

# Commercial and Industrial Programs Evaluation, Measurement and Verification Report 2017

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Prepared for the FirstEnergy Ohio Companies:

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The Cleveland Electric Illuminating Company  
The Toledo Edison Company*

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# 1. Executive Summary

The Ohio Operating companies, The Cleveland Electric Illuminating Company (CEI), Ohio Edison Company (OE), and The Toledo Edison Company (TE) (collectively “Companies”), implemented commercial and industrial programs during 2017. These programs include C&I Energy Solutions for Business Program for both Large Commercial (LCI) and Small Commercial (SCI) customers.

The LCI and SCI programs were implemented by Sodexo and ADM has been contracted to perform the impact and process evaluations. Energy efficiency equipment installations incentivized through the LCI and SCI programs include; Lighting, HVAC, Custom Equipment, Consumer Electronics, Kitchen Equipment, and Agricultural Equipment.

In addition, Reclaim implemented the Appliance Turn In SCI program. The appliance Turn In measure incents the recycling of refrigerators, freezers, dehumidifiers, and room air conditioners (RAC).

For non-appliance turn in measures, a total of 2,357 projects with a combined ex ante annual energy savings of 204,615,706 kWh were reported, as is shown in Table 1-1. Appliance Turn In accounted for 425 projects with ex ante annual energy savings of 670,398 kWh. A summary of the ex ante energy savings for Appliance Turn In for each service territory is shown in Table 1-2.

*Table 1-1 Summary of Ex Ante Savings (kWh) for Non-Appliance Turn In Measures<sup>1</sup>*

Program	CEI	OE	TE	Total
LCI	15,815,479	28,467,946	15,393,978	59,677,403
SCI	62,173,966	60,772,201	21,992,137	144,938,304
<b>Total</b>	<b>77,989,444</b>	<b>89,240,147</b>	<b>37,386,115</b>	<b>204,615,706</b>

*Table 1-2 Summary of Ex Ante Savings (kWh) for Appliance Turn In Measures<sup>2</sup>*

Program	CEI	OE	TE	Total
Appliance Turn In SCI	236,752	339,873	93,773	670,398
<b>Total</b>	<b>236,752</b>	<b>339,873</b>	<b>93,773</b>	<b>670,398</b>

Statistically representative samples of the program population were used for analysis purposes in both the impact and process evaluations. For the impact evaluation, sample stratum is based on energy efficient measure type, and ex ante savings (kWh). Samples sizes for both impact and process evaluations are shown in Table 1-3. Program participants in the Appliance Turn-In program are included in the counts for the customer

<sup>1</sup> All savings in this report are calculated at the retail level and do not include line losses.

<sup>2</sup> All savings in this report are calculated at the retail level and do not include line losses.

decision maker survey shown in Table 1-3. Appliance Turn-In customer decision makers account for 31 of the customers surveyed.

*Table 1-3 Sample Sizes for Data Collection Efforts*

Type of Data Collected	Large Customers	Small Customers	Total
Project On-Site Measurement and Verification	56	107	163
Customer Decision Maker Survey	41	248	289
Trade Ally Survey	2	19	21

During the PY2017 evaluation, pre-construction reviews were completed by ADM to mitigate evaluation risk for above-threshold projects. These included lighting projects with over 750,000 ex ante kWh savings, and custom projects with over 500,000 ex ante kWh savings. Pre-Reviews were completed for 85 above threshold projects. Tracking of these pre-reviews as well as evaluation status was conducted through bi-weekly conference calls and ADM provided quarterly reports.

Estimates of the ex post energy savings (kWh) for LCI and SCI for each service territory are reported in Table 1-4.

*Table 1-4 LCI and SCI kWh Impact Evaluation Results*

Operating Company	Customer Class	Ex Ante kWh Savings	Ex Post kWh Savings	Realization Rate
CEI	LCI	15,815,479	16,238,684	103%
	SCI	62,410,718	54,779,532	88%
<b>Total</b>		<b>78,226,196</b>	<b>71,018,217</b>	<b>91%</b>
OE	LCI	28,467,946	27,582,428	97%
	SCI	61,112,074	61,895,595	101%
<b>Total</b>		<b>37,479,888</b>	<b>37,654,868</b>	<b>100%</b>
TE	LCI	15,393,978	15,672,712	102%
	SCI	22,085,910	21,982,156	100%
<b>Total</b>		<b>37,479,888</b>	<b>37,654,868</b>	<b>100%</b>
<b>Grand Total</b>		<b>205,286,104</b>	<b>198,151,108</b>	<b>97%</b>

Estimates of peak demand reduction (kW) for LCI and SCI for each service territory are reported in

Table 1-5.

*Table 1-5 LCI and SCI kW Impact Evaluation Results*

Operating Company	Customer Class	Ex Ante kW Savings	Ex Post kW Savings	Realization Rate
CEI	LCI	2,943.84	3,067.14	104%
	SCI	10,947.18	9,373.56	86%
<b>Total</b>		<b>13,891.02</b>	<b>12,440.70</b>	90%
OE	LCI	4,017.15	3,656.53	91%
	SCI	9,848.62	9,593.23	97%
<b>Total</b>		<b>13,865.77</b>	<b>13,249.76</b>	96%
TE	LCI	2,575.51	2,558.02	99%
	SCI	3,299.53	2,350.76	71%
<b>Total</b>		<b>5,875.05</b>	<b>4,908.78</b>	84%
<b>Grand Total</b>		<b>33,631.84</b>	<b>30,599.24</b>	<b>91%</b>



## 2. Introduction and Purpose of Study

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This report presents the results of the impact and process evaluations of the Large Commercial, and Small Commercial Incentive Programs (collectively “C&I Programs”) for activity during the 2017 program year.

### 2.1 Non-Appliance Turn In Measures

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The overall objective for the impact evaluation of the C&I Programs was to verify the gross energy savings and peak demand (kW) reduction resulting from participation in the program during the 2017 program year.

The approach for the impact evaluation had the following main features:

- Available documentation (e.g., audit reports, savings calculation work papers, etc.) was reviewed for a sample of projects, with attention given to the calculation procedures and documentation for savings estimates.
- On-site data collection was conducted for a sample of projects to provide the information needed for estimating savings and demand reductions. Monitoring was also conducted at some sites to obtain more accurate information on the hours of operation for lighting and HVAC equipment.
- Ex post savings were estimated using the Ohio Technical Reference Manual (OH TRM)<sup>3</sup>, for deemed savings, and proven industry techniques for as-found savings:
  - Analysis of lighting savings was accomplished using ADM’s custom-designed lighting evaluation model with system parameters (fixture wattage, operating characteristics, etc.) based on information either collected on-site, taken from the Ohio TRM, and, if appropriate, using industry standards.
  - For non-lighting prescriptive measures, savings algorithms were used from the Ohio TRM. If prescriptive measures were not listed in the Ohio TRM, then industry standard algorithms were used; with the Pennsylvania TRM being the first choice.
  - Analysis of non-lighting custom measures was accomplished using ADM’s custom-designed non-lighting evaluation tool based on information on operating parameters collected on-site, from the Ohio TRM, and, if appropriate, industry standards.
- A customer survey was conducted with a sample of program participants to gather information on their decision making, and their likes and dislikes of the program.

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<sup>3</sup> Vermont Energy Investment Corporation (VEIC), *State of Ohio Energy Efficiency Technical Reference Manual*, Prepared for Public Utilities Commission of Ohio, August 6, 2010.

## 2.2 Appliance Turn In

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The research questions used to evaluate the Appliance Turn In measures are:

- How many eligible refrigerators, freezers, dehumidifiers, and room air conditioners were collected for recycling?
- How many of the appliances were removed from the grid without replacement.
- 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 five research questions:

- How effective were the marketing efforts for the program? Which marketing methods were most effective?
- How well did Company staff and the implementation team work together?
- Were the program participants satisfied with their experience? What was the level of satisfaction with the incentive amount, the scheduling process, and the pickup process? Did the increased incentive amount for part of the program year drive program participation satisfaction?
- Were there any significant changes or new obstacles during the 2017 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 Programs

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To be eligible to participate in the LCI Program, a customer had to be considered “large” as defined by the customer’s rate code. To be eligible to participate in the SCI Program, a customer had to be considered “small” also as defined by the customer’s rate code. Rate codes and corresponding customer sizes are presented in Table 3-1.

To be eligible for the appliance turn in measure, refrigerators and freezers must be between 10 and 30 cubic feet, operational (i.e., able to cool), and must be empty at the time of pickup. There is a limit of two refrigerators/freezers as well as two room air conditioners/dehumidifiers per calendar year. Participants are able to gain information on the program from the Energy Save Ohio website.

*Table 3-1 Rate Code by Customer Size*

Rate Code	Customer Size
GS	Small
GP	Large
GSU	Large
GT	Large

The primary objective of these programs is to increase the market share of high efficiency equipment among commercial and industrial customers. Qualifying existing small commercial, industrial, and municipal customers with buildings in the Companies’ service territories are eligible to participate in the program.

The energy efficiency measures (EEMs) that are implemented by the LCI and SCI programs are organized into three categories: *HVAC measures, Lighting measures, and Custom & Other Equipment measures.*

The HVAC, Lighting and Custom measures within LCI and SCI are intended to encourage customers to retrofit or install more efficient equipment to reduce both energy consumption and demand.

Customers can submit projects using the program’s online application process. Equipment installation projects are categorized into three main categories on the Energy Save Ohio website. Those categories are lighting programs, HVAC & Appliances, and Specialty Programs. Specialty programs include agricultural energy efficiency measures, consumer electronics, data centers, and retro-commissioning.

Customers can also request an energy audit be performed by the Council of Smaller Enterprises (COSE) to assist in identifying energy efficient measures that the business could benefit from.

Ex ante energy savings were calculated using methodologies outlined in the OH TRM, or using industry standard engineering calculations as determined by the implementation contractor.

For the LCI Program, the ex ante gross savings by measure type are shown in Table 3-2.

*Table 3-2 Ex ante Annual Energy Savings of Large Commercial*

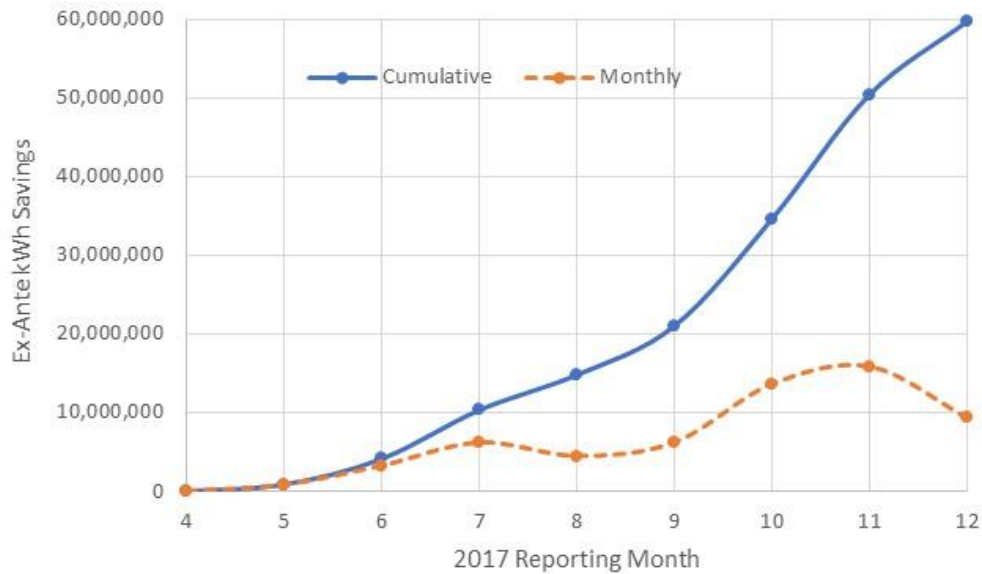
<b>Measure Type</b>	<b>Ex ante kWh Savings</b>			
	<b>CEI</b>	<b>OE</b>	<b>TE</b>	<b>Total Companies</b>
Custom Equipment	3,900,820	9,070,311	2,368,811	15,339,941
HVAC	0	0	13,227	13,227
Lighting	11,914,659	19,397,635	13,011,941	44,324,235
<b>Total</b>	<b>15,815,479</b>	<b>28,467,946</b>	<b>15,393,978</b>	<b>59,677,403</b>

For the SCI Program, the ex ante gross savings by measure type are shown in Table 3-3.

*Table 3-3 Ex ante Annual Energy Savings of Small Commercial*

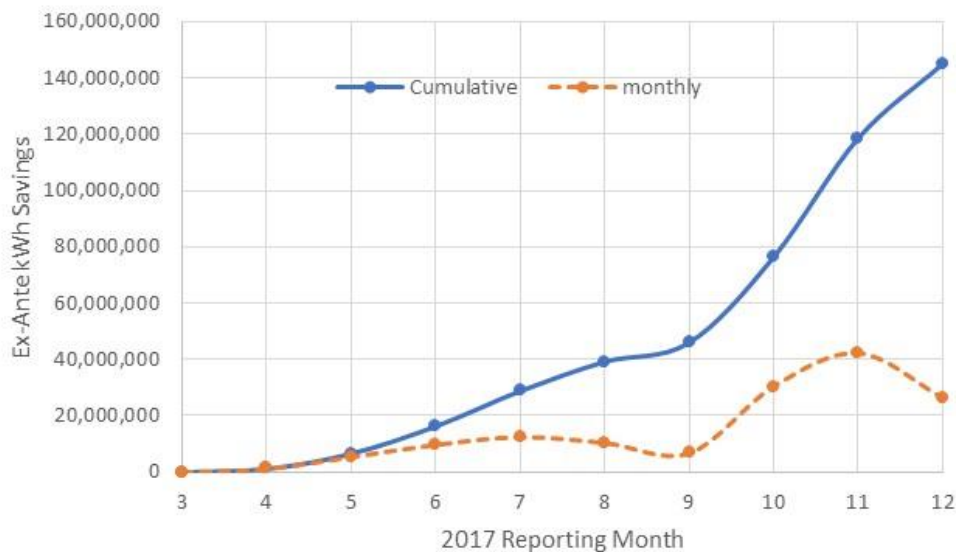
<b>Measure Type</b>	<b>Ex ante kWh Savings</b>			
	<b>CEI</b>	<b>OE</b>	<b>TE</b>	<b>Total Companies</b>
Appliance Turn In	236,752	339,873	93,773	670,398
Custom	10,202,962	9,254,406	2,697,774	22,155,143
HVAC	468,873	200,645	2,428	671,946
Lighting	51,502,130	51,317,150	19,291,935	122,111,215
<b>Grand Total</b>	<b>62,410,718</b>	<b>61,112,074</b>	<b>22,085,910</b>	<b>145,608,702</b>

Figure 3-1 shows the monthly and cumulative LCI Program's ex ante kWh savings by the date of application submission for all service territories. Nearly 65% of the total annual kWh ex ante savings were reported in the last 3 months of the year.



*Figure 3-1 LCI Monthly and Cumulative Ex post kWh Savings by Date of Application Submission*

Figure 3-2 shows the monthly and cumulative SCI Program's ex ante kWh savings by the date of application submission for all service territories. Nearly 70% of the total annual kWh ex ante savings were reported in the last 3 months of the year.



*Figure 3-2 SCI Monthly and Cumulative Ex post kWh Savings by Date of Application Submission*

## 4. Methodology

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ADM's evaluation of the 2017 C&I Programs consisted of both an impact evaluation and a process evaluation. The impact evaluation methodology is described in section 4.1 and the process evaluation methodology is described in section 4.2 of this chapter.

### 4.1 Impact Methodology

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The methodology used for estimating ex post savings is described in this section.

#### 4.1.1 Sampling Plans

Data used to estimate the ex post savings achieved through the LCI and SCI Programs were collected for samples of projects completed during the 2017 program year. Data provided by the implementation contractor showed that during 2017, there were 2,782 projects for the programs, which were expected to provide savings (ex ante) of 205,286,104 kWh annually.

#### Non-Appliance Turn In Measures

Prior to project completion by the implementation contractor, ADM performs pre-construction reviews of above-threshold projects (750,000 kWh for lighting projects, and 500,000 kWh for custom projects) to mitigate evaluation risk. The pre-construction reviews consist of a review of the project documentation to determine evaluation risk. If there is high risk in a project, then ADM may choose to perform a site verification visit, and/or collect post-installation data before a project is considered complete and an incentive is paid.

For LCI and SCI Programs, inspection of data on kWh savings for individual projects provided by the implementation contractor indicated that the distribution of savings was generally positively skewed, with a relatively small number of projects accounting for a high percentage of the estimated savings. Estimation of savings for each program is based on a ratio estimation procedure, which allows precision/confidence requirements to be met with a smaller sample size for each service territory. ADM selected a sample for each service territory with a sufficient number of projects to estimate the total achieved savings with  $\pm 10\%$  precision at 90% confidence. For each service territory, the precisions are designed to be less than  $\pm 10\%$ .

Sampling for the collection of program M&V data accounted for the M&V effort occurring in somewhat real-time, during program implementation. Completed projects accumulate over time as the program is implemented, and sample selection was thus spread over the entire program year. ADM used a near real-time process whereby a portion of the sample was selected periodically as projects in the program were completed. The timing of sample selection was contingent upon the timing of the completion of projects during the program year.

Table 4-1 shows the number of projects and ex ante energy savings of projects by stratum for the CEI service territory. Table 4-2 shows the number of projects and ex ante energy savings of projects by stratum for the OE service territory, and Table 4-3 shows the number of projects and ex ante energy savings of projects by stratum for the TE service territory.

### Appliance Turn In Measures

The actual sample size for these measures is based on the survey response rate for self-reported data, as well as the number of ride along that were possible in 2017. The survey was administered as a census to all participants.

*Table 4-1 Population Statistics Used for Sample Design for CEI*

Stratum Name	Ex ante kWh Savings	Strata Boundaries (kWh)	Population of Projects	Design Sample Size
Custom - SCI 1	895,433	<60,166	33	2
Custom - SCI 2	1,902,371	66,167 - 175,401	18	4
Custom - SCI 3	4,283,061	175,402 - 377,619	15	3
Custom - SCI 4	3,122,098	377,620 - 1,492,830	3	3
Custom - LCI 1	889,299	<279,861	6	4
Custom - LCI 2	3,011,521	279,862 - 762,881	5	1
HVAC - SCI 1	59,090	<4,079	33	2
HVAC - SCI 2	173,564	4,080 - 9,163	26	2
HVAC - SCI 3	105,395	9,164 - 65,412	2	2
HVAC - SCI 4	130,824	>65,413	1	1
Lighting - LCI 1	2,606,724	<176,190	30	4
Lighting - LCI 2	3,111,398	176,191 - 445,738	10	2
Lighting - LCI 3	6,196,537	445,739 - 1,481,281	6	4
Lighting - SCI 1	9,261,281	<59,488	377	5
Lighting - SCI 2	14,717,532	59,489 - 149,474	154	3
Lighting - SCI 3	14,268,398	149,475 - 270,375	70	2
Lighting - SCI 4	10,384,866	270,376 - 485,307	29	2
Lighting - SCI 5	2,870,052	>485,308	4	2
Appliance Turn In	236,752	NA	150	12
<b>Total</b>	<b>78,226,196</b>		<b>972</b>	<b>60</b>

*Table 4-2 Population Statistics Used for Sample Design for OE*

Stratum Name	Ex ante kWh Savings	Strata Boundaries (kWh)	Population of Projects	Design Sample Size
Custom - SCI 1	992,330	<55,712	40	2
Custom - SCI 2	1,243,345	55,713 - 151,390	14	2
Custom - SCI 3	5,079,105	151,391 - 426,637	18	4
Custom - SCI 4	1,939,626	>426,638	1	1
Custom - LCI 1	2,847,841	<269,085	31	6
Custom - LCI 2	2,335,252	269,086 - 630,265	5	2
Custom - LCI 3	3,887,217	>630,266	2	2
HVAC - SCI 1	13,329	<2,943	18	2
HVAC - SCI 2	123,347	2,944 - 7,591	22	4
HVAC - SCI 3	63,968	>7592	6	2
Lighting - LCI 1	2,410,172	<88,757	69	4
Lighting - LCI 2	3,728,019	88,758 - 245,947	25	2
Lighting - LCI 3	6,553,321	245,948 - 571,142	18	3
Lighting - LCI 4	6,706,123	>571,143	7	2
Lighting - SCI 1	7,132,600	<34,236	455	7
Lighting - SCI 2	9,833,699	34,237 - 83,150	185	6
Lighting - SCI 3	10,776,422	83,151 - 165,164	95	5
Lighting - SCI 4	7,819,129	165,165 - 292,085	35	2
Lighting - SCI 5	8,668,559	292,085 - 488,685	23	2
Lighting - SCI 6	7,086,741	>488,685	11	2
Appliance Turn In	339,873	NA	221	18
<b>Total</b>	<b>89,580,020</b>		<b>1,301</b>	<b>80</b>



*Table 4-3 Population Statistics Used for Sample Design for TE*

Stratum Name	Ex ante kWh Savings	Strata Boundaries (kWh)	Population of Projects	Design Sample Size
Custom - SCI 1	220,476	<20,460	16	3
Custom - SCI 2	661,863	20,461 - 79,308	21	2
Custom - SCI 3	253,168	79,309 - 134,500	2	1
Custom - SCI 4	1,562,267	>134,501	5	2
Custom - LCI 1	840,104	<206,734	9	5
Custom - LCI 2	1,528,706	>206,734	4	3
HVAC - LCI 1	13,227	NA	1	1
HVAC - SCI 1	2,428	NA	2	2
Lighting - LCI 1	2,938,067	<162,858	51	5
Lighting - LCI 2	5,175,302	162,859 - 431,383	17	3
Lighting - LCI 3	2,414,401	431,384 - 878,132	3	2
Lighting - LCI 4	2,484,171	>878,132	1	1
Lighting - SCI 1	3,130,986	<40,000	188	7
Lighting - SCI 2	8,283,896	40,001 - 148,574	104	5
Lighting - SCI 3	4,074,074	148,575 - 323,441	20	3
Lighting - SCI 4	1,867,150	323,442 - 603,621	4	2
Lighting - SCI 5	1,935,828	>603,621	2	2
Appliance Turn In	93,773	NA	54	5
<b>Total</b>	<b>37,479,888</b>		<b>504</b>	<b>55</b>

As shown in Table 4-4, the CEI sample projects account for approximately 18% of the claimed ex ante kWh savings within that territory. Similarly, Table 4-5, and Table 4-6 show that the OE and TE samples account for 18% and 32%, respectively, of the claimed ex ante savings within those territories.

*Table 4-4 Ex ante kWh Savings for Sampled Projects by Stratum for CEI*

<b>Stratum Name</b>	<b>Ex ante kWh Savings (population)</b>	<b>Ex ante kWh Savings (Sample)</b>	<b>Percent of Ex ante kWh in Sample</b>
Custom - SCI 1	895,433	24,274	3%
Custom - SCI 2	1,902,371	538,524	28%
Custom - SCI 3	4,283,061	774,321	18%
Custom - SCI 4	3,122,098	3,122,098	100%
Custom - LCI 1	889,299	683,370	77%
Custom - LCI 2	3,011,521	762,882	25%
HVAC - SCI 1	59,090	3,066	5%
HVAC - SCI 2	173,564	12,757	7%
HVAC - SCI 3	105,395	105,395	100%
HVAC - SCI 4	130,824	130,824	100%
Lighting - LCI 1	2,606,724	350,505	13%
Lighting - LCI 2	3,111,398	714,286	23%
Lighting - LCI 3	6,196,537	4,326,346	70%
Lighting - SCI 1	9,261,281	141,800	2%
Lighting - SCI 2	14,717,532	295,939	2%
Lighting - SCI 3	14,268,398	407,847	3%
Lighting - SCI 4	10,384,866	735,420	7%
Lighting - SCI 5	2,870,052	567,711	20%
Appliance Turn In	236,752	11,819	5%
<b>Total</b>	<b>78,226,196</b>	<b>13,709,186</b>	<b>18%</b>

*Table 4-5 Ex ante kWh Savings for Sampled Projects by Stratum for OE*

<b>Stratum Name</b>	<b>Ex ante kWh Savings (population)</b>	<b>Ex ante kWh Savings (Sample)</b>	<b>Percent of Ex ante kWh in Sample</b>
Custom - SCI 1	992,330	33,088	3%
Custom - SCI 2	1,243,345	159,840	13%
Custom - SCI 3	5,079,105	1,267,027	25%
Custom - SCI 4	1,939,626	1,939,626	100%
Custom - LCI 1	2,847,841	816,184	29%
Custom - LCI 2	2,335,252	790,772	34%
Custom - LCI 3	3,887,217	3,887,217	100%
HVAC - SCI 1	13,329	476	4%
HVAC - SCI 2	123,347	24,442	20%
HVAC - SCI 3	63,968	23,821	37%
Lighting - LCI 1	2,410,172	213,564	9%
Lighting - LCI 2	3,728,019	402,660	11%
Lighting - LCI 3	6,553,321	1,249,695	19%
Lighting - LCI 4	6,706,123	1,762,437	26%
Lighting - SCI 1	7,132,600	123,657	2%
Lighting - SCI 2	9,833,699	239,135	2%
Lighting - SCI 3	10,776,422	435,026	4%
Lighting - SCI 4	7,819,129	473,462	6%
Lighting - SCI 5	8,668,559	628,998	7%
Lighting - SCI 6	7,086,741	1,940,405	27%
Appliance Turn In	339,873	34,004	10%
<b>Total</b>	<b>89,580,020</b>	<b>16,445,536</b>	<b>18%</b>

*Table 4-6 Ex ante kWh Savings for Sampled Projects by Stratum for TE*

<b>Stratum Name</b>	<b>Ex ante kWh Savings (population)</b>	<b>Ex ante kWh Savings (Sample)</b>	<b>Percent of Ex ante kWh in Sample</b>
Custom - SCI 1	220,476	32,944	15%
Custom - SCI 2	661,863	102,836	16%
Custom - SCI 3	253,168	134,500	53%
Custom - SCI 4	1,562,267	581,927	37%
Custom - LCI 1	840,104	598,734	71%
Custom - LCI 2	1,528,706	1,070,113	70%
HVAC - LCI 1	13,227	13,227	100%
HVAC - SCI 1	2,428	2,428	100%
Lighting - LCI 1	2,938,067	321,114	11%
Lighting - LCI 2	5,175,302	1,467,883	28%
Lighting - LCI 3	2,414,401	1,536,268	64%
Lighting - LCI 4	2,484,171	2,484,171	100%
Lighting - SCI 1	3,130,986	47,167	2%
Lighting - SCI 2	8,283,896	350,671	4%
Lighting - SCI 3	4,074,074	629,720	15%
Lighting - SCI 4	1,867,150	603,621	32%
Lighting - SCI 5	1,935,828	1,935,828	100%
Appliance Turn In	93,773	5,372	6%
<b>Total</b>	<b>37,479,888</b>	<b>11,918,523</b>	<b>32%</b>

As shown in Table 4-7, the CEI sample projects account for approximately 15% of the ex ante peak kW savings. As shown in Table 4-8, the OE sample projects account for approximately 16% of the ex ante peak kW savings. As shown in Table 4-9, the TE sample projects account for approximately 30% of the ex ante peak kW savings.

*Table 4-7 Ex ante Peak Demand kW Savings for Sampled Projects for CEI*

<b>Stratum Name</b>	<b>Ex ante kW Savings (population)</b>	<b>Ex ante kW Savings (Sample)</b>	<b>Percent of Ex ante kWh in Sample</b>
Custom - SCI 1	184.41	3.52	2%
Custom - SCI 2	293.99	77.96	27%
Custom - SCI 3	487.93	175.08	36%
Custom - SCI 4	503.41	503.41	100%
Custom - LCI 1	135.32	107.89	80%
Custom - LCI 2	1,118.83	87.09	8%
HVAC - SCI 1	26.40	1.12	4%
HVAC - SCI 2	83.39	5.25	6%
HVAC - SCI 3	37.52	37.52	100%
HVAC - SCI 4	2.88	2.88	100%
Lighting - LCI 1	367.31	72.68	20%
Lighting - LCI 2	566.10	92.76	16%
Lighting - LCI 3	756.28	522.32	69%
Lighting - SCI 1	1,651.38	8.04	0%
Lighting - SCI 2	2,574.58	49.43	2%
Lighting - SCI 3	2,757.87	58.77	2%
Lighting - SCI 4	1,868.24	125.22	7%
Lighting - SCI 5	427.84	91.56	21%
Appliance Turn In	47.33	1.89	4%
<b>Total</b>	<b>13,891.02</b>	<b>2,024.38</b>	<b>15%</b>

Table 4-8 Ex ante Peak Demand kW Savings for Sampled Projects by Stratum for OE

Stratum Name	Ex ante kW Savings (population)	Ex ante kW Savings (Sample)	Percent of Ex ante kWh in Sample
Custom - SCI 1	178.39	2.43	1%
Custom - SCI 2	266.85	30.54	11%
Custom - SCI 3	264.64	40.98	15%
Custom - SCI 4	28.12	28.12	100%
Custom - LCI 1	474.70	112.30	24%
Custom - LCI 2	319.62	70.53	22%
Custom - LCI 3	460.34	460.34	100%
HVAC - SCI 1	7.75	0.20	3%
HVAC - SCI 2	50.24	9.89	20%
HVAC - SCI 3	31.72	15.12	48%
Lighting - LCI 1	354.36	49.30	14%
Lighting - LCI 2	529.17	67.61	13%
Lighting - LCI 3	1,040.76	186.27	18%
Lighting - LCI 4	838.20	205.20	24%
Lighting - SCI 1	1,121.11	15.40	1%
Lighting - SCI 2	1,821.61	36.20	2%
Lighting - SCI 3	1,917.81	103.43	5%
Lighting - SCI 4	1,300.27	92.73	7%
Lighting - SCI 5	1,471.92	133.33	9%
Lighting - SCI 6	1,315.93	489.07	37%
Appliance Turn In	72.24	5.44	8%
<b>Total</b>	<b>13,865.77</b>	<b>2,154.43</b>	<b>16%</b>

*Table 4-9 Ex ante Peak Demand kW Savings for Sample Projects by Stratum for TE*

<b>Stratum Name</b>	<b>Ex ante kW Savings (population)</b>	<b>Ex ante kW Savings (Sample)</b>	<b>Percent of Ex ante kWh in Sample</b>
Custom - SCI 1	11.87	0.47	4%
Custom - SCI 2	25.28	13.34	53%
Custom - SCI 3	15.43	12.24	79%
Custom - SCI 4	58.29	34.88	60%
Custom - LCI 1	120.42	75.00	62%
Custom - LCI 2	202.38	145.90	72%
HVAC - LCI 1	5.35	5.35	100%
HVAC - SCI 1	2.21	2.21	100%
Lighting - LCI 1	567.77	54.16	10%
Lighting - LCI 2	1,009.22	295.95	29%
Lighting - LCI 3	288.53	178.67	62%
Lighting - LCI 4	381.84	381.84	100%
Lighting - SCI 1	479.08	21.25	4%
Lighting - SCI 2	1,372.70	10.01	1%
Lighting - SCI 3	648.66	78.20	12%
Lighting - SCI 4	302.91	100.34	33%
Lighting - SCI 5	361.79	361.79	100%
Appliance Turn In	21.31	0.86	4%
<b>Total</b>	<b>5,875.05</b>	<b>1,772.46</b>	<b>30%</b>

#### **4.1.2 Review of Documentation for Non-Appliance Turn In Measures**

After the samples of projects were selected, project documentation was downloaded from the implementation database, energyOrbit. The first step in the evaluation was to review this documentation and other program materials that were relevant to the evaluation effort.

For each project, the available documentation (e.g., audit reports, savings calculation work papers, etc.) for each rebated measure was reviewed, with attention given to the calculation procedures and documentation for savings estimates. Documentation that was reviewed for all projects selected for the sample included program forms, data bases, reports, billing system data, weather data, and any other potentially useful data. Each application was reviewed to determine whether the following types of information had been provided:

- Documentation for the equipment changed, including: (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information
- Documentation for the new equipment installed, including: (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information

- Information about the savings calculation methodology, including: (1) what methodology was used, (2) specifications of assumptions and sources for these specifications, and (3) correctness of calculations

If there was uncertainty regarding a project, or apparently incomplete project documentation, ADM staff contacted the implementation contractor to seek further information to ensure the development of an appropriate project-specific M&V plan.

#### 4.1.3 Data Collection Verification for Appliance Turn In Measures

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

- Validated program tracking data provided in the Vision DSM SSRS reporting system by checking for duplicate or erroneous entries; and,
- Conducted 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.

Participant tracking data for the program provided by Recleim through the Vision DSM SSRS reporting system were reviewed. The numbers of refrigerators, freezers, dehumidifiers, and RACs reported in the program tracking data that were recycled during 2017 are shown in Table 4-10.

*Table 4-10: Appliances Recycled in 2017*

Utility	Number of Refrigerators Collected	Number of Freezers Collected	Number of RACs Collected	Number of Dehumidifiers Collected
CEI	148	24	9	2
OE	200	46	17	5
TE	49	18	6	3
<b>All Companies</b>	<b>397</b>	<b>88</b>	<b>32</b>	<b>10</b>

As the table above shows, the majority of program participation was represented by recycled refrigerators. Freezer units were a distant second, and RACs were the third, while dehumidifiers represented the smallest portion of program participation. Refrigerators represent approximately 75% of the ex ante kWh savings claimed for the



program, freezers represent approximately 17%, RAC represent approximately 6%, and dehumidifiers represent less than 2%.

#### **4.1.4 Data Collection Verification for Non-Appliance Turn In Measures**

On-site visits were used to collect data for calculating ex post savings impacts. The visits to the sites of the sampled projects were used to collect primary data on the facilities participating in the program. Occasionally, on-site visits were conducted during pre-construction reviews. ADM also attended pre or post-inspections along with the implementation team when necessary. These combined on-site visits help reduce the level of effort for the participating business.

When projects were selected for the M&V sample, ADM notified the Companies by providing the Companies Energy Efficiency and Demand Response EM&V staff with a list of projects for which ADM planned to schedule M&V activities. This list included the company name, the project ID, the site address or other premise identification, and the respective contact information for the customer representative ADM intended to contact to schedule an appointment.

Typically, notification was provided at least one week prior to ADM contacting customers to schedule M&V visits. Upon request, ADM coordinated its scheduling and M&V activities with the Customer Service Representative.

During an on-site visit, the field staff accomplished three major tasks:

- First, they verified the implementation status of all measures for which customers received incentives. They verified that the energy efficiency measures were indeed installed, that they were installed correctly and that they still functioned properly.
- Second, they collected the physical data needed to analyze the energy savings that have been realized from the installed improvements and measures. Data were collected using a form that was prepared specifically for the project in question after an in-house review of the project file.
- Third, they interviewed the contact personnel at a facility to obtain additional information on the installed system to complement the data collected from other sources.

At some sites, monitoring was conducted to gather more information on the operating hours of the installed measures. Monitoring was conducted at sites where it was judged that the monitored data would be useful for further refinement and higher accuracy of savings calculations. Monitoring was not considered necessary for sites where project documentation allowed for sufficiently detailed calculations.

#### 4.1.5 Procedures for Estimating Savings from Measures

The method ADM employs to determine ex post savings impacts depends on the types of measures being analyzed. Categories of measures include the following:

- Lighting
- HVAC
- Motors
- VFDs
- Compressed-Air
- Refrigeration Equipment
- Process Improvements
- Appliance Turn In

ADM uses a specific set of methods to determine ex post savings for projects that depend on the type of measure being analyzed. For these programs, the Ohio TRM savings algorithms are utilized first and if additional calculations are necessary, EM&V best practices are used. Typical EM&V methods employed are summarized in Table 4-11.

*Table 4-11 Typical Methods to Determine Savings for Custom Measures*

<i>Type of Measure</i>	<i>Method to Determine Savings</i>
Compressed Air Systems	Engineering analysis, with monitored data on load factor and schedule of operation
Lighting	Custom-designed lighting evaluation model, which uses data on wattages before and after installation of measures and hours-of-use data from field monitoring.
HVAC (including packaged units, chillers, cooling towers, controls/EMS)	eQUEST model using DOE-2 as its analytical engine for estimating HVAC loads and calibrated with site-level billing data to establish a benchmark.
Motors and VFDs	Measurements of power and run-time obtained through monitoring
Refrigeration	Simulations with eQUEST engineering analysis model, with monitored data
Process Improvements	Engineering analysis, with monitored data on load factor and schedule of operation

The activities specified in Table 4-11 can result in two estimates of savings for each sample project: a deemed ex post gross savings estimate (when the measure is applicable to a deemed savings calculation as defined in the Ohio TRM) and an as-found ex post gross savings estimates developed through the M&V procedures employed by

ADM. If a measure is not listed in the Ohio TRM, but is a prescriptive measure, then the Pennsylvania TRM is utilized. ADM developed estimates of program-level ex post savings by applying a ratio estimation procedure in which achieved savings rates estimated for the sample projects were applied to the program-level ex ante savings.

Energy savings realization rates<sup>4</sup> were calculated for each project for which on-site data collection and engineering analysis/building simulations are conducted. Sites with relatively high or low realization rates were further analyzed to determine the reasons for the discrepancy between ex ante and ex post energy savings.

The following discussion describes the basic procedures used for estimating savings from various measure types.

**Lighting Measures:** Lighting measures examined include retrofits of existing fixtures, lamps and/or ballasts with energy efficient fixtures, lamps and/or ballasts. These types of measures reduce demand, while not affecting operating hours. Any proposed lighting control strategies were examined that might include the addition of energy conserving control technologies such as motion sensors or daylighting controls. These measures typically involve a reduction in hours of operation and/or lower current passing through the fixtures.

Analyzing the savings from such lighting measures requires data for retrofitted fixtures on: (1) wattages before and after the retrofit, and (2) hours of operation before and after the retrofit. Fixture wattages were taken from a table of standard wattages, with corrections made for non-operating fixtures. Hours of operation were determined from communications with site contact or metered data collected after measure installation for a sample of fixtures.

To determine baseline and post-retrofit demand values for the lighting efficiency measures, ADM used industry standard data on wattages of lighting fixtures and ballasts to determine demand values for lighting fixtures. These data provide information on wattages for common lamp and ballast combinations.

ADM used per-fixture baseline demand, retrofit demand, and appropriate post-retrofit operating hours to calculate peak demand savings and annual energy savings for sampled fixtures of each usage type.

The identified hours of use and the fixture wattages are used to calculate post-retrofit kWh usage. Fixture peak demand is calculated by dividing the total kWh usage calculated peak period of the day by the number of hours in the peak period.

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<sup>4</sup> The savings realization rate for a project is calculated as the ratio of the achieved savings (ex post) for the project (as measured and verified through the M&V effort) to the expected savings (ex ante) (as determined through the project application procedure and recorded in the tracking system for the program).

Peak Period Demand Savings are calculated as the difference between peak period baseline demand and post-installation peak period demand of the affected lighting equipment.

The baseline and post-installation peak period demands are calculated by dividing the total kWh usage during the Peak Period by the number of hours in the peak period.

ADM calculated annual energy savings for each sampled fixture per the following formula:

$$\text{Annual Energy Savings} = kWh_{\text{Before}} - kWh_{\text{After}}$$

The values for insertion in this formula are determined through the following steps:

- 1) Results from the on-site visit are used to determine if deemed hours of use or as-found hours of use should be applied. The data are extrapolated to develop the annual operating profile of the lighting.
- 2) These average operating hours are then applied to the baseline and post-installation average demand for each usage area to calculate the energy usage and peak period demand for each usage area.
- 3) The annual baseline energy usage is calculated as the sum of the annual baseline kWh for all the usage areas. The post-retrofit energy usage is calculated similarly. The energy savings are calculated as the difference between baseline and post-installation energy usage.
- 4) Savings from lighting measures in conditioned spaces are factored by the region-specific, building type-specific heating cooling interaction factors to calculate total savings attributable to lighting measures, inclusive of impacts on HVAC operation. These factors are based on the Ohio TRM.

**HVAC Measures:** Savings estimates for HVAC measures installed at a facility are calculated based on the calculations provided in the Ohio TRM or derived by using the energy use estimates developed through DOE-2 simulations. Each simulation produces estimates of HVAC energy and demand usage to be expected under different assumptions about equipment and/or construction conditions. There may be cases in which DOE-2 simulation is inappropriate because data are not available to properly calibrate a simulation model, and engineering analysis provides more accurate M&V results. For the analysis of HVAC measures, the data collected through on-site visits and monitoring are utilized. Using these data, ADM prepared estimates of the energy savings for the energy efficient equipment and measures installed in each of the participant facilities.

When a simulation was necessary, engineering staff prepared a model calibration run. This is a base case simulation to ensure that the energy use estimates from the simulations have been reconciled against actual data on the building's energy use. This

run is based on the information collected in an on-site visit pertaining to types of equipment, their efficiencies and capacities, and their operating profiles. Current operating schedules are used for this simulation, as are local (TMY) weather data covering the study period. The model calibration run is made using actual weather data for a time corresponding to the available billing data for the site.

The goal of the model calibration effort is to have the results of the DOE-2 simulation come within approximately 10% of the patterns and magnitude of the energy use observed in the billing data history. In some cases, it may not be possible to achieve this calibration goal because of idiosyncrasies of facilities (e.g., multiple buildings, discontinuous occupancy patterns, etc.).

Once the analysis model has been calibrated for a facility, ADM performs three steps in calculating estimates of energy savings for HVAC measures installed or to be installed at the facility.

- First, an analysis of energy use at a facility under the assumption that the energy efficiency measures are not installed is performed. If the measure involves replacement of equipment on failure, the required minimum efficiencies given by the appropriate energy efficiency standard would be used. This methodology holds true for all programs/measures being considered.
- Second, energy use at the facility with all conditions the same but with the energy efficiency measures now installed is analyzed.
- Third, the results of the analyses from the preceding steps are compared to determine the energy savings attributable to the energy efficiency measure.

**Motor Measures:** The energy savings from use of high efficiency motors on HVAC and non-HVAC applications are derived from the Ohio TRM. Energy use is measured only for the high efficiency motor and only after it has been installed. The data thus collected are then used in estimating what energy use would have been for the motor application if the high efficiency motor had not been installed. The equivalent full load hours are determined from on-site interviews with the site contact.

**VFD Measures:** A variable-frequency drive (VFD) is an electronic device that controls the speed of a motor by varying the magnitude of the voltage, current, or frequency of the electric power supplied to the motor. The factors that make a motor load a suitable application for a VFD are: (1) variable speed requirements, and (2) high annual operating hours. The interplay of these two factors can be summarized by information on the motor's duty cycle, which essentially shows the percentage of time during the year that the motor operates at different speeds. The duty cycle should show good variability in speed requirements, with the motor operating at reduced speed a high percentage of the time.

Potential energy savings from the use of VFDs are usually most significant with variable-torque loads, which have been estimated to account for 50% to 60% of total motor energy use in the non-residential sectors. Energy saving VFDs may be found on fans, centrifugal pumps, centrifugal blowers, and other centrifugal loads, most usually where the duty cycle of the process provides a wide range of speeds of operation.

ADM's approach to determining savings from the installation of VFDs involves: (1) making one-time measurements of voltage, current, and power factor of the VFD/motor, and (2) conducting continuous measurements of amperage over a period of time in order to obtain the data needed to develop VFD load profiles and calculate demand and energy savings. VFDs are generally used in applications where motor loading changes when the motor speed changes. Consequently, the true power drawn by a VFD is recorded to develop VFD load shapes. One-time measurements of power are made for different percent speed settings. Power and percent speed or frequency (depending on VFD display options) are recorded for as wide a range of speeds as the customer allows the process to be controlled; field staff attempt to obtain readings from 40% to 100% speed in 10% to 15% increments.

**Compressed Air Measures:** Measures to improve the efficiency of a compressed air system include the reduction of air leaks, resizing of compressors, installing more efficient compressors, improved controls, or a complete system redesign. Savings from such measures are evaluated through engineering analysis of compressor performance curves, supported by data collected through short-term metering.

ADM field staff obtains nameplate information for the pre-retrofit equipment either from the project file or during the on-site survey. Performance curve data are obtained from manufacturers. Engineering staff then conducts an engineering analysis of the performance characteristics of the pre-retrofit equipment. During the on-site survey, field staff inspects the as-built system equipment, take pressure and load readings, and interview the system operator to identify seasonal variations in load. Potential interactions with other compressors are assessed and it is verified that the rebated compressor is being operated as intended.

When appropriate, short-term measurements are performed to reduce the uncertainty in defining the load on the as-built system. These measurements may be taken either with a multi-channel logger, which can record true power for several compressors, with current loggers, which can provide average amperage values, or with motor loggers to record operating hours. The appropriate metering equipment is selected by considering variability in load and the cost of conducting the monitoring.

For one-to-one air compressor replacements that are 40 HP or lower, the deemed savings algorithms may be applied. However, typical air compressor upgrades include further improvements.



**Refrigeration and Process Improvements:** Analysis of savings from refrigeration and process improvements is inherently project-specific; however, savings algorithms from the Ohio TRM, if available and applicable, are used. Because of the specificity of processes, analyzing the processes through simulations is generally not feasible. Rather, reliance is made on engineering analysis of the process affected by the improvements. Major factors in ADM's engineering analysis of process savings are operating schedules and load factors. Information on these factors is developed through short-term monitoring of the affected equipment, be it pumps, heaters, compressors, etc. The monitoring is done after the process change, and the data gathered on operating hours and load factors are used in the engineering analysis to define "before" conditions for the analysis of savings. In the case where monitoring is not applicable, detailed information from the site contact is necessary.

**Appliance Measures:** Calculation of energy savings from appliances are derived from the Ohio TRM. This includes refrigerators, washing machines, refrigerated vending machines, and commercial kitchen equipment.

**Agricultural Measures:** Various agricultural measures are considered for the LCI and SCI energy efficiency program. Savings algorithms for these measures are treated as prescriptive measures based on the latest version of the Pennsylvania TRM or as custom calculations.

**Appliance Turn In Measures:** Ex ante savings estimates for the Companies' Commercial Appliance Turn-In Program were taken directly from the OH TRM for units recycled during 2017. These values are 1,376 kWh per refrigerator, 1,244 kWh per freezer, 1,075 kWh per dehumidifier, and 122 kWh per RAC<sup>5</sup> recycled through the program.

During the impact evaluation effort, ADM calculated annual kWh savings for measures in the program using both the deemed savings values from the OH TRM and the as found methodologies described in the following sections. The higher gross annual kWh values were extrapolated to the population of 2017 recycled units to obtain a program-level estimate of gross kWh savings per Ohio RC \$4928.662.

The estimated savings from the as found methodologies were assessed by developing separate, independent gross unit energy consumption (UEC) estimates for refrigerators, freezers, dehumidifiers, and RACs recycled through the program in 2017. The details regarding how these UEC estimates were developed are provided in the following sections.

**Appliance Turn in Refrigerators and Freezers:** Gross savings for refrigerators and freezers recycled through utility pickup programs have been estimated in previous impact

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<sup>5</sup> 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.

evaluations by using multiple linear regression analysis to determine UECs. In analytical terms, the regression analysis involves estimating the parameters of a regression model:

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

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 all appliances in the population.

This regression-based approach to estimating refrigerator and freezer energy use is described in the U.S. Department of Energy's (DOE) *Uniform Methods Project Refrigerator Recycling Evaluation Protocol*.<sup>6</sup> The Uniform Methods Project (UMP) is a set of protocols developed by the DOE that provides 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 several appliance characteristics including age, size, configuration, usage (primary/secondary), and location (conditioned or unconditioned space).

ADM used this regression model developed by the UMP to estimate the UEC for refrigerators recycled through the Companies' program. Specifically, the average characteristics of refrigerators recycled through the program were multiplied by the associated coefficients from the UMP model and summed to produce an estimated average UEC for refrigerators. This average UEC represents an estimate of the annual energy usage of the average refrigerator recycled through the program in 2017. The program tracking data collected by Recleim and stored in the VisionDSM database contained much of the necessary appliance characteristic data needed to use the UMP model. ADM supplemented the program tracking data with survey data from program participants regarding primary/secondary usage, and appliance location.

It is important to note that the UMP model only considers refrigerators. Accordingly, ADM used a refrigerator-to-freezer ratio factor to determine the average UEC for freezers. This refrigerator-to-freezer factor methodology is like that used by the NMR Group, Inc. in a recent evaluation of the Massachusetts Appliance Turn-in Program.<sup>7</sup> 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

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<sup>6</sup> <http://www1.eere.energy.gov/wip/pdfs/53827-7.pdf>

<sup>7</sup> NMR Group, Inc. *Massachusetts Appliance Turn-in Program Impact Evaluation, Final*. June 15<sup>th</sup>, 2011. Available at: <http://ma-eeac.org/wordpress/wp-content/uploads/Impact-Evaluation-Final-Report.pdf>



mentioned Massachusetts Appliance Turn-In Measures Evaluation performed by NMR Group, Inc.

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

Based on the preceding discussion, the procedure used by ADM to estimate as found 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 2017 based on the average refrigerator characteristics established from Recleim tracking data and participant surveying.
- 2) Freezer UEC was obtained by multiplying the estimated refrigerator UEC by the refrigerator-to-freezer factor of 0.85 to obtain estimates of the average freezer UECs.
- 3) Partial-use factors were applied to the UEC estimates to account for the fact that some appliances would likely not be plugged in year-around had they not been decommissioned.

**Appliance Turn In Room Air Conditioners (RAC):** Calculating as found gross kWh savings for recycled room air conditioners was completed in accordance with the algorithms in the Energy Star Room AC Calculator.<sup>8</sup> 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. The standard TRM algorithm may not be appropriate in all cases, given the various replacement scenarios. However, because RAC recycling makes up such a small percentage of program savings, the stipulated 76% replacement value from the TRM was used. The following formula was used to calculate as found kWh savings for the average RAC recycled through the program:

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<sup>8</sup>[http://www.energystar.gov/ia/business/bulk\\_purchasing/bpsavings\\_calc/CalculatorRoomAC.xls?7e02-5075](http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorRoomAC.xls?7e02-5075)

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

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<sup>9</sup>. 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 (0.02<sup>10</sup>)

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

Information regarding the age of collected RACs was provided in the tracking database. The Association of Home Appliance Manufacturers (AHAM) maintains sales-weighted average capacity and EER data going back to 1972<sup>11</sup>. The most recent year that the data

<sup>9</sup> NREL (2006). "*Building America Performance Analysis Procedures for Existing Homes*." <https://www.nrel.gov/docs/fy06osti/38238.pdf>

<sup>10</sup> On page 11 of "*Building America Performance Analysis Procedures for Existing Homes*," the professional maintenance factor is 0.01, and the seldom or never maintained factor is 0.03. ADM decided to take 0.02 as a conservative assumption.

<sup>11</sup> This AHAM data was accessed from two sources:

1. <https://rtf.nwccouncil.org/meeting/rtf-meeting-march-1-2011>

was available was 2010<sup>12</sup>. Some interpolation was required for the years 1973 and 1979 and 1998.

Using this AHAM data, each RAC recycled through the program was assigned a proxy EER value based on the units age reported in the tracking system. For RACs whose reported age indicated a vintage before 1972, the sales-weighted average EER for 1972 was used as a proxy. For RACs whose reported age indicated a 2011 or 2012 vintage, the sales-weighted average EER for 2010 was used as a proxy. The EER values were then adjusted to account for equipment degradation as described above. The baseline replacement RAC was assumed to have an EER equal to the sales-weighted average RAC in 2010 from the AHAM data (EER = 10.18). Effective Full Load Hours (EFLH) were assumed to be 233 hours based on the assumptions in the TRM. The existing and new baseline capacity was assumed to be 10,000 Btuh based on the assumptions in the Energy Star Room Air Conditioner Savings Calculator.

**Appliance Turn In Dehumidifiers:** Calculating as found energy savings for participating dehumidifiers was accomplished in accordance with the Ohio TRM with updated run hours per EnergyStar revisions. Savings were calculated for units that were retired and recycled without a direct replacement. Therefore, the energy savings from a recycled dehumidifier are equal to the energy consumed by the unit when it is in service. The kWh energy savings per unit was taken to be equal to the federal standard efficient dehumidifier energy consumption by capacity.

Lifetime kWh savings were calculated by multiplying ex post verified annual gross kWh estimates by the remaining useful life (RUL) values for each appliance type, and by the estimated useful life (EUL) of installed energy efficiency measures.

## 4.2 Process Evaluation Methodology

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The process evaluation is designed to research and document the program delivery mechanisms, and collective experiences of program participants, partners, and staff. ADM uses such information to assess if implementation strategies and/or program design could better serve business customers. Table 4-12 provides a summary of the research questions and corresponding data collection activities.

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2. <https://ieer.org/wp/wp-content/uploads/2012/03/DOE-2011-Buildings-Energy-DataBook-BEDB-tables.xlsx>

<sup>12</sup> The data applied to this report was still the most recent version based on ADM's verification.

*Table 4-12: C&I Energy Solutions Program Research Questions*

Researchable Questions	Activity to Support the Question
Were there any significant program design changes? If so, what influenced the change(s) how did the change(s) impact the program?	<ul style="list-style-type: none"> <li>■ Program staff interviews</li> <li>■ Program ally interviews</li> </ul>
Is the program being administered effectively in terms of program oversight, communication, staffing, training and/or reporting?	<ul style="list-style-type: none"> <li>■ Program staff interview</li> </ul>
Is the program being implemented effectively in terms of the participation processes, application tools and marketing and outreach? Could improvements be made to better reach the intended market?	<ul style="list-style-type: none"> <li>■ Program ally interviews</li> <li>■ Participant Survey</li> <li>■ Near Participant Survey</li> </ul>
Were the program participants and program allies satisfied with their experiences?	<ul style="list-style-type: none"> <li>■ Participant survey</li> <li>■ Program ally interviews</li> </ul>
What changes can be made to the program's design or delivery to improve its effectiveness in future program years?	<ul style="list-style-type: none"> <li>■ Program staff interview</li> <li>■ Program ally survey</li> <li>■ Participant survey</li> </ul>

To address these researchable issues, ADM reviewed program documentation, administered participant and near participant surveys, and completed in-depth interviews with program staff and program allies. ADM began the process evaluation in August of 2017 with the development of data collection instruments and a review of program documentation. Data collection and analysis occurred September 2017 through January 2018.

- **Program Documentation Review:** Program materials are an important data source for the process evaluation. We began by requesting all available documentation from program staff. This list included any operating or process manuals, implementation contracts, resident and agency outreach and education materials, agency newsletters and the current price sheet.
- **Program Staff In-Depth Interviews:** ADM researchers conducted in-depth interviews with key program staff at the Companies and Sodexo. The objective of these interviews was to gather information about program design and implementation strategies to elicit feedback regarding program successes and opportunities for improvements.
- **Program Ally In-Depth Interviews:** ADM conducted in-depth interviews with 21 program allies that completed projects through the C&I Energy Solutions Program. The survey addressed issues related to program design, communication, and opportunities for improvements.

- Participant Survey: ADM administered online surveys to program participants. In total, 258 customers completed the survey. Survey topics covered program awareness, decision making, the participation process including communication with program staff, and satisfaction.
- Near Participant Survey: ADM administered online surveys to program near participants. In total, 14 near participants completed the survey. Near participants were defined as having an application in the following status: application canceled, denied, void or expired.

Additional survey questions were asked in the participant survey for those that participated in the appliance turn in program; with the goal to answer the following researchable 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 program team (the Companies and Recleim) work together?
- What changes, if any, could be made to the program's design or delivery to improve its effectiveness in future program years?
- What are the characteristics of the customers participating in the program?
- What were significant changes or new obstacles during the 2017 program year?

## 5. Detailed Evaluation Findings

This chapter reports ADM's impact evaluation findings and process evaluation findings for the LCI and SCI Programs during the 2017 program year.

### 5.1 Impact Evaluation Overview

This section provides the results of ex post savings for the LCI and SCI Programs during the 2017 program year. Table 5-1 summarizes the ex post savings by sub-program name for all service territories.

*Table 5-1 Ex post Savings by Sub Program*

Sub Program	Ex ante kWh Savings	Ex post kWh Savings	kWh Realization Rate	Ex ante Peak kW Savings	Ex post Peak kW Savings	kW Realization Rate
Custom - LCI	15,339,941	14,419,854	94%	2,831.62	2,721.40	96%
Custom – SCI*	22,155,143	18,823,044	85%	2,306.79	2,054.00	88%
HVAC - LCI	13,227	16,046	121%	5.35	5.89	110%
HVAC - SCI	671,946	290,555	43%	242.11	120.09	50%
Lighting - LCI	44,324,235	45,057,924	102%	6,699.54	6,554.40	95%
Lighting - SCI	122,111,215	118,874,452	97%	21,393.72	19,030.27	93%
Appliance Turn In	670,398	669,231	100%	140.88	113.19	80%
<b>Total</b>	<b>205,286,104</b>	<b>198,151,108</b>	<b>97%</b>	<b>33,631.84</b>	<b>30,599.24</b>	<b>91%</b>

\*Food Service and Custom Buildings are included in this category

Ex post energy savings and peak demand reduction by service territory is shown in Table 5-2.

*Table 5-2 Ex post Savings by Service Territory*

Service Territory	Ex ante kWh Savings	Ex post kWh Savings	kWh Realization Rate	Ex ante Peak kW Savings	Ex post Peak kW Savings	kW Realization Rate
CEI	78,226,196	71,018,217	91%	13,891.02	12,440.70	90%
OE	89,580,020	89,478,023	100%	13,865.77	13,249.76	96%
TE	37,479,888	37,654,868	100%	5,875.05	4,908.78	84%
<b>Total</b>	<b>205,286,104</b>	<b>198,151,108</b>	<b>97%</b>	<b>33,631.84</b>	<b>30,599.24</b>	<b>91%</b>

As part of both LCI and SCI, energy audits were performed by COSE in 2017. These energy audits helped businesses identify energy efficient measures. Audits were conducted in the CEI and OE service territories, shown in Table 5-3.

*Table 5-3 Count of COSE Audits*

Service Territory	LCI Audits	SCI Audits	Total
CEI	4	42	46
OE	0	10	10
<b>Total</b>	<b>4</b>	<b>52</b>	<b>56</b>

Out of the 56 audits provided in 2017, 12 of the businesses completed projects in the energy efficiency programs. Savings associated with businesses who participated in a COSE audit are shown in Table 5-4.

*Table 5-4 Ex ante Program Savings from Businesses that Received Audits*

Service Territory	Count	Ex ante kWh	Ex ante kW
CEI	5	79,507	14.67
OE	7	58,332	13.85
<b>Total</b>	<b>12</b>	<b>137,840</b>	<b>28.52</b>

## **5.2 Process Evaluation Overview**

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The following section summarizes the findings from the 2017 C&I Programs.

### **5.2.1 Non-Appliance Turn In Measures Overview**

The following summarizes the findings from the process evaluation for measure not including Appliance Turn-In.

#### **Program Design**

- All program staff referred to the two bonus incentives, the contractor bonus and the double incentive, as program year highlights. They believe the increased incentives contributed to maintaining program momentum and ensuring the program hit its energy savings goals. According to program allies<sup>13</sup>, the bonus incentive influenced customers to move ahead with projects they were undecided on and motivated program ally sales staff to increase outreach efforts and sell the program. Many interviewees were pleased with the bonus incentive and hopeful for its return in 2018. Several program allies interviewed indicated that if the program launches a bonus incentive period in the future they would like more notice regarding start and stop dates.

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<sup>13</sup> "Program allies" is program nomenclature for approved contractor.

## **Program Administration**

- All program staff agreed that communication and staffing levels are sufficient for supporting the administration and oversight needs of the program. The program teams host weekly conference calls to discuss program progress, project-specific issues, and any other issues where a staff member may need guidance on an issue or to build a consensus on a path forward.
- Program allies strongly prefer email and in-person communication as means for providing updates on program happenings. Many program allies expressed interest in annual in-person meetings to discuss program changes and connect with program staff.

## **Program Implementation**

- Program allies mentioned ways in which the program could better support their efforts including providing more leads and directing customers to an approved list of program allies. Several program allies mentioned that contractors who are doing a good job should be championed.
- While several program allies reported high levels of program awareness among their customers, the majority said less than half of their customers are aware that incentives exist for energy efficient building upgrades. The feedback suggests that program allies believe overall program awareness to be relatively low among business customers. The number one suggestion regarding ways the program could improve awareness was to include program marketing in bill inserts.
- Most survey respondents also indicated that this was the first year that they applied or received incentives through the C&I Energy Solutions Program for equipment replacements/building upgrades and they noted that the vendor (retailer) and the contractor (installer) had the biggest impact on their decisions to install energy efficient equipment.
- Most program participants that responded to the participant survey reported low levels of awareness of incentives for HVAC equipment, appliance recycling, custom projects including new construction and retro-commissioning, as well as consumer electronics, commercial refrigeration, and agriculture equipment. Awareness of lighting and appliances was higher.

## **Satisfaction**

- Program allies were satisfied with the incentive structure and levels; they said that the C&I Energy Solutions Program is like other regional programs they work with. Program allies are also very satisfied with the support they've received from the program implementation contractor, Sodexo. Most program allies said implementation staff was responsive and knowledgeable when they reached out.



- Program participants reported high levels of satisfaction with the C&I Energy Solutions Program. They reported being very satisfied with the equipment that was installed and the quality of the installed equipment, as well as the application and the overall program. Sources of dissatisfaction were the time it takes to get applications approved, incentive processing times and the requirement for lighting measures to be DLC rated.
- Near participants were satisfied overall with various aspects of the application process and program, including documentation requirements, the ease of finding how to apply for incentives on the Companies' website, the ease of using the electronic application, and the clarity of the application. The survey results indicate that most projects not completed are still on hold, mainly due to a lack of funds to complete the project. Most near-participants surveyed plan to install high-efficiency equipment in the next two years, with the highest reported projects being high-efficiency lighting, variable speed motors and/or drives, and high-efficiency HVAC equipment. Most organizations plan on applying for an incentive when completing future energy efficient projects.

### **5.2.2 Appliance Turn In Measures Overview**

Key findings from the process evaluation include:

- Communication is strong. The program maintains open lines of communication between the Companies and the implementation contractor, Recleim. Additionally, responding customers are satisfied with the pick-up process and the program overall.
- Customers reported a high level of satisfaction with the rebate. Almost everyone (92%) had reported receiving their rebate for recycling their old appliance. When surveyed about the amount of the rebate they received, most people (96%) reported that it was what they expected to receive.
- At the time people decided to recycle their old appliance(s), half of the respondents (50%) reported being aware that the \$75 promotional rebate that they would receive was more than the \$50 rebate that is typically offered.

## **5.3 Ex post Savings Findings**

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To estimate ex post kWh savings and peak kW reductions for LCI and SCI, data were collected and analyzed for samples of 159 incentivized equipment installation projects, and 35 recycled units. The methodology outlined in the Ohio TRM, as well as industry standard methods, were used to estimate ex post kWh savings and peak kW reductions with baselines adjusted as applicable per Ohio RC §4928.662.

The data were analyzed using the methods described in section 4.1 to estimate project energy savings and peak kW reductions and to determine realization rates for the programs. The results of that analysis are reported in this section.

### 5.3.1 Ex post Savings Findings for Non-Appliance Turn In Measures

Ex post savings by customer class are represented in Section 1 of this report. The statistically representative sample was stratified by measure type (Custom & Other, HVAC, and Lighting, Appliance Turn In) as well as ex ante annual energy savings (kWh), for each service territory. Each service territory sample was designed to meet  $\pm 10\%$  precision at the 90% confidence interval. Precision for each sample based on kWh is shown in Table 5-5.

*Table 5-5 Sample Precision by kWh*

Service Territory	Sample Ex ante kWh Savings	Sample Ex post kWh Savings	Realization Rate	Ex post Precision
CEI	13,709,186	13,147,885	96%	9.42%
OE	16,445,536	15,576,741	95%	7.24%
TE	11,918,523	11,502,515	97%	9.99%
<b>Total</b>	<b>42,022,050</b>	<b>40,227,141</b>	<b>96%</b>	

Sample level realization rates are extrapolated at the stratum level, causing variation from the total sample realization rate to the program level realization rate.

There are several explanations for the kWh realization rates by measure type. They are as follows:

- HVAC Maintenance: The sample included 11 projects across all service territories. Of these projects, only one reported a required coolant recharge, and the amount of recharge. The savings algorithm used by ADM is from the Pennsylvania TRM as the Ohio TRM does not specify a savings algorithm for commercial HVAC tune-ups. While other tasks are required during HVAC maintenance, the Pennsylvania TRM does not grant savings for these tasks. The ex ante calculations reference a different source as a savings algorithm.
- Anti-Sweat Door Heaters: This measure has the most projects in the food service category. ADM utilized the Ohio TRM savings algorithms for this measure, which results in lower savings compared to the reference used by the implementation contractor.

- Custom Projects: Due to the nature of ex post savings calculated based on post-installation conditions, additional trend data is available to determine usage and configuration of equipment. This often results in differences between ex ante and ex post savings. The largest impact has been on HVAC & Chillers, air compressors, and VFD's.

The most noted, systematic differences in savings by measure across all service territories are shown in Table 5-6. The implementation of pre-approval reviews by ADM has led to a decrease in variation in energy savings for above threshold projects. This is evident in the comparison of realization rates between LCI and SCI.

*Table 5-6 Measure Level Savings Differences*

Measure	Realization Rate
Anti-Sweat Heater Controls - SCI	74%
Custom - VFDs <= 10HP - SCI	80%
Custom - Compressed Air - SCI	79%
Custom - HVAC & Chillers - SCI	57%
HVAC - Maintenance - SCI	6%

The correlation between ex ante and ex post across project size was checked, and there is strong correlation for both LCI projects and SCI projects; meaning that there does not appear to be a trend of large variation in realization rate based on the size of the project.

### 5.3.2 Ex post Savings Findings for Appliance Turn In Measures

Gross annual kWh savings for appliance turn in are shown in Table 5-7:

*Table 5-7: Gross Annual kWh Savings per Appliance*

Appliance Type	Ex Ante kWh per Unit	Ex Post kWh per Unit	Overall Ex Ante kWh	Overall Ex Post kWh
Refrigerators	1,376	1,376	546,272	546,272
Freezers	1,244	1,244	109,472	109,472
RACs	122	165	3,904	5,267
Dehumidifiers	1,075	822	10,750	8,220
<b>Total</b>			<b>670,398</b>	<b>669,231</b>

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

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 5-8.

*Table 5-8: DOE Uniform Methods Project UEC Regression Details<sup>14</sup>*

Independent Variables	Coefficient
Intercept	0.582
Appliance Age	0.027
Dummy: Manufactured Pre-1990	1.055
Appliance Size (cubic feet)	0.067
Dummy: Single-Door Configuration	-1.977
Dummy: Side-by-Side Configuration	1.071
Dummy: Primary Usage Type (in absence of program)	0.6054
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,<sup>15</sup> and pickup address for the 397 refrigerators collected in 2017. Of these 397 refrigerators, 73% were top freezer; 13% were side-by-side models; 11% were single door models;<sup>16</sup> the average size was 17.43 cubic feet; 31% percent were manufactured before 1990 and the average age was 24 years old. Additionally, the participant survey asked respondents to indicate whether their refrigerators were primary or secondary appliances. Across the three companies, 47% of respondents indicated the recycled unit was a primary refrigerator. Respondents also indicated that 23% of the recycled refrigerators and freezers were in spaces that are generally unconditioned, such as a garage or porch. This information, along with TMY3 heating and cooling degree days (base temperature = 65F) for the Ohio reference cities outlined in the OH TRM were used to generate the final two interaction variables.

<sup>14</sup> Source: Uniform Methods Project Refrigerator Recycling Evaluation Protocol.

<sup>15</sup> 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.

<sup>16</sup> The complete breakdown of recycled refrigerator configuration is: 72.54% top freezer, 13.10% side-by-side, 11.34% single door, and 3.02% bottom freezer.

Table 5-9 shows all the refrigerator characteristics relevant to the UMP model.

*Table 5-9: 2017 Program Refrigerator Characteristics*

Appliance Characteristic	Average for Refrigerators
Appliance Age (Years)	24.00
Percentage of Units Manufactured before 1990	31%
Average Size (Cubic Feet)	17.46
Percentage Single Door	11%
Percentage Side-by-Side	13%
Percentage Primary	47%
Interaction: Unconditioned Space x CDD	0.06
Interaction: Unconditioned Space x HDD	2.48

The refrigerator characteristics shown in Table 5-9 were used in conjunction with the model coefficients in

Table 5-8 to calculate annual energy consumption estimates for verified 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)

$$365.25 \text{ (days per year)} * [0.582 + 0.027 * 24.00(\text{age}) + 1.055 * 0.31(\text{dummy: 1990}) + 0.067 * 17.46 \text{ (size, cu. ft.)} - 1.977 * 0.1134 \text{ (dummy: single door)} + 1.071 * 0.1310(\text{dummy: sbs}) + 0.6054 * 0.47 \text{ (dummy: primary)} + 0.02 * 0.06 \text{ (CDD Interaction)} - 0.045 * 2.48 \text{ (HDD Interaction)}] = 1,029 \text{ kWh}$$

Freezer UEC (kWh)

$$1,029 * 0.85 \text{ (refrigerator – to – freezer factor)} = 875 \text{ kWh}$$

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

- 1) Some units that were recycled are not likely to operate at all in the absence of the program. The part-use factor for such units, therefore, would be zero.
- 2) Other units are likely to have operated part-time in the absence of the program. For these units, the partial use factor is calculated by dividing the number of months in the

past year that the unit had been plugged in and running by the number of months in the year (i.e., 12). Based on data collected through the survey of participants, the average number of months in use for a refrigerator that was being partially used was 3.4 months, implying a use factor of 0.29 (i.e., 3.4/12). For freezers in this category, the use factor was calculated to be 0.25, reflecting an average of 3.0 months in use for freezers being partly used.

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

The overall part-use factor and the corresponding overall Unit Energy Savings (UES) are calculated as a weighted average across the three categories, where the weights are determined by the percentages of units falling into the three categories. It is worth noting that the information used to calculate the part-use factor is based on usage during the past year, under the assumption that the distribution of usage patterns for the population of recycled units would be similar in the absence of the program. Table 5-10 shows the calculation of the overall UES for refrigerators and freezers when partial use is considered.

*Table 5-10: Unit Energy Savings Adjusted for Part-Use*

Operating Status of Unit	Percentage of Recycled Units in Category	Use Factor	Calculation of UES to Adjust for Part Use
<i>Refrigerators (n=34)</i>			
Not running	0.00%	0	0
Running part time	25.81%	0.29	295
Running all time	74.19%	1.00	1,029
Weighted Average UES for Refrigerators			840
<i>Freezers (n=6)</i>			
Not running	20.00%	0	0
Running part time	20.00%	0.25	219
Running all time	60.00%	1.00	875
Weighted Average UES for Freezers			569

In accordance with the OH TRM methodology, the deemed in-situ factor, partial use factors, and UECs were applied to the calculation. These calculations are shown below:

Refrigerator (kWh)

$$1,619 (\text{UEC}_{\text{retired}}) * 0.85 (\text{ISAF}) = 1,376 \text{ kWh}$$

$\text{UEC}_{\text{retired}}$  = Unit Energy Consumption of Retired Unit

In Situ Adjustment Factor = In Situ Adjustment Factor.

- Adjustment to savings based on Ohio climate and whether the recycled appliance was a primary or secondary unit.

### Freezer (kWh)

$$1,464 (\text{UEC}_{\text{retired}}) * 0.85 (\text{ISAF}) = 1,244 \text{ kWh}$$

Per Ohio RC §4928.662, the ex post gross per-unit annual kWh savings from OH TRM are reported as the final ex post.

For Room air conditioners, AHAM sales-weighted average EER values were applied to each RAC recycled through the program in 2017 based on the reported vintage. If the vintage was missing in the data set, the TRM deemed EER value was applied to the recycled unit. The resulting average EER value was 8.63. Appliance degradation was calculated using the methodology established by the National Renewable Energy Laboratory's 2006 "*Building America Performance Analysis Procedures for Existing Homes*" booklet.<sup>17</sup> After accounting for degradation, the average EER for recycled RACs dropped to 6.88.

Based on the assumptions presented in the TRM, EFLH were assumed to be 233 hours per year and 76% of recycled units were assumed to be replaced. The average capacity for the existing and baseline replacement RACs was assumed to be 10,000 Btuh based on the assumptions in the Energy Star Room Air Conditioner Savings Calculator. This assumption is in line with the AHAM data which implied an average of 10,474 Btuh. 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 Commercial Appliance Turn-In Program in 2017 was calculated to be 162 kWh as follows:

$$\begin{aligned} \text{Recycled RAC Annual kWh Savings}^{18} &= (233 (\text{Hours}) * 10,000 (\text{BtuH}) / 6.94 (\text{EER}_{\text{exist}})) / 1000 \\ &- (0.76 (\% \text{replaced}) * (233 * (10,000 / 10.18 (\text{EER}_{\text{base}}))) / 1000) \\ &= 162 \text{ kWh} \end{aligned}$$

The kWh realization rate for room ACs was 135%. The variation in realization rate was caused by a lower ex post verified efficiency for both baseline and existing unit conditions.

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<sup>17</sup> NREL (2006). "*Building America Performance Analysis Procedures for Existing Homes*." <https://www.nrel.gov/docs/fy06osti/38238.pdf> Any efficiency lower than 9.75 was adjusted to 9.75 so the applicable formula could be correctly applied. Degradation EERs were capped at 6.83. (VEIC comments EER value)

<sup>18</sup> The formula and methodology were defined on page 4-6.



The ex post annual kWh savings from the as found methodology were reported as the results in this report.

Calculating energy savings for participating dehumidifiers was done in accordance with the Ohio TRM with updated runtimes for EnergyStar. Savings were calculated for units that were retired and recycled without a direct replacement. The kWh energy savings per unit was taken to be equal to the Federal Standard efficient dehumidifier unit energy consumption by capacity. Energy impacts were based only on the existing unit, and savings apply only for the remaining useful (RUL) of the unit. Based on the algorithms, the gross per unit kWh savings across all capacities of dehumidifiers recycled through 2017 was calculated to be 822.

The ex ante kWh savings per unit provided in the tracking data was 1,075, and the ex post verified kWh savings per unit were 822, which generated a 76% realization rate. The variation in realization rate was caused by the difference in savings calculation methodologies. The ex ante reported savings were the straight average unit energy consumption across all different capacities of dehumidifiers referenced in the Ohio TRM for downstream rebated dehumidifiers. However, the ex post energy savings were verified and calculated based on the actual capacity of each unit recycled in 2017.

### 5.3.3 Ex Post Peak Demand Reduction for Non-Appliance Turn In Measures

Ex post peak reduction by customer class are represented in Section 1 of this report. The statistically representative sample was stratified by measure type (Custom & Other, HVAC, and Lighting) as well as ex ante annual energy savings (kWh), for each service territory. While sample precision is determined based on kWh, precision for peak demand reduction is also calculated. The kW precision by service territory is shown in Table 5-11.

*Table 5-11 Sample Precision by kWh*

Service Territory	Sample Ex ante kW Savings	Sample Ex post kW Savings	Realization Rate	Ex post Precision
CEI	2,024	1,971	97%	25.45%
OE	2,154	1,995	93%	15.91%
TE	1,772	1,673	94%	14.91%
<b>Total</b>	<b>5,950</b>	<b>5,639</b>	<b>95%</b>	

Sample level realization rates are extrapolated at the stratum level, causing variation from the total sample realization rate to the program level realization rate.

Ex post kW values differ from ex ante values for the same reasons outlined in the explanation for kWh differences. For prescriptive non-lighting measures, kW values are based on coincident factors from the Ohio TRM. Different sources for coincident factors may have been used by the implementation contractor.



Furthermore, the difference in peak demand reduction may be due to a different method of calculation in the ex post algorithms for as-found lighting projects and custom projects. For as-found lighting calculations, ADM develops an hourly energy reduction based on each hour of the 2018 calendar year (8,760 curve). This allows the calculation to pull out the average kW reduction during the peak demand window. Custom ex post calculations which involve simulations also pull hourly values for peak demand reduction.

### 5.3.4 Ex post Peak Demand Reduction for Appliance Turn In Measures

The gross peak demand (kW) savings for appliance turn in measures were calculated as described in chapter four of this report per Ohio RC §4928.662. The details and results of these calculations are reported in this section. Table 5-12 shows the results:

*Table 5-12: Gross Peak Demand (kW) Savings per Appliance*

Appliance Type	Ex Ante kW per Unit	Ex Post kW per Unit	Overall Ex Ante kW	Overall Ex Post kW
Refrigerators	0.22	0.22	87.34	87.34
Freezers	0.20	0.20	17.60	17.60
RACs	1.07	0.21	34.24	6.78
Dehumidifiers	0.17	0.15	1.70	1.47
<b>Total</b>			<b>140.88</b>	<b>113.19</b>

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 OH TRM was used to calculate the average kW reduction occurring during the PUCO defined on-peak period. The calculation is shown below:

*Recycled RAC Annual kW<sup>19</sup>*

$$\begin{aligned}
 &= ((10000(BtuH) * (1/6.88 (EER_{exist}))) / 1000) - (76\%(\%replaced)) \\
 &* ((10000(BtuH) * (1/10.18EER_{newbase}))/1000 * 0.3(Coincidence Factor)) \\
 &= 0.21
 \end{aligned}$$

For dehumidifiers, the summer coincident peak demand savings for recycling a dehumidifier was taken to be equal to the peak demand of the recycled unit. Table 5-13 below shows the peak demand savings by capacity:

<sup>19</sup> The formula and methodology were defined on page 74 in Ohio TRM.

*Table 5-13: Dehumidifier Retirement Peak Demand Reduction (kW)*

Capacity in Pints per day	kW Reduction
≤25	0.1393
≤30	0.1458
≤35	0.1523
≤40	0.1588
≤45	0.1653
≤50	0.1718
≤60	0.1848
≤65	0.1913
≤70	0.1979
≤110	0.2499

Using the OH TRM methodology, ADM calculated an average on-peak demand reduction of 0.22 kW per recycled refrigerator, 0.20 kW per recycled freezer, 0.15 kW per recycled dehumidifier, and 0.21 kW per recycled RAC.

## 5.4 Process Evaluation Findings

The following section presents the results from a sample (258 responses) of C&I Energy Solutions Program participants, including Appliance Turn-In. The survey collected data on program awareness customer decision making, program experiences, and satisfaction. Below are conclusions that should aid in program evaluation and improvement. The response rates, by EDC, are summarized in Table 5-14 below.

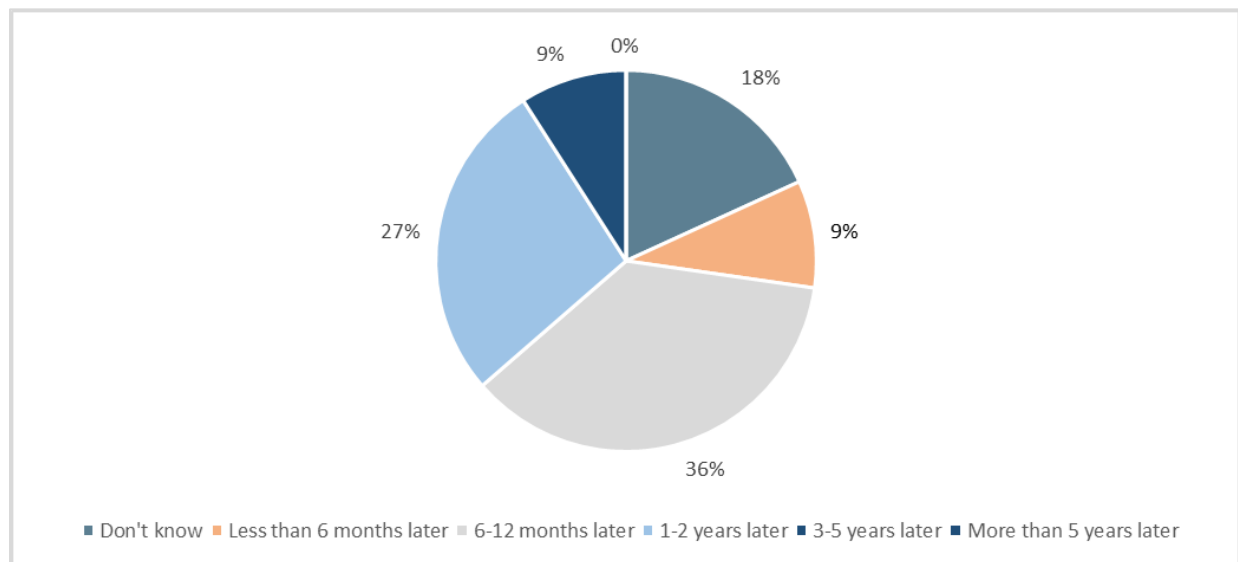
*Table 5-14: Participant Survey Response Rate by EDC*

EDC	Total Ex ante kWh	Percent of savings	Number of Survey Completes	Percent of Completes
CEI	78,226,196	38%	90	35%
OE	89,580,020	44%	138	53%
TE	37,479,888	18%	30	12%
<b>Total</b>	<b>205,286,104</b>	<b>100%</b>	<b>258</b>	<b>100%</b>

### 5.4.1 Non-Appliance Turn In Findings

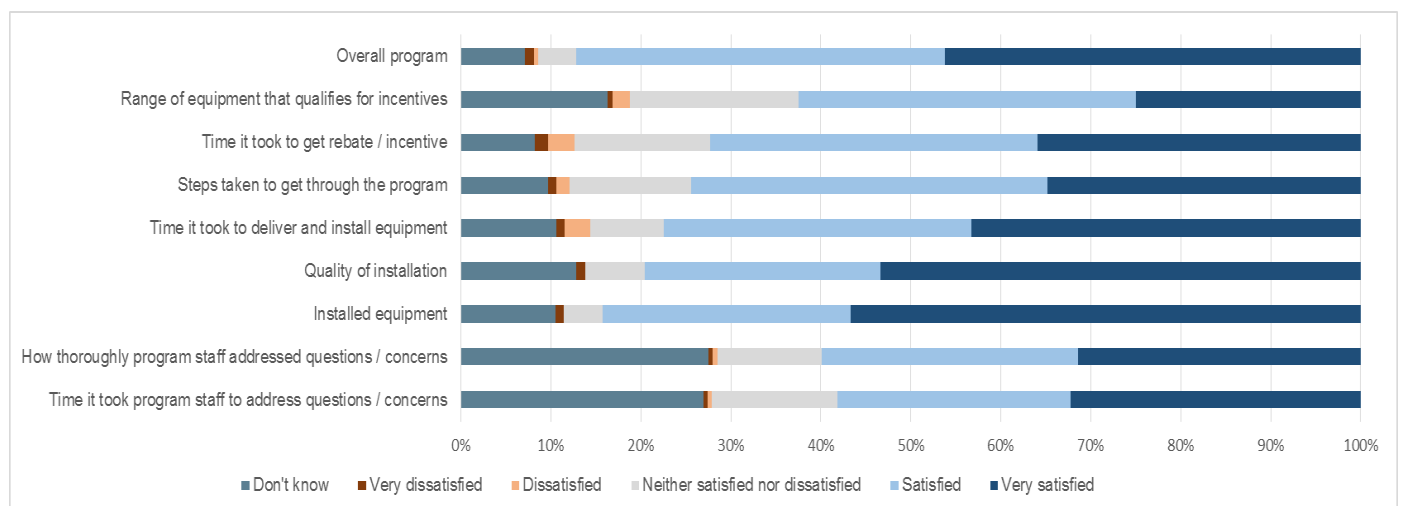
Participants were surveyed about if they were aware that their company received a bonus incentive, which doubled the incentive rate for the project. Less than half the people surveyed (42%) were aware of receiving this incentive. Of the people who were aware of the bonus incentive, most people (57%) reported being aware of the bonus incentive before deciding to start the project. Even though most people were aware of the bonus incentive before starting the project, most of survey respondents (78%) indicated that they were somewhat or very likely to still complete the project even without the offer of a bonus incentive. However, 48% of participants reported that the project was completed earlier than it otherwise would have been without the bonus incentive. Out of the projects that were completed early, 36% of people reported it would have taken an extra 6 – 12 months

to be complete without the bonus incentive and 27% of people reported it would have taken an extra 1 – 2 years. Figure 5-1 summarizes the time it would have taken to complete the project without the bonus incentive.



*Figure 5-1: Time to Complete Project without Bonus Incentive*

Eighty-seven percent of survey respondents indicated they were either satisfied or very satisfied with the overall program. Eighty-four percent of survey respondents also reported high levels of satisfaction (satisfied to very satisfied) with the equipment that was installed and the quality of the installed equipment (80%). Satisfaction levels are shown in Figure 5-2.



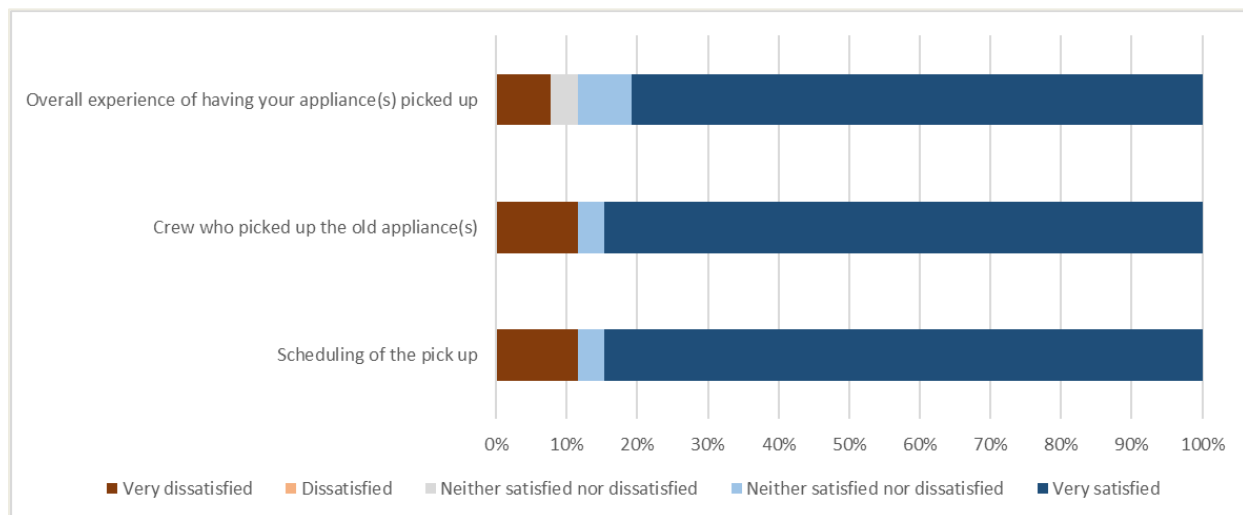
*Figure 5-2: Project/Program Satisfaction*

### 5.4.2 Appliance Turn-In Findings

Survey respondents provided feedback on when they first learned about the rebates for recycling used appliance(s). Most customers surveyed (77%) reported being aware of the rebates before deciding to recycle their old appliance(s).

Starting with the first time a person was contacted about recycling an appliance, it took 10 or fewer days for every person surveyed (100%) for the appliance pick-up to occur, which was agreed upon by 100% of people to be a reasonable amount of time from the first contact to actual pick-up. Also, 100% of people reported being able to schedule a pickup time that was convenient for them. It was also reported by 96% of people that they were contacted by the customer representative prior to the pick-up date to confirm the date and time of their scheduled appliance pick-up, as well as 77% of people reported being contacted by the customer representative to inform them that the technician would be arriving soon on the pick-up date.

During the actual appliance pick-up, almost every person surveyed (94%) reported that the crew who picked up their appliance acted professionally. When surveyed about rating satisfaction levels, 84% of people reported being very satisfied with the scheduling of pick-up, 87% of people reported being very satisfied with the crew who picked up the old appliance(s), and 81% of people reported being very satisfied with the overall experiences of having their appliance(s) picked-up (summarized in Figure 5-3).



*Figure 5-3: Pick-Up Satisfaction*

## 6. Summary and Conclusions

This report presents the results of the evaluation of FirstEnergy Ohio's LCI and SCI programs for 2017. Results for annual energy savings (kWh) by service territory are shown in Table 6-1. Results for peak demand reduction (kW) by service territory are shown in Table 6-2. Further detailed impact evaluation results are shown in Appendix A.

*Table 6-1 Evaluation kWh Results by Service Territory*

Service Territory	Ex ante kWh Savings	Ex post kWh Savings	Realization Rate	Ex post Precision
CEI	78,226,196	71,018,217	91%	9.42%
OE	89,580,020	89,478,023	100%	7.24%
TE	37,479,888	37,654,868	100%	9.99%
<b>Total</b>	<b>205,286,104</b>	<b>198,151,108</b>	<b>97%</b>	

*Table 6-2 Evaluation kW Results by Service Territory*

Service Territory	Ex ante kW Savings	Ex post kW Savings	Realization Rate	Ex post Precision
CEI	13,891.02	12,440.70	90%	25.45%
OE	13,865.77	13,249.76	96%	16.14%
TE	5,875.05	4,908.78	84%	14.90%
<b>Total</b>	<b>33,631.84</b>	<b>30,599.24</b>	<b>91%</b>	

### 6.1 Recommendations

ADM offers the following acquired information for continued improvement of the C&I Energy Solutions Program.

- Mitigation of evaluation risk can be further accomplished through increased consistency of algorithms in the ex ante calculations based on the Ohio TRM for prescriptive measures.
- Feedback suggests that the bonuses drive participation, motivate program allies, and encourage customers to complete energy efficient project sooner than they otherwise would. If bonus incentive periods are implemented in the future, the program should be sure to provide clear and consistent messaging to program allies regarding the guidelines, start and stop dates.

- Consider hosting annual program ally meetings to inform program allies about program updates and provide a forum for questions and information sharing. These events could serve as networking opportunities for local equipment vendors and prospective participants. The format could be half-day workshops or shorter-formats, such as lunch-n-learns.
- Strategize about ways to increase program awareness. Feedback from both program allies and customers suggests that the overall awareness of the incentives available through the C&I Energy Solutions Program remains low. Outreach strategies could include bill inserts to business customers, as well as hosting workshops that bring together sector-specific customers, program allies and vendors for relationship building.
- Consider the feasibility of offering a fast track application for projects that meet predefined thresholds, perhaps projects under certain dollar amount or kWh savings. These projects could by-pass the pre-approval process; the result would be a quicker turn around for smaller projects that pose less uncertainty regarding ex post energy savings.
- Provide customers and contractors with incentive status updates. There was some dissatisfaction with the overall time it takes to receive the incentive and the lack of communication regarding when to expect the check to arrive. Consider providing this information in the form of an email or an update on the customer interface webpage.
- Consider additional program materials that discuss the value of the DLC rating. The DLC rating was a source of dissatisfaction for both program participants and program allies. Educating customers and program partners about the value of the DLC rating may create additional buy-in for both program allies and participants.

## 7. Appendix A: Required Savings Tables

This appendix contains ex post kWh savings, and peak demand savings for LCI and SCI for all service territories.

*Table 7-1 Ex post Savings by Program for CEI*

Program	Ex ante kWh Savings	Ex post kWh Savings	Realization Rate	Ex ante kW Savings	Ex post kW Savings	Realization Rate
Large Commercial	15,815,479	16,238,684	103%	2,943.84	3,067.14	104%
Small Commercial	62,410,718	54,779,532	88%	10,947.18	9,373.56	86%
<b>Total</b>	<b>78,226,196</b>	<b>71,018,217</b>	<b>91%</b>	<b>13,891.02</b>	<b>12,440.70</b>	<b>90%</b>

*Table 7-2 Ex post Savings by Program for OE*

Program	Ex ante kWh Savings	Ex post kWh Savings	Realization Rate	Ex ante kW Savings	Ex post kW Savings	Realization Rate
Large Commercial	28,467,946	27,582,428	97%	4,017.15	3,656.53	91%
Small Commercial	61,112,074	61,895,595	101%	9,848.62	9,593.23	97%
<b>Total</b>	<b>89,580,020</b>	<b>89,478,023</b>	<b>100%</b>	<b>13,865.77</b>	<b>13,249.76</b>	<b>96%</b>

*Table 7-3 Ex post Savings by Program for TE*

Program	Ex ante kWh Savings	Ex post kWh Savings	Realization Rate	Ex ante kW Savings	Ex post kW Savings	Realization Rate
Large Commercial	15,393,978	15,672,712	102%	2,575.51	2,558.02	99%
Small Commercial	22,085,910	21,982,156	100%	3,299.53	2,350.76	71%
<b>Total</b>	<b>37,479,888</b>	<b>37,654,868</b>	<b>100%</b>	<b>5,875.05</b>	<b>4,908.78</b>	<b>84%</b>

*Table 7-4 Summary of kWh Savings for Large Commercial*

Service Territory	Ex ante kWh Savings	Ex post kWh Savings	Realization Rate
CEI	15,815,479	16,238,684	103%
OE	28,467,946	27,582,428	97%
TE	15,393,978	15,672,712	102%
<b>Total</b>	<b>59,677,403</b>	<b>59,493,825</b>	<b>100%</b>

*Table 7-5 Summary of Peak kW Savings for Large Commercial*

Service Territory	Ex ante kW Savings	Ex post kW Savings	Realization Rate
CEI	2,943.84	3,067.14	104%
OE	4,017.15	3,656.53	91%
TE	2,575.51	2,558.02	99%
<b>Total</b>	<b>9,536.51</b>	<b>9,281.69</b>	<b>97%</b>

*Table 7-6 Summary of Lifetime Ex Post kWh Savings for Large Commercial*

Service Territory	Lifetime Savings (kWh)
CEI	167,983,163
OE	296,717,631
TE	167,110,107
<b>Total</b>	<b>631,810,901</b>

*Table 7-7 Summary of kWh Savings for Small Commercial*

Service Territory	Ex ante kWh Savings	Ex post kWh Savings	Realization Rate
CEI	62,410,718	54,779,532	88%
OE	61,112,074	61,895,595	101%
TE	22,085,910	21,982,156	100%
<b>Total</b>	<b>145,608,702</b>	<b>138,657,284</b>	<b>95%</b>



*Table 7-8 Summary of Peak kW Savings for Small Commercial*

<b>Service Territory</b>	<b>Ex ante kW Savings</b>	<b>Ex post kW Savings</b>	<b>Realization Rate</b>
CEI	10,947.18	9,373.56	86%
OE	9,848.62	9,593.23	97%
TE	3,299.53	2,350.76	71%
<b>Total</b>	<b>24,095.33</b>	<b>21,317.55</b>	<b>88%</b>

*Table 7-9 Summary of Lifetime Ex Post kWh Savings for Small Commercial*

<b>Service Territory</b>	<b>Lifetime Savings (kWh)</b>
CEI	543,649,199
OE	721,600,017
TE	247,810,193
<b>Total</b>	<b>1,513,059,408</b>

## 8. Appendix B: Surveys and Interview Guides

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### **FirstEnergy Business Incentive Programs Participant Survey**

Variables	Definition
PROJECT DESCRIPTION	Insert text description
LIGHTING END USE	If project is lighting = 1, else = 0
APPLIANCE END USE	If project is appliance = 1, else = 0
RECYCLING	If project is recycling = 1, else = 0
HVAC END USE	If project is HVAC= 1, else = 0
KITCHEN EQUIP END USE	If project is kitchen equip = 1, else = 0
AGRICULTURE EQUIP END USE	If project is agriculture equipment= 1, else = 0
ELECTRONICS END USE	If project is electronics = 1, else = 0
CUSTOM END USE	If project is custom = 1, else = 0
LOCATION	Location for selected project
ORGANIZATION	Premise Company
BONUS INCENTIVE	0 or 1 (No or Yes)
RECYCLING	0 or 1 (No or Yes)
DATE INSTALLED	Installation Date
APPLIANCE REBATE AMOUNT	Dollar amount
APPLIANCES RECYCLED	List appliances recycled
# OF REFRIGERATORS	0-2
# OF FREEZERS	0-2
# OF ROOM AC	0-2
# OF DEHUMIDIFIERS	0-2
PROJECT	Either NC, RCX, EQUIPMENT for selected project
EQUIPMENT	Includes End Uses which = Lighting, Appliances, HVAC, Kit, Ag, Electronics, Custom
UTILITY	EDC

#### **Mode of Administration**

Online (Primary) and Telephone (Secondary Follow-up as needed)

#### **Email Invitation**

*Subject: Provide Feedback on [UTILITY]'s Energy Efficiency Program*

*Reply to: [INSERT ADM CONTACT]*

*Hello [contact("first name")],*

*Thank you for participating in [UTILITY]'s Energy Efficiency Program. According to our records [contact("organization")] completed an energy efficiency project during 2017. Please take a few minutes to provide feedback about your experience. Your response,*

*in combination with other program participants, will be used to develop recommendations regarding future program improvements.*

*Click Here to Start the Survey*

*Your survey password is: [invite("custom 1")]*

*If you have any questions, or would prefer to complete the survey by telephone, please contact me.*

*Thank you in advance for your feedback, we really do value your input!*

*Sincerely,*

*[ADM CONTACT]*

*ADM Associates, Inc./ Contractor to FirstEnergy's Ohio utilities*

### **Respondent Characteristics [Do Not Display]**

- 1. Our records indicate you were the main contact for the [PROJECT DESCRIPTION] project completed at the [LOCATION] location.**

**The following questions are about your experience with the program and various factors that influence your organization when making decisions about energy efficiency projects.**

**Were you involved in the decision to complete this project(s)?**

1. Yes, I was involved in the decision to complete the project(s)
2. No, I was involved in the project(s) but not the decision to complete the project(s)
3. No, I was not involved in the project(s)
4. No, I do not work for the company that completed the energy efficiency project; I provided services for the project
98. Don't know

**[DISPLAY Q2 IF Q1 = 2-4; THEN SKIP TO END]**

- 2. Could you please provide the name and contact information of the person most knowledgeable about the decision to complete the [PROJECT DESCRIPTION] project at the [LOCATION]?**

1. (Open Ended) \_\_\_\_\_Name and Email

- 3. What is your job title or role?**

1. Facilities Manager
2. Energy Manager
3. Other facilities management/maintenance position
4. Chief Financial Officer
5. Other financial/administrative position

- 6. Proprietor/Owner
- 7. President/CEO
- 8. Manager
- 97. Other (please specify)

**Decision Making [Do Not Display]**

**4. Which of the following, if any, does your company have in place at the [LOCATION] location? (Select all that apply)**

- 1. A person or persons responsible for monitoring or managing energy usage
- 2. Defined energy savings goals
- 3. A specific policy requiring that energy efficiency be considered when purchasing equipment
- 4. Carbon reduction goals
- 5. None of the above
- 97. Other (please specify)
- 98. Don't know

**5. How does your organization typically decide to make energy efficiency improvements for this facility?**

- 1. Made by a group or committee
- 2. One person decision
- 3. Based on staff recommendations to a decision maker
- 4. Depends on the amount of the investment
- 97. Other (please specify)
- 98. Don't know

**6. Had you applied for or received [UTILITY] incentives for any equipment replacements or building upgrades before the one(s) you did this year?**

- 1. Yes
- 2. No
- 98. Don't know

**[DISPLAY Q7 IF Q6 = 2 OR 98]**

**7. How did you learn about [UTILITY]'s incentives for efficient equipment or upgrades? (Select all that apply)**

- 1. From the contractor, equipment vendor, or energy consultant who completed the project at the [LOCATION] location.
- 2. From some other contractor, equipment vendor, or energy consultant
- 3. From an [UTILITY] Account Representative
- 4. From a program representative
- 5. From [UTILITY]'s website, (EnergySaveOhio.com)
- 6. From a search engine(Google, Yahoo, Bing)
- 7. An event or trade show
- 8. Received an email blast or electronic newsletter

9. Received an informational brochure
10. TV / radio ads sponsored by [UTILITY]
11. Friends or colleagues
97. Other (please explain)
98. Don't know

**Cross Program Awareness [Do Not Display]**

**8. In addition to incentives for [PROJECT DESCRIPTION], are you aware that [UTILITY] offers incentives for the following:**

1. [DISPLAY IF LIGHTING END USE=0]Installation of High Efficiency Lighting
2. [DISPLAY IF APPLIANCE END USE=0]Installation of ENERGYSTAR Rated Appliances
3. [DISPLAY IF RECYCLING= 0]Appliance Recycling
4. [DISPLAY IF HVAC END USE=0]Installation of High Efficiency HVAC Equipment
5. [DISPLAY IF KIT EQUIP END USE=0]Installation of High Efficiency Commercial Kitchen Equipment
6. [DISPLAY IF AG EQUIP END USE=0]Installation of High Efficiency Agriculture Equipment
7. [DISPLAY IF ELECTRONICS END USE=0]Installation of High Efficiency Consumer Electronics
8. [DISPLAY IF CUSTOM END USE=0] Custom Incentives that include projects that do not meet eligibility criteria for other programs
9. [DISPLAY IF PROJECT=RCX] Retro-Commissioning Projects
10. [DISPLAY IF PROJECT=NC]New Construction Projects that include the Installation of custom projects that do not meet eligibility criteria for other programs

**9. Is there any type of energy saving equipment that is not currently covered by the program that should be?**

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

**[DISPLAY Q10 IF Q9 = 1]**

**10. What additional energy saving equipment type should be covered?**

1. [OPEN ENDED]
98. Don't know

**[DISPLAY Q11 IF PROJECT = NC]**

**11. How well did the range of new construction or major building renovation incentive options fit your needs?**

Not at all	Somewhat	Neutral	Mostly	Completely	Don't know
1	2	3	4	5	98

[DISPLAY Q12 ONLY IF Q11 < 4]

**12. What caused the range of offered incentive options to fail to meet your needs completely?**

[DISPLAY Q13 and Q14 IF PROJECT = RCX]

**13. How well did the Retro-commissioning program's range of incentive options fit your needs?**

Not at all	Somewhat	Neutral	Mostly	Completely	Don't know
1	2	3	4	5	98

[DISPLAY Q14 ONLY IF Q13 < 3]

**14. In what way did the range of offered incentive options fail to meet your needs completely?**

### **Program Delivery Efficiency [Do Not Display]**

Although you may have completed other projects that received an incentive through a [UTILITY] program, the following questions are about your organization's experience with the program for the [PROJECT DESCRIPTION] project completed at the [LOCATION] location. Please keep this project in mind when answering these questions.

#### **APPLICATION PROCESS**

**15. Regarding your organization's decision to participate in the incentive program, who initiated the discussion about the incentive opportunity? Would you say...**

1. Your organization initiated it
2. Your vendor or contractor initiated it
3. The idea arose in discussions between your organization and your vendor or contractor
97. Some other way (please specify)
98. Don't Know

**16. Which of the following people worked on completing your application for program incentives (including gathering required documentation)? (Select all that apply)**

1. Yourself
2. Another member of your company
3. A contractor

4. An equipment vendor
5. A designer or architect
97. Someone else (please define)
98. Don't know

**17. Did you work through one of the following organizations when you applied for an incentive for the project completed at [LOCATION]?**

1. Association of Independent Colleges & Universities
2. Council of Small Enterprises COSE
3. County Commissioners' Association of Ohio
4. Industrial Energy Users – Ohio
5. Ohio Manufacturer's Association
6. [UTILITY] Account Managers
7. Did not work with any of these organizations
98. Don't know

[DISPLAY Q18 IF Q17 < 8]

**18. How satisfied or dissatisfied were you with your experience in working with the organization?**

Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Don't know
1	2	3	4	5	98

[DISPLAY Q19 IF Q18 = 1 OR 2]

**19. Why were you dissatisfied with your experience?**

[DISPLAY Q20 IF Q16= 1]

**20. Thinking back to the application process, please rate the clarity of instructions on how to complete the application...**

Not at all clear	Somewhat clear	Neutral	Mostly clear	Completely clear	Don't know
1	2	3	4	5	98

[DISPLAY Q21 IF Q20 < 3]

**21. What information, including instructions on forms, needed to be further clarified?**

[DISPLAY Q0 IF Q15 = 1]

**Using the scale provided, how do you rate the following.... a. ...the ease of finding how to apply for incentives on [UTILITY]'s website**

Completely unacceptable	Somewhat unacceptable	Neutral	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**b. ...the ease of using the electronic application**

Completely unacceptable	Somewhat unacceptable	Neutral	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**c. ...the time it took to have the application approved**

Completely unacceptable	Somewhat unacceptable	Neutral	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**d. ...the effort needed to provide required invoices or other supporting documentation**

Completely unacceptable	Somewhat unacceptable	Neutral	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**e. ...the overall application process**

Completely unacceptable	Somewhat unacceptable	Neutral	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**[DISPLAY Q22 IF Q16 = 1]**

**22. Did you have a clear sense of who you could go to for assistance with the application process?**

- 1. Yes
- 2. No
- 98. Don't know

**[DISPLAY Q23 IF PROJECT = RCX]**

**23. Did you have a clear sense of who you could go to for assistance in finding a Retro-commissioning Service provider?**

- 1. Yes
- 2. No
- 98. Don't know



**24. How did the incentive amount compare to what you expected?**

1. It was much less
2. It was somewhat less
3. It was about the amount expected
4. It was somewhat more
5. It was much more
98. Don't know

**Appliance Turn In [Do Not Display]**

[DISPLAY Q25 IF RECYCLING = 1]

**PROGRAM PARTICIPATION VERIFICATION**

**25. Do you recall having a refrigerator, freezer, dehumidifier, or room air conditioner picked up for recycling at [LOCACTION] location, during 2017?**

1. Yes
2. No

**PROGRAM AWARENESS**

[DISPLAY Q26 - Q39 IF Q25 = 1]

**26. When did you first learn about the rebates for recycling appliances? Was it...?**

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

**PICK-UP SATISFACTION**

**27. Starting with the first time you contacted the program about recycling your appliance, about how many days passed before the pick-up occurred?**

1. Number of days\_\_\_\_\_
98. Don't know

[DISPLAY Q28 If Q27=1]

**28. Do you think that it was a reasonable amount of time?**

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

**29. Were you able to schedule the pick-up time that was convenient for you?**

- 1. Yes
- 2. No
- 98. Don't know

**30. Before the pick-up date, did the customer representative call to confirm the date and time of your scheduled pick up?**

- 1. Yes
- 2. No
- 98. Don't know

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

- 1. Yes
- 2. No
- 98. Don't know

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

- 1. Yes
- 2. No
- 98. Don't know

[DISPLAY Q33 If Q32=2]

**33. Please explain why you feel they did not behave professionally?**

- 1. Record verbatim\_\_\_\_\_

**34. Using the scale provided please rate how satisfied or dissatisfied are you with...**

**a. ...the scheduling of the pick up**

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied	Don't know
1	2	3	4	5	98

**b. ...the crew who picked up the old appliance(s)**

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied	Don't know
1	2	3	4	5	98

**c. ...the overall experience of having your appliance(s) picked up**

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied	Don't know
1	2	3	4	5	98

[DISPLAY Q35 IF Q34a=1 or 2]

**35. Why were you dissatisfied with the scheduling process?**

- 1. Record verbatim \_\_\_\_\_
- 98. Don't know

[DISPLAY Q36 IF Q34b=1 or 2]

**36. Why were you dissatisfied with the crew?**

- 1. Record verbatim \_\_\_\_\_
- 98. Don't know

[DISPLAY Q37 IF Q34=1 or 2]

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

- 1. Record verbatim \_\_\_\_\_
- 98. Don't know

**APPLIANCE VERIFICATION**

[DISPLAY Q38 IF Q25 = 1 AND # OF REFRIGERATORS > 0]

**38. Our records indicate that you have recycled [# OF REFRIGERATORS] refrigerator(s) through [UTILITY]'s program in 2017? Is this correct?**

- 1. Yes
- 2. No
- 98. Don't know

[DISPLAY Q39 IF Q38=2]

**39. How many refrigerators did you recycle?**

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

[DISPLAY Q40 IF Q25 = 1 AND # OF FREEZERS > 0]

**40. Our records indicate that you have recycled [# OF FREEZERS] freezer(s) through [UTILITY]'s program in 2017? Is this correct?**

- 1. Yes
- 2. No

[DISPLAY Q41 IF Q40=2]

**41. How many freezers did you recycle?**

- 1. Zero
- 2. One
- 3. Two
- 4. More than two

98. Don't know

[DISPLAY Q42 IF Q25 = 1 AND # OF ROOM AC > 0]

**42. Our records indicate that you have recycled [# OF ROOM AC] room air conditioner(s) through [UTILITY]'s program in 2017? Is this correct?**

1. Yes

2. No

98. Don't know

[DISPLAY Q43 IF Q42=2]

**43. How many room air conditioners did you recycle?**

1. Zero

2. One

3. Two

4. More than two

98. Don't know

[DISPLAY Q38 IF Q25 = 1 AND # OF DEHUMIDIFIERS > 0]

**44. Our records indicate that you have recycled [# OF DEHUMIDIFIERS] dehumidifier(s) through [UTILITY]'s program in 2017? Is this correct?**

1. Yes

2. No

98. Don't know

[DISPLAY Q45 If Q44=2]

**45. How many dehumidifiers did you recycle?**

1. Zero

2. One

3. Two

4. More than two

98. Don't know

#### REFRIGERATOR RECYCLING

[DISPLAY IF Q39 = 4 OR # OR REFRIGERATORS > 2]

The following questions are designed to collect information about a maximum of 2 refrigerators, please keep the same 2 refrigerators in mind when providing your response

[DISPLAY Q46- Q58 IF Q38=1 or Q39=2 or 3,]

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

1. Yes

2. No

98. Don't know

[DISPLAY Q47 IF Q46 = 2]

**47. When was the refrigerator(s) picked up?**

- 1. (Open Ended) \_\_\_\_\_
- 99. Don't know

**48. Approximately how old was the refrigerator at the time you recycled it? [Enter "00" if less than one year]**

Refrigerator#1

- 1. \_\_\_\_\_ [Record years]
- 98. Don't know

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

- 1. \_\_\_\_\_ [Record years]
- 98. Don't know

**49. At the time of recycling, was the refrigerator your primary unit or was it a secondary unit that was used in addition to your primary unit? [Primary unit would be used more frequently, located in the kitchen or common area. Secondary unit would be used less frequently, possibly for storage]**

Refrigerator #1

- 1. Primary
- 2. Secondary
- 98. Don't know

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator#2

- 1. Primary
- 2. Secondary
- 98. Don't know

**50. Did you replace the unit(s) you recycled with a new unit?**

Refrigerator #1

- 1. Yes
- 2. No
- 98. Don't know

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

- 1. Yes
- 2. No
- 98. Don't know

**51. At the time of recycling, where in the business was the old refrigerator located?**

Refrigerator #1

- 1. Open Ended \_\_\_\_\_
- 98. Don't know

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

- 1. Open Ended \_\_\_\_\_
- 98. Don't know

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

Refrigerator #1

- 1. All of the time
- 2. During certain months of the year only
- 3. Never plugged in or running
- 98. Don't know

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

- 1. All of the time
- 2. During certain months of the year only
- 3. Never plugged in or running
- 98. Don't know

[DISPLAY Q53 If Q52=2 or 3]

**53. During the 12 months prior to the recycling about how many months was the old unit running?**

Refrigerator #1

- 1. Record number of months [1-11] \_\_\_\_\_
- 2. All of the time
- 98. Don't know

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

- 1. Record number of months [1-11] \_\_\_\_\_
- 2. All of the time

98. Don't know

**54. Which of the following best describes the condition of the old unit? Was it ...?**

Refrigerator #1

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

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

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

[DISPLAY Q55 IF Q54=2, 3, or 4]

**55. What was wrong with the unit?**

Refrigerator #1

1. Wouldn't turn on
2. Would not produce cold air
3. Wouldn't keep food cold enough
4. Would not cool consistently
5. Wouldn't keep food cold at all
6. Too loud
7. Don't know, but would produce cold air
8. Don't know, but would NOT produce cold air
9. Other (Specify) \_\_\_\_\_
98. Don't know

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

1. Wouldn't turn on
2. Would not produce cold air
3. Wouldn't keep food cold enough
4. Would not cool consistently
5. Wouldn't keep food cold at all
6. Too loud
7. Don't know, but would produce cold air
8. Don't know, but would NOT produce cold air
9. Other (Specify) \_\_\_\_\_
98. Don't know

**56. Had you already considered disposing the refrigerator before you heard about this program? By disposing, I mean getting the appliance out of your business 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.**

Refrigerator #1

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

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

1. Yes
3. No
98. Don't know

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

Refrigerator #1



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 (note that there would have been a drop off fee)
10. Hired someone else to haul the used appliance away for junking, dumping or recycling
11. Gotten rid of it some other way (Specify) \_\_\_\_\_
98. Don't know

[DISPLAY IF # OF REFRIGERATORS > 1]

Refrigerator #2

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 (note that there would have been a drop off fee)
10. Hired someone else to haul the used appliance away for junking, dumping or recycling
11. Gotten rid of it some other way (Specify) \_\_\_\_\_
98. Don't know

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

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

#### FREEZER RECYCLING

[DISPLAY IF Q41 = 4 OR # OF FREEZERS > 1]

The following questions are designed to collect information about a maximum of 2 freezers, please keep the same 2 units in mind when providing your response

[DISPLAY Q59-Q71 IF Q40=1 or Q41=2 or 3]

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

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

[DISPLAY Q47 IF Q46 = 2]

**60. When was the freezer(s) picked up?**

1. (Open Ended) \_\_\_\_\_
98. Don't know

**61. Approximately how old was the freezer at the time you recycled it?**

Freezer #1

1. \_\_\_\_\_ [Record years]
98. Don't know

[DISPLAY IF # OF FREEZER > 1]

Freezer#2

1. \_\_\_\_\_ [Record years]
98. Don't know

**62. At the time of recycling, was the freezer your primary unit or was it a secondary unit that was used in addition to your primary unit?**

Freezer#1

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

[DISPLAY IF # OF FREEZER > 1]

Freezer#2

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

**63. Did you replace the old freezer with a new unit?**

Freezer#1

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

[DISPLAY IF # OF FREEZER > 1]

Freezer#2

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

**64. At the time of recycling, where in the business was the freezer located?**

Freezer#1

1. Open Ended \_\_\_\_\_
98. Don't know

[DISPLAY IF # OF FREEZER > 1]

Freezer#2

1. Open Ended
2. Other (Specify) \_\_\_\_\_
98. Don't know

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

Freezer#1

1. All of the time
2. During certain months of the year only
3. Never plugged in or running
98. Don't know

[DISPLAY IF # OF FREEZER > 1]

Freezer#2

1. All of the time
2. During certain months of the year only
3. Never plugged in or running
98. Don't know

[DISPLAY Q66 IF Q65=2 or 3]

**66. 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.**

Freezer#1

1. Record number of months [1-11] \_\_\_\_\_
2. All of the time
98. Don't know

[DISPLAY IF # OF FREEZER > 1]

Freezer#2

1. Record number of months [1-11] \_\_\_\_\_
2. All of the time
98. Don't know

**67. Which of the following best describes the condition of the old unit? Was it ...?**

Freezer#1

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

[DISPLAY IF # OF FREEZER > 1]

Freezer#2

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

[DISPLAY Q68 IF Q67=2 or 3]

**68. What was wrong with the unit?**

Freezer#1

1. Wouldn't turn on
2. Wouldn't keep food cold enough
3. Wouldn't keep food 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

[DISPLAY IF # OF FREEZER > 1]

Freezer#2

1. Wouldn't turn on
2. Wouldn't keep food cold enough
3. Wouldn't keep food 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

**69. Had you already considered disposing the freezer before you heard about this program? By disposing, I mean getting the appliance out of your business 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.**

Freezer #1

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

[DISPLAY IF # OF FREEZER > 1]

Freezer #2

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

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

Freezer #1

1. Sold it to a private party
2. Sold it to a used appliance dealer
3. Kept it and continued to use it
4. Kept it and stored it unplugged
5. Given it away to a private party, such as a friend or a neighbor
6. Given it away to a charity organization, such as Goodwill Industries or a church
7. Put it on a curb with a "Free" sign on it
8. Had it removed by the dealer you got your new or replacement freezer from
9. Taken it to a dump or recycling center (note that there would be a drop-off fee)
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

[DISPLAY IF # OF FREEZER > 1]

Freezer #2

1. Sold it to a private party
2. Sold it to a used appliance dealer
3. Kept it and continued to use it
4. Kept it and stored it unplugged
5. Given it away to a private party, such as a friend or a neighbor
6. Given it away to a charity organization, such as Goodwill Industries or a church
7. Put it on a curb with a "Free" sign on it
8. Had it removed by the dealer you got your new or replacement freezer from
9. Taken it to a dump or recycling center (note that there would be a drop-off fee)
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

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

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

ROOM AIR CONDITIONER RECYCLING

[DISPLAY IF Q43 = 4 OR # OF ROOM AC > 2]

The following questions are designed to collect information about a maximum of 2 room ACs please keep the same 2 units in mind when providing your response

[DISPLAY Q72-Q85 IF Q42=1 or Q43=2 or 3]

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

- 1. Yes
- 2. No
- 98. Don't know

[DISPLAY Q73 IF Q46 = 2]

**73. When was the room air conditioner(s) picked up?**

- 1. (Open Ended) \_\_\_\_\_
- 98. Don't know

**74. Approximately how old was your room air conditioner at the time you recycled it? [Record response in years, enter "00" if less than one year]**

RAC #1

- 1. \_\_\_\_\_ [Record years]
- 98. Don't know

[DISPLAY IF # OF ROOM AC > 1]

RAC #2

- 1. \_\_\_\_\_ [Record years]
- 98. Don't know

**75. Did you replace the old room air conditioner with a new unit?**

RAC #1

- 1. Yes
- 2. No
- 98. Don't know

[DISPLAY IF # OF ROOM AC > 1]

RAC #2

- 1. Yes
- 2. No
- 98. Don't know

**76. Before recycling the unit, how many room air conditioners were in operation in your business?**

- 1. \_\_\_\_\_Record number of units
- 98. Don't know

**77. How many room air conditioners are currently in operation in your business?**

- 1. \_\_\_\_\_Record number of units
- 98. Don't know

**78. Before recycling the unit, did your business have a central air conditioning system?**

- 1. Yes
- 2. No
- 98. Don't know

**79. Does your business now have a central air conditioning system?**

- 1. Yes
- 2. No
- 98. Don't know

**80. For the majority of year prior to recycling, where within your business was the room air conditioner located?**

RAC #1

- 1. Open Ended \_\_\_\_\_
- 98. Don't know

[DISPLAY IF # OF ROOM AC > 1]

RAC #2

- 1. Open Ended \_\_\_\_\_
- 98. Don't know

**81. Which of the following best describes the condition of the old unit? Was it ...?**

RAC #1

- 1. Worked and was in good physical condition
- 2. Worked but needed minor repair
- 3. Worked but needed major repair
- 4. It did not work

[DISPLAY IF # OF ROOM AC > 1]

RAC #2

- 1. Worked and was in good physical condition
- 2. Worked but needed minor repair
- 3. Worked but needed major repair
- 4. It did not work



[If Q81=2 or 3]

**82. What was wrong with the unit?**

RAC #1

1. Wouldn't turn on
2. Wouldn't keep room cold enough
3. Wouldn't keep 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

[DISPLAY IF # OF ROOM AC > 1]

RAC #2

1. Wouldn't turn on
2. Wouldn't keep room cold enough
3. Wouldn't keep 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

**83. Had you already considered disposing the room air conditioner before you heard about [UTILITY]'s appliance recycling program? By disposing, I mean getting the appliance out of your business 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.**

RAC #1

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

[DISPLAY IF # OF ROOM AC > 1]

RAC #2

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

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

RAC #1

1. Sold it to a private party

2. Sold it to a used appliance dealer
3. Kept it and continued to use it
4. Kept it and stored it unplugged
5. Given it away to a private party, such as a friend or a neighbor
6. Given it away to a charity organization, such as Goodwill Industries or a church
7. Put it on a curb with a "Free" sign on it
8. Had it removed by the dealer you got your new or replacement room air conditioner from
9. Taken it to a dump or recycling center (note that there would be a drop-off fee)
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

[DISPLAY IF # OF ROOM AC > 1]

RAC#2

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 (note that there would be a drop-off fee)
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

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

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

## DEHUMIDIFIER RECYCLING

[DISPLAY IF Q45 = 4 OR # OF DEHUMIDIFIERS > 1]

The following questions are designed to collect information about a maximum of 2 dehumidifiers please keep the same 2 units in mind when providing your response

[DISPLAY Q86-Q95 IF Q44=1 or Q45=2 or 3]

### **86. Approximately how old was your dehumidifier at the time you recycled it? [**

Dehumidifier#1

1. \_\_\_\_\_ [Record years]

98. Don't know

[DISPLAY IF # OF DEHUMIDIFIERS > 1]

Dehumidifier #2

2. \_\_\_\_\_ [Record years]

98. Don't know

### **87. Did you replace the old dehumidifier with a new unit?**

Dehumidifier #1

1. Yes

2. No

98. Don't know

[DISPLAY IF # OF DEHUMIDIFIERS > 1]

Dehumidifier #2

1. Yes

2. No

98. Don't know

### **88. Before recycling the unit, how many dehumidifiers were in operation in your business?**

1. \_\_\_\_\_ Record number of units

98. Don't know

### **89. How many dehumidifiers are currently in operation in your business?**

1. \_\_\_\_\_ Record number of units

98. Don't know

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

Dehumidifier #1

1. Open Ended \_\_\_\_\_

98. Don't know

[DISPLAY IF # OF DEHUMIDIFIERS > 1]

Dehumidifier #2

1. Open Ended \_\_\_\_\_
98. Don't know

**91. Which of the following best describes the condition of the old unit? Was it ...?**

Dehumidifier #1

1. Worked and was in good physical condition
2. Worked but needed minor repair
3. Worked but needed major repair
4. It did not work

[DISPLAY IF # OF DEHUMIDIFIERS > 1]

Dehumidifier #2

1. Worked and was in good physical condition
2. Worked but needed minor repair
3. Worked but needed major repair
4. It did not work

[DISLAY Q92 IF Q91=2 or 3]

**92. What was wrong with the unit?**

Dehumidifier #1

1. Wouldn't turn on
2. Wouldn't remove moisture
3. Too loud
4. Other (Specify) \_\_\_\_\_
98. Don't know

[DISPLAY IF # OF DEHUMIDIFIERS > 1]

Dehumidifier #2

1. Wouldn't turn on
2. Wouldn't remove moisture
3. Too loud
4. Other (Specify) \_\_\_\_\_
98. Don't know

**93. Had you already considered disposing the dehumidifier before you heard about [UTILITY]'s appliance recycling program? By disposing, I mean getting the appliance out of your business 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.**

Dehumidifier #1

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

[DISPLAY IF # OF DEHUMIDIFIERS > 1]

Dehumidifier #2

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

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

Dehumidifier #1

1. Sold it to a private party
2. Sold it to a used appliance dealer
3. Kept it and continued to use it
4. Kept it and stored it unplugged
5. Given it away to a private party, such as a friend or a neighbor
6. Given it away to a charity organization, such as Goodwill Industries or a church
7. Put it on a curb with a "Free" sign on it
8. Had it removed by the dealer you got your new or replacement dehumidifier from
9. Taken it to a dump or recycling center (note that there would be a drop-off fee)
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

[DISPLAY IF # OF DEHUMIDIFIERS > 1]

Dehumidifier #2

1. Sold it to a private party
2. Sold it to a used appliance dealer
3. Kept it and continued to use it
4. Kept it and stored it unplugged
5. Given it away to a private party, such as a friend or a neighbor
6. Given it away to a charity organization, such as Goodwill Industries or a church
7. Put it on a curb with a "Free" sign on it
8. Had it removed by the dealer you got your new or replacement dehumidifier from
9. Taken it to a dump or recycling center (note that there would be a drop-off fee)
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

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

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

#### REBATE SATISFACTION

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

**96. Has your organization received its rebate for recycling [APPLIANCES RECYCLED] yet?**

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

[DISPLAY Q97 - Q102 IF Q96=1]

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

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

[DISPLAY Q98- Q102 IF Q97=1]

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

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

**99. Was the rebate amount what you expected?**

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

**[DISPLAY Q100 IF Q99 = 1]**

100. **Why did it not meet you expectations**

- 3. The rebate was less than I expected
- 4. The rebate was more than I expected
- 5. Other (Specify) \_\_\_\_\_
- 98. Don't know

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

- 1. Record # of weeks \_\_\_\_\_
- 98. Don't know

102. **Using the scale provided, please rate how satisfied or dissatisfied you are with how long it took to receive the rebate**

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied	Don't know
1	2	3	4	5	98

BONUS INCENTIVE

[DISPLAY IF NUMBER OF REFRIGERATORS OR FREEZERS > 0 AND APPLIANCE REBATE AMOUNT = \$75]

103. **The \$75 rebate that you received was a promotional rebate offered for a limited period of time. At the time you decided to recycle your [APPLIANCES RECYCLED], were you aware that the \$75 rebate that you would receive was more than the \$50 rebate that is typically offered?**

- 1. Yes
- 2. No
- 3. Don't Know
- 98. Don't know

[DISPLAY Q104 IF Q103 = 1]

104. **How did you learn about the \$75 promotional rebate?**

- 1. Newspaper/magazine/print media
- 2. Bill insert
- 3. Friend or relative (word-of-mouth)
- 4. TV ad
- 5. [UTILITY] representative
- 6. [UTILITY] brochure
- 7. FirstEnergy website
- 8. Retailer/store
- 9. Community event
- 10. Other (Specify) \_\_\_\_\_.
- 98. Don't know
- 99. Refused

[DISPLAY Q105 IF Q103 = 1 AND Q97 != 1]

105. How likely or unlikely would you have been to recycle your [APPLIANCES RECYCLED] if a \$50 rebate was offered?

Very unlikely	Somewhat unlikely	Neutral	Somewhat likely	Very likely	Don't know
1	2	3	4	5	98

Equipment Selection and Influence Factors [Do Not Display]

[DISPLAY Q106 AND Q107 IF PROJECT=EQUIPMENT]

106. How did each of the following types of people affect your decision to install the efficient equipment?

	Provided no input	Input did not affect decision	Small effect on decision	Moderate to large effect on decision	Critical effect – could not have made decision without it	Don't know
a. Vendor (retailer)	1	2	3	4	5	98
b. Contractor (installer)	1	2	3	4	5	98
c. Designer or architect	1	2	3	4	5	98
d. Industry organization staff (i.e.COSE)	1	2	3	4	5	98
e. Utility staff member, such as an account representative	1	2	3	4	5	98

107. Was there anyone else who affected your decision to install the energy saving equipment?

1. Yes, who? \_\_\_\_\_
2. No
98. Don't know

[DISPLAY Q108 IF ANY RESPONSES TO Q106 = 4 or 5 OR Q107 = 1]

108. What did they do that affected your decision?

[DISPLAY Q109 IF PROJECT= RCX]

109. How did each of the following types of people effect your decision implement the efficiency improvements? (Select all that apply)

Provided no input	Input did not affect decision	Small effect on decision	Moderate to large effect on decision	Critical effect – could not have made	Don't know
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					decision without it	
a. Audit results	1	2	3	4	5	98
b. Contractor (installer)	1	2	3	4	5	98
c. RCx Service Provider	1	2	3	4	5	98
d. Industry organization staff (i.e.COSE)	1	2	3	4	5	98
e. Utility staff member, such as an account representative	1	2	3	4	5	98

**110. Was there anyone else who affected your decision to implement the energy saving equipment?**

1. Yes, who? \_\_\_\_\_
2. No
98. Don't know

[DISPLAY Q111 IF ANY RESPONSES TO Q109 = 4 or 5 OR Q110 = 1]

**111. What did they do to affect your decision?**

[DISPLAY IF PROJECT = NC]

**112. How did each of the following types of people affect your decision to install the efficient equipment or design features? (Select all that apply)**

	Provided no input	Input did not affect decision	Small effect on decision	Moderate to large effect on decision	Critical effect – could not have made decision without it	Don't know
a. The project design process	1	2	3	4	5	98
b. General Contractor	1	2	3	4	5	98
c. Designer or architect	1	2	3	4	5	98
d. [UTILITY] staff member, such as an account representative	1	2	3	4	5	98

**113. Was there anyone else who affected your decision to implement the energy saving equipment or design features?**

1. Yes, who? \_\_\_\_\_

2. No

98. Don't know

[DISPLAY Q114 IF ANY RESPONSES TO Q112 = 4 or 5 OR IF Q113 = 1]

114. What did they do that affected your decision?

[DISPLAY Q115 ONLY IF PROJECT = EQUIPMENT]

115. Did you work directly with a retailer to purchase the incentivized equipment?

1. Yes

2. No

98. Don't know

[DISPLAY Q116 IF Q115= 1 AND PROJECT = EQUIPMENT]

116. How long did you have to wait for the program-qualified equipment?

1. Readily available

2. Less than 1 week

3. 1-2 weeks

4. 3-4 weeks

5. 5-6 weeks

6. More than 6 weeks

98. Don't Know

[DISPLAY Q117 IF PROJECT = EQUIPMENT]

117. Who installed your program-qualified equipment or efficiency upgrades?

1. Your own staff

2. A contractor you've worked with before

3. A contractor recommended by [UTILITY]'s business incentive program (registered trade ally)

4. A new contractor that someone else recommended

97. Other (please specify)

98. Don't know

[DISPLAY Q118 IF Q117 = 2,3,4]

118. Using the scale provided, please rate your agreement with the following statements:

	Completely disagree	Somewhat disagree	Neutral	Somewhat agree	Completely agree	Don't know
a. the contractor was knowledgeable about the equipment installed	1	2	3	4	5	98

b. the contractor was knowledgeable about the program	1	2	3	4	5	98
c. the contractor was professional and courteous	1	2	3	4	5	98
d. the contractor was efficient	1	2	3	4	5	98

**[DISPLAY Q119 IF PROJECT=EQUIPMENT]**

**119. Is the equipment that you implemented through the business incentive program still in place and operating?**

- 1. Yes**
- 2. No**
- 98. Don't know**

**[DISPLAY Q120 IF Q119 = 2]**

**120. Why is the equipment no longer installed or operating?**

**BONUS INCENTIVE**

**[DISPLAY Q121 IF BONUS INCENTIVE = 1]**

**121. According to our records your company received a bonus incentive, which doubled the incentive rate for your project. Were you aware that your organization received the bonus incentive?**

- 1. Yes**
- 2. No**
- 98. Don't know**

**[DISPLAY Q122 - Q126 IF Q121 = 1]**

**122. When did you become aware of the bonus incentive?**

- 1. Before deciding to complete the project**
- 2. After deciding to complete the project, but before the project was underway**
- 3. When the project was already underway**
- 4. Once the project was complete**
- 98. Don't know**
- 99. Refused**

**123. How likely would you have been to complete the project if the bonus incentive was not offered?**

124. How likely or unlikely would you have been to complete the project if the bonus incentive was not offered?

Very unlikely	Somewhat unlikely	Neutral	Somewhat likely	Very likely	Don't know
1	2	3	4	5	98

125. We would like to know whether the bonus incentive offered through [UTILITY]'s Energy Efficiency Program affected the timing of your project.

Did you complete the project earlier than you otherwise would have without the bonus incentive?

- 1. Yes
- 2. No, the dual incentive did not affect the timing of the project
- 98. Don't know

[DISPLAY Q126 IF Q125 = 1]

126. When would you have otherwise completed the project?

- 1. Less than 6 months later
- 2. 6-12 later
- 3. 1-2 years later
- 4. 3-5 years later
- 5. More than 5 years later
- 98. Don't know

Program Communication and Customer Satisfaction [Do No Display]

The following few questions pertain to your communications with the program staff. Program staff are anyone that reviewed your application, conducted site inspections, determined your incentive amount, or processed your incentive check. Program staff are not anyone hired by you to conduct an audit, design your system, or install your hardware.

127. In the course of doing this project did you have any interactions with program staff?

- 1. Yes
- 2. No
- 98. Don't know

[DISPLAY Q128 AND Q129 If Q127 = 1]

128. On the scale provided, please indicate how knowledgeable were program staff about the issues you discussed with them?

Not at all knowledgeable	Slightly knowledgeable	Somewhat knowledgeable	Fairly knowledgeable	5 – Very knowledgeable	Not sure
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**129. On the scale provided, please indicate how satisfied or dissatisfied are you with:**

	Very Dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied	Don't Know
a. how long it took program staff to address your questions or concerns	1	2	3	4	5	98
b. how thoroughly program staff addressed your question or concern	1	2	3	4	5	98
c. the equipment that was installed	1	2	3	4	5	98
d. the quality of the installation						
e. the amount of time it took to deliver and install the equipment	1	2	3	4	5	98
f. the steps you had to take to get through the program	1	2	3	4	5	98
g. the amount of time it took to get your rebate or incentive	1	2	3	4	5	98
h. the range of equipment that qualifies for incentives	1	2	3	4	5	98
i. the program, overall	1	2	3	4	5	98

**[DISPLAY Q130 IF ANY RESPONSES Q129 = 1 or 2]**

**130. Please describe the ways in which you were not satisfied with the aspects of the program mentioned above?**

Measurement and Verification [Do Not Display]

**131. After your project was completed, did a program representative inspect the work done through the program?**

**1. Yes**

**2. No**

**98. Don't know**

**[DISPLAY QError! Reference source not found. If QError! Reference source not found.=1]**

**132. Using the scale provided, please rate your agreement with the following statements:**

	Completely disagree	Somewhat disagree	Neutral	Somewhat agree	Completely agree	Don't know
a. The inspector was courteous	1	2	3	4	5	98
b. The inspector was efficient	1	2	3	4	5	98

### **Firmographic [Do Not Display]**

**133. Which of the following best describes the type of work that your firm or organization does at [LOCATION]?**

- 1. Industrial**
- 2. Restaurant (not fast food)**
- 3. Fast food restaurant**
- 4. Retail**
- 5. Office**
- 6. Grocery and convenience**
- 7. School**
- 8. Lodging**
- 9. Warehouse**
- 97. Other (please specify) \_\_\_\_\_**
- 98. Don't Know**

**134. About how many full-time equivalent employees work at the facility at [LOCATION]?**

- 1. Less than 10**
- 2. 11 to 25**
- 3. 26 to 40**
- 4. 41 to 75**
- 5. 76 to 100**
- 6. 100 to 500**
- 7. More than 500**
- 98. Don't know**

**135. Including all the properties, how many separate work locations does your organization own or lease space in, in FirstEnergy's Ohio utilities' service area? (A work location may consist of multiple buildings in close proximity to each other, such as a university campus – please indicate the number of locations)**

**136. How many square feet (indoor space) is the part of the property at the [Location] that your firm or organization occupies? (If your firm or organization occupies the entire property, indicate the total size of that property.)**

- 1. Less than 5,000**
- 2. 5,001 to 10,000**
- 3. 10,001 to 20,000**
- 4. 20,001 to 50,000**

- 5. 50,001 to 75,000
- 6. 75,001 to 100,000
- 7. 100,001 to 250,000
- 8. 250,001 to 500,000
- 9. 500,001 to 1,000,000
- 10. More than 1,000,000
- 97. Don't Know

Thank you for taking the survey. Have a great day!

## **FirstEnergy Business Incentive Programs Trade Ally Survey**

<b>Research Question</b>
What are the primary market imperfections common to target market segment?
Are non-participants aware of the program?
Are program services provided comprehensive? Are there any missed opportunities? Are there better ways to address market imperfections to increase adoption of each program measure?
What is the level of program satisfaction? How has satisfaction improved with participation? Are there suggestions for improvements?
Did the trade allies and participants find the application process to be difficult? Did this vary for custom and standard applications?
What are the most effective ways to communicate program updates to trade allies?

### **Programming note style conventions in this document:**

[PROGRAMMING] Programming instructions are in bracketed CAPS.

[*Interviewer notes*] Onscreen interviewer instructions are in *italics*.

[**Piped value**] Database inputs are in **bold**.

### **Mode of Administration**

Online and Telephone

### **Survey Instrument**

Approximately how many employees work at your firm?

1. 1 to 4 employees
2. 5 to 9 employees
3. 10 to 19 employees
4. 20 to 99 employees
5. 100 to 499 employees
6. 500 or more employees

How would you characterize your type of business? (Do not read)

1. Architect
2. Contractor – Electrical
3. Contractor – Mechanical
4. Distributor
5. Engineer
6. Manufacturer



7. Manufacturer representative
8. Vendor / Retailer
97. Other (please specify)

How would you characterize the types of services and products that you provide to your customers and clients? (Select all the apply)

1. Building design
2. Commissioning
3. Compressed air systems
4. Controls
5. Energy analysis
6. Foodservice equipment
7. Grocery equipment
8. HVAC
9. Insulation
10. Lighting
11. Motors/drives
12. Windows
97. Other (please specify)

How did you find out about [EDC(s) Associated with Applications]'s business incentive program?

**APPLICATION PROCESS [DO NOT DISPLAY]**

Has your firm completed or assisted in the completion of any business incentive program project applications?

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

Have you sought any assistance from [EDC(s) Associated with Applications] or Sodexo staff for incentive projects you were working on?

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

[DISPLAY Q0, Q0, and Q0 IF Q0= 1]

What did you need help with?

With whom did you speak?

1. **[EDC(s) Associated with Applications]** staff

2. Sodexo staff
98. Don't know

Did you get the assistance that you needed?

1. Yes
2. No
97. Don't know

Are there any aspects of the business incentive application materials or process that you would recommend be modified in the future?

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

[DISPLAY Q0 IF Q0 = 1]

For which applications is the process in need of future modification?

1. Prescriptive lighting
2. Calculated lighting
3. HVAC and water heaters
4. Appliances
5. Food service
6. Custom buildings and equipment
7. Facility audits
8. Data centers
9. Retro – commissioning
10. Traffic signals
98. Don't know

In what ways would you recommend the application materials or process be changed?

### **PROGRAM OFFERINGS [DO NOT DISPLAY]**

The next few questions are about the incentives and services that were offered through the Energy Save Ohio programs during 2014.

The business incentive programs offered prescriptive incentives that provided incentives on a per unit of equipment basis to customers.

Do you think there is any additional equipment for which a prescriptive incentive should have been offered to meet the needs of your customers?

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

[DISPLAY Q0 if Q0 = 1]

What equipment should have been offered with a prescriptive incentive ?

Next, please think about the information and support provided to you by the program. Using a scale of completely unacceptable, somewhat unacceptable, somewhat acceptable, completely acceptable, how would you rate the following...

	Completely unacceptable	Somewhat unacceptable	Somewhat acceptable	Completely acceptable	Don't know
f. Information provided about incentive program requirements	1	2	3	4	98
g. Communications about program updates and changes	1	2	3	4	98
h. Information about incentive offerings	1	2	3	4	98
i. Information about the application process	1	2	3	4	98
j. Information on how to market and sell energy efficiency	1	2	3	4	98

[DISPLAY Q0 if any Q0a -Q0e < 3]  
More specifically, what did you find unacceptable?

### **PROGRAM IMPACT ON BUSINESS [DO NOT DISPLAY]**

Has your involvement in the Energy Save Ohio business incentive program affected the types of equipment or services that you provide?

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

[DISPLAY Q0 IF Q0 = 1]

In what ways has your involvement in the business incentive programs affected the types of equipment or services that you provide?

Do you expect to make any changes to the types of equipment or services that you provide in the next 12 months?

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

[DISPLAY Q0 IF Q0= 1]

What changes do you plan on making?

[DISPLAY Q0 IF Q0= 1]

Why are you making these changes?

What trends have you noticed, if any, in the equipment choices that customers are making?

**MARKETING AND CUSTOMER AWARENESS [DO NOT DISPLAY]**

Think about your customers who have not completed an Energy Save Ohio Business Incentive project. What share of those customers do you think are aware of the programs?

1. 0%-9%
2. 10%-19%
3. 20%-29%
4. 30%-39%
5. 40%-49%
6. 50%-59%
7. 60%-69%
8. 70%-79%
9. 80%-89%
10. 90%-100%

98. Don't know

Are there ways in which [EDC(s) Associated with Applications] could have improved awareness of the programs among business customers?

1. Yes
2. No

98. Don't know

[DISPLAY Q0 IF Q0= 1]

Please describe how [EDC(s) Associated with Applications] could have more effectively promote the programs.

Did you actively market Energy Save Ohio business incentive programs to your customers?

1. Yes
2. No

98. Don't know

[DISPLAY Q0 IF Q0 = 1]

Through what means did you actively market the business incentive program to your customers? About what percentage of your customers were aware that they could get incentives from the Energy Save Ohio business incentive programs for upgrading energy-using equipment - that is before you mentioned it to them?

1. 0%-9%
2. 10%-19%
3. 20%-29%
4. 30%-39%
5. 40%-49%

6. 50%-59%
7. 60%-69%
8. 70%-79%
9. 80%-89%
10. 90%-100%
98. Don't know

Think about the jobs you completed in the Illuminating Company, Ohio Edison, and Toledo Edison service territories in the last year. In what percentage of those jobs did you propose an energy-saving project that could qualify for Energy Save Ohio business incentives?

1. 0%-9%
2. 10%-19%
3. 20%-29%
4. 30%-39%
5. 40%-49%
6. 50%-59%
7. 60%-69%
8. 70%-79%
9. 80%-89%
10. 90%-100%
98. Don't know

And in approximately what percentage of those jobs did the client agree to most of the incentive-qualifying equipment that you proposed?

1. 0%-9%
2. 10%-19%
3. 20%-29%
4. 30%-39%
5. 40%-49%
6. 50%-59%
7. 60%-69%
8. 70%-79%
9. 80%-89%
10. 90%-100%
98. Don't know

For those clients that didn't agree to install most of the incentive-qualifying equipment, what reasons did they give?

In what ways, if any, did their reasoning relate to the size or type of organization?

[DISPLAY Q0 IF Q0 >1]

Now, think about the jobs that you did propose equipment that qualified for incentives. For those clients that accepted most of the qualifying equipment that you proposed, what percentage applied for an Energy Save Ohio business incentive? (Do not read to respondents)

1. 0%-9%
2. 10%-19%
3. 20%-29%
4. 30%-39%
5. 40%-49%
6. 50%-59%
7. 60%-69%
8. 70%-79%
9. 80%-89%
10. 90%-100%
98. Don't know

[DISPLAY Q0 IF Q0 <10]

For those clients that didn't apply for an Energy Save Ohio business incentive for the qualifying equipment, what reasons did they give?

[DISPLAY Q0 IF Q0 <10]

In what ways, if any, did their reasoning relate to the size or type of organization?

Thinking more generally about the reasons why businesses are unable or unwilling to implement energy-efficient equipment, what do you think are most important barriers to energy efficiency in businesses?

### **COMMUNICATION OF PROGRAM CHANGES [DO NOT DISPLAY]**

How effective is each of the following methods of communicating changes about [EDC(s) Associated with Applications] programs to you?

	Very effective	Somewhat effective	Slightly effective	Not at all effective	Don't know
a. Email	1	2	3	4	98
b. Phone calls from program representatives	1	2	3	4	98
c. Presentations at events or conferences	1	2	3	4	98
d. Website updates	1	2	3	4	98
e. In person visits	1	2	3	4	98

**SATISFACTION [DO NOT DISPLAY]**

Overall, how satisfied or dissatisfied are you with your experiences in working with the business incentive programs?

1. Very Satisfied
2. Satisfied
3. Neither Satisfied nor Dissatisfied
4. Very Dissatisfied
5. Dissatisfied

[DISPLAY Q0 IF Q0 = 1 OR 2]

Please describe why you were not satisfied with the program.

Is there anything else you would like to tell us about your experience with [EDC(s) Associated with Applications]'s business incentive programs?

Do you have any other comments that you would like to relay to [EDC(s) Associated with Applications] about energy efficiency in commercial and industrial facilities or about their programs?

Thank you!

Thank you for taking this survey of trade allies assisting implementation of projects for [EDC(s) Associated with Applications]'s business incentive programs.

Your response is very important to us.

**If you have any questions regarding this survey, please contact Jeremy Offenstein of ADM Associates at 916-363-8383.**

## **FirstEnergy Business Incentive Programs Near-Participant Survey**

<b>Variables</b>	<b>Definition</b>
Near Participants	Project status = cancelled, void, denied, expired, rejected
PROJECT DESCRIPTION	Insert text description
LOCATION	Location for selected project
ORGANIZATION	Premise Company
DATE INSTALLED	Installation Date
UTILITY	EDC

### **Mode of Administration**

Telephone

### **Phone Introduction**

*Hello, may I speak to [name from call list]?*

*Hello, my name is \_\_\_\_\_. I'm calling on behalf of [UTILITY] and would like to discuss your experience with the utility's Energy Efficiency Program.*

*As part of the evaluation, we talk with customers that began – but did not to complete – the process to receive incentives. Customer feedback is important to [UTILITY] and suggestions may help improve the program.*

***Are you the best person to talk to about your firm's involvement in [UTILITY]'s Energy Efficiency Program?***

1. Yes
2. No

***[If not best person to talk to]***

***Who is the best person to talk to? Document name and phone number***

***Name:***

***Phone number:***

***[THANK AND TERMINATE INTERVIEW. CALL NEW CONTACT]***

*Would this be a convenient time for us to talk? We probably need about 10 to 15 minutes. [If not, schedule another time; if so, continue]*

*If needed:*

- *Not selling anything.*
- *Responses confidential*

*Do you have any questions before we get started?*

**PROJECT BACKGROUND AND STATUS [DO NOT DISPLAY]**

1. **According to our records [ORGANIZATION] was considering a [PROJECT DESCRIPTION] project at the [LOCATION] location.**



**Do you recall submitting an application for this project?**

- 1. Yes
- 2. No [THANK AND TERMINATE]
- 98. Don't know [THANK AND TERMINATE]
- 99. Refused [THANK AND TERMINATE]

**[DISPLAY Q IF Q = 1]**

**2. According to our records [ORGANIZATION] *did not* receive an incentive for this project. Is this correct?**

- 1. Yes
- 2. No, an incentive was received [THANK AND TERMINATE]
- 98. Don't know [THANK AND TERMINATE]
- 99. Refused [THANK AND TERMINATE]

**[DISPLAY Q3 IF Q2 = 1]**

**3. What is the current status of that project?**

- 1. The project is in progress now
- 2. Project is on hold/planning on doing it later
- 3. Not doing the project
- 4. Other (Specify)
- 98. Don't know
- 99. Refused

**[DISPLAY Q4 IF Q3 = 1 or 2]**

**4. Does your company plan on applying for an [UTILITY] incentive at a later point?**

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

**[DISPLAY Q5 IF Q4 = 2]**

**5. Why do you feel your company will not apply for an incentive from [UTILITY] at a later time?**

**[DISPLAY Q6 IF Q3 = 2]**

**6. Why is the project on hold?**

Open Ended \_\_\_\_\_

**7. Why did your company decide not to do the project?**

Open Ended \_\_\_\_\_

**8. Why did your company consider this project to begin with?**

Open Ended \_\_\_\_\_

**APPLICATION PROCESS [DO NOT DISPLAY]**

**9. How did your company learn about [UTILITY]'s incentives for efficient equipment or upgrades? (Select all that apply)**

- 99. Past experience with the program
- 100. From the contractor, equipment vendor, or energy consultant we worked with to start the project at [LOCATION].
- 101. From some other contractor, equipment vendor, or energy consultant
- 102. From an [UTILITY] Account Representative
- 103. From a program representative
- 104. From [UTILITY]'s website, (EnergySaveOhio.com)
- 105. From a search engine(Google, Yahoo, Bing)
- 106. An event or trade show
- 107. Received an email blast or electronic newsletter
- 108. Received an informational brochure
- 109. TV / radio ads sponsored by [UTILITY]
- 110. Friends or colleagues
- 111. Other (please explain)
- 112. Don't know

**10. Which of the following people worked on completing your application for program incentives (including gathering required documentation)? (Select all that apply)**

- 1. Yourself
- 2. Another member of your company
- 3. A contractor
- 4. An equipment vendor
- 5. A designer or architect
- 6. Someone else (please define)
- 98. Don't know
- 99. Refused

[DISPLAY Q11 ONLY IF Q10= 1]

**11. Using a scale of completely unacceptable, somewhat unacceptable, neutral, somewhat acceptable, completely acceptable, how would you rate the following...**

**a. ...the ease of finding how to apply for incentives on [UTILITY]'s website**

Completely unacceptable	Somewhat unacceptable	Neutr	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**b. ...the ease of using the electronic application**

Completely unacceptable	Somewhat unacceptable	Neutr	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**c. ...the clarity of information about the application**

Completely unacceptable	Somewhat unacceptable	Neutr	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**d. ...the documentation requirements**

Completely unacceptable	Somewhat unacceptable	Neutr	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**e...the time requirements for participating in the program**

Completely unacceptable	Somewhat unacceptable	Neutr	Somewhat acceptable	Completely acceptable	Don't know
1	2	3	4	5	98

**[DISPLAY Q12 IF ANY Q13a- Q13e = 1 or 2]**

**12. What did you find unacceptable?**

**13. Did you have a clear understanding of whom you could go to for assistance with the application process?**

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

**14. Do you have any suggestions for streamlining the application forms or the approval process?**

**15. Do you have any suggestions for how the program could be improved or general feedback for [UTILITY] regarding the business incentive program?**  
**PLANS FOR FUTURE EE PROJECTS [DO NOT DISPLAY]**

**16. Does your organization have plans to install any high efficiency equipment in the next two years?**

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

[DISPLAY Q17 IF Q16 = 1]

**17. What equipment types does your organization plan to install/complete?**  
**(Select all that apply)**

- 1. High Efficiency Lighting
- 2. High Efficiency HVAC equipment
- 3. Variable Speed Motors and/or Drives
- 4. EnergyStar rated Appliances
- 5. High efficiency Commercial Kitchen Equipment
- 6. Agriculture Equipment
- 7. High Efficiency Consumer Electronics (high efficiency TVs, computer, data centers, and/or imaging devices)
- 8. Something else (Specify) \_\_\_\_\_
- 98. Don't know
- 99. Refused

[DISPLAY Q18 IF Q16 = 1]

**18. To the best of your knowledge, which of the following [UTILITY] incentives, if any, do you plan to apply for when you install that equipment?**

- 1. [UTILITY]'s Energy Save Ohio
- 2. We do not plan to apply for incentives
- 98. Don't Know
- 99. Refused

[DISPLAY Q19 IF Q18 = 2]

**19. Why would you choose not to apply for an incentive?**

**FIRMOGRAPHICS AND ENERGY POLICIES [DO NOT DISPLAY]**

**Lastly, I have a few questions about your company.**

**20. Which of the following, if any, does your company have in place at [LOCATION]? (Select all that apply)**

1. A person or persons responsible for monitoring or managing energy usage
2. Defined energy-savings goals
3. A specific policy requiring that energy efficiency be considered when purchasing equipment
4. Carbon reduction goals
5. Other policies or procedures regarding energy efficiency or use (please describe)
6. None of the above
98. Don't know
99. Refused

**21. Does your company own, lease, or rent the facility at [LOCATION]?**

1. Own
2. Lease
3. Rent
98. Don't know
99. Refused

**22. What type of work does your firm or organization do at [LOCATION]? [Read list if needed]**

1. Industrial
2. Restaurant (not fast food)
3. Fast food restaurant
4. Retail
5. Office
6. Grocery and convenience
7. School
8. Lodging
9. Warehouse
10. Other (please specify)
98. Don't Know
99. Refused

**23. Including all the properties, how many separate locations does your organization own or lease space in, in FirstEnergy's Ohio utilities' territory? (A work location may consist of multiple buildings in close proximity to each other, such as a university campus – please indicate the number of locations)**

**24. How many square feet (indoor space) is the part of the property at [LOCATION] that your firm or organization occupies? (If your firm or organization occupies the entire property, indicate the total size of that property.)**

1. Less than 5,000
2. 5,001 to 10,000
3. 10,001 to 20,000
4. 20,001 to 50,000

- 5. 50,001 to 75,000
- 6. 75,001 to 100,000
- 7. 100,001 to 250,000
- 8. 250,001 to 500,000
- 9. 500,001 to 1,000,000
- 10. More than 1,000,000
- 98. Don't Know
- 99. Refused

That is all the questions I have. Thank you for your time. Good bye.