

Appliance Turn-In Program Evaluation, Measurement, and Verification Report 2013

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

1.	Executive Summary	1-1
2.	Introduction and Purpose of Study.....	2-1
3.	Description of Program	3-1
4.	Methodology	4-1
5.	Detailed Impact Evaluation Findings.....	5-1
6.	Detailed Process Evaluation Findings.....	6-1
7.	Conclusions and Recommendations	7-1
8.	Appendix A: Required Savings Tables	8-1
9.	Appendix B: Participant Survey Instrument.....	9-1

List of Figures

Figure 6-1: 2012 and 2013 Comparison – Source of Hearing about the Program Overall 6-4

Figure 6-2: Location of Unit in the Home..... 6-6

Figure 6-3: What Likely Would Have Been Done with Unit in Absence of Program 6-7

Figure 6-4: Main Reason for Choosing to Recycle Unit through the Program..... 6-8

Figure 6-5: Would Have Participated if Lesser Rebate Amount 6-8

Figure 6-6: Frequency of Contact with Utility/Program Staff during Course of Participation 6-9

Figure 6-7: Satisfaction with the Program Overall 6-11

List of Tables

Table 1-1: Program Participation by Utility	1-1
Table 1-2: Ex Ante Per-Unit Annual kWh Savings	1-2
Table 1-3: Overall Evaluation Results	1-2
Table 4-1: Appliances Recycled in 2013	4-2
Table 5-1: Verification Rates by Utility and Appliance Type	5-1
Table 5-2: Recycled Appliances Verified to be in Working Condition	5-2
Table 5-3: DOE Uniform Methods Project UEC Regression Details.....	5-3
Table 5-4: 2013 Program Refrigerator Characteristics	5-3
Table 5-5: Unit Energy Savings Adjusted for Part-Use	5-5
Table 5-6: Per-Unit Lifetime kWh Savings.....	5-6
Table 6-1: Source of Hearing about the Program.....	6-3
Table 6-2: Average Number of Days it took for Appliance Pick Up	6-4
Table 6-3: Pick Up Calls Received.....	6-5
Table 6-4: Age of Recycled Appliance	6-5
Table 6-5: Replaced Old Unit with a New One.....	6-6
Table 6-6: Household Characteristics	6-13
Table 7-1: Number of Participants by Company.....	7-1
Table 7-2: Overall Evaluation Results for Gross kWh and kW Savings.....	7-1
Table 8-1: Annual Ex Post Energy Savings (kWh)	8-1
Table 8-2: Annual Ex Post On-Peak Demand Reductions (kW).....	8-1
Table 8-3: Lifetime Ex Post Energy Savings (kWh).....	8-1

1. Executive Summary

For 2013, the Ohio operating companies The Cleveland Electric Illuminating Company (CEI), Ohio Edison (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, and room air conditioners (RACs) during the 2013 program year. The goal of the program is to permanently remove from the system old appliances, 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 16,327 households in the service territories of the Companies received appliance collection and recycling services through the Appliance Turn-In Program in 2013. Program design allows for an individual household to turn in up to two refrigerators or freezers and up to two RACs per year. The number of participating households within each utility is shown in Table 1-1.

Table 1-1: Program Participation by Utility

<i>Utility</i>	<i>Number of Participants¹</i>
CEI	5,926
OE	8,332
TE	2,069
All Companies	16,327

Ex ante savings estimates for the Companies’ Appliance Turn-In program were taken directly from the *State of Ohio Energy Efficiency Technical Reference Manual (TRM)*² for units recycled during 2013. These values are 1,376 kWh per refrigerator, 1,244 kWh per freezer, and 122 kWh per RAC³ recycled through the program. Table 1-2 summarizes the *ex ante* per-unit annual kWh savings estimates by measure.

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.

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.

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

<i>Measure</i>	<i>Ex Ante Per-Unit Annual kWh Savings</i>	<i>Source</i>
Refrigerator	1,376	TRM
Freezer	1,244	TRM
Room Air Conditioner	122	TRM (assumed average capacity of 10,000 Btuh)

Ex post gross electric savings were estimated through detailed analysis of program tracking data and participant survey data. ADM Associates, Inc. (ADM) conducted analyses of these data using statistical models and evaluation protocols that have been utilized to evaluate similar recycling programs.

Ex post verified electric savings was 18,741,523 kWh annually (a realization rate of 79 percent) during the 2013 calendar year. *Ex post* verified peak demand reduction was 3,163 kW. For detailed tables listing energy savings and demand reductions by measure type, please refer to Appendix A. *Ex post* gross energy savings (kWh) and peak demand reduction (kW) for the program in the three service territories are reported in Table 1-3.

Table 1-3: Overall Evaluation Results

<i>Utility</i>	<i>Ex Ante Expected Gross Savings</i>		<i>Ex Post Verified Gross Savings</i>	
	<i>Gross kWh</i>	<i>Gross kW</i>	<i>Gross kWh</i>	<i>Gross kW</i>
CEI	8,639,636	1,737.88	6,736,043	1,135.11
OE	12,132,866	2,451.37	9,658,182	1,630.84
TE	3,015,962	607.75	2,347,298	396.57
All Companies	23,788,464	4,797.00	18,741,523	3,162.51

Key findings from the process evaluation of the 2013 Appliance Turn-In program include:

- **The Appliance Turn-In program is continuing to operate smoothly.** The basic design of the program (i.e., measures, implementation, QA/QC, etc.) has not changed from the first program year, so neither the Companies staff nor JACO staff reported any issues with program implementation in 2013. Additionally, participating customers have no major complaints about the program.

- **Participants of the Appliance Turn-In Program are highly satisfied.** Participant survey respondents reported high levels of satisfaction with the program overall. There were very few instances of dissatisfaction with any aspect of program participation.
- **Quality assurance and quality control (QA/QC) procedures continues to effectively monitor the entire recycling process at the measure level.** The Companies program staff and the JACO staff described extensive QA/QC checks to monitor the appliance chain-of-custody, beginning with the scheduling of the pick-up to the actual recycling of the appliance at the facility.
- **JACO's dashboard continues to be an effective reporting mechanism for program staff.** The Companies have real-time access to detailed levels of information needed to effectively manage and monitor program operations. The dashboard replaces the additional costs of generating time-consuming reports. The dashboard also allows for easy data transfer to the Companies' main portfolio tracking database: VisionDSM with SSRS reporting.
- **Program incentive levels are still appropriate.** Both the Companies staff and JACO staff report that incentive levels are effective and are similar to other appliance recycling programs across the country. Participating customers also report being satisfied with the rebate amount.
- **Program partnerships with retailers, such as Sears, have generated much participation.** It is reported by program staff that approximately 8 percent of the recycled appliances come from retailer assistance. In 2013, sales associate incentives (spiffs) were used to help encourage program participation. While incentives given out in 2013 were low, early 2014 results suggest greater participation.
- **There are no immediate challenges to implementing the program and reaching goals.** All program staff agreed that this program has no foreseeable challenges. The market potential is plentiful enough to reach targets and increase 3 percent annually, QA/QC is well grooved and consistent, and marketing efforts have been effective.

2. Introduction and Purpose of Study

Under contract with the Companies, ADM is performing measurement and verification (M&V) activities to confirm the energy savings and demand reduction being realized through the energy efficiency programs that the Companies are implementing in Ohio in 2013. 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 2013. Additionally, this report presents the results of the process evaluation of the program focusing on participant and program staff perspectives regarding the program's second year of 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, and room air conditioners were collected for recycling?
- How many of the room air conditioners were replaced and how many represent a net removal from the grid?
- What is the average annual kWh savings per collected appliance?
- What is the average kW reduction per collected appliance?
- What fraction of collected appliances were either not used, or used only part time over the past year?

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 six research questions.

- How satisfied are customers with various aspects of the program? What was the level of satisfaction with the incentive amount, the scheduling process, and the pickup process?
- What are the characteristics of the appliances being recycled?
- How effective were the marketing efforts for the program? Which marketing methods were most effective?
- How well did the team (i.e., The Companies' staff and implementation staff) work together?
- Were there any significant changes or new obstacles during the 2013 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 has completed its third year of implementation. First launched on May 2, 2011, the program is designed to help customers reduce their energy consumption by removing old, working refrigerators, freezers, and room air conditioners (RACs) from their homes for recycling. There is a limit of two refrigerators or freezers per household per calendar year. A maximum of two room air conditioners can be picked up at the same time as the refrigerator and/or freezer. The Companies benefit because the old appliances, which are generally inefficient, are permanently removed from the system. The environment also benefits from the recycling process through safe disposal of environmentally harmful material.

The goal of the program is to reduce the number of old, inefficient refrigerators and freezers that customers have moved to their garages or other locations such as basements and patios. Many areas in which spare units are placed are not space conditioned and most refrigerators used in that environment operate under a heavy thermal load during the summer. This is exacerbated by the fact that the appliances are usually quite old and inefficient. Previous studies by the Environmental Protection Agency (EPA), the Department of Energy (DOE) and other utilities have determined that removing these appliances, and properly recycling them, performs an energy saving service.

The Companies contract with JACO, Inc. (JACO) to implement the program. The program is designed as a turnkey, stand-alone energy efficiency initiative. The program targets existing multi- and single-family households, renters and homeowners who have old, inefficient refrigerators, freezers, or RACs. Marketing for the program consists of newspaper, radio, and TV ads; bill stuffers; and community events. There is an additional marketing channel for low-income participants, who may become aware of the program from auditors from other low-income specific energy efficiency programs. To be eligible for the program, appliances to be recycled must be in working condition, plugged in and cooling at the time of pick-up. The customer receives pick-up and removal service in addition to a \$50 rebate per recycled refrigerator or freezer. Customers with inefficient, working RAC units receive a \$25 rebate for each recycled unit.

Removing old, inefficient refrigerators, freezers and RACs prevents them from being resold or transferred to another utility customer. The program provides annual electric energy savings for the remaining life of the unit by permanently removing the appliance from service. As an added environmental benefit, 95% of the materials from these units are able to be recycled (metals, plastic, glass, oil, etc.) and disposed of in an environmentally responsible manner, thus preventing the materials from reaching landfills and contaminating the environment.

4. Methodology

This chapter provides a description of the methodology applied by ADM in the evaluation of the 2013 Appliance Turn-In Program. The chapter is divided into two sections: impact evaluation methodology and process evaluation methodology.

4.1 Impact Evaluation Methodology

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

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

4.1.1 Verification of Units Recycled

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

- Validating program tracking data provided in the Vision DSM SSRS reporting system by checking for duplicate or erroneous entries; and,
- Conducting verification telephone 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.

As the first step toward verification, tracking data for the program provided by JACO through the VisionDSM SSRS reporting system were reviewed. The numbers of

refrigerators, freezers, and RACs reported in the program tracking data that were recycled during 2013 are shown in Table 4-1.

Table 4-1: Appliances Recycled in 2013

<i>Utility</i>	<i>Number of Refrigerators Collected</i>	<i>Number of Freezers Collected</i>	<i>Number of RACs Collected</i>
CEI	5,041	1,336	338
OE	7,111	1,840	485
TE	1,741	487	119
All Companies	13,893	3,663	942

As the table above shows, the vast majority of program participation was represented by recycled refrigerators. Freezer units were a distant second while RACs represented the smallest portion of program participation. Refrigerators represent approximately 80% of the *ex ante* kWh savings claimed for the program; freezers represent approximately 19% while RACs represent less than 1%. ADM conducted telephone interviews with a sample of program participants to verify participation and obtain information with which to determine the percentage of units that were still operable when picked up by the recycler. A random sample, stratified by measure type and company, 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.⁴ On this assumption, a minimum sample size of 68 participants per utility was required, as shown in the following formula:

⁴ 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.

As set out in the *Model Energy Efficiency Program Impact Evaluation Guide*:

“Until the actual mean and standard deviation of the population can be estimated from actual samples, 0.5 is often accepted as an initial estimate for cv . The more homogenous the population, the smaller the cv .”

Using a $cv = 0.5$ is also in accordance with California Evaluation Protocols for homogenous measures.

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 235 participants across the three service territories. Specifically, 81 surveys with CE customers, 79 surveys with OE customers, and 75 surveys with TE customers were completed. The questionnaire that was the instrument for the survey interviews is provided in Appendix B. Survey respondents were asked a number of appliance specific questions. Based on the measure stratification scheme outlined above, appliance specific information was collected for the following: 30 refrigerators, 19 freezers and 32 RAC in the CEI service territory; 23 refrigerators, 22 freezers and 34 RACs in the OE service territory; and 28 refrigerators, 29 freezers and 18 RACs in the TE service territory. The results of this survey effort were used to verify the number of program eligible appliances recycled in 2013.

4.1.2 Calculating Gross Annual kWh Savings per Appliance

Ex ante savings estimates for the Companies' Appliance Turn-In program were taken directly from the *State of Ohio Energy Efficiency Technical Reference Manual (TRM)*⁵ for units recycled during 2013. These values are 1,376 kWh per refrigerator, 1,244 kWh per freezer, and 122 kWh per RAC⁶ recycled through the program.

For the impact evaluation effort, these savings estimates were assessed by developing separate, independent gross unit energy consumption (UEC) estimates for refrigerators, freezers and RACs recycled through the program in 2013. The details regarding how these UEC estimates were developed are provided in the following sections.

4.1.2.1 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 unit energy consumption values (UECs) of the recycled refrigerators and freezers. In analytical terms, the regression analysis involves estimating the parameters of a regression model:

⁵ Vermont Energy Investment Corporation (VEIC), *State of Ohio Energy Efficiency Technical Reference Manual*, Prepared for Public Utilities Commission of Ohio, August 6, 2010.

⁶ 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.

$$\text{UEC} = \text{function of } (V_1, V_2, V_3, \dots, V_n)$$

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 appliances in the population.

This regression based approach to estimating refrigerator and freezer energy use was recently described in the U.S. Department of Energy's (DOE) *Uniform Methods Project Refrigerator Recycling Evaluation Protocol*.⁷ The Uniform Methods Project (UMP) is a set of protocols under development by the DOE that provide straightforward methods for evaluating gross energy savings for common energy efficiency measures offered 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 through 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 2013. The program tracking data collected by JACO and stored in the VisionDSM database contained much of the necessary appliance characteristic data needed to utilize 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.⁸ 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.⁹

⁷ <http://www1.eere.energy.gov/wip/pdfs/53827-7.pdf>

⁸ Ibid.

⁹ Ibid.

Finally, a part-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.

Based on the proceeding 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 2013 based on the average refrigerator characteristics established from JACO 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) Part-use factors were applied to the UEC estimates to account for the fact that some appliances would likely not be plugged in year-around had they not been decommissioned.

The estimated average UECs for refrigerators and freezers were extrapolated to the population of 2013 recycled units to obtain a program level estimate of gross kWh savings resulting from refrigerator and freezer decommissioning.

4.1.2.2 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.¹⁰ For the sake of consistency with the methodology outlined in the 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 TRM. As part of the participant survey, respondents were asked to identify whether they replaced the RACs they recycled. The survey results suggest that 36% 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 replacement rate may be less than the 76% stipulation in the TRM, it is possible that the timing of the survey was insufficient to capture replacements that will occur in preparation for the 2014 summer season. Additionally, because some RACs were supplanted by central air systems, the standard TRM algorithm may not be appropriate in all cases. However, because RAC

¹⁰http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerRoomAC.xls?7e02-5075

recycling makes up such a small percentage of program savings, the stipulated 76% replacement value from the TRM was used. The following formula was used to calculate kWh savings for the average RAC recycled through the program:

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

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.¹¹ Specifically, the following equation was used to degrade the existing room air conditioners' at-manufacture EER value:

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

Where:

$EER_{degrade}$ = Estimated EER at time of collection.

$EER_{At-manufacture}$ = At-manufacture EER

M = Maintenance Factor (0.01)

Age = Age of unit at time of collection in years.

¹¹ NREL (2006). "Building America Performance Analysis Procedures for Existing Homes." <http://www.nrel.gov/buildings/pdfs/38238.pdf>

The program tracking database was not as detailed for RACs as it was for refrigerators and freezers. Information regarding the age of collected RACs was provided in the tracking database, but there was no information regarding capacity or EER. Additionally, the model numbers provided in the tracking database could not easily be used to find capacity and EER information in any systematic way. However, the Association of Home Appliance Manufacturers (AHAM) maintains sales weighted average capacity and EER data going back to 1972.¹² The most recent year that the data was available was 2010. 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. 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 Air Conditioner Savings Calculator. This 10,000 BtuH capacity assumption is greater than the 8,500 BtuH assumption in the TRM. However, it is in line with the AHAM average sales-weighted capacity of RACs recycled through the program in 2013 based on vintage.

4.1.3 Calculating Gross Peak Demand (kW) Savings

Gross electric peak demand savings were calculated based on the algorithms and stipulations specified in the TRM. For refrigerators and freezers, the 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 1.30¹³ as well as a load shape adjustment factor of 1.074.¹⁴ For room air conditioning units, the TRM stipulates that summer coincident peak demand savings are estimated using a summer peak coincidence factor of 0.3.¹⁵ While the algorithm for calculating RAC peak kW reduction presented in the TRM is reasonable, there is an order-of-operations error

¹² This AHAM data was accessed from two sources:

1. http://www.nwcouncil.org/energy/rtf/meetings/2011/0301/LED_MF_RAC_supporting%20files.zip
2. <http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=5.7.7>

¹³ 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.

¹⁴ 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)

¹⁵ Consistent with coincidence factors found in: RLW Report: Final Report Coincidence Factor Study Residential Room Air Conditioners, June 23, 2008 (http://www.puc.nh.gov/Electric/Monitoring%20and%20Evaluation%20Reports/National%20Grid/117_RLW_CF%20Res%20RAC.pdf)

in the TRM that results in an over-statement of the intended calculation's actual per-unit reduction. ADM corrected this error in applying the TRM algorithm for RACs recycled through the program in 2013.

4.1.4 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 three years for RACs and eight years for refrigerators and freezers based on the assumptions presented in the TRM.

4.2 Process Evaluation Methodology

The process evaluation component of this report was designed to answer the following research questions:

- How satisfied are customers with various aspects of the program?
- What are the characteristics of the appliances being recycled?
- How effective were the marketing efforts for the program? Which marketing methods were most effective?
- How well did the team (i.e., The Companies staff and implementation staff) work together?
- Were there any significant changes or new obstacles during the 2013 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.

4.2.1 Participant Telephone Interviews

A telephone survey was conducted with program participants to collect data about customer decision making, preferences, and opinions of the Appliance Turn-In program. The questions focused on the pick-up process, appliance age, usage amount, and location. The survey also focused on customer satisfaction with various aspects of the program. In particular, respondents were asked about their level of satisfaction with the scheduling process, pickup process, incentive amount, and interaction with program staff. Additionally, respondents were asked a number of demographic questions including those recommended by the Statewide Evaluator (SWE) for purposes of consistency across Ohio utilities, as relevant to the Appliance Turn-In program.

Research America, under subcontract with ADM, conducted the surveys in February 2014 with customers who had participated in the 2013 program year. In total, 235 customers

responded to the survey. The survey sample was selected to ensure representative responses across the Companies. The sample was further stratified by measure—refrigerators, freezers, and RACs. Response data is weighted for reporting and statistical representativeness.

4.2.2 Program Staff Interviews

Tetra Tech, under subcontract with ADM, conducted in-depth interviews with program staff from the Companies and JACO, Inc. The interviews were conducted during February of 2014. The objective of these interviews was to gather feedback from the Appliance Turn-In program implementation staff to determine how the program is operating and to collect suggestions for program improvements. In total, Tetra Tech conducted three in-depth interviews for this qualitative assessment. Two of the interviews were conducted with JACO staff and one was conducted with the Companies program manager.

5. Detailed Impact Evaluation Findings

This chapter presents the findings of the impact evaluation of the 2013 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 SSRS reporting system for accuracy. No duplicate entries were discovered. To verify that the number of units claimed in the program tracking database was accurate, ADM administered a telephone survey with a sample of program participants.

All 235 respondents who completed the participant survey verified that they had in fact participated in the program during 2013. All except three of the survey respondents also indicated that the number of appliances recycled was identical to the claims in the program tracking database. One respondent stated that he/she recycled a refrigerator, instead of the freezer indicated in the tracking database. The other two respondents indicated that they had recycled more appliances than shown in the tracking database. Overall, these discrepancies make up approximately 1% of survey respondents and are anecdotal in nature. No changes to the number of units recycled were made based on these survey responses.

However, 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. Survey respondents were questioned regarding whether the recycled appliances were in working condition at the time of pick-up. Two respondents in the CEI service territory, one respondent in the OE service territory and one respondent in the TE territory indicated that their appliance was not in working condition at the time of pick-up. These non-working designations included a follow up question to ensure that by “not working” the respondent’s did not mean anything cosmetic or otherwise unrelated to the energy use of the appliance. All other survey respondents 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 5-1 for each utility and each appliance were determined:

Table 5-1: Verification Rates by Utility and Appliance Type

<i>Utility</i>	<i>Appliance Type</i>		
	<i>Refrigerator</i>	<i>Freezer</i>	<i>RAC</i>
CEI	96.6%	100.0%	96.4%
OE	100.0%	95.5%	100.0%
TE	96.3%	100.0%	100.0%

Based on these verification rates, Table 5-2 reports the numbers of refrigerators, freezers, and RACs recycled through the program during 2013 that were verified as being in working condition when recycled and therefore program-eligible.

Table 5-2: Recycled Appliances Verified to be in Working Condition

<i>Utility</i>	<i>Quantity Reported as Recycled</i>	<i>Verification Rate</i>	<i>Quantity of Recycled Units Verified as Program Eligible</i>
<i>CEI</i>			
Refrigerator	5,041	96.6%	4,867
Freezer	1,336	100.0%	1,336
RAC	338	96.4%	326
<i>OE</i>			
Refrigerator	7,111	100.0%	7,111
Freezer	1,840	95.5%	1,756
RAC	485	100.0%	485
<i>TE</i>			
Refrigerator	1,741	96.3%	1,677
Freezer	487	100.0%	487
RAC	119	100.0%	119

5.2 Gross Annual kWh Savings per Appliance

Gross annual kWh savings were calculated as described in chapter four of this report. The details and results of these calculations are reported in this section.

5.2.1 Refrigerators and Freezers

For refrigerators, 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 5-3.

*Table 5-3: DOE Uniform Methods Project UEC Regression Details¹⁶
(Dependent Variable – Daily kWh)*

<i>Independent Variables</i>	<i>Coefficient</i>
Intercept	0.582
Appliance Age	0.027
Dummy: Manufactured Pre-1990	1.055
Appliance Size (square feet)	0.067
Dummy: Single-Door Configuration	-1.977
Dummy: Side-by-Side Configuration	1.071
Dummy: Primary Usage Type (in absence of program)	0.6054
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,¹⁷ and correct pickup address for 13,796 of the 13,893 refrigerators collected in 2013. Of these 13,796 refrigerators, 21.8% were side-by-side models; 7.6% were single door models; the average size was 18.39 cubic feet; 43.7% percent were manufactured before 1990 and the average age was 23.89 years old. Additionally, the participant survey asked respondents to indicate whether their refrigerators were primary or secondary appliances. Across the three companies, 68.4% of respondents indicated the recycled unit was a primary refrigerator (n=79). Respondents also indicated that 37.5% of the recycled refrigerators were located in spaces that are generally unconditioned, such as a garage or porch (n=80). This information, along with TMY3 heating and cooling degree days (base temperature = 65F) for the Ohio reference cities outlined in the TRM were used to generate the final two interaction variables.

Table 5-4 shows all of the refrigerator characteristics relevant to the UMP model.

Table 5-4: 2013 Program Refrigerator Characteristics

<i>Average Appliance Characteristics</i>	<i>Refrigerators</i>
Appliance Age (Years)	23.89
Percentage of Units Manufactured before 1990	43.7%
Average Size (Cubic Feet)	18.39

¹⁶ Source: Uniform Methods Project Refrigerator Recycling Evaluation Protocol.

¹⁷ 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.

<i>Average Appliance Characteristics</i>	<i>Refrigerators</i>
Percentage Single Door	7.6%
Percentage Side-by-Side	21.8%
Percentage Primary	68.4%
Interaction: Unconditioned Space x CDD	0.85
Interaction: Unconditioned Space x HDD	6.27

The refrigerator characteristics shown in Table 5-4 were used in conjunction with the model coefficients in Table 5-3 to calculate annual energy consumption estimates for program participating refrigerators. The refrigerator-to-freezer factor of 0.85 was applied to develop annual energy consumption estimates for freezers. These calculations are shown below:

Refrigerator UEC (kWh)

$$365.25 \text{ (days per year)} * [0.582 + 0.027 * 23.89 \text{ (age)} + 1.055 * 0.437 \text{ (dummy: 1990)} + 0.067 * 18.39 \text{ (size, cu. ft.)} - 1.977 * 0.076 \text{ (dummy: single door)} + 1.071 * 0.218 \text{ (dummy: sbs)} + 0.6054 * 0.684 \text{ (dummy: primary)} + 0.02 * 0.85 \text{ (CDD Interaction)} - 0.045 * 6.27 \text{ (HDD Interaction)}] = 1,151 \text{ kWh}$$

Freezer UEC (kWh)

$$1,151 * 0.85 \text{ (refrigerator - to - freezer factor)} = 978 \text{ kWh}$$

One final adjustment was made to account for the fact that not all refrigerators and freezers are plugged in year round. This part-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 part-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 average number of months in use for a refrigerator that was being partly used was 3 months, implying a use factor of 0.25 (i.e., 3/12). For freezers in this category, the use factor was calculated to be 0.56, reflecting an average of 6.75 months in use for freezers being partly used.
- 3) Units used all of the time have a use factor of one (1). It is assumed that all primary refrigerators operate all of 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 5-5 shows the calculation of the overall UES for refrigerators and freezers when partial use is taken into account.

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

<i>Operating Status of Unit</i>	<i>Percentage of Recycled Units in Category</i>	<i>Use Factor</i>	<i>Calculation of UES to Adjust for Part Use</i>
<i>Refrigerators</i>			
Not running	1.30%	0	0
Running part time	2.60%	0.25	288
Running all time	96.10%	1	1,151
Weighted Average UES for Refrigerators			1,114
<i>Freezers</i>			
Not running	1.27%	0	0
Running part time	5.06%	0.56	550
Running all time	93.67%	1	978
Weighted Average UES for Freezers			944

Based on the findings detailed in this section, the *ex post* gross per-unit annual kWh savings for refrigerators recycled through the program is estimated to be 1,114 kWh; the *ex post* gross per-unit annual kWh savings for freezers recycled through the program is estimated to be 944 kWh.

5.2.2 Room Air Conditioners (RACs)

AHAM Sales-weighted average EER values were applied to each RAC recycled through the program in 2013 based on the reported vintage. The resulting average EER value was 8.41. Appliance degradation was taken into account using the methodology established by the National Renewable Energy Laboratory's 2006 "*Building America Performance Analysis Procedures for Existing Homes*" booklet.¹⁸ After accounting for degradation, the average EER for recycled RACs dropped to 6.83. Based on the assumptions presented in the TRM, EFLH were assumed to be 233 and 76% of units were assumed to be replaced. Average capacity for the average existing and baseline replacement RAC was assumed to be 10,000 BtuH based on the assumptions in the

¹⁸ NREL (2006). "*Building America Performance Analysis Procedures for Existing Homes*." <http://www.nrel.gov/buildings/pdfs/38238.pdf>

Energy Star Room Air Conditioner Savings Calculator. This assumption is in line with the AHAM data implied average of 10,055 BtuH for RACs recycled in 2013. 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 2013 was calculated to be 167.2 kWh as follows:

$$\begin{aligned}
 \text{RAC Annual kWh Savings} &= (233 * (10,000/6.83))/1000 - (0.76 * (233 * (10,000/10.18)))/1000 \\
 &= 167.2 \text{ kWh}
 \end{aligned}$$

5.2.3 Gross Peak Demand (kW) Savings per Appliance

The summer coincident peak demand savings formula, which incorporates a temperature adjustment factor and a load shape adjustment factor, was used to estimate the average kW reduction occurring during the PUCO defined on-peak period, for refrigerators and freezers. For RACs, the summer coincident peak demand savings formula from the TRM was used to calculate the average kW reduction occurring during the PUCO defined on-peak period.

Using the TRM methodology, ADM calculated an average on-peak demand reduction of 0.183 kW per recycled refrigerator, 0.156 kW per recycled freezer, and 0.215 kW per recycled RAC.

5.2.4 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 TRM, RUL values of three years for RACs and eight years for refrigerators and freezers were used. Table 5-6 shows the resulting per-unit lifetime kWh savings estimates.

Table 5-6: Per-Unit Lifetime kWh Savings

<i>Appliance Type</i>	<i>Ex Post Per-Unit Annual kWh Savings</i>	<i>RUL (years)</i>	<i>Ex Post Per-Unit Lifetime kWh Savings</i>
Refrigerators	1,114	8	8,909
Freezers	944	8	7,554
RACs	167.2	3	502

6. Detailed Process Evaluation Findings

This chapter provides the findings of the process evaluation component of this report. The process evaluation was informed by participant telephone survey data and in-depth interviews with program staff at JACO and the Companies.

6.1 Program management, Implementation and Oversight

Since program inception, the management structure of the program has remained the same. The program manager works in conjunction with JACO's program manager to ensure program administration is effective and achieving its goals. Each year the program goals increase by 3 percent to account for natural attrition assumed in the program.

JACO has been the program's implementer since program inception. They have been recycling appliances for over 20 years and have grown to become one of the largest recyclers of household appliances in the United States. Through a proven combination of proprietary and non-proprietary equipment and processes, JACO ensures that over 95 percent of the components and materials of the discarded appliance are either recycled for beneficial uses or eliminated in an environmentally responsible way.

JACO's role is to assist in program design, conduct marketing campaigns to promote the program, and pick up and recycle the units. Both the Companies' program manager and JACO agree the program has become a "well-oiled machine" over the past few years. There are no issues or concerns reported by either party, and there are no future concerns.

The program manager at JACO is responsible for meeting targets, designing the marketing campaigns, ensuring quality control procedures are performed, and quality assurance standards are achieved along with administrative activities and troubleshooting issues. This person also works directly with the Companies' program manager.

For tracking purposes, JACO designed a comprehensive online tracking tool to document and report the program's progress. The tool tracks program details such as the number of orders by day, pick-up schedule, trends, customer data, and unit-specific data. A dashboard was created to allow the Companies real-time access to program results. The dashboard is reviewed during biweekly meetings between the Companies' program manager and JACO. Data collected and stored within JACO's internal tracking system is then transferred to the Companies' main portfolio tracking system, VisionDSM. There have been no issues reported with the dashboard by program staff.

6.1 Marketing and Program Awareness

JACO uses a combination of earned media (press releases and public relations events), paid media (television, newspaper, radio, web banners, and optimized Google search),

and utility channels (bill inserts) to promote the program. Data is collected from each customer pick-up that describes how the customer first heard about the program. Annual reports are developed to report the effectiveness of the various marketing campaigns.

In addition, JACO has been working to establish a retail partnership with various retail stores, such as Sears and ABC Appliance, as another avenue for encouraging appliance recycling during the purchase of a new appliance. The partnership with Sears has been in place for two years now and continues to evolve. JACO staff goes to Sears locations to train their staff on the program, explain the benefits to the retailer and customer, explain how to use the program's software to enroll customers at the time of purchase, and what happens to the unit once it has been collected. Retail stores also allow JACO to display program marketing material.

To maintain the chain-of-custody, customers recycling through a retail store are provided with an identification sticker to affix to the unit to be recycled. This sticker includes the customer name and a confirmation number. The retailer picks up the unit to be recycled and takes it to the Sears collection center where appliances that have the Companies Appliance Turn-In program sticker are segregated. The JACO collection team collects the appliances with the Companies sticker, scans the program stickers and verifies program eligibility, and the units are then tracked in the JACO tracking system.

Last year JACO experimented with offering a minor financial incentive to sales associates at Sears in hopes of increasing retail participation. JACO reports that they did not see a big jump but feel it got their attention, and they are already seeing higher numbers this year.

Retail store involvement with the program has been slow to yield results but has improved in the past two years. The first year working with Sears yielded about 2 to 3 percent of the total units recycled. In the second year the program is seeing approximately 8 percent of the total units recycled coming from retail-generated participation. This is a positive sign that retail involvement is beneficial to the program and worth supporting in future years. JACO has been piloting the program with other big box stores, such as Best Buy and Lowe's.

When participants were asked how they heard about the Appliance Turn-In Program, one of the most commonly mentioned ways was the bill insert. This was mentioned most often by OE (59.1 percent) and CEI (34.0 percent) respondents, while in TE it was the second-most mentioned item (31.0 percent). A television ad was most mentioned (32.6 percent) by customers in TE. These results are in line with a customer survey JACO conducted between January and December of 2013 to ask how they heard about the program. The most-mentioned item in JACO's research was the bill insert at 43.2 percent overall out of all EDCs combined (compared to 43.1 percent in the evaluation) and the second-most mentioned item was television ads (15.7 percent overall for JACO and 19.9 percent overall in this evaluation).

Table 6-1: Source of Hearing about the Program

	OE	CEI	TE	Overall
Bill insert	59.1%	34.0%	31.0%	43.1%
TV ad	15.6%	19.8%	32.6%	19.9%
Newspaper/magazine/print media	10.5%	24.0%	13.7%	17.5%
Retailer/store	6.1%	14.4%	7.2%	10.3%
Friend or relative (word of mouth)	4.5%	6.8%	9.5%	6.3%
Online	3.7%	4.7%	3.5%	4.2%
The Companies' website	0.3%	3.7%	0.0%	1.9%
Other	3.9%	0.1%	0.0%	1.5%
The Companies' representative	0.0%	0.0%	2.7%	0.4%
The Companies' brochure	0.2%	0.1%	0.0%	0.1%
Respondents (n)	79	76	73	228

These results are also consistent with 2012 evaluation results and indicate bill inserts are still an important media outlet for advertising the program and gaining participation, as shown in Figure 6-1 below. Television ads and print media, such as newspaper or magazine ads, have also been successful for program advertising.

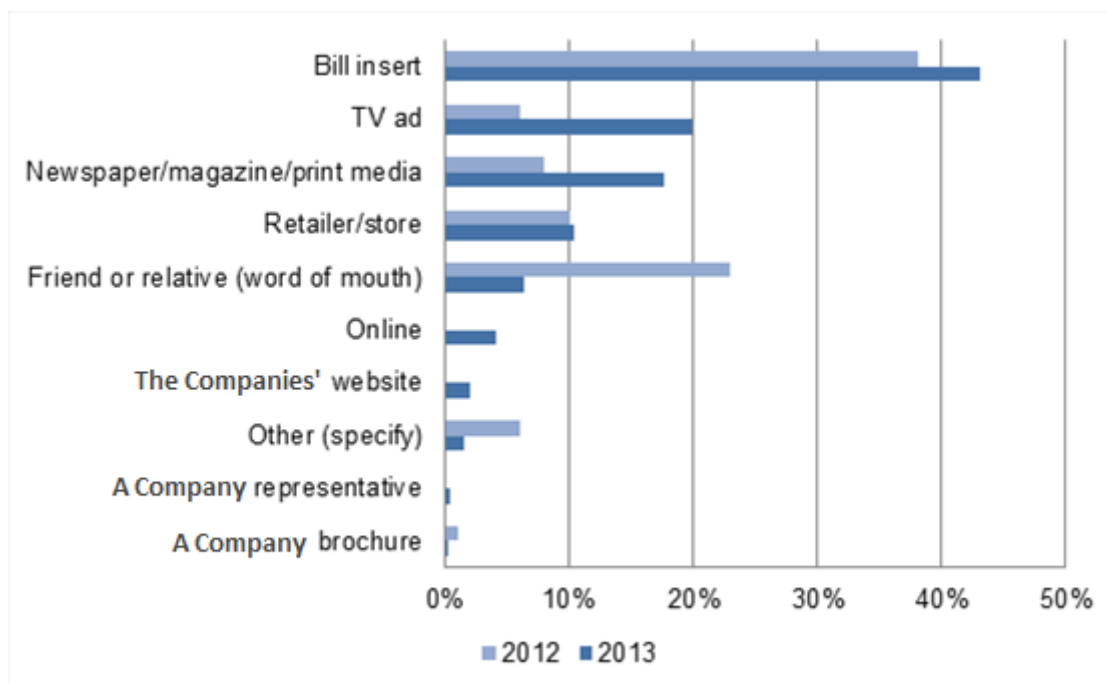


Figure 6-1: 2012 and 2013 Comparison – Source of Hearing about the Program Overall

6.2 Pick-Up Process

Customer steps to program participation have remained the same since program inception. The customer schedules a pick-up either by phone or online, the appliance is picked up, and a rebate is mailed shortly thereafter. This is a process JACO has been using for two decades for utilities across the nation, making the implementation smooth and without issue.

Participants were asked about a number of different aspects regarding the pick-up process. Overall, the time between the initial call for pick-up and actual pick-up averaged 11.4 days. The longest time being in TE's territory (13.1 days) and the shortest in OE (9.3 days). A follow-up question asked if this was a reasonable amount of time. Only five respondents said it was not, and when asked what would be a reasonable amount of time, the response averaged less than ten days.

Table 6-2: Average Number of Days it took for Appliance Pick Up

	<i>OE</i>	<i>CEI</i>	<i>TE</i>	<i>Overall</i>
Mean	9.3	12.5	13.1	11.4
Respondents (n)	66	60	60	186

Convenience of the pick-up time is an important part of the program. When asked if they were able to schedule a pick-up time that was convenient for them, overall, 98 percent of respondents said yes. This overcomes the barrier of not having the time or ability to dispose of the unit.

Participants were asked if, prior to the pick-up date, they received a phone call to confirm the date and time of the scheduled pick-up (Table 6-3). All respondents in OE said they were called prior to that date. In CEI 96.1 percent said they were called and in TE 94.5 percent said they were called. In addition, customers may have also received a phone call the day of the pick-up to confirm the time. Overall, 97.2 percent of customers received a phone call the day of the pickup, with TE respondents reporting the lowest percentage of day-of calls at 90.8 percent.

Table 6-3: Pick Up Calls Received

	OE		CEI		TE		Overall	
	Received call to confirm date	Received call day of pickup	Received call to confirm date	Received call day of pickup	Received call to confirm date	Received call day of pickup	Received call to confirm date	Received call day of pickup
Yes	100.0%	96.9%	96.1%	99.7%	94.5%	90.8%	97.3%	97.2%
No	0.0%	3.1%	3.9%	0.3%	5.5%	9.2%	2.7%	2.8%
Respondents (n)	68	67	67	63	73	70	208	200

Finally, customers were asked about the professionalism of the staff who removed the unit from their home. All but two respondents said the staff behaved professionally. The first of the two who said they did not believe the staff acted professional thought so because the technician was not able to get the unit through the doorway. The customer had to remove it themselves and reschedule the pick-up. The second of the two said they were never asked to empty the freezer before the unit was taken and the technician walked away with their food. However, this response conflicts with the online and phone sign-up process, both of which include reminders that the unit must be content free at the time of pick up.

6.3 Appliance Description

Respondents were asked about the specifics of the unit recycled. This included age, whether it was a primary or secondary unit, quantity, location, usage amount, and condition when picked up.

The average age of recycled units reported by survey respondents is 20 years, but this varies amongst the three appliances, as shown below in Table 6-4. Refrigerators' average age is 19 years old, freezers are averaging 24.5 years, and RACs are averaging 14.4 years. These estimates of appliance age are similar, though somewhat newer, than the more complete program tracking data information regarding appliance age.

Table 6-4: Age of Recycled Appliance

	Refrigerator	Freezer	Room AC	Overall
Mean	19.0	24.5	14.4	20.0
Respondents (n)	69	59	64	192

Overall, over 70 percent of respondents reported that they replaced their recycled unit with a new one. This was mostly seen with refrigerators (77.9 percent). Results for

freezers and RACs show households are more likely permanently removing these units from the home.

Table 6-5: Replaced Old Unit with a New One

	Refrigerator	Freezer	Room AC	Overall
Yes	77.9%	48.9%	36.4%	70.4%
No	22.1%	51.1%	63.6%	29.6%
Respondents (n)	81	68	84	233

Respondents were asked about the location of the recycled unit prior to the unit being recycled. The results varied depending on the measure type. Besides the typical location of the refrigerator in the kitchen, the other locations were in the garage, porch/patio, or the basement. For freezers, they were most likely to be located in the basement or the garage. RACs were most commonly in bedrooms, followed by the living room, but also reported in various other areas in the home.

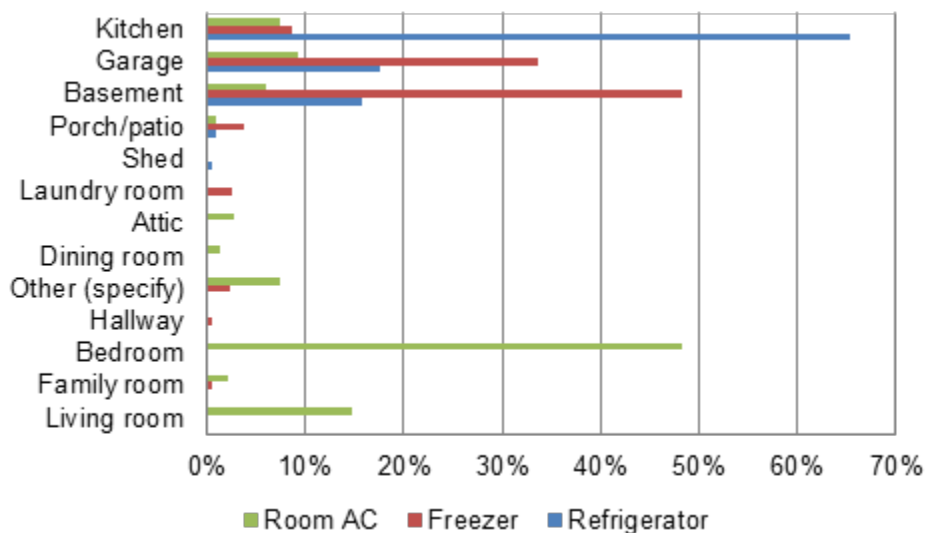


Figure 6-2: Location of Unit in the Home

Refrigerators and freezers were most likely to be plugged in and running the full year before recycling. Most respondents indicated their RACs are used seasonally, as shown in the percentage who use the unit only during certain months of the year (59.9 percent) or that are never plugged in or running (22.3 percent). When asked about the number of months the RACs were running, the average was 2.9 months.

6.4 Decision Making Process

Overall, 60 percent of program participants had already considered disposing the unit prior to hearing about the program (60.7 percent for refrigerators, 53.6 percent for freezers and 69.0 percent for room AC)

Respondents were asked what they would have done with the unit if they had not disposed of it through the program. Figure 6-3 shows approximately one-third of RACs would have been taken to a dump or recycling center. Giving it to a private party was next at 14.7 percent. Freezers had a relatively even split between taking it to a dump or recycling center and keeping it and continuing to use it. The latter is a good example of the program being effective since it was either recycle it through the program or keep using it. For refrigerators, taking it to the dump or recycling center, having it removed by the dealer of the new unit, and giving it away to a charity organization were the top three mentioned actions.

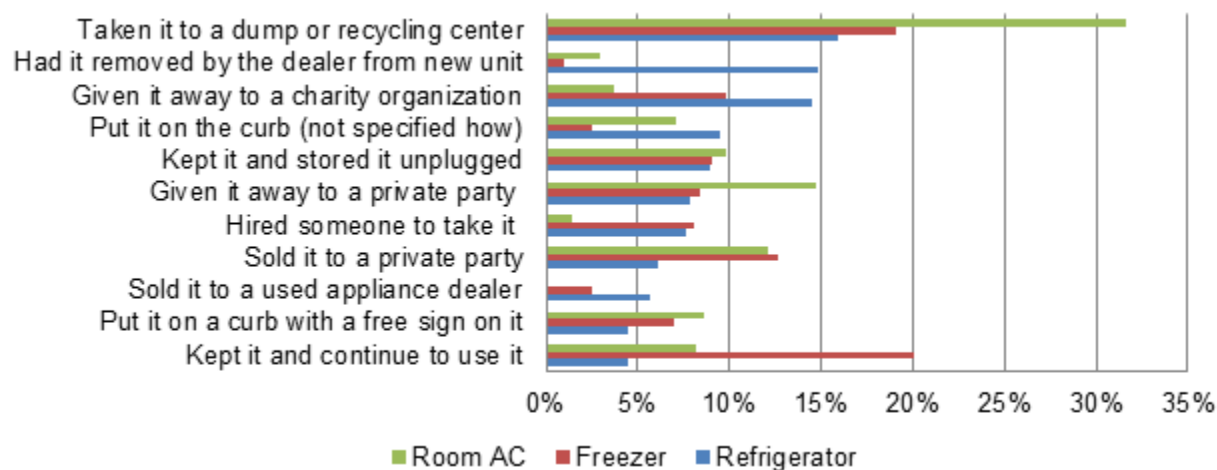


Figure 6-3: What Likely Would Have Been Done with Unit in Absence of Program

The rebate incentive is the biggest motivator for customers to participate in the program for 45 percent to 50 percent of respondents, as shown in Figure 6-4 below, followed by the free pick-up service and convenience as the next biggest motivators. This is comparable to last year's survey results, where the incentive was mentioned by 55 percent of the respondents and 18 percent said the free pick-up service was their primary reason, followed by 15 percent mentioning the convenience. It would appear between the two years that convenience and the free pick-up are increasing in value to customers over the incentive.

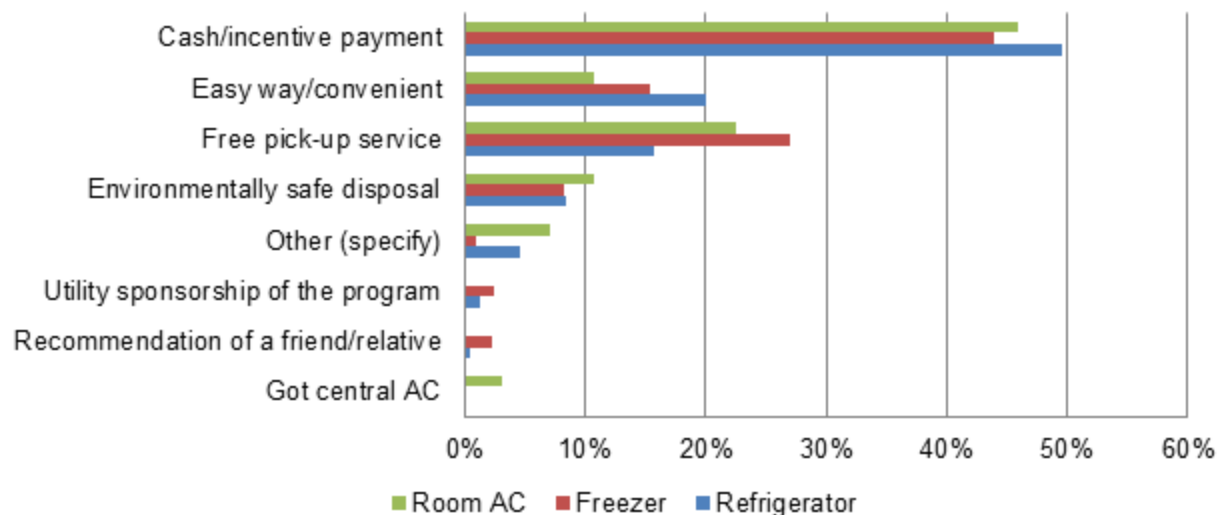


Figure 6-4: Main Reason for Choosing to Recycle Unit through the Program

To further gauge the importance of the incentive in program participation, respondents were asked if they would have participated in the program if the rebate amount had been less but the pick-up service was still provided at no cost. The response was similar across the measure types, with 65.9 percent to 69.5 percent saying they would still have participated in the program. Last year, 68 percent of respondents said the same.

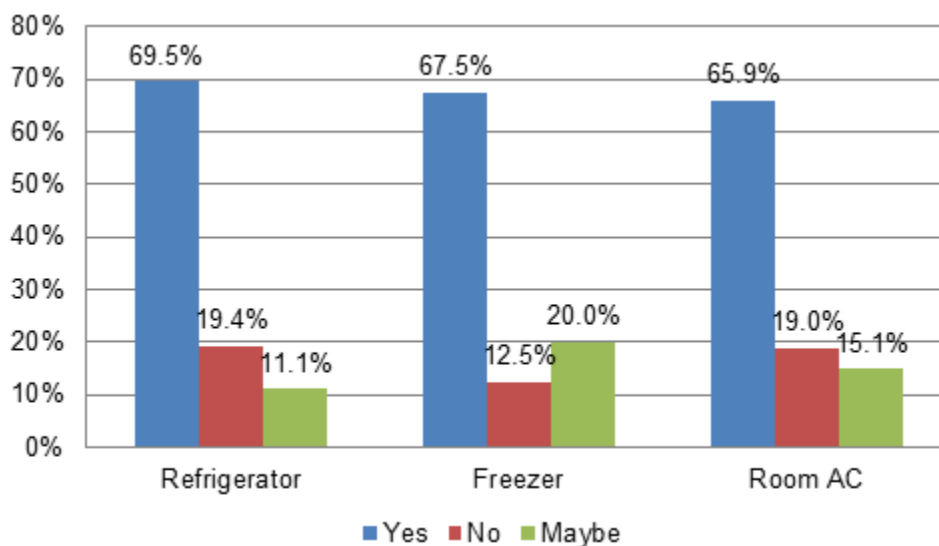


Figure 6-5: Would Have Participated if Lesser Rebate Amount

All program staff believes the current incentive levels are appropriate for Ohio's utility service territory. The Companies' program staff believes that the incentive levels are about right for each of the three appliances included in the program. JACO staff indicated

that the current incentive levels are comparable to those offered by other utilities in other states.

6.5 Program Experience

According to JACO, rebates are mailed within a week or two of appliance pick-up. According to feedback from program participants, the average number of days it took to receive it varied among the Companies, with CEI having the longest time with an average of 26.9 days. TE followed with a 16-day average, and OE had the shortest with an average of 12.5 days. All but two participants said they received their rebate. Having to wait longer than expected was the most common complaint JACO reports hearing from customers. This is often a matter of days, but some customers want their appliance picked up right away. JACO reports this is a similar complaint among other appliance turn in programs as well.

Approximately 45 percent of participants had contact with utility or program staff, most typically by phone, during the course of participation one or more times. Some of this contact is likely a normal part of the pick-up scheduling process. For those respondents that indicated having contact with program staff numerous times, understanding the reasons for the contact may identify areas for improvement in program information and advertisement.

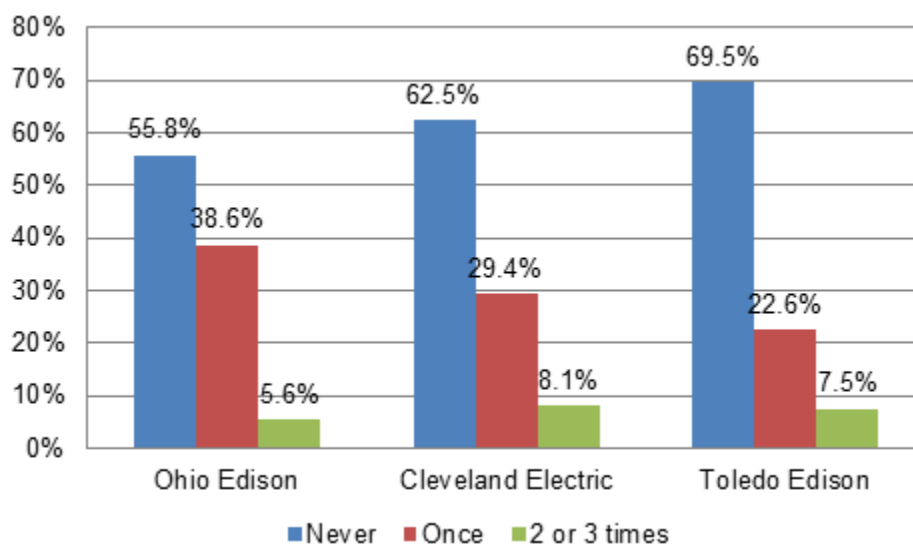


Figure 6-6: Frequency of Contact with Utility/Program Staff during Course of Participation

6.5.1 Program Satisfaction and Participant Recommendations

Respondents were asked about their levels of satisfaction with multiple aspects of the program on a scale of “very satisfied,” “somewhat satisfied,” “neither satisfied nor dissatisfied,” “somewhat dissatisfied,” and “very dissatisfied.”

Satisfaction of the application process was rated high among participants. Overall, 98.2 percent gave a rating of somewhat or very satisfied. In OE, 100 percent of participants gave a satisfactory rating. In CEI that metric is 96.7 percent and in TE it is 99.3 percent. No participants across the EDCs gave an unsatisfactory rating to the application process.

The average number of days it took to receive the rebate, overall, was 20 days. OE was the lowest with 12 days, TE averaged 16 days, and the longest timeframe was CEI with 26 days. When asked their level of satisfaction with the time it took to receive the rebate, 92 percent said they were somewhat or very satisfied. This is the same as last year’s evaluation findings.

Over 96 percent of respondents reported being satisfied with the rebate amount. This is slightly higher than last year’s evaluation results of 95 percent. Satisfaction this year was highest in TE (98.7 percent), followed by OE (97.4 percent), and then CEI (95.4 percent).

Participants were also asked about their satisfaction with the pick-up process, including the scheduling of the pick-up, the actual pick-up, and the professionalism of the technician who picked it up. All but one respondent said they were satisfied (very or somewhat) with the scheduling of the pick-up. The one respondent who was very dissatisfied with the scheduling of the pick-up said it was because “it took almost a month.”

Over 97 percent of respondents said they were satisfied with the actual pick-up of their unit. There were only 3 out of 231 who said they were somewhat or very dissatisfied. The reason for that rating, one said, was that a dent was put on their door. The second said the technicians could not get the unit through the door so they had to take off the door and were told they would come back later. They did not come back and had to reschedule so they had to put the door back on. The third respondent said they were called prior to the pick-up to say the technicians would be there in 45 minutes, but they did not show up for an hour and 45 minutes.

Over 94 percent of respondents were very satisfied with the contractor who picked up the unit. There were 2 out of 234 who were dissatisfied and those reasons were due to a dent that was left and because food was still in the unit when it was removed.

Communication with utility or program staff had an overall satisfaction rating of 98.7 percent. There was 1 out of 83 respondents who was dissatisfied with their communication with utility or program staff, and they said it was because “the lady had an attitude.”

About 45 percent to 53 percent of participants reported seeing savings on their electric bill since participating in the program. Ninety percent of those that had reported seeing savings gave a satisfactory rating of those savings amounts. Another 8 percent were neither satisfied nor dissatisfied with the savings they saw.

When asked to rate their overall satisfaction with the program, 99.4 percent of respondents said they were somewhat or very satisfied.

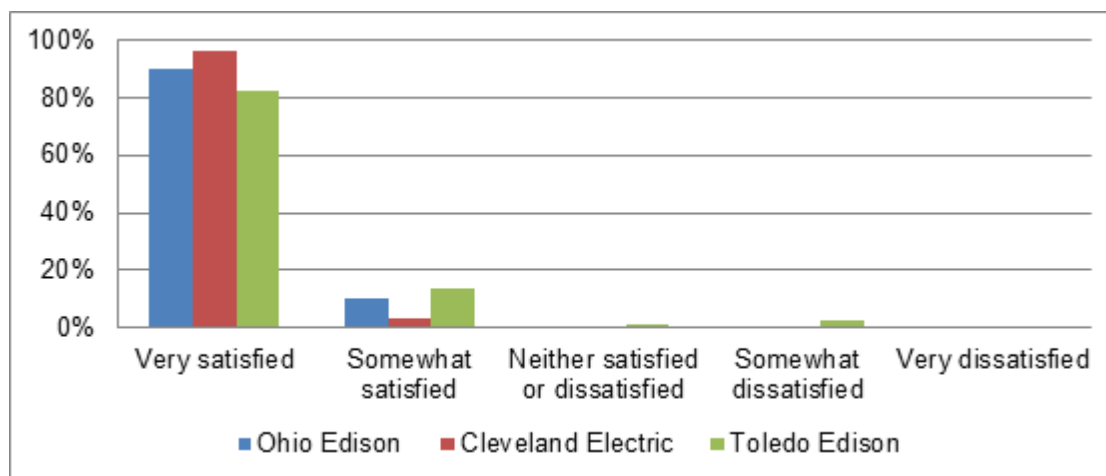


Figure 6-7: Satisfaction with the Program Overall

Some of the reasons mentioned for the high rating were:

- “All I had to do was make a call and they came and picked it up.”
- “Because of the customer service overall.”
- “Because of the incentive, the quickness, and no hassles.”
- “Easy to get the rebate and the people were polite.”
- “I just had to simply apply online. Very simple.”
- “I like that the electric company is helping to try to save me money.”
- “I think the program helps people get rid of appliances they can’t get rid of themselves and the rebate was excellent.”
- “It was convenient and efficient.”
- “The program is great and I have recommended it to 3 people. The program is great because it keeps people from improperly disposing of items.”
- “They did everything they said they would.”

As far as any suggestions for improving the program, 185 of 230 respondents said they did not have any suggestions. Of those who did have suggestions (45 respondents), the most common suggestion was to advertise more (9 respondents). Other suggestions

mentioned were to increase the rebate amount (8 respondents), pick up other appliances such as washers, dryers, or stoves (6 respondents), reduce the pick-up time (4 respondents), and improve the time it takes to get the rebate (2 respondents).

6.6 Quality Assurance and Quality Control

JACO's QA/QC process has not changed from previous years. JACO employs extensive QA/QC procedures to ensure the entire process is well documented. This information is tracked on a dashboard where managers anywhere can access and retrieve information on every appliance recycled. The quality assurance and quality control procedures implemented by JACO include, but are not limited to:

- Calls to the call center operations are monitored by coordinators who listen in.
- Management staff monitor and track drivers' schedule adherence track record (appliances collected within the four-hour window customers are given) and customer complaints.
- Drivers use cell phones and GPS devices to communicate with and locate customers.
- Chain-of-custody procedure ensures pickup-to-recycling process integrity and consists of:
 - Appliance data and digital pictures of all the units are collected.
 - After verification of a working unit, the pickup crew renders the appliance inoperable at the home—the power cord is cut, the seal is removed from the door, and the temperature control is broken. This activity often occurs in front of the customer so they can verify the unit is going out of service.
 - The customer's signature is collected electronically to verify that there was no damage done to the customer's property during appliance pickup.
 - A bar-coding system tracks the units from pickup to the recycling facility and links all data collected on the unit along with the photo.
- Routine quality checks are performed on all drivers' vehicles and on day-to-day work.

6.7 Participant Demographics

To help understand the type of customers who participate in the program, respondents were asked questions about their home. Participants are most likely to live in single-family detached homes and own their home. The majority of participants live in homes that were built before 1960 and is between 1,001 and 2,000 square feet. This information could be used to target older neighborhoods where appliances are more likely to be older and less efficient.

Table 6-6: Household Characteristics

	OE	CEI	TE	Overall
Type of home				
Single-family detached home	83.9%	87.9%	86.3%	84.8%
Single-family, factory manufactured/modular	6.4%	2.3%	3.8%	5.4%
Condominium	2.8%	5.1%	3.4%	3.3%
Single-family mobile home	3.6%	2.4%	1.3%	3.2%
Row house	2.3%	0.0%	1.3%	1.8%
2 or 3 family attached residence	0.0%	2.3%	1.3%	0.5%
Other	0.5%	0.0%	2.6%	0.5%
Apartment, 4 or more units	0.5%	0.0%	0.0%	0.4%
Respondents (n)	78	69	84	231
Own or rent				
Own	91.8%	98.1%	87.4%	94.4%
Rent	8.2%	1.9%	12.6%	5.6%
Respondents (n)	79	76	74	229
Year home was constructed				
Before 1960	57.6%	34.5%	46.3%	44.0%
1960–1969	5.9%	12.1%	10.2%	9.7%
1970–1979	7.5%	17.6%	12.0%	13.4%
1980–1989	17.0%	7.7%	7.1%	10.8%
1990–1999	11.4%	18.8%	22.0%	16.7%
2000–2005	0.6%	4.7%	1.6%	2.9%
2006 or later	0.0%	4.5%	0.8%	2.5%
Respondents (n)	73	72	70	215
Estimate of above ground living space				
Mean	1,914.6	1,999.9	1,941.9	1,963.1
Respondents (n)	57	49	51	157
Estimate of above ground living space				
Less than 1,000 sq. ft.	10.5%	6.6%	5.5%	7.8%
1,001–2,000 sq. ft.	58.4%	73.0%	66.5%	67.0%
2,001–3,000 sq. ft.	15.5%	10.3%	19.1%	13.3%
3,001–4,000 sq. ft.	14.9%	5.8%	7.6%	9.3%

	<i>OE</i>	<i>CEI</i>	<i>TE</i>	<i>Overall</i>
4,001–5,000 sq. ft.	0.0%	4.2%	0.9%	2.3%
Greater than 5,000 sq. ft.	0.6%	0.1%	0.4%	0.3%
Respondents (n)	65	61	57	183
Estimate of conditioned living space				
Less than 1,000 sq. ft.	35.2%	41.3%	30.5%	37.7%
1,001–2,000 sq. ft.	36.9%	55.9%	55.1%	48.4%
2,001–3,000 sq. ft.	18.1%	2.4%	7.2%	9.1%
3,001–4,000 sq. ft.	9.1%	0.4%	7.2%	4.6%
Greater than 5,000 sq. ft.	0.6%	0.0%	0.0%	0.2%
Respondents (n)	46	47	28	121

7. Conclusions and Recommendations

This chapter reports the conclusions and recommendations resulting from the impact and process evaluation of the 2013 Appliance Turn-In Program.

7.1 Energy and Demand Impacts

A total of 16,327 households in the service territories of the three Companies received appliance recycling services through the Appliance Turn-In Program in 2013. The numbers of participants for each service territory is shown in Table 7-1.

Table 7-1: Number of Participants by Company

<i>Utility</i>	<i>Number of Participants</i>
CEI	5,926
OE	8,332
TE	2,069
All Companies	16,327

Estimated Ex Post electric impacts were 18,741,523 kWh saved annually, which represents a realization rate of 79 percent. Average on-peak Ex Post demand reduction was estimated to be 3,163 kW. For detailed tables listing energy savings and demand reductions by measure type, please refer to Appendix A. Estimates of annual gross energy savings (kWh) and on-peak demand reductions (kW) for the program in the three Companies are reported in Table 7-2.

Table 7-2: Overall Evaluation Results for Gross kWh and kW Savings

<i>Utility</i>	<i>Ex Ante Expected Gross Savings</i>		<i>Ex Post Verified Gross Savings</i>	
	<i>Gross kWh</i>	<i>Gross kW</i>	<i>Gross kWh</i>	<i>Gross kW</i>
CEI	8,639,636	1,737.88	6,736,043	1,135.11
OE	12,132,866	2,451.37	9,658,182	1,630.84
TE	3,015,962	607.75	2,347,298	396.57
All Companies	23,788,464	4,797.00	18,741,523	3,162.51

7.2 Process Findings

- **The Appliance Turn-In program is continuing to operate smoothly.** The basic design of the program (i.e., measures, implementation, QA/QC, etc.) has not changed from the first program year, so neither the Companies' staff nor JACO staff reported any issues with program implementation in 2013. Additionally, participating customers have no major complaints about the program.
- **Participants of the Appliance Turn-In Program are highly satisfied.** Participant survey respondents reported high levels of satisfaction with the program overall. There were very few instances of dissatisfaction with any aspect of program participation.
- **Quality assurance and quality control (QA/QC) procedures continues to effectively monitor the entire recycling process at the measure level.** The Companies' program staff and the JACO staff described extensive QA/QC checks to monitor the appliance chain-of-custody, beginning with the scheduling of the pick-up to the actual recycling of the appliance at the facility.
- **JACO's dashboard continues to be an effective reporting mechanism for program staff.** The Companies have real-time access to detailed levels of information needed to effectively manage and monitor program operations. The dashboard replaces the additional costs of generating time-consuming reports. The dashboard also allows for easy data transfer to the Companies' main portfolio tracking database: VisionDSM with SSRS reporting.
- **Program incentive levels are still appropriate.** Both the Companies staff and JACO staff report that incentive levels are effective and are similar to other appliance recycling programs across the country. Participating customers also report being satisfied with the rebate amount.
- **Program partnerships with retailers, such as Sears, have generated much participation.** It is reported by program staff that approximately 8 percent of the recycled appliances come from retailer assistance. In 2013, sales associate incentives (spiffs) were used to help encourage program participation. While incentives given out in 2013 were low, early 2014 results suggest greater participation.
- **There are no immediate challenges to implementing the program and reaching goals.** All program staff agreed that this program has no foreseeable challenges. The market potential is plentiful enough to reach targets and increase 3 percent annually, QA/QC is well grooved and consistent, and marketing efforts have been effective.

7.3 Recommendations

Overall, the program is running smoothly in its third year of implementation. The Companies and JACO staff are confident with their implementation procedures and data, and do not foresee any challenges for the program in the coming program year. JACO has been in the appliance recycling business for more than a dozen years and administers

appliance turn-in programs for utilities across the country. The evaluation team has the following recommendations for program consideration.

- **Increase marketing efforts to improve program awareness among customers living in older homes.** When looking at the demographics of participating customers, those who live in older homes were more likely to utilize the program. The Companies and JACO staff could consider targeting their marketing efforts to customers in older homes who may have older, less efficient appliances or are more likely to have secondary appliances. Targeted marketing to specific neighborhoods with older housing stock may also create operational efficiencies for the program.
- **Continue to reach out to additional retail stores to promote the program.** In addition to working with existing retailers, continue to work with and encourage participation from other retailers. JACO is currently piloting the program with other big-box stores, but smaller retailers should not be overlooked. Retail store partnerships offer an opportunity to reach out to customers purchasing a new appliance and can help promote the program even if they do not ultimately sell the customer an appliance.
- **Monitor the use of incentives (spiffs) for sales associates.** Early 2014 results indicate spiffs may be needed to help encourage retailers to promote the program. This was done as a test run at Sears to see if sales associates could be incentivized to promote the program. JACO said they have seen a small percent increase (5 percent in 2012 to 8 percent during 2013) but cannot say with certainty that it is due to the spiffs. More experimentation will be needed before considering a full effort.

8. Appendix A: Required Savings Tables

Tables showing measure-level participation counts and savings for the 2013 Appliance Turn-In Program were provided in various locations throughout this report. This appendix provides additional tables summarizing savings results.

- Table 8-1 reports the annual Ex Post kWh savings by utility and measure.
- Table 8-2 reports the average annual Ex Post on-peak kW reductions by utility and measure.
- Table 8-3 reports the lifetime Ex Post kWh savings by utility and measure.

Table 8-1: Annual Ex Post Energy Savings (kWh)

<i>Appliance Type</i>	<i>CEI</i>	<i>OE</i>	<i>TE</i>	<i>All Companies</i>
Refrigerators	5,419,976	7,918,933	1,867,536	15,206,445
Freezers	1,261,562	1,658,161	459,866	3,379,588
RACs	54,505	81,089	19,896	155,490
Total	6,736,043	9,658,182	2,347,298	18,741,523

Table 8-2: Annual Ex Post On-Peak Demand Reductions (kW)

<i>Appliance Type</i>	<i>CEI</i>	<i>OE</i>	<i>TE</i>	<i>All Companies</i>
Refrigerators	863.86	1,262.15	297.65	2,423.66
Freezers	201.07	264.28	73.30	538.65
RACs	70.18	104.41	25.62	200.20
Total	1,135.11	1,630.84	396.57	3,162.51

Table 8-3: Lifetime Ex Post Energy Savings (kWh)

<i>Appliance Type</i>	<i>CEI</i>	<i>OE</i>	<i>TE</i>	<i>All Companies</i>
Refrigerators	43,359,805	63,351,464	14,940,290	121,651,559
Freezers	10,092,496	13,265,286	3,678,926	27,036,708
RACs	163,515	243,266	59,688	466,469
Total	53,615,815	76,860,016	18,678,904	149,154,736

9. Appendix B: Participant Survey Instrument

The Illuminating Company, Ohio Edison Company, The Toledo Edison Company Appliance Turn-In Program Participant Telephone Survey

Interviewer: _____
_____/_____/_____

Date of Interview: _____

Respondent: _____

Address: _____

May I please speak with **[CONTACT NAME]**: _____)?

*Hello. My name is _____ and I am calling on behalf of **[UTILITY]** about the Appliance Turn-In Program that your household participated in back in ____ **[Month/Year of Participation]**. Are you the person who is most familiar with having a refrigerator, freezer, and/or room air conditioner picked up for recycling through **[UTILITY]**'s program?*

(IF NOT RIGHT PERSON) May I please speak to the person who would know the most about the appliance that was picked up for recycling?

REPEAT INTRODUCTION AND CONTINUE

*(IF RIGHT PERSON) We are conducting a study to evaluate **[UTILITY]**'s Appliance Turn-In Program. **[UTILITY]** will use the results of this evaluation to determine the effectiveness of the program and to make improvements. We would like to include your feedback about the program in our evaluation. The interview will take approximately 15 minutes. May I ask you a few questions?*

IF REFUSAL: THANK AND TERMINATE

VERIFICATION

1. Our program records indicate that you had ____ (**quantity of refrigerators, freezers, and/or room air conditioners**) picked up for recycling through the Appliance Turn-In program around (**date of pickup**). Is that correct?
 1. Yes
 2. No
 98. Don't know
 99. Refused

[ASK IF Q1=2]

2. How many refrigerators, freezers, and/or room air conditioners did you have recycled through the Appliance Turn-In program?
 1. _____ **[Record Quantity of Each Appliance]**
 98. Don't know
 99. Refused

AWARENESS

3. How did you first learn about **[UTILITY]**'s appliance pick-up and recycling program? **[Do not read, prompt if necessary. Choose One.]**
1. Newspaper/magazine/print media
 2. Bill insert
 3. Friend or Relative (word-of-mouth)
 4. TV ad
 5. FirstEnergy Representative
 6. FirstEnergy Brochure
 7. Retailer/store
 8. Other **[Specify]**_____.
 98. Don't know
 99. Refused
4. Did you hear about the program from any other sources? If so, which sources?
[Check all that apply.]
1. No other sources
 2. Newspaper/magazine/print media
 3. Bill insert
 4. Friend or Relative (word-of-mouth)
 5. TV ad
 6. FirstEnergy Representative
 7. FirstEnergy Brochure
 8. Retailer/store
 9. Other **[Specify]**_____.
 98. Don't know
 99. Refused

PICK-UP PROCESS

PU1 Starting with the first time you contacted the program about recycling your <MEASURE>, about how many days passed before the program picked up your <MEASURE>?

- | | |
|-----|----------------|
| ___ | Number of Days |
| 88 | Don't know |
| 99 | Refused |

PU2 [Skip if PU1= 88 or 99] Do you feel that this was a reasonable amount of time?
(Select one)

- 1 Yes [SKIP TO PU4]
- 2 No
- D Don't know [SKIP TO PU4]
- R Refused [SKIP TO PU4]

PU3 [IF PU2=2] What do you feel would have been a reasonable number of days?

- Number of Days
- 88 Don't know
- 99 Refused

PU4 Were you able to schedule the pick-up for a time that was convenient for you?
(Select one)

- 1 Yes
- 2 No

PU5 Before the pick-up date, did someone call to confirm the date and time of your
scheduled pick up? (Select one)

- 1 Yes
- 2 No
- D Don't know
- R Refused

PU6 On the pick-up date, were you called by the program to let you know someone
would be arriving soon? (Select one)

- 1 Yes
- 2 No
- D Don't know
- R Refused

PU7 Did the technician who removed your [IF QUANTITY = 1: appliance; if QUANTITY
> 1: appliances] behave professionally? (Select one)

- 1 Yes
- 2 No
- D Don't know
- R Refused

PU8 [IF PU7=2] Why do you say that?

[RECORD VERBATIM]

APPLIANCE DESCRIPTION AND RECYCLING DECISION

5. **IF [TOT_QTY] = 1:** Now I'm going to ask you some specific questions about the **[refrigerator, freezer]** that was picked up and recycled by **<UTILITY>**.

IF [TOT_QTY] > 1 AND [RAC]=0: I'd like to focus on just one of the appliances you recycled through **<UTILITY>**'s program. It does not matter which appliance you choose, just that you respond with only that appliance in mind. Can you tell me which appliance you've selected to tell me about?

1. ____ Refrigerator
2. ____ Freezer

IF [TOT_QTY] > 1 AND [RAC]>0: I'd like to focus on just one of the appliances you recycled through **<UTILITY>**'s program. Specifically, I'd like to ask you about the room air conditioner you recycled.

6. How old was your **[refrigerator, freezer, room air conditioner]**? **[Record response in years, enter "00" if less than one year]**

1. _____ **[Record years]**
98. Don't know
99. Refused

7. Was the old **[refrigerator, freezer, room air conditioner]** your primary or secondary (spare, auxiliary) unit?

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

[If refrigerator or freezer, skip to question 12]

8. **[If room air conditioner]** Before recycling the unit, how many room air conditioners were in operation in your home?

1. ____ Record number of units
98. Don't know
99. Refused

9. **[If room air conditioner]** How many room air conditioners are currently in operation in your home?

1. ____ Record number of units
98. Don't know
99. Refused

10. **[If room air conditioner]** Before recycling the unit, did your home have a central air conditioning system?

1. Yes
 2. No
 98. Don't know
 99. Refused
11. **[If room air conditioner]** Does your home now have a central air conditioning system?
1. Yes
 2. No
 98. Don't know
 99. Refused
12. Did you replace the old **[refrigerator, freezer, room air conditioner]** with a new unit?
1. Yes
 2. No
 98. Don't know
 99. Refused
13. For the majority of 2013, where within your home was the **[refrigerator, freezer, room air conditioner]** located?
1. Kitchen
 2. Garage
 3. Porch/patio
 4. Basement
 5. Living room
 6. Family room
 7. Bedroom
 8. Hallway
 9. Other **[Specify]** _____
 98. Don't know
 99. Refused
14. Thinking about the year prior to recycling the **[refrigerator, freezer, room air conditioner]**, was it plugged in and running ... **[Read all]**
1. . All the time **[Go to Q16]**
 2. . For special occasions only
 3. . During certain months of the year only, or
 4. . Never plugged in or running **[Go to Q16]**
 98. Don't know
 99. Refused

15. If you were to add up the total amount of time it was running in the year prior to being picked up, how many months would that be? Your best estimate is okay. **[Get nearest month]**
1. . _____ **[Record number of months 1-11]**
 2. . All the time
 98. Don't know
 99. Refused
16. Was the **[refrigerator, freezer, room air conditioner]** still in working condition when it was picked up? By working condition I mean did the unit turn on and produce cold air?
1. . Yes **[Skip to Q18]**
 2. . No
 3. . It worked but had some problems
 98. Don't know **[Skip to Q18]**
 99. Refused **[Skip to Q18]**
17. What was wrong with the unit? (If respondent is unsure, ask "would it turn on and produce cold air?")
1. Wouldn't turn on
 2. Wouldn't keep food/room cold ENOUGH
 3. Wouldn't keep food/room cold at all
 4. Too loud
 5. Don't know, but would produce cold air
 6. Don't know, but would NOT produce cold air
 7. Other **[Specify]** _____
 98. Don't know
 99. Refused
18. Had you already considered disposing of the **[refrigerator, freezer, room air conditioner]** before you heard about **[UTILITY]**'s appliance recycling program? By dispose of, I mean getting the appliance out of 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
19. What would you have most likely done with the **[refrigerator, freezer, room air conditioner]** had you not disposed of it through **[UTILITY]**'s program?
- [Read list unless respondent indicates choice without reading the list]**
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
 11. Gotten rid of it some other way [**Specify**]_____
 98. Don't know
 99. Refused
20. What is the MAIN reason you chose to get rid of your [**refrigerator, freezer, room air conditioner**] through [**UTILITY**]'s program over other methods of disposing of your appliance?
- [If multiple are mentioned, ask: "Of those, which is the main reason?" Do not read, accept one answer only.]**
- [If respondent says: "I didn't need or want the refrigerator/freezer," respond "Yes, but why did you choose to discard it through [UTILITY]'s program rather than through another method?"]**
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
 9. . Other [**Specify**]
 98. Don't know
 99. Refused
21. Did you receive your rebate for participation in this program?
- a. Yes
 - b. No
22. Would you have participated in the program if the amount of the rebate had been less, but appliance pick-up was still provided at no cost?
1. Yes
 2. No [**Go to Q24**]
 3. Maybe
 98. Don't know

99. Refused

23. Would you have participated in the program with no rebate check altogether, but appliance pick-up was still provided at no cost?

1. Yes

2. No

98. Don't know

99. Refused

PROGRAM SATISFACTION

“Now I have some questions about your satisfaction with your participation in the program.”

24. How satisfied were you with the application process? Would you say you were: Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied or Very Dissatisfied??

1. Very satisfied

2. Somewhat satisfied

3. Neither satisfied nor dissatisfied

4. Somewhat dissatisfied

5. Very dissatisfied

98. Don't know

99. Refused

25. How satisfied were you with the rebate amount? Would you say you were: Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied or Very Dissatisfied??

1. Very satisfied

2. Somewhat satisfied

3. Neither satisfied nor dissatisfied

4. Somewhat dissatisfied

5. Very dissatisfied

98. Don't know

99. Refused

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

1. Record # of weeks _____

98. Don't know [**Skip to Q27**]

99. Refused [**Skip to Q27**]

27. How satisfied were you with how long it took to receive the rebate? Would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied or Very Dissatisfied?

1. Very satisfied

2. Somewhat satisfied
 3. Neither satisfied nor dissatisfied
 4. Somewhat dissatisfied
 5. Very dissatisfied
 98. Don't know
 99. Refused
28. How satisfied were you with the scheduling of the pick-up of your old appliance(s)?
1. Very satisfied
 2. Somewhat satisfied
 3. Neither satisfied nor dissatisfied
 4. Somewhat dissatisfied
 5. Very dissatisfied
 98. Don't know
 99. Refused
29. How satisfied were you with the actual pick up of your old appliance(s)?
1. Very satisfied
 2. Somewhat satisfied
 3. Neither satisfied nor dissatisfied
 4. Somewhat dissatisfied
 5. Very dissatisfied
 98. Don't know
 99. Refused
30. How satisfied were you with the contractor who picked up your old appliance(s)?
1. Very satisfied
 2. Somewhat satisfied
 3. Neither satisfied nor dissatisfied
 4. Somewhat dissatisfied
 5. Very dissatisfied
 - 98 Don't know
 - 99 Refused
31. **[IF UNSATISFIED FOR Q26, Q27 or Q28]** Why were you dissatisfied?
1. Record Verbatim_____
 98. Don't know
 99. Refused
32. In the course of participating in **[UTILITY]'s** program, how often did you contact **[UTILITY]** or program staff with questions?
1. Never **[Skip to Q34]**
 2. Once
 3. 2 or 3 times

4. 4 times or more
 98. Don't know
 99. Refused
33. How did you contact them? **[CHECK ALL THAT APPLY]**
1. Phone
 2. Email or fax
 3. Letter
 4. In person
 98. Don't know
 99. Refused
34. And how satisfied were you with your communications with **[UTILITY]** and program staff? Would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied or Very Dissatisfied?
1. Very satisfied **[Skip to Q34]**
 2. Somewhat satisfied **[Skip to Q34]**
 3. Neither satisfied nor dissatisfied **[Skip to Q34]**
 4. Somewhat dissatisfied
 5. Very dissatisfied
 98. Don't know **[Skip to Q34]**
 99. Refused **[Skip to Q34]**
35. Why were you dissatisfied?
1. Record Verbatim _____
 98. Don't know
 99. Refused
36. Have you noticed any savings on your electric bill since removing your old appliance(s)?
1. Yes
 2. No **[Skip to Q36]**
 3. Not sure **[Skip to Q36]**
 98. Don't know **[Skip to Q36]**
 99. Refused **[Skip to Q36]**
37. **[IF NOTICED SAVINGS].** How satisfied are you with any savings you noticed on your electric bill since removing your old appliance(s)? Would you say you were: Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied or Very Dissatisfied??
1. Very satisfied
 2. Somewhat satisfied
 3. Neither satisfied nor dissatisfied
 4. Somewhat dissatisfied
 5. Very dissatisfied
 98. Don't know

99. Refused
38. Finally, if you were rating your overall satisfaction with the **[UTILITY]** Rebate Program, would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied or Very Dissatisfied?
1. Very satisfied
 2. Somewhat satisfied
 3. Neither satisfied nor dissatisfied
 4. Somewhat dissatisfied
 5. Very dissatisfied
98. Don't know
99. Refused
39. Why do you give it that rating?
1. Record Verbatim_____
98. Don't know
99. Refused
40. Do you have any suggestions to improve **[UTILITY]'s** Appliance Turn-In Program?
1. Yes, Record Verbatim_____
 2. No
98. Don't know
99. Refused

DEMOGRAPHICS

“Now I have just a few final questions about your home and energy use.”

41. Which of the following best describes your home/residence?
01. Single-family home, detached construction **[NOT A DUPLEX, TOWNHOME, OR APARTMENT; ATTACHED GARAGE IS OK]**
 02. Single family home, factory manufactured/modular
 03. Single family, mobile home
 04. Row House
 05. Two or Three family attached residence—traditional structure
 06. Apartment (4 + families)---traditional structure
 07. Condominium---traditional structure
 08. Other: **[Specify]**_____
 98. Don't know
 99. Refused
42. Do you own or rent this residence?
1. Own
 2. Rent
98. Don't know

99. Refused

43. Approximately when was your home constructed? **[DO NOT READ]**

1. Before 1960
2. 1960-1969
3. 1970-1979
4. 1980-1989
5. 1990-1999
6. 2000-2005
7. 2006 or later
98. Don't know
99. Refused

44. How many square feet is the above-ground living space (IF NECESSARY, THIS EXCLUDES WALK-OUT BASEMENTS)?

1. Numerical open end [Range 0-99,999] _____
98. Don't know
99. Refused

45. [IF Q41=98,99] Would you estimate the above-ground living space is about:

1. Less than 1,000 sqft
2. 1,001-2,000 sqft
3. 2,001-3,000 sqft
4. 3,001-4,000 sqft
5. 4,001-5,000 sqft
6. Greater than 5,000 sqft
98. Don't know
99. Refused

46. How many square feet of conditioned living space is below- ground (IF NECESSARY, THIS INCLUDES WALK-OUT BASEMENTS)?

1. Numerical open end [Range 0-99,999] _____
98. Don't know
99. Refused

47. [IF 43=98,99] Would you estimate the below-ground living space is about:?

1. Less than 1,000 sqft
2. 1,001-2,000 sqft
3. 2,001-3,000 sqft
4. 3,001-4,000 sqft
5. 4,001-5,000 sqft
6. Greater than 5,000 sqft
98. Don't know
99. Refused

This completes the survey. [UTILITY] appreciates your participation. Thanks for your time. Have a good day/evening.