.99
H2O & Geothermal (Heat Pump)	1.57	3.05	0.00	4.61
Thermostats	0.00	0.00	0.00	0.00
Room Air Conditioner	60.71	47.44	17.92	126.07
HVAC Tune-Up	118.71	109.91	21.39	250.00
PTAC	0.00	0.44	0.00	0.44
PTHP	0.19	1.11	0.00	1.30
<b>Totals</b>	<b>5,074.30</b>	<b>5,391.70</b>	<b>1,652.09</b>	<b>12,118.08</b>

*Table 10-3: Lifetime Ex-Post Energy Savings (kWh)*

Measure Type	CEI	OE	TE	All Companies
Clothes Washer	6,268,262	8,094,746	2,319,768	16,682,776
Clothes Dryer	405,726	546,683	171,005	1,123,414
Refrigerators	2,753,086	3,526,236	938,070	7,217,392
Dehumidifiers	24,821,981	46,689,265	7,403,141	78,914,388
Freezers	1,459,089	3,780,584	933,743	6,173,415
Heat Pump Water Heaters	50,653	861,105	270,151	1,181,909
LED Fixtures	1,297,014	2,630,527	564,922	4,492,463
LED Bulbs	454,792,820	450,908,084	160,534,408	1,066,235,312
Televisions	4,989,450	4,298,316	1,089,120	10,376,886
Computer	530,740	540,648	117,572	1,188,960
Computer Monitor	142,752	141,024	39,552	323,328
Imaging	680,280	581,898	159,282	1,421,460
Central Air Conditioner	920,880	375,769	73,655	1,370,304.02
Circulation Pump	47,100	67,940	0	115,040.00
Ductless Mini-Split	6,718,571	2,505,135	601,192	9,824,896.96
Furnace Fans	7,324,212	4,451,972	761,768	12,537,952.00
Heat Pump	1,123,934	2,063,392	111,423	3,298,748.52
H2O & Geothermal (Heat Pump)	509,395	1,299,054	0	1,808,449.36
Thermostats	1,189,400	1,054,441	231,778	2,475,619.19
Room Air Conditioner	547,555	427,862	161,643	1,137,060.44
HVAC Tune-Up	1,791,725	1,620,785	268,115	3,680,625.29
PTAC	0	4,631	0	4,630.75
PTHP	6,260	22,635	0	28,894.66
<b>Totals</b>	<b>518,370,886</b>	<b>536,492,732</b>	<b>176,750,306</b>	<b>1,231,613,924</b>

## 11 Appendix B: Survey Instruments

**20 December 2018 | MOBILE IN-STORE CUSTOMER SURVEY - FINAL**

**TO:** ADM & FIRSTENERGY **FROM:** ILLUME ADVISING

As part of the FirstEnergy Energy Efficient Products Program process evaluation, ILLUME Advising is conducting a mobile in-store customer survey. This memo outlines the research goals, study design, and timeline for the mobile in-store surveys. The draft survey instrument appears at the end of this memo.

### Research Goals

The mobile in-store customer survey will assess the in-store customer experience. Specifically, the survey will capture information related to customer response to program signage; customer experience with sales associates; and whether program information obtained during the in-store experience may motivate customers to purchase qualifying products. In addition, the survey will capture information related to the effectiveness of product placement within the store and customers' overall in-store experience.

Table 1, below, details the specific questions related to these objectives.

**TABLE 1. KEY RESEARCH AREAS AND QUESTIONS FOR MOBILE IN-STORE CUSTOMER SURVEYS.**

TOPIC	RESEARCH QUESTIONS	SURVEY QUESTIONS
Changes in Program Design or Delivery – Interactions with Signage and Associates	Is program signage effectively placed? How do customers perceive program signage? Do customers perceive signage to be useful and informative? How effective is program signage at increasing customer awareness of program-qualifying high efficiency options over lower efficiency options? Does program signage provide clear, easily understandable information? Does program signage clearly show the program sponsor (FirstEnergy: Ohio Edison, The Illuminating Company, Toledo Edison)? Which marketing efforts are most effective in increasing customer awareness and participation? How effective are the signage and retailer staff in communicating benefits and encouraging purchase of program qualifying equipment?	B2; B3; B4; B5; B6; B7; B8; B9; B10; D3

	How consistently is the program being delivered across retail partners?	
Motivations and decision to purchase	<p>How effective is program signage in motivating customers to want to purchase qualifying equipment over non-qualifying equipment?</p> <p>[For those that speak with a sales representative] How effective is information provided by sales representatives in motivating customers to want to purchase qualifying equipment over non-qualifying equipment?</p> <p>[For downstream measures] Would rebate levels be sufficient to influence customer decision to purchase qualifying equipment over non-qualifying equipment?</p> <p>When do customers decide to act in the marketing timeline (i.e., at the first touchpoint or after several touchpoints)?</p>	C1; C2; C3; C4; D4; D5; D6
Program products and product placement	<p>Were all advertised items in stock?</p> <p>Where is program qualified equipment placed within store, and is equipment in easily-viewed areas?</p> <p>[For lighting] Do respondents understand which bulb they need to purchase based on their understanding of information seen in program signage and in-store?</p> <p>Are customers aware of FirstEnergy's sponsorship of the program? How does this awareness impact customer satisfaction with FirstEnergy?</p> <p>How did key program experiences for the HVAC program work for customers? What, if anything, could be improved?</p>	D1; D2
Overall satisfaction	<p>How satisfied are customers with their shopping experience?</p> <p>Where are opportunities to improve the shopping experience?</p> <p>Are customers aware of FirstEnergy's sponsorship of the program? How does this awareness impact customer satisfaction with FirstEnergy?</p> <p>Are customers satisfied with the program?</p>	D5; D6; D7; F1; F2

## Study Design

The surveys will be completed by panel members on their mobile devices while in-store.

This evaluation will partner with a market research firm who maintains mobile customer panels within all states across the country. The mobile customer panel is made up of individuals who have already agreed to participate in research.

To select survey customers from the panel, Geo-fencing will be set up around specific participating retail locations. Once anyone from the previously recruited customer panel enters the specified retail location parking lots, the firm sends the customer a text



message letting them know an in-store experience survey is available and where they should visit to complete the in-store experience survey. From there the customer panel member is able to answer questions specific to their experience and upload pictures for record. Table 2, below, depicts the retail locations that will be geo-fenced as part of this study, in addition to which sub-programs (Appliances, Consumer Electronics, HVAC and Lighting) each of the retailers participates in.

The retail locations identified in Table 2 were selected from a list of 139 participating retail locations<sup>34</sup> provided by the program implementer, Honeywell. Our team chose to use the implementer-provided retailer list, rather than the program tracking data, because it was a comprehensive view into the current retailer participants and in-store offerings.

Among the original 236 participating retail locations in the retailer list provided by Honeywell, our team removed any stores that are not considered “big box” retail locations. Smaller and independent stores are typically not well-suited to this type of mobile in-store customer survey. The remaining retail locations include Best Buy®, Costco®, Home Depot®, Kmart®, Lowe’s®, Menard’s™, Sears, and Walmart.

Our final sampling strategy prioritizes stores that participate in the Consumer Electronic and HVAC programs, as these are priority areas for this evaluation. We included all participating retail stores if there were six or fewer in the state (i.e. Costco®, Kmart®, Menard’s™, and Sears). We also included all participating retail stores that participate in the HVAC program. For the remaining stores (Best Buy®, Home Depot® (non-HVAC), Lowe’s® (non-HVAC), and Walmart), we randomly selected up to six stores for each chain. Table 2 shows the final stores in the sample.

For retail locations that only participate in one sub-program, mobile panel members will be asked questions related to that one sub-program only. For retail locations that participate in more than one sub-program, mobile panel members will first be asked questions related to one sub-program. If customers are willing, they will then be asked to answer questions about program signage for an additional sub-program. The unique retail locations with sub-programs are detailed in Table 4. The primary sub-program (detailed in Table 4, column 3) was determined based on priority areas for this survey, including the Consumer Electronics sub-program and the new HVAC program.

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<sup>34</sup> Honeywell provided an initial list of participating retailers which included 236 total retailers. After removing all smaller retailers (i.e. not big box stores) we were left with 197 participating retailers; none of these retailers were duplicates. 58 of the remaining retailers were marked by the implementer as not actively participating in the program. There were 136 retailers in the final pool for sampling. Final retailers in the list include 14 Best Buy locations, 33 Home Depot® Locations, four Kmart® locations, 29 Lowe’s® locations, six Menard’s™ locations, one Sear’s location, and 44 Walmart locations.

Consumer Electronics was prioritized due to fewer participation and implementer-identified challenges for this sub-program; HVAC was identified as high priority because this sub-program was rolled out this year for the first time since 2014. For HVAC participating retailers that only sell room air conditioners (i.e. Menard's™ and Sears) will be excluded from the HVAC sub-program surveys. In addition, the program was rolled out primarily as a mid-stream offering, whereas previously, FirstEnergy had offered the program as a downstream offering. Downstream appliances and lighting sub-programs are prioritized last, due to higher participation and less implementation challenges with these sub-programs. For example, any retail locations that participate in the Consumer Electronics program will have survey questions focused on that sub-program first. If retail locations also participate in other sub-programs, customers will then be asked if they are willing to answer additional questions that relate to this secondary sub-program.

We are aiming for a total of 50 survey completes.

TABLE 2. RETAIL LOCATIONS AND SUB-PROGRAM PARTICIPATION.

RETAILER	LOCATIONS	SUB-PROGRAM PARTICIPATION
Best Buy®	North Olmsted, Sandusky, Elyria, Fairlawn, Toledo, Macedonia	Appliances (downstream and midstream); Consumer Electronics <sup>35</sup> ; HVAC
Costco®	Avon, Boston Heights, Mayfield Heights, Perrysburg, Strongsville, Toledo	Lighting <sup>36</sup>
Home Depot®	Ashland, Salem, Chardon, Cleveland, Avon, Euclid	Appliances (downstream and midstream); Lighting; HVAC <sup>37</sup>
Kmart®	Barberton, Brunswick, Cleveland, Middleburg Heights, Tallmadge	Appliances (midstream), Consumer Electronics <sup>38</sup>

<sup>35</sup> Best Buy locations in North Olmsted Sandusky, Elyria, Toledo, and Macedonia participates in the both the mid and downstream Appliances program; Fairlawn participates in downstream only. All six Best Buy locations participate in the Consumer Electronics program.

<sup>36</sup> All six Costco® locations participate in the lighting program.

<sup>37</sup> All Home Depot® locations participate in the lighting program and both the midstream and downstream Appliance programs. The Ashland and Salem locations participate in the HVAC program.

<sup>38</sup> All four Kmart® locations participate in the Consumer Electronic program and the midstream Appliances program. One store was removed from the sample because it will be closing in 2019 and will drastically reduce the number of employees at the end of December 2018. We believe this will affect the data collected at that store.

Lowe's®	Defiance, Mansfield, Marion, Springfield, Streetsboro, Mooresville	Appliances (downstream and midstream); Lighting; HVAC <sup>39</sup>
Menard's™	Defiance, Holland, Massillon, Ontario, Oregon, Sandusky	HVAC; Lighting <sup>40</sup>
Sears	North Olmstead	Appliances (downstream only), HVAC <sup>41</sup> ;
Walmart	Lorain, Mansfield, Eastlake, Springfield, Kent, North Olmsted	Lighting <sup>42</sup>

Once a mobile panel member agrees to participate in the survey, they will then be directed to enter the retail store to look for specific products within the store. For lighting, respondents will be asked to look for “led light bulbs or fixtures.” For consumer electronics, respondents will be asked to look for “televisions, computers and computer monitors, or printers and scanners.” For downstream appliances, respondents will be asked to look for “refrigerators, clothes washers and dryers.” For midstream appliances, respondents will be asked to look for “freezers, dehumidifiers, or heat pump water heaters.” For HVAC, respondents will be asked to look for “smart thermostats or room air conditioning units.” Respondents will be asked to complete the 10-15-minute survey.

We are aiming for a larger proportion of survey completes representing the Appliances and Consumer Electronics sub-programs. Table 3 depicts the quota minimums by sub-program.

TABLE 3. QUOTA MINIMUMS BY SUB-PROGRAM.<sup>43</sup>

<sup>39</sup> Lowe's® locations in Defiance, Mansfield, Marion, Springfield, Streetsboro participate in HVAC program; the Lowe's® location in Mooresville does not. The Defiance, Mansfield, Marion, Springfield, Streetsboro locations participate in the downstream Appliances program only. The Mooresville location participates in the midstream Appliances program only.

<sup>40</sup> All six Menard's™ locations participate in the HVAC program; only the Defiance location does not participate in the Lighting program. The HVAC measure these stores sell, room air conditioners, are not sold during the winter. Therefore, survey respondents who go to these stores will only be prompted with the lighting sub-program survey.

<sup>41</sup> The only Sears location participates in the HVAC and downstream Appliance programs. The HVAC measure this store sell, room air conditioners, are not sold during the winter. Therefore, survey respondents who go to this store will only be prompted with the lighting sub-program survey.

<sup>42</sup> All six Walmart locations participate in the Lighting program.

<sup>43</sup> The quotas in Table 3 are minimums. The evaluation team aims to complete a total of 50 mobile in-store customer surveys, meeting quota minimums in each of the three sub-programs.

sub-program	quota MINIMUMS
Appliances (downstream and midstream)	10
Consumer Electronics	15
Lighting	10
HVAC	15

Finally, part of this evaluation includes conducting retailer interviews. We will aim to conduct some retailer interviews and mobile in-store customer surveys at some of the same retail locations, which will allow our team to triangulate evaluation findings. It should be noted that a total of 10 retailer in-depth interviews are being conducted. The evaluation team aims to have some representation of the mobile in-store customer surveys among retail locations that also participate in the retailer in-depth interviews.

## Timeline

The ILLUME team received feedback on the draft mobile survey instrument from FirstEnergy on December 20<sup>th</sup>. The ILLUME team finalized the survey instrument and sent it back to FirstEnergy for final approval on December 20<sup>th</sup>. Assuming FirstEnergy provides approval by January 4, programming and QA/QC testing of the program survey will be conducted 7-11. The mobile in-store surveys will be fielded from January 14-31.

## Survey Guide

The purpose of this section is to provide a draft of the mobile in-store customer survey instrument.

### Introduction

NOTE TO PROGRAMMER: THE FOLLOWING TEXT SHOULD BE SENT TO MOBILE PANEL PARTICIPANTS WHO ENTER GEO-FENCED RETAIL LOCATIONS. CUSTOMERS SHOULD BE PINGED ON THEIR PHONES IMMEDIATELY UPON ENTERING GEO-FENCED RETAIL PARKING LOT LOCATIONS. UPON AGREEING TO PARTICIPATE, CUSTOMERS WILL THEN BE DIRECTED TO SPECIFIC AREAS OF THE STORE.

You have been selected to participate in a brief research study related to your experiences visiting [FILL RETAIL LOCATION]. If you agree to participate in this survey, we will ask that you look for specific products in [FILL RETAIL LOCATION] and provide feedback on those products. This survey should take approximately 10 - 15 minutes.

NOTE TO PROGRAMMER: [FILL RETAIL LOCATION] WITH UNIQUE RETAIL LOCATIONS, IN TABLE 4, COLUMN 1, BELOW.

**A. SCREENER**

A1. Are you willing to participate in this survey?

- 1. Yes
- 2. No [Terminate]
- 97. [Other][Specify] [Terminate]
- 98. [Not Sure] [Terminate]
- 99. [Refused] [Terminate]

A2. Why did you come to [RETAIL LOCATION] today? [NOTE TO PROGRAMMER:  
FILL BASED ON RETAIL LOCATION IN TABLE 4, COLUMN 1] [ROTATE]

- 1. To shop for a refrigerator, clothes washer, clothes dryer, or water heater
- 2. To shop for a freezer, dehumidifier, or heat pump water heater
- 3. To shop for televisions, computers, monitors, printers or scanners
- 4. To shop for LED light bulbs and lighting fixtures
- 97. [Other][Specify] [Terminate]
- 98. [Not Sure]
- 99. [Refused]

**B. CUSTOMER EXPERIENCE WITH PROGRAM SIGNAGE AND ASSOCIATE INTERACTIONS**

NOTE TO PROGRAMMER: [SUB-PROGRAM] BELOW SHOULD BE FILLED WITH LIGHTING, APPLIANCES, HVAC, OR CONSUMER ELECTRONICS BASED UPON TABLE 4. FILL [SUB-PROGRAM] WITH TEXT IN TABLE 4 COLUMN 3, "SUB-PROGRAM FILL FOR PROGRAMMING – PRIMARY FOR LIGHTING, RESPONDENTS WILL BE ASKED TO LOOK FOR "LED LIGHT BULBS OR FIXTURES." FOR CONSUMER ELECTRONICS, RESPONDENTS WILL BE ASKED TO LOOK FOR "TELEVISIONS, COMPUTERS AND COMPUTER MONITORS, OR PRINTERS AND SCANNERS." FOR DOWNSTREAM APPLIANCES, RESPONDENTS WILL BE ASKED TO LOOK FOR "REFRIGERATORS, CLOTHES WASHERS AND DRYERS." FOR MIDSTREAM APPLIANCES, RESPONDENTS WILL BE ASKED TO LOOK FOR "FREEZERS, DEHUMIDIFIERS, OR HEAT PUMP WATER HEATERS." FOR HVAC, RESPONDENTS WILL BE ASKED TO LOOK FOR "THERMOSTATS OR HVAC UNITS, LIKE HEAT PUMPS, AIR CONDITIONING UNITS, OR FURNACE FANS."

Please proceed to the [SUB-PROGRAM] section of the store

TABLE 4. programming fills by unique retail location.

<b>unique retail location</b>	<b>sub-program participation</b>	<b>SUB-PROGRAM FILL FOR PROGRAMMING - PRIMARY</b>	<b>SUB-PROGRAM FILL FOR PROGRAMMING - SECONDARY</b>
Best Buy® – North Olmsted	Appliances (downstream and midstream); Consumer Electronics	Consumer Electronics	Appliances (midstream)
Best Buy® – Sandusky	Appliances (downstream and midstream); Consumer Electronics	Consumer Electronics	Appliances (downstream)
Best Buy® – Elyria	Appliances (downstream and midstream); Consumer Electronics	Consumer Electronics	Appliances (midstream)
Best Buy® - Toledo	Appliances (downstream and midstream); Consumer Electronics	Consumer Electronics	Appliances (downstream)
Best Buy® - Macedonia	Appliances (downstream and midstream); Consumer Electronics	Consumer Electronics	Appliances (midstream)
Best Buy® - Fairlawn	Appliances (downstream); Consumer Electronics	Consumer Electronics	Appliances (downstream)
Costco® – Avon	Lighting only	Lighting	None
Costco® – Boston Heights	Lighting only	Lighting	None
Costco® – Mayfield Heights	Lighting only	Lighting	None
Costco® – Perrysburg	Lighting only	Lighting	None
Costco® – Mayfield Heights	Lighting only	Lighting	None
Costco® - Strongsville	Lighting only	Lighting	None
Costco® – Toledo	Lighting only	Lighting	None
Home Depot® – Ashland	Appliances (downstream and midstream); Lighting; HVAC	HVAC (thermostat)	Appliances (midstream)
Home Depot® – Salem	Appliances (downstream and midstream); Lighting; HVAC	HVAC (other HVAC equipment)	Appliances (downstream)
Home Depot® – Chardon	Appliances (downstream and midstream); Lighting	Appliances (midstream)	Lighting

<b>unique retail location</b>	<b>sub-program participation</b>	<b>SUB-PROGRAM FILL FOR PROGRAMMING - PRIMARY</b>	<b>SUB-PROGRAM FILL FOR PROGRAMMING - SECONDARY</b>
Home Depot® – Cleveland (Brookpark Rd)	Appliances (downstream and midstream); Lighting	Appliances (midstream)	Lighting
Home Depot® – Avon	Appliances (downstream and midstream); Lighting	Appliances (midstream)	Lighting
Home Depot® – Euclid	Appliances (downstream and midstream); Lighting	Appliances (midstream)	Lighting
Kmart® – Barberton	Appliances (midstream), Consumer Electronics	Consumer Electronics	Appliances (midstream)
Kmart® – Brunswick	Appliances (midstream), Consumer Electronics	Consumer Electronics	Appliances (midstream)
Kmart® – Cleveland	Appliances (midstream), Consumer Electronics	Consumer Electronics	Appliances (midstream)
Kmart® – Tallmadge	Appliances (midstream), Consumer Electronics	Consumer Electronics	Appliances (midstream)
Lowe's® – Defiance	Appliances (downstream); Lighting; HVAC	HVAC (thermostat)	Appliances (downstream)
Lowe's® – Mansfield	Appliances (downstream); Lighting; HVAC	HVAC (other HVAC equipment)	Appliances (downstream)
Lowe's® – Marion	Appliances (downstream); Lighting; HVAC	HVAC (thermostat)	Appliances (downstream)
Lowe's® – Springfield	Appliances (downstream); Lighting; HVAC	HVAC (other HVAC equipment)	Appliances (downstream)
Lowe's® - Streetsboro	Appliances (downstream); Lighting; HVAC	HVAC (thermostat)	Appliances (midstream)
Lowe's® - Mooresville	Appliances (midstream); Lighting	Appliances (midstream)	Lighting
Menard's™ – Defiance	Lighting	Lighting	None
Menard's™ – Holland	Lighting; HVAC (not surveyed)	Lighting	None
Menard's™ - Massillon	Lighting; HVAC (not surveyed)	Lighting	None
Menard's™ - Ontario	Lighting; HVAC (not surveyed)	Lighting	None

unique retail location	sub-program participation	SUB-PROGRAM FILL FOR PROGRAMMING - PRIMARY	SUB-PROGRAM FILL FOR PROGRAMMING - SECONDARY
Menard's™ - Oregon	Lighting; HVAC (not surveyed)	Lighting	None
Menard's™ - Sandusky	Lighting; HVAC (not surveyed)	Lighting	None
Sears – North Olmstead	Downstream appliances; HVAC (not surveyed)	Appliances (downstream)	None
Walmart- Lorain	Lighting	Lighting	None
Walmart – Mansfield (Airport Hwy)	Lighting	Lighting	None
Walmart – Eastlake	Lighting	Lighting	None
Walmart - Springfield	Lighting	Lighting	None
Walmart - Kent	Lighting	Lighting	None
Walmart – North Olmsted	Lighting	Lighting	None

Once you have arrived at the [SUB-PROGRAM] section of the store, please look for [FILL PER PROGRAMMING NOTE BELOW.]

FOR [LIGHTING], FILL, “PLEASE LOOK FOR LED LIGHT BULBS OR FIXTURES.”

FOR [CONSUMER ELECTRONICS], FILL, “PLEASE LOOK FOR TELEVISIONS, COMPUTERS, MONITORS, PRINTERS, OR SCANNERS.”

NOTE TO PROGRAMMER: [APPLIANCES] SUB-PROGRAM FILL DEPICTED IN TABLE 4, COLUMN 3 INCLUDES 2 DIFFERENT APPLIANCE STREAMS – DOWNSTREAM AND MIDSTREAM.

FOR DOWNSTREAM APPLIANCES, FILL, “PLEASE LOOK FOR REFRIGERATORS, CLOTHES WASHERS AND DRYERS, OR WATER HEATERS.”



FOR MIDSTREAM APPLIANCES, FILL, "PLEASE LOOK FOR FREEZERS, DEHUMIDIFIERS, OR HEAT PUMP WATER HEATERS."

NOTE TO PROGRAMMER: [HVAC] SUB-PROGRAM FILL DEPICTED IN TABLE 4, COLUMN 3 INCLUDES 2 DIFFERENT HVAC STREAMS – THERMOSTAT AND OTHER HVAC EQUIPMENT.

FOR THERMOSTAT, FILL, "PLEASE LOOK FOR SMART THERMOSTATS."

FOR OTHER HVAC EQUIPMENT, FILL, "PLEASE LOOK FOR HVAC UNITS, LIKE ROOM AIR CONDITIONERS."

Please take a few minutes to select one item, either [FOR [LIGHTING], FILL, "LED LIGHT BULBS OR FIXTURES." FOR [CONSUMER ELECTRONICS], FILL, "TELEVISIONS, COMPUTERS AND COMPUTER MONITORS, OR PRINTERS AND SCANNERS." FOR DOWNSTREAM APPLIANCES, FILL, "REFRIGERATORS, CLOTHES WASHERS AND DRYERS, OR WATER HEATERS." FOR MIDSTREAM APPLIANCES, FILL, "FREEZERS, DEHUMIDIFIERS, OR HEAT PUMP WATER HEATERS." FOR THERMOSTAT, FILL, "PLEASE LOOK FOR SMART THERMOSTATS." FOR OTHER HVAC EQUIPMENT, FILL, "PLEASE LOOK FOR SMART THERMOSTATS OR ROOM AIR CONDITIONING UNITS," Once you have selected one type of product, please familiarize yourself with the surroundings around this product. Once you are done, hit next, and we will ask you some questions.

[PROGRAMMING NOTE: INCLUDE 'NEXT' BUTTON THAT RESPONDENTS MUST HIT TO PROCEED.]

B1. What product did you select to review today?

[OPEN END]

[ASK B2 ONLY IF [SUB-PROGRAM FILL] = LIGHTING OR APPLIANCES (DOWNSTREAM). ASK B3 ONLY IF [SUB-PROGRAM FILL] = CONSUMER ELECTRONICS OR APPLIANCES (MIDSTREAM) OR HVAC.]

B2. Do you see any flyers, signs, posters, or stickers advertising rebates or instant discounts offered by one of FirstEnergy's utilities: Ohio Edison, The Illuminating Company, Toledo Edison [SUB-PROGRAM]?

1. Yes
2. No
97. [Other][Specify]
98. [Not Sure]
99. [Refused]

B3. What is the most prominent message in the information you see?

[OPEN END RESPONSE]

B4. How much do you agree or disagree with each of the following statements? [ROTATE]

[NOTE: ONLY ASK B5.E IF [SUB-PROGRAM] =APPLIANCES (DOWNSTREAM) OR LIGHTING. DO NOT ASK B5.E IF [SUB-PROGRAM] =CONSUMER ELECTRONICS OR APPLIANCES (MIDSTREAM) OR HVAC.]

	Completely disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Completely agree
	1	2	3	4	5
a. The signs were easy to find.					
b. The signs are attention-grabbing.					
c. The signs are easy to understand.					
d. The signs are informative.					
e. The signs clearly show which products qualify for rebates and/or instant discounts.					
f. The signs clearly show the program					

	Completely disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Completely agree
	1	2	3	4	5
sponsor (i.e. Ohio Edison, The Illuminating Company, or Toledo Edison).					

B5. Please take a picture of the rebate, instant discount, or energy savings sign that you like the most? [RESPONDENT TO UPLOAD PICTURE]

B6. Please tell us why you chose this sign. [OPEN END]

B7. Did you speak to a store sales representative or sales associate while looking at [SUB-PROGRAM-FILL]?

1. Yes

2. No

97. [Other][Specify]

98. [Not Sure]

99. [Refused]

**[IF B7 = 1, PROCEED TO B8. If B7 =2, 97, 98, OR 99, Skip to C1, SECTION C: MOTIVATIONS AND DECISIONS TO PURCHASE]**

B8. Did the sales associate show you energy-efficient products? [FILL: (THAT QUALIFY FOR INSTANT DISCOUNTS OR REBATES) IF [SUB-PROGRAM] = LIGHTING OR APPLIANCES (DOWNSTREAM)?

1. Yes

2. No

97. [Other][Specify]

98. [Not Sure]

99. [Refused]

**[ASK IF B8= 1. IF B8=2, 97, 98, OR 99, skip to B10.]**

B9. What did the sales associate tell you about these products? Did they discuss product... [SELECT ALL THAT APPLY] [ROTATE]?

1. Functionality

2. Cost

3. Energy savings
4. Rebates available for products
5. Instant discounts for products
6. Sponsorship by Ohio Edison, The Illuminating Company, or Toledo Edison
97. [Other][Specify]
98. [Not Sure]
99. [Refused]

B10. How much do you agree or disagree with each of the following statements?

	Completely disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Completely agree
	1	2	3	4	5
The sales associate was knowledgeable in discussing energy-efficient products. [FILL: (THAT QUALIFY FOR INSTANT DISCOUNTS OR REBATES) IF [SUB-PROGRAM] = LIGHTING OR APPLIANCES (DOWNSTREAM)]					
Information provided by the sales associate was easy to understand.					
Information provided by the sales associate was useful.					

### C. MOTIVATIONS AND DECISION TO PURCHASE

C1. Based on the in-store advertisements, how likely would you be to purchase this product the next time you need [SUB-PROGRAM]?

1	2	3	4	5	98	99
Definitely would not purchase				Definitely would purchase	Not sure	Refused

C2. **[IF C1 =1]** Based on your discussion with the sales associate, how likely would you be to purchase this product the next time you need [sub-program]?

1	2	3	4	5	98	99
Definitely would not purchase				Definitely would purchase	Not sure	Refused

[PROGRAMMING NOTE: ONLY ASK C3 IF [SUB-PROGRAM] = APPLIANCES (DOWNSTREAM) OR IF [SUB-PROGRAM] = LIGHTING.]

C3. The rebate amount is enough to convince me to buy the qualifying product over the non-qualifying products.

1. Yes

2. No

97. [Other][Specify]

98. [Not Sure]

99. [Refused]

**[IF C3 = 1, SKIP TO D1, SECTION D: PROGRAM PRODUCTS AND PRODUCT PLACEMENT. IF C3=2, 97, 98 OR 99, PROCEED TO C4.]**

C4. To convince me to buy a qualifying product, the rebate or discount amount should be increased...

1. A lot more
2. A little more
3. Is just right
98. [Not Sure]
99. [Refused]

#### D. PROGRAM PRODUCTS AND PRODUCT PLACEMENT

D1. How much do you agree or disagree with each of the following statements?

	Completely disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Completely agree
	1	2	3	4	5
a. I could easily locate products that were advertised.					
b. Products were easily accessible.					

PROGRAMMING NOTE: ONLY ASK D2 IF [SUB-PROGRAM] = LIGHTING.

D2. Based on information you saw or received in-store, how confident do you feel in purchasing the correct light bulb to meet your needs?

1	2	3	4	5	98	99
Not at all confident				Extremely confident	Not sure	Refused

D3. Have you seen FirstEnergy utility (Ohio Edison, The Illuminating Company, Toledo Edison) program materials before taking this survey?  
[SELECT ALL THAT APPLY]

1. Yes, I have purchased program sponsored products before.

2. Yes, I have received program collateral, such as a bill insert or email, before.
3. Yes, I have seen program signs in retail stores before.
4. No this is my first-time seeing signs or advertisements for the program.

97. [Other][Specify]

98. [Not Sure]

99. [Refused]

D4. Have you purchased [SUB-PROGRAM] before?

1. Yes

2. No

97. [Other][Specify]

98. [Not Sure]

99. [Refused]

**D5. [IF D4 = 1, PROCEED TO D5. IF D5=2, 97, 98 OR 99, SKIP TO E1, SECTION E: ADDITIONAL SUB-PROGRAM BATTERY.]** Is this your preferred store for purchasing [SUB-PROGRAM]?

1. Yes

2. No

3. [Other][Specify]

4. [Not Sure]

5. [Refused]

D6. Why do you shop from this store for [SUB-PROGRAM]? OPEN ENDED

D7. Do you shop for [SUB-PROGRAM] online?

1. Yes

2. No

97. [Other][Specify]

98. [Not Sure]

99. [Refused]

## **E. ADDITIONAL SUB-PROGRAM BATTERY**

PROGRAMMING NOTE: ASK E1 ONLY IF TABLE 4, COLUMN 4 "SUB-PROGRAM FILL FOR PROGRAMMING – SECONDARY" DOES NOT EQUAL "NONE". IF TABLE 4, COLUMN 4 "SUB-PROGRAM FILL FOR PROGRAMMING – SECONDARY" EQUALS "NONE", SKIP TO F1, SECTION F: OVERALL CUSTOMER SATISFACTION.

E1. Thank you for answering these questions. Would you be willing to answer a few more questions on a different product in this store?

- 1. Yes
- 2. No
- 97. [Other][Specify]
- 98. [Not Sure]
- 99. [Refused]

[If F1=2, 97, 98, 99, go to section F: overall customer satisfaction.]

[IF F1=2, REPEAT SECTION B: CUSTOMER EXPERIENCE WITH PROGRAM SIGNAGE.]

PROGRAMMING NOTE: [SUB-PROGRAM] FOR SECTION B REPEAT SHOULD BE FILLED WITH LIGHTING, APPLIANCES, OR CONSUMER ELECTRONICS BASED UPON TABLE 4, COLUMN 4. FILL [SUB-PROGRAM] WITH TEXT IN TABLE COLUMN, "SUB-PROGRAM FILL FOR PROGRAMMING – SECONDARY." **FOR APPLIANCES, TABLE 4, COLUMN 4 DENOTES WHETHER THE APPLIANCES ARE MIDSTREAM OR DOWNSTREAM. CREATE FLAG TO NOTE THIS. DO NOT INCLUDE "DOWNSTREAM" OR "MIDSTREAM" WHEN DIRECTING RESPONDENTS TO "APPLIANCES".**

Once you have arrived at the [SUB-PROGRAM] section of the store, please look for [FILL PER PROGRAMMING NOTE BELOW.]

NOTE TO PROGRAMMER: FOR [LIGHTING], FILL, "PLEASE LOOK FOR ENERGY EFFICIENT LIGHTING OPTIONS." FOR [CONSUMER ELECTRONICS], FILL, "PLEASE LOOK FOR TELEVISIONS, COMPUTERS, MONITORS, OR IMAGING ELECTRONICS SUCH AS PRINTERS AND SCANNERS."

NOTE TO PROGRAMMER: [APPLIANCES] SUB-PROGRAM FILL DEPICTED IN TABLE 4, COLUMN 3 INCLUDES 2 DIFFERENT APPLIANCE STREAMS – DOWNSTREAM AND MIDSTREAM. FOR DOWNSTREAM APPLIANCES, FILL, "PLEASE LOOK FOR REFRIGERATORS, CLOTHES WASHERS AND DRYERS, OR SOLAR WATER HEATERS." FOR MIDSTREAM APPLIANCES, FILL, "PLEASE LOOK FOR FREEZERS, DEHUMIDIFIERS, OR HEAT PUMP WATER HEATERS."

Please take a few minutes to familiarize yourself with the available products in this section of the store. Once you are done, hit next, and we will ask you some questions about any signs or flyers that you saw about these products, and any interactions that you had with sales associates regarding these products



[PROGRAMMING NOTE: INCLUDE 'NEXT' BUTTON THAT RESPONDENTS MUST HIT TO PROCEED. THEN BEGIN SECTION B AT QUESTION B1. COMPLETE SECTION B THROUGH B10, THEN PROCEED TO F1, SECTION F: OVERALL CUSTOMER SATISFACTION.

## F. OVERALL CUSTOMER SATISFACTION

F1. On a scale of 1 to 5, with 1 being extremely dissatisfied and 5 being extremely satisfied, how satisfied were you with your overall experience at [FILL RETAIL LOCATION] today?

1	2	3	4	5	98	99
Not at all satisfied				Extremel y satisfied	Not sure	Refused

On a scale of 1 to 5, with 1 being extremely dissatisfied and 5 being extremely satisfied, how satisfied are you with FirstEnergy Ohio after this shopping experience?

1	2	3	4	5	98	99
Not at all satisfied				Extremel y satisfied	Not sure	Refused

Survey Completed – Thank you

Thank you for taking our survey. Your efforts are greatly appreciated!

Thank you for your feedback. Those are all the questions we have today.

## 12 Appendix C: Downstream Participant Survey

### 2018 EE Products Program Participant Web-Based Survey (Downstream)

#### Survey Variables

CUSTOMER_NAME	CUSTOMER NAME
UTILITY	EDC
ALL_MEASURES	List of all measures for which customer received a rebate
REF	1 if refrigerator, else 0
CW	1 if clothes washer, else 0
CD	1 if clothes dryer, else 0
HVAC	1 if HVAC Tune-Up, else 0

#### Email Introduction

Dear [CUSTOMER\_NAME],

The [UTILITY] Energy Efficient Products Program is offered to residential customers in the Ohio territory. The program is designed to encourage these customers to save money and energy by purchasing and installing energy efficient appliances, as well as performing HVAC Tune-ups.

This survey was developed on behalf of [UTILITY] to obtain customer feedback about their experiences with the Energy Efficient Products Program. The survey should take about eight minutes. Upon completion of the survey, you will be awarded an electronic gift card to a retailer of your choice from Tango Card in the amount of \$5. Thank you for your time and we appreciate your feedback.

#### Screening

1. Our records indicate that you participated in [UTILITY]'s Energy Efficient Products Program. Through this program, you may have received a rebate for the purchase of

energy efficient products like an ENERGY STAR® certified refrigerator, dryer, or clothes washer, or for conducting an HVAC Tune-Up. Do you recall participating in this program?

1. Yes

2. No **[Skip to THANK YOU PAGE and TERMINATE]**

**[DISPLAY Q2 IF Q1 = 2]**

2. If someone else in your household is more familiar with the purchase of an energy efficient appliance or an HVAC Tune-up from [UTILITY], we ask that you please write the email of that household member in the textbox below.

Email address: \_\_\_\_\_

**Survey**

3. How did you learn about the rebates available through [UTILITY]'s Energy Efficient Products program? [SELECT ALL THAT APPLY]

- 1. Bill Insert
- 2. Direct Mail from Utility
- 3. Program Website (energysaveohio.com)
- 4. Retail Store
- 5. Contractor
- 6. Print Ad
- 7. Radio
- 8. Word-of-Mouth/Family Member/Friend
- 9. Internet Search
- 10. Other (Specify): \_\_\_\_\_
- 98. I don't recall.

**[SHOW Q4 IF Q3 = 4]**

4. While in the retail store, how did you learn about rebates available for ENERGY STAR® certified appliances? [SELECT ALL THAT APPLY]

- 1. A store employee
- 2. Store signage near appliances displays
- 3. Other
- 98. I do not recall

5. Please verify the products for which you received a rebate through the program. Our records indicate that you received a rebate for [ALL\_MEASURES]. Is that correct?

		Yes	No	I don't recall.
[DISPLAY IF REF = 1] a	ENERGY STAR® Refrigerator	01	02	98
[DISPLAY IF CW = 1] b	ENERGY STAR® Clothes Washer	01	02	98
[DISPLAY IF CD = 1]c	ENERGY STAR® Clothes Dryer	01	02	98
[DISPLAY IF HVAC = 1] d	HVAC Tune-Up	01	02	98

### ENERGY STAR® Refrigerator

#### [SHOW Q6 - Q12 IF Q5a = 1]

6. Was this refrigerator purchased:

1. To replace a functioning unit?
2. To replace a broken unit?
3. Because you did not previously own a refrigerator?
4. Because you wanted another?
98. I don't recall.

#### [SHOW Q7 IF Q6 = 1 OR 2]

7. What has been done with the old unit?

1. I still have it.
2. I recycled it through a recycling program.
3. I took it to the dump.
4. I sold it for scrap metal.
5. I sold it for parts.
6. I sold or gifted unit to an individual.
7. I sold or donated to an organization/company
8. Other (Specify): \_\_\_\_\_
98. I don't recall.

**[SHOW Q9 IF Q7 = 1]**

8. What is the name of the company or organization that you sold/donated your old unit to?

**[SHOW Q9 IF Q7 = 1]**

9. Is the old refrigerator still in use and plugged in?

- 1. Yes
- 2. No
- 98. I don't recall.

**[SHOW Q10 IF Q9 = 2 or 98]**

10. Do you know that [UTILITY] provides rebates for recycling your old (working) refrigerator?

- 1. Yes
- 2. No
- 98. I don't recall.

**[SHOW Q11 IF Q10 = 1]**

11. Why was the refrigerator not recycled through the [UTILITY] Program?

- 1. The incentive wasn't high enough
- 2. The options for pick up times were not convenient
- 3. I did not know how to participate in the program
- 4. Other (Specify): \_\_\_\_\_
- 98. I don't recall.

12. What influenced you to select the particular model or type of refrigerator you recently purchased? [SELECT ALL THAT APPLY]

- 1. The price was good
- 2. It had a rebate
- 3. It costs less to operate
- 4. It's good for the environment
- 5. It was all that was available
- 6. The retailer recommended it
- 7. It had the features I wanted
- 8. It was the right size/color
- 9. Wanted the brand
- 10. Other (Specify): \_\_\_\_\_
- 98. I don't recall.

## **ENERGY STAR® Clothes Washer**

### **[SHOW Q13 - Q15 IF Q5b= 1]**

13. Do you have an electric or gas water heater?

- 1. Gas
- 2. Electric
- 98. I don't recall.

### **[SHOW Q14 IF Q13 = 98]**

14. Please look at the top of the water heater for an electrical supply cord. This looks like a thick extension cord and is typically black or gray. Do you see a cord similar to the one described?

- 1. Yes
- 2. No
- 98. I don't recall.

15. Why did you select this model or type of clothes washer? [SELECT ALL THAT APPLY]

- 1. It was a good price
- 2. There was a rebate for it
- 3. It costs less to operate
- 4. It's good for the environment
- 5. It was all that was available
- 6. The retailer recommended it
- 7. It had the features I wanted
- 8. It was the right size/color
- 9. Wanted the brand
- 10. Other (Specify): \_\_\_\_\_
- 98. I don't recall.

## **ENERGY STAR® Clothes Dryer**

### **[SHOW Q16 IF Q5c = 1]**

16. Why did you select this model or type of clothes dryer? [SELECT ALL THAT APPLY]

- 1. It was a good price
- 2. There was a rebate for it
- 3. It costs less to operate
- 4. It's good for the environment
- 5. It was all that was available

- 6. The retailer recommended it
- 7. It had the features I wanted
- 8. It was the right size/color
- 9. Wanted the brand
- 10. Other (Specify): \_\_\_\_\_
- 98. I don't recall.

## **HVAC Tune-Up**

### **[SHOW Q17 IF Q5d = 1]**

17. Prior to participating in the program, did you have regular tune-ups conducted by a heating and cooling contractor?

- 1. Yes
- 2. No
- 98. I don't recall.

### **[SHOW Q18 IF Q17 = 2 or 98]**

18. When, if ever, was your last tune-up?

- 1. Less than one year ago
- 2. 1-2 years ago
- 3. 3-5 years ago
- 4. More than 5 years ago
- 5. I've never had a tune up
- 98. I don't recall.

### **[SHOW Q19 IF Q17 = 1]**

19. Approximately how often do you get a tune up?

- 1. Every year
- 2. Once every two years
- 3. Every three to five years
- 4. More than five years
- 5. Only as needed for repairs
- 6. Other (specify)
- 98. I don't recall. / I'm not sure

20. Did your contractor explain what was different about the [UTILITY] HVAC Tune-Up from their standard tune-up?

- 1. Yes

- 2. No
- 3. The contractor said there was no difference.
- 98. I don't recall.

**[SHOW Q21 IF Q20 =1]**

21. What difference did the contractor describe about the [UTILITY] HVAC Tune-up from a standard tune-up?

- 1. Condenser coil cleaning
- 2. Evaporator coil cleaning
- 3. Cleaned blower
- 4. Verify airflow
- 5. More accurate refrigerant recharge
- 6. Other (Specify)
- 98. I don't recall.

22. Approximately how old is your A/C unit?

- 1. \_\_\_\_\_ age in years
- 98. I don't recall.

**Program Satisfaction**

We have just a few more questions about your satisfaction with the EE Products Program.

23. On a scale of 1 to 5 where 1 means very dissatisfied and 5 means very satisfied, please rate how satisfied or dissatisfied you were with the rebate amount for the following:

	Very Dissatisfied	Somewhat dissatisfied	Neutral	Somewhat Satisfied	Very Satisfied	I don't recall
Energy Star® Refrigerator [DISPLAY IF Q5a = 1]	1	2	3	4	5	98
Energy Star® Clothes Washer [DISPLAY IF Q5b = 1]	1	2	3	4	5	98
Energy Star® Clothes Dryer [DISPLAY IF Q5c = 1]	1	2	3	4	5	98
HVAC Tune-Up [DISPLAY IF Q5e = 1]	1	2	3	4	5	98



24. From the time you submitted the application, about how many weeks did it take to receive your rebate?

1. 1 – 2 weeks
2. 2 - 3 weeks
3. 3 - 4 weeks
4. 4 – 5 weeks
5. 5- 6 weeks
6. More than 6 weeks
98. I don't recall.

25. On a scale of 1 to 5 where 1 means very dissatisfied and 5 means very satisfied, please rate how satisfied or dissatisfied you were with how long it took to receive the rebate for the item listed below:

	Very Dissatisfied	Somewhat dissatisfied	Neutral	Somewhat Satisfied	Very Satisfied	I don't recall
Energy Star® Refrigerator [DISPLAY IF Q5a = 1]	1	2	3	4	5	98
Energy Star® Clothes Washer [DISPLAY IF Q5b = 1]	1	2	3	4	5	98
Energy Star® Clothes Dryer [DISPLAY IF Q5c = 1]	1	2	3	4	5	98
HVAC Tune-Up [DISPLAY IF Q5e = 1]	1	2	3	4	5	98

26. During your participation in the program, how often did you contact program staff with questions?

1. Never
2. Once
3. 2 or 3 times
4. 4 times or more
98. I don't recall.

**[SHOW Q27 IF Q26 = 2, 3, OR 4]**

27. How did you contact them? [SELECT ALL THAT APPLY]

1. Phone
2. Email/online
3. Letter
4. In person
98. I don't recall.

**[SHOW Q28 IF Q26 = 2, 3, OR 4]**

28. On a scale of 1 to 5 where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied are you with your communications with program staff?

1. Very dissatisfied
2. Somewhat dissatisfied
3. Neither satisfied nor dissatisfied
4. Somewhat satisfied
5. Very satisfied
98. I don't recall.

**[SHOW Q29 IF Q28 = 1 OR 2]**

29. Why were you dissatisfied?

1. \_\_\_\_\_
98. I don't recall.

30. Have you noticed any savings on your electric bill since installing your new [MEASURES IN Q5 = 1]?

1. Yes
2. No
3. Not sure
98. I don't recall.

**31. On a scale of 1 to 5 where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied are you, overall, with each of the appliances/equipment listed below:**

	Very Dissatisfied	Somewhat dissatisfied	Neutral	Somewhat Satisfied	Very Satisfied	Don't know
Energy Star® Refrigerator [DISPLAY IF Q5a = 1]	1	2	3	4	5	98
Energy Star® Clothes Washer [DISPLAY IF Q5b = 1]	1	2	3	4	5	98

Energy Star® Clothes	1	2	3	4	5	98
Dryer [DISPLAY IF Q5c = 1]						

HVAC Tune-Up	1	2	3	4	5	98
[DISPLAY IF Q5e = 1]						

[SHOW Q32 IF Q31 = 1 OR 2]

32. Why were you dissatisfied?

1. \_\_\_\_\_ [RECORD VERBATIM]  
 98. I don't recall.

33. On a scale of 1 to 5 where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied are you, overall, with the [UTILITY]'s Energy Efficient Products Program

- 1. Very dissatisfied
- 2. Somewhat dissatisfied
- 3. Neither satisfied nor dissatisfied
- 4. Somewhat satisfied
- 5. Very satisfied
- 98. I don't recall.

34. Do you have any additional comments for [UTILITY] regarding your experience or suggestions to improve the program?

1. \_\_\_\_\_

## Home Demographics

A few of questions about your home and income level follow. These are anonymous and will be used solely for the purpose of combining different customers' responses. You can choose to not answer any of these questions.

35. Which of the following best describes your residence?

- 1. Single-family home, detached construction
- 2. Single-family home, factory manufactured/modular
- 3. Mobile home
- 4. Townhome
- 5. Two or Three family attached residence
- 6. Apartment building with 4+ units
- 7. Condominium

8. Other (Specify): \_\_\_\_\_  
98. I don't recall.

36. Do you own or rent this residence?

- 1. Own
- 2. Rent
- 98. I don't recall.

37. Approximately when was your residence built?

- 1. Before 1960
- 2. 1960-1969
- 3. 1970-1979
- 4. 1980-1989
- 5. 1990-1999
- 6. 2000-2005
- 7. 2006 or later
- 98. I don't recall.

38. How many square feet is the above-ground living space?

- 1. Square Feet: \_\_\_\_\_

**[SHOW Q39 IF Q38 = 98 OR 99]**

39. Please estimate the square footage of the above-ground living space:

- 1. Less than 1,000 square feet
- 2. 1000-2000 square feet
- 3. 2000-3000 square feet
- 4. 3000-4000 square feet
- 5. 4000-5000 square feet
- 6. Greater than 5000 square feet
- 98. I don't recall.

40. How many square feet of below-ground living space is heated or air conditioned?

- 1. Square Feet: \_\_\_\_\_
- 2. Does not apply
- 3. I don't recall.

**[SHOW Q41 IF Q40 = 98 OR 99]**

41. Please estimate the square footage of the below-ground living space:

1. Less than 1,000 square feet
2. 1000-2000 square feet
3. 2000-3000 square feet
4. 3000-4000 square feet
5. 4000-5000 square feet
6. Greater than 5000 square feet
98. I don't recall.

42. How many people are living or staying at this address?

Include everyone who is living or staying here for more than 2 months.

Include yourself if you are living or staying here for more than 2 months.

Include anyone else staying here who does not have another place to stay, even if they are here for less than two months.

Do not include anyone who is living somewhere else for more than two months, such as a college student living away or someone in the Armed Forces on deployment.

1. \_\_\_\_\_
98. I don't recall.

43. What is your approximate total household income?

1. Less than \$18,000
2. \$18,000 to less than \$25,000
3. \$25,000 to less than \$31,000
4. \$31,000 to less than \$38,000
5. \$38,000 to less than \$44,000
6. \$44,000 to less than \$51,000
7. \$51,000 to less than \$57,000
8. \$57,000 to less than \$64,000
9. \$64,000 to less than \$70,000
10. \$70,000 to less than \$77,000
11. \$77,000 to less than \$83,000
12. \$83,000 to less than \$90,000
13. \$90,000 or more
98. Don't know

44. Would you be interested in scheduling a follow-up home visit with ADM Associates as an additional step of verification of the measures installed at your home? If your home is selected for a visit you will receive an additional \$20 gift card for your courtesy at the time of the appointment.

1. Yes
2. No

**[SHOW Q45 IF Q44 = 1]**

45. Can you please provide your current home address for the site visit?

1. Full Name
2. Address
3. City
4. State
5. Zip Code

46. Thank you for your time answering questions regarding [UTILITY]'s Energy Efficient Products Program. We would like to give you a \$5 gift card of your choice for your participation. To do that, we will need your name and an email address where we can send you a link to your gift card.

If you are willing to provide your name and email address so that we can send the gift card to you, please enter them in the boxes below:

Name: \_\_\_\_\_

Email address: \_\_\_\_\_

**[SHOW FOLLOWING PARAGRAPH IF TEXTBOXES IN Q46 ARE FILLED OUT]**

You should be receiving an email with the link to your gift card in the next couple of days. If you have any questions regarding this survey or would like to know the status of your gift card, please call Sarah Vernon at (775) 345-3031 or send an email to [adm-surveys@admenergy.com](mailto:adm-surveys@admenergy.com). Once again thank you for your participation on behalf of [UTILITY]. Have a great day!

**Thank You Page**

Thank you for participating in this survey. Have a great day!

## 13 Appendix D: CAP/EE Products Online Survey

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**FirstEnergy's Ohio Utilities**  
**2018 Customer Action Program / EE Products**  
**Online Survey (Upstream)**

### Introduction

#### Email Introduction

Dear [CUSTOMER\_NAME],

We are asking for a bit of your time for this survey, on behalf of [UTILITY], regarding household lighting, appliance, and electronics purchases in Ohio. It contains a few questions about light bulbs or appliances you may have purchased for your home in 2018.

**If someone else is more familiar with purchasing light bulbs and appliances/electronics for your home, we ask that you please forward this email to that household member.**

The survey should only take about ten minutes, and your answers will be completely anonymous. Upon completion of the survey, you will receive an electronic gift card in the amount of \$5.

Survey link:

Password:

Thank you

1. Do you purchase light bulbs, appliances and/or electronics for your home?

1. Yes, I purchase lights
2. Someone else does it **[SKIP TO THANK YOU PAGE with text ASKING THE INTRO EMAIL BE FORWARDED TO OTHER PERSON]**
3. No **[TERMINATE – SKIP TO THANK YOU PAGE (different page than for option (2))]**

## Electric Utility and Location Information

2. To ensure your eligibility to participate, we need to determine if you are a customer of one of FirstEnergy's Ohio utilities. What is the name of your electric utility?
1. Ohio Edison
  2. The Illuminating Company
  3. Toledo Edison
  97. Other **[Specify]**
  98. Don't know

### **[DISPLAY IF Q2 = 97 OR 98]**

3. Based on your electric utility, it does not appear you are eligible for this survey. Thank you for your time and have a nice day. **[TERMINATE – SKIP TO THANK YOU PAGE]**
4. Please provide your zip code.
1. \_\_\_\_\_ **[OPEN]**
  98. Don't know

## Awareness of Bulb Types

A few questions about your awareness of different types of light bulbs follow. The most common type of CFL is made with a glass tube bent into a spiral. It generally looks like a corkscrew and uses less energy than a typical incandescent light bulb.

5. Have you heard of compact fluorescent light bulbs, or CFLs?
1. Yes
  2. No
  98. Don't know

LED light bulbs are a newer light bulb technology that fit in regular light bulb sockets but have various appearances. LED bulbs are typically a lot heavier than incandescent bulbs. They use less energy and last much longer than typical incandescent light bulbs.

6. Have you heard of light emitting diode light bulbs, or LEDs?
1. Yes
  2. No
  98. Don't know



Halogen bulbs look similar to incandescent bulbs but are typically marketed using wattage equivalents, which are designed to show the increased energy efficiency of the halogen bulbs compared to the standard incandescent bulbs. For example, the 72-Watt halogen bulb packaging will show a lighting equivalent of a 100-Watt standard incandescent bulb.

7. Have you heard of increased efficiency incandescent bulbs, or halogens?

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

8. Conventional light bulbs are known as incandescent light bulbs. Do you think you could correctly identify the following types of light bulbs, a typical incandescent light bulb, CFL light bulb, LED light bulb, and a halogen light bulb if all four were placed in front of you?

	Yes	No	Don't Know
a. A typical incandescent light	1	2	98
b. CFL light bulb	1	2	98
c. LED light bulb	1	2	98
d. Halogen light bulb	1	2	98

### Recent Light Bulb Purchases

A few questions about bulbs you purchased this year follow.

9. In 2018, have you purchased any light bulbs?

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

### [IF Q9 = 2 OR 98, SKIP TO Q20]

10. In 2018, about how many light bulbs would you say you have purchased? (Your best estimate is OK.)

- 1. \_\_\_\_\_ [OPEN or DROP DOWN]
- 98. Don't know

11. Have you purchased any compact fluorescent light bulbs, also known as CFLs, during 2018?

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

12. Have you purchased any light emitting diode bulbs, also known as LEDs, during 2018?

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

13. Have you purchased any increased efficiency incandescent bulbs, also known as halogens, during 2018?

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

14. LED fixtures are light fixtures that use LED technology and are wired directly instead of screwed in. They typically have a lower wattage and longer lifespan than equivalent screw in bulbs. Have you purchased any light emitting diode fixtures, also known as LED fixtures, during 2018?

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

15. Have you purchased any occupancy sensors (also known as lighting controls)?

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

**[DISPLAY IF Q11 = 1 OR Q12 = 1 OR Q13 = 1 OR Q14 = 1]**

Questions about the number of different bulb types you have purchased in 2018 follow.

16. You mentioned earlier that you have purchased **[INSERT QUANTITY FROM Q10]** light bulbs in 2018. How many of those bulbs were CFLs, LEDs, LED fixtures or halogen bulbs? An example would be 5 CFLs, 5 LEDs, and 5 halogens. (Your best estimate is OK)

Type	Number	
CFLs	DROP DOWN 0-100;	Don't know
LEDs	DROP DOWN 0-100;	Don't know
Halogens	DROP DOWN 0-100;	Don't know
LED Fixtures	DROP DOWN 0-100;	Don't know

17. When did you last purchase each of the following type of lighting.

Type	Last purchase date	Don't Know
CFLs		
LEDs		
Halogens		
LED Fixtures		

**[DISPLAY IF Q11 = 1 OR Q12 = 1 OR Q13 = 1 OR Q14 = 1]**

18. Were any of the CFLs, LEDs, halogen bulbs, or LED fixtures you purchased in 2018 installed in a business or commercial building?
1. Yes
  2. No
  98. Don't know

**[DISPLAY IF Q18 = 1]**

19. Approximately how many of the **[ANSWER FROM Q10]** CFLs, LEDs, Halogens, or LED Fixtures you said you purchased were installed in a business or commercial building?

[Programming note: Only display types with a >0 quantity from Q16. Possibly include that quantity as maximum in a drop-down box.]

Type	Number Installed in a Business or Commercial Bldg.	Don't Know
CFLs		
LEDs		
Halogens		
LED Fixtures		

**Prior Purchases/Program Awareness/Satisfaction**

20. Prior to 2018, had you ever purchased CFL light bulbs?

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

21. Prior to 2018, had you ever purchased LED light bulbs?

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

22. Prior to 2018, had you ever purchased halogen light bulbs?

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

23. Prior to 2018, had you ever purchased LED fixtures? LED fixtures are light fixtures that use LED technology and are wired directly instead of screwed in.

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

## In-Service Rate

**[DISPLAY IF Q11 = 1 OR Q12 = 1 OR Q13 = 1 OR Q14 = 1]**

24. Again, you said you purchased **[ANSWER FROM Q10] bulbs** in 2018. How many of those CFLs, LEDs or halogens would you estimate you installed within one week of purchase?

1. \_\_\_\_\_ **[OPEN or Drop Down].**
2. All of them (100%) **[SKIP TO Q27]**
98. Don't know

**[DISPLAY IF Q11 = 1 OR Q12 = 1 OR Q13 = 1 OR Q14 = 1]**

25. How many of those CFLs, LEDs or Halogens purchased did you save to install at a later date?

1. \_\_\_\_\_ **[OPEN or Drop Down]**
2. All of them (100%) **[SKIP TO Q27]**
98. Don't know

26. Approximately how many of the light bulbs you purchased have you not installed? (Your best estimate is okay.)

Type	Number Not Installed	Don't Know
CFLs		
LEDs		
Halogens		
LED Fixtures		

## Purchase Reasoning

**[DISPLAY IF Q11 = 1]**

27. You mentioned you have purchased CFL light bulbs in 2018. When you purchased these CFLs, why did you make the purchase? (Select all that apply)

1. Replaced burned out bulbs
2. Replace working bulbs, wanted to lower energy usage
3. Installed in a new light fixture or lamp socket
4. Improve lighting quality/brighten a room
5. Replaced burned out bulbs & working bulbs at same time
6. Stock up on bulbs
7. Good deal prompted purchase

- 97. Other (Specify) \_\_\_\_\_
- 98. Don't know

**[SHOW Q28 – Q33 IF Q12 = 1]**

28. You mentioned you have purchased LED light bulbs in 2018. When you purchased these LEDs, why did you make the purchase? (Select all that apply)

- 1. Replaced burned out bulbs
- 2. Replace working bulbs, wanted to lower energy usage
- 3. Installed in a new light fixture or lamp socket
- 4. Improve lighting quality/brighten a room
- 5. Replaced burned out bulbs & working bulbs at same time
- 6. Stock up on bulbs
- 7. Good deal prompted purchase
- 8. Promotion of LED bulbs changed my mind
- 97. Other (Specify) \_\_\_\_\_
- 98. Don't know

29. Did you know **[ANSWER Q2]** provides funds to reduce the price of LED bulbs purchased at retail stores?

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

**[DISPLAY Q30 - Q31 IF Q29 = 1]**

30. How did you learn about the discounted price?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't Know

31. To the best of your knowledge, were the LED bulbs you purchased in 2018 discounted through your utility?

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

32. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the LED bulbs you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

33. Have you noticed a difference on your electric bill?

- 1. Yes, I've noticed savings
- 2. No
- 98. Don't know

**[DISPLAY IF Q13 = 1]**

34. You mentioned you have purchased halogen light bulbs in 2018. When you purchased these halogens, why did you make the purchase? (Select all that apply)

- 1. Replaced burned out bulbs
- 2. Replace working bulbs, wanted to lower energy usage
- 3. Installed in a new light fixture or lamp socket
- 4. Improve lighting quality/brighten a room
- 5. Replaced burned out bulbs & working bulbs at same time
- 6. Stock up on bulbs
- 7. Good deal prompted purchase
- 97. Other (Specify) \_\_\_\_\_
- 98. Don't know

**[DISPLAY IF Q14 = 1]**

35. You mentioned you have purchased LED fixtures in 2018. When you purchased these LED fixture, why did you make the purchase? LED fixtures are light fixtures that use LED technology and are wired directly instead of screwed in. (Select all that apply)

- 1. Replaced burned out bulbs
- 2. Replace working bulbs, wanted to lower energy usage
- 3. Installed in a new light fixture or lamp socket
- 4. Improve lighting quality/brighten a room
- 5. Replaced burned out bulbs & working bulbs at same time
- 6. Stock up on bulbs

- 7. Good deal prompted purchase
- 97. Other (Specify) \_\_\_\_\_
- 98. Don't know

36. Did you know **[ANSWER Q2]** provides funds to reduce the price of LED fixtures purchased at retail stores?

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

**[DISPLAY Q37 - Q38 IF Q36 = 1]**

37. How did you learn about the discounted price?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't Know

38. To the best of your knowledge, were the LED fixtures you purchased in 2018 discounted through your utility?

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

39. Please rate, on a scale of 1-5, how satisfied or dissatisfied you are with the LED fixtures you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

40. Have you noticed a difference on your electric bill?

- 1. Yes, I've noticed savings
- 2. No
- 98. Don't know



## Bulb Types Replaced

[DISPLAY Q41 - Q46 IF Q11 = 1]

41. Earlier you mentioned you purchased new CFL's in 2018, how many were installed in your home?

- 1. \_\_\_\_\_ [OPEN or Drop Down]
- 98. Don't know

42. In which of the following locations did you install the CFLs? (Select all that apply)

- 1. Bedrooms
- 2. Bathrooms
- 3. Living Room
- 4. Kitchen
- 5. Entry Way
- 6. Dining Room
- 7. Garage
- 8. Basement
- 9. Den
- 10. Stairway
- 11. Office
- 12. Hallway
- 13. Outdoor
- 14. Store for later installation
- 97. Other Room/Location (Specify)
- 97. Other Room/Location (Specify)
- 98. Don't know

43. How many of the new CFLs replaced standard incandescent bulbs?

- 1. \_\_\_\_\_ [OPEN or Drop Down]
- 2. **None**
- 98. Don't know

44. How many of the new CFLs replaced halogens?

- 1. \_\_\_\_\_ [OPEN or Drop Down]
- 2. **None**
- 98. Don't know

45. How many of the new CFLs replaced old CFLs?

- 1. \_\_\_\_\_ [OPEN or Drop Down]
- 2. **None**

98. Don't know

46. How many of the new CFLs replaced LEDs?

1. \_\_\_\_\_ **[OPEN or Drop Down]**

2. **None**

98. Don't know

**[DISPLAY Q47 – Q52 IF Q12 = 1]**

47. Earlier you mentioned you purchased new LED's in 2018, how many were installed in your home?

1. \_\_\_\_\_ **[OPEN or Drop Down]**

2. None

98. Don't know

48. In which of the following locations do you install the LEDs? (Select all that apply)

1. Bedrooms

2. Bathrooms

3. Living Room

4. Kitchen

5. Entry Way

6. Dining Room

7. Garage

8. Basement

9. Den

10. Stairway

11. Office

12. Hallway

13. Outdoors

14. Store for later installation

97. Other Room/Location (Specify)

97. Other Room/Location (Specify)

98. Don't know

49. How many of the new LEDs replaced standard incandescent bulbs?

1. \_\_\_\_\_ **[OPEN or Drop Down]**

2. None

98. Don't know

50. How many of the new LEDs replaced halogens?

1. \_\_\_\_\_ **[OPEN or Drop Down]**
2. None
98. Don't know

51. How many of the new LEDs replaced CFLs?

1. \_\_\_\_\_ **[OPEN or Drop Down]**
2. None
98. Don't know

52. How many of the new LEDs replaced old LEDs?

1. \_\_\_\_\_ **[OPEN or Drop Down]**
2. None
98. Don't know

**[DISPLAY Q53 – Q58 IF Q13 = 1]**

53. Earlier you mentioned you purchased new Halogens in 2018, how many were installed in your home?

1. \_\_\_\_\_ **[OPEN or Drop Down]**
2. None
98. Don't know

54. In which of the following locations do you install the Halogens? (Select all that apply)

1. Bedrooms
2. Bathrooms
3. Living Room
4. Kitchen
5. Entry Way
6. Dining Room
7. Garage
8. Basement
9. Den
10. Stairway
11. Office
12. Hallway
13. Outdoors
14. Store for later installation
97. Other Room/Location (Specify)
97. Other Room/Location (Specify)
98. Don't know

55. How many of the new Halogens replaced standard incandescent bulbs?

1. \_\_\_\_\_ **[OPEN or Drop Down]**

2. None

98. Don't know

56. How many of the new Halogens replaced old Halogens?

1. \_\_\_\_\_ **[OPEN or Drop Down]**

2. None

98. Don't know

57. How many of the new Halogens replaced CFLs?

1. \_\_\_\_\_ **[OPEN or Drop Down]**

2. None

98. Don't know

58. How many of the new Halogens replaced LEDs?

1. \_\_\_\_\_ **[OPEN or Drop Down]**

2. None

98. Don't know

**[DISPLAY Q59 – Q64 IF Q14 = 1]**

59. Earlier you mentioned you purchased new LED fixtures in 2018, how many were installed in your home?

1. \_\_\_\_\_ **[OPEN or Drop Down]**

2. None

98. Don't know

60. In which of the following locations did you install the LED fixtures? (Select all that apply)

1. Bedrooms

2. Bathrooms

3. Living Room

4. Kitchen

5. Entry Way

6. Dining Room

7. Garage

8. Basement

9. Den

- 10. Stairway
- 11. Office
- 12. Hallway
- 13. Outdoors
- 14. Store for later installation
- 97. Other Room/Location (Specify)
- 97. Other Room/Location (Specify)
- 98. Don't know

61. How many of the new LED fixtures replaced fixtures with standard incandescent bulbs?

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 2. None
- 98. Don't know

62. How many of the LED fixtures replaced fixtures with Halogens?

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 2. None
- 98. Don't know

63. How many of the new LED fixtures replaced fixtures with CFLs?

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 2. None
- 98. Don't know

64. How many of the new LED fixtures replaced fixtures with old LEDs?

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 2. None
- 98. Don't know

**[DISPLAY IF Q11 = 1 OR Q12 = 1 OR Q13 = 1 OR Q14 = 1]**

65. Of the light bulbs you purchased in 2018, were any of them purchased through any of the following retail stores:

- 1. The Home Depot®
- 2. Lowes Home Improvement
- 3. Sam's Club
- 4. Walmart
- 5. Costco®
- 6. Sears
- 7. Hartville Hardware
- 97. Other (Specify)

98. Don't know

### Lighting Controls

#### [DISPLAY Q66 IF Q15 =1]

66. Did you install the occupancy sensors you indicated you purchased?

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

#### [DISPLAY Q67 IF Q66 =1]

67. What is the wattage of the fixture being controlled by the occupancy sensor?

- 1. \_\_\_\_\_ [Open or Drop Down]
- 98. Don't know

### Appliance Basics

68. Since January 1, 2018, have you purchased or had installed ANY of the following items in your home/residence: Refrigerator, Freezer, Dehumidifier, Room Air Conditioner, High-Efficiency Central Air Conditioner, Heat Pump or Mini-Split Heat Pump?

Q.	Appliance	Yes	No	DK	
a.	Refrigerator	1	2	98	
b.	Freezer	1	2	98	
c.	Dehumidifier	1	2	98	
d.	Room Air Conditioner	1	2	98	
e.	Central AC	1	2	98	
f.	Heat Pump	1	2	98	
g.	Mini-Split Heat Pump	1	2	98	

### Refrigerator

**[DISPLAY Q69– Q81 IF Q68a = 1]**

69. What kind of refrigerator model did you purchase?

- 1. Top-freezer refrigerator model
- 2. Bottom-freezer refrigerator model
- 3. Side-by-side refrigerator model
- 98. Don't know

70. Was the refrigerator you purchased ENERGY STAR® certified?

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

71. Do you remember the month in 2018 when you purchased the refrigerator?

- 1. \_\_\_\_\_ **[DROP DOWN]**
- 98. Don't know

72. Was this refrigerator purchased:

- 1. To replace a functioning unit
- 2. To replace a broken unit
- 3. Not a replacement
- 98. Don't know

**[DISPLAY IF Q73 = 2]**

73. Why didn't you repair the broken unit?

- 1. Too costly
- 2. Too much time involved
- 3. Wanted to change style
- 98. Don't know

**[DISPLAY IF Q72 = 1 or 2]**

74. What did you do with your old unit?

- 1. Still have it, not in use
- 2. Recycled the unit
- 3. Took it to the dump
- 4. Sold it for scrap metal
- 5. Sold for parts
- 6. Sold or gifted unit to an individual
- 7. Sold or donated to an organization/company
- 97. Other (Specify)

98. Don't know

**[DISPLAY IF Q74 = 7]**

75. Please provide the organization/company that received the donation:

1. \_\_\_\_\_ [OPEN]

98. Don't know

76. For the refrigerator you bought, was it purchased through any of the following retail stores:

- 1. The Home Depot®
- 2. Lowes Home Improvement
- 3. Sam's Club
- 4. Walmart
- 5. Costco®
- 6. Sears
- 7. Hartville Hardware
- 97. Other (Specify)
- 98. Don't know

77. Did you know **[ANSWER Q2]** provides funds to reduce the price of refrigerators purchased at retail stores?

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

**[DISPLAY Q78 - Q79 IF Q77 = 1]**

78. How did you learn about the discounted price?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't Know

79. To the best of your knowledge, was the refrigerator you purchased in 2018 discounted through your utility?

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



80. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the refrigerator you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

81. Have you noticed a difference on your electric bill?

- 1. Yes, I've noticed savings
- 2. No
- 98. Don't know

### Freezer

**[DISPLAY Q82 - Q94 IF Q68b = 1]**

82. What kind of freezer model did you purchase?

- 1. Chest freezer, with the lid on top
- 2. Upright Freezer, with the door on the front
- 98. Don't know

83. Was the freezer you purchased ENERGY STAR® certified?

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

84. Do you remember the month in 2018 when you purchased the freezer?

- 1. \_\_\_\_\_ **[DROP DOWN]**
- 98. Don't know

85. Was this freezer purchased:

- 1. To replace a functioning unit
- 2. To replace a broken unit
- 3. Not a replacement
- 98. Don't know

**[DISPLAY IF Q85 = 2]**

86. Why didn't you repair the broken unit?

- 1. Too costly

- 2. Too much time involved
- 3. Wanted to change style
- 98. Don't know

**[DISPLAY IF Q85 = 1 or 2]**

87. What did you do with your old unit?

- 1. Still have it, not in use
- 2. Recycled the unit
- 3. Took it to the dump
- 4. Sold it for scrap metal
- 5. Sold for parts
- 6. Sold or gifted unit to an individual
- 7. Sold or donated to an organization/company
- 97. Other (Specify)
- 98. Don't know

**[DISPLAY IF Q87 = 7]**

88. Please provide the organization/company that received the donation:

- 1. \_\_\_\_\_ [OPEN]
- 98. Don't know

89. For the freezer you bought, was it purchased through any of the following retail stores:

- 1. The Home Depot®
- 2. Lowes Home Improvement
- 3. Sam's Club
- 4. Walmart
- 5. Costco®
- 6. Sears
- 7. Hartville Hardware
- 97. Other (Specify)
- 98. Don't know

90. Did you know **[ANSWER Q2]** provides funds to reduce the price of freezers purchased at retail stores?

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

**[DISPLAY Q91 - Q92 IF Q90= 1]**

91. How did you learn about the discounted price?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't Know

92. To the best of your knowledge, was the freezer you purchased in 2018 discounted through your utility?

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

93. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the freezer you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

94. Have you noticed a difference on your electric bill?

- 1. Yes, I've noticed savings
- 2. No
- 98. Don't know

**Dehumidifier**

**[DISPLAY Q95 – Q104 IF Q68c = 1]**

95. Was the dehumidifier you purchased ENERGY STAR® certified?

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

96. Do you remember the month in 2018 when you purchased the dehumidifier?

- 1. \_\_\_\_\_ **[DROP DOWN]**
- 98. Don't know

97. Was this dehumidifier purchased:

- 1. To replace a functioning unit
- 2. To replace a broken unit
- 3. Not a replacement
- 98. Don't know

**[DISPLAY IF Q97 = 2]**

98. Why didn't you repair the broken unit?

- 1. Too costly
- 2. Too much time involved
- 3. Wanted to change style
- 98. Don't know

99. For the dehumidifier you bought, was it purchased through any of the following retail stores:

- 1. The Home Depot®
- 2. Lowes Home Improvement
- 3. Sam's Club
- 4. Walmart
- 5. Costco®
- 6. Sears
- 7. Hartville Hardware
- 97. Other (Specify)
- 98. Don't know

100. Did you know **[ANSWER Q2]** provides funds to reduce the price of dehumidifiers purchased at retail stores?

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

**[DISPLAY Q101 - Q102 IF Q100 = 1]**

101. How did you learn about the discounted price?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't know

102. To the best of your knowledge, was the dehumidifier you purchased in 2018 discounted through your utility?

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

103. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the dehumidifier you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

104. Have you noticed a difference on your electric bill?

- 1. Yes, I've noticed savings
- 2. No
- 98. Don't know

### Room Air Conditioner

#### [DISPLAY Q105 - Q111 IF Q68d = 1]

We have questions about your new room air conditioner that may require you to look at the appliance. Details sought include: **Make/Manufacturer; BTUs (capacity)**

105. What was the make or manufacturer of the room air conditioner you purchased? The make or manufacturer should be listed on the unit. (Please look at the room air conditioner)

- 1. \_\_\_\_\_ [OPEN]
- 98. Don't know

106. What is the capacity of the unit in BTUs? (Please look at the room air conditioner)

- 1. \_\_\_\_\_ [OPEN]
- 98. Don't know

107. Was the room AC you purchased ENERGY STAR® certified?

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

108. Which month in 2018 was the air conditioner installed?

- 1. \_\_\_\_\_ **[DROP DOWN]**
- 98. Don't know

109. Was this air conditioner purchased?

- 1. To replace a functioning unit
- 2. To replace a broken unit
- 3. Not a replacement
- 98. Don't know

**[DISPLAY IF Q109 = 2]**

110. Why didn't you repair the broken unit?

- 1. Too costly
- 2. Too much time involved
- 3. Wanted to change style
- 98. Don't know

**[DISPLAY IF Q109 = 1 or 2]**

111. What did you do with your old unit?

- 1. Still have it, not in use
- 2. Recycled the unit
- 3. Took it to the dump
- 4. Sold it for scrap metal
- 5. Sold for parts
- 6. Sold or gifted unit to an individual
- 7. Sold or donated to an organization/company
- 97. Other (Specify)
- 98. Don't know

**[DISPLAY IF Q111 = 7]**

112. Please provide the organization/company that received the donation:

- 1. \_\_\_\_\_ **[OPEN]**
- 98. Don't know

113. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the room air conditioner you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

### High-Efficiency Central Air Conditioner

[DISPLAY Q114 - Q126 IF Q68e = 1]

We have questions about your new central air conditioner that may require you to look at the appliance. Details sought include: **Make/Manufacturer; BTUs (capacity); SEER rating**

114. Which month in 2018 did you purchase the central air conditioning system?

- 1. \_\_\_\_\_ [ DROP DOWN]
- 98. Don't know

115. Please provide the make or manufacturer of the central air conditioning system you purchased. The make or manufacturer should be listed on the outdoor unit. (Please look at the central air conditioner)

- 1. \_\_\_\_\_ [OPEN]
- 98. Don't know

116. Was the central air conditioning system you purchased ENERGY STAR® certified?

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

117. What is the capacity of the unit in BTU/hr.? (Please look at the central air conditioner)

- 1. \_\_\_\_\_ [OPEN or Drop Down]
- 98. Don't know

118. What is the SEER rating of the NEW unit? (Please look at the central air conditioner)

- 1. \_\_\_\_\_ [OPEN or Drop Down]

98. Don't know
119. Do you recall the SEER rating of the OLD unit? If so, please enter below:
1. \_\_\_\_\_ **[OPEN or Drop Down]**
98. Don't know

**[DISPLAY Q120 IF Q119 = 98]**

120. Do you recall the age of the OLD unit?
1. \_\_\_\_\_ **[OPEN or Drop Down]**
98. Don't know
121. Can you tell me the name of the contractor who installed the new unit?
1. \_\_\_\_\_ **[OPEN]**
2. Did not use contractor
98. Don't know
122. Was this air conditioner purchased?
1. To replace a functioning unit
2. To replace a broken unit
3. Not a replacement
98. Don't know

**[DISPLAY IF Q0 = 2]**

123. Why didn't you repair the broken unit?
1. Too costly
2. Too much time involved
3. Wanted to change style
98. Don't know

**[DISPLAY IF Q122 = 1 or 2]**

124. What did you do with your old unit?
1. Still have it, not in use
2. Recycled the unit
3. Took it to the dump
4. Sold it for scrap metal
5. Sold for parts
6. Sold or gifted unit to an individual
7. Sold or donated to an organization/company
97. Other (Specify)



98. Don't know

**[DISPLAY IF Q124 = 7]**

125. Please provide the organization/company that received the donation:

1. \_\_\_\_\_ [OPEN]

98. Don't know

126. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the central AC you purchased?

1. Very dissatisfied

2. Dissatisfied

3. Neutral

4. Satisfied

5. Very satisfied

98. Don't know

**Heat Pump**

**[DISPLAY Q127 – Q0 IF Q68f = 1]**

We have questions about your new heat pump that may require you to look at the appliance. Details sought include: **Make/Manufacturer; BTUs (capacity); SEER rating**

127. Which month in 2018 did you purchase the heat pump?

1. \_\_\_\_\_ [DROP DOWN]

98. Don't know

128. Please provide the make or manufacturer of the heat pump you purchased.  
(Please look at the heat pump)

1. \_\_\_\_\_ [OPEN]

98. Don't know \

129. Was the heat pump you purchased ENERGY STAR® certified?

1. Yes

2. No

98. Don't know

130. What is the capacity of the unit in BTU/hr.? (Please look at the heat pump)

1. \_\_\_\_\_ [OPEN or Drop Down]

98. Don't know

131. What is the SEER rating of the NEW unit? (Please look at the heat pump)

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 98. Don't know

132. Do you recall the SEER rating of the OLD unit?

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 98. Don't know

**[DISPLAY IF Q132 = 98]**

133. Do you recall the age of the OLD unit?

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 98. Don't know

134. Can you tell me the name of the contractor who installed the new unit?

- 1. \_\_\_\_\_ **[OPEN]**
- 2. Did not use contractor
- 98. Don't know

135. Was this heat pump purchased?

- 1. To replace a functioning unit
- 2. To replace a broken unit
- 3. Not a replacement
- 98. Don't know

136. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the heat pump you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

### **Mini-Split Heat Pump**

**[DISPLAY Q137 – Q145 IF Q68g = 1]**

We have questions about your new mini-split heat pump that may require you to look at the appliance. Details sought include: **Make/Manufacturer; BTUs (capacity); SEER rating**

137. Which month in 2018 did you purchase the mini-split heat pump?

1. \_\_\_\_\_ **[DROP DOWN]**  
98. Don't know

138. Can you tell me the make or manufacturer of the mini-split heat pump you purchased? (Please look at the mini heat pump)

1. \_\_\_\_\_ **[OPEN]**  
98. Don't know

139. Was the mini-split heat pump you purchased ENERGY STAR® certified?

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

140. What is the capacity of the unit in BTU/hr.? (Please look at the mini heat pump)

1. \_\_\_\_\_ **[OPEN or Drop Down]**  
98. Don't know

141. What is the SEER rating of the NEW unit? (Please look at the mini heat pump)

1. \_\_\_\_\_ **[OPEN or Drop Down]**  
98. Don't know

142. Do you recall the SEER rating of the OLD unit?

1. \_\_\_\_\_ **[OPEN or Drop Down]**  
98. Don't know

**[DISPLAY IF Q142 = 98]**

143. Do you recall the age of the OLD unit?

1. \_\_\_\_\_ **[DROP DOWN]**  
98. Don't know

144. Can you tell me the name of the contractor who installed the new unit?

1. \_\_\_\_\_ **[OPEN]**  
2. Did not use contractor  
98. Don't know

145. Was this mini-split heat pump purchased:

- 1. To replace a functioning unit
- 2. To replace a broken unit
- 3. Not a replacement
- 98. Don't know

146. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the mini-split heat pump you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

### Household Electronics

147. Since January 1, 2018, have you purchased or had installed ANY of the following items in your home/residence: Computer, Computer Monitor, Digital Imaging or Printers, a TV less than 40 inches, or a TV that is 40 inches or larger?

Q.	Appliance	Yes	No	DK	
a.	Computer	1	2	98	
b.	Computer Monitor	1	2	98	
c.	Imaging or printers	1	2	98	
d.	TV, less than 40 inches	1	2	98	
e.	TV, 40 inches or larger	1	2	98	

### Computers

**[DISPLAY Q148 – Q153 IF Q147a = 1]**

148. Are you currently using the computer you purchased?

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

149. For the computer you bought, was it purchased through any of the following retail stores:

1. Sam's Club
2. Walmart
3. Costco®
4. Sears
5. Best Buy®
97. Other (Specify)
98. Don't know

150. Did you know **[ANSWER Q2]** provides funds to promote energy efficient computers purchased at retail stores?

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

**[DISPLAY Q151 to Q152 if Q150 = 1]**

151. How did you learn about the promotion?

1. Retail Store Signage
2. Retail Store Employee
3. Utility Marketing
4. Friend/Family
5. TV/Radio/Internet Advertising
97. Other (Specify)
98. Don't Know

152. To the best of your knowledge, was the computer you purchased in 2018 promoted through your utility?

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

153. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the computer you purchased?

1. Very dissatisfied
2. Dissatisfied
3. Neutral
4. Satisfied
5. Very satisfied
98. Don't know

## Computer Monitors

### [DISPLAY Q154 – Q159 IF Q147b = 1]

154. Are you currently using the computer monitor you purchased?

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

155. For the computer monitor you bought, was it purchased through any of the following retail stores:

- 1. Sam's Club
- 2. Walmart
- 3. Costco®
- 4. Sears
- 5. Best Buy®
- 97. Other (Specify)
- 98. Don't know

156. Did you know **[ANSWER Q2]** provides funds to promote energy efficient computer monitors purchased at retail stores?

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

### [DISPLAY Q157 - Q158 IF Q156= 1]

157. How did you learn about the promotion?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't Know

158. To the best of your knowledge, was the computer monitor you purchased in 2018 promoted through your utility?

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

159. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the computer monitor you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

### **Imaging, Printers, and Scanners**

#### **[DISPLAY Q160 – Q165 IF Q147c = 1]**

160. Are you still using the printer or other imaging device you purchased?

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

161. For the printer or other imaging device you bought, was it purchased through any of the following retail stores:

- 1. Sam's Club
- 2. Walmart
- 3. Costco®
- 4. Sears
- 5. Best Buy®
- 97. Other (Specify)
- 98. Don't know

162. Did you know **[ANSWER Q2]** provides funds to promote energy efficient imaging devices purchased at retail stores?

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

#### **[DISPLAY Q163 - Q164 IF Q162 = 1]**

163. How did you learn about the promotion?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't Know

164. To the best of your knowledge, was the printer or imaging device you purchased in 2018 promoted through your utility?

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

165. Please rate, on a scale of 1-5, how satisfied or dissatisfied you are with the printer or imaging device you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

**TVs less than 40"**

**[DISPLAY Q166 – Q0 IF Q147d = 1]**

166. Did you install the TV smaller than 40 inches you purchased?

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

167. For the TV smaller than 40 inches you bought, was it purchased through any of the following retail stores:

- 1. Sam's Club
- 2. Walmart
- 3. Costco®
- 4. Sears
- 5. Best Buy®
- 97. Other (Specify)
- 98. Don't know

168. Did you know **[ANSWER Q2]** provides funds to promote energy efficient TVs purchased at retail stores?

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



**[DISPLAY Q169 - Q170 if Q168= 1]**

169. How did you become aware of the promotion?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't Know

170. To the best of your knowledge, was the TV you purchased in 2018 promoted through your utility?

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

171. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the TV you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

**[DISPLAY Q172– Q177 IF Q147e = 1]**

**TVs 40" or greater**

172. Did you install the TV 40 inches or greater you purchased?

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

173. For the TV 40 inches or greater, was it purchased through any of the following retail stores:

- 1. Sam's Club
- 2. Walmart
- 3. Costco®

- 4. Sears
- 5. Best Buy®
- 97. Other (Specify)
- 98. Don't know

174. Did you know **[ANSWER Q2]** provides funds to promote energy efficient TVs purchased at retail stores?

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

**[DISPLAY Q175 - Q176 IF Q174 = 1]**

175. How did you learn about the promotion?

- 1. Retail Store Signage
- 2. Retail Store Employee
- 3. Utility Marketing
- 4. Friend/Family
- 5. TV/Radio/Internet Advertising
- 97. Other (Specify)
- 98. Don't Know

176. To the best of your knowledge, was the TV you purchased in 2018 promoted through your utility?

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

177. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the TV you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

**Smart Thermostat**

178. Did you purchase a Smart Thermostat in 2018? Smart thermostat models include Nest, ecobee, Honeywell, LUX, and Emerson models.

- 1. Yes
- 2. No

98. Don't know

**[DISPLAY Q179 – Q186 IF Q178 = 1]**

179. Did you install the Smart Thermostat you purchased?

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

180. On a scale of 1-5, where 1 means very dissatisfied and 5 means very satisfied, how satisfied or dissatisfied you are with the smart thermostat you purchased?

- 1. Very dissatisfied
- 2. Dissatisfied
- 3. Neutral
- 4. Satisfied
- 5. Very satisfied
- 98. Don't know

181. Have you noticed a difference on your electric bill?

- 1. Yes, I've noticed savings
- 2. No
- 98. Don't know

182. What kind of AC unit do you have?

- 1. Room Air Conditioner
- 2. Central AC
- 3. Heat Pump
- 4. Mini-Split Heat Pump
- 98. Don't know

183. What kind of heating unit do you have?

- 1. Electric Furnace
- 2. Gas Furnace
- 3. Heat Pump
- 98. Don't know

184. Do you recall the SEER rating of the A/C unit?

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 98. Don't know

185. Do you recall the age of the A/C unit?

- 1. \_\_\_\_\_ [OPEN or Drop Down]
- 98. Don't know

186. What type of thermostat is your Smart Thermostat replacing?

- 1. Manual
- 2. Programmable
- 98. Don't know

### Household Characteristics / Demographics

A few of questions about your home and income level follow. These are anonymous and will be used solely for the purpose of combining different customers' responses. You can choose to not answer any of these questions.

Please answer the following questions about the house, apartment, or mobile home you reside in.

187. Which best describes this building? Include all apartments, flats, etc., even if vacant.

- 1. A mobile home
- 2. A one-family house detached from any other house
- 3. A one-family house attached to one or more houses
- 4. A building with 2 apartments
- 5. A building with 3 or 4 apartments
- 6. A building with 5 to 9 apartments
- 7. A building with 10 to 19 apartments
- 8. A building with 20 to 49 apartments
- 9. A building with 50 or more apartments
- 10. Boat, RV, van, etc.
- 98. Don't know

188. Please select one of the following. Is this house, apartment, or mobile home:

- 1. Owned by you or someone in this household with a mortgage or loan? Include home equity loans?
- 2. Owned by you or someone in this household free and clear (without a mortgage or loan)?
- 3. Rented?
- 4. Occupied without payment of rent?
- 98. Don't know

189. About when was this building first built?

- 1. 2000 or later
- 2. 1990 to 1999
- 3. 1980 to 1989
- 4. 1970 to 1979

- 5. 1960 to 1969
- 6. 1950 to 1959
- 7. 1940 to 1949
- 8. 1939 or Earlier
- 98. Don't know

**[DISPLAY IF Q189= 1]**

190. You indicated the building was built in 2000 or later. Please provide the exact year.

- 1. \_\_\_\_\_ **[OPEN OR Drop Down]**
- 98. Don't know

191. Approximately how many square feet is your home?

- 1. \_\_\_\_\_ **[OPEN]**
- 98. Don't know

192. How many separate rooms are there in this house, apartment or mobile home? Include bedrooms, kitchens, etc. Exclude bathrooms, porches, foyers, halls or unfinished basements.

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 98. Don't know

193. How many of those rooms are bedrooms? Count as bedrooms those rooms you would list if this house, apartment, or mobile home were for sale or rent. (For an efficiency/studio apartment please record "0")

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 98. Don't know

194. How many people are living or staying at this address?

Include everyone who is living or staying here for more than 2 months. Include yourself if you are living or staying here for more than 2 months. Include anyone else staying here who does not have another place to stay, even if they are here for less than two months. Do not include anyone who is living somewhere else for more than two months, such as a college student living away or someone in the Armed Forces on deployment.

- 1. \_\_\_\_\_ **[OPEN or Drop Down]**
- 98. Don't know

195. When did the person who owns or leases this house, apartment or mobile home move in? Please provide a month and year.

1. Month \_\_\_\_\_ [OPEN or Drop Down]
2. Year \_\_\_\_\_ [OPEN or Drop Down]
98. Don't know

196. Which fuel is used MOST for heating this house, apartment, or mobile home?

1. Gas: from underground pipes serving the neighborhood
2. Gas: stored liquid petroleum gas (propane/butane)
3. Electricity
4. Fuel oil, kerosene, etc.
5. Coal
6. Wood
7. Solar energy
8. Other fuel
9. No fuel used
98. Don't know

197. In the past 12 months, what was the cost in dollars of oil, coal, kerosene, wood, etc., for this house, apartment, or mobile home? If you have lived here less than 12 months, estimate the cost for an entire year.

1. \$ \_\_\_\_\_ [OPEN or Drop Down]
98. Don't know

198. What is your approximate total household income?

1. Less than \$18,000
2. \$18,000 to less than \$25,000
3. \$25,000 to less than \$31,000
4. \$31,000 to less than \$38,000
5. \$38,000 to less than \$44,000
6. \$44,000 to less than \$51,000
7. \$51,000 to less than \$57,000
8. \$57,000 to less than \$64,000
9. \$64,000 to less than \$70,000
10. \$70,000 to less than \$77,000
11. \$77,000 to less than \$83,000
12. \$83,000 to less than \$90,000
13. \$90,000 or more
98. Don't know

## Customer Information

Thank you for your time in answering questions regarding lighting and appliance purchases in Ohio. We are finished at this time. Upon verification that you are a

customer of FirstEnergy's Ohio utilities, we would like to provide you with a \$5 gift card. To do that, we will need your name and an email address where we can send you a link to your gift card.

1. First Name and Last Name: \_\_\_\_\_
2. Email Address: \_\_\_\_\_

190. Would you allow us to contact you again to schedule a household visit to document the energy saving measures you described? You would receive an additional \$20 gift card if you are selected and participate in the home visit.

1. Yes
2. No

**[DISPLAY Q191 & Q192 IF Q190 = 1]**

191. What is the best way to contact you about scheduling the home verification visit if your home is selected, via phone or email? Please enter a phone number or email address

If Telephone preferred, please enter: \_\_\_\_\_

If Email preferred, please enter: \_\_\_\_\_

192. What day of the week and time would work best for you?

1. Day: \_\_\_\_\_ **[RECORD RESPONSE]**
2. Time: \_\_\_\_\_ **[RECORD RESPONSE]**
98. Don't Know

You should be receiving an email with the link to your gift card in 10 days or less. If you have any questions regarding this survey or would like to know the status of your gift card, please send an email to [adm-surveys2018@admenergy.com](mailto:adm-surveys2018@admenergy.com). Once again thank you for participating in this survey regarding household lighting and appliance purchases in Ohio. Have a great day!

**[PROGRAM NOTE: INCLUDE THANK YOU PAGE REQUESTING ANOTHER HOUSEHOLD MEMBER]**

**[PROGRAM NOTE: INCLUDE THANK YOU PAGE for those who aren't eligible].**

## 14 Appendix E: Interview Guides

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### 14.1 HVAC Contractor Interview Guide

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#### Overview

This contractor guide is to be administered to HVAC contractors participating in FirstEnergy's Energy Efficient Products Program.

The HVAC sub-program launched in May of 2018. The 2018 evaluation includes interviews with up to five participating HVAC contractors to gather information on issues or concerns engaging in the program in 2018, support needs, level of engagement in program, customer response to rebates, areas the program is working well and opportunities for improvement. Interviews will target participating contractors, listed on the FirstEnergy website who are qualified to complete HVAC tune-ups for customers.

Customers receive a rebate of \$50.00 for this HVAC maintenance. Other HVAC measures offered by the Energy Efficient Products program include heat pumps, central air conditioners, room air conditioners, ductless mini-split heat pumps, water and geothermal heat pumps, furnace fans, circulation pumps, and smart thermostats. These are all midstream product offerings, where FirstEnergy provides instant discounts in-store for these qualifying products.

We structured this interview guide to focus on questions about the HVAC tune-ups that qualifying contractors complete; however, we also include questions to understand contractor interactions with, and influence on, customer purchases of these mid-stream HVAC measures.

The following guide addresses the research questions listed in the table below.



*Table 14-1: Key Research Areas and Questions for Retailer Interviews.*

Research Area	Research Question	Interview Guide Questions
Program Experience	<p>How do HVAC businesses enter the program?  What motivates them to participate in the program? What program benefits do these businesses perceive to be most motivating?</p> <p>How is the program working for HVAC contractors, including their level of engagement in the program, key program processes, opportunities for improvement, and overall satisfaction?</p> <p>What, if anything, needs to be improved?</p> <p>Are contractors interested in an incentive/reward system for their participation; if yes, why would this motivate and/or help them?</p>	<p>B1, B2, B3  E3, E4, E5</p>
Customer Experience in Program	<p>How do customers find out about the program tune-ups?</p> <p>What do customers experience in the program?</p> <p>How might participation be increased in the tune-up portion of the HVAC sub-program?</p> <p>Is the new HVAC maintenance messaging effective in increasing customer awareness and use of the HVAC tune-up measure and rebate?</p>	<p>C1, C2, C3, C4, C5, C6, C7, C8, C9, C10</p> <p>D1, D2, D3, D4</p>
Perception of Value	<p>How does the program affect business sales outside of the program?</p> <p>Do businesses see value in the program?</p>	<p>E1, E2, E3, E4, E5</p>
Overall Satisfaction	<p>Overall, are HVAC contractors satisfied with the program?</p>	<p>F1, F2, F3</p>

## Sampling Plan

According to the FirstEnergy HVAC program website, a total of 59 organizations offer HVAC tune-ups as participating contractors in the program. We will use this list to recruit and speak with five HVAC contractors.

## Screener

Hi, this is \_\_\_\_\_ from [ILLUME Advising], a national research firm. FirstEnergy hired us to speak with contractors about their experience providing tune-up services through their HVAC program. Your views into FirstEnergy's HVAC program and rebates are very important to this study. We'd like to ask you a few questions to learn your perspective on this program and the rebates. It will take about 20 minutes over the phone.

According to our records, your company participates in FirstEnergy's HVAC program. This means that you/your company signed the FirstEnergy participating contractor agreement, that you are listed on FirstEnergy's HVAC website as a qualified contractor, and that you can submit rebates for HVAC tune-ups for your customers.

I'm looking to speak to a person familiar with your company's participation in FirstEnergy's HVAC program.

[IF NEEDED: We're looking for a person who was involved, someone who decided to participate in the program as a qualified contractor, who signed the participating contractor agreement, or who submits rebates on behalf of customers.]

Are you the best person from your company to talk to about this? [RECORD YES, NO, DK, REFUSED]

1. [IF YES] Great. Is now a good time to speak?
  - a. [IF YES] Continue with interview.
  - b. [IF NO] When is a better time that I could try to call you back? [RECORD DATE, TIME].
2. [IF NO, DK] Can you please refer me to the person that I should speak with? [RECORD FULL NAME, TELEPHONE NUMBER].
3. [IF REFUSED] Ok, thank you for very much for your time. [TERMINATE].

[IF NEEDED: If you would like to contact FirstEnergy to verify the legitimacy of this study, please contact Rebecca Harder at [rharder@firstenergycorp.com](mailto:rharder@firstenergycorp.com).]

## Voicemail

Hi, this is \_\_\_\_\_ from [ILLUME Advising], a national research firm hired by FirstEnergy to do research on the tune-up portion of their HVAC program. We would like to speak with participating contractors to learn about their experience so far in this program. We'd like to ask you a few questions to learn your perspective on this program and the

rebates. It will take about 20 minutes over the phone. If this sounds like something you'd be interested in, please give me a call back at \_\_\_\_\_. Thank you so much.

## **Interview Guide**

### **A. Introduction**

Thank you again for speaking with me today. I just want to let you know that your responses will be kept anonymous and we will only report in aggregate. We want you to be as honest as possible so that we can provide FirstEnergy with all the information. Before we start, do you have any questions for me? And, do you mind if I record this call, so I don't have to take notes furiously?

Great, I'd like to begin by asking some general questions about you and your company.

1. What is your title and role within <Company Name>?
  - a. How long have you been in this role?
2. What types of services does your company provide? [Probe to understand HVAC tune-ups; other HVAC services].

### **B. General overview of Program Participation**

Now, I'd like to ask you generally about what your company has experienced so far in the FirstEnergy program.

1. How did your company first learn about the FirstEnergy HVAC program?
  - a. How long has your business been involved in the FirstEnergy Program?
2. Can you tell me a little bit about why your company decided to participate in the program?
3. Overall, what has your company's experience in the program been like?
  - a. During 2018, about how many HVAC tune-up projects did your company complete?
  - b. How many of these tune-ups were part of the FirstEnergy program?

### **C. Customer Experience in Program**

Now I have a few questions for you about the specifics of the tune-up process and the customers who receive tune-ups.

1. First, can you describe a typical tune-up job from start to finish? What are the key steps that you go through? [Probe: start by when you speak with the customer for the first time and end with your final interaction with the customer.]
2. About what portion of your customers receive tune-ups regularly (such as annually)?
3. What are your tactics to get people to sign up for HVAC tune-ups?
4. At what point do you tell them about FirstEnergy's rebate?
5. Do or your customers typically complete the HVAC maintenance rebate application?
  - a. Have you heard of any issues or concerns about the rebate processing from your customers?
6. How, if at all, does this differ between your customers that have purchased a rebated item from a partner store, versus other customers?
7. How do customers learn about the FirstEnergy tune-up program?
8. What type of marketing or advertising, if any, does your company use for tune-up services? [*Probe for types of marketing activities and marketing materials.*]
  - a. How does FirstEnergy support, if at all, you with this marketing?
  - b. How do you decide which customers to market to?
9. Do customers ever mention learning about the tune-ups from signs they've seen in stores like Home Depot® or Menard's™?
10. About what portion of the customers are aware of the rebate before you tell them?
11. How impactful is the rebate in customers' decisions to have the service complete? Please explain.
12. What challenges, if any, do you experience in getting customers to tune-up their equipment?
13. What portion of customers become repeat customers based on the tune-up?

#### D. Midstream HVAC Rebates and HVAC Tune-Up

Next, I have some questions about another portion of the FirstEnergy program.

1. Were you aware that FirstEnergy offers discounted HVAC equipment like ENERGY STAR® central air conditioners and geothermal heat pumps at retailers throughout the state? **IF YES CONTINUE TO THE REST OF SECTION D; IF NO MOVE TO SECTION E.**

2. Do customers mention the FirstEnergy HVAC rebates when scheduling their tune-up?
3. About how many customers that receive tune-ups also mention these HVAC rebates?
  - a. Do you see a difference in this type of customer versus those you tell about the rebate? If yes, how are they different?
4. What, if anything, can FirstEnergy do to help customers who have purchased a rebated HVAC product learn about the tune-up program and your business?

#### E. Perception of Value

Now, I'd like to discuss how the program has affected your business. We do not need specific sales numbers, just a general perception of how your business has been in the last year.

1. What effect has the program had on your business?
  - a. Have you completed more tune-ups than before you started participating in the program?
  - b. Has the program driven business beyond tune-ups to your company?
2. How does the program add value to your company?
3. Are you planning to participate next year?
  - a. *[IF NO]* Why are you leaving the program?
4. How, if at all, can FirstEnergy improve the program for next year? *[Probe for training, rebate processing or tracking if not already addressed.]*
5. FirstEnergy is considering offering a reward program for jobs completed and the quality of the jobs. Is this something that would be of interest to your business?

#### F. program benefits and satisfaction

Finally, I would like to ask a few questions about your overall satisfaction with the program.

1. Overall, how satisfied are you with your business's involvement in the First Energy program?
2. Broadly, has participating in the program met your company's expectations? If not, why?

3. Would you recommend participating in this program to another HVAC company?  
Why or why not?

## CONCLUSION

Those are all the questions I had for you today. Is there anything else related to your experience that you would like to discuss?

Thank you so much for your time. FirstEnergy really appreciates your participation and your feedback.

## 14.2 Retail Manager Interview Guide

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### RETAILER INTERVIEW GUIDE

**PREPARED FOR:** FirstEnergy

**PREPARED BY:** ILLUME ADVISING, LLC

**DATE:** December 20, 2018

### INTRODUCTION

As part of the FirstEnergy Energy Efficient Products Program process evaluation, ILLUME Advising is conducting qualitative, in-depth interviews with retailers who currently participate in the program. The goal of these interviews is to assess the key research areas and questions described in Table 14-2, below.

*Table 14-2: Key Research Areas and Questions for Retailer Interviews.*

Research Area	Research Questions	Interview Guide Questions
Program Implementation	How consistently is the program being delivered across retail partners? What changes have been made to the program's design or delivery since 2017 to improve the effectiveness of retailer training and communication? How are these changes working for retailers? Has the program and each sub-program performed as expected and, if not, why not? With regards to the HVAC sub-program: how might participation be increased in this sub-program? What was the level of participation for heat pump water heater and smart thermostat	A3, A4, B3, F1, F2, F3, F4

Research Area	Research Questions	Interview Guide Questions
	measures (and all program measures) in 2018?	
Program Engagement and Training	<p>How do stores engage with the program?</p> <p>What components of program engagement are working well for retailers?</p> <p>What components of program engagement, if any, are not working well for retailers?</p> <p>What types of additional support, if any, do retailers need to sell qualifying equipment?</p> <p>For retailers who have participated in program trainings, how effective are these trainings in preparing retail staff to discuss rebates and qualifying equipment with customers?</p> <p>How have training/information sharing improvements affected stores?</p>	B1, B2, B3, B4, B5
Motivation to Participate	<p>What motivates retailers to participate in the program? What program benefits are most motivating?</p> <p>How do retailers make decisions about which products to stock?</p> <p>What are retailers' expectations for sales of program qualifying?</p> <p>Are there other ways the program can recruit high-profile retailers, such as Wal-Mart?</p>	C1, C2, C3
Customer awareness and effectiveness of signage	<p>What types of program signage are retailers using in their stores?</p> <p>What is the purpose of the signage?</p> <p>How effective is signage at increasing customer awareness of qualifying equipment? Which types of signage have been most effective in increasing customer awareness of qualifying equipment?</p> <p>How effective is signage in motivating customers to purchase qualifying equipment over non-qualifying equipment? Which types of signage have been most effective in motivating customers to purchase the qualifying equipment?</p>	E1, E2, E3, E4
Perception of impact	<p>How effective are program rebates in motivating customers to purchase qualifying equipment?</p> <p>Do retailers perceive rebate levels to be adequate to incentivize customers to purchase qualifying equipment?</p>	F1, F2, F3, F4

Research Area	Research Questions	Interview Guide Questions
	<p>How influential do retailers believe the program (inclusive of rebates, signage, and training) is in increasing sales of program qualified equipment?</p> <p>Are there other high efficiency products not included in the program that retailers think should be included in the program?</p>	
Program value and Overall satisfaction	<p>What do retailers perceive as the key value propositions to participating in the program?</p> <p>What do retailers perceive as the key value propositions for their customers?</p> <p>How satisfied are retailers with the program overall?</p> <p>Where are there opportunities for program improvement for program products?</p> <p>Are program partners, including retailers, distributors, manufacturers and HVAC contractors satisfied with the program?</p>	A4, E5, G1, G2

We are aiming for up to a total of 10 retailer interview completes. Honeywell provided retailer contact information for a subset of participating retailers on November 15, 2018. The retailer contact information provided includes contact information for retailers from all four sub-programs, including Consumer Electronics, Lighting, Appliances, and HVAC. The evaluation team will target interview completions with retailers representing all four sub-programs. We will also place priority on conducting interviews with retailers stocking and selling HVAC equipment, as this sub-program launched in May of 2018.

Interviews will be completed by telephone. Due to the holiday season, it is expected that retailers will only be able to spend 15-20 minutes completing the interview. As such, high priority questions are noted below in **bold** font. If retailers are willing to spend additional time answering questions, secondary questions (not bolded) will be asked.

## Introduction

Thank you for agreeing to talk with me today. I received your name from Honeywell staff, who suggested I speak with you about First Energy's Energy Efficient Products program. My company, ILLUME Advising, LLC, is conducting evaluation research on the program. Your knowledge and insights are extremely important in this process. Before we start, I wanted to let you know that I am recording this interview in order to ensure my notes are accurate. Is this okay with you?

### A. Program Implementation



1. Please describe your role and responsibilities at [RETAILER]. (Probe for role in determining what products to stock; role in overseeing staff in store who sell efficient qualifying products; role in merchandising and stocking decisions; role in product placement and signage decisions; etc.)
2. We understand that [RETAILER] stocks and has sold [CONSUMER ELECTRONICS, APPLIANCES, LIGHTING, HVAC] which are qualifying products in First Energy's Energy Efficient Products Program. What are your roles and responsibilities related to FirstEnergy's Energy Efficient Products Program?
  - a. Are there others at [RETAILER] who are engaged in the Energy Efficient Products Program? [IF SO] What are their roles?
3. How long has [RETAILER] been involved in the First Energy Program?
  - a. [If longer than one year] Have there been any changes in the program since last year? If so, what changes? How have those changes affected your experience in the program?
4. How has [RETAILER]'s experience been in the program so far? [Probe for customer experience, perception on success or challenges].
  - a. *[HVAC Only]* How has your experience been selling smart thermostats?
  - b. *[HVAC Only]* How has your experience been selling FirstEnergy rebated HVAC equipment (i.e., heat pump water heaters, min-split ductless heat pumps, geothermal pumps, etc.)?

#### B. Program Engagement and Training

1. I understand that Honeywell offers to conduct trainings with sales staff at each participating store. Has your store participated in any of these trainings?
  - a. What type of information was provided through the trainings?
  - b. What goals or expectations did you have going into that training? (Probe for: program information, information about qualifying products, whether they wanted a specific number of staff to be trained, etc.)
2. How satisfied were you with training your staff has received through the program?
  - a. Are there any sales associate questions that the training did not address?
  - b. Are there any customer questions that the training did not address?
  - c. Do you have any recommendations for improving the training?
3. What types of program materials or training materials has Honeywell provided to your store? (Probe to understand types of materials, program binder, other training materials provided.)

- a. How useful was the program binder and program materials that Honeywell left with your store?
  - b. *[For stores who participated last year]* How have the new trainings items, like the program binder, affected your store?
4. Was there any way the program could better inform you about the program or better support your efforts training staff?
5. How often do you interact with FirstEnergy? With Honeywell? And for what purposes (i.e. who's contacting whom)?
  - a. Have you had to reach out to program staff with program questions or concerns? [Probe for timeliness, knowledge and ability to answer questions.]

### C. Motivation to Participate

I want to ask you about how [RETAILER] initially got involved with FirstEnergy's Energy Efficient Products Program. [INTERVIEWER NOTE: The bolded questions in this section are high priority only if speaking with management].

1. [IF MANAGEMENT] Do you know what motivated [RETAILER] to participate in the program? (Probe for rebates or discounts offered, etc.)
2. [IF INVOLVED IN, OR AWARE OF, STOCKING DECISIONS PER ABOVE] How does [RETAILER] typically decide what equipment to stock? How does ENERGY STAR® status factor into your stocking decisions?
  - a. Did the program have any impact on [RETAILER'S] decision to stock the program-qualifying equipment? Please explain.
  - b. Did the program have any impact on the placement of qualifying equipment in your store? Please explain.
3. Have the program qualifying products sold like you expected? Why do you think that is?
  - a. *[If they have done more poorly than expected]* What ways do you think FirstEnergy can help to improve the sale of these products?

### E. Customer Awareness and Effectiveness of Signage

1. We understand that the program provides in-store materials such as stickers and banners that can be placed on qualifying equipment. [IF POS rebates: Additionally, your customers can get an instant rebate in the store]. What types of program signage are you currently using in your store?
2. What do you think the signage is most effective in conveying to customers? Do you believe that the signage is effective in encouraging customers to purchase qualifying equipment? Why/why not?

3. How effective do you believe this signage is in increasing customer awareness about the program and qualifying products? [Probe for differences among four sub-programs.]
  - a. What types of signage have been most effective in increasing customer awareness of qualifying products?
  - b. *[HVAC only; if not already addressed]* Can you describe the signage your store is using to promote FirstEnergy rebated HVAC equipment?
    - i. How are customers reacting to this signage?
    - ii. What types of questions do customers have after seeing the signage?
4. What, if any, types of signage would you like to have in your store that you don't currently have?
5. Generally, why do you think customers purchase the program qualifying products over the non-program products? *[Probe for rebates, signage, efficiency.]*

#### F. Perception of Impact of Financial Support On Purchasing Decisions

[INTERVIEWER NOTE: If the retailer participates in the HVAC sub-program, specific HVAC questions will follow the broader product questions].

1. Please think back to recent sales numbers for these products. Are these products selling better, worse, or about the same as other products of the same price range?
  - a. What impact, if any, do you think the program rebates or discounts have had on these sales numbers? Why do you say that?
  - b. *[HVAC only]* What impact has the program had on the HVAC equipment (i.e., pump water heaters, min-split ductless heat pumps, geothermal pumps) that have been selling? How are the HVAC qualifying products selling relative to non-qualifying products?
  - c. *[HVAC only]* What impact has the program had on smart thermostats that have been selling? Why do you say that?
2. From your perspective, are there any challenges to selling any of the products (probe for which products have been difficult to sell)?
  - a. *[HVAC only]* What challenges have you seen for selling HVAC products specifically?
  - b. Is there anything the program could help you to do overcome these challenges?
3. Overall, how influential do you believe the program (inclusive of rebates, discounts, signage, and training) is in increasing sales of program-qualified equipment?

4. [*HVAC only*] How influential has the program been in helping your store to sell HVAC products?
5. Have you encouraged customers to sign up for the FirstEnergy HVAC tune-up? If yes, when do you do this?
6. Are there other high efficiency products not included in the program that retailers think should be included in the program?

#### G. Program Value and Overall Satisfaction

Finally, I would like to ask a few questions about your overall experience with the program.

1. How satisfied are you with [RETAILER's] involvement in the First Energy program?
  - a. What are the main benefits to [RETAILER] for participating in this program?
  - b. What are the drawbacks to participating in this program?
  - c. Is there any aspect of the program that could be improved? (Probe on in-store signage, training, rebate processing or tracking if not already addressed.)
2. Would you recommend participating in this program to another retailer? Why or why not?

Those are all the questions I have for you today. Thank you very much for your time.