APPENDIX G – ENERGY EFFICIENT PRODUCTS EM&V REPORT

Ohio Edison Company
The Cleveland Electric Illuminating Company
The Toledo Edison Company

Energy Efficient Products Program
Evaluation, Measurement, and Verification Report
2019

Prepared for FirstEnergy Ohio Companies:

The Cleveland Electric Illuminating Company
The Ohio Edison Company
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1 Executive Summary

In 2019, 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 (EEP) Program to its customers. The EEP Program offered residential customers rebates, incentives, and instant discounts for the purchase of energy-efficient products. Also, rebates were offered to customers who had HVAC Tune-ups performed on their heating or cooling equipment through a program-approved contractor. The EEP program utilized three methods (upstream, midstream, and downstream) to encourage energy-efficient behaviors and purchases from its customers. The EEP program goal is to encourage the Companies' customers to purchase energy-efficient products and to perform HVAC Tune-ups when they are able. During the 2019 program year, Consumer Electronics, Lighting, Appliances, and HVAC measures and services were offered through the program. The program was administered by Honeywell as the Program Implementation Vendor, who worked with manufacturers, distributors, contractors, 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 State of Ohio Energy Efficiency Technical Reference Manual (Ohio TRM[1]) and the State of Pennsylvania Energy Efficiency Technical Reference Manual (PA TRM[2]) were used to perform the EM&V activities described in this report.

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

A total of 501,834 rebates/incentives were issued in the Companies service territories through the EEP Program in 2019. The number of rebates/incentives by measure type and utility are detailed below.

[1] 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.

[2] 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	2,473	3,346	940	6,759
Clothes Dryers	1,070	1,562	455	3,087
Refrigerators	1,416	1,861	526	3,803
Dehumidifiers	6,292	13,804	2,261	22,357
Freezers	660	1,883	394	2,937
Heat Pump Water Heaters	3	68	24	95
LED Fixtures	5,013	3,659	1,601	10,273
LED Bulbs	152,175	161,333	54,574	368,082
Televisions	9,657	8,046	1,878	19,581
Computers	503	716	84	1,303
Computer Monitors	1,426	1,392	319	3,137
Imaging	3,323	3,263	675	7,261
Central Air Conditioners	459	1,045	581	2,085
Circulation Pumps	205	136	11	352
Ductless Mini-Splits	772	1,134	231	2,137
Furnace Fans	4,352	7,421	2,516	14,289
Heat Pumps	106	545	482	1,133
H20 & Geothermal (Heat Pump)	10	18	0	28
Smart Thermostats - Midstream	3,991	5,781	1,463	11,235
Smart Thermostats - Downstream	251	353	86	690
Room Air Conditioners	4,083	5,644	1,839	11,566
HVAC Tune-Ups	5,082	3,330	1,005	9,417
Packaged Terminal Air Conditioners (PTACs)	38	112	1	151
Packaged Terminal Heat Pump (PTHPs)	21	54	1	76
Total	**203,381**	**226,506**	**71,947**	**501,834**

Ex-post electric savings were calculated through a detailed analysis of program tracking data and participant survey data. For all measure types listed in the Ohio TRM, the 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, ADM used the savings algorithms from the 2016 Pennsylvania TRM. Furthermore, 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 83,531,532 kWh (a realization rate of 107 percent). Ex-post verified peak demand reduction was 12,588.94 kW (a realization rate of 112 percent). The variation between ex-ante and ex-post results can be attributed in part to an updated savings algorithm for ductless mini-split heat pumps. Additionally, accurate data inputs for savings algorithms allowed for more precise ex-post savings calculations than the deemed ex-ante savings values. Appendix A: Required Savings Tables contains detailed tables listing energy savings and demand reductions by measure type. Table 1-2 compares ex-post gross energy savings (kWh) and peak demand reduction (kW) for the program to ex-ante estimates in the three service territories.

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	31,370,170	4,323.41	32,862,606	4,744.56	105%	110%
OE	33,892,371	5,078.64	37,613,232	5,862.07	111%	115%
TE	12,849,202	1,845.37	13,055,694	1,982.32	102%	107%
All Companies	**78,111,743**	**11,247.42**	**83,531,532**	**12,588.94**	**107%**	**112%**

A comprehensive process evaluation was performed during the 2019 program year, and the key findings can be found in the following subsections.

2 Introduction and Purpose of Study

The FirstEnergy Ohio Companies' Residential Energy Efficiency Products program is comprised of four sub-programs, (1) Appliances, (2) Consumer Electronics, (3) Lighting, and (4) HVAC program. A program implementation vendor, Honeywell, administers the program in the Ohio territory. The program depends on a collective effort among distributors, contractors, retailers, and residential customers.

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 EEP Program during 2019. 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 implementation.

2.1 Description of the Program

The primary objectives of the EEP 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). For downstream measures, customers apply for the rebate using an application often provided by the retailer. Midstream and upstream incentives are provided directly to retailers and 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 provide 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 below details the rebate incentive structures and rebate amounts for all EEP Program qualifying measures.

Table 2-1: 2019 Energy Efficient Products Program Measure List and Portfolio Status[3]

Sub-Program	Measure[4]	Rebate Amount	Rebate Strategy
Appliances	Clothes Washer	$50/unit	Downstream
	Clothes Dryer	$50/unit	Downstream
	Freezers	$10/unit	Midstream
	Refrigerators – Tier 1, 2, 3	$25 (Tier 1) $50 (Tier 2) $75 (Tier 3)	Downstream
	Dehumidifiers	$10/unit	Midstream
	Heat Pump Water Heaters	$250/unit	Midstream
	Water Heater – Solar	$375/unit	Downstream
Consumer Electronics	Monitors	$1/unit	Midstream
	Computers	$3/unit	Midstream
	Imaging	$2/unit	Midstream
	TVs – small, large	$3/unit (small) $4/unit (large)	Midstream
	LEDs ENERGY STAR® and LED Specialty ENERGY STAR	Up to $1.50/bulb ($6 max on multi-packs)	Upstream
	LED Fixtures	$3/unit	Upstream
HVAC	Heat Pump	$250/unit	Midstream
	Central Air Conditioner	$100/unit	Midstream
	Room Air Conditioner	$20/unit	Midstream
	Ductless Mini-Split Heat Pump	$125/unit	Midstream
	PTAC – Multifamily	$50/unit	Midstream
	PTHP – Multifamily	$100/unit	Midstream
	Heat Pump – Water & GeoT	$300/unit	Midstream
	HVAC – Maintenance	$50/unit	Downstream
	Furnace Fans	$150/unit	Midstream
	Circulation Pumps	$30	Midstream

[3] According to the products incentives file for 2017 – 2019. This file provides the following information: program; state, sub-program, measure, rebate/incentive type, and rebate/incentive amount.

[4] Measures listed in the Ohio Revised Portfolio Plan, Case Number 16-0743-EL-POR. Additional measures listed in the Plan, but for which none were rebated according to the 2019 tracking data, included home automation and lighting controls. Measure-specific rebate amounts listed in the Portfolio Plan differed from those provided in the Products Incentives File. Our team deferred to the Products Incentives File provided by program staff.

Sub-Program	Measure[4]	Rebate Amount	Rebate Strategy
	Programmable / SMART Thermostat[5]	$30	Midstream
	Programmable / SMART Thermostat	$75[6]	Downstream
Total	**26 Measures**	-	

The programs actively engage market actors to promote and deliver the program.

The appliances, lighting, and consumer electronics subprograms partner with 211 participating retailers.

The HVAC sub-program relies on the partnership of 275 qualified contractors who offer HVAC Tune-Ups[7] and 16 participating distributors of HVAC equipment. Retailers also provide support to the HVAC sub-program by selling qualified measures. The program doesn't stipulate how incentives for HVAC qualified measures (except for the tune-up) are passed on to the contractor or customer. As such, the program provides overall program promotional brochures to participating HVAC contractors, which focus on efficiency and energy savings opportunities as opposed to incentives. The midstream program is designed to influence stocking practices of distributors and retailers, and most distributors pass on a portion or all the incentives to contractors who purchase directly from them.

In 2019, the program modified the thermostat delivery model to include a downstream offering along with the existing midstream offering. In addition to providing a contractor with a $30 incentive for the installation, customers can also now directly purchase and claim an instant thermostat rebate up to $75 online or by mail. Customers can purchase smart thermostats online or at participating retailers, and customers receive the instant rebate in the form of a MasterCard® Prepaid Card. According to the program website, the card is delivered via email for qualifying purchases, and customers can select a virtual card, available instantly, or a physical card sent by mail within 7 – 15 days.[8]

[5] No unit goals are listed for the SMART Thermostat midstream measure in the Portfolio Plan.

[6] The thermostat measure offering changed from a midstream to downstream model during 2019. The downstream instant rebate of up to $75 that customers can receive was implemented in retail stores beginning on November 15, 2019.

[7] As listed on the FirstEnergy website, available at: https://energysaveohio-home.com/hvac/participating-contractors/

[8] Information from the FirstEnergy Smart Thermostat website, available at: https://energysaveohio-home.com/hvac/smart-thermostats/

3 Impact Evaluation Objectives

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 energy savings achieved by the program?
- What was the kW demand reduction achieved by the program?

The primary deemed savings and engineering algorithm source for determining program impacts was the Ohio TRM. The 2016 Pennsylvania TRM ("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 are described in detail in chapters5, 6, 7, and8.

3.1 Percent of Savings from Income Qualified Customers

Questions were added to the evaluation and upstream surveys to assess low-income participation in this subprogram. The surveys were administered so that customers 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 determine whether the household is above or below 150% of the Federal Poverty Level (FPL). Respondents were low income qualified if the stated income was below 150% of the FPL (Table 3-1).

Table 3-1: 2019 Federal poverty levels and 150% of poverty levels.

Persons in Household	2019 Federal Poverty Level	150% Federal Poverty Level
1	$12,490	$18,735
2	$16,910	$25,365
3	$21,330	$31,995
4	$25,750	$38,625
5	$30,170	$45,255
6	$34,590	$51,885
7	$39,010	$58,515
8	$43,430	$65,145

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 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. The ex-post energy and demand savings are multiplied by the percentage of low-income participants by EDC to calculate the savings for the low-income portion of the program participants.

4 Process Evaluation Objectives

The evaluation team developed a multi-modal research approach to answer key process evaluation questions, building upon the findings from previous evaluation years and addressing the 2019 program changes. Table 4-1 includes the research questions and the research activities designed to evaluate these key questions.

Table 4-1: Energy Efficient Products Program Research Questions

RESEARCH AREA	RESEARCH QUESTION	ACTIVITIES
Marketing	Is the new HVAC Tune-Up messaging effective in increasing customer awareness and use of the HVAC Tune-Up measure and rebate?	Interviews with HVAC contractors
	Is the new HVAC messaging for thermostats effective for increasing customer awareness and participation in the HVAC program?	Interviews with HVAC contractors Retailer interviews Mobile in-store survey
	When do customers decide to act in the marketing timeline (i.e., at the first touchpoint or after several touchpoints)?	Mobile in-store survey
	Which marketing efforts are most effective in increasing customer awareness and participation?	Mobile in-store survey
	How effective are the signage and retailer staff in communicating benefits and encouraging purchase of program qualifying equipment?	Mobile in-store survey; upstream and downstream surveys
Partner Recruitment	What changes have been made to help recruit retailers, distributors, and contractors (as relevant) for these sub-programs? How are these changes working for retailers and/or distributors?	Program Manager interviews; Retailer interviews
Retailer Engagement	How consistently is the program being delivered across retail partners? What changes have been made to the program's design or delivery since 2018 to improve the effectiveness of retailer training and communication? How are these changes working for retailers?	Retailer and store partner interviews; mobile in-store survey
Customer Awareness	Are customers aware of FirstEnergy's sponsorship of the program? How does this awareness impact customer satisfaction with FirstEnergy?	Mobile in-store survey; upstream and downstream surveys
Program Participation	Has the program and each sub-program performed as expected and, if not, why not? What was the level of participation for each program measure in 2019?	Tracking data review; retailer and store partner interviews; upstream and downstream surveys (questions related to purchasing, installation, etc.)

RESEARCH AREA	RESEARCH QUESTION	ACTIVITIES
HVAC Sub-program	How is the program working for HVAC contractors, including their level of engagement, key program processes, opportunities for improvement, and overall satisfaction? What, if anything, needs to be improved? Are contractors interested in an incentive/reward system for their participation; if yes, why would this motivate and/or help them?	HVAC contractor interviews
	How do HVAC businesses enter the program? Why do they choose to participate? What are the benefits of participation?	HVAC contractor interviews
	How do the instant rebates and incentive amounts impact customer participation? How do the changes in the incentive structure impact program participation for retailers, distributors, and contractors?	Mobile in-store survey; retailer and store partner interviews
	How do the thermostat incentives influence customers' participation in the tune-up measure?	HVAC contractor interviews; retailer and store partner interviews; mobile in-store survey
	How did key program experiences for the HVAC program work for customers? What, if anything, could be improved?	Mobile in-store survey; upstream and downstream surveys (questions related to HVAC experiences, and satisfaction)
Satisfaction	Are program partners, including retailers, distributors, manufacturers and HVAC contractors, satisfied with the program?	Retailer and store partner interviews; HVAC contractor interviews
	How does the program affect sales outside the program? Do businesses see value in the program?	Retailer and store partner interviews; HVAC contractor interviews
	Are customers satisfied with the program?	Mobile in-store survey; upstream and downstream surveys

To address these researchable issues, ILLUME conducted seven primary and secondary activities from November 2019 to February 2020:

- **Program Manager and Implementer interviews:** The team conducted one-hour phone interviews with program staff from the Companies and Honeywell. During these interviews, the team gained insights about program processes, operations, and potential areas of improvement. Program managers also informed the team about program changes. The interviews were conducted during November 2019.
- **Documentation and materials analysis:** To understand program design, offerings, and messaging tailored to customers and retailers, we reviewed key program documents, including marketing materials and the program website. Most

program marketing materials remained relatively unchanged from 2018, with the exception of marketing for the new downstream HVAC sub-program thermostat offering.

- **Tracking data analysis:** The Companies provided program participation data that captured measures rebated by individual retailers and HVAC contractors (midstream and upstream) and customer rebates (downstream). We used this data to analyze progress towards savings goals and retailer participation.
- **HVAC Distributor interviews:** The team completed in-depth interviews with HVAC distributors who participated in the program in 2019. The Program Implementation Vendor, Honeywell, provided contact information for 16 participating HVAC distributors. We completed seven total interviews, lasting approximately 30 minutes each, in January 2020.
- **HVAC Contractor Interviews:** The team completed nine in-depth interviews (and two partially completed interviews) with participating HVAC sub-program contractors. We recruited contractors from the list of the 274 HVAC organizations on the program website. Through these interviews, the team gained insights into the HVAC Tune-Up procedure and rebate application process. Contractors also shared their program experiences including the enrollment process, the impact on their business, the perceived value, and the impact on their experiences serving customers. Contractors also offered suggestions for program improvements. We conducted these interviews between December of 2019 and January 2020.
- **Retailer Interviews:** The team completed eight interviews (and four partially completed interviews) with participating program retailers. Through these interviews, we gained insights into program implementation processes in stores, experiences with program trainings, motivations to participate, the effectiveness of in-store signage, the program's impact on sales, and overall satisfaction with the program. We conducted these interviews during January 2020.
- **Upstream and Downstream Customer Surveys:** The team fielded a survey with customers who received rebates for measures through the upstream and downstream program in 2019. In total, 2,399 (2,159 upstream and 240 downstream) customers completed the survey between December 2019 and February 2020. Through the surveys, we gained an understanding of customers' experiences with the program including customer awareness, reasons for and barriers to program participation, satisfaction, and household and demographic information. Respondents received a five-dollar electronic gift card for their participation.
- **Mobile Survey:** The team employed a mobile survey to gather insights about the in-store experience that customers encountered when shopping in participating retail stores. We recruited participants through a mobile survey panel. Respondents received an invitation for the study if they were within a certain range of one of the geofenced store zip codes. Based on screening criteria, we invited eligible customers to respond to a series of in-store experience questions and to

document their experience through photos captured during their visit. We collected 57 responses between January and February 2020. Respondents received compensation in the form of electronic points through the panel platform.

5 Appliances

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

5.1 Description of Appliances Sub-program

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 2019 through the downstream channel include:

- ENERGY STAR® Clothes Dryers
- ENERGY STAR® Clothes Washers
- ENERGY STAR® Refrigerators
- Solar Water Heaters[9]

Energy efficient appliances that are rebated in 2019 through the midstream channel include:

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

Table 5-1 presents the number of appliance rebates in 2019 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.

[9] No solar water heaters were rebated in PY2019.

Table 5-1: Count of Appliances Rebates by EDC and Measure

Measure	CEI	OE	TE	Total
Clothes Washer	2,473	3,346	940	6,759
Clothes Dryer	1,070	1,562	455	3,087
Refrigerators	1,416	1,861	526	3,803
Dehumidifiers	6,292	13,804	2,261	22,357
Freezers	660	1,883	394	2,937
Water Heater (Heat Pump)	3	68	24	95
Totals	**11,914**	**22,524**	**4,600**	**39,038**

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

Measure	CEI	OE	TE	Total
Clothes Washer	499,546	675,892	189,880	1,365,318
Clothes Dryer	29,297	42,768	12,458	84,522
Refrigerators	168,391	221,971	62,696	453,058
Dehumidifiers	1,541,211	3,363,535	547,849	5,452,595
Freezers	87,120	248,556	52,008	387,684
Water Heater (Heat Pump)	5,064	114,784	40,512	160,360
Totals	**2,330,629**	**4,667,506**	**905,403**	**7,903,537**

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

Measure	CEI	OE	TE	Total
Clothes Washer	57.13	77.29	21.71	156.13
Clothes Dryer	5.14	7.50	2.18	14.82
Refrigerators	29.45	38.81	10.96	79.22
Dehumidifiers	366.11	797.30	130.06	1,293.47
Freezers	13.20	37.66	7.88	58.74
Water Heater (Heat Pump)	0.69	15.71	5.54	21.95
Totals	**471.71**	**974.27**	**178.34**	**1,624.33**

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

The sample size for the follow-up surveys in each service territory achieved a relative precision of ±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

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

Where:

n_0 = Minimum sample size

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

Zα/2 = Z value at 90% confidence interval, 1.645

¼ = 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 240 respondents in the downstream participant survey. This number was chosen to ensure 80 completed surveys per EDC.

5.2.2 Ex-ante Review

ADM completed a census review of all measures listed in the appliance tracking data to ensure appropriate use of deemed savings values. 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.[10]

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

[10] This check was carried out through a combination of procedures, including desk review of Honeywell documentation, and customer surveys.

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 are claimed in the 2019 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 via SurveyGizmo. 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. Participants surveys were used to gather data on gross household income and the number of people living in each household and used 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 program awareness, the application process, satisfaction with the energy efficient appliance or equipment purchased, and satisfaction with 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 Honeywell SQL Server Reporting Services (SSRS) appliance 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 detailed explanations of the calculations are 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 SSRS appliance database. The 2008 federal standard baseline for max consumption is applicable based 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^3)	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 were ENERGY STAR® rated. 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[11]	191	0.019
CEE TIER 3® Washer	320	0.033	225	0.024

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 to qualify for the rebate. 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

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

Where:

$Cycles_{wash}$ = 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

$Load_{avg}$ = weight of average dryer load in pounds per load = 8.45(standard); 3.0 (compact dryer)

CEF_{base} = Combined Energy Factor of baseline dryer, in lbs/kWh

CEF_{ee} = Combined Energy Factor of ENERGY STAR® dryer, in lbs/kWh

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

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

Where:

$Load_{avg}$ = weight of average dryer load in pounds per load = 8.45 (standard); 3.0 (compact dryer)

CEF_{base} = Combined Energy Factor of baseline dryer, in lbs/kWh

[11] The OH TRM calculation uses a CF of 0.045 instead of the specified value of 0.033. ADM used the specified value in our calculations.

CEF_{ee} = Combined Energy Factor of ENERGY STAR® dryer, in lbs/kWh

$Time_{cycle}$ = 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

$$\Delta kWh = kWh_{base}\left(\frac{COP_{new} - COP_{base}}{COP_{new}}\right) + kWh_{cooling} - kWh_{heating}$$

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, provided in TRM

Av Capacity = Average dehumidification capacity for each capacity range (pints/day),

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	0.029
>25 to 35	120	0.027
>35 to 45	149	0.034
>45 to 54	266	0.060
>54 to 75	249	0.057
>75 to 185	179	0.040

5.3 Impact Evaluation Findings

The ex-post energy savings for the Appliances sub-program totaled 7,896,131 kWh and ex-post peak load demand reduction totaled 1,560.65 kW. The ex-ante estimates by measure were highly accurate and the overall realization rates for this sub-program to 100% and 96% 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 total. Explanations for variation from the ex-ante values by measure are below.

Clothes Washers

The ex-ante clothes washer data did not discriminate between ENERGY STAR® and CEE certification. Thus, only one energy savings and demand reduction value were assigned to each line item at 202 kWh and 0.0231 kW respectively. The ex-post calculations utilized the OH TRM to assign deemed values based upon program certification as shown in Table 5-6 above. 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 the 0.033 coincidence factor in the demand reduction algorithm. This resulted in ex-post kW reductions of 0.01978 kW for ENERGY STAR® units and 0.02325 kW for CEE Advanced

Tier units. Realization rates for energy savings and peak demand reduction are 99% and 90% respectively.

Clothes Dryers

The differences in realization rates are due to rounding. Realization rates for energy savings and peak demand reduction are 100% and 101% 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, compact, or single 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% and 99% respectively.

Dehumidifiers

Ex-ante values in the SQL Server Reporting Services (SSRS) data are 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% and 96% respectively.

Freezers

Ex-ante values in SSRS data are 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% and 116% 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% and 100% respectively.

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

Measure	CEI	OE	TE	Total
Clothes Washer	494,158	671,703	189,815	1,355,676
Clothes Dryer	29,152	42,689	12,458	84,299
Refrigerators	167,854	220,015	62,168	450,037
Dehumidifiers	1,542,391	3,365,667	548,224	5,456,282
Freezers	87,514	249,679	52,243	389,435
Water Heater (Heat Pump)	5,065	114,814	40,523	160,402
Total	**2,326,134**	**4,664,567**	**905,431**	**7,896,132**

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

Measure	CEI	OE	TE	Total
Clothes Washer	50.96	69.27	19.57	139.80
Clothes Dryer	5.16	7.55	2.20	14.91
Refrigerators	29.39	38.53	10.89	78.81
Dehumidifiers	349.68	763.05	124.29	1,237.02
Freezers	15.32	43.72	9.15	68.20
Water Heater (Heat Pump)	0.69	15.68	5.54	21.91
Total	**451.21**	**937.80**	**171.64**	**1,560.65**

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	1,365,318	156.13	1,355,676	139.80	99%	90%
Clothes Dryer	84,522	14.82	84,299	14.91	100%	101%
Refrigerators	453,058	79.22	450,037	78.81	99%	99%
Dehumidifiers	5,452,595	1,293.47	5,456,282	1,237.02	100%	96%
Freezers	387,684	58.74	389,435	68.20	100%	116%
Water Heater (Heat Pump)	160,360	21.95	160,402	21.91	100%	100%
Total	**7,903,537**	**1,624.33**	**7,896,132**	**1,560.65**	100%	96%

6 Consumer Electronics

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

6.1 Description of Consumer Electronics Program

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 2019 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	9,657	8,046	1,878	19,581
Computers	503	716	84	1,303
Computer Monitors	1,426	1,392	319	3,137
Imaging	3,323	3,263	675	7,261
Totals	**14,909**	**13,417**	**2,956**	**31,282**

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

Measure	CEI	OE	TE	Total
Televisions	516,921	426,952	98,435	1,042,308
Computers	59,857	85,204	9,996	155,057
Computer Monitors	34,224	33,408	7,656	75,288
Imaging	48,848	47,966	9,923	106,737
Totals	**659,850**	**593,530**	**126,010**	**1,379,390**

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

Measure	CEI	OE	TE	Total
Televisions	48.10	39.72	9.17	96.98
Computers	8.10	11.53	1.35	20.98
Computer Monitors	4.56	4.45	1.02	10.04
Imaging	9.97	9.79	2.02	21.78
Totals	**70.73**	**65.49**	**13.56**	**149.78**

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

An upstream survey was conducted online via email with a sample of 100,000 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 ±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 2,072 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 2019 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 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. Savings from scanners 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, found in Table 6-4.

Imaging

Imaging includes several measures revolving around imaging technology for the home office. Measures for the 2019 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 for a specific rating and type based on 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 deemed savings for scanners were pulled from energystar.gov since there were no OH TRM or PA TRM deemed savings listed for this measure. The ENERGY STAR® savings algorithm[12] is shown in Equation 6-1.

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 found in the ENERGY STAR® database to verify their rating. Verified monitors were assigned 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 ≤ 5	37	0.0050

[12] https://www.energystar.gov/sites/default/files/FINAL%20Version%202.0%20Imaging%20Equipment%20Program%20Requirements%20%28Rev%20Oct-2014%29.pdf

Measure	Energy Savings kWh	Peak Demand Savings kW
5 < images/min ≤ 15	26	0.0035
15 < images/min ≤ 20	9	0.0012
20 < images/min ≤ 30	42	0.0057
30 < images/min ≤ 40	50	0.0068
40 < images/min ≤ 65	186	0.0251
65 < images/min ≤ 82	372	0.0502
82 < images/min ≤ 90	469	0.0633
images/min > 90	686	0.0926
Printer (laser, monochrome)		
images/min ≤ 5	37	0.0050
5 < images/min ≤ 15	26	0.0035
15 < images/min ≤ 20	23	0.0031
20 < images/min ≤ 30	42	0.0057
30 < images/min ≤ 40	50	0.0068
40 < images/min ≤ 65	181	0.0244
65 < images/min ≤ 82	372	0.0502
82 < images/min ≤ 90	542	0.0732
images/min > 90	686	0.0926
Printer (Ink Jet)	6	0.0008
Multifunction (laser, monochrome)		
s ≤ 5	57	0.0077
5 < s ≤ 10	48	0.0065
10 < s ≤ 26	52	0.0070
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

Measure	Energy Savings kWh	Peak Demand Savings kW
Multifunction (Ink Jet)	6	0.0008
Monitor	24	0.0032
Scanner[13]	10	0.0000

Televisions

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 the televisions 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. The PA TRM assigns additional savings to models which meet a maximum power load (P_{Max}) requirement based on the diagonal screen size. Additional savings are calculated using Equation 6-2.

Equation 6-2: P_{Max} for Most Energy Efficient Rating[14]

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

Where:

P_{max} = maximum allowable On Mode Power consumption in W

Area = viewable screen area of the product in square inches

tanh = hyperbolic tangent function

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

[13] 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

[14] 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.

Table 6-5: kWh & kW Values for Televisions

	TV kWh		TV kW	
Diagonal Screen Size (inches) [1]	**Energy Savings ENERGY STAR® V. 6.0 TVs (kWh/yr)**	**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

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 1,553,246 kWh and ex-post peak load demand reduction totaled 165 kW. The kWh and kW realization rates for this sub-program were 113% and 110% respectively. Explanations for variation from the ex-ante values by measure are below.

Televisions

The discrepancy in savings values is caused by the lower assigned ex-ante values from the Energy Savings ENERGY STAR® version 6.0 in columns two and four of Table 6-5 for each television category. 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 103% and 103% respectively.

Imaging

The imaging “measure” of the Consumer Electronics sub-program includes the following sub-measures: scanners, printers, and multi-function devices. Ex-ante savings calculations used a single deemed savings value (14.7 kWh and 0.003 kW) for all 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 based on its specific rating, specification, and type. This resulted in differing savings per measure, and realization rates that differ from 100%. The realization rates for kWh and kW savings by equipment type are listed below:

- Multifunction devices: 235% for kWh and 155% for kW
- Printers: 249% for kWh and 165% 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	532,931	440,819	101,193	1,074,943
Computers	59,857	85,204	9,996	155,057
Computer Monitors	34,224	33,408	7,656	75,288
Imaging	113,131	109,143	25,684	247,958
Totals	**740,143**	**668,574**	**144,529**	**1,553,246**

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

Measure	CEI	OE	TE	Total
Televisions	49.67	41.08	9.44	100.19
Computers	8.10	11.53	1.35	20.98
Computer Monitors	4.56	4.45	1.02	10.04
Imaging	15.40	14.81	3.49	33.69
Totals	**77.73**	**71.87**	**15.30**	**164.90**

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	1,042,308	96.98	1,074,943	100.19	103%	103%
Computers	155,057	20.98	155,057	20.98	100%	100%
Computer Monitors	75,288	10.04	75,288	10.04	100%	100%
Imaging	106,737	21.78	247,958	33.69	232%	155%
Totals	**1,379,390**	**150**	**1,553,246**	**164.90**	**113%**	**110%**

7 Lighting

The purpose of this chapter is to present the lighting sub-program findings of the impact 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 2019 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	5,013	3,659	1,601	10,273
LED Bulbs	152,175	161,333	54,574	368,082
Totals	**157,188**	**164,992**	**56,175**	**378,355**

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

Measure	CEI	OE	TE	Total
LED Fixtures	493,385	232,776	146,564	872,724
LED Bulbs	23,308,208	21,197,254	9,282,297	53,787,759
Totals	**23,801,593**	**21,430,030**	**9,428,861**	**54,660,483**

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

Measure	CEI	OE	TE	Total
LED Fixtures	59.13	27.84	17.56	104.52
LED Bulbs	2,784.72	2,532.82	1,109.06	6,426.60
Totals	**2,843.85**	**2,560.66**	**1,126.62**	**6,531.13**

7.2 Impact Evaluation Methodology

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 100,000 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 ±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 2,072 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 2019 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 an upstream survey conducted in the companies' service territory. Customers were asked if they purchased LED light bulbs or fixtures during 2019, how many they purchased, and how many they hadn't installed yet.

7.2.4 Review of Lighting 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 Lighting manufacturers. ADM determined that all equipment listed in the SSRS database was accounted for by their associated invoices.

7.2.5 Energy Savings Calculation

ADM has analyzed data from the upstream 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

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

Where:

$Watts_{base}$ = Effective baseline wattage

$Watts_{EE}$ = Watts of LED

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

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

IE_{kWh} = 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) to verify that each bulb distributed in 2019 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_{kWh}).

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:

Two data elements collected through surveys were used to estimate an ISR for 2019. 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 2019 were calculated as one minus the sum of Data Element 2 divided by Data Element 1.

Equation 7-2: Summer Peak Demand Savings

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

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 53,938,288 kWh and ex-post peak load demand reduction totaled 6,446 kW. Realization rates for this sub-program were 99% and 99% 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 84% for LED bulbs and 91% for LED fixtures were identified via the upstream 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	283,237	173,796	87,628	544,660
LED Bulbs	22,813,250	21,553,781	9,026,596	53,393,627
Totals	**23,096,487**	**21,727,578**	**9,114,224**	**53,938,288**

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

Measure	CEI	OE	TE	Total
LED Fixtures	33.85	20.77	10.47	65.09
LED Bulbs	2,726.13	2,575.63	1,078.66	6,380.41
Totals	**2,759.97**	**2,596.39**	**1,089.13**	**6,445.50**

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	872,724	104.52	544,660	65.09	62%	62%
LED Bulbs	53,787,759	6,426.60	53,393,627	6,380.41	99%	99%
Totals	**54,660,483**	**6,531.13**	**53,938,288**	**6,445.50**	**99%**	**99%**

8 HVAC

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

8.1 Description of the HVAC Program

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 retailers to stock efficient equipment and customers to purchase and install energy efficient HVAC units that will reduce electricity consumption and summer peak load demands.

Energy efficient HVAC measures that are rebated in 2019 through the midstream channel include:

- ENERGY STAR® Room Air Conditioners
- ENERGY STAR® Furnace Fans
- ENERGY STAR® Central Air Conditioners
- Programmable/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

Energy efficient HVAC measures that are rebated in 2019 through the downstream channel include:

- HVAC Tune-Ups

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 2019 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	459	1,045	581	2,085
Circulation Pump	205	136	11	352
Ductless Mini-Split	772	1,134	231	2,137
Furnace Fans	4,352	7,421	2,516	14,289
Heat Pump	106	545	482	1,133
H20 & Geothermal (Heat Pump)	10	18	-	28
Smart Thermostats - Midstream	3,991	5,781	1,463	11,235
Smart Thermostats - Downstream	251	353	86	690
Room Air Conditioner	4,083	5,644	1,839	11,566
HVAC Tune-Up	5,082	3,330	1,005	9,417
PTAC	38	112	1	151
PTHP	21	54	1	76
Total	**19,370**	**25,573**	**8,216**	**53,159**

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

Measures	CEI	OE	TE	Total
Central Air Conditioner	75,414	171,693	95,458	342,566
Circulation Pump	32,595	21,624	1,749	55,968
Ductless Mini-Split	716,725	1,052,806	214,460	1,983,991
Furnace Fans	1,940,992	3,309,766	1,122,136	6,372,894
Heat Pump	95,252	489,737	433,125	1,018,114
H20 & Geothermal (Heat Pump)	36,000	64,800	0	100,800
Smart Thermostats - Midstream	1,069,388	1,549,019	392,011	3,010,418
Smart Thermostats - Downstream	49,568	79,722	19,969	149,260
Room Air Conditioner	79,210	109,494	35,677	224,380
HVAC Tune-Up	462,771	297,956	73,540	834,267
PTAC	7,410	21,840	195	29,445
PTHP	12,774	32,848	608	46,231
Total	**4,578,099**	**7,201,306**	**2,388,929**	**14,168,333**

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

Measures	CEI	OE	TE	Total
Central Air Conditioner	64.26	146.30	81.34	291.90
Circulation Pump	3.69	2.45	0.20	6.34
Ductless Mini-Split	123.52	181.44	36.96	341.92
Furnace Fans	456.96	779.21	264.18	1,500.35
Heat Pump	14.84	76.30	67.48	158.62
H20 & Geothermal (Heat Pump)	2.80	5.04	0.00	7.84
Smart Thermostats – Midstream	0.00	0.00	0.00	0.00
Smart Thermostats – Downstream	0.00	0.00	0.00	0.00
Room Air Conditioner	102.07	141.10	45.97	289.15
HVAC Tune-Up	152.46	99.90	30.15	282.51
PTAC	10.64	31.36	0.28	42.28
PTHP	5.88	15.12	0.28	21.28
Total	**937.13**	**1,478.21**	**526.84**	**2,942.18**

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 ±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 240 respondents in the downstream participant survey. This number was chosen to ensure 80 completed surveys per EDC.

Upstream Survey

An online survey was conducted with a sample of 100,000 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 ± 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 2,159 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 2019 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 were analyzed further for energy savings and peak demand reduction using the procedures described below. The final measure count per HVAC category is the total number of HVAC measures that passed all applicable screens 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 were unable to be verified were 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 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 savings algorithm 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 = 139.9[15]

BtuH = Average size of rebated unit = 10000[16]

EER_{base} = Efficiency of baseline unit = 9.8

EER_{ee} = Efficiency of ENERGY STAR® unit = 10.8[16] 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:

[15] Weighted average of RAC hours based on the results of the General Population Survey.

[16] ADM utilized the rebated units actual cooling capacity and EER_{ee}, which were obtained from EnergyStar® database.

CF = Summer Peak Coincidence Factor for Measure = 0.3

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 savings algorithms 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_{cool} = Full load cooling hours

Dependent on location as in Table 8-4.

Table 8-4: Ohio $EFLH_{cool}$

Location	Run Hours
Akron	476
Cincinnati	664
Cleveland	426
Columbus	552
Dayton	631
Mansfield	474
Toledo	433
Youngstown	369

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

$SEER_{base}$ = Seasonal Energy Efficiency Ratio of baseline unit = 13

$SEER_{ee}$ = 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_{base} = Energy efficiency ratio for baseline unit = 11

EER_{ee} = Energy efficiency ratio for ENERGY STAR® unit = Actual installed

CF = Summer Peak Coincidence Factor for measure = 0.5

Programmable/Smart Thermostats

ADM used deemed values for energy savings and peak demand reduction from the Pennsylvania Interim Measure Protocol (IMP).[17] ADM used the following savings algorithms to calculate detailed energy savings:

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

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

[17] The Pennsylvania Residential Thermostats IMP (02/26/2018) can be provided upon request

Equation 8-8: Annual Cooling Energy Savings Programmable/Smart Thermostats

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

Equation 8-9: Annual Heat Pump Energy Savings Programmable/Smart Thermostats

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

Equation 8-10: Annual Electric Furnace Heat Energy Savings Programmable/Smart Thermostats

$$\Delta kWh_{heat.electricfurn} = \frac{CAPY_{heat}}{1000\frac{W}{kW}} \times \frac{1}{HSPF_{other} \times Eff_{duct}} \times EFLH_{heat} \times ESF_{heat} \times DF$$

Equation 8-11: Annual Baseboard Heat Energy Savings Programmable/Smart Thermostats

$$\Delta kWh_{heat.baseboard} = \frac{CAPY_{heat}}{1000\frac{W}{kW}} \times \frac{1}{HSPF_{other}} \times EFLH_{heat} \times ESF_{heat} \times DF$$

Equation 8-12: Annual Fuel Furnace Heat Energy Savings Programmable/Smart Thermostats

$$\Delta kWh_{heat.fuelfurn} = \frac{HP_{motor} \times (746\frac{W}{HP}) \times EFLH_{heat}}{\eta_{motor} \times 1000\frac{W}{kW}} \times ESF_{heat}$$

Equation 8-13: Peak Demand Savings Programmable/Smart Thermostats

$$DkWpeak = 0$$

Where:

$CAPY_{cool}$ = Capacity of air conditioning unit

= 32,000

$CAPY_{heat}$ = Normal heat capacity of Heat Pump/Electric Furnace

= 32,000

SEER = Seasonal Energy Efficiency Ratio

= 11.9

$HSPF_{heat\ pump}$ = Heating Seasonal Performance Factor of heat pump

= 3.412 (equivalent to electric furnace COP of 1)

$HSPF_{other}$ =Heating Seasonal Performance Factor for other electric heating systems

= 3.412

Eff_{duct} = Duct System Efficiency

= 0.8

ESF_{cool} = Cooling energy saving factor, from PA TRM IMP

ESF_{heat} = Heating Energy Saving Factor, from PA TRM IMP

$EFLH_{cool}$ = Full load cooling hours.

= Dependent on location, as specified in 2013 OH TRM

$EFLH_{heat}$ = Full Load heating hours.

= Dependent on location, as specified in 2013 OH TRM

HP_{motor} = Gas furnace blower motor horsepower

= 0.5 HP

η_{motor} = Efficiency of furnace blower motor

= 50%

DF = Derate Factor for Electric Heating Systems

= 0.85

ENERGY STAR® Air Source Heat Pumps

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

Equation 8-14: Annual Energy Savings Air Source Heat Pumps

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

Where:

FLH_{cool} = 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

$SEER_{base}$ = Seasonal Energy Efficiency Ratio of baseline unit

= 13

$SEER_{ee}$ = Seasonal Energy Efficiency Ratio of ENERGY STAR® unit

= Actual Installed

FLH_{heat} = Full load heating hours

Dependent on location as in Table 8-5.

Table 8-5: Ohio $EFLH_{heat}$

Location	Run Hours
Akron	1,576
Cincinnati	1,394
Cleveland	1,567
Columbus	1,272
Dayton	1,438
Mansfield	1,391
Toledo	1,628

$HSPF_{base}$ = Heating Season Performance Factor for baseline unit

= 7.7

$HSPF_{ee}$ = Heating Season Performance Factor for efficient unit

= Actual Installed

Equation 8-15: 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_{base} = Energy efficiency ratio for baseline unit

= 11

EER_{ee} = 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 savings algorithms for energy savings and peak demand reduction from the Ohio TRM.

Equation 8-16: Annual Energy Savings Geothermal Heat Pumps

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

Where:

FLH_{cool} = 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

$SEER_{base}$ = Seasonal energy efficiency ratio of baseline unit

= 13

EER_{ee} = 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_{heat} = Full load heating hours

Dependent on location as in Table 8-5

$HSPF_{base}$ = Heating Season Performance Factor for baseline unit

= 7.7

COP_{ee} = Coefficient of Performance of efficient unit

= Actual Installed

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

Equation 8-17: Peak Demand Savings Geothermal Heat Pumps

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

Where:

EER_{base} = Energy efficiency ratio of baseline unit

= 11

EER_{ee} = 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

This is then converted to the unit's equivalent air conditioning EER to enable comparisons to the baseline unit using the following algorithm:

EERac = (SEER * 0.37) + 6.43

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 savings algorithms from the Pennsylvania TRM.

Equation 8-18 Single Zone Energy Savings

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

Equation 8-19 a.

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

Equation 8-20 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 8-21 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 8-22 Multi-zone Energy Savings

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

Equation 8-23 a.

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

Equation 8-24 b.

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

Equation 8-25 Multi-zone Peak Demand Reduction

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

Where:

$CAPY_{cool}$ = The cooling (at 47° F) capacity of the ductless heat pump unit

= actual installed[18]

[18] ADM calculated a weighted average CAPYcool, CAPYheat, EERee, SEERee, HSPFee, EFLHheat, EFLHcool based upon the rebated units in the program data and utilized the weighted averages in the savings algorithms.

$CAPY_{heat}$ = The heating (at 47° F) capacity of the ductless heat pump unit

= actual installed[18]

$EFLH_{primary}$ = Equivalent full load hours of the primary system[18] – See Table 8-4 and Table 8-5

$EFLH_{secondary}$ = Equivalent full load hours of the secondary system[18] – If the unit is installed as the secondary heating or coolng system

$HSPF_{base}$ = Heating Seasonal Performance Factor (heating efficiency of baseline unit)[19]

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

$HSPF_{ee}$ = Heating Seasonal Performance Factor (heating efficiency of installed ductless heat pump)[18]

$SEER_{ee}$ = Seasonal energy efficiency ratio of installed installed ductless heat pump18

$SEER_{base}$ = Seasonal energy efficiency ratio of baseline unit[19]

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.[19]

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

Default depends on baseline condition:

[19] The Energy Information Administration (eia.gov) and 2016 PA TRM heating and cooling data were used to determine baseline conditions for $HSPF_{base}$, DLF, OF, $SEER_{base}$, and EER_{base}

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_{base} = Energy efficiency ratio of the baseline unit[19]

=(11.3/13)*$SEER_{base}$ for central AC or no existing cooling

=(12/14)*$SEER_{base}$ for DHP

=9.8 room AC

EER_{ee} = Energy efficiency ratio of the installed ductless heat pump[18]

=(12/14)*$SEER_{ee}$

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.[20] 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. 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

[20] Revised document RP878 was published by ClimateMaster on 7 February 2011 (climatemaster.com)

HVAC Maintenance/Tune Ups

There are no minimum efficiency criteria listed for HVAC tune ups on the 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 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 8-26: Annual Energy Savings-Central AC

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

Equation 8-27: Annual Energy Savings-Heat Pump

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

Where:

FLH_{cool} = Full load cooling hours, which depend on location[21]

FLH_{heat} = Full load heating hours, which depend on location[21]

BtuH = Size of the HVAC equipment in tons (1 ton = 12,000 BtuH)[21]

$SEER_{CAC}$ = SEER efficiency rating of the CAC unit receiving maintenance[21]

$SEER_{ASHP}$ = SEER efficiency rating of the ASHP receiving maintenance[21]

MF_e = Maintenance energy savings factor = 0.05

$HSPF_{ASHP}$ = Heating Season Performance Factor of the ASHP receiving maintenance[21]

[21] ADM calculated an average input value for FLHcool, FLHheat, BtuH, SEERcac, $SEER_{ASHP}$, $HSPF_{ASHP}$, and EER based upon a sample of 150 units in the HVAC Tune-up data, sufficient to meet 90/10 precision requirements for a population of 9417 units.

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 8-28: Summer Coincident Peak Demand Savings

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

Where:

EER = Energy efficiency ratio of the unit receiving maintenance[21] = SEER * 0.9

MF_d = Maintenance demand savings factor = 0.02

CF = Summer peak coincidence factor = 0.594

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 was obtained from the AHRI Database, manufacturers website, and other reputable sources.

Because some model numbers were illegible or mis-reported, ADM used Equation 5-1 to calculate the minimum sample size of HVAC Tune-up customers needed to meet 90/10 precision requirements. Then a random sample of the HVAC tune-up models was used to calculate approximate savings for the population. The minimum sample size was found to be 68 customers; a total of 150 model numbers were sampled to increase the precision of the estimate.

8.3 Impact Evaluation Findings

The ex-post energy savings for the HVAC sub-program totaled 20,143,866 kWh and ex-post peak load demand reduction totaled 4,418 kW. Realization rates for this sub-program were 142% and 150% respectively. Explanations for variation from the ex-ante values by measure are listed below.

Central Air Conditioners

The central air conditioners ex-ante values used the average of three savings which differed only the in the FLHcool hours used in the savings algorithm. Ex-post savings were calculated using FLHcool hours for the closest major city to the installation location. Measure Cooling capacity, SEER, and EER for each measure installed come from model specifications and the AHRI database. The higher than expected savings and demand reductions can be attributed to the more granular analysis.

Circulation pumps

The ex-ante savings values came from the average of the three deemed values based on territory. The realization rates of 99% for kWh savings and 100% for demand savings differ from 100% after assigning a deemed savings value based upon the territory, matched from the installed measure's zip code in the tracking data.

Ductless Mini-Split Heat Pump

ADM assigned heating and cooling hours based upon the closest major city to 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.

The ex-ante values were calculated using savings algorithms from a prior version of the PA TRM. The 2015 and 2016 PA TRM present a new savings algorithm which result in higher savings. Ex-post savings were calculated based on the updated algorithm. The Ex-post realization rate for energy savings and demand reductions is therefore 411% and 395%, respectively. However, when ex-ante savings were re-calculated using the new algorithm, the resulting energy and demand realization rates were found to be 108% and 56%, respectively. Thus, the high realization rate is due to updated algorithms and more accurate data.

Furnace fans

The savings value for furnace fans is a deemed value from the Pennsylvania TRM. The savings and demand reduction realization rates were 100%.

Heat Pump

The heat pump ex-ante values used the average of three savings which differed only in the the FLH_{cool} and FLH_{heat} values 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 91% and 87% 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.

H20 & Geothermal Heat Pump

The H20 & 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 specification sheets. The more accurate data resulted in realization rates for energy savings and demand reduction of 190% and 98% respectively.

Smart Thermostats - Midstream

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 upstream survey to justify the use of alternate input variable values for $EFLH_{heat}$, $EFLH_{cool}$, ESF_{cool}, and ESF_{heat}. ADM then took the weighted average of savings based upon the surveys reported heat type to obtain savings of 243.22 kWh per measure. This resulted in a realization rate for energy savings of 90%.

Smart Thermostats - Downstream

ADM calculated savings from downstream thermostats using the same method outlined above for midstream thermostats. Downstream tracking data reported the heating and cooling condition for each installed measure. ADM calculated total savings for each customer based on their location and HVAC system, using the inputs outlined above. The granular analysis resulted in higher than expected savings.

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} and Btu/H of each of the models in the `data set. Furthermore, we used the weighted average of HOU based upon the results from the upstream survey. The weighted average HOU is less than the TRM deemed value. The resulting realization rates for energy savings and demand reductions were 130% and 217%, respectively, due to the use of exact EER_{ee} and Btu/H values.

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 minimum sample size. Then ADM found the actual inputs for 150 models on the AHRI database and manufacturer websites. FLH_{cool} and FLH_{heat} values were determined based upon zip code in the dataset. The 150 savings values from the sample were then averaged and the resultant kWh and kW savings were applied to all units in the dataset. This resulted in a kWh realization rate of 91% and a kW realization rate of 121%.

PTAC

The ex-ante savings calculations used three assumptions: cooling capacity of 12,000 BtuH, EER_{base} (8.344), and EER_{ee} (12). The ex-ante calculations then 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 64% and 73% 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 COPee 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 84% and a kW realization rate of 77%.

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	93,173	228,199	129,491	450,862
Circulation Pump	32,185	21,488	1,793	55,466
Ductless Mini-Split (Heat Pump)	2,901,853	4,333,548	914,575	8,149,976
Furnace Fans	1,940,992	3,309,766	1,122,136	6,372,894
Heat Pump	108,506	581,824	233,058	923,388
H20 & Geothermal (Heat Pump)	65,004	126,745	0	191,749
Smart Thermostats – Midstream	970,713	1,406,086	355,839	2,732,637
Smart Thermostats - Downstream	51,984	84,630	21,789	158,403
Room Air Conditioner	104,066	143,036	45,185	292,287
HVAC Tune-Up	416,565	274,957	67,063	758,586
PTAC	5,426	13,384	148	18,959
PTHP	9,376	28,850	434	38,660
Total	**6,699,843**	**10,552,513**	**2,891,510**	**20,143,866**

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

Measures	CEI	OE	TE	Total
Central Air Conditioner	81.33	207.24	112.21	400.78
Circulation Pump	3.67	2.45	0.20	6.33
Ductless Mini-Split (Heat Pump)	480.33	717.31	151.39	1,349.03
Furnace Fans	456.96	779.21	264.18	1,500.35
Heat Pump	11.44	82.30	44.49	138.23
H20 & Geothermal (Heat Pump)	2.13	5.58	-	7.71
Smart Thermostats - Midstream	-	-	-	-
Smart Thermostats - Downstream	-	-	-	-
Room Air Conditioner	223.13	306.69	96.88	626.70
HVAC Tune-Up	184.22	120.73	36.49	341.44
PTAC	8.22	22.57	0.22	31.00
PTHP	4.20	11.94	0.19	16.33
Total	**1,455.64**	**2,256.00**	**706.25**	**4,417.89**

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	342,566	291.90	450,862	400.78	132%	137%
Circulation Pump	55,968	6.34	55,466	6.33	99%	100%
Ductless Mini-Split	1,983,991	341.92	8,149,976	1,349.03	411%	395%
Furnace Fans	6,372,894	1500.35	6,372,894	1,500.35	100%	100%
Heat Pump	1,018,114	158.62	923,388	138.23	91%	87%
H20 & Geothermal (Heat Pump)	100,800	7.84	191,749	7.71	190%	98%
Smart Thermostats - Midstream	3,010,418	-	2,732,637	-	91%	-
Smart Thermostats - Downstream	149,260	-	158,403	-	106%	-
Room Air Conditioner	224,380	289.15	292,287	626.70	130%	217%
HVAC Tune-Up	834,267	282.51	758,586	341.44	91%	121%
PTAC	29,445	42.28	18,959	31.00	64%	73%
PTHP	46,231	21.28	38,660	16.33	84%	77%
Totals	**14,168,333**	**2942.18**	**20,143,866**	**4,417.89**	**142%**	**150%**

9 Process Evaluation Findings

9.1 Program Operations and Changes

The Companies oversee the Residential EEP Program and the appointed Program Implementation Vendor, Honeywell. As the Program Implementation Vendor, Honeywell is responsible for executing the program including, but not limited to, overseeing the cross-functional teams that implement marketing, recruitment, store visits, rebate processing, and customer service.

Honeywell designs and distributes the program marketing promotional materials directly to participating retail stores and distributors. The Companies approve all promotional materials before distribution. Honeywell representatives recruit the key program partners, including HVAC distributors, HVAC contractors, and retailers for all sub-programs. Honeywell handles all customer service issues, answering the concerns and questions from customers and program partners alike.

The program made the following operational changes in 2019:

- Engaged additional HVAC contractors. Honeywell made a concerted effort to increase the number of contractors participating in the network, with the aim of increasing participation in the tune-up measure.
- Modified the smart thermostat offering in mid-2019 to add a downstream thermostat measure to the existing midstream program and offer an instant rebate. As a result, the Companies now directly offer customers up to a $75 instant rebate with a simplified instant rebate process. Specifically, this provides a prepaid $75 MasterCard (a mail-in option was also available to customers). The Companies rolled out the program among eligible retailers on November 15, 2019.

9.2 Marketing and Outreach

9.2.1 Program Marketing and Outreach Support

As the Program Implementation Vendor, Honeywell provides marketing support directly to distributors, contractors, and retailers in the form of trainings and program materials such as marketing promotional materials (i.e., point of sale materials).

For **distributors**, Honeywell provides a variety of marketing materials that distributors can use to help sell equipment and promote program-qualifying equipment to contractors.

For **contractors**, the program provides educationally focused brochures that describe the benefits of purchasing high-efficiency equipment and energy savings opportunities.

For **retailers**, the program provides a variety of in-store materials, such as 8x11 signs, banners, brochures, stickers, tripod supported standing signage, and window signs.

Midstream product signage emphasizes energy savings opportunities and efficiency, whereas downstream product signage emphasizes the available rebate.

9.2.2 Distributor Experience with Marketing and Outreach

The program incentivizes distributors based on the number of qualifying units sold. Distributors therefore focus their sales tactics on encouraging their customers (contractors) to purchase more efficient models of HVAC equipment, primarily through a variety of promotional efforts. For example, some distributors market specific measures at different times of the year to increase sales of those products.

Distributors described actively marketing products in their facilities and directly to contractors—their main buyer. Some distributors outlined how they use the marketing promotional materials and signage provided by Honeywell, while others mentioned designing their own promotions in-store, specifically related to connected devices.

9.2.3 Contractor Experience with Marketing and Outreach

Overall, contractors described their participation in the program as generally passive or reactive. This makes sense since Distributors receive the incentive for the HVAC equipment, and customers receive the incentive for the tune-ups.

As a primary influencer for customers, contractors are in the best position to help drive the residential HVAC market. However, the program does not appear to provide contractors with the education or information to “sell” high efficiency to customers. As examples, none of the contractors reported receiving marketing materials, and relatedly, none of them were using the Companies-branded marketing directly. By design, the program provides contractors with program promotional brochures.

Interviews with the program team identified the desire for market actors—including contractors—to cross-promote programs and eligible measures. For example, a contractor providing tune-up services is in a good position to inform a customer about HVAC equipment upgrades and efficiency options. Interviews with contractors revealed this is not happening. Contractors do not discuss HVAC sub-program rebates for new HVAC products, although one contractor mentioned that they discuss the retail product rebates. This may be due in part because the midstream program is not designed to directly incentivize the contractor to purchase high efficiency equipment. Rather contractor’s equipment purchases are indirectly influenced through the distributors that do receive the incentive who in turn offer HVAC equipment at competitive prices to participating contractors.

9.2.4 Retailer Experience with Marketing and Outreach

As noted above, the program primarily provides marketing and outreach materials to retailers through signage. Signage can take many forms. It is intended to educate customers on which equipment is high-efficiency and inform them about discounts available.

The perception of the effectiveness and visibility of this signage differed by retailer size. Larger retailers reported they did not have much signage, and sales associates and managers said they had little to no control over display design and signage position.

Interviews revealed that smaller, local stores and regional chains used signage more than larger retailers. They have more control over placement of products (typically prescribed for larger retailers), and therefore have more control over the materials placed within the store.

DISTRIBUTOR ENROLLMENT

Direct recruitment is very effective for enrolling distributors into the program; all distributors were recruited in this way.

Distributors appreciate the follow-up from the Honeywell team during and after the enrollment process.

9.3 Enrollment and Program Experience

This section highlights how the participating market actors—distributors, contractors, and retailers—enroll in the program and experience the program throughout their course of participation.

Across all three groups, we observed that active and early interactions (during or post-enrollment) increased engagement and subsequent participation with customers. For example, interviewees positively viewed Honeywell field staff visits where they provided information, guidance, and materials such as training, signage, program materials, and rebate forms.

In addition, distributors, contractors, and retailers have varying levels of interaction with the program. Within the program, they have varying levels of self-determination and latitude to decide how to implement the program. Distributors, followed by retailers, have higher flexibility in their execution of the program. Contractors have limitations to customizing or applying the program to their unique audiences.

9.3.1 Distributor Enrollment and Program Experience

Distributors are highly engaged and report a strong sense of ownership in their participation in the HVAC sub-program. Distributors described receiving communication from Honeywell about the program and expressed appreciation for that direct line of communication with the Honeywell team.

Related to the enrollment process itself, some distributors interviewed noted that the process was a bit arduous; however, they also described how Honeywell staff members helped them troubleshoot and provided useful support during the enrollment and onboarding process. Specifically, they described how the Honeywell staff initiated a conference call with several other distributors where they discussed the program details in depth. Distributors were able to ask questions, air their concerns, and ultimately decide whether to participate.

CONTRACTOR ENROLLMENT

Contractors are more engaged and satisfied when they receive some type of follow-up after submitting their program application.

By contrast, contractors who did not receive visits or follow up after enrolling online did not express positive engagement in the program. They either did not perform any rebated tune-ups during the year, or only completed rebates at the customer's request.

9.3.2 Contractor Enrollment and Program Experience

The contractors interviewed all provided HVAC Tune-Up services through the HVAC rebate sub-program. Respondents included individual licensed contractors and larger HVAC service providers across the state of Ohio.

Contractors fall into two main categories: (1) those who are engaged with the program and (2) those who either did not know they were part of the program or who are relatively unengaged. Engaged contractors generally recall the application process and discussions with the program implementer and feel comfortable completing the rebate application process with their customers.

Contractors who did not receive visits, phone calls, or follow-up confirmation after enrolling did not promote the program among their customers. Relatedly, they did not perform any rebated tune-ups, or they only completed the form at the customer's request.

9.3.3 Retailer Enrollment and Program Experience

The team interviewed representatives from three groups of retailers that differed by program participation and type of retailer, including:

- HVAC rebate retailers, all of which were national big box stores.
- Large retailers that participated in sub-programs other than HVAC. We interviewed managers from two stores from a midwestern appliance chain.
- Smaller, local retail stores which tend to be stand-alone stores. We interviewed owners who worked on-site.

The decision to enroll and participate in the program is typically made at a corporate executive level for big box retail stores, above that of local store managers. Sales

associates and department managers were reticent to speculate about management's reasons for enrolling and participating in the program. Similarly, smaller regional chain retailers also reported a lack of control related to their store's decision to enroll in the program. As such, direct recruiting at the store level for these types of stores will likely not yield fruitful results.

Smaller, local retailers and non-HVAC retailers described their experience with ongoing program support, saying that they had representatives or "reps" for the rebate program who made regular store visits and mentioned that their reps provided sales associates with coaching on how to incorporate rebates into sales pitches. Retailers who remembered interacting with reps were not sure who their reps worked for, and generally assumed they were associated with the Companies. Midstream rebate retailers also reported that their rep collected sales information on rebated items during these visits so that they could receive their incentives.

Staff at big box retailers generally described less ongoing program support, and typically were not aware of where in-store signage came from or that any representative of a third-party implementor visited their store. This was true for sales associates and department managers. Staff at these stores were also less aware of rebates from the Companies in general. Again, this is likely attributable to the turnover rate of employees in the retail industry.

Prior evaluations of this program found that smaller, local stores were more challenging to engage compared to larger, national chain stores. However, that may be changing. Overall, our team found that smaller, local stores are aware of the program, report having interactions with their program representatives who visit the stores and feel that they have more ownership and control of the program within their stores, including on decisions related to enrollment. These retailers also described latitude related to what products to stock and what signs to post within their stores.

9.4 Reasons for Participation

The reasons for participation in the program do not seem to vary too widely among the different groups—distributors, contractors, and retailers. Overall, the potential for increased sales or services revenue is the main motivator for program partners. Contractors and retailers view the offering as an opportunity to bring in more business as well as increase customers' satisfaction and loyalty, for example by engaging repeat business as well as giving and receiving word-of-mouth referrals.

9.4.1 Distributors' Reasons for Participation

The most compelling reason for distributors to participate in the program is the potential increase in revenue. Additionally, distributors interviewed described how participation

aligned with their company sales goals. Most distributors, due to contracts with manufacturers, must sell the full line of branded products, which includes a range of efficiency products (low and high). Distributors reported that, as a matter of both principal and profit, they generally aim to sell higher efficiency products when they can, and the program helps them to do that.

9.4.2 Contractors' Reasons for Participation

Contractors described the tune-ups as a fairly routine service. On a typical service call, they perform the tune-up, clean coils, check fluid levels, and check the motor. Engaged contractors—described as those who interact more with the program and perform many rebated tune-ups per year—reported that they inform their customer about the program and fill out the rebate form, usually leaving it for the customer to submit. While contractors generally are not actively marketing the tune-up, they still attributed an increase of 10% – 30% in tune-up business to the rebate. They also explained that they like to offer the rebate as a "bonus" to their customers, especially their loyal customers who typically receive services from them at set intervals.

By contrast, less engaged contractors—those who have little interaction with the program—reported that they would fill out the rebate forms only at the customer's request. In these instances, contractors reported that their customers had heard about the tune-up rebate though their utility bill inserts or other Company marketing channels and had brought it up to their contractor. They were not actively marketing or discussing the rebate with their customers.

9.5 Rebate Process and Effectiveness of Rebates on Sales

Distributors, contractors, and retailers alike recognize that lowering upfront costs are a priority for a majority of end-use customers. In this section, we describe how distributors, contractors, and retailers experienced the rebate process and how they perceive the effectiveness of rebates in selling higher efficiency equipment.

9.5.1 Distributors' Views on the Rebate

Distributors are very positive about the rebates and how they affect their business practices. They indicated that their participation in the program had increased their sales of energy efficient products and pushed contractors that they work with to their top-tier efficiency equipment.

Most notably, they believe the rebates are helping to shift the buying habits of contractors they sell to. They characterize contractors as 'creatures of habit', buying the same familiar product year after year. By incentivizing them to stock and promote high-efficiency

products, distributors believe the program is effectively shifting contractors' sales practices.

In fact, several distributors estimated that upwards of 35 –40% of their overall equipment sales were rebated and high efficiency, which they suggested would not have occurred without the program rebates.

Additionally, distributors described the flexibility in how they are able to pass along rebates and discounts to their contractors, which they seem to appreciate. As examples:

- Most of the distributors interviewed provided a portion of the rebates paid to them to the contractor, deducted from their overall invoice for the equipment. Some distributors issued the credits on a bi-weekly schedule, while others offered as needed or quarterly distributions of the funds.
- Distributors also described the ability to customize their offering to suit their clientele. One distributer provides 0% financing to their customers while another provides credits to customer accounts, and others reported marking down product prices displayed in store.

All distributors had varying issues with the rebate process itself, including the investment in time it takes to complete rebate processing. In particular, distributors described that the rebate process is often not compatible with the way their invoicing is set up. As such, they have to develop and set up separate systems to produce reports that are compatible with program needs. In short, the data fields required for program reporting are often not what distributors have readily available. Distributors described using an administrative payment (or an administrative "fee") for participation. While frustrated by the additional effort, they also recognize that this administrative fee covers the additional cost for the time required to complete the rebates.

9.5.2 Contractors' Views on the Rebate

Contractors interact with the program in two ways:

1. As purchasers of equipment from distributors.

Outside of potentially receiving credits or discounts passed down by distributors (discussed earlier), contractors have no interaction with the rebates or rebate processes, except in cases where they help customers complete the tune-up rebate form. Supporting distributors' perception that contractors typically purchase products they are familiar with, contractors interviewed generally expressed less interest in the efficiency level of products, and instead said they tend to focus on price, urgency, and cost-effectiveness. This is especially the case in emergency situations (i.e., a furnace stops working).

2. As providers of tune-up services.

Contractors directly interact with customers and support them through the tune-up rebate process.

Those interviewed perceive this tune-up rebate as a benefit and are grateful that the rebates are marketed directly to customers.

Specifically, contractors believe these rebates bring in business they may not have gotten otherwise. As one contractor said, "it's just another avenue to open up people to call you, because you know we do it (the tune-up)."

Despite contractors' perceptions that the rebate increases their business, they report discussing the rebate with customers during or after the tune-up service, rather than before. This may indicate that the rebate is not truly driving program participation in this measure, or sales or growth for these contractors. Contractors do, however, report that their customers are very appreciative of the rebate, and that it increases customer satisfaction and loyalty.

9.5.3 Retailers Views on the Rebate

Retailers receive a rebate for selling qualifying equipment. How they use the rebate, and communicate that rebate to the customer, generally varies by retailer size. Specifically, they use the promise of a rebate to varying degrees in pitching to customers, depending on the store type and type of customers shopping at that store.

Sales associates at large big box stores reported that they did not try to sell or pitch particular rebated products to customers. The program theory centers around the premise that offering retailers a rebate for qualifying equipment would encourage the promotion and prioritization of placement of program-qualifying equipment to customers. This may be an area for deeper investigation by the Companies and Honeywell and is likely also attributable to the turnover rate in the retail industry.

By contrast, smaller, local stores and some larger stores with sales associates reported that they may be commissioned or tasked with selling specific products. In these instances, they discussed using the program rebates as part of their pitch to sell higher efficiency products. Retailers described framing sales in terms of meeting customer desires; for example, by providing them with an appliance that meets their needs. After pitching a specific unit to the customer, and while the customer was still considering, they mention the rebate offerings to help close a sale.

Interviewees from big box stores report that customers are generally not aware if the equipment is discounted, although they occasionally have customers who specifically approach them with questions about products and Company rebates. Even if customers were aware, however, retailers reported that they did not perceive the discount as a primary motivator to purchase more efficient equipment. Even smaller, local retailers said

that the rebates were not highly influential in motivating customers to purchase qualifying equipment.

9.6 Customer Purchases and Experience

In this section, we focus on the customer experience from their perspective. We report on findings from the mobile customer survey and the upstream and downstream customer surveys.

9.6.1 In-Store Experience (Mobile Survey)

We recruited customers through a mobile survey panel. Customers received an invitation for the study if they were within a certain range of one of the geofenced store zip codes and responded to a screener to qualify for the study. The screen questions included verification of their age (confirming adulthood) and that they were customers of the Companies. Further, to ensure the relevance of the products reviewed, we asked customers whether they rented or owned their homes. Those who qualified received instructions on the mobile mission available at specified store locations near them. The mobile missions assigned varied by store location and participation in the various sub-programs. To verify their authenticity, customers were instructed to turn on their phone's location services. Customers participating in the mobile survey responded to a series of in-store experience questions and documented their experience through photos captured during their store visit. Fifty-seven responses were collected between January and February 2020. Respondents received compensation in the form of electronic points redeemable for cash through the panel platform.

Mobile survey respondents reviewed products in all four of the sub-programs. The sample of respondents included 40 homeowners and 17 renters. To enhance the relevance of the questions and therefore increase data quality, we optimized the survey so that renters and homeowners would be directed to review products that they would be likely to purchase (renters were not asked about large home appliances that are typically managed by homeowners or landlords). Respondents varied in age from 18 to 65 years of age. The table below is a breakdown of responses between the four sub-programs and the measures reviewed.[22]

[22] The total of those who reviewed each measure may not equal the total n sample. Some customers reviewed more than one product.

Table 9-1: Mobile Survey Respondents by Reviewed Measure

Sub-Program	Measure	N
Lighting	LED Light Bulbs	15
	Lighting Fixtures	4
	TOTAL	***19***
Appliances	Freezers	8
	Refrigerators	8
	Clothes washers and/or clothes dryers	5
	Heat pump water heater	0
	Dehumidifiers	5
	TOTAL	***26***
Consumer Electronics	Computers	5
	Televisions	0
	Printers	5
	Computer monitor	2
	TOTAL	***12***
HVAC	Thermostats	19
	TOTAL	***19***

Table Note: After reviewing a product, mobile survey respondents were asked if they would be willing to review a second product. This table includes all product reviews (i.e., one person may have reviewed up to two total products). However, fewer survey questions were asked during the second product review so as not to over-burden survey respondents. As such, figures depicted in the text in subsequent sections may not match this table exactly. Differences between figures in this table and those within the report are notated throughout the report.

HVAC Customer Experiences – Mobile Survey

All survey respondents who reviewed HVAC products reviewed ENERGY STAR® Smart Thermostats[23]. In general, most customers who reviewed the ENERGY STAR® Smart

[23] To ensure that customers selected relevant products we allowed customers to choose from the variety of products offered under the HVAC sub-program. All customers opted to review ENERGY STAR® Smart Thermostats.

Thermostats reported that they found signage easily, understood signage messages, and were able to find the discounted ENERGY STAR® Smart Thermostats in the stores.

Of the 19 respondents who reviewed ENERGY STAR® Smart Thermostats, nearly all (n=16) saw signage specifically advertising up to a $75 instant rebate for ENERGY STAR® Smart Thermostats. The majority of respondents (n=12) were also able to locate the advertised ENERGY STAR® Smart Thermostats in the store, while three respondents were unsure about whether they had found the correct products.

Figure 9-1: In-Store Customer Photo of ENERGY STAR® Smart Thermostat Signage

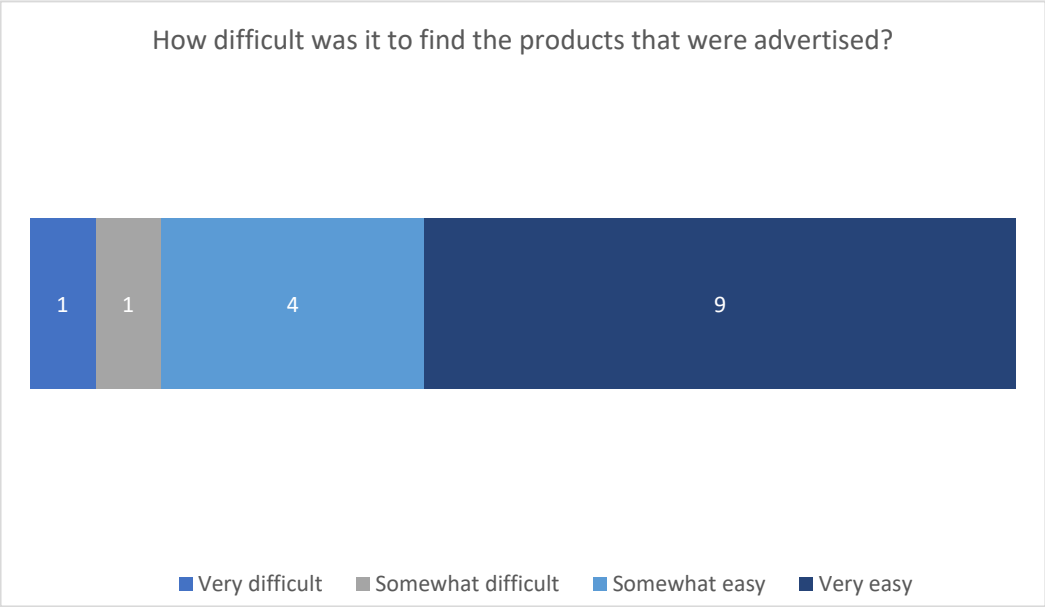
Among the few customers who had a difficult time locating the advertised ENERGY STAR® Smart Thermostats in store, they noted that they either “don’t know if it includes all models” or that the “rebate signs [were too] small.” An example of this type of signage is presented in Figure 9-1.

Figure 9-2: Ease of Locating ENERGY STAR® Smart Thermostat Products (n=15 respondents)

Figure Note: Total responses add to 15 (and not 19 as depicted in Table 9-1) because survey respondents who reviewed a Thermostat as their second product were not asked this question.

More than half of respondents noted that the Companies' signs were easy to find, attention-grabbing, and clearly showed which products qualified for the instant discounts. (Figure 9-2 and Figure 9-3).

Figure 9-3. ENERGY STAR® Smart Thermostat Signage Experience (n=15 respondents)



Most respondents understood the main message of the signage and offering, noting that it was to "Purchase an [ENERGY STAR® Smart Thermostat] and get an instant rebate of up to $75 via online request that results in a prepaid MasterCard." The majority of respondents also felt confident that they could follow the signage instructions to claim the instant rebate (n=14). Figure 9-4 shows an example of signage.

Most respondents also reported that they are more likely to purchase an ENERGY STAR® Smart Thermostat compared to a standard thermostat based upon their review of the program signage (n=15).

Despite this, several respondents commented that the signage could be displayed more prominently, that they wanted information about the installation process for ENERGY STAR® Smart Thermostats, and they wanted information about how to determine whether these thermostats would be compatible with their home heating and cooling system.

Figure 9-4: In-Store Customer Photo of ENERGY STAR® Smart Thermostat Signage

Approximately half of respondents (n=8) spoke with a store associate during their store visit. Topics of conversation between the respondent and sales associate can be found in Figure 9-5 below. Of the respondents who spoke with a sales associate during their store visit, most frequently, they received information about rebates available for the ENERGY STAR® Smart Thermostats.

Figure 9-5: Conversation Topics between HVAC Survey Respondent and Store Associate (n=8 respondents)

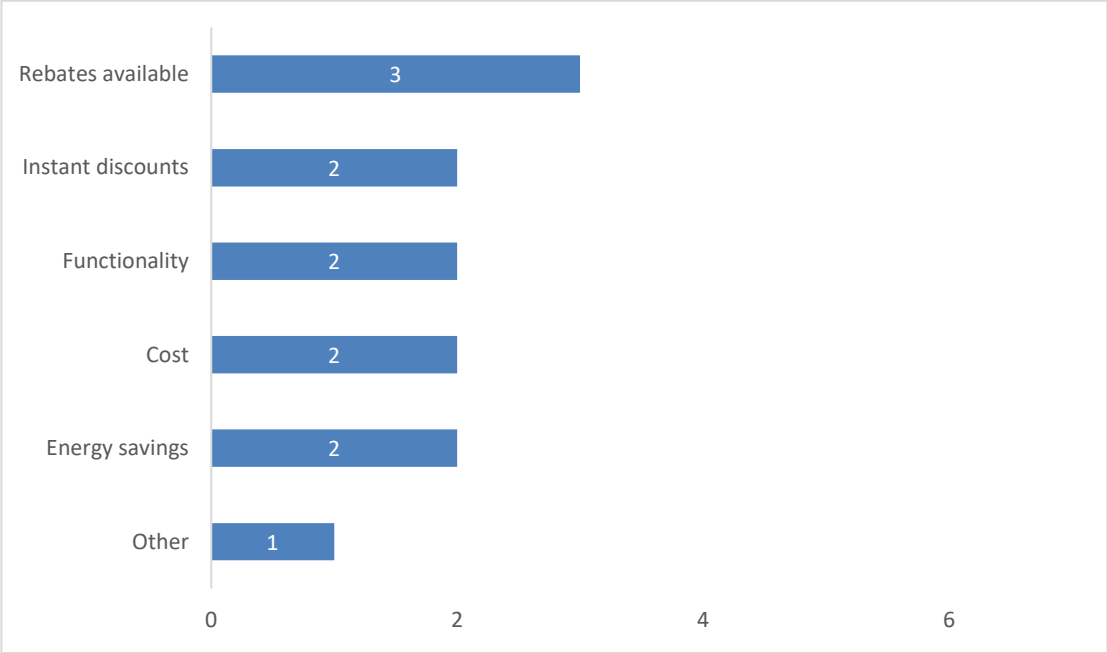


Figure Note: Multiple responses allowed thus totals do not add up to the 8 total respondents who answered this question.

Respondents who reported that they did not speak with store associates reported that they either chose not to engage with store associates or were not approached by sales team members while shopping in the store.

Consumer Electronic Customer Experiences – Mobile Survey

Respondents who reviewed products under the Consumer Electronics sub-program provided feedback about their in-store experiences for various selections including computers, monitors, printers, or scanners. Twelve total respondents reviewed products in the Consumer Electronics category. However, of the 12 total respondents, 5 reviewed these products as their second product during the mobile survey and thus, were asked limited questions.

Seven total respondents who reviewed Consumer Electronics products were asked the survey battery of questions related to signage and responded to those questions. Of the seven people who responded about Consumer Electronics product signage, only two reported seeing signage advertising energy savings or rebate savings for the products.

Only two respondents were able to locate the Consumer Electronics signage. Figure 9-6 shows an example of signage. Of these two, both had difficulty understanding how efficient products were.

Figure 9-6: In-Store Customer Photo of Consumer Electronics Signage

Customers had mixed reactions as to whether they would be swayed to purchase products; in part, this may be because five of seven respondents were unable to find product signs. Two respondents indicated that they would be inclined to purchase the advertised products, while the remaining customers indicated that they either had no preference for products they would buy (3 respondents), or they were unsure altogether (2 respondents).

Most respondents did not speak with a sales associate during their store visit. Three respondents stated that they specifically avoided speaking to sales associates, two reported that associates did not approach them at all during their visit, and two spoke with associates (customers at Kmart and Best Buy). Both respondents said that the associates were generally helpful and knowledgeable about the products.

Lighting Customer Experiences – Mobile Survey

Respondents who reviewed products under the Lighting sub-program provided feedback about their in-store experiences. Nineteen total respondents reviewed products in the Lighting category. However, of the 19 total respondents, 6 reviewed these products as their second product during the mobile survey and thus, were asked limited questions.

Of the 13 respondents who reviewed Lighting as their first mobile survey product, almost all were able to locate in-store signage (n=11). Respondents described seeing flyers, signs, posters, or stickers advertising rebates or instant savings offered by FirstEnergy's Ohio utilities. In addition, eight of these 13 respondents said that they saw branded flyers, signs, posters, or stickers specifically advertising energy savings for lighting. Figure 9-7 shows an example of the signage.

Figure 9-7: In-Store Customer Photo of Lighting Signage

Respondents reported that the messages contained in program signage are clear and focus on information about the discount, energy savings, and directions to visit the website for more information.

Most respondents found it easy to find the products in store (8 respondents). The few respondents who had a hard time locating the products noted that signage was not near the relevant products or that signage did not specify particular products.

Figure 9-8: Ease of Locating LED Lighting Products

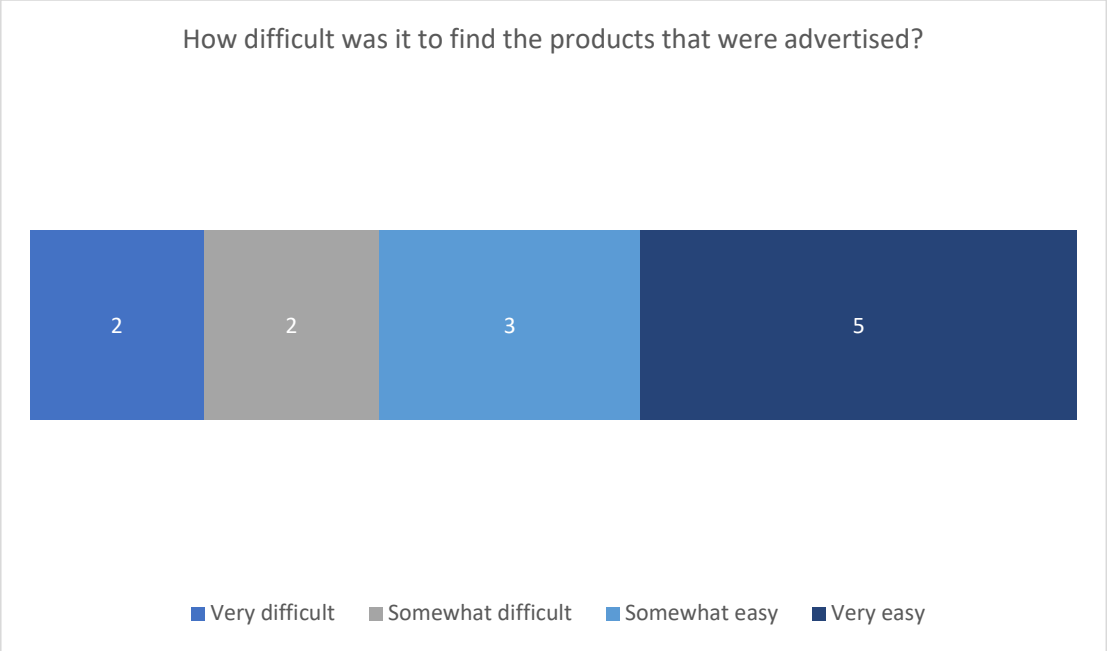


Figure Note: Total responses add to 12 (and not 19 as depicted in Table 1-1) because survey respondents who reviewed Lighting as their second product were not asked this question, and one respondent did not answer this survey question.

Similar to the Consumer Electronics sub-program, most respondents did not speak with associates during their store visits. Only two had conversations; other customers either chose not to engage with associates or were not approached by a sales team member. Among the two who had conversations, they reported that the associates spoke with them about savings, rebates, or the ENERGY STAR® rating (customers at Wal Mart and Home Depot).

About half of respondents were convinced by program signage and their in-store experience, saying that they would be inclined to purchase the LED products (7 of 13 respondents).[24] Most respondents (n=10) also felt that they were equipped and informed enough to make an educated decision the next time they were in the market for lighting products.

[24] Thirteen total respondents were asked this question, although there were 19 total LED product reviews. As stated earlier, the six respondents reviewing lighting as their second product category in the mobile survey were not asked this question.

Appliance Customer Experiences – Mobile Survey

Respondents who reviewed products under the Appliances sub-program provided feedback about their in-store experiences. In total, 26 respondents reviewed products in the Appliances category. However, of the 26 total respondents, 8 reviewed these products as their second product during the mobile survey and thus, were asked limited questions.

Of the 18 respondents who reviewed Appliance products as their first product in the mobile survey, about half were able to locate in-store signage for the product they chose to review (n=7).

Among the seven respondents who found signage, they also easily found the advertised appliances. Figure 9-9 shows an example of the signage. Some questions that arose for customers after reviewing the signage, related to energy usage and cost savings as a monthly estimate. Customers stated that they want information that would help them estimate how quickly they will start to observe energy savings and to what degree they can expect to notice savings. Customers also expressed that they are interested in seeing comparisons of specific products against the rebated products.

Figure 9-9. In-Store Customer Photo of Appliance Signage

As seen across the other sub-programs, most respondents did not interact with sales associates. Some respondents (n=3) noted that they chose not to engage with store associates or that they were not approached by a sales associate (n=5). An additional three respondents said that associates were too preoccupied or busy to speak with them.

The two respondents who spoke with a sales associate during their store visit said the associate spoke to them about cost and energy savings and that associates were knowledgeable about savings and rebates and provided clear and useful information during the shopping experience (one at Sam's Club, the other at Costco).

Most respondents were not sure whether they would purchase the reviewed product or said they would likely purchase a different make or model. In part, this may be because appliances are more expensive items (for example, compared to lighting or computer printers). (Figure 9-10)

Figure 9-10. Likelihood to Purchase Rebated Appliance

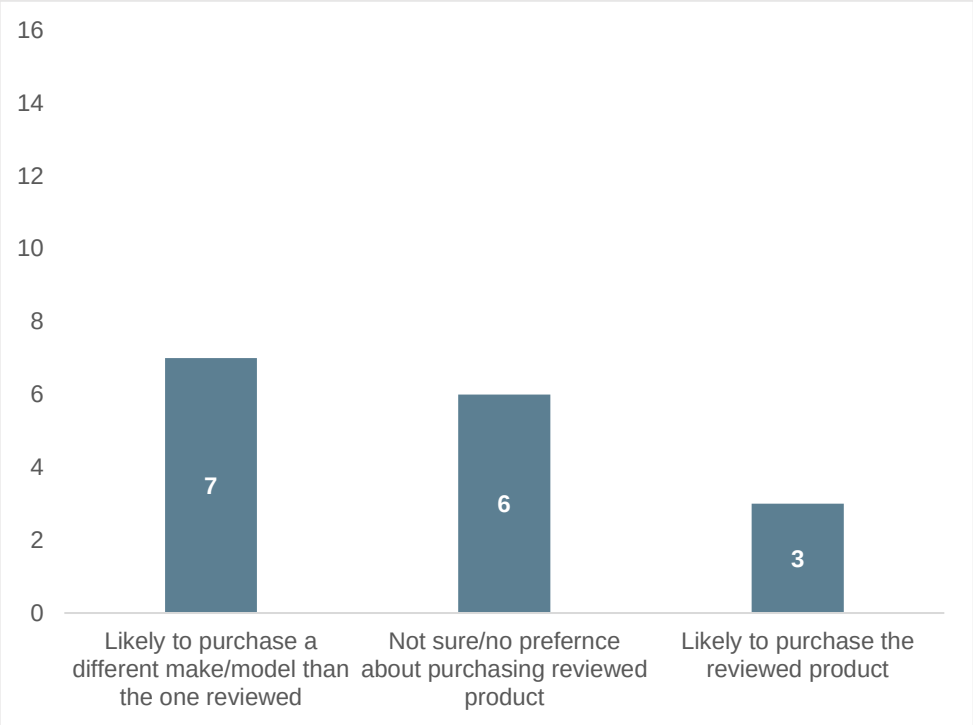


Figure Note: Total responses add to 16 (and not 26 as depicted in Table 1-1) because survey two respondent said they did not have a need for the product at all and eight respondents did not respond to the survey question.

Respondents who said they'd be likely to purchase the advertised models mentioned that they were motivated by price, rebate, warranty, and features including size and efficiency.

Respondents who were unsure or thought they might purchase alternative products stated that they needed to do more research on the brands and models or that they needed more information about efficiency.

Mobile Survey Conclusions

Most respondents saw program signage for the recently rolled-out instant rebate for ENERGY STAR® Smart Thermostat offering up to $75 and Lighting sub-program products. These respondents also found the products being advertised, and described a variety of signage such as flyers, signs, and posters.

By contrast, respondents were less likely to report seeing in-store signage for Consumer Electronics and Appliance sub-program products, with very few respondents noticing signs about these products while in-store.

Across all four sub-programs, there was minimal interaction between mobile survey respondents and sales associates. In part, this was self-directed; mobile survey respondents could choose not to interact with or approach sales staff if they did not want

to or did not have questions to discuss. Among those who did have conversations with sales team members, respondents said that staff were generally knowledgeable, and could speak about rebates and energy savings.

9.6.2 Customer Purchases, Awareness, and Satisfaction (Upstream Customer Survey)

The evaluation team conducted a web-based survey with 2,159 customers who received rebates for the upstream incentives representing customers who answered questions regarding lighting, lighting controls, refrigerators, freezers, dehumidifiers, and HVAC equipment. As noted in the Table 9-2 below, the survey represented customers from all three operating companies.

Table 9-2: Proportion of Customers representing FirstEnergy Ohio Utilities

Operating Companies	% Survey Respondents	# Survey Respondents
OE	46%	990
CEI	38%	816
TE	16%	353
Total	**100%**	**2,159**

Lighting

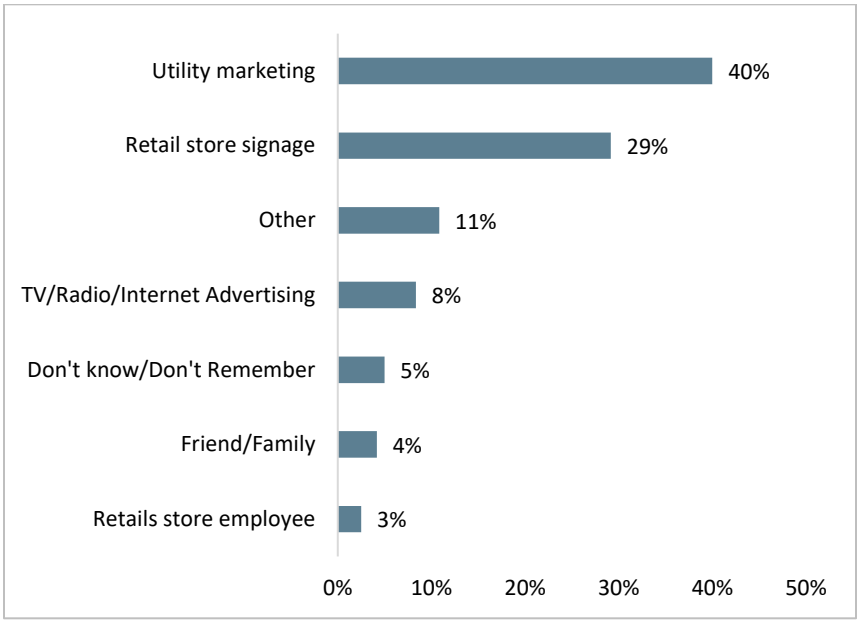
In 2019, a majority of customers who responded to the upstream survey purchased light bulbs (86% total). Of those who purchased light bulbs in 2019, 75% specifically purchased LED lamps[25], while 26% purchased CFLs, and 24% reported purchasing halogen bulbs[26]. About 36% of respondents reported that they had purchased LED fixtures in 2019. A smaller percentage of upstream survey respondents reported purchasing occupancy sensors (12%).

Customers primarily learn about the discounted price on LEDs through utility marketing. Among survey respondents who were aware of the LED discounts (9.3% of customers, n=120), nearly half reported that they learned about the discounts through utility marketing (40%), through retail store signage (29%), and other sources (11%) specifically email or at special events. Figure 9-11 shows how customers learned about discounts on qualifying LEDs.

[25] LED Lamps were labeled as “bulbs” in the survey.

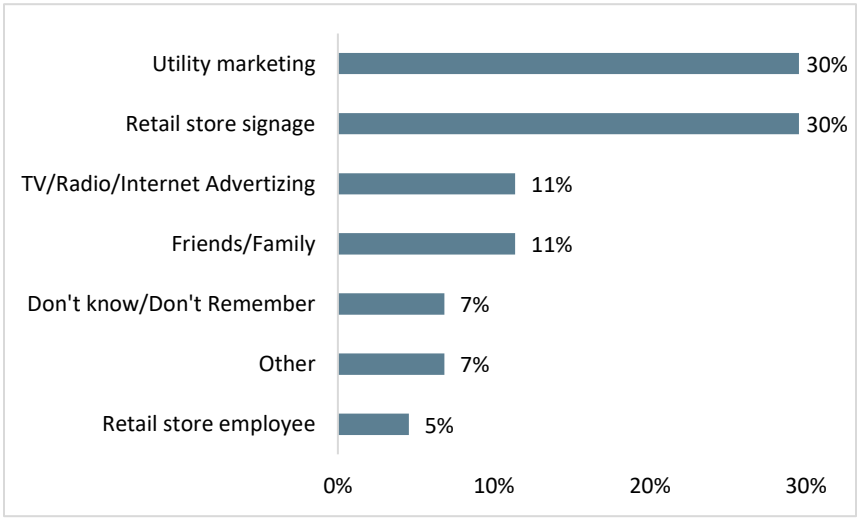
[26] Survey participants could select more than one type of lamp. Therefore, the sum of the percentage of lamp types purchased can be greater than 100%.

Figure 9-11: Source of Customer Awareness of LED Bulb Discounts



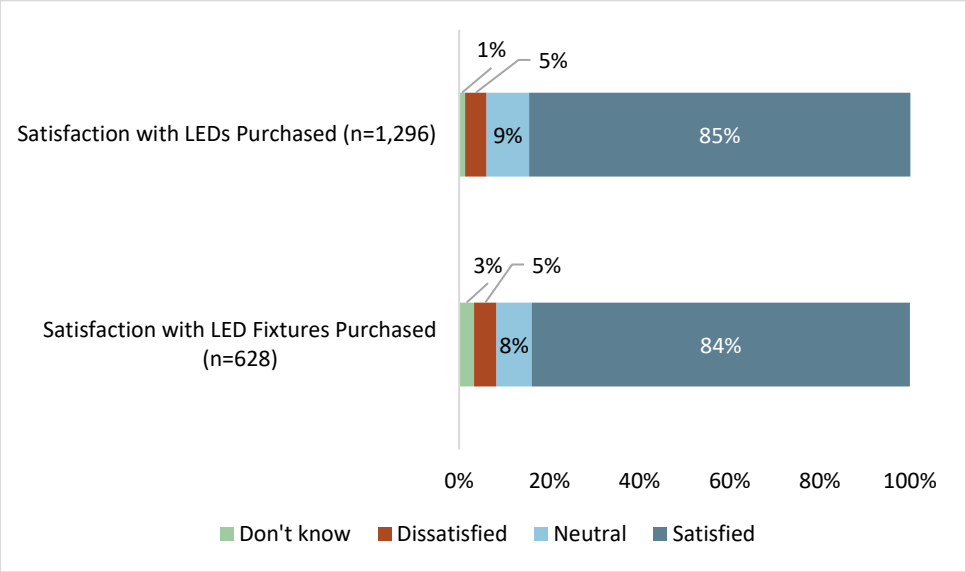
Customers who are aware of LED fixture discounts (7% of customers, n=44), similarly reported learning of those discounts from utility marketing (30%), and retail store signage (30%). Figure 9-12 shows all sources of customer awareness for LED fixture discounts.

Figure 9-12: Source of Customer Awareness of LED Fixture Discounts



The majority of LED lamps and LED fixture customers reported that they are satisfied with their experience with the lighting products they purchased. Figure 9-13 shows the satisfaction with their product purchases, with upwards of two-thirds of customers who purchased LED lamps and LED fixtures reporting that they are very satisfied with their product purchase.

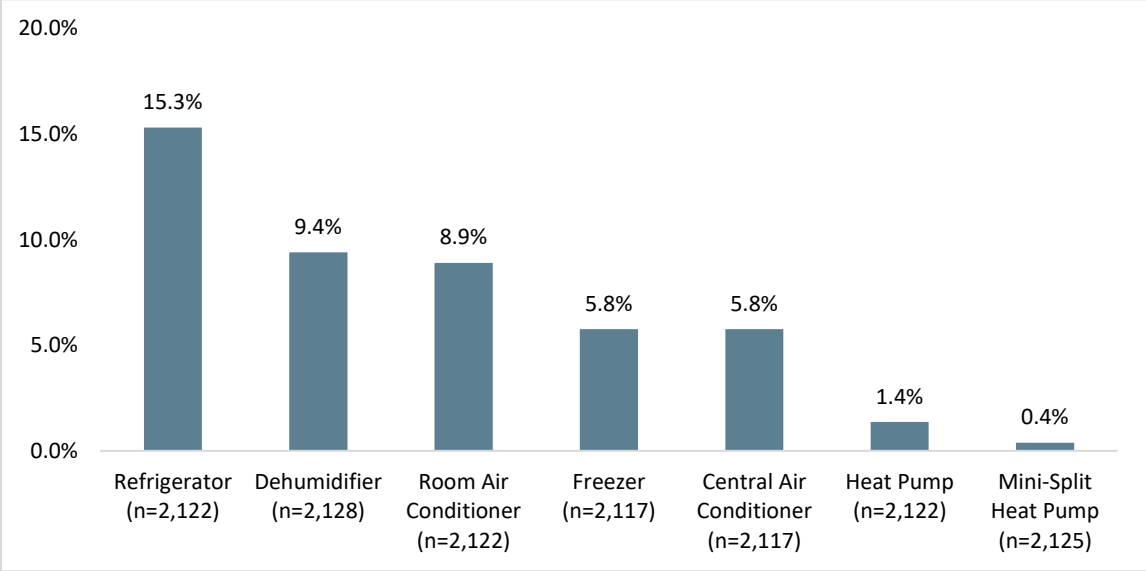
Figure 9-13: Survey Respondent Satisfaction with LEDs and LED Fixtures



Home Appliances and Equipment

Among survey respondents, refrigerators (15%), dehumidifiers (9%), and room air conditioners (9%) were the most commonly reported purchases. Mini-split heat pumps were the least frequently purchased product. Figure 9-14 shows the distribution of customers who reported that they had purchased home appliances and/or equipment.

Figure 9-14: Percentage of Respondents Who Purchased Appliances

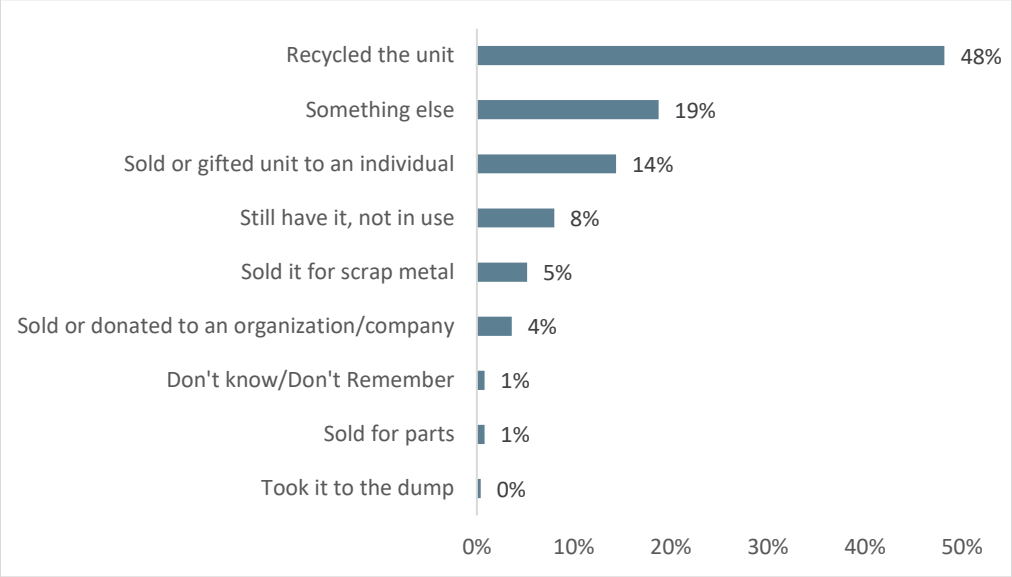


Customers reported replacing their refrigerator for a variety of reasons: to update a functioning unit (39%), because it was broken (38%), or that they were not making their purchase as a replacement (20%).

The Companies have an Appliance Turn-in program, where customers can get rid of their old refrigerator or freezer and receive a $50 rebate. To qualify, customers must own their current refrigerator or freezer, be a Company customer, and have a refrigerator/freezer that is in working condition. The majority of respondents who purchased a refrigerator reported that they recycled their old unit (48%)[27], as seen in Figure 9-15.

[27] The respondents that indicated they recycled their refrigerator may not have recycled their refrigerator through the Companies appliance recycling program. Although participation in the Companies Appliance recycling program greatly exceeded the number of respondents who indicated they recycled their refrigerator.

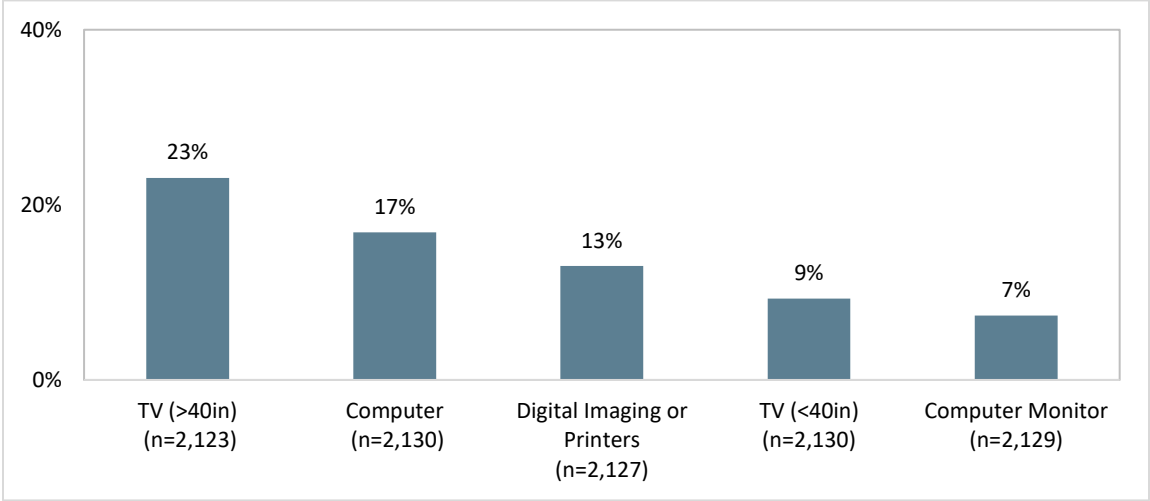
Figure 9-15: How Respondents Disposed of Their Older Refrigerator (n=251)



Consumer Electronics

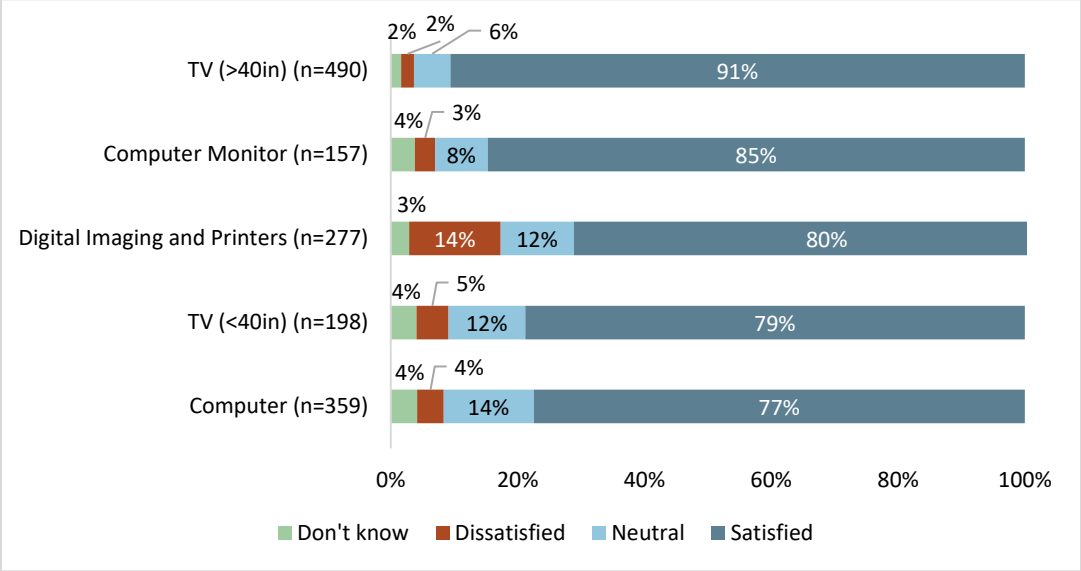
According to respondents, televisions were the most frequently purchased consumer electronic product followed by computers. Figure 9-16 shows the distribution of customers who reported that they had purchased consumer electronic products.

Figure 9-16: Percentage of Respondents Who Purchased Consumer Electronics



In general, customers are highly satisfied with their consumer electronic product purchases. Survey respondents reported high levels of satisfaction, ranging from 77% (who purchased computers) to 91% (who purchased large TVs). Figure 9-17 below demonstrates customer satisfaction with the consumer electronics products purchased.

Figure 9-17: Customer Satisfaction with Consumer Electronics



Thermostats

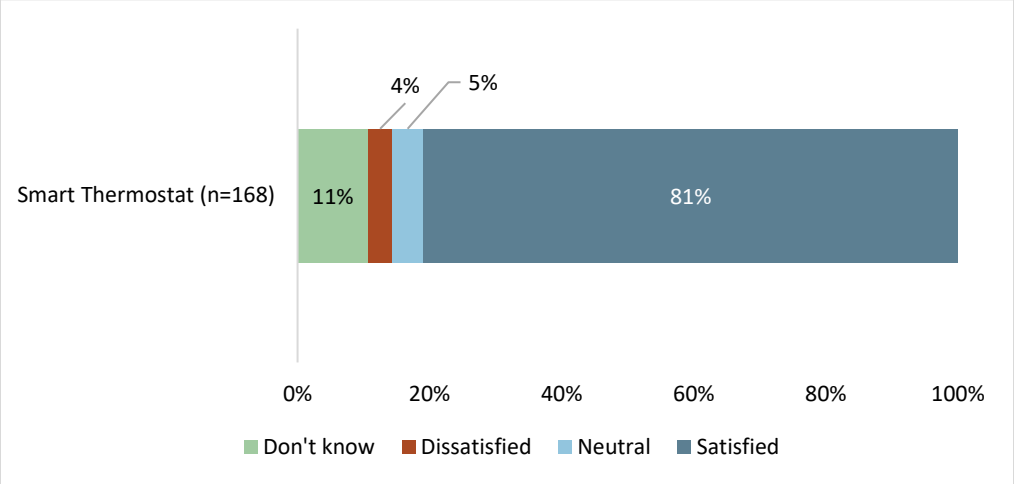
The downstream thermostat offering was deployed in stores on November 15, 2019. As such, this evaluation provides preliminary insights into the new downstream offer, though additional research should be completed to provide detailed information on the offering after it has been in-field for a longer period of time.

Among upstream survey respondents, about 8% (n=168) reported purchasing smart thermostats. Of these, nearly half (42%) had the smart thermostat professionally installed in their homes.

Customers were highly varied in whether they noticed a difference on their energy bill after installing their thermostat. Of survey respondents who had installed a smart thermostat, about 31% reported that they had noticed a difference in their energy bill, another 34% did not notice a difference in their bill, and the remainder (35%) did not know whether there was any difference in their bill.

Respondents who purchased smart thermostats were very satisfied with their purchases, 81% reported high satisfaction with the products, while only 11% were unsure how to rate their satisfaction. Figure 9-18 below demonstrates customer satisfaction with their smart thermostat.

Figure 9-18: Customer Satisfaction with Smart Thermostats



9.6.3 Customer Purchases, Awareness, and Satisfaction (Downstream Customer Survey)

The evaluation team conducted a web-based survey with 240 customers who received rebates for the downstream incentives representing 304 purchased clothes washers, refrigerators, clothes dryers, and HVAC Tune-Ups. A portion of customers received rebates for more than one measure; therefore, the total exceeds 100%. Notably, downstream customer survey respondents who received an HVAC Tune-Up increased from 7.5% (n=18) in 2018 to 18% (n=48) in 2019, indicating that this measure is gaining traction in the market.

Table 9-3: Appliance Program Participation among Survey Respondents Who Received Rebates in 2019

Measure	% Survey Respondents Who Received Rebate[28]	# Survey Respondents Who Received Rebate
Clothes washers	41%	108
Refrigerators	38%	100
Clothes dryers	22%	58
HVAC tune up	18%	48

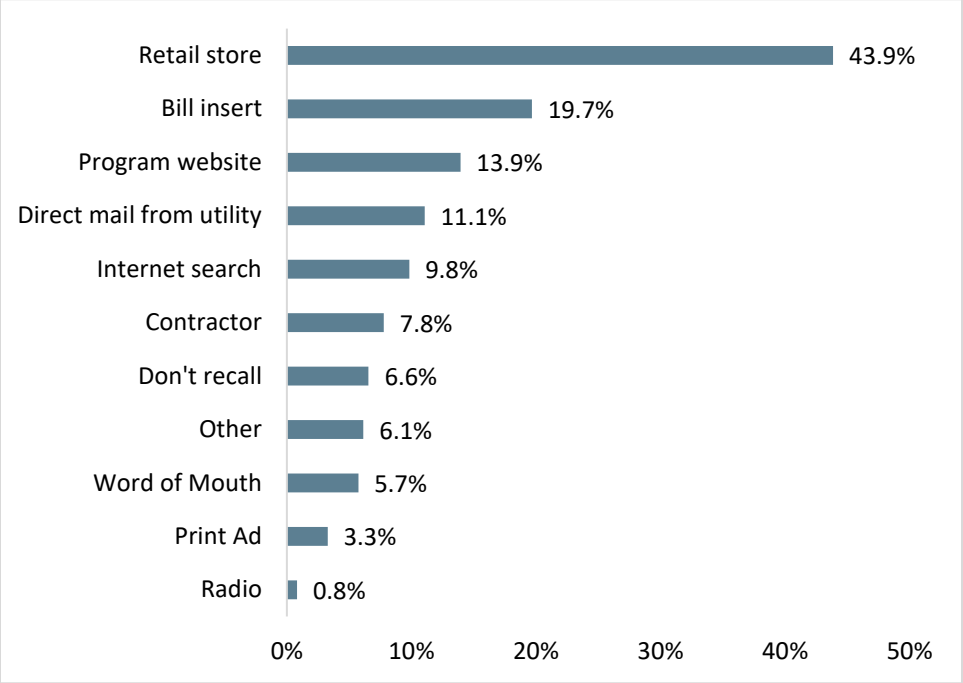
Sources of Awareness

Downstream survey respondents primarily learn about the appliance and HVAC rebates at the retailer or through the Companies' communications. Among survey respondents, nearly half reported that they learned about program rebates while at a retail store (44%)

[28] Percent does not total 100% since customers can receive rebates on multiple measures.

and about one in five heard about rebates from a utility bill insert. Figure 9-19 shows all sources of customer awareness for the Appliance sub-program and HVAC Tune-Up within the Efficient Products Program.

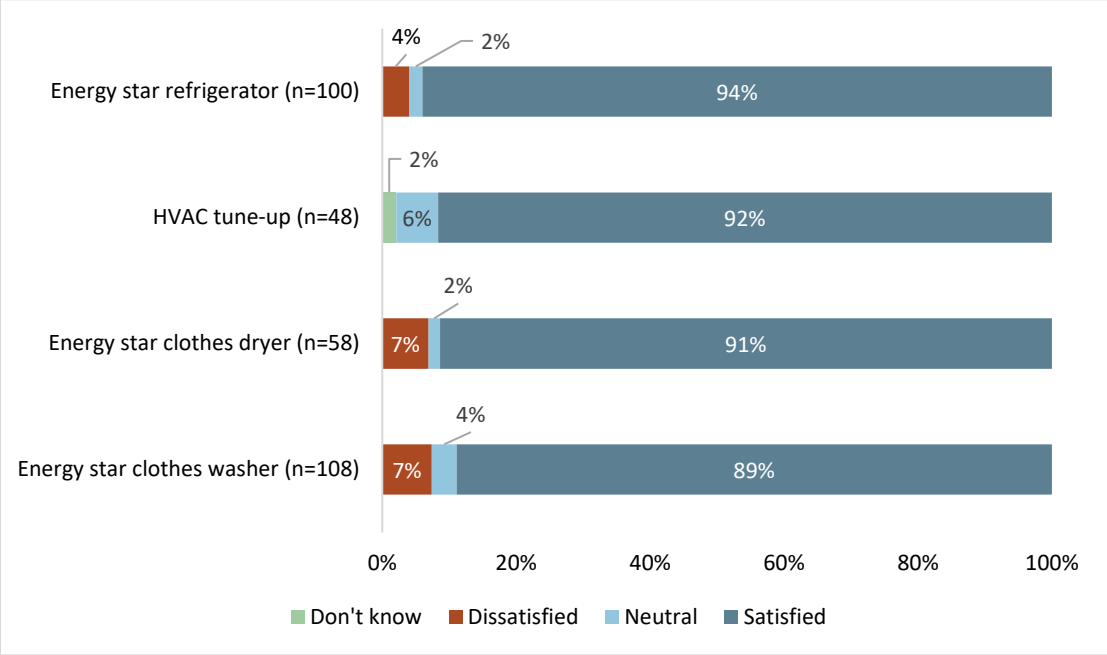
Figure 9-19: Source of Customer Awareness of Downstream Rebates



The top motivator for appliance purchases in 2019 across the refrigerator, clothes washers, and clothes dryer measures consistently was the price of the unit and product features. Other motivations included rebate availability, size/color, environmental impact, availability, recommendation, and brand loyalty.

The majority of downstream survey respondents are very satisfied with the products they purchased, the rebate amount, and the time it took to receive their rebate. Product satisfaction was highest among HVAC Tune-Up respondents, with 96% reporting that they were either somewhat or very satisfied with their tune-up.

Figure 9-20: Survey Respondent Satisfaction with Appliances and HVAC Tune-Up



Satisfaction among downstream customer survey respondents is similarly high on both the rebate amount and time to receive the rebate. The following figures show satisfaction with the rebate amount and the time to receive the rebate, by product.

Figure 9-21: Satisfaction with Rebate Amount

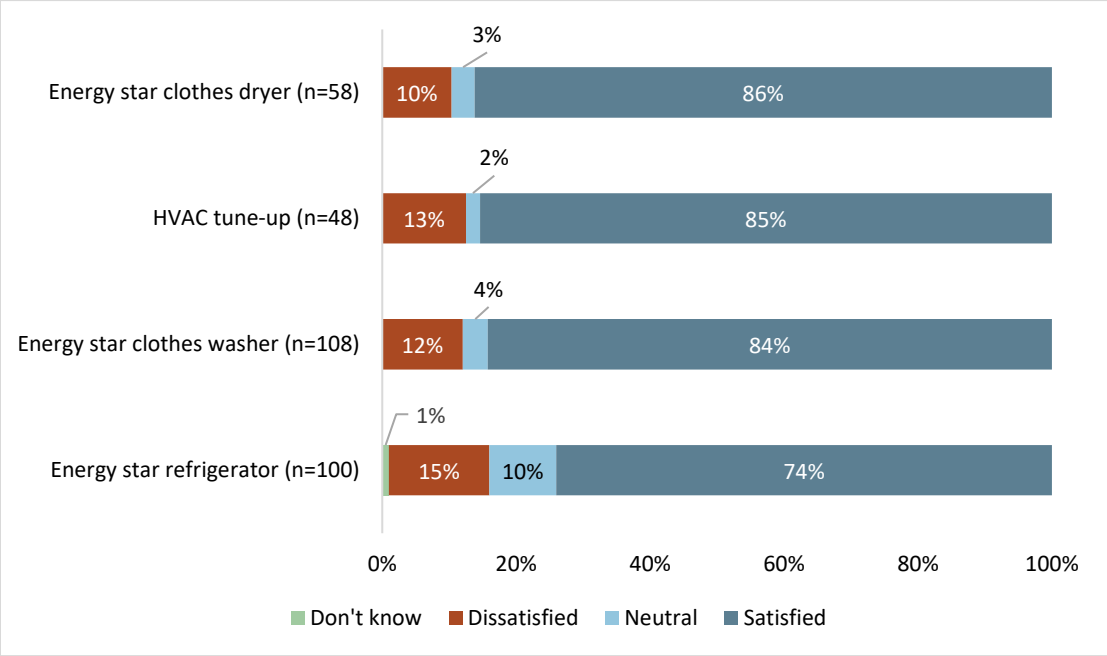
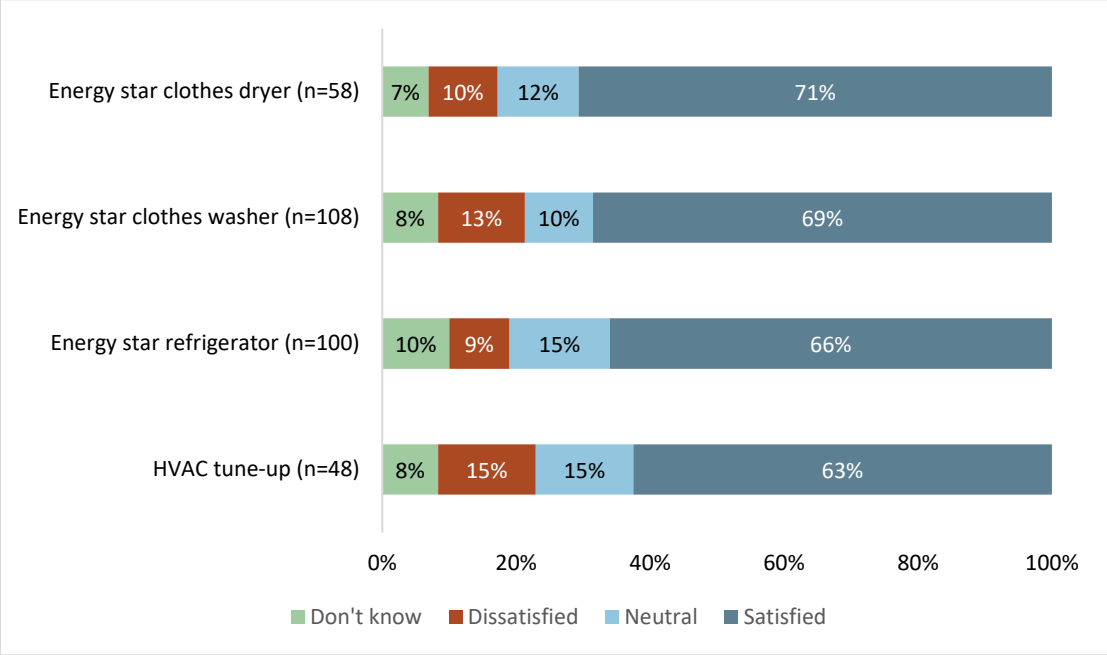


Figure 9-22: Satisfaction with Time it Took to Receive Rebate



10 Summary and Conclusions

This chapter reports the summary and conclusions resulting from the impact and process evaluation of the 2019 EEP Program.

10.1 Energy and Demand Impact Findings

The number of rebated products in each service territory is detailed in Table 10-1. A total of 501,834 rebates were issued through the EEP Program in 2019.

Table 10-1: Qualifying Products Rebated in Each Service Territory

Measure Type	CEI	OE	TE	Total
Clothes Washer	2,473	3,346	940	6,759
Clothes Dryer	1,070	1,562	455	3,087
Refrigerators	1,416	1,861	526	3,803
Dehumidifiers	6,292	13,804	2,261	22,357
Freezers	660	1,883	394	2,937
Heat Pump Water Heaters	3	68	24	95
LED Fixtures	5,013	3,659	1,601	10,273
LED Bulbs	152,175	161,333	54,574	368,082
Televisions	9,657	8,046	1,878	19,581
Computer	503	716	84	1,303
Computer Monitor	1,426	1,392	319	3,137
Imaging	3,323	3,263	675	7,261
Central Air Conditioner	459	1,045	581	2,085
Circulation Pump	205	136	11	352
Ductless Mini-Split	772	1,134	231	2,137
Furnace Fans	4,352	7,421	2,516	14,289
Heat Pump	106	545	482	1,133
H20 & Geothermal (Heat Pump)	10	18	-	28
Smart Thermostats – Midstream	3,991	5,781	1,463	11,235
Smart Thermostats – Downstream	251	353	86	690
Room Air Conditioner	4,083	5,644	1,839	11,566
HVAC Tune-Up	5,082	3,330	1,005	9,417
PTAC	38	112	1	151
PTHP	21	54	1	76
Totals	**203,381**	**226,506**	**71,947**	**501,834**

Ex-post electric impacts were 83,531,532 kWh saved annually, which represents a realization rate of 107%. Average on-peak Ex-post demand reduction was estimated to be 12,588.94 kW annually, which represents a realization rate of 112%. 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 10-2 and Table 10-3 below.

Table 10-2: 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	31,370,170	4,323.41	32,862,606	4,744.56	105%	110%
OE	33,892,371	5,078.64	37,613,232	5,862.07	111%	115%
TE	12,849,202	1,845.37	13,055,694	1,982.32	102%	107%
All Companies	**78,111,743**	**11,247.42**	**83,531,532**	**12,588.94**	**107%**	**112%**

Table 10-3: 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	7,903,537	1,624.33	7,896,132	1560.65	100%	96%
Consumer Electronics	1,379,390	149.78	1,553,246	164.90	113%	110%
Lighting	54,660,483	6,531.13	53,938,288	6445.50	99%	99%
HVAC	14,168,333	2,942.18	20,143,866	4417.89	142%	150%
Totals	**78,111,743**	**11,247.42**	**83,531,532**	**12588.94**	**107%**	**112%**

10.2 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 10-4 shows the quantity of units, kWh, and kW that can be attributed to low-income population participant in the EE Products program.

Table 10-4: Ex-Post Savings Attributable to Low-Income Customers

Energy Efficient Products	Percentage of Low-Income Purchasers	Quantity	Ex-Post kWh Savings	Ex-Post kW Reduction
CEI	15%	31,102	5,025,532	725.56
OE	22%	48,908	8,121,554	1,265.75
TE	17%	12,126	2,200,398	334.10
Totals	**18%**	**91,714**	**15,265,959**	**2,300.71**

Table 10-5: Percentage of Low-Income Savings by Sub-Program

	Utility			
Sub-Program	**CEI**	**OE**	**TE**	**Total**
Appliances	4%	11%	8%	8%
Consumer Electronics	13%	20%	17%	17%
Lighting	18%	25%	17%	20%
HVAC	20%	25%	17%	22%
Totals	**15%**	**22%**	**17%**	**18%**

Table 10-6: Ex-Post Savings of Low-Income Customers by Sub-Program

	Utility			
Sub-Program	**CEI**	**OE**	**TE**	**Total**
Appliances	94,944	497,554	75,453	638,658
Consumer Electronics	95,728	134,888	24,698	260,459
Lighting	4,055,968	5,431,895	1,551,357	10,985,395
HVAC	1,332,565	2,590,162	502,871	4,331,136
Totals	**5,025,532**	**8,121,554**	**2,200,398**	**15,265,959**

Table 10-7: Ex-Post Demand Reduction of Low-Income Customers by Sub-Program

	Utility			
Sub-Program	**CEI**	**OE**	**TE**	**Total**
Appliances	18.42	100.03	14.30	126.23
Consumer Electronics	10.05	14.50	2.61	27.65
Lighting	484.68	649.10	185.38	1,312.73
HVAC	289.52	553.75	122.83	949.89
Totals	**725.56**	**1,265.75**	**334.10**	**2,300.71**

10.3 Process Findings

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

10.4 Program Operations Conclusions

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

- Overall, the program performed well in 2019, achieving 107% realization rate. The Lighting sub-program contributed the most substantial portion of savings (65% of kWh savings).
- The HVAC sub-program also performed well in 2019, achieving 142% realization rate. The increased savings are in line with the program's goals to increase HVAC sub-program participation in 2019. In total, the HVAC sub-program achieved 20,143,866 kWh in savings in 2019. Within the HVAC sub-program, furnace fans, room air conditioners, and smart thermostats had the highest levels of participation.
- In 2019 the Consumer Electronics sub-program saved 1,553,246 kWh, while only installing 23% of its targeted filed plan values.
- During the program year 2019, the program continued with the midstream smart thermostat offering that provided a $30 midstream incentive to retailers or participating distributors that sold a qualified smart thermostat. The Companies paid rebates for 11,235 thermostats through the midstream approach, resulting in 2,732,637 kWh saved. In mid-November, the Companies added a downstream incentive to that offer up to a $75 instant rebate incentive directly to customers. The third quarter of 2019 was spent getting the appropriate smart thermostat data and data systems set up to support the roll-out and developing and deploying new marketing promotional materials. The new smart thermostat offering was deployed in retail stores on November 15, 2019 and rebated a total of 690 downstream thermostats during the offering's relatively short 2019 implementation period.

10.5 Retailer Feedback Conclusions

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

- Smaller local stores appear engaged with the program and expressed greater control over and latitude with how their store participates in the program. Smaller local retailers reported being aware of the program, described store visits from program staff, and talked about their participation and in-store decisions related to the program. They also described flexibility and control over the program within their own stores—for example, related to stocking decisions and what program signage to use.

- Sales associates at large big box stores reported that they did not try to sell or pitch particular rebated products to customers. This may be an area for deeper investigation by the Companies and Honeywell and is likely also attributable to the turnover rate of store staff in the retail industry.

10.6 Customer Research Conclusions

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).
- Customers are very satisfied with their product purchases across the sub-program and product offerings. In addition, satisfaction metrics remain consistently high. Among both upstream and downstream customer respondents, 70% or more reported being satisfied with their product purchases. Customers are also generally very satisfied with the rebate amount and time to receive rebate for downstream products.

10.7 HVAC Distributor and Contractor Conclusions

The following summarizes the key findings from the HVAC distributor and contractor interviews.

- Honeywell personally recruited distributors and reported that this outreach was effective in onboarding them to the program. Distributors appreciate the communication with Honeywell program staff, noting that they have helped with troubleshooting and solving issues as they arise.

- All distributors interviewed had some level of difficulty with the rebate process, most commonly citing the time required to complete the rebate process, and what they referred to as a "lack of streamlining." Often, distributor invoicing systems are not compatible with the reports required by the program, causing distributors to spend extra time and resources pulling out relevant information from their invoices and invoicing systems and developing specific processes to adhere to program reporting requirements.
- Contractors interviewed vary in their levels of engagement with the program.
- Engaged distributors and contractors said they participate to increase their sales revenue potential. Distributors view program participation as an opportunity to increase overall sales and high efficiency equipment sales, which they note generally have higher price tags. Similarly, engaged contractors participate to bring in more business and to cultivate repeat business opportunities.
- Engaged contractors focus on promoting HVAC Tune-Ups. Having the contractors focus on promoting HVAC Tune-Ups is in line with program design, which aims to use the tune-up to influence contractor and customer efficiency and energy savings.
- The program may have an opportunity for cross-promotion between rebates for new HVAC equipment and tune-ups. Most HVAC Tune-up contractors do not know about the midstream HVAC rebate opportunities. The Companies provide promotional program brochures to HVAC Tune-up contractors. As part of these promotional materials or contractor trainings, the program may have an opportunity for cross-promotion between rebates for midstream HVAC equipment and HVAC tune-ups. There may be significant potential in scenarios where the HVAC Tune-up contractor discovers that a customer may require new equipment in the near future.

10.8 Recommendations

The evaluation team offers the following recommendations for continued improvement of the Residential EEP Program.

- Continue direct outreach to distributors, including providing troubleshooting support and guidance from recruitment through the rebate submission process. Distributors value this communication and the ability to speak with program staff as issues arise.
- More deeply investigate distributors' challenges related to the rebate and reporting process and identify opportunities to streamline this process. This may help to make the process less time-consuming for distributors to complete and may have the added benefit of increasing their satisfaction with this aspect of the program.

- Follow up with inactive contractors to ensure they have the information and support they need. A subset of contractors interviewed mentioned they have not received any information after their application to the program. In addition to ensuring all contractors receive post-application follow-up, establish a process to engage inactive yet enrolled contractors to ensure they received the program-related information and address any further support needs.
- Utilize the 2016 Pennsylvania TRM for the calculation of energy savings and demand reduction for ductless mini-split heat pumps.
- Consider using the AHRI values for cooling capacity and EER when calculating savings and demand reductions for Packaged Terminal Air Conditioners.
- Consider using the 2016 Pennsylvania TRM to calculate energy savings and demand reductions for imaging measures in the consumer electronics subprogram.

11 Appendix A: Required Savings Tables

Tables showing measure-level participation counts and savings for the 2019 EEP Program were provided in various locations throughout this report. This appendix provides additional tables summarizing savings results.

- Table 11-1 reports the annual ex-post kWh savings by EDC and measure.
- Table 11-2 reports the average annual ex-post on-peak kW reductions by EDC and measure.
- Table 11-3 reports the lifetime ex-post kWh savings by EDC and measure.

Table 11-1: Annual Ex-Post Energy Savings (kWh)

Measure Type	CEI	OE	TE	All Companies
Clothes Washer	494,158	671,703	189,815	1,355,676
Clothes Dryer	29,152	42,689	12,458	84,299
Refrigerators	167,854	220,015	62,168	450,037
Dehumidifiers	1,542,391	3,365,667	548,224	5,456,282
Freezers	87,514	249,679	52,243	389,435
Heat Pump Water Heaters	5,065	114,814	40,523	160,402
LED Fixtures	283,237	173,796	87,628	544,660
LED Bulbs	22,813,250	21,553,781	9,026,596	53,393,627
Televisions	532,931	440,819	101,193	1,074,943
Computer	59,857	85,204	9,996	155,057
Computer Monitor	34,224	33,408	7,656	75,288
Imaging	113,131	109,143	25,684	247,958
Central Air Conditioner	75,414	171,693	95,458	342,566
Circulation Pump	32,595	21,624	1,749	55,968
Ductless Mini-Split	716,725	1,052,806	214,460	1,983,991
Furnace Fans	1,940,992	3,309,766	1,122,136	6,372,894
Heat Pump	95,252	489,737	433,125	1,018,114
H20 & Geothermal (Heat Pump)	36,000	64,800	0	100,800
Thermostats	1,069,388	1,549,019	392,011	3,010,418
Room Air Conditioner	49,568	79,722	19,969	149,260
HVAC Tune-Up	79,210	109,494	35,677	224,380
PTAC	462,771	297,956	73,540	834,267
PTHP	7,410	21,840	195	29,445
Totals	**32,862,606**	**37,613,232**	**13,055,694**	**83,531,532**

Table 11-2: Annual Ex-Post Peak Demand Reductions (kW)

Measure Type	CEI	OE	TE	All Companies
Clothes Washer	50.96	69.27	19.57	139.80
Clothes Dryer	5.16	7.55	2.20	14.91
Refrigerators	29.39	38.53	10.89	78.81
Dehumidifiers	349.68	763.05	124.29	1,237.02
Freezers	15.32	43.72	9.15	68.20
Heat Pump Water Heaters	0.69	15.68	5.54	21.91
LED Fixtures	33.85	20.77	10.47	65.09
LED Bulbs	2,726.13	2,575.63	1,078.66	6,380.41
Televisions	49.67	41.08	9.44	100.19
Computer	8.10	11.53	1.35	20.98
Computer Monitor	4.56	4.45	1.02	10.04
Imaging	15.40	14.81	3.49	33.69
Central Air Conditioner	81.33	207.24	112.21	400.78
Circulation Pump	3.67	2.45	0.20	6.33
Ductless Mini-Split	480.33	717.31	151.39	1,349.03
Furnace Fans	456.96	779.21	264.18	1,500.35
Heat Pump	11.44	82.30	44.49	138.23
H20 & Geothermal (Heat Pump)	2.13	5.58	0.00	7.71
Thermostats	0.00	0.00	0.00	0.00
Room Air Conditioner	0.00	0.00	0.00	0.00
HVAC Tune-Up	223.13	306.69	96.88	626.70
PTAC	184.22	120.73	36.49	341.44
PTHP	8.22	22.57	0.22	31.00
Totals	**4,744.56**	**5,862.07**	**1,982.32**	**12,588.94**

Table 11-3: Lifetime Ex-Post Energy Savings (kWh)

Measure Type	CEI	OE	TE	All Companies
Clothes Washers	5,435,738	7,388,736	2,087,967	14,912,441
Clothes Dryers	378,976	554,957	161,958	1,095,892
Refrigerators	2,349,956	3,080,210	870,352	6,300,518
Dehumidifiers	18,508,689	40,388,006	6,578,686	65,475,381
Freezers	1,225,189	3,495,502	731,401	5,452,092
Heat Pump Water Heaters	50,653	1,148,141	405,226	1,604,020
LED Fixtures	3,965,313	2,433,148	1,226,785	7,625,247
LED Bulbs	319,174,507	301,341,563	126,330,146	746,846,216
Televisions	3,197,586	2,644,914	607,158	6,449,658
Computers	239,428	340,816	39,984	620,228
Computer Monitors	136,896	133,632	30,624	301,152
Imaging	678,786	654,858	154,104	1,487,748
Central Air Conditioners	1,677,116	4,107,573	2,330,834	8,115,524
Circulation Pumps	321,850	214,880	17,930	554,660
Ductless Mini-Splits	43,527,794	65,003,216	13,718,627	122,249,638
Furnace Fans	27,173,888	46,336,724	15,709,904	89,220,516
Heat Pumps	1,953,107	10,472,829	4,195,042	16,620,978
H20 & Geothermal (Heat Pump)	1,170,069	2,281,409	0	3,451,478
Smart Thermostats - Midstream	10,677,838	15,466,947	3,914,226	30,059,012
Smart Thermostats - Downstream	571,826	930,932	239,675	1,742,433
Room Air Conditioners	1,248,793	1,716,436	542,215	3,507,445
HVAC Tune-Ups	184	121	36	341
Packaged Terminal Air Conditioners (PTACs)	81,393	200,763	2,223	284,379
Packaged Terminal Heat Pump (PTHPs)	140,635	432,754	6,510	579,899
Total	**443,886,212**	**510,769,067**	**179,901,616**	**1,134,556,895**

12 Appendix B: Downstream Participant Survey

2019 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 Dryer [DISPLAY IF Q5c = 1]	1	2	3	4	5	98

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. 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 C: EE Products Online Survey

FirstEnergy's Ohio Utilities

2019 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 2019.

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 2019, have you purchased any light bulbs?
   1. Yes
   2. No
   98. Don't know

[IF Q9 = 2 OR 98, SKIP TO Q20]

10. In 2019, 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 2019?
    1. Yes
    2. No
    98. Don't know

12. Have you purchased any light emitting diode bulbs, also known as LEDs, during 2019?
    1. Yes
    2. No
    98. Don't know

13. Have you purchased any increased efficiency incandescent bulbs, also known as halogens, during 2019?
    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 that equivalent screw in bulbs. Have you purchased any light emitting diode fixtures, also known as LED fixtures, during 2019?
    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 2019 follow.

16. You mentioned earlier that you have purchased **[INSERT QUANTITY FROM Q10]** light bulbs in 2019. 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 2019 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 2019, had you ever purchased CFL light bulbs?
    1. Yes
    2. No
    98. Don't know

21. Prior to 2019, had you ever purchased LED light bulbs?
    1. Yes
    2. No
    98. Don't know

22. Prior to 2019, had you ever purchased halogen light bulbs?
    1. Yes
    2. No
    98. Don't know

23. Prior to 2019, 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 2019. 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 2019. 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 2019. 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 2019 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 2019. 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 2019. 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 2019 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 2019, 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 2019, 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)
    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 2019, 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 2019, 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 2019, 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, 2019, 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 2019 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 2019 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 2019 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 2019 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 2019 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 2019 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 2019 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 2019 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 2019 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 2019 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, 2019, 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 2019 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 2019 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 2019 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 2019 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 2019 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 2019? 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-surveys2019@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 D: Interview Guides

14.1 PM and Implementer Interview Guide

MEMO

FIRST ENERGY – ENERGY EFFICIENT PRODUCTS PROGRAM

PM AND IMPLEMENTER INTERVIEW GUIDE - DRAFT

PREPARED FOR: ADM/FirstEnergy

PREPARED BY: ILLUME

DATE: October 23, 2019

Thanks for agreeing to talk to me today. I am looking forward to hearing more about your work with First Energy's Residential Energy Efficient Products program. The ADM and ILLUME team will be conducting research in order to understand how the programs operate and ways that the program can be improved. 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. Also, this should take about an hour. Is this okay with you? Do you have any questions before we begin?

Roles and Responsibilities

1. Can you describe your current role in managing and implementing the Residential Energy Efficient Products program?
    a. How has your role been changed, if at all, from last year?
    b. Considering that you are new to the position have you been encouraged to make many changes to the way you proceed in this role? If so, what are those changes?
2. Can you describe your working relationship with FirstEnergy/Honeywell (tailor appropriately)?
    a. What are your key responsibilities, and what are FirstEnergy/Honeywell's key responsibilities for the program?

b. How has the working relationship been going? What, if anything, has changed since last year? How often do you interact? What works best?
c. Could the working relationship be improved, if so how?

3. Overall, do you feel that you have enough help to deliver this program?
4. What, if any, areas do you feel you need more support?

Program Planning, Goals, and Measures

1. What do you view as the main goals for the Efficient Products program? We have reviewed the portfolio plan and the energy savings goals. *[Probe for energy savings, participation goals, measure-specific goals, etc.]*
    a. What are the goals for the individual sub-programs? [Probe for participation goals, measure-specific goals, such as increasing smart thermostats by 30,000 units, customer satisfaction, and other goals].
        i. Appliances
        ii. Consumer Electronics
        iii. Lighting
        iv. HVAC
    b. Are there specific metrics that you capture, beyond energy savings? How, if at all, do these differ by sub-program? How do you measure or define success for each of the sub- programs?
        i. Appliances
        ii. Consumer Electronics
        iii. Lighting
        iv. HVAC
    c. How do you define success for the Efficient Products program overall?
2. What are the implications for not meeting goals (for FE or Honeywell)?
3. What have been key program priority areas this year (i.e., increasing customer awareness of utility sponsorship of the program?)
    a. Have these priority areas changed or shifted? How so?
    b. How have new recommendations been implemented in this year's program design?

Target Market

4. Can you describe the target markets for each of the four sub-programs?
    i. Appliances
    ii. Consumer Electronics
    iii. Lighting
    iv. HVAC
5. What do you think are the primary benefits that this program offers? [Probe on customers reached, etc.]

Relevant Documents/Collateral to review

6. Are there any formal program implementation plans, marketing plans or other documentation that I should review, such as procedures, manuals, etc.? Would you be willing to send these to me?

Changes/Deviations from original plans

7. Has the program implementation differed from what was initially planned? If yes, what drove those changes?
    a. How have you adjusted to accommodate these changes?

b. What challenges have you had to overcome to meet these changes?

8. Can you describe any major program changes since last year?
    c. How has the HVAC program been going?
    d. What successes have you had specific to the HVAC program?
    e. What challenges have you had specific to the HVAC program?

Incentives/Rebates and Budget

9. I understand that the program provides rebates to consumers and midstream or upstream financial incentives to manufacturers, distributors, and retailers that sell qualifying energy efficient products.
    a. Can you describe the differences in midstream versus upstream incentives provided?
    b. Can you describe the upstream incentives provided to manufacturers, distributors, and retailers?
    c. We know there are upstream incentives for lighting and consumer electronics. Are there other measures that receive these types of upstream incentives? If yes, which measures?
    d. Can you send me documentation to confirm the downstream customer rebate amounts for all incented equipment in the program?
    e. Can you confirm the measures in the HVAC sub-program? How are these being offered (midstream, etc.?)
10. Have program expenditures differed from the planned budget in significant ways? What drove those changes?
11. Do you think the program budget is going to be sufficient to meet the program goals? Do you think incentive levels are high enough to induce program participation?

Program Implementation (Questions to be asked during Honeywell interview)

I understand that the program provides rebates to consumers, and support to retailers, manufacturers, contractors, and distributors.

1. I'd like to discuss the partners FirstEnergy works with to deliver the EE products program. [Probe on retailers, manufacturers, and distributors.]
    a. What are the key roles and responsibilities for each of these partners within the program?
    b. How are manufacturers and distributors identified for participation in the program?
    c. Can you describe the process of working with each of these partners? [Probe to understand key differences between retailers, manufacturers, distributors].
    d. From the program website, it looks like the following retailers participate in the programs. How many retailers participate in the program?

PROGRAM	RETAILER	# OF RETAILERS
Lighting	Costco Hartville Hardware	

	Home Depot Lowe's Menards Walmart	
Appliances	Best Buy Home Depot Sears	
Consumer Electronics	Best Buy Kmart Sears Other Local/Independent Retailers	
HVAC	Qualified Contractors	

e. How has the working relationship been going with each of these different partners?
Data Request/ Retailer contact information

f. I understand that retailer contact information is not in the tracking data. Do you have any suggestions for how we can obtain retailer contact information for the purposes of conducting retailer interviews to inform our evaluation?

g. As part of our evaluation, we do want to speak with retailer staff. Are you more interested in learning about issues related to product advertising and customer response, in which case we would want to speak with individual store managers, or are you more interested in retailer decisions to participate, in which case we would want to speak with corporate level staff?

h. Would you be able to send an email of introduction to retailers that we want to target for interviews? [Follow up after interview].

2. Can you describe the types of support provided to each of these partners? [Probe to understand key differences in support provided to retailers, manufacturers, and distributors].

   i. What types of promotional and/or point-of-sales materials do retailers receive?

   j. How has this changed, if at all, from last year? How were recommendations from previous years integrated into this year's plan?

   k. Can you describe the communications with retail staff?

      i. What do these look like?
      ii. How often do they occur?
      iii. Have you developed or launched any new communication tools for retail staff?
      iv. Do you have examples of these that you could share with me?
      v. Do you have a sense of what works well and what could be improved upon?

   l. Can you describe any types of training provided to these partners?

i. How has this changed, if at all, from last year? (Probe to understand if more trainings are being offered; how retailers are reacting to the trainings, if Honeywell is visiting retailers more frequently to provide trainings.)
ii. How often are trainings provided?
iii. Who provides the trainings?
iv. What do the trainings include?
v. Are trainings provided to retailers only, or also to manufacturers and distributors? [Probe on key differences in trainings provided to different partners, if any exist.]

3. The program plan mentions that promotional events are a component of the program's implementation. Can you tell me what those events entail?
    m. Are events provided at all retailers, or is there a process for selecting which retailers will have promotional events?
    n. How often do these events take place? How many events have occurred during the past year?
    o. If I was at a store during an event, what would my experience, as a customer, be like?
    p. In your opinion, how effective have these events been in encouraging customers to purchase energy efficient appliances?
    q. Can you provide me with a list of all events that took place (or planned) for 2019-2020?
4. (If not already covered) Can you describe any other outreach activities that you do?
    r. If working on recruitment, how are customers or partners identified for recruitment?
    s. Who do you see as your target audience?
    t. Can you describe any cross-promotional activities (i.e. with other programs)?
    u. How effective do you think marketing and outreach has been? Do you have any suggestions for improving outreach?

HVAC Sub-program questions

5. How is the HVAC program being implemented this year?
    a. Does this program have ample base of qualified trade ally network eligible to participate in this program? Alternatively, could customers use any contractor that they like? [If there is a contractor network: follow up with]
        i. How many contractors participate in the network?
        ii. What eligibility criteria must contractors meet to participate in the network?
        iii. Have there been any challenges with the contractor network; if yes, what?
6. What type of marketing support, if any, does the program provide to contractors?
    a. How do contractors conduct outreach to customers?
7. [If not already covered] What happens once a customer learns about the program? What key processes does that customer go through? [Probe on rebate application if rebate is not instant, other touchpoints customers have with the program].
8. Do customers understand how the program works? Are there any elements that seem to be confusing to them, and if yes, what are these?
9. Do the program partners understand how the program works? Are there any elements that seem to be confusing to them, and if yes, what are these? [Probe for key differences between retailers, distributors, manufacturers, contractors].

10. Have there been any challenges with any of the partners that you work with? If yes, what have these been? [Probe for key differences in challenges with retailers, manufacturers, distributors, contractors].
    a. How have you overcome these so far?
11. Is the program reaching its goals in terms of participation? If not, why do you think that is?

Program Data and Tracking

1. What type of data tracking systems are in place? Is there a single customer database that tracks customer rebates? How is the data tracking system working (for all parties involved)?
2. Do the program databases link to any other databases, such as the overall FirstEnergy billing data?
3. What type of quality control procedures are in place? Are they being followed? Have you seen many issues or problems with data quality?
4. How do you handle customer questions or complaints?

Summary Questions

1. Are you anticipating any additional planned changes for 2020? What are these changes
2. Are there any specific aspects of the program implementation that particularly concern you? What changes would you make?
3. What program elements are working particularly well?
4. What are some things we could find from the evaluation that would particularly help you in your role? Is there anything you would like to learn from the evaluation?
5. Is there anything that we should talk about that I haven't already covered?

Thank you very much for taking the time to speak with me regarding the Energy Efficient Products program.

14.2 HVAC Distributor In-Depth-Interview Guide

MEMO

HVAC DISTRIBUTOR IN-DEPTH INTERVIEW GUIDE

PREPARED FOR: FirstEnergy Ohio
PREPARED BY: ILLUME,
ADM DATE: December 2019

OVERVIEW

This distributor guide is to be administered to HVAC distributors participating in FirstEnergy's Energy Efficient Products Program.

The HVAC sub-program launched in May of 2018. The 2019 evaluation includes interviews with five to eight participating HVAC distributors to gather information on issues or concerns engaging in the program in 2019, support needs, level of engagement in program, areas the program is working well, and opportunities for improvement. Interviews will target participating distributors.

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. We structured this interview guide to focus on questions about the HVAC equipment that qualifying distributors stock; however, we also include questions to understand distributor interactions with, and influence on, retailer (or other customer) purchases of these HVAC measures.

The following guide addresses the research questions listed in the table below.

Table 14-1: HVAC Distributor Interviews: Research Areas and Questions

RESEARCH AREA	RESEARCH QUESTION
Program Experience	1) 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? 2) How is the program working for HVAC distributors, including their level of engagement in the program, key program processes, opportunities for improvement and overall satisfaction? 3) What, if anything, needs to be improved? 4) What changes have been made to the program's design or delivery since 2018 to help achieve savings goals for HVAC? 5) How are these changes working for distributors?
Engagement and Training	1) What is the training process for participating distributors? 2) How can the training be improved? 3) How often do distributors initiate interactions with Honeywell and FirstEnergy? What prompts these interactions 4) How can these interactions be improved?
Perception of Value	1) How does the program affect business sales 2) Do businesses see value in the program?
Overall Satisfaction	1) Overall, are HVAC distributors satisfied with the program?

SAMPLING PLAN

We will sample distributors from the list provided by FirstEnergy. We will use this list to recruit between five to eight HVAC distributors.

SCREENER

Hi, this is from [ILLUME Advising], a national research firm. FirstEnergy hired us to speak with distributors about their experience providing HVAC units as part of the 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 distributor agreement, that you are listed on FirstEnergy's HVAC website as a qualified distributor, 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 distributor, who signed the participating distributor 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.]

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?

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 HVAC equipment or products does your company distribute?
    a. Where do you distribute these to? [Probe on specific retailers, direct to contractor, etc.]
    b. Does your company distribute products other than HVAC? [If yes] What kinds of products?

3. [If they don't sell ALL qualifying HVAC types] Were you aware that FirstEnergy offers discounted HVAC equipment like ENERGY STAR central air conditioners and geothermal heat pumps at retailers throughout the state?

B. PROGRAM AWARENESS AND MOTIVATION

Now, I'd like to ask you some general questions about the FirstEnergy program.

1. How long has your business been involved in the FirstEnergy program?
2. How did your company first learn about the FirstEnergy HVAC program?
    a. [Probe on interactions with Honeywell. What was discussed? Who was involved in making the decision? What is the decision-making process at the company?]
3. Can you walk me through what happened after you learned about the program? [Probe on sign up process, interactions with Honeywell, etc.]
    a. What did you do next? What steps did you have to take to become a participating distributer?
4. How long has your business been involved in the FirstEnergy program?
5. Can you tell me a little bit about why your company decided to participate in the program?
    a. [Probe on perceived value and benefits.]

C. CUSTOMER EXPERIENCE IN PROGRAM

Now I have a few questions for you about the specifics of the program.

	MEASURE	STOCKS Y/N
HVAC Sub-Program	Heat Pump	
	Central Air Conditioner	
	Room Air Conditioner	
	Ductless Mini-Split Heat Pump	
	PTAC – Multi-Family	
	PTHP – Multi-Family	
	Heat Pump – Water & GeoT	
	Furnace Fans	
	Circulation Pumps	
	Programmable/ SMART Thermostat	
	HVAC Maintenance*	

* Not expected of distributors

1. *[How do you decide what products to carry/sell/offer?]* First, can you describe typical considerations of deciding on product selection?
    a. What are the key considerations that you go through?
2. *[It sounds like you do stock qualifying models.]* How impactful are FirstEnergy's rebates in your company's decision to stock these qualified models? Please explain.
3. What are the driving circumstances that prompt most of your sales? [Probe for emergency replacement, pre-season/early replacement, new construction]
4. During 2019, about how many HVAC sales did your company complete?
    a. How many or what percentage of these were part of the FirstEnergy program?
5. Can you talk me through what the sales process looks like?
    a. What happens first? What happens next? Etc.
        i. [If needed] Who are the key players in these conversations?
    b. How does this differ, if at all, for FirstEnergy qualified products?
6. [If distributes to retailers] What does the process look like to get your equipment into retail stores?
    a. What sales strategies do you use?
    b. What type of marketing or advertising do you do, if any? [*Probe for types of marketing activities and marketing materials.*] How does FirstEnergy support you, if at all, with this marketing?
    c. How does this differ, if at all, for HVAC equipment that is part of the FirstEnergy program?
    d. In your opinion, what types of equipment or features are retailers interested in?

e. For FirstEnergy equipment, who receives the rebate? [Probe on distributer keeps rebate, splits rebate with retailer, or other method]
f. How does the HVAC Tune-up rebate affect the sales process for your company, if at all?

7. [If distributes to contractors] What does the process look like to get contractors to buy your equipment?
    a. What sales strategies do you use?
    b. What type of marketing or advertising do you do, if any? [*Probe for types of marketing activities and marketing materials.*] How does FirstEnergy support you, if at all, with this marketing?
    c. How does this differ, if at all, for HVAC equipment that is part of the FirstEnergy program?
    d. In your opinion, what types of equipment or features are contractors interested in?
    e. For FirstEnergy equipment, who receives the rebate? *[Probe on distributer keeps rebate, splits rebate with contractor, or other method]*
    f. How does the HVAC Tune-up rebate affect the sales process for your company, if at all?
8. [If any other distribution channel] What does the process look like to get customers to buy your equipment?
    a. What sales strategies do you use?
    b. What type of marketing or advertising do you do, if any? [*Probe for types of marketing activities and marketing materials.*] How does FirstEnergy support you, if at all, with this marketing?
    c. How does this differ, if at all, for HVAC equipment that is part of the FirstEnergy program?
    d. In your opinion, what types of equipment or features are customers interested in?
    e. For FirstEnergy equipment, who receives the rebate? *[Probe on distributer keeps rebate, splits rebate with customer, or other method]*
    f. How does the HVAC Tune-up rebate affect the sales process for your company, if at all?
9. Have there been any changes to the program since you joined? What were these changes and how did they affect your business?

D. PROGRAM ENGAGEMENT AND TRAINING

1. I understand that Honeywell offers to conduct trainings with participating distributors. Has your company participated in any of these trainings?
    a. [If yes] How did you first learn about the program? What was it like to schedule this?
    b. [If yes] How did you get your sales team to attend this? What did they talk about?
    c. [If yes] What type of information was provided through the trainings? What type of materials were provided at the time of training?
    d. [If yes] 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. [If participated in training] How satisfied were you with training your staff has received through the program?
    a. Are there any questions that the training did not address? [IF yes] what are these?
    b. Do you have any recommendations for improving the training?
3. What types of program materials or training materials has Honeywell provided to your company? [Probe to understand types of materials provided.]
    a. How useful were the program materials that Honeywell left with your company?

b. Who primarily uses the materials?

4. Was there any way Honeywell could better inform you about the program or better support your efforts training staff?
5. [If not discussed earlier] 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.] [IF yes] about what?
    b. How have your questions or concerns been addressed? Would you say the resolution was to your satisfaction?
    c. How could these interactions be improved?

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. How does the program add value to your company?
2. Are you planning to participate next year?
    a. [*IF NO*] Why are you leaving the program?
3. How, if at all, can FirstEnergy improve the program for next year?

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.

14.3 HVAC Contractor In-Depth-Interview Guide

MEMO

HVAC CONTRACTOR IN-DEPTH INTERVIEW GUIDE

PREPARED FOR: FirstEnergy Ohio
PREPARED BY: ILLUME, ADM
DATE: December 2019

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 2019 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 14-2: HVAC Contractor Interviews: Research Areas and Questions

RESEARCH AREA	RESEARCH QUESTION
Program Experience	1) 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? 2) 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? 3) What, if anything, needs to be improved? 4) Are contractors interested in an incentive/reward system for their participation; if yes, why would this motivate and/or help them?
Customer Experience in Program	1) How do customers find out about the program tune-ups? 2) What do customers experience in the program? 3) How might participation be increased in the tune-up portion of the HVAC sub-program? 4) Is the new HVAC maintenance messaging effective in increasing customer awareness and use of the HVAC tune-up measure and rebate?
Perception of Value	1) How does the program affect business sales outside of the program? 2) Do businesses see value in the program?
Overall Satisfaction	1) Overall, are HVAC contractors satisfied with the program?

SAMPLING PLAN

According to the FirstEnergy HVAC program website, a total of 275 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.]

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?

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. Can you tell me how you first learned 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 2019, about how many HVAC tune-up projects did your company complete?
    b. How many of these tune-us were part of the FirstEnergy program?

C. HVAC TUNE-UP PROGRAM EXPERIENCE

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.]
    a. How do customers learn about the FirstEnergy tune-up program? [Probe to understand where they've heard about it: Contractor, in store signs, other.]
    b. How do you encourage people to sign up for HVAC tune-ups? What do you tell them? At what point? *[Probe on specific tactics/strategies.]*
    c. What happens after you talk about it with them?
    d. What do you do next? What does the customer have to do next?
    e. About what portion of the customers are aware of the rebate before you tell them?
2. About what portion of your customers receive tune-ups regularly?
    a. What do customers typically consider "regularly"? *[Probe on annual, twice a year, etc.]*
3. Do your customers typically complete the HVAC maintenance rebate application?
    a. [If contractor completes] Can you walk me through this process. What's easy, what's difficult?
    b. [Ask all] What issues or concerns if any, have you heard about the rebate processing from your customers?
4. Now, I would like to talk about any advertising your company does for tune-up services. *[Probe for types of marketing activities and marketing materials.]*
    a. What types of advertising do you do, if any?
    b. Where do you advertise?
    c. How do you make these decisions?
    d. How does FirstEnergy support you, if at all, with this marketing*? [Probe on messaging, logo use, etc.]*
    e. How do you decide which customers to market to?
5. How impactful is the rebate in customers' decisions to have the service complete? Please explain.

a. [If needed: On a 1 to 10 scale, 1 being not at all impactful, 10 being very impactful, how impactful is the rebate on customer's decision to get the tune-up?]

6. What challenges, if any, do you experience in getting customers to tune-up their equipment?
    a. What do you do to try to overcome these?
    b. How could FirstEnergy help you overcome these?
7. What portion of customers become repeat customers based on the tune-up?

D. MIDSTREAM HVAC REBATES AWARENESS AND EXPERIENCE

Next, I have some questions about another portion of the FirstEnergy program.

1. Were you aware that FirstEnergy offers rebates for 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 you discuss these with your customers at any point?
    a. [If yes] When do you talk about these?
    b. Who do you talk to? [Probe for specific customer types (those with older equipment, all customers, etc)
    c. What do you tell your customers about these? *[Probe on selling points]*
    d. Do customers ever approach you about the HVAC equipment rebates? What do they ask? What equipment do they ask you about?
    e. What is the process like if a customer buys one of these products? *[Probe to understand contractor interactions with the customer from when the customer learns about the product through installation.]*
3. About how many customers that receive tune-ups also mention these HVAC equipment rebates?
4. What, if anything, can FirstEnergy do to help customers who have had a tune-up learn about other HVAC equipment rebates?
    a. Similarly, 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? [If yes probe on types of business or types of equipment].
2. How does the program add value to your company?
3. Are you planning to participate next year? Why or why not?
4. How, if at all, can FirstEnergy improve the program for next year? *[Probe for training, rebate processing or tracking if not already addressed.]*

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.

14.4 Retailer Interview Guide

MEMO

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 1, below.

Table 14-3:Key Research Areas and Questions for Retailer Interviews

RESEARCH AREA	RESEARCH QUESTION	INTERVIEW GUIDE QUESTIONS
Program Implementation	1) How consistently is the program being delivered across retail partners? 2) 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? 3) Has the program and each sub-program performed as expected and, if not, why not? 4) With regards to the HVAC sub-program: how might participation be increased in this sub-program? 5) What was the level of participation for heat pump water heater and smart thermostat measures (and all program measures) in 2018?	A3, A4, B3, F1, F2, F3, F4
Program Engagement and Training	1) How do stores engage with the program? 2. What components of program engagement are working well for retailers? 3. What components of program engagement, if any, are not working well for retailers? 4. What types of additional support, if any, do retailers need to sell qualifying equipment? 5) 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? 6) How have training/information sharing improvements affected stores?	B1, B2, B3, B4, B5
Motivation to Participate	1) What motivates retailers to participate in the program? What program benefits are most motivating? 2) How do retailers make decisions about which products to stock? 3) What are retailers' expectations for sales of program qualifying? 4) Are there other ways the program can recruit high profile retailers, such as Wal Mart?	C1, C2, C3
Customer awareness and effectiveness of signage	1) What types of program signage are retailers using in their stores? 2) What is the purpose of the signage? 3)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? 4) How effective is signage in motivating customers to purchase qualifying equipment over non-qualifying	E1, E2, E3, E4

RESEARCH AREA	RESEARCH QUESTION	INTERVIEW GUIDE QUESTIONS
	equipment? Which types of signage have been most effective in motivating customers to purchase the qualifying equipment?	
Perception of impact	1) How effective are program rebates in motivating customers to purchase qualifying equipment? 2) Do retailers perceive rebate levels to be adequate to incentivize customers to purchase qualifying equipment? 3) How influential do retailers believe the program (inclusive of rebates, signage, and training) is in increasing sales of program qualified equipment? 4) Are there other high efficiency products not included in the program that retailers think should be included in the program?	F1, F2, F3, F4
Program value and Overall satisfaction	1) What do retailers perceive as the key value propositions to participating in the program? 2) What do retailers perceive as the key value propositions for their customers? 3) How satisfied are retailers with the program overall? 4) Where are there opportunities for program improvement for program products? 5) Are program partners, including retailers, distributors, manufacturers and HVAC contractors satisfied with the program?	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, 2019. 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 EnergyStar 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 more broad 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.

14.5 Mobile In-Store Customer Survey Guide

DECEMBER 2019 | MOBILE IN-STORE CUSTOMER SURVEY

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

As part of the FirstEnergy Residential Energy Efficiency 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 signs; 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 SURVEY.

RESEARCH AREA	RESEARCH QUESTIONS
Customer experience with program signs	1. Is program signage effectively placed? 2. How do customers perceive program signs? What do customers believe are the goals of the signs? 3. Do customers perceive signs to be useful and informative? 4. How effective is program signs at increasing customer awareness of program-qualifying high efficiency options over lower efficiency options? 5. Does program signage provide clear, easily understandable information? 6. Does program signage clearly show the program sponsor (FirstEnergy: Ohio Edison, The Illuminating Company, Toledo Edison)? 7. Does program signage raise additional questions for customers; and if yes, what are these questions?
Interactions with sales associates	1. Did customers speak with a sales associate? 2. Do sales associates discuss qualifying products and (for downstream measures) rebates with customers? 3. Do customers perceive sales associates to be knowledgeable in discussing qualifying products and (for downstream measures) rebates?
Motivations and decision to purchase	1. How effective are program signs in motivating customers to want to purchase qualifying equipment over non-qualifying equipment? 2. [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? 3. [For downstream measures] Would rebate levels be sufficient to influence customer decision to purchase qualifying equipment over non-qualifying equipment?
Program products and product placement	1. Were all advertised items in stock? 2. Where is program qualified equipment placed within store, and is equipment in easily-viewed areas? 3. [For lighting] Do respondents understand which bulb they need to purchase based on the information and lumens?
Overall satisfaction	1. How satisfied are customers with their shopping experience? 2. Where are opportunities to improve the shopping experience?

STUDY DESIGN

Members of a market research panel will complete the in-store mobile surveys while they are shopping at/near specific participating retail locations. 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.

Respondents will be asked to complete the 10-15 minute survey. Using their phone, the customer panel member can answer questions specific to their experience and upload pictures for record.

SAMPLE DESIGN: PARTICIPATING RETAILERS

Please refer to the Sample Plan document for the retailer sampling design.

SAMPLE DESIGN: EQUIPMENT/APPLIANCES ASSIGNMENTS

Once a mobile panel member agrees to participate in the survey, they will then be directed to enter the retail store and look for specific products within the store. Product assignments depend on three factors:

- Whether the retailer carries a sub-program category
- Whether the respondent is a homeowner or renter
- Evaluation priorities for sub-program (giving preference to thermostats, where possible, and based on program goals and savings to date)

Table 2 depicts the quota minimums by sub-program.

TABLE 2: QUOTA MINIMUMS BY SUB-PROGRAM[29]

SUB-PROGRAM	QUOTA MINIMUMS	HOW PARTICIPANTS ARE DIRECTED
HVAC	15	Homeowners: Smart and Wi-Fi Thermostats Renters: Will *not* be asked about HVAC
Appliances	15	Homeowners: Clothes washers and dryers, refrigerators and freezers Renters: Dehumidifiers
Consumer Electronics	10	Televisions, computers and computer monitors, or printers and scanners
Lighting	10	Homeowners: LED Light Bulbs and Fixtures Renters: LED Light Bulbs

TIMELINE

Upon survey approval by FirstEnergy, our team will then move to survey programming. Programming and QA/QC typically takes approximately one business week. Once the survey launches, we expect it will take 2-3 weeks in-filed to meet the survey quota (50 completes).

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 : STORE TYPE]. If you agree to participate in this survey, we will ask that you look for specific products in [FILL RETAIL LOCATION : STORE TYPE] and provide feedback on those products. This survey should take approximately 10 -15 minutes. [LEEDE TO INSERT INCENTIVE LANGUAGE HERE].

[29] 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

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

TABLE 3. RETAIL LOCATION RENTER OWNER INSTRUCTION

STORE TYPE	SUBPROGRAM OWNERS [A3 =1]	SUBPROGRAM RENTERS [A3 =2]	INSTRUCTION FOR OWNERS [A3 =1]	INSTRUCTION FOR RENTERS [A3 =2]
ABC Warehouse	Appliances		Freezers	Do NOT ask about Downstream
Appliance Mart[30]	Appliances		Freezers	Do NOT ask about Downstream
Appliance Mart	Appliances	Appliances	Washers, dryers, and refrigerators	Dehumidifiers
Best Buy	HVAC	Appliances and consumer electronics	Smart and Wi-Fi Thermostats	Randomly select Dehumidifier or Consumer Electronic text
Costco	Appliances	Appliances	Washers, dryers, and refrigerators	Dehumidifiers
Home Depot	HVAC	Appliances and lighting	Smart and Wi-Fi Thermostats	Randomly select Dehumidifier or lighting
Kmart	HVAC	Appliances and consumer electronics	Smart and Wi-Fi Thermostats	Randomly select Dehumidifier or Consumer Electronic text
Lowes	HVAC	Appliances and lighting	Smart and Wi-Fi Thermostats	Randomly select Dehumidifier or lighting
Sam's Club	Appliances		Freezers	Do NOT ask about Downstream
Sears	HVAC	Appliances	Smart and Wi-Fi Thermostats	Dehumidifiers
Wal Mart	Lighting	Lighting	LED Light Bulbs and Fixtures	LED Light Bulbs

A. SCREENER

A1. Are you willing to participate in this survey?

[30] According to Honeywell Data, there were two types of Appliance Mart participants. One, Included only downstream appliances; the other included both mid and downstream appliances.

1. Yes
2. No [Terminate: Skip to K1]

A2. Are you a customer of any of the following utilities? (select all that apply)

1. Cleveland Electric Illuminating
2. Ohio Edison
3. Toledo Edison
4. Other [Terminate: Skip to K1]

A3. Do you own or rent your home?

1. Own
2. Rent

PROGRAMMING: INTERGRATE RENTER & OWNER VARIABLES FOR THE REST OF THE SURVEY.

A4. Did you come to shop for any of the following today? [ROTATE; MULTIPLE RESPONSE]

1. Refrigerator or freezer
2. Clothes washer and/or clothes dryer
3. Water heater or heat pump water heater
4. Dehumidifier
5. Television
6. Computers or monitor
7. Printer or scanner
8. LED light bulbs
9. Lighting fixtures
10. Thermostat
96. None of the above

B. **CUSTOMER EXPERIENCE WITH PROGRAM SIGNS**

B1. Please proceed to the section of the store with [SUB-PROGRAM B1 READ-IN].

SUB-PROGRAM	Rebate	sub-program read-in for b1	[a3 =1] homeowner read-in for b1	[a3 =2] renter read-in for b2
HVAC		Thermostats	Smart and Wi-Fi thermostats	N/A – should not be assigned to HVAC
Appliances	Downstream	[A3 =1] IF HOMEOWNER: large appliances	Clothes washers or dryers, or refrigerators	Dehumidifiers
	Downstream	[A3 =2] IF RENTER: dehumidifiers		Dehumidifiers
	Midstream	[A3 =1] IF HOMEOWNER: large appliances	Freezers, dehumidifiers, or water heaters (heat pumps)	
	Midstream	[A3 =2]		Dehumidifiers
Consumer Electronics		Electronics	Televisions or computers or computer monitors or printers/scanners	Televisions or computers or computer monitors or printers/scanners
Lighting		Lighting	LED light bulbs or fixtures	LED light bulbs

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

B2. Once you have arrived at the [SUB-PROGRAM B1 READ-IN] section of the store, select one type of product within [B2 READ-IN SPECIFIC TO OWNER OR RENTER] to look at. Once you have selected one type of product, please familiarize yourself with the surroundings around this product. When you're ready, hit NEXT, and we will ask you some questions.

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

B3. What product did you select to review today?

IF SUB-PROGRAM IS APPLIANCES AND OWNER:

1. Refrigerators [SHOW IF REBATE = DOWNSTREAM]
2. Freezers
3. Clothes Washers [SHOW IF REBATE = DOWNSTREAM]
4. Clothes Dryers [SHOW IF REBATE = DOWNSTREAM]
5. Dehumidifiers
6. Water Heaters or Heat Pump Water Heaters

IF SUB-PROGRAM IS APPLIANCES AND RENTER:

7. Dehumidifiers

IF SUB-PROGRAM IS HVAC AND OWNER:

8. Smart and WiFi thermostats

IF SUB-PROGRAM IS CONSUMER ELECTRONICS:

9. Computers
10. Monitors
11. Printers or Scanners

IF SUB-PROGRAM IS LIGHTING:

12. LED Light Bulbs
13. Lighting Fixtures
99. [Refused]

PROGRAMMING: GENERATE READ-INS FOR THE REMAINDER OF THE SURVEY:

SELECTED_MEAS = B3 RESPONSE (LOWER CASE)

B4. [ASK ALL] Do you see any flyers, signs, posters, or stickers advertising rebates or instant savings offered by

FirstEnergy's utilities (Ohio Edison, The Illuminating Company, Toledo Edison)?

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

B5. [ASK ALL] Do you see any FirstEnergy utility (Ohio Edison, The Illuminating Company, Toledo Edison) branded flyers, signs, posters, or stickers advertising energy savings if you purchase the [SELECTED_MEAS] you are reviewing? (e.g., annual savings or bill savings)

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

B6. [ASK IF B4 OR B5 =1] What is the main message in the information you see?

1. [OPEN END RESPONSE]

B7. [ASK IF B4 OR B5 =1] How much do you agree or disagree with each of the following statements? [ROTATE]

	COMPLETELY DISAGREE	SOMEWHAT DISAGREE	NEITHER DISAGREE NOR AGREE	SOMEWHAT AGREE	COMPLETELY AGREE
	1	2	3	4	5
a. The FirstEnergy signs were easy to find.					

b. The FirstEnergy signs are attention grabbing
c. The FirstEnergy signs clearly show which products qualify for discounts or rebates

B8. [ASK IF B4 OR B5 =1] What do you believe the signs are encouraging you to do? [OPEN END RESPONSE]

98. [Not Sure]

99. [Refused]

B9. [ASK IF B4 OR B5 =1] How could the signs be improved?

[OPEN ENDED RESPONSE]

98. [Not Sure]

99. [Refused]

B10. [ASK IF B4 OR B5 =1] After reviewing the signs, what questions do you have, if any?

1. [OPEN END RESPONSE]

2. I don't have any questions

B11. [ASK IF B4 OR B5 =1] Please take a picture of the rebate, instant discount, or energy savings sign that you like the most. [RESPONDENT TO UPLOAD PICTURE]

C. **PROGRAM PRODUCTS AND PRODUCT PLACEMENT**

[ASK SECTION IF THEY SAW FIRSTENERGY SIGNS]

C1. [ASK IF B4 OR B5 =1] Were you able to find the products that were highlighted in these signs?

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

C2. [ASK IF B4 OR B5 =1] How difficult was it to find the products that were advertised?

1. Very difficult
2. Somewhat difficult
3. Somewhat easy
4. Very easy

C3. [ASK IF B4 OR B5 =1 & C2 = 1 OR 2] What made it difficult to find the advertised products/ What did you have to do to find them?

1. [OPEN END RESPONSE]

D. **THERMOSTAT OFFERING**

[ASK SECTION IF HOMEOWNER AND ASSIGNED TO HVAC]

We'd like to ask you a few more questions about Smart and WiFi Thermostats.

D1. Did you see any signs about a $75 instant rebate on ENERGY STAR® certified Smart Thermostats?

1. Yes
2. No

97. [Other][Specify]

98. [Not Sure]

D2. [IF D1 = 1] Please take a picture of the signs that you see. [RESPONDENT TO UPLOAD PICTURE]

D3. [ASK IF D1=1] Were you able to find the smart thermostats that were highlighted in these signs?

1. Yes

2. No

97. [Other][Specify]

98. [Not Sure]

99. [Refused]

D4. [ASK IF D1=1] Given the information in the store about ENERGY STAR Smart or WiFi thermostats, would you be more likely to purchase…

1. An ENERGY STAR Smart or WiFi thermostat that has a rebate

2. Another make/model of thermostat

3. Not sure / no preference

4. Neither – I won't need a thermostat in near the future

98. [Not Sure]

99. [Refused]

D5. [ASK ALL] Why do you say that?

1. [OPEN RESPONSE]

D6. [IF D1 = 1] Based on the signs you see, how easy do you feel it would be to get your thermostat instant rebate?

1	2	3	4	5	98	99
Not at all confident				Extremely Confident	Not sure	Refused

E. **OTHER IN STORE SIGNS**

E1. Do you see any flyers, signs, posters, or stickers advertising rebates or instant savings on the [SELECTED_MEAS] that are NOT offered by one of FirstEnergy's utilities (Ohio Edison, The Illuminating Company, Toledo Edison)?

1. Yes
2. No [SKIP TO F1]
98. [Not Sure][SKIP TO F1]
99. [Refused]

E2. [ASK IF E1 = 1,] Please take a picture of the rebate, instant discount, or energy savings sign that you see. [RESPONDENT TO UPLOAD PICTURE]

E3. [ASK IF E1= 1,] Which signs drew your attention most?

1. FirstEnergy's utilities signs
2. Other signs

E4. [ASK IF E1 = 1, & E3=2] In your opinion, why was this signs more attentions grabbing than the FirstEnergy signs? [OPEN END RESPONSE]

F. **INTERACTIONS WITH SALES ASSOCIATES**

Next, we'd like to ask you a few questions about any interactions that you had with sales associates while viewing products in this section of the store.

F1. Did you speak to a store sales representative or sales associate while looking at [SELECTED_MEAS]?

1. Yes
2. No
97. [Other][Specify]
98. [Not sure]
98. [Not sure]

F2. [IF F1 = 2] Why didn't you speak to a sales associate?

1. Associates were busy or unavailable
2. Associates did not approach me
3. I don't like speaking to associates while shopping
4. I did not have any questions for the associate

97. [Other][Specify]

F3. [IF F1 = 1] What did the sales associate tell you about these products? Did the associate discuss product…[SELECT ALL THAT APPLY] [ROTATE]

1. Functionality
2. Cost
3. Energy savings
4. Rebates available
5. Instant discounts

97. [Other][Specify]

98. [Not Sure]

99. [Refused]

F4. [IF F1 = 1] Did the sales associate show you specific products that…..?

	YES	NO	NOT SURE
	1	2	98
a. Save Energy.			
Are ENERGY STAR Certified.			
Have an instant discount.			
Qualify for a rebate.			

F5. [IF F1 = 1] Did the sales associate direct you to visit the energysaveohio-home.com website for additional information?

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

F6. [IF F1 = 1] 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. The sales associate was knowledgeable about energy use and energy savings					
b. The sales associate was knowledgeable about discounts or rebates					
c. Information provided by the sales associate was easy to understand.					
d. Information provided by the sales associate was useful.					

F7. Thinking about your experience shopping for [SELECTED_MEAS] today, including the signs, sales associates, product packaging, and the way the products are displayed/stored, what would have made the shopping experience better?

1. [OPEN END RESPONSE]

98. [Not Sure]

99. [Refused]

G. **OTHER PRODUCT SHOPPING EXPERIENCES**

G1. Besides [SELECTED_MEAS], did you look at any other appliances, electronics, lighting or HVAC equipment while shopping?

1. Yes

2. No [SKIP TO H1]

G2. [IF G1 = 1] Which of the following appliances, electronics, lighting or HVAC equipment did you look at?

IF SUB-PROGRAM IS APPLIANCES AND OWNER

1. Refrigerators [DOWNSTREAM]
2. Freezers
3. Clothes Washers [DOWNSTREAM]
4. Clothes Dryers [DOWNSTREAM]
5. Dehumidifiers
6. Water Heaters or Heat Pump Water Heaters

IF SUB-PROGRAM IS APPLIANCES AND RENTER:

7. Dehumidifiers

IF SUB-PROGRAM IS HVAC AND OWNER:

8. Smart and WiFi thermostats

IF SUB-PROGRAM IS CONSUMER ELECTRONICS:

9. Computers
10. Monitors
11. Printers or Scanners

IF SUB-PROGRAM IS LIGHTING:

12. LED Light Bulbs
13. Lighting Fixtures

99. [Refused]

[GENERATE OTHER_PROD READ-IN FROM E2; EXCLUDE [SELECTED_MEAS]] OTHER_PROD = G2 RESPONSE (LOWER CASE)

G3. [IF G1 = 1] Compared with [SELECTED_MEAS] how did the signs or information in the [OTHER_PROD] section compare?

1. Signs/information was better
2. Signs/information was worse
3. No difference
4. No signs in the [OTHER_PROD] section

G4. [IF G1 = 1 & G3=1] What about the signs/information in the [OTHER_PROD] section was better than in [SELECTED_MEAS]?

1. [OPEN RESPONSE]

G5. [IF G1 = 1 & G3=2] What about the signs/information in the [OTHER_PROD] section was worse than in [SELECTED_MEAS]?

1. [OPEN RESPONSE]

G6. [IF G1 = 1 & G3 =/= 4] Please upload a picture of a sign or information you like in [OTHER_PROD] section.

1. [RESPONDENT TO UPLOAD PICTURE]

G7. [IF F1 = 1] Compared with [SELECTED_MEAS], how helpful were the sales associates in the [OTHER_PROD]
section?

1. Sales associates were more helpful
2. Sales associates were less helpful
3. No difference
4. I can't compare – I didn't talk to sales associates in both sections

G8. [IF G1 = 1 & G7=1] In what ways were the sales associates in the [OTHER_PROD] section more helpful than in [SELECTED_MEAS]?

1. [OPEN RESPONSE]

H. **MOTIVATIONS AND DECISION TO PURCHASE**

H1. [DO NOT ASK IF SELECTED_MEAS = Thermostats] Thinking about the [SELECTED_MEAS] you saw advertised today (i.e., on signs), what are you likely to purchase the next time you need [SELECTED_MEAS]?

1. The advertised product(s)
2. Another make/model
3. Not sure / no preference
4. Neither – I won't need [SELECTED_MEAS] IN THE FUTURE

98. [Not Sure]

98. [Refused]

H2. [DO NOT ASK IF SELECTED_MEAS = Thermostats] Why do you say that?

1. [OPEN RESPONSE]

H3. [ASK IF H1 = 1] Did any of the following factors influence your preference for the advertised [SELECTED_MEAS] over another make or model? Please select any that apply. [ROTATE; MULTIPLE RESPONSE]

1. FirstEnergy signs
2. ENERGY STAR signs
3. Yellow Energy Guide sticker
4. Product packaging (e.g., information on the box)
5. The instant discount

6. The rebate

7. The sales associate

8. Other (specify)

H4. How likely would you be to purchase the advertised products the next time you need [SELECTED_MEAS]?

1	2	3	4	5	98	99
Not at all confident				Extremely Confident	Not sure	Refused

H5. [ASK IF [SUB-PROGRAM] = LIGHTING] 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

H6. [ASK IF F7 isn't answered] What, if anything, could have been improved to make your shopping for [SELECTED_MEAS] better? [OPEN END RESPONSE]

98. [Not Sure]

99. [Refused]

I. **OVERALL SATISFACTION**

I1. [ASK ALL] On a scale of 1 to 5, with 1 being extremely dissatisfied and 5 being extremely satisfied, how satisfied were you with your experience shopping for [SELECTED_MEAS] today?

1	2	3	4	5	98	99

Not at all confident				Extremely Confident	Not sure	Refused

J. **DEMOGRAPHICS**

J1. Thank you for completing our survey. We have a few more optional questions to ask. Are you willing to answer a few more questions?

1. Yes
2. No [SKIP TO K2]

J2. [ASK IF J1 = 1] What is your age?

1. [OPEN END NUMERIC]

J3. [ASK IF J1 = 1] Are you currently?

1. Employed for wages
2. Self-employed
3. Unemployed
4. A stay-at-home parent or caretaker
5. A student
6. Retired
7. Unable to work

J4. [ASK IF J1 = 1] Are you of Hispanic, Latin(x), or Spanish origin?

1. No, not of Hispanic, Latin(s) or Spanish origin
2. Yes, Mexican, Mexican-Am., Chicano
3. Yes, Puerto Rican
4. Yes, Cuban
5. Yes, another Hispanic, Latino, or Spanish origin for example, Salvadoran, Dominican,

Columbia, Guatemalan, Spaniard, Ecuadorian, etc.

J5. [ASK IF J1 = 1] What is your race?

1. White/Caucasian
2. Black/African American
3. American Indian or Alaskan Native (please specify the name of enrolled or principal tribe(s))
4. Chinese
5. Filipino
6. Asian Indian
7. Vietnamese
8. Korean
9. Japanese
10. Native Hawaiian
11. Samoan
12. Chamorro
13. Other Pacific Islander (please specify)
14. Some other race (please specify)

J6. [ASK IF J1 = 1] Which of the following best describes your home?

1. Single-family attached home
2. Rowhouse, townhouse or condominium
3. Duplex or triplex
4. Apartment (4 or more units in building)
5. Mobile/manufactured home
6. Other (specify)

K. **CLOSINGS AND TERMINATIONS**

K1. [SHOW IF INELIGIBLE] Based on your responses you are not eligible to complete the study. We appreciate your time and willingness to participate. Thank you on behalf of FirstEnergy.

K2. [SHOW FOR ALL COMPLETED] Survey Completed – Thank you

Thank you for taking our survey. Your efforts are greatly appreciated!

Thank you. Those are all the questions we have today. FirstEnergy appreciates your feedback.