APPENDIX E – APPLIANCE TURN IN EM&V REPORT

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

Appliance Turn-In Program
Evaluation, Measurement, and Verification Report
2019

Prepared for FirstEnergy Ohio Companies:

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

Prepared by:

ADM Associates, Inc.
3239 Ramos Circle
Sacramento, CA 95827
916-363-8383

Table of Contents

List of Tables

Table of Figures

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 Appliance Turn-In Program. This program offered residential customers rebates for the recycling of refrigerators, freezers, dehumidifiers, and room air conditioners (RACs) during the 2019 program year. The goal of the program is to permanently remove old appliances from the system, which are generally inefficient. Units removed from customers' homes cannot enter the used appliance market, which in the absence of this program would be a likely alternate outcome.

A total of 20,914 households in the service territories of the Companies received appliance collection and recycling services through the Appliance Turn-In Program in 2019. Program design allows for an individual household to turn in up to two refrigerators or freezers, up to two RACs per year, and up to two dehumidifiers. The number of participating households within each utility is shown in Table 1-1.

Table 1-1: Program Participation by Utility

Utility	Number of Participants[1]
CEI	7,496
OE	10,784
TE	2,634
Total Program	**20,914**

Ex-ante savings estimates for the Companies' Appliance Turn-In Program were taken directly from the *State of Ohio Energy Efficiency Technical Reference Manual* (OH TRM)[2] for refrigerators, freezers, and RACs recycled during 2019. These values are 1,376 kWh per refrigerator, 1,244 kWh per freezer, and 162 kWh per RAC[3] recycled through the program. Ex-ante kWh savings estimates for dehumidifiers were taken directly from the OH TRM with updated run hours as per ENERGY STAR revisions[4], which resulted in the

[1] The number of participants was counted by identifying the number of unique customer IDs in the program tracking database. A number of participants recycled more than one appliance.

[2] Vermont Energy Investment Corporation (VEIC), *State of Ohio Energy Efficiency Technical Reference Manual,* Prepared for Public Utilities Commission of Ohio, August 6, 2010, revised September 30, 2013. (http://dis.puc.state.oh.us/TiffToPDf/A1001001A19A07B55418I00975.pdf)

[3] The annual kWh savings for RACs is based on an assumed average capacity of 10,000 Btuh as opposed to the 8,500 Btuh assumed in the TRM.

[4] Based on 68 days of 24-hour operation: ENERGY STAR Appliance Calculator, Dehumidifier Calcs. (https://www.sfwmd.gov/sites/default/files/documents/calculator_energy_star_res_appliance_savings.xlsx)

calculated Federal Standard kWh savings based on the capacity per unit. A weighted average based on the capacities of the units from the 2017 and 2018 program data was calculated for the ex-ante savings, which resulted in 861 kWh per dehumidifier. Table 1-2 summarizes the ex-ante per-unit annual kWh savings estimates by measure.

Table 1-2: Ex-Ante Per-Unit Annual kWh Savings

Measure	Ex-Ante kWh	Source
Refrigerator	1,376	Ohio TRM
Freezer	1,244	Ohio TRM
Room Air Conditioner	162	Ohio TRM
Dehumidifier	861	Ohio TRM[5]

Ex-post gross electric savings were calculated through detailed analysis of program tracking data and participant survey data. ADM Associates, Inc. (ADM) conducted analyses of these data using statistical models containing inputs reported in participant survey data and evaluation protocols that have been utilized to evaluate similar recycling programs. ADM compared these results to the deemed savings values reported in the TRM. Per Ohio RC §4928.662, the methodology that generated higher energy savings was selected for each appliance category.

Annual ex-post verified electric savings were 30,624,464 kWh (a realization rate of 97.8%). Ex-post verified peak demand reduction was 5,160.70 kW (a realization rate of 97.4%). Detailed tables listing energy savings and demand reductions by measure type can be found in Appendix A. Ex-post gross energy savings (kWh) and peak demand reduction (kW) for the program in the three service territories are compared to ex-ante estimates in Table 1-3.

Table 1-3: Overall Evaluation Results[6]

Utility	Ex-Ante Expected Gross Savings		Ex-Post Verified Gross Savings		Realization Rate	
	Gross kWh	Gross kW	Gross kWh	Gross kW	kWh	kW
CEI	11,188,817	1,891.00	10,933,793	1,843.05	97.7%	97.5%
OE	16,199,887	2,742.49	15,839,041	2,666.68	97.8%	97.2%
TE	3,938,718	667.18	3,851,630	650.98	97.8%	97.6%
All Companies	**31,327,422**	**5,300.67**	**30,624,464**	**5,160.70**	**97.8%**	**97.4%**

[5] Energy savings for participating dehumidifiers was done in accordance with the OH TRM with updated run hours of 1,632 as per ENERGY STAR revisions.
[6] All savings in this report are calculated at the retail level and do not include line losses.

A comprehensive process evaluation was performed during the 2019 program year. Key findings from the process evaluation of the 2019 Appliance Turn-In Program include:

- Overall, the Appliance Turn-In Program is meeting its participation and internal KPI goals to a high degree. Customer satisfaction is high for the program overall and most aspects of the process, including scheduling of appliance pick-up, pick-up crew, pick-up process, rebate amount, time it took to receive the rebate, and communications with program staff.
- The Appliance Turn-In Program incentive and ease of getting rid of an appliance are most often stated as the program's favored aspects. The time between pick-up and rebate receipt is mentioned as a source of dissatisfaction by a small number of survey respondents.
- Bill inserts and word-of-mouth remain the primary means by which people learn about the Appliance Turn-In Program. A portion of survey participants initially learned about the program through social media advertisement, which is new to the program in 2019.
- The Appliance Turn-In Program's addition of text notifications in 2019 provided additional scheduling convenience and customer satisfaction, while calendar reminders of pickup appointments continue to be a useful aspect of the scheduling process.
- The communication between the Companies and the implementation contractor, Recleim, is consistent and effective with bi-weekly meetings and thorough monthly reports. Additionally, Recleim has efficient working relationships with the subcontractors responsible for IT support and scheduling appliance pick-ups.
- Recleim continues to participate in Responsible Appliance Disposal (RAD) throughout 2019, which enhances the program's vigilance to properly dispose of appliances and reduce environmental hazards.

2 Introduction and Purpose of Study

Under contract with FirstEnergy's Ohio Utilities, The Cleveland Electric Illuminating Company (CEI), Ohio Edison Company (OE), and The Toledo Edison Company (TE) (collectively "Companies"), ADM Associates, Inc. (ADM) performed evaluation, measurement and verification (EM&V) activities and confirmed the energy savings and demand reduction realized through the energy efficiency programs that the Companies implemented in Ohio in 2019. 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 appliances collected and recycled, as further described in Section 3, through the Appliance Turn-In Program during 2019. Additionally, this report presents the results of the process evaluation of the program completed by ADM with a focus on participant and program staff perspectives regarding the program's implementation.

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

- How many eligible refrigerators, freezers, RACs, and dehumidifiers were collected for recycling?
- How many of the appliances were replaced and how many represent a net removal from the grid?
- What fraction of collected appliances were either not used, or used only part time over the past year?
- What is the average annual kWh savings per collected appliance?
- What is the average kW reduction per collected appliance?

The goal of the process evaluation component was to determine how effective the program is in terms of customer satisfaction, customer awareness, and stakeholder interaction. The process evaluation was framed by the following five research questions:

- How effective were the marketing efforts for the program? Which marketing methods were most effective?
- How well did Company staff and the implementation team work together?
- Were the program participants satisfied with their experience? What was the level of satisfaction with the incentive amount, the scheduling process, and the pick-up process? Did the increased incentive amount for part of the program year drive customer satisfaction?
- Were there any significant changes or new obstacles during the program year?
- What changes can be made to the program's design or delivery to improve its effectiveness in future program years?

3 Description of Program

The Appliance Turn-In Program offers rebates to customers who recycle their old, but working, refrigerator or freezer. Room air conditioners (RAC) and dehumidifiers are also eligible to be recycled but must be recycled along with an eligible refrigerator or freezer. The goal of the program is to reduce the number of old, inefficient working refrigerators and freezers that customers have moved to their garages or other locations, such as basements or patios, and to have the old units recycled in a responsible manner. The program was brought back to the portfolio in 2017 and transitioned to Recleim as the implementer.

To be eligible, refrigerators and freezers must be between 10 and 30 cubic feet, operational (i.e., able to cool), and must be empty at the time of pickup. Within six weeks of their appliance pickup, customers receive a $50 rebate for each recycled refrigerator or freezer and $25 for each recycled room air conditioner or dehumidifier in addition to the free pick-up and removal service.

The program targets residential electric customers through a wide variety of residential customer participation. Marketing efforts include bill inserts, newspaper, digital ads (including Pandora, YouTube, Facebook and search), email blasts, home energy reports, community events. and marketing materials at retailers. The program is also marketed through other FirstEnergy programs, including the Energy Efficient Products and Energy Efficient Homes programs. Customers can either enroll online[7] or by calling a toll-free number.

[7]https://www.firstenergycorp.com/save_energy/save_energy_ohio/for_your_home/appliance-turn-in-program.html

4 Methodology

This chapter provides a description of the methodology applied by ADM in the evaluation of the 2019 Appliance Turn-In Program. The chapter is divided into two sections: Impact Evaluation Methodology and Process Evaluation Methodology.

4.1 Impact Evaluation Methodology

Per Ohio RC §4928.662, all installation rates, deemed savings, and hours of use were calculated per the OH TRM ("Deemed"). In addition, ADM calculated gross savings for measures in the program using the Uniform Methods Project (UMP) methodology described below ("As Found"). 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, also per Ohio RC §4928.662.

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 eligible refrigerators, freezers, RACs, and dehumidifiers were collected for recycling?
- How many of the appliances were replaced and how many represent a net removal from the grid?
- What fraction of collected appliances were either not used, or used only part time over the past year?
- What is the average annual kWh savings per collected appliance?
- What is the average kW reduction per collected appliance?

The methodology used to address each of these questions is detailed in the following sections.

4.1.1 Data Collection Verification of Units Recycled

A first aspect of conducting measurements of program activity is to verify the number of refrigerators, freezers, RACs, and dehumidifiers collected and recycled. ADM completed the following steps in the verification effort:

- Validating program tracking data provided in the VisionDSM and SSRS reporting systems by checking for duplicate or erroneous entries; and,
- Conducting verification online surveys with a statistically valid sample of program participants. The focus of these verification surveys was to verify that customers listed in the program tracking database did indeed participate and that the number

of appliances claimed to be recycled was accurate. Additionally, survey respondents were asked a series of questions to verify the working condition of their recycled appliances; it is a program requirement that collected units be in working condition at the time of pick-up. A verification rate of the percent of working appliances is calculated and applied to the final ex-post savings.

As the first step toward verification, tracking data for the program provided by Recleim through the VisionDSM and SSRS reporting systems was reviewed. The number of refrigerators, freezers, RACs, and dehumidifiers reported in the program tracking data that were recycled during 2019 are shown in Table 4-1.

Table 4-1: Appliances Recycled in 2019

Utility	Number of Refrigerators Collected	Number of Freezers Collected	Number of RACs Collected	Number of Dehumidifiers Collected
CEI	6,739	1,241	482	340
OE	9,419	2,061	671	656
TE	2,338	480	181	110
All Companies	**18,496**	**3,782**	**1,334**	**1,106**

As the table above shows, the majority of program participation was represented by recycled refrigerators. Freezer units were the second most common recycled appliance, and RACs were the third, while dehumidifiers represented the smallest portion of program participation. Refrigerators represent approximately 81.2% of the ex-ante kWh savings claimed for the program, freezers represent approximately 15.0%, dehumidifiers represent approximately 3.0%, and RACs represent less than 1%.

4.2 Sampling Strategy

A random sample was selected to ensure that 90 percent confidence with ±10 percent relative precision or better would be achieved for each utility.

For the calculation of sample size, a coefficient of variation of 0.5 was assumed.[8] With this assumption, a minimum sample size of 68 participants per utility was required, as shown in the following formula:

[8] The coefficient of variation, cv(y), is a measure of variation for the variable to be estimated. Its value depends on the mean and standard deviation of the distribution of values for the variable (i.e., cv(y) = sd(y)/mean(y)). Essentially, cv is a metric of how wide the distribution of values for the variable of interest is. Using a cv = 0.5 is recommend by the Uniform Methods Project Evaluation Protocol for Refrigerator Recycling Programs.

Equation 4-1: Minimum Sample Size Formula for 90 Percent Confidence Level

$$n_0 = \left(\frac{Z * CV}{RP}\right)^2 = \left(\frac{1.645 * 0.5}{0.10}\right)^2 = 68$$

Where:

n_0 = minimum sample size
Z = Z-statistic value (1.645 for the 90% confidence level)
CV = Coefficient of Variation (assumed to be 0.5)
RP = relative precision (0.10)

ADM conducted phone surveys with 252 participants across the three service territories. Specifically, 100 completed surveys for The Illuminating Company, 72 for Ohio Edison, and 80 for Toledo Edison. The instrument for the survey is provided in Appendix B. Survey respondents were asked a number of appliance-specific questions based on the type of appliance(s) they recycled through the program.

In addition to the phone surveys, ADM performed 72 ride-along verification visits across three utilities with the program implementer, Recleim, to observe the collection and recycling processes. Table 4-2 below presents sample points from phone surveys and ride along verification activities in 2019 categorized by measure type.

Table 4-2: Sample Points by Measure Type

Utility	Number of Collected Appliances			
	Refrigerators	Freezers	RACs	Dehumidifiers
CEI	110	20	8	7
OE	81	16	5	9
TE	86	15	8	6
Total	**277**	**51**	**21**	**22**

The results of this survey and ride-along effort were used to verify the number of program eligible appliances recycled in 2019. Overall, ADM sampled 324 (252 phone surveys and 72 ride-along visits) participants, which satisfied the target precision and minimum sample size of the sampling strategy and accounted for the variation in measure type.

4.3 Calculating Gross Annual kWh Savings per Appliance

Ex-post kWh savings estimates for the Companies' Appliance Turn-In Program were taken directly from the OH TRM for refrigerators, freezers, and RACs recycled during 2019.[9] These values are 1,346 kWh per refrigerator, 1,219 kWh per freezer, and

[9] A verification rate of the percent of working appliances is calculated and applied to the final ex-post savings taken from the OH TRM. The verification rate for refrigerators was 97.8% and 98.0% for freezers.

162 kWh[10] per RAC. Ex-post kWh savings estimates for dehumidifiers were taken from the OH TRM with updated run hours of 1,632 as per ENERGY STAR revisions, which resulted in the calculated Federal Standard kWh savings based on the capacity per unit. The average value for all dehumidifiers recycled during 2019 is 823 kWh.

During the impact evaluation effort, ADM calculated annual kWh savings for each measure in the program using both the deemed savings values from the OH TRM and *Pennsylvania Energy Efficiency Technical Reference Manual* (PA TRM) and the as-found methodology described in the following sections. For final ex-ante kWh annual savings, the higher gross annual kWh values were extrapolated to the population of 2019 recycled units to obtain a program-level estimate of gross kWh savings resulting from refrigerator and freezer recycling per Ohio RC §4928.662.

The estimated savings from the as-found methodologies were assessed by developing separate, independent gross unit energy consumption (UEC) estimates for refrigerators, freezers, RACs, and dehumidifiers recycled through the program in 2019. The details regarding how these UEC estimates were developed are provided in the following sections.

4.3.1 Refrigerators and Freezers

Gross savings for refrigerators and freezers recycled through utility pickup programs have been estimated in previous impact evaluations by using multiple linear regression analysis to determine UECs. In analytical terms, the regression analysis involves estimating the parameters of a regression model:

Equation 4-2: Gross Savings Using Multiple Linear Regression Analysis

$$UEC = \text{Function of } (V_1, V_2, V_3, \ldots, V_n)$$

Where UEC is a measure of the annual energy use of a refrigerator and the V_i are independent variables (e.g., age, configuration, etc.) used to explain the amount of energy use. Energy use for the population of recycled appliances is then estimated by applying the regression equations to data characterizing these factors for all appliances in the population.

This regression-based approach to estimating refrigerator and freezer energy use is described in the U.S. Department of Energy's (DOE) *Uniform Methods Project Refrigerator Recycling Evaluation Protocol.*[11] The Uniform Methods Project (UMP) is a set of protocols under development by the DOE that provides straightforward methods for evaluating gross energy savings for common energy efficiency measures offered

[10] The annual kWh savings for RACs is based on an assumed average capacity of 10,000 BtuH as opposed to the 8,500 BtuH assumed in the TRM.
[11] https://www.nrel.gov/docs/fy17osti/68563.pdf

through utility-sponsored programs. The first set of protocols, which includes the refrigerator recycling evaluation protocol, was published in April of 2013. The refrigerator recycling evaluation protocol includes a previously developed regression model based on in-situ monitoring from 472 refrigerators recycled through five separate utility-sponsored programs. The regression model estimates refrigerator energy usage (kWh) based on a number of appliance characteristics including age, size, configuration, usage (primary/secondary), and location (conditioned or unconditioned space).

ADM used this regression model developed by the UMP to estimate the UEC for refrigerators recycled through the Companies' program. Specifically, the average characteristics of refrigerators recycled through the program were multiplied by the associated coefficients from the UMP model and summed to produce an estimated average UEC for refrigerators recycled through the program. This average UEC represents an estimate of the annual energy usage of the average refrigerator recycled through the program in 2019. The program tracking data collected by Recleim and stored in the VisionDSM database contained much of the necessary appliance characteristic data needed to use the UMP model. ADM supplemented the program tracking data with survey data from program participants regarding primary/secondary usage, and appliance location.

It is important to note that the UMP model only considers refrigerators. Accordingly, ADM used a refrigerator-to-freezer ratio factor to determine the average UEC for freezers. This refrigerator-to-freezer factor methodology is similar to that used by the NMR Group, Inc. in a recent evaluation of the Massachusetts Appliance Turn-in Program.[12] Using relevant secondary sources, ADM concluded that freezers on average use 15% less energy annually than refrigerators. This implies a refrigerator-to-freezer factor of 0.85. The analysis supporting this refrigerator-to-freezer factor is detailed in the previously mentioned Massachusetts Appliance Turn-In Program Evaluation performed by NMR Group, Inc.

Finally, a partial use factor, consistent with the UMP protocol, was developed for refrigerators and freezers to adjust UEC estimates to reflect the fact that not all recycled refrigerators would have operated year-round had they not been decommissioned. Secondary appliances are more likely to be unplugged for a portion of the year than primary appliances, and since there was a large presence of secondary appliances in the program, the partial use factor is an important consideration when developing gross savings estimates.

[12] NMR Group, Inc. *Massachusetts Appliance Turn-in Program Impact Evaluation, Final*. June 15th, 2011. Available at: http://ma-eeac.org/wordpress/wp-content/uploads/Impact-Evaluation-Final-Report.pdf

Based on the preceding discussion, the procedure used by ADM to estimate gross energy savings (kWh) for the refrigerators and freezers recycled through the program can be summarized by the following steps:

1) The UMP model was used to predict the average UEC for participating refrigerators in 2019 based on the average refrigerator characteristics established from Recleim tracking data and participant surveying.
2) Freezer UEC was obtained by multiplying the estimated refrigerator UEC by the refrigerator-to-freezer factor of 0.85 to obtain estimates of the average freezer UECs.
3) Partial-use factors were applied to the UEC estimates to account for the fact that some appliances would likely not be plugged in year-round had they not been decommissioned.

4.3.2 Room Air Conditioners (RACs)

Calculating gross kWh savings for recycled room air conditioners was done in accordance with the algorithms in the ENERGY STAR Room AC Calculator.[13] To maintain consistency with the methodology outlined in the OH TRM, savings were adjusted for units that were replaced by new RACs after recycling. The percentage of units replaced by new RACs was assumed to be 76% based on assumptions presented in the OH TRM. As part of the participant survey, respondents were asked to identify whether they replaced the RACs they recycled. The survey results suggest that 19% of RACs were replaced directly with new RACs, while an additional 20% of recycled RACs were supplanted by new central AC systems. While these results suggest that the actual direct replacement rate may be less than the 76% stipulation in the OH TRM, the cooling load in participant homes is likely met by new or existing equipment in most cases. The standard OH TRM algorithm may not be appropriate in all cases, given the various replacement scenarios. However, because RAC recycling makes up such a small percentage of program savings, the stipulated 76% replacement value from the OH TRM was used. The following formula was used to calculate kWh savings for the average RAC recycled through the program:

Equation 4-3: Room Air Conditioner kWh Savings

$$Annual\ kWh\ Savings = \frac{EFLH * \left(\frac{CAPY_{existing}}{EER_{existing}}\right)}{1000} - \left(\%replaced * \frac{EFLH * \left(\frac{CAPY_{newbase}}{EER_{newbase}}\right)}{1000}\right)$$

[13] www.energystar.gov/sites/default/uploads/buildings/old/files/RoomAC_Calculator.xls

Where:

EFLH	= Effective Full Load Cooling Hours
$CAPY_{existing}$	= Capacity of the average collected unit (in BtuH)
$CAPY_{newbase}$	= Capacity of the baseline replacement unit (in BtuH)
$EER_{existing}$	= The Energy Efficiency Ratio of the average collected unit
$EER_{newbase}$	= The Energy Efficiency Ratio of the baseline replacement unit
%replaced	= The percentage of collected units replaced

Furthermore, performance degradation of existing room air conditioners was accounted for using the methodology established by the National Renewable Energy Laboratory's 2006 "*Building America Performance Analysis Procedures for Existing Homes*" booklet.[14] Specifically, the following equation was used to degrade the existing room air conditioners' at-manufacture EER value:

Equation 4-4: Room Air Conditioner EER Value Degradation

$$EER_{degrade} = \left(EER_{At-manufacture}\right) * (1 - M)^{age}$$

Where:

$EER_{degrade}$	= Estimated EER at time of collection
$EER_{At\text{-}manufacture}$	= At-manufacture EER
M	= Maintenance Factor (0.02[15])
Age	= Age of unit at time of collection in years

Information regarding the age of collected RACs was provided in the tracking database. The Association of Home Appliance Manufacturers (AHAM) maintains sales-weighted average capacity and EER data going back to 1972.[16] The most recent year that the data was available was 2010.[17] Some interpolation was required for the years 1973 and 1979 and 1998.

Using this AHAM data, each RAC recycled through the program was assigned a proxy EER value based on the units' age reported in the tracking system. For RACs whose reported age indicated a vintage before 1972, the sales-weighted average EER for 1972 was used as a proxy. For RACs whose reported age indicated a 2011 or 2012 vintage,

[14] NREL (2006). "*Building America Performance Analysis Procedures for Existing Homes.*" https://www.nrel.gov/docs/fy06osti/38238.pdf

[15] On page 11 of "*Building America Performance Analysis Procedures for Existing Homes.*", the professional maintenance factor is 0.01, and the seldom or never maintained factor is 0.03. ADM decided to take 0.02 as a conservative assumption.

[16] This AHAM data was accessed from two sources: https://rtf.nwcouncil.org/meeting/rtf-meeting-march-1-2011 https://ieer.org/wp/wp-content/uploads/2012/03/DOE-2011-Buildings-Energy-DataBook-BEDB-tables.xlsx

[17] The data applied to this report was still the most recent version based on ADM's verification.

the sales-weighted average EER for 2010 was used as a proxy. The EER values were then adjusted to account for equipment degradation as described above. The baseline replacement RAC was assumed to have an EER equal to the sales weighted average RAC in 2010 from the AHAM data (EER = 10.18). Effective Full Load Hours (EFLH) were assumed to be 233 hours based on the assumptions in the TRM. The existing and new baseline capacity was assumed to be 10,000 BtuH based on the assumptions in the ENERGY STAR Room AC Savings Calculator.

4.3.3 Dehumidifiers

Calculating energy savings for participating dehumidifiers was done in accordance with the OH TRM with updated run hours of 1,632[18] as per ENERGY STAR revisions. Savings were adjusted for units that were retired and recycled without a direct replacement. Therefore, the energy savings were the same as energy consumptions. The following equation was used to calculate kWh savings per unit based on individual capacity:

Equation 4-5: Dehumidifier Federal Standard kWh Savings

$$kWh = \frac{\frac{(Average\ Capacity \times 0.473)}{(24 \times Hours)}}{L/kWh}$$

Where:

0.473 = Constant to convert pints to liters

Hours = Run hours per year
= 1,632[18]

L/kWh = Liters of water per kWh consumed

The kWh energy savings per unit was taken to be equal to the Federal Standard dehumidifier energy consumptions by capacity. The average capacity of all dehumidifiers recycled through the program was 31-pints per day with the most common per-unit capacity being 25-pints per day. This resulted in an average verified ex-post kWh savings of 823 across all recycled units. The table below shows the Federal Standard kWh consumptions by capacity.

[18] Based on 68 days of 24-hour operation: ENERGY STAR Appliance Calculator, Dehumidifier Calcs. (https://www.sfwmd.gov/sites/default/files/documents/calculator_energy_star_res_appliance_savings.xlsx)

Table 4-3: Federal Standard Unit kWh Consumption of Dehumidifier[19]

Capacity	kWh per Unit
<25	720
>25 to 35	804
>35 to 45	989
>45 to 54	1,224
>54 to 75	1,383
>75 to 185	1,326

Energy and demand savings are the estimated energy consumption of the retired unit over its remaining useful life (RUL).

4.4 Calculating Gross Peak Demand (kW) Savings

Ex-post kW savings estimates for the Companies' Appliance Turn-In Program were taken directly from the OH TRM for refrigerators, freezers, and RACs recycled during 2019. These values are 0.22 kW per refrigerator, 0.20 kW per freezer, and 0.21 kW per RAC. Ex-post kW savings estimates for dehumidifiers were taken from the PA TRM for dehumidifier recycling and were based on the capacity of each unit. The average value for all dehumidifiers recycled during 2019 is 0.15 kW.

During the calculation of gross peak demand (kW) effort, ADM calculated kW values for measures in the program using both the deemed values from the OH TRM/PA TRM and the as-found methodology described in the following sections. The higher kW values from OH TRM for refrigerators and freezers were extrapolated to the population of 2019 recycled units to obtain a program-level estimate of gross peak demand savings resulting from refrigerator and freezer recycling per Ohio RC §4928.662. The kW values as described by the as-found methodology for RACs (see Section 4.4.2) and dehumidifiers (see Section 4.4.3) were extrapolated to the population of 2019.

4.4.1 Refrigerators and Freezers

Gross peak demand savings were calculated based on the algorithms and stipulations specified in the OH TRM. For refrigerators and freezers, the OH TRM stipulates that summer coincident peak demand savings are estimated by dividing verified gross per-unit kWh savings by 8,760 and multiplying by a temperature adjustment factor of 1.30[20], as

[19] Table 4-3 is the annual kWh calculation results for each capacity class table taken from Page 65 of the OH TRM.

[20] Temperature adjustment factor based on Blasnik, Michael, "Measurement and Verification of Residential Refrigerator Energy Use, Final Report, 2003-2004 Metering Study", July 29, 2004 (p. 47). It assumes 64% of Ohio homes have central air conditioning.

well as a load shape adjustment factor of 1.074.[21] The verified average ex-post kW savings per unit was 0.22 for refrigerators and 0.20 for freezers.

4.4.2 Room Air Conditioners (RACs)

For room air conditioning units, the OH TRM stipulates that summer coincident peak demand savings are estimated using a summer peak coincidence factor of 0.3.[22] The algorithm for calculating RAC peak kW reduction presented in the OH TRM is reasonable, and therefore, the verified ex-post kW savings per unit was 0.21.

4.4.3 Dehumidifiers

For dehumidifiers, the peak demand savings for recycling a dehumidifier were taken to be equal to the peak demand of the recycled unit as per the PA TRM. The average capacity across all dehumidifiers recycled through the program was 31-pints per day with the most common per-unit capacity being 25-pints per day. The verified average ex-post kW savings per unit was 0.15 across all recycled units and was based on the average peak demand savings by capacity. The table below shows the peak demand reduction (kW) by capacity from the PA TRM.

Table 4-4: Dehumidifier Retirement Peak Demand Reduction (kW)[23]

Capacity	kW Reduction
25	0.1393
30	0.1458
35	0.1523
40	0.1588
45	0.1653
50	0.1718
60	0.1848

[21] Daily load shape adjustment factor also based on Blasnik, Michael, "Measurement and Verification of Residential Refrigerator Energy Use, Final Report, 2003-2004 Metering Study", July 29, 2004 (p. 48, using the average Existing Units Summer Profile for hours ending 16 through 18)

[22] Consistent with coincidence factors found in: RLW Report: Final Report Coincidence Factor Study Residential Room Air Conditioners, June 23, 2008 (https://www.puc.nh.gov/electric/Monitoring%20and%20Evaluation%20Reports/National%20Grid/124_SPWG%20Room%20%20AC%20Evaluation%20FINALReport%20June%2023%20ver7.pdf)

[23] Table 4-4 was taken directly from IMP - DEHUMIDIFIER Retirement Protocol - PA TRM.

4.5 Calculating Lifetime kWh Savings

Lifetime kWh savings were calculated by multiplying ex-post verified annual gross kWh estimates by Remaining Useful Life (RUL) values for each appliance type. The RUL values used were eight years for refrigerators and freezers, three years for RACs, and three years for dehumidifiers based on the assumptions presented in the OH TRM.

4.6 Calculating the Percent of Savings from Income Qualified Customers

Questions were added to the evaluation survey to assess low-income participation in this program. The survey was administered so that the customer disclosed their annual income range from a series of categories. Customers also reported the number of occupants in the household. This information was used to support the determination of whether the household is above or below 150% of Federal Poverty Level (FPL). Respondents were low-income-qualified if the stated incomes were below 150% of FPL (Table 4-5).

Table 4-5: 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 4-5. For each of these groupings of occupants and incomes, ADM further broke down the data by reported participants in each EDC by measure type. Once these counts of low-income participants are calculated for each group in Table 4-5, they are summed up to get the number of low-income participants in each EDC by measure type. Because the survey represents a statically valid sample for the program population, we can use the percentages calculated from the numbers of low-income participants relative to the number of participants in the entire survey, to assess the savings for low-income participants in the program. To calculate the savings for the low-income portion of the program participants, the ex-post energy and demand savings are multiplied by the percentage of low-income participants by EDC.

4.7 Process Evaluation Methodology

The process evaluation component of this report was designed to address the following researchable questions:

- How effective were the marketing efforts for the program? Which marketing methods were most effective?
- How well did Company staff and the implementation team work together?
- Were the program participants satisfied with their experience? What was the level of satisfaction with the incentive amount, the scheduling process, and the pick-up process?
- Were there any significant changes or new obstacles during the program year?
- What changes can be made to the program's design or delivery to improve its effectiveness in future program years?

The data collection activities used to address these researchable questions are discussed in the following sections.

4.7.1 Online Participant Surveys

Online surveys of customers who participated in the program in 2019 were conducted in November 2019. In total, 252 customers completed the survey. The survey addressed the pick-up process, appliance characteristics, customer satisfaction, and customer characteristics. The survey sample was selected to ensure representativeness across the three EDCs.

4.7.2 Program Staff Interviews

ADM conducted two in-depth interviews with program staff from the Companies in September 2019 and Recleim in October 2019. The interviews focused on program operations and suggestions for improvement.

5 Detailed Impact Evaluation Findings

This chapter presents the findings of the impact evaluation of the 2019 Appliance Turn-In Program.

5.1 Verification of Units Recycled

As a first step toward estimating program level kWh and kW impacts, ADM reviewed program tracking data contained in the VisionDSM and SSRS reporting systems for accuracy. No duplicate entries were discovered. To verify that the number of units claimed in the program tracking database was accurate, ADM administered an online survey with a sample of program participants.

The online surveys were completed with 252 customers who participated in the Appliance Turn-In Program by recycling at least one appliance in 2019 between January and September. Program participants across FirstEnergy Ohio's three Electric Distribution Utilities (the Companies') were surveyed with 100 completed surveys for The Illuminating Company, 72 for Ohio Edison, and 80 for Toledo Edison. All except seven of the survey respondents indicated that the number or type of appliances recycled was identical to the claims in the program tracking database. The seven respondents who claimed they recycled different appliance types or quantities are shown in Table 5-1 below. Overall, these discrepancies make up less than 3% of survey respondents. Because the program tracking data includes detailed model information, it is likely these discrepancies reflect survey respondent recall issues. No changes to the number of units recycled were made based on these survey responses.

Table 5-1: Survey Respondent Appliance Type/Quantity Differences

Respondent Number	Database Claim	Respondent Claim	Quantity Difference
1	1 Refrigerator	2 Refrigerators	-1 Refrigerator
2	1 Refrigerator	2 Refrigerators	-1 Refrigerator
3	1 Refrigerator	2 Refrigerators	-1 Refrigerator
4	1 Refrigerator	2 Refrigerators	-1 Refrigerator
5	1 Refrigerator	2 Refrigerators	-1 Refrigerator
6	1 Refrigerator	2 Refrigerators	-1 Refrigerator
7	1 Freezer	0 Freezers	+1 Freezer
		Total	**-6 Refrigerators, +1 Freezer**

In order for participating appliances to accrue energy savings by being taken out of service, the units must be in working condition at the time of pick-up. Both survey and ride-along respondents were questioned regarding whether the recycled appliances were in working condition at the time of pick-up. Across the three service territories, only 9 ([6 refrigerators, 1 freezer, and 2 dehumidifiers) out of 303 appliances were reported as

non-working at the time of pickup. These non-working designations included a follow-up question to ensure that by "not working" the respondents did not mean anything cosmetic or otherwise unrelated to the energy use of the appliance. Survey respondents for all of the other 294 appliances indicated that their units were in working condition at the time of pick-up, as expected based on the program requirements.

Based on these results, the verification rates shown in Table 5-2 for each appliance type:

Table 5-2: Verification Rates by Appliance Type

Metric	Appliance Type			
	Refrigerator	Freezer	RAC	Dehumidifiers
Verification Rate	97.8%	98.0%	100.0%	90.9%

Based on these verification rates, Table 5-3 reports the numbers of refrigerators, freezers, RACs, and dehumidifiers recycled through the program during 2019 that were verified as being in working condition when recycled and therefore program-eligible.

Table 5-3: Recycled Appliances Verified to be in Working Condition

Utility	Quantity Reported as Recycled	Verification Rate	Quantity of Recycled Units Verified as Program Eligible
CEI			
Refrigerator	6,739	97.8%	6,593
Freezer	1,241	98.0%	1,217
RAC	482	100.0%	482
Dehumidifier	340	90.9%	309
OE			
Refrigerator	9,419	97.8%	9,215
Freezer	2,061	98.0%	2,021
RAC	671	100.0%	671
Dehumidifier	656	90.9%	596
TE			
Refrigerator	2,338	97.8%	2,287
Freezer	480	98.0%	471
RAC	181	100.0%	181
Dehumidifier	110	90.9%	100

5.2 Gross Annual kWh Savings per Appliance

Gross annual kWh savings were calculated as described in Section 4 of this report per Ohio RC §4928.662. The details and results of these calculations are reported in this section. The table below shows the results:

Table 5-4: Gross Annual kWh Savings per Appliance

Appliance Type	Ex-Ante kWh per Unit	Ex-Post kWh per Unit	Overall Ex-Ante kWh	Overall Ex-Post kWh	Realization Rate (kWh)
Refrigerators	1,376	1,346	25,453,270	24,890,585	97.8%
Freezers	1,244	1,219	4,706,321	4,610,712	98.0%
RACs	162	162	215,823	215,823	100.0%
Dehumidifiers	861	823	952,008	907,345	95.3%
		Total	**31,327,422**	**30,624,464**	**97.8%**

5.2.1 Refrigerators and Freezers

For refrigerators, both UMP and OH TRM methodologies were applied to the gross savings calculation per Ohio RC §4928.662. The findings are presented below.

5.2.1.1 UMP

Unit Energy Consumption (UEC) estimates were derived using the UMP regression model developed based on in-situ metering data from 472 refrigerators just before decommissioning. The model specification and estimated coefficients of the UMP model are shown in Table 5-5.

Table 5-5: DOE Uniform Methods Project UEC Regression Details[24] (Dependent Variable – Daily kWh)

Independent Variables	Coefficient
Intercept	0.582
Appliance Age	0.027
Dummy: Manufactured Pre-1990	1.055
Appliance Size (cubic feet)	0.067
Dummy: Single-Door Configuration	-1.977
Dummy: Side-by-Side Configuration	1.071
Dummy: Primary Usage Type (in absence of program)	0.605
Interaction: Located in Unconditioned Space x CDD	0.020
Interaction: Located in Unconditioned Space x HDD	-0.045

The program tracking database included information regarding configuration, size, age,[25] and pickup address for the 18,496 refrigerators collected in 2019. Of these 18,496 refrigerators, 63.5% were top freezer; 26.5% were side-by-side models, 2.6% were single door models;[26] the average size was 19.42 cubic feet; 11.9% percent were manufactured before 1990 and the average age was 20 years old. Additionally, the program tracking database also included information on whether the refrigerators were primary or secondary appliances and where they were located within each residence prior to being recycled. Across the three Companies, 62.6% of recycled units were a primary refrigerator, while 65.3% of the recycled refrigerators were located in spaces that are generally unconditioned, such as a garage or porch. This information, along with TMY3 heating and cooling degree days (base temperature = 65ºF) for the Ohio reference cities outlined in the OH TRM were used to generate the final two interaction variables.

Table 5-6 shows all the refrigerator characteristics relevant to the UMP model.

[24] Source: Uniform Methods Project Refrigerator Recycling Evaluation Protocol.

[25] Model year is listed on refrigerator nameplates for many but not all units. As explained to ADM staff, when model year is not listed on the nameplate it is estimated based on appliance characteristics common to certain vintages.

[26] The complete breakdown of recycled refrigerator configuration is: 63.5% top freezer, 26.5% side-by-side, 2.6% single door, and 7.2% bottom freezer.

Table 5-6: 2019 Program Refrigerator Characteristics

Appliance Characteristic	Average for Refrigerators
Appliance Age (Years)	20
Percentage of Units Manufactured before 1990	11.9%
Average Size (Cubic Feet)	19.42
Percentage Single Door	2.6%
Percentage Side-by-Side	26.5%
Percentage Primary	62.6%
Interaction: Unconditioned Space x CDD	0.524
Interaction: Unconditioned Space x HDD	8.072

The refrigerator characteristics shown in Table 5-6 were used in conjunction with the model coefficients in Table 5-5 to calculate annual energy consumption estimates for verified refrigerators. The refrigerator-to-freezer factor of 0.85[27] was applied to develop annual energy consumption estimates for freezers. These calculations are shown below:

Equation 5-1: Refrigerator UEC (kWh)

$$365.25 * [0.582 + 0.027 * (20\text{ years}) + 1.055 * (11.9\%\text{ manufactured before 1990}) + 0.067 * (19.42\text{ cubic feet}) - 1.977 * (2.6\%\text{ single} - \text{door}) + 1.071 * (26.5\%\text{ side} - \text{by} - \text{side}) + 0.605 * (62.6\%\text{ primary usage}) + 0.02 * (0.524\text{ unconditioned CDDs}) - 0.045 * (8.072\text{ unconditioned HDDs})] = 1{,}025\text{ kWh}$$

Equation 5-2: Freezer UEC (kWh)

$$1{,}025 * 0.85\ (refrigerator - to - freezer\ factor) = 871\ kWh$$

One final adjustment was made to account for the fact that not all refrigerators and freezers are plugged in year-round. This partial use adjustment assigns different part-use factors based on three categories into which recycled appliances fall:

1) Some units that were recycled are not likely to operate at all in the absence of the program. The part-use factor for such units, therefore, would be zero.
2) Other units are likely to have operated part-time in the absence of the program. For these units, the partial use factor is calculated by dividing the number of months in the past year that the unit had been plugged in and running by the number of months in the year (i.e., 12). Based on data collected through the survey of participants, the

[27] Refer to Section 4.3.1 for source of refrigerator-to-freezer factor.

average number of months in use for a refrigerator that was being partially used was 4.6 months, implying a use factor of 0.383 (i.e., 4.6/12). For freezers in this category, the partial use factor was calculated to be 0.375, reflecting an average of 4.5 months in use for freezers being partly used.

3) Units used all the time have a use factor of one (1). It is assumed that all primary refrigerators operate all the time.

The overall part-use factor and the corresponding overall Unit Energy Savings (UES) are calculated as a weighted average across the three categories, where the weights are determined by the percentages of units falling into the three categories. It is worth noting that the information used to calculate the part-use factor is based on usage during the past year, under the assumption that the distribution of usage patterns for the population of recycled units would be similar in the absence of the program. Table 5-7 shows the calculation of the overall UES for refrigerators and freezers when partial use is taken into account.

Table 5-7: Unit Energy Savings Adjusted for Part-Use

Operating Status of Unit	Percentage of Recycled Units in Category	Use Factor	Calculation of UES to Adjust for Part Use
Refrigerators (n = 277)			
Not running	3.1%	0	0
Running part time	6.7%	0.383	393
Running all time	90.2%	1	1,025
Weighted Average UES for Refrigerators			951
Freezers (n = 51)			
Not running	10.8%	0	0
Running part time	10.8%	0.375	369
Running all time	78.4%	1	985
Weighted Average UES for Freezers			812

5.2.1.2 OH TRM

OH TRM methodologies were used to calculate energy savings for refrigerators and freezers per Ohio RC §4928.662. These calculations are shown below:

Equation 5-3: Refrigerator and Freezer per Unit kWh savings

$$\Delta kWh = UEC_{retired} * ISAF$$

Where:

$UEC_{retired}$ = Average in situ Unit Energy Consumption of retired unit, adjusted for part use

ISAF = In Situ Adjustment Factor
= 0.85

$$Refrigerator\ \Delta kWh\ =\ 1{,}376\ kWh$$

$$Freezer\ \Delta kWh\ =\ 1{,}244\ kWh$$

Per Ohio RC §4928.662, the ex-post gross per-unit annual kWh savings are calculated using the calculations from the OH TRM. A verification rate is then applied to the per-unit annual kWh savings and the resulting values are reported as the final ex-post savings. See Section 5.1 for how the verification rate is calculated using verified survey data.

For refrigerators, the ex-ante kWh savings per unit provided in the tracking data was 1,376 and the ex-post verified kWh savings per unit was 1,346, which generated a 97.8% realization rate. For freezers, the ex-ante kWh savings per unit provided in the tracking data was 1,244 and the ex-post verified kWh savings per unit was 1,219, which generated a 98.0% realization rate. The ex-ante kWh savings used the deemed values from the OH TRM, while the ex-post kWh savings were the deemed values from the OH TRM multiplied by the verification rate.[28]

5.2.2 Room Air Conditioners (RACs)

AHAM Sales-weighted average EER values were applied to each RAC recycled through the program in 2019 based on the reported vintage. If the vintage was missing in the data set, the OH TRM deemed EER value was applied to the recycled unit. The resulting average EER value was 9.12. Appliance degradation was calculated using the methodology established by the National Renewable Energy Laboratory's 2006 "*Building America Performance Analysis Procedures for Existing Homes*" booklet.[29] After accounting for degradation, the average EER for recycled RACs dropped to 7.79.

Based on the assumptions presented in the TRM, EFLH were assumed to be 233 hours per year and 76% of recycled units were assumed to be replaced. The average capacity for the existing and baseline replacement RACs was assumed to be 10,000 BtuH based on the assumptions in the ENERGY STAR Room Air Conditioner Savings Calculator.[30] This assumption is in line with the AHAM data implied an average of 10,474 BtuH for

[28] The verification rate for refrigerators was 97.8% and 98.0% for freezers.

[29] NREL (2006). "*Building America Performance Analysis Procedures for Existing Homes.*" (https://www.nrel.gov/docs/fy06osti/38238.pdf). Any efficiency lower than 9.75 was adjusted to 9.75 so the applicable formula could be correctly applied. Degradation EERs were capped at 6.83. (VEIC comments EER value).

[30] www.energystar.gov/sites/default/uploads/buildings/old/files/RoomAC_Calculator.xls

RACs recycled in 2019. The EER of replacement RACs was assumed to be 10.18, the sales-weighted average RAC EER in 2010 according to AHAM data.

Based on these assumptions, gross per unit kWh savings for RACs recycled through the Appliance Turn-In Program in 2019 was calculated to be 162 kWh as follows:

Equation 5-4: RAC Gross per Unit kWh Savings

$$\begin{aligned} &Recycled\ RAC\ Annual\ kWh\ Savings^{31} \\ &\quad = (233\ (Hours) * 10{,}000\ (BtuH)\ /6.94\ (EER_{exist}))/1000 \\ &\quad - \ (0.76\ (\%replaced) * (233 * (10{,}000/10.18(EER_{base})))/1000) \\ &\quad = \ 162\ kWh \end{aligned}$$

The ex-ante kWh savings per unit provided in the tracking data was 162 and the ex-post verified kWh savings per unit was 162, which generated a 100.0% realization rate. The ex-post annual kWh savings from the as-found methodology were the final results in this report.

5.2.3 Dehumidifiers

Calculating energy savings for participating dehumidifiers was done in accordance with the OH TRM with updated runtimes from the ENERGY STAR calculations. Savings were adjusted for units that were retired and recycled without a direct replacement. The kWh energy savings per unit was taken to be equal to the Federal Standard dehumidifier energy consumptions by capacity (see Section 4.3.3). Energy impacts were based only on the existing unit, and savings apply only for the remaining useful life (RUL) of the unit. Based on the algorithms, the gross per unit kWh savings across all capacities of dehumidifiers recycled through 2019 was calculated to be an average of 823.

The ex-ante kWh savings per unit provided in the tracking data was 861 and the ex-post verified kWh savings per unit was 823, which generated a 95.3% realization rate. The variation in realization rate was caused by the difference in savings calculation methodologies. The ex-ante kWh savings were a weighted average based on the capacities of the units from the 2017 and 2018 program data. However, the ex-post energy savings were verified and calculated based on the actual capacity of each unit recycled in 2019.

5.3 Gross Peak Demand (kW) Savings per Appliance

The gross peak demand (kW) savings were calculated as described in Section 4.4 of this report per Ohio RC §4928.662. Gross peak demand savings were calculated based on the algorithms and stipulations specified in the OH TRM and PA TRM. The details and

[31] The formula and methodology were defined in Section 4.

results of these calculations are reported in this section. The table below shows the results:

Table 5-8: Gross Peak Demand (kW) Savings per Appliance

Appliance Type	Ex-Ante kW per Unit	Ex-Post kW per Unit	Overall Ex-Ante kW	Overall Ex-Post kW	Realization Rate (kW)
Refrigerators	0.22	0.22	4,056.84	3,979.60	98.1%
Freezers	0.20	0.20	750.11	741.27	98.8%
RACs	0.21	0.21	277.88	277.88	100.0%
Dehumidifiers	0.20	0.15	215.83	161.94	75.0%
		Total	**5,300.67**	**5,160.70**	**97.4%**

5.3.1 Refrigerators and Freezers

For refrigerators and freezers, the OH TRM stipulates that summer coincident peak demand savings are estimated by dividing verified gross per-unit kWh savings by 8,760 and multiplying by a temperature adjustment factor of 1.30[32], as well as a load shape adjustment factor of 1.074.[33]

The verified ex-ante and ex-post kW savings per unit was 0.22 for refrigerators and 0.20 for freezers. However, the ex-post kW savings for both refrigerators and freezers ended up being slightly lower than the deemed value from the OH TRM[34], which caused the realization rates for refrigerators and freezers to be less than 100%. This is due to the verification rates that were applied to the gross peak demand savings and resulted in realization rates of 98.1% for refrigerators and 98.8% for freezers. See Table 5-2 for all verification rates per appliance type.

5.3.2 Room Air Conditioners (RACs)

For RACs, the summer coincident peak demand savings formula from the OH TRM was used to calculate the average kW reduction occurring during the PUCO defined on-peak period. The calculation is shown below:

[32] Temperature adjustment factor based on Blasnik, Michael, "Measurement and Verification of Residential Refrigerator Energy Use, Final Report, 2003-2004 Metering Study", July 29, 2004 (p. 47). It assumes 64% of Ohio homes have central air conditioning.

[33] Daily load shape adjustment factor also based on Blasnik, Michael, "Measurement and Verification of Residential Refrigerator Energy Use, Final Report, 2003-2004 Metering Study", July 29, 2004 (p. 48, using the average Existing Units Summer Profile for hours ending 16 through 18)

[34] Actual kW per unit savings was 0.21516 for refrigerators and 0.19600 for freezers.

Equation 5-5: RAC Summer Coincident Peak Demand Savings

$$Recycled\ RAC\ Annual\ kW^{35}$$
$$= ((10000(BtuH) * (1/6.94\ (EER_{exist}))\ /1000) - (76\%(\%replaced)$$
$$* ((10000(BtuH) * (1/10.18EER_{newbase}))/1000 * 0.3(Coincidence\ Factor)$$
$$= 0.21$$

The OH TRM stipulates that summer coincident peak demand savings are estimated using a summer peak coincidence factor of 0.3.[36] The algorithm for calculating RAC peak kW reduction presented in the OH TRM is reasonable, and therefore, the verified ex-ante and ex-post kW savings per unit was 0.21. This resulted in a 100% realization rate.

5.3.3 Dehumidifiers

For dehumidifiers, the peak demand savings for recycling a dehumidifier were taken to be equal to the peak demand of the recycled unit as per the PA TRM with updated run hours as per ENERGY STAR revisions.[37] The ex-ante kW savings per unit provided in the tracking data was 0.20, and the ex-post verified kW savings per unit were 0.15, which generated a 75.0% realization rate. The ex-ante kW savings were calculated by dividing the weighted ex-ante kWh savings by 1,632 updated run hours[37] and multiplying by a CF[38] of 0.37. The ex-post reported kW savings were the average peak demand savings based on the actual capacity of each unit recycled in 2019.

5.4 Lifetime kWh Savings per Appliance

Lifetime kWh savings were calculated by multiplying the gross annual kWh savings by assumed RULs for each appliance type. Based on the assumptions in the OH TRM, Estimated Useful Life (EUL) values are eight years for refrigerators and freezers and three years for RACs and dehumidifiers. Table 5-9 shows the resulting per-unit lifetime kWh savings estimates.

[35] The formula and methodology were defined on Page 74 in the OH TRM.
[36] Consistent with coincidence factors found in: RLW Report: Final Report Coincidence Factor Study Residential Room Air Conditioners, June 23, 2008.
[37] Based on 68 days of 24-hour operation: ENERGY STAR Appliance Calculator, Dehumidifier Calcs. (https://www.sfwmd.gov/sites/default/files/documents/calculator_energy_star_res_appliance_savings.xlsx)
[38] CF = Summer Peak Coincidence Factor for measure.

Table 5-9: Per-Unit Lifetime kWh Savings

Appliance Type	Ex-Post Per-Unit Annual kWh Savings	EUL (years)	Ex-Post Per-Unit Lifetime kWh Savings
Refrigerators	1,346	8	10,766
Freezers	1,219	8	9,753
RACs	162	3	485
Dehumidifiers	823	3	2,469

5.5 Low-income Program 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 5-10 shows the quantity of units, kWh, and kW that can be attributed to low-income population participant in the EE Products program.

Table 5-10: Savings Attributable to Low-income Customers

Appliance Turn-in	Percentage of Low-Income Participants	Quantity	kWh Savings	kW Savings
CEI	3.0%	225	328,014	55.29
OE	9.7%	1,046	1,536,387	258.67
TE	13.8%	363	531,525	89.83
Total	**7.8%**	**1,634**	**2,395,926**	**403.79**

6 Detailed Process Evaluation Findings

This chapter presents the process evaluation findings for the Appliance Turn-In Program administered by FirstEnergy Ohio's three Electric Distribution Utilities, The Cleveland Illuminating Company (CEI), Ohio Edison Company (OE), and The Toledo Edison Company (TE) (EDCs, collectively "the Companies"). These findings are based on in-depth interviews with program and implementation staff and quantitative participant surveys conducted by the evaluation team at ADM Associates. The research plan identified implementation staff to interview in collaboration with the Companies.

6.1 Surveyed Participant Characteristics

Participant surveys were completed with 252 customers who participated in the Appliance Turn-In Program by recycling an appliance between February and September 2019. Program participants across FirstEnergy Ohio's three Electric Distribution Utilities (the Companies) were surveyed with 100 completed surveys for The Illuminating Company, 72 for Ohio Edison, and 80 for Toledo Edison.

Most of the respondents surveyed only recycled one appliance through the program (82%) and the most commonly recycled appliance was refrigerators (75%). Table 6-1 below shows the distribution, across EDC, of the number and type of appliances that were recycled by survey respondents.

Table 6-1: Number and Type of Appliances Recycled by EDC

Item Name	CEI	OE	TE	Overall
One appliance	**90**	**55**	**62**	**207**
One refrigerator	77	49	53	179
One freezer	13	6	9	28
Two appliances	**6**	**16**	**17**	**39**
One refrigerator and one freezer	2	3	4	9
Two refrigerators	1	4	1	6
Two freezers	0	1	1	2
One refrigerator and one RAC	2	5	4	11
One refrigerator and one dehumidifier	1	3	5	9
One freezer and one dehumidifier	0	0	2	2
Three appliances	**4**	**1**	**1**	**6**
Two refrigerators and one dehumidifier	1	1	0	2
One refrigerator and two RACs	1	0	1	2
One refrigerator, one freezer, one dehumidifier	1	0	0	1
Four appliances	**0**	**0**	**0**	**0**
Respondents (n)	**100**	**72**	**80**	**252**

6.2 Program Operations Perspective

In September of 2019, ADM interviewed three members of the program staff who provided feedback on how the program is managed, operated, and marketed. The program staff also provided feedback on their roles with regards to the program, as well as program planning and design. ADM interviewed two program staff members from the implementation contractor, Recleim, and one program staff member from the Companies.

6.2.1 Program Roles and Responsibilities

Program staff from Recleim provided feedback regarding their roles with the Appliance Turn-In Program in Ohio. ADM interviewed the senior program manager who is acting as the program manager. The program manager oversees all energy-efficient programs and contracts, regulatory agencies, reporting field staff, and the project management team at the Companies. ADM also interviewed the backup project manager, whose responsibilities include working directly with data issues, keeping the customers satisfied, and overseeing the marketing firm and plan. ADM interviewed the program manager from

the Companies who has sole responsibility and performs the day-to-day operations for the program (e.g., oversite of the vendors, reviewing marketing materials, making sure the budget is adhered to, guaranteeing goals are met, dealing with customer complaints, and ensuring customer satisfaction).

Recleim interacts directly with multiple agencies (RSE, IT Soft, and daVinci Payments Prepaid Solutions) as part of the Appliance Turn-In program. RSE develops the marketing plan and helps achieve the unit goals within a set budget. As the implementation contractor for the program, Recleim interacts directly with the customers and scheduling of each appliance to be picked up, while SCS Logistics collects the units throughout the service territory as part of the program. IT Soft developed the platform that Recleim utilizes for receiving and recording customer phone calls, as well as the web-enrollment (see Section 6.2.4), and the IT platform developed by IT Soft is directly responsible for sending these text message reminders to customers. IT Soft also developed an app which collects real-time data in the field as it is being entered by pick-up crews (see Section 6.2.4). This allows clients to facilitate delivery of data to the Companies. Recleim funds an account that daVinci Payments can access to send out a list of all program participants and process incentives. daVinci Payments brands each rebate gift card with Companies' logo and sends them to the program participants. Recleim staff indicated that all agencies work well together, which helps facilitate an efficient and successful program.

6.2.2 Program Planning and Design

According to Recleim, the program design and implementation in 2019 remained the same as previous years. Program participants received $50 for a recycled refrigerator or freezer and $25 for a dehumidifier or room A/C.

Introduced to the program in 2019 were text message reminders that were sent to customers to remind them about their pickup appointments. These reminders are distributed through Recleim. Also new to the program in 2019 was that customers could upload the appointment directly to their calendar if they had provided Recleim their email address when they had scheduled a pickup. The text message and calendar reminders were implemented at the start of this year to decrease no shows and cancellations. This implementation also correlated with an improvement in customer satisfaction.

Recleim's call center also strives to meet certain scheduling and pickup goals. The scheduling window goal is under 14 days, and they try to adhere to a 4-hour pickup window for each appointment. The call center also has service-level goals – at least 85% of all customer calls need to be handled in 30 seconds or less. Their average speed to answer customer calls is under 32 seconds. Recleim's incentive processing goal is to have all units processed and incentives sent within 6 weeks. In previous years incentives were processed at the end of each month which made it difficult to adhere to the six-week window for the customers that had pickups at the beginning of the month. Starting in

September, the process was amended to include bi-weekly processing of incentives to further close the window of wait time.

The Companies receive monthly reports from Recleim which includes all customer calls, order rates, incentives sent, marketing data from RSE, and a monthly summary including all internal Key Performance Indicators (KPIs). The monthly report is discussed during monthly meetings, along with the program goals and updates. In addition to the monthly report and meeting, there are also one-hour biweekly calls in which Recleim provides the Companies with a direct link to live data through their dashboard (see Section 6.2.4).

Recleim program staff indicated the $50 rebate that the customers receive for recycling a refrigerator or freezer is currently working well to encourage participation in the program.

Program staff provided feedback on program barriers. Some of the barriers include people missing their appointments and adhering to program specifications. Recleim addresses these issues by calling, emailing, and texting the customers before their scheduled appointments. Customers also have the option to download the appointment directly to their calendar.

6.2.3 Program Marketing and Outreach

The Appliance Turn-In program coordinates with other efficiency programs offered by the Companies for marketing purposes. Brochures that advertise the Appliance Turn-In program are included in the Energy Efficient Homes kits, as well as in the Comprehensive and Online Audits programs. There is also a tool for the Online Audits program that surveys participants on whether they have a second refrigerator or freezer. A list of people with a second refrigerator or freezer is then compiled and sent to Recleim, which they can use to directly market the program to those customers.

Recleim program staff indicated that all the advertising for the program through retailers is handled by Honeywell. Honeywell is contracted through the Companies to help with cross marketing and distributes flyers to retailers to advertise the program (see Figure 6-2). The Companies' program staff indicated the marketing flyers that retailers hand out are a good tool for generating program participation. Recleim does not reach out to retailers directly and does not directly communicate with Honeywell. The Companies work directly with Honeywell to ensure there are enough flyers to provide to retailers.

Recleim staff indicated that the largest demographic of program participants are suburban, middle-class, and between the ages of 35 and 65 years old. Recleim elaborated on how they market the program to encompass this wide array of demographics. The marketing plan includes creating the bill inserts (see Figure 6-1), banner and social media ads (see Figure 6-3), and email campaigns to drive program participation. Recleim notes that their most effective marketing is mass media campaigns

(broad marketing). The goal of these campaigns is to increase program awareness for customers who want to recycle their old appliance(s). Unlike previous years, Recleim opted out of TV, radio and newspaper advertisements to reduce costs. Advertisements in 2019 included bill inserts, online marketing, social media, and email blasts (see Figure 6-4). Program staff indicated that the TV, radio, and newspaper advertisements have been a main source of information for their older customers, and thus numbers have been slightly behind compared to last year.

Program staff at the Companies do a marketing review twice a year in order to ensure marketing tactics are working for the program and to make sure program participation continues how they expect. Trends in marketing are reviewed to make sure program participation is still working and that they do not exceed their budget.

Figure 6-1: Appliance Turn-In Bill Insert

Figure 6-2: Appliance Turn-In Tear Pad

Figure 6-3: Appliance Turn-In Facebook Advertisement

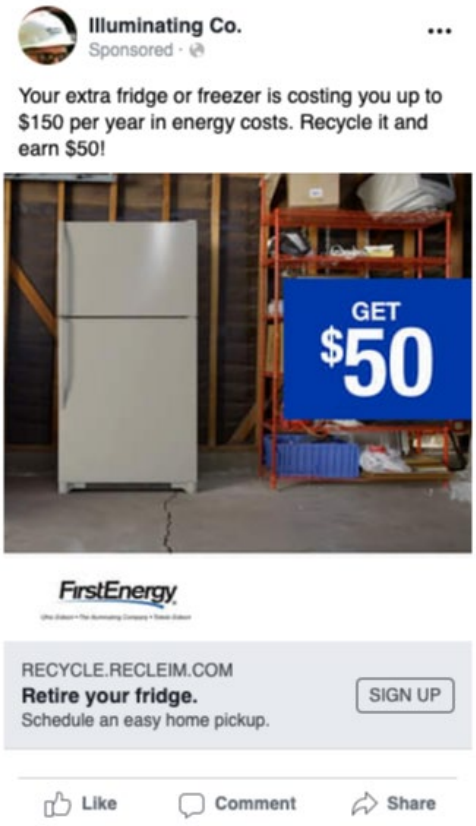


Figure 6-4: Appliance Turn-In Email Blast

6.2.4 Program Operations and Management

As part of the program in 2019, customers can now receive text message reminders of their scheduled appointments, as well as when the crew is on their way to the pickup appointment. Recleim has observed good results by adding the text message feature to the program during 2019. The text message reminders are an opt-in option and about 75% of participants have signed up to receive them. The text message reminders also alleviate the workload of the customer service call center.

Recleim staff discussed that customers' program eligibility is verified through a verification service. Recleim receives a list of all customers who are eligible for the program that then is checked against customers' scheduled appointments. If a customer isn't on the provided list, then Recleim verifies with the Companies if the customer is eligible for the program. A customer must be on the eligibility list or be verified with the Companies in order to participate in the program.

Incentive payments for all program participants, which are handled by Recleim, come in the form of a prepaid VISA card with the FirstEnergy logo branded on it. Incentive payments are processed and issued biweekly with the goal of reaching customers in 3-4 weeks after appliance pickup. Incentive amounts are $50 per refrigerator/freezer and $25 per dehumidifier/room air conditioner. Recleim sends an invoice for all incentive payments to the Companies, which are then paid by the Companies and incentive rebate cards are then issued to customers by Recleim. Recleim has weekly calls with their IT department to ensure there are no ongoing issues with program implementation.

Program staff at the Companies indicated that they receive many compliments and very few complaints from program participants. The only complaints received include incentive timing, and that should potentially be resolved with processing incentives biweekly.

Recleim described quality control and quality assurance throughout the appliance pickup process. When pickup crews arrive for an appointment, they ensure that the unit is plugged in and working. The crew then asks the customer questions about the unit, takes pictures of the unit, and then "spikes" the unit (which includes cutting the unit's cord) in front of the customer. Data for each appliance pickup is recorded on tablets in real time using an app (described in Section 6.2.1). On-time performance and wait time are tracked using the app, as well as the number of days from when a customer signs up for the program to the first available pickup appointment. Time stamps, geographical stamps, pictures and data gathered about the units are also available through the app. Data is monitored through internal KPIs. There are also quality control processes in place after an appliance is picked up, including a chain of custody. The appliances are first barcoded at the home, and then again once they reach the recycling facility (owned by Recleim). In the recycling facility the advanced recycling process is documented for each appliance. The recycling process starts by removing components inside the appliance. The appliance "shell" then goes through the recycling process, which includes collecting any

gases into tanks, while the rest of the unit gets destroyed. The tanks filled with gas are properly disposed.

As part of the program in 2019, Recleim is enlisted with the RAD (Responsible Appliance Disposal) program. The RAD program promotes advanced recycling efforts and is partnered with the EPA (Environmental Protection Agency) in order to protect the ozone layer, cut greenhouse gas emissions, and benefit communities. Companies that partner with the RAD program are using the best environmental practices available and going beyond what is required by federal law. As part of the RAD program, Recleim must meet in-person with EPA and submit a report which includes volume of items recycled from each unit. RAD aggregates and publishes the reports from each company that they partner with into one annual report, where only the data is published, and each company remains anonymous. Before Recleim can submit their report for the RAD program, it must first be reviewed and signed off by the Companies.

6.3 Survey Results

This section summarizes feedback received from a sample of residential Appliance Turn-In Program participants who recycled an appliance in 2019 between February and September. The evaluation team conducted online surveys of program participants and received a total of 252 responses. Program participants across FirstEnergy Ohio's three Electric Distribution Utilities (the Companies) were surveyed with 100 completed surveys for The Illuminating Company, 72 for Ohio Edison, and 80 for Toledo Edison. The surveys collected data on program and appliance verification, program awareness, rebate and program satisfaction, and home demographics.

6.3.1 Program Awareness

Survey participants were asked how and when they first became aware of the Companies' Appliance Turn-In Program. People learned about the Appliance Turn-In Program through a variety of methods (summarized in Table 6-2). The most common source customers learned about the program was through bill inserts (36%), followed by through a friend or relative (25%). Other commonly mentioned sources include retailer/store (11%), utility website (8%), and utility email (7%). Starting in 2019, social media was used to advertise the program, which accounted for 6% of survey participants learning about the program.

The majority of participants first learned about the program before deciding to recycle their appliance(s) (74%), while 15% learned about it at the same time as deciding to recycle their appliance(s).

Table 6-2: Sources of Program Awareness

Response	Percentage of Respondents (n = 251)
Bill insert	36%
Friend or relative (word-of-mouth)	25%
Retailer/store	11%
[UTILITY] website – Energysaveohio.com	8%
[UTILITY] email	7%
Social media advertisement	6%
Don't know	4%
Other	3%
Information provide through a Home Energy Report	1%

6.3.2 Prior Plans for Appliance Recycling and Program Motivation

Respondents were asked about their plans for recycling their appliances prior to learning about the Appliance Turn-In Program and what aspect of the program motivated their participation. The majority of those who recycled refrigerators (70%), freezers (63%), room air conditioners (RACs) (69%), and dehumidifiers (57%) had considered disposing of that appliance prior to hearing about the program. Customers provided feedback on what they would have most likely done with their old appliance if it had not been recycled through the program. For refrigerators (18%), RACs (38%), and dehumidifiers (57%), the most common method people reported for disposing of their appliance was taking it to the dump or recycling center. For freezers, the most common methods were taking it to the dump or recycling center (17%) or giving it away to a private party, such as a friend or a neighbor (17%). All alternative methods of disposing of old appliances are summarized in Table 6-3.

Table 6-3: Alternate Appliance Recycling Methods

Response	Percentage of Respondents			
	Refrigerator (n = 234)	Freezer (n = 41)	Room Air Conditioner (n = 16)	Dehumidifier (n = 14)
Sold it to a private party	12%	15%	6%	7%
Kept it and continued to use it	9%	5%	6%	0%
Kept it and stored it unplugged	3%	7%	13%	7%
Given it away to a private party, such as a friend or a neighbor	9%	17%	13%	14%
Given it away to a charity organization, such as Goodwill Industries or a church	5%	15%	0%	0%
Put it on a curb with a “Free” sign on it	12%	0%	13%	7%
Had it removed by the dealer you got your new or replacement refrigerator from	17%	7%	0%	0%
Taken it to a dump or recycling center	18%	17%	38%	57%
Hired someone else to haul it away for junking, dumping or recycling	8%	10%	0%	7%
Gotten rid of it some other way	3%	0%	0%	0%
Don't know/Not applicable	3%	7%	13%	0%

Respondents were also surveyed about the main reason they choose to get rid of their appliance through the Appliance Turn-In Program. The incentive was mentioned as the most common reason people decided to participate in the program over other methods of disposal for refrigerators (54%), freezers (40%), RACs (57%), and dehumidifiers (79%). Table 6-4 summarizes all of the reasons respondents reported for participating in the program.

Table 6-4: Main Reason for Recycling Appliance through Program

Response	Percentage of Respondents			
	Refrigerator (n = 219)	Freezer (n = 40)	Room Air Conditioner (n = 14)	Dehumidifier (n = 14)
Cash/incentive payment	54%	40%	57%	79%
Free pick-up service/others don't pick up/don't have to take it myself	14%	35%	29%	7%
Environmentally safe disposal/recycled/good for environment	18%	15%	7%	0%
Recommendation of a friend/relative	1%	0%	0%	0%
Utility sponsorship of the program	0%	0%	0%	7%
Easy way/convenient	9%	5%	0%	7%
Other	2%	3%	0%	0%
Don't know	0%	3%	7%	0%

6.3.3 Program Experience

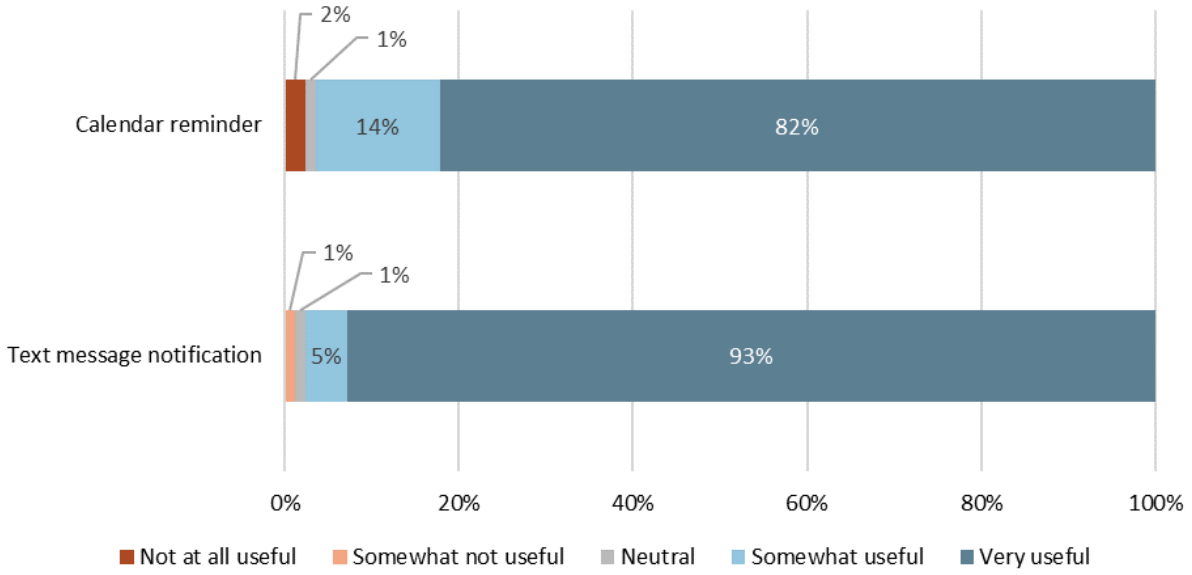
Program participants were surveyed about several aspects of the program, including the pick-up process, rebate experience, communication with program staff, and overall program experience.

6.3.3.1 Scheduling and Pick-Up Process

The majority of people had their appliance picked up within 2 weeks (75%) from the first time they reached out about recycling an appliance through the program, and almost every person surveyed (94%) thought that was a reasonable amount of time. Ninety-seven percent (97%) of survey respondents were able to schedule a pick-up time that was convenient for them, all of which resulted in 94% of participants being either somewhat or very satisfied with the scheduling of the pick-up.

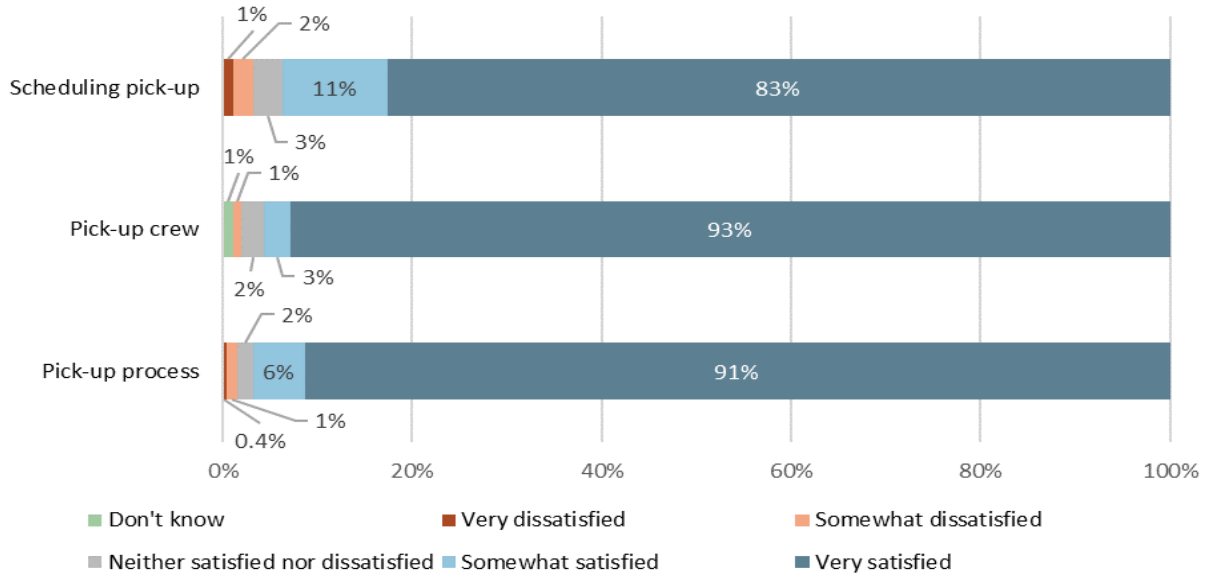
The majority of people (83%) received a call from the program representative to confirm the date and time of the scheduled pick-up, while 34% of people signed up to receive a calendar reminder of their appointment. Out of those who did receive the calendar reminder, 96% found it to be somewhat or very useful (see Figure 6-5). The majority of people (86%) were also contacted by the program representative to inform them that a technician would be arriving soon to pick-up their appliance, while 39% of those people were contacted via text message. Out of those who did receive the text message, almost all of them (98%) found it to be somewhat or very useful (see Figure 6-5).

Figure 6-5: Appointment Reminder Usefulness



Almost every person surveyed (97%) reported that the pick-up crew behaved professionally. When asked about their satisfaction with the pick-up crew and process, 96% of people were either somewhat or very satisfied with the crew who picked up their appliance and 97% of people were either somewhat or very satisfied with the pick-up process as a whole (summarized in Figure 6-6).

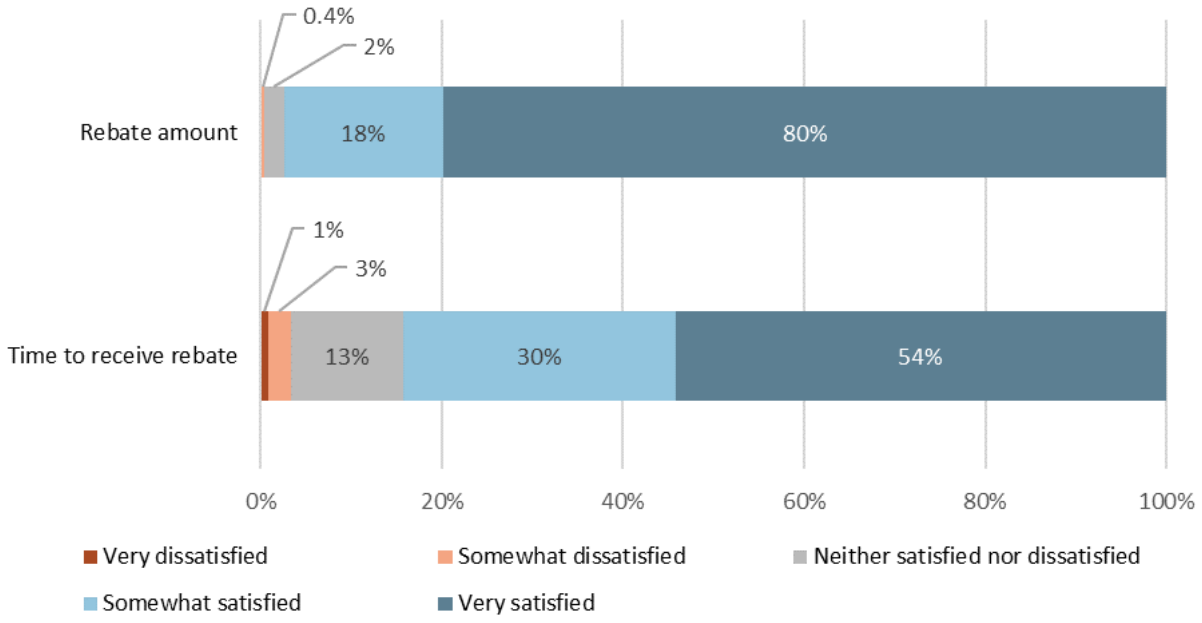
Figure 6-6: Appliance Pick-Up Experience



6.3.3.2 Rebate Experience and Satisfaction

The majority of people (92%) had already received their rebate by the time they were surveyed, and out of those people, almost every person surveyed was either somewhat or very satisfied with the rebate amount (97%). Forty-seven (47%) of people reported receiving their rebate in 6 weeks or less from the time they had their appliance picked up with 84% of people being either somewhat or very satisfied with the amount of time it took to receive the rebate (summarized in Figure 6-7). However, 48% of respondents did not know how long it took to receive their rebate. A slight majority of people (54%) reported that they would have participated in the program if the amount of the rebate had been less but with appliance pick-up and disposal still being provided at no cost. Out of those people, 64% would have participated in the program with no rebate but with appliance pick-up and disposal being provided at no cost.

Figure 6-7: Rebate Satisfaction



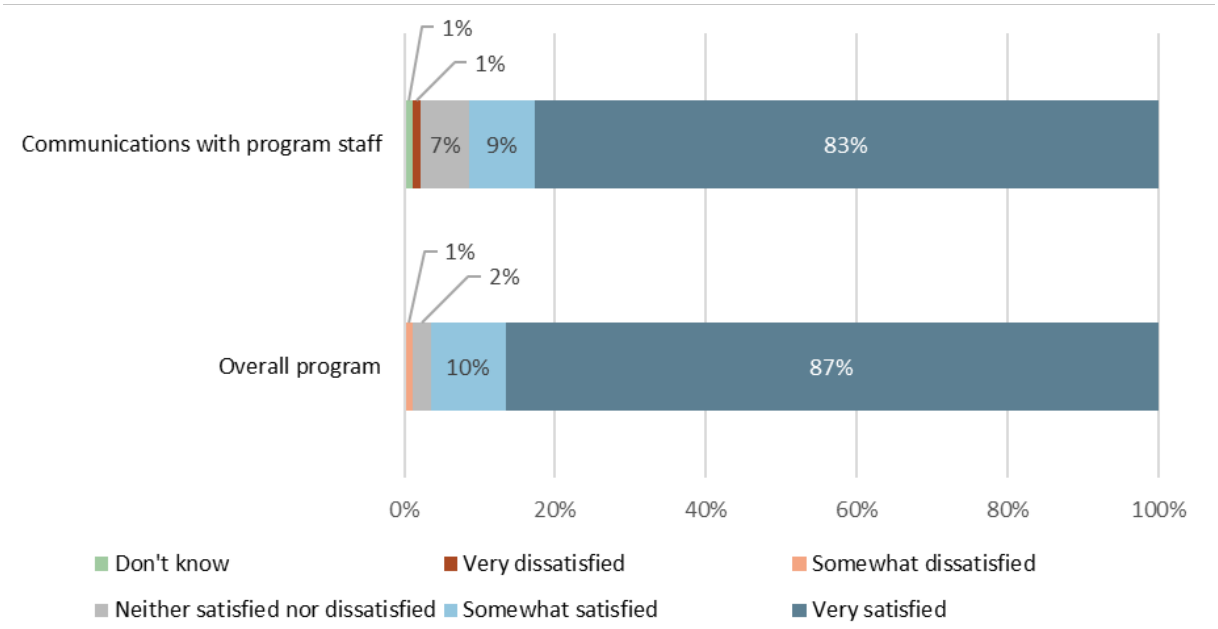
6.3.3.3 Program Experience and Satisfaction

Respondents provided feedback about how often and why customers contacted utility or program staff with questions while participating in the program. The majority of people (60%) never contacted utility or program staff during the course of the program, while 36% of people contacted the staff 3 times or fewer. The most common reason people contacted program staff was the initial scheduling of the appliance pick-up (73%). The next most common reasons were to inquire about the program (38%) and to reschedule an appointment/pick-up (12%). Out of those who did contact program staff, almost everyone did so via phone call (90%). The majority of people who did contact program

staff were either somewhat or very satisfied (91%) with the communications they had (summarized in Figure 6-8).

Almost every person surveyed (96%) was either somewhat or very satisfied with the program overall (summarized in Figure 6-8). The majority of people surveyed (88%) had recommended the program to others when surveyed. Of those who had not yet recommended the program to others, 72% would do so if given the opportunity. When surveyed about aspects of the program people would change, most commonly reported were more flexibility of scheduling appliance pick-up and quicker turn-around time for receiving the rebate.

Figure 6-8: Program Staff and Program Satisfaction



6.3.4 Household Demographics

Lastly, program participants were surveyed about their home's characteristics. Household characteristics, including home type, home age, ownership status, number of people living in the home, home size, and total household income, are presented in Table 6-5. Most program participants lived in single-family, detached construction homes (83%), with 41% of homes having been built before 1960. Regarding the size of the home, 54% of people reported having less than 3,000 square feet of above-ground living space while 61% reported not having any below-ground living space or not knowing the square footage of the space. Also, the majority of survey respondents owned their home (87%) and had 1 - 2 people living in their home (52%). Sixty-five (65%) percent of respondents chose to provide their household income range. Of those that did, 45% reported making less than $90,000 total income before taxes in 2018.

Table 6-5: Household Characteristics

Response	Percentage of Respondents
Type of Home (n = 252)	
Single family home, detached construction	83%
Single family home, factory manufactured/modular	2%
Row house	3%
Apartment with 2 or 3 units	1%
Condominium	4%
Other	1%
Don't know/Prefer not to answer	5%
Year Home was Constructed (n = 252)	
Before 1960	41%
1960 – 1969	12%
1970 – 1979	15%
1980 – 1989	5%
1990 – 1999	7%
2000 – 2009	10%
2009 – 2019	2%
Don't know/Prefer not to answer	8%
Own or Rent Home (n = 252)	
Own	87%
Rent	7%
Don't know/Prefer not to answer	6%
Number of People in Household (n = 248)	
1 - 2 people	52%
3 - 4 people	24%
5 - 6 people	9%
7 or more people	1%
Don't know/Prefer not to answer	15%

Above-Ground Living Space (n = 252)	
Less than 1,000 square feet	2%
1,000 - 2,000 square feet	34%
2,000 - 3,000 square feet	18%
3,000 - 4,000 square feet	4%
4,000 - 5,000 square feet	1%
Don't know/Prefer not to answer	42%
Below-Ground Living Space (n = 252)	
Less than 1,000 square feet	15%
1,000 - 2,000 square feet	9%
2,000 - 3,000 square feet	2%
Not applicable	16%
Don't know/Prefer not to answer	57%
Total Household Income (n = 251)	
Less than $18,000	4%
$18,000 to less than $25,000	6%
$25,000 to less than $31,000	4%
$31,000 to less than $38,000	4%
$38,000 to less than $44,000	5%
$44,000 to less than $51,000	4%
$51,000 to less than $57,000	4%
$57,000 to less than $64,000	3%
$64,000 to less than $70,000	2%
$70,000 to less than $77,000	2%
$77,000 to less than $83,000	2%
$83,000 to less than $90,000	4%
$90,000 or more	20%
Don't know/Prefer not to answer	35%

7 Conclusions and Recommendations

This chapter reports the conclusions and recommendations resulting from the impact and process evaluation of the 2019 Appliance Turn-In Program.

7.1 Energy and Demand Impacts Findings

A total of 20,914 households in the service territories of the three Companies received appliance recycling services through the Appliance Turn-In Program in 2019. The numbers of participants for each service territory is shown in Table 7-1.

Table 7-1: Number of Participants by Company

Utility	Number of Participants[39]
CEI	7,496
OE	10,784
TE	2,634
All Companies	**20,914**

Estimated ex-post electric impacts were 30,624,464 kWh saved annually, which represents a realization rate of 97.8%. Average on-peak ex-post demand reduction was estimated to be 5,160.70 kW annually, which represents a realization rate of 97.4%. The program level realization rates for kWh and kW were primarily impacted by the difference in savings calculation methodologies between the ex-ante savings and the ex-post savings for dehumidifiers (see Section 5.2.3 and Section 5.3.3).

For detailed tables listing energy savings and demand reductions by measure type, please refer to Appendix A. 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 the table below.

Table 7-2: Realization Rate by Appliance Type

Appliance Type	Realization Rate of kWh	Realization Rate of kW
Refrigerators	97.8%	98.1%
Freezers	98.0%	98.8%
RACs	100.0%	100.0%
Dehumidifiers	95.3%	75.0%
Total	**97.8%**	**97.4%**

[39] The number of participants was counted by identifying the number of unique account numbers in the program tracking database. A number of participants recycled more than one appliance.

Table 7-3: Overall Evaluation Results for Gross kWh and kW Savings

Utility	Ex-Ante Expected Gross Savings		Ex-Post Verified Gross Savings	
	Gross kWh	Gross kW	Gross kWh	Gross kW
CEI	11,188,817	1,891	10,933,793	1,843.05
OE	16,199,887	2,742	15,839,041	2,666.68
TE	3,938,718	667	3,851,630	650.98
All Companies	**31,327,422**	**5,301**	**30,624,464**	**5,160.70**

7.2 Process Findings

Key findings from the process evaluation of the 2019 Appliance Turn-In Program include:

- Overall, the Appliance Turn-In Program is meeting its participation and internal KPI goals to a high degree. Customer satisfaction is high for the program overall and most aspects of the process, including scheduling of appliance pick-up, pick-up crew, pick-up process, rebate amount, time it took to receive the rebate, and communications with program staff.
- The Appliance Turn-In Program incentive and ease of getting rid of an appliance are most often stated as the program's favored aspects. The time between pick-up and rebate receipt is mentioned as a source of dissatisfaction by a small number of survey respondents.
- Bill inserts and word-of-mouth remain the primary means by which people learn about the Appliance Turn-In Program. A portion of survey participants initially learned about the program through social media advertisement, which is new to the program in 2019.
- The Appliance Turn-In Program's addition of text notifications in 2019 provided additional scheduling convenience and customer satisfaction, while calendar reminders of pickup appointments continue to be a useful aspect of the scheduling process.
- The communication between the Companies and the implementation contractor, Recleim, is consistent and effective with bi-weekly meetings and thorough monthly reports. Additionally, Recleim has efficient working relationships with the subcontractors responsible for IT support and scheduling appliance pick-ups.
- Recleim continues to participate in Responsible Appliance Disposal (RAD) throughout 2019, which enhances the program's vigilance to properly dispose of appliances and reduce environmental hazards.

7.3 Recommendations

Overall, the program ran smoothly during the 2019 implementation year. The Companies and Recleim staff are confident with their implementation procedures and data. The evaluation team offers the following recommendations for continuous improvement of the Appliance Turn-In Program:

- **Continue the use of texting and calendar reminders for pick-up appointments.** Most survey participants found the text and calendar reminders of their appliance pick-up appointments to be useful. Continuing this process will help to maintain scheduling effectiveness between Recleim, the crew, and program participants. Program staff should look for additional ways to streamline and improve this process.
- **Investigate how bonus payments or increased rebates may incentivize participation for hard-to-reach customers**. As fewer older appliances remain in the service areas, additional effort and/or resources may be required to maintain participation levels. Program staff should closely monitor how many appliances are recycled through the program to monitor any reduction in the number of units recycled from year to year.
- **Consider including information about how the units are effectively recycled and how much energy it saves by recycling them when advertising program.** Some survey participants expressed concern with old appliances that worked and were in good condition being taken out of commission and recycled instead of being resold or given away to charity.
- **Consider expanding the social media marketing in order to advertise the program.** Social media advertisement accounted for a portion of the survey participants initially learning about the program. Advertising through social media has the potential to reach a larger population of customers, as well as a more diverse demographic.

Appendix A: Required Savings Tables

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

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

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

Appliance Type	CEI	OE	TE	All Companies
Refrigerators	9,068,861	12,675,412	3,146,312	24,890,585
Freezers	1,512,928	2,512,606	585,178	4,610,712
RACs	77,981	108,558	29,283	215,823
Dehumidifiers	274,023	542,464	90,857	907,345
Total	**10,933,793**	**15,839,041**	**3,851,630**	**30,624,464**

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

Appliance Type	CEI	OE	TE	All Companies
Refrigerators	1,449.96	2,026.59	503.04	3,979.60
Freezers	243.24	403.96	94.08	741.27
RACs	100.40	139.77	37.70	277.88
Dehumidifiers	49.44	96.35	16.15	161.94
Total	**1,843.05**	**2,666.68**	**650.98**	**5,160.70**

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

Appliance Type	CEI	OE	TE	All Companies
Refrigerators	72,550,888	101,403,296	25,170,497	199,124,681
Freezers	12,103,423	20,100,851	4,681,421	36,885,695
RACs	233,943	325,675	87,850	647,468
Dehumidifiers	822,070	1,627,392	272,572	2,722,034
Total	**85,710,324**	**123,457,214**	**30,212,339**	**239,379,877**

Appendix B: Participant Survey Instrument

FirstEnergy's Ohio Utilities

2019 Appliance Turn-In Program

Participant Survey

Variables	**Definition**
CONTACT NAME	Primary contact full name
CONTACT ADDRESS	Primary contact full address
UTILITY	EDC
PICKUP DATE	mm/dd/yy
# OF REFRIGERATORS	0-2
# OF FREEZERS	0-2
# OF ROOM A/CS	0-2
# OF DEHUMIDIFIERS	0-2

ONLINE SURVEY INTRODUCTION

Dear [CUSTOMER NAME],

I'm contacting you on behalf of [UTILITY]. According to our records, you recycled an appliance through the Appliance Recycling Program. We would like to hear about your experience. Please take a few moments to complete the online survey using the password provided below.

If someone else is most knowledgeable about the recycled appliance, we ask that you please forward this email to that household member.

Your response will be kept anonymous and will be used to improve the program in the future. A $5 gift card of your choice will be provided as a thank you for your time.

You can access the survey at: [SURVEY LINK]
Your password is: [PASSWORD]

Thank you in advance for your time!

Kind Regards,

ADM Staff Contact
ADM Associates / Contractor to [UTILITY]

PROGRAM PARTICIPATION VERIFICATION

1. Do you recall having a refrigerator, freezer, dehumidifier or room air conditioner picked up for recycling in 2019?

    1. Yes **[PROCEED TO Q2]**
    2. No **[TERMINATE SURVEY]**
    98. Don't know **[TERMINATE SURVEY]**
    99. Refused **[TERMINATE SURVEY]**

PROGRAM AWARENESS

2. How did you **first** learn about [UTILITY]'s Appliance Recycling Program?

    1. Bill insert
    2. Friend or relative (word-of-mouth)
    3. [UTILITY] representative
    4. [UTILITY] website – Energysaveohio.com
    5. [UTILITY] email
    6. Information provide through a Home Energy Report
    7. Retailer/store
    8. Community event
    9. Social media advertisement
    97. Other (Please specify)
    98. Don't know
    99. Refused

3. When did you first learn about [UTILITY]'s Appliance Recycling Program? Was it…?

    1. Before deciding to recycle your appliance(s)
    2. After deciding to recycle your appliance(s)
    3. At the same time as deciding to recycle your appliance(s)
    98. Don't know
    99. Refused

PICK-UP SATISFACTION

4. Starting with the first time you contacted the program about recycling your appliance, about how long passed before the pick-up occurred?

    1. Within a week
    2. 1 - 2 weeks
    3. 3 - 4 weeks
    4. More than a month
    98. Don't know
    99. Refused

[SHOW Q5 IF Q4 = 1-4]

5. Was that a reasonable amount of time?

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

6. Were you able to schedule a pick-up time that was convenient for you?

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

7. How satisfied were you with the **scheduling** of the pick-up?

    1. Very dissatisfied
    2. Somewhat dissatisfied
    3. Neither satisfied or dissatisfied
    4. Somewhat satisfied
    5. Very satisfied
    98. Don't know
    99. Refused

[SHOW Q8 IF Q7 = 4 OR 5]

8. Why were you dissatisfied with the scheduling process?

    1. Open ended: _____

9. Before the pick-up date, did the program representative call to confirm the date and time of your scheduled pick up?

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

10. Did you sign up to receive a calendar reminder of your appointment?

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

[SHOW Q11 IF Q10 = 1]

11. How useful was the calendar reminder?

    1. Not at all useful
    2. Somewhat not useful
    3. Neutral
    4. Somewhat useful
    5. Very useful
    98. Don't know
    99. Refused

12. On the pick-up date, were you contacted by the program representative to inform you that the technician would be arriving soon?

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

[SHOW Q13 IF Q12 = 1]

13. Were you contacted via text message?

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

[SHOW Q14 IF Q13 = 1]

14. How useful was receiving a text message notification that the technician would be arriving soon?

    1. Not at all useful
    2. Somewhat not useful
    3. Neutral
    4. Somewhat useful
    5. Very useful
    98. Don't know
    99. Refused

15. Did the crew who removed your appliance(s) behave professionally?

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

[SHOW Q16 IF Q15 = 2]

16. Please explain why you feel they did not behave professionally.

    1. Open ended: _____

17. Overall, how satisfied were you with the **crew** who picked up the old appliance(s)?

    1. Very dissatisfied
    2. Somewhat dissatisfied
    3. Neither satisfied or dissatisfied
    4. Somewhat satisfied
    5. Very satisfied
    98. Don't know
    99. Refused

[SHOW Q18 IF Q17 = 4 OR 5]

18. Why were you dissatisfied with the crew?

    1. Open ended: _____

19. How satisfied were you with the pick-up **process** of the old appliance(s)?

    1. Very dissatisfied
    2. Somewhat dissatisfied
    3. Neither satisfied or dissatisfied
    4. Somewhat satisfied
    5. Very satisfied
    98. Don't know
    99. Refused

[SHOW Q20 IF Q19 = 4 OR 5]

20. Why were you dissatisfied with the appliance pick-up?

    1. Open ended: _____

APPLIANCE VERIFICATION

[SHOW Q21 IF # OF REFRIGERATORS >0]

21. Our records indicate that you have recycled [# OF REFRIGERATORS] refrigerator(s)? Is this correct?

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

[SHOW Q22 IF Q21 = 2]

22. How many refrigerators did you recycle?

    1. Zero
    2. One
    3. Two
    4. More than two
    98. Don't know
    99. Refused

[SHOW Q23 IF # OF FREEZERS >0]

23. Our records indicate that you have recycled [# OF FREEZERS] freezer(s)? Is this correct?

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

[SHOW Q24 IF Q23 = 2]

24. How many freezers did you recycle?

    1. Zero
    2. One
    3. Two
    4. More than two
    98. Don't know
    99. Refused

[SHOW Q25 IF # OF ROOM A/CS >0]

25. Our records indicate that you have recycled [# OF ROOM A/Cs] room air conditioner(s)? Is this correct?

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

[SHOW Q26 IF Q25 = 2]

26. How many room air conditioners did you recycle?

    1. Zero
    2. One
    3. Two
    4. More than two
    98. Don't know
    99. Refused

[SHOW Q27 IF # OF DEHUMIDIFIERS >0]

27. Our records indicate that you have recycled [# OF DEHUMIDIFIERS] dehumidifier(s)? Is this correct?

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

[SHOW Q28 IF Q27 = 2]

28. How many dehumidifiers did you recycle?

    1. Zero
    2. One
    3. Two
    4. More than two
    98. Don't know
    99. Refused

REFRIGERATOR RECYCLING

[SHOW IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

The following questions are designed to collect information about a maximum of two refrigerators, please keep the same two refrigerators in mind when providing your response.

[SHOW Q29 - Q47 IF Q21 = 1 OR Q22 = 2, 3, OR 4]

29. According to our records your refrigerator(s) was picked up on or around [DATE INSTALLED], does that sound accurate?

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

[SHOW Q30 IF Q29 = 2]

30. What was the actual date your refrigerator was picked up?

    1. Record date: _____ (mm/dd/yyyy)
    98. Don't know

31. Approximately how old in years was your refrigerator at the time you recycled it?

    1. Age in years: _____
    98. Don't know
    99. Refused

[SHOW Q32 IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

32. Approximately how old in years was your second refrigerator at the time you recycled it?

    1. Age in years: _____
    98. Don't know
    99. Refused

33. At the time of recycling, was your refrigerator your primary/main unit, or was it a secondary unit that was used in addition to your primary unit?

    1. Primary
    2. Secondary
    98. Don't know
    99. Refused

[SHOW Q34 IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

34. At the time of recycling, was your second refrigerator your primary/main unit, or was it a secondary unit that was used in addition to your primary unit?

    1. Primary
    2. Secondary
    98. Don't know
    99. Refused

35. Did you replace the refrigerator with a new unit?

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

[SHOW Q36 IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

36. Did you replace the second refrigerator with a new unit?

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

37. At the time of recycling, where in the house was the refrigerator located?

    1. Kitchen
    2. Living room
    3. Family room
    4. Bedroom
    5. Hallway
    6. Basement
    7. Garage
    8. Porch/patio
    9. Breezeway
    10. Shed
    11. Driveway
    97. Other (Please specify)
    98. Don't know
    99. Refused

[SHOW Q38 IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

38. At the time of recycling, where in the house was the second refrigerator located?

    1. Kitchen
    2. Living room
    3. Family room
    4. Bedroom
    5. Hallway
    6. Basement
    7. Garage
    8. Porch/patio
    9. Breezeway
    10. Shed
    11. Driveway
    97. Other (Please specify)
    98. Don't know
    99. Refused

39. During the 12 months prior to the recycling, how often did you use the refrigerator?

    1. All of the time
    2. During certain months of the year only; Please specify number of months (1 – 12): _____
    3. Never plugged in or running
    98. Don't know
    99. Refused

[SHOW Q40 IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

40. During the 12 months prior to the recycling, how often did you use the second refrigerator?

    1. All of the time
    2. During certain months of the year only; Please specify number of months (1 – 12): _____
    3. Never plugged in or running
    98. Don't know
    99. Refused

41. Which of the following best describes the condition of the unit?

    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Refused

[SHOW Q42 IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

42. Which of the following best describes the condition of the second unit?

    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Refused

43. Had you already considered disposing of the refrigerator before you heard about [UTILITY]'s appliance recycling program? Disposing meaning removing the appliance from your home by any means including selling it, giving it away, having someone pick it up or taking it to the dump or a recycling center yourself.

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

[SHOW Q44 IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

44. Had you already considered disposing of the second refrigerator before you heard about [UTILITY]'s appliance recycling program?

    1. Yes
    2. No
    98. Don't know
    99. 99 Refused

45. What would you have most likely done with the refrigerator if you had not recycled it through [UTILITY]'s program?

    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement refrigerator from
    9. Taken it to a dump or recycling center
    10. Hired someone else to haul it away for junking, dumping or recycling
    97. Gotten rid of it some other way (Please specify)
    98. Don't know
    99. Refused

[SHOW Q46 IF Q22 = 3 OR 4 OR # OF REFRIGERATORS >1]

46. What would you have most likely done with the second refrigerator if you had not recycled it through [UTILITY]'s program?

    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement refrigerator from
    9. Taken it to a dump or recycling center
    97. Hired someone else to haul it away for junking, dumping or recycling
        97. Gotten rid of it some other way (Please specify)
    98. Don't know
    99. Refused

47. What is the **main** reason you chose to get rid of your refrigerator(s) through [UTILITY]'s program over other methods?

    1. Cash/incentive payment
    2. Free pick-up service/others don't pick up/don't have to take it myself
    3. Environmentally safe disposal/recycled/good for environment
    4. Recommendation of a friend/relative
    5. Recommendation of retailer/dealer
    6. Utility sponsorship of the program
    7. Easy way/convenient
    8. Never heard of any others/only one I know of
    97. Other (Please specify)
    98. Don't know
    99. Refused

FREEZER RECYCLING

[SHOW IF Q24 = 3 OR 4 OR # OF FREEZERS >1]

The following questions are designed to collect information about a maximum of two freezers, please keep the same two freezers in mind when providing your response.

[SHOW Q48 - Q64 IF Q23 = 1 OR Q24 = 2, 3, OR 4]

48. According to our records your freezer(s) was picked up on or around [DATE INSTALLED], does that sound accurate?

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

[SHOW Q49 IF Q48 = 2]

49. What was the actual date your freezer was picked up?

    1. Record date: _____ (mm/dd/yyyy)
    98. Don't know

50. Approximately how old in years was the freezer at the time you recycled it?

    1. Age in years: _____
    98. Don't know
    99. Refused

[SHOW Q51 IF Q24= 3 OR 4 OR # OF FREEZERS >1]

51. Approximately how old in years was the second freezer at the time you recycled it?

    1. Age in years: _____
    98. Don't know
    99. Refused

52. Did you replace the freezer with a new unit?

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

[SHOW Q53 IF Q24 = 3 OR 4 OR # OF FREEZERS >1]

53. Did you replace the second freezer with a new unit?

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

54. At the time of recycling, where in the house was the freezer located?

    1. Kitchen
    2. Living room
    3. Family room
    4. Bedroom
    5. Hallway
    6. Basement
    7. Garage
    8. Porch/patio
    9. Breezeway
    10. Shed
    11. Driveway
    97. Other (Please specify)
    98. Don't know
    99. Refused

[SHOW Q55 IF Q24 = 3 OR 4 OR # OF FREEZERS >1]

55. At the time of recycling, where in the house was the second freezer located?

    1. Kitchen
    2. Living room
    3. Family room
    4. Bedroom
    5. Hallway
    6. Basement
    7. Garage
    8. Porch/patio
    9. Breezeway
    10. Shed
    11. Driveway
    97. Other (Please specify)
    98. Don't know
    99. Refused

56. During the 12 months prior to the recycling, how often did you use the freezer?

    1. All of the time
    2. During certain months of the year only; Please specify number of months (1 – 12): _____
    3. Never plugged in or running
    98. Don't know
    99. Refused

[SHOW Q57 IF Q24 = 3 OR 4 OR # OF FREEZERS >1]

57. During the 12 months prior to the recycling, how often did you use the second freezer?

    1. All of the time
    2. During certain months of the year only; Please specify number of months (1 – 12): _____
    3. Never plugged in or running
    98. Don't know
    99. Refused

58. Which of the following best describes the condition of the freezer?

    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Refused

[SHOW Q59 IF Q24 = 3 OR 4 OR # OF FREEZERS >1]

59. Which of the following best describes the condition of the second freezer?

    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Refused

60. Had you already considered disposing the freezer before you heard about [UTILITY]'s appliance recycling program? Disposing meaning removing the appliance from your home by any means including selling it, giving it away, having someone pick it up or taking it to the dump or a recycling center yourself.

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

[SHOW Q61 IF Q24 = 3 OR 4 OR # OF FREEZERS >1]

61. Had you already considered disposing the second freezer before you heard about [UTILITY]'s appliance recycling program?

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

62. What would you have most likely done with the freezer had you not disposed of it through [UTILITY]'s program?

    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement freezer from
    9. Taken it to a dump or recycling center
    10. Hired someone to take it to a dump or recycling center
    97. Gotten rid of it some other way (Please specify)
    98. Don't know
    99. Refused

[SHOW Q63 IF Q24 = 3 OR 4 OR # OF FREEZERS >1]

63. What would you have done with the second freezer had you not disposed of it through [UTILITY]'s program?

    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement freezer from
    9. Taken it to a dump or recycling center
    10. Hired someone to take it to a dump or recycling center
    97. Gotten rid of it some other way (Please specify)
    98. Don't know
    99. Refused

64. What is the **main** reason you chose to get rid of your freezer(s) through [UTILITY]'s program over other methods of disposing of your appliance?

    1. Cash/incentive payment
    2. Free pick-up service/others don't pick up/don't have to take it myself
    3. Environmentally safe disposal/recycled/good for environment
    4. Recommendation of a friend/relative
    5. Recommendation of retailer/dealer
    6. Utility sponsorship of the program
    7. Easy way/convenient
    8. Never heard of any others/only one I know of
    97. Other (Please specify)
    98. Don't know
    99. Refused

ROOM AIR CONDITIONER RECYCLING

[SHOW IF Q26 = 3 OR 4 OR # OF ROOM A/CS >1]

The following questions are designed to collect information about a maximum of two room air conditioners, please keep the same two room air conditioners in mind when providing your response.

[SHOW Q65 - Q83 IF Q25 = 1 OR Q26 = 2, 3, OR 4]

65. According to our records your room air conditioner(s) was picked up on or around [DATE INSTALLED], does that sound accurate?

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

[SHOW Q66 IF Q65 = 2]

66. What was the actual date your room air conditioner was picked up?

    1. Record date: _____ (mm/dd/yyyy)
    98. Don't know

67. Approximately how old in years was your room air conditioner at the time you recycled it?

    1. Age in years: _____
    98. Don't know
    99. Refused

[SHOW Q68 IF Q26 = 3 OR 4 OR # OF ROOM A/CS >1]

68. Approximately how old in years was your second room air conditioner at the time you recycled it?

    1. Age in years: _____
    98. Don't know
    99. Refused

69. Did you replace the room air conditioner with a new unit?

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

[SHOW Q70 IF Q26 = 3 OR 4 OR # OF ROOM A/CS >1]

70. Did you replace the second room air conditioner with a new unit?

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

71. Before recycling the unit(s), how many room air conditioners were in operation in your home?

    1. Number of room air conditioners: _____
    98. Don't know
    99. Refused

72. How many room air conditioners are currently in operation in your home?

    1. Number of room air conditioners: _____
    98. Don't know
    99. Refused

73. Before recycling the unit, did your home have a central air conditioning system?

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

74. Does your home now have a central air conditioning system?

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

75. For the majority of the year prior to recycling, where within your home was the room air conditioner located?

    1. Kitchen
    2. Garage
    3. Porch/patio
    4. Basement
    5. Living room
    6. Family room
    7. Bedroom
    8. Hallway
    97. Other (Please specify)
    98. Don't know
    99. Refused

[SHOW Q76 if Q26 = 3 OR 4 OR # OF ROOM A/Cs >1]

76. For the majority of the year prior to recycling, where within your home was the second room air conditioner located?

    1. Kitchen
    2. Garage
    3. Porch/patio
    4. Basement
    5. Living room
    6. Family room
    7. Bedroom
    8. Hallway
    97. Other (Please specify)
    98. Don't know
    99. Refused

77. Which of the following best describes the condition of the old unit?

    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Refused

[SHOW Q78 IF Q26 = 3 OR 4 OR # OF ROOM A/CS >1]

78. What was the condition of the second unit?

    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Refused

79. Had you already considered disposing the room air conditioner before you heard about [UTILITY]'s appliance recycling program? Disposing meaning removing the appliance from home by any means including selling it, giving it away, having someone pick it up or taking it to the dump or a recycling center yourself.

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

[SHOW Q80 IF Q26 = 3 OR 4 OR # OF ROOM A/CS >1]

80. Had you already considered disposing of the second room air conditioner before you heard about [UTILITY]'s appliance recycling program?

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

81. What would you have most likely done with the room air conditioner had you not disposed of it through [UTILITY]'s program?

    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement room air conditioner from
    9. Taken it to a dump or recycling center
    10. Hired someone to take it to a dump or recycling center
    97. Gotten rid of it some other way (Please specify)
    98. Don't know
    99. Refused

[SHOW Q82 IF Q26 = 3 OR 4 OR # OF ROOM A/CS >1]

82. What would you have most likely done with the second room air conditioner had you not disposed of it through [UTILITY]'s program?

    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement refrigerator from
    9. Taken it to a dump or recycling center
    10. Hired someone to take it to a dump or recycling center
    97. Gotten rid of it some other way (Please specify)
    98. Don't know
    99. Refused

83. What is the **main** reason you chose to get rid of your room air conditioner(s) through [UTILITY]'s program over other methods of disposing of your appliance?

    1. Cash/incentive payment
    2. Free pick-up service/others don't pick up/don't have to take it myself
    3. Environmentally safe disposal/recycled/good for environment
    4. Recommendation of a friend/relative
    5. Recommendation of retailer/dealer
    6. Utility sponsorship of the program
    7. Easy way/convenient
    8. Never heard of any others/only one I know of
    97. Other (Please specify)
    98. Don't know
    99. Refused

DEHUMIDIFIER RECYCLING

[SHOW IF Q28 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

The following questions are designed to collect information about a maximum of two dehumidifiers, please keep the same two dehumidifiers in mind when providing your response.

[SHOW Q84 - Q98 IF Q27 = 1 OR Q26 = 2, 3, OR 4]

84. According to our records your dehumidifier(s) was picked up on or around [DATE INSTALLED], does that sound accurate?

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

[SHOW Q85 IF Q84 = 2]

85. What was the actual date your dehumidifier was picked up?

    1. Record date: _____ (mm/dd/yyyy)
    98. Don't know

86. Did you replace the dehumidifier with a new unit?

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

[SHOW Q87 IF Q28 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

87. Did you replace the second dehumidifier with a new unit?

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

88. Before recycling the unit(s), how many dehumidifiers were in operation in your home?

    1. Number of dehumidifiers: _____
    98. Don't know
    99. Refused

89. How many dehumidifiers are currently in operation in your home?

    1. Number of dehumidifiers: _____
    98. Don't know
    99. Refused

90. For the majority of the year prior to recycling, where within your home was the dehumidifier located?

    1. Garage
    2. Porch/patio
    3. Basement
    97. Other (Please specify)
    98. Don't know
    99. Refused

[SHOW Q91 IF Q28 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

91. For the majority the of year prior to recycling, where within your home was the second dehumidifier located?

    1. Garage
    2. Porch/patio
    3. Basement
    97. Other (Please specify)
    98. Don't know
    99. Refused

92. Which of the following best describes the condition of the unit?

    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Refused

[SHOW Q93 IF Q28 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

93. Which of the following best describes the condition of the second dehumidifier?

    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Refused

94. Had you already considered disposing the dehumidifier before you heard about [UTILITY]'s appliance recycling program? Disposing meaning removing the appliance from your home by any means including selling it, giving it away, having someone pick it up or taking it to the dump or a recycling center yourself.

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

[SHOW Q95 IF Q28 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

95. Had you already considered disposing the second dehumidifier before you heard about [UTILITY]'s appliance recycling program?

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

96. What would you have most likely done with the dehumidifier had you not disposed of it through [UTILITY]'s program?

    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement dehumidifier from
    9. Taken it to a dump or recycling center
    10. Hired someone to take it to a dump or recycling center
    97. Gotten rid of it some other way (Please specify)
    98. Don't know
    99. Refused

[SHOW Q97 IF Q28 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

97. What would you have most likely done with the second dehumidifier had you not disposed of it through [UTILITY]'s program?

    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement dehumidifier from
    9. Taken it to a dump or recycling center
    10. Hired someone to take it to a dump or recycling center
    97. Gotten rid of it some other way (Please specify)
    98. Don't know
    99. Refused

98. What is the **main** reason you chose to get rid of your dehumidifier(s) through [UTILITY]'s program over other methods of disposing of your appliance?

    1. Cash/incentive payment
    2. Free pick-up service/others don't pick up/don't have to take it myself
    3. Environmentally safe disposal/recycled/good for environment
    4. Recommendation of a friend/relative
    5. Recommendation of retailer/dealer
    6. Utility sponsorship of the program
    7. Easy way/convenient
    8. Never heard of any others/only one I know of
    97. Other (Please specify)
    98. Don't know
    99. Refused

REBATE SATISFACTION

Now, we would like to ask you a few questions regarding the rebate that you received for recycling the appliance(s).

99. Have you received the rebate for participation in [UTILITY]'s appliance recycling program?

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

[SHOW Q100 - Q104 IF Q99 = 1]

100. How satisfied were you with the rebate amount?

    1. Very dissatisfied
    2. Somewhat dissatisfied
    3. Neither satisfied nor dissatisfied
    4. Somewhat satisfied
    5. Very satisfied
    98. Don't know
    99. Refused

101. Would you have participated in the program if the amount of the rebate had **been less**, but appliance pick-up and disposal was still provided at no cost?

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

[SHOW Q102 IF Q101 = 1]

102. Would you have participated in the program with **no rebate**, but appliance pick-up and disposal was still provided at no cost?

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

103. From the time you had the appliance(s) picked up, about how many weeks did it take to receive the rebate?

1. Number of weeks: _____
98. Don't know
99. Refused

[SHOW Q104 IF Q103 = 1]

104. How satisfied were you with how long it took to receive the rebate?

1. Very dissatisfied
2. Somewhat dissatisfied
3. Neither satisfied nor dissatisfied
4. Somewhat satisfied
5. Very satisfied
98. Don't know
99. Refused

PROGRAM SATISFACTION

Now, we would like to ask you a few questions regarding any interactions with [UTILITY]'s program staff and overall satisfaction with [UTILITY]'s appliance recycling program.

105. In the course of participating in [UTILITY]'s program, how often did you contact [UTILITY] or program staff with questions?

1. Never
2. Once
3. 2 or 3 times
4. 4 times or more
98. Don't know
99. Refused

[SHOW Q106 - Q109 IF Q105 = 2, 3, OR 4]

106. For what reason(s) did you contact the [UTILITY] or program staff? **[MULTI SELECT]**

1. Inquire about the program
2. Initial scheduling
3. Reschedule appointment/pickup
4. Verify appointment time
5. No-show for appointment
6. Rebate delays
7. Issues with the website

97. Other (Please specify)
98. Don't know
99. Refused

107. How did you contact them? [**MULTI-SELECT**]

1. Phone
2. Email
3. Letter
4. In-person

98. Don't know
99. Refused

108. How satisfied were 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. Don't know
99. Refused

[SHOW Q109 IF Q108 = 1 OR 2]

109. Why were you dissatisfied with those communications?

1. Open ended: _____

110. Have you noticed any savings on your electric bill since removing your old appliance(s)?

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

111. Overall, how satisfied were you with the [UTILITY]'s appliance recycling program?

1. Very dissatisfied
2. Somewhat dissatisfied
3. Neither satisfied nor dissatisfied
4. Somewhat satisfied
5. Very satisfied
98. Don't know
99. Refused

[SHOW Q112 IF Q111 = 1 OR 2]

112. Why were you dissatisfied with the program?

1. Open ended: _____

113. Have you recommended the program to others?

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

[SHOW Q114 IF Q113 = 2]

114. If provided the opportunity, would you recommend the program to others?

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

[SHOW Q115 IF Q114 = 2]

115. What is the main reason you would not recommend the program to anyone?

1. Open ended: _____

116. What did you like best about the program?

1. I liked… _____
98. Don't know
99. Refused

117. If you could change one thing about the program, what would it be?

1. I would change… _____
98. Don't know
99. Refused

HOME AND DEMOGRAPHICS

Now, we have just a few final questions about your home and energy use.

118. How many people are living in your household?

1. Number of people: _____
98. Don't know
99. Prefer not to answer

119. Including wages, salaries, pensions, Social Security and other sources of income for all members of your household, what was your total household income before taxes in 2018? Please select from the following categories:

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
99. Prefer not to answer

120. Which of the following best describes your home/residence?

1. Single-family home, detached construction (not a Duplex, Town Home, or Apartment; Attached Garage is ok)
2. Single family home, factory manufactured/modular
3. Single family, mobile home
4. Row house
5. Apartment with 2 or 3 units
6. Apartment with 4 or more units
7. Condominium

97. Other (Please specify)
98. Don't know
99. Prefer not to answer

121. Do you own or rent this residence?

1. Own
2. Rent

98. Don't know
99. Prefer not to answer

122. Approximately when was your home constructed?

1. Before 1960
2. 1960-1969
3. 1970-1979
4. 1980-1989
5. 1990-1999
6. 2000-2009
7. 2010-2019

98. Don't know
99. Prefer not to answer

123. How many square feet is the above-ground living space for your home (this excludes walk-out basements; your best estimate is ok)?

1. Square Feet: _____

98. Don't know
99. Prefer not to answer

124. How many square feet of conditioned living space is below-ground for your home (this includes walk-out basements; your best estimate is ok)?

1. Square Feet: _____
98. Don't know
99. Prefer not to answer

CONCLUSION

We have finished all the questions for this survey. Thank you for your time in answering questions about the Appliance Recycling Program. We would like to email you a $5 gift card of your choice for your participation.

125. Would you like your gift card sent to [EMAIL ADDRESS]?

1. Yes, please send it to this email address
2. No, please send it to a different email address
99. Prefer not to receive gift card

[SHOW Q126 IF Q125 = 2]

126. Could you please provide the email address to where we can send your gift card?

1. Email address: _____

Thank you for taking our survey. Your response is very important to us.

If you have any questions about the survey or would like to check on the status of your gift card, please call (775) 229-4430 or send an email to adm-surveys@admenergy.com. [UTILITY] appreciates your participation. Thank you again and have a great day!