APPENDIX I – COMMERCIAL AND INDUSTRIAL EM&V REPORT

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

Commercial and Industrial Programs 2019 Evaluation, Measurement and Verification Report

Prepared for the FirstEnergy Ohio Companies:

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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 2019. These programs include C&I Energy Solutions for Business Program for both Large Commercial (LCI) and Small Commercial (SCI) customers as well as Government Tariff Lighting.

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 this report, the programs SCI and LCI combined will be referred to as C&I.

In addition, Recleim implemented the Appliance Turn-In SCI program and Franklin Energy Implemented Multifamily measures. The Appliance Turn-In measure incents the recycling of refrigerators, freezers, room air conditioners (RAC), and dehumidifiers. Multifamily measures in the SCI program are measures from Franklin Energy's GoodCents® services that impact commercial electric meters. GoodCents® services that impact residential electric meters are reported through the residential energy efficiency programs.

The total ex-ante annual energy savings (kWh) by program is shown in Table 1-1. Appliance Turn-In accounted for 407 projects[1] with ex-ante annual energy savings of 689,597 kWh into SCI. Multifamily measures accounted for 1,848,348 kWh of SCI annual energy savings.

Table 1-1: Summary of Ex-ante Savings (kWh) for LCI and SCI[2]

Program	CEI	OE	TE	Total
LCI	32,009,982	68,826,542	19,209,610	120,046,134
SCI	70,876,385	85,578,296	29,857,197	186,311,879
Gov't Lighting	210,761	363,446	1,147,821	1,722,028
Total	**103,097,128**	**154,768,284**	**50,214,628**	**308,080,040**

A breakdown of all sub-programs in LCI and SCI is shown in Table 1-2.

[1] Represents the number of individual participants in the Appliance Turn-In Program.
[2] All savings in this report are calculated at the retail level and do not include line losses.

Table 1-2: Summary of Ex-ante Savings (kWh) by Sub-Program

Program	CEI	OE	TE	Total
Appliance Turn In - SCI	273,214	332,528	83,856	689,597
Appliances – SCI	0	149	4,722	4,870
Audits & Education - LCI	0	0	0	0
Audits & Education - SCI	699,480	1,054,746	94,122	1,848,348
Consumer Electronics - SCI	982,406	203,419	321,179	1,507,004
Custom – LCI	20,070,925	42,491,289	12,051,832	74,614,046
Custom – SCI	8,515,164	11,993,709	3,885,733	24,394,607
Custom Buildings - SCI	888,499	525,405	267,639	1,681,543
Food Service	661,521	650,528	187,459	1,499,507
Government Tariff Lighting	210,761	363,446	1,147,821	1,722,028
HVAC – LCI	30,137	43,797	0	73,934
HVAC – SCI	152,788	377,437	76,342	606,567
Lighting – LCI	11,908,921	26,291,455	7,157,779	45,358,155
Lighting – SCI	58,703,313	70,440,376	24,936,146	154,079,835
Grand Total	**103,097,128**	**154,768,284**	**50,214,628**	**308,080,040**

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). Sample 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 decision maker survey shown in Table 1-3. Appliance Turn-In customer decision makers account for 10 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	55	70	125
Customer Decision Maker Survey	41	140	181
Trade Ally Survey	37		37

Pre-construction evaluation reviews were completed by ADM to mitigate evaluation risk for above-threshold projects. These included lighting projects with over 750,000 kWh ex-ante savings, and custom projects with over 500,000 kWh ex-ante savings. Pre-construction reviews were completed for 88 above threshold projects for a total of 124,377,765 kWh. In addition, ADM reviewed above-threshold projects in the post-installation condition to account for changes in project scope-of-work and equipment installation. Tracking and dissemination of pre-construction reviews was achieved through status updates in the implementation software database as well as bi-weekly conference calls and 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	32,009,982	29,813,545	93%
	SCI	70,876,385	69,400,459	98%
Total		**102,886,367**	**99,214,004**	**96%**
OE	LCI	68,826,542	65,589,812	96%
	SCI	85,578,296	79,215,398	93%
Total		**154,404,838**	**145,074,622**	**94%**
TE	LCI	19,209,610	19,437,603	101%
	SCI	29,857,197	29,907,254	100%
Total		**49,066,808**	**49,344,856**	**101%**
Grand Total		**306,358,013**	**293,633,483**	**96%**

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 Peak kW Savings	Ex-post Peak kW Savings	Realization Rate
CEI	LCI	4,642.68	4,506.31	97%
	SCI	11,601.19	10,890.82	94%
Total		**16,243.87**	**15,397.13**	**95%**
OE	LCI	9,463.33	9,157.99	97%
	SCI	13,420.46	12,058.56	90%
Total		**22,883.78**	**21,216.55**	**93%**
TE	LCI	2,772.10	2,977.90	107%
	SCI	4,784.79	4,580.80	96%
Total		**7,556.90**	**7,558.70**	**100%**
Grand Total		**46,684.18**	**44,172.38**	**95%**

2. Introduction and Purpose of Study

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 2019 program year.

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 2019 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)[3], 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 OH TRM, and, if appropriate, using industry standards.
    - For non-lighting prescriptive measures, savings algorithms were used from the OH TRM. If prescriptive measures were not listed in the OH 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 OH 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.

[3] Vermont Energy Investment Corporation (VEIC), *State of Ohio Energy Efficiency Technical Reference Manual,* Prepared for Public Utilities Commission of Ohio, August 6, 2010, revised September 30, 2013.

The process evaluation is designed to research and document the program delivery mechanisms, and the 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.

3. Description of Programs

The C&I Energy Solutions Programs provide energy-efficient upgrades to business customers that receive electric service from the Companies. The following measures are eligible for program incentives:

- HVAC Program
- Agriculture
- Food Service
- Appliance Turn-In
- Appliances
- Consumer Electronics
- Data Centers
- Lighting Program
- Custom Equipment Program
- Retro-Commissioning
- Audits and Education (Multi-Family)
- Indoor Horticultural Lighting

To be eligible to participate in these programs, a customer must first be designated as "Large" or "Small" as defined in the Rate Code and Customer Size as provided in Table 3-1.

Table 3-1: Rate Code by Customer Size

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

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 can gain information on the program from the Energy Save Ohio website.

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.

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

Measure Type	Ex-ante kWh Savings			
	CEI	OE	TE	Total Companies
Custom Equipment	20,070,925	42,491,289	12,051,832	74,614,046
HVAC	30,137	43,797	0	73,934
Lighting	11,908,921	26,291,455	7,157,779	45,358,155
Total	**32,009,982**	**68,826,542**	**19,209,610**	**120,046,134**

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

Measure Type	Ex-ante kWh Savings			
	CEI	OE	TE	Total Companies
Appliance Turn-In	273,214	332,528	83,856	689,597
Appliances	0	149	4,722	4,870
Consumer Electronics	982,406	203,419	321,179	1,507,004
Custom	8,515,164	11,993,709	3,885,733	24,394,607
Custom Buildings	888,499	525,405	267,639	1,681,543
Food Service	661,521	650,528	187,459	1,499,507
HVAC	152,788	377,437	76,342	606,567
Lighting	58,703,313	70,440,376	24,936,146	154,079,835
Audits and Education	699,480	1,054,746	94,122	1,848,348
Total	**70,876,385**	**85,578,296**	**29,857,197**	**186,311,879**

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. The third quarter of the year saw a large increase in new applications.

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

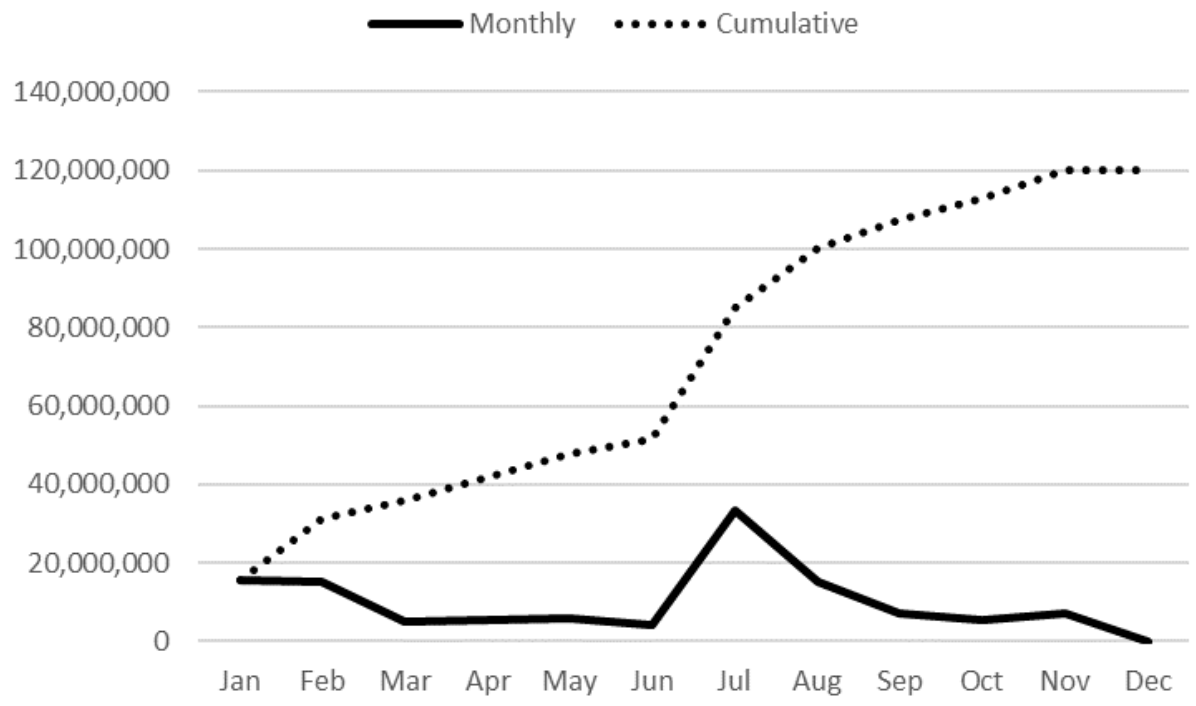
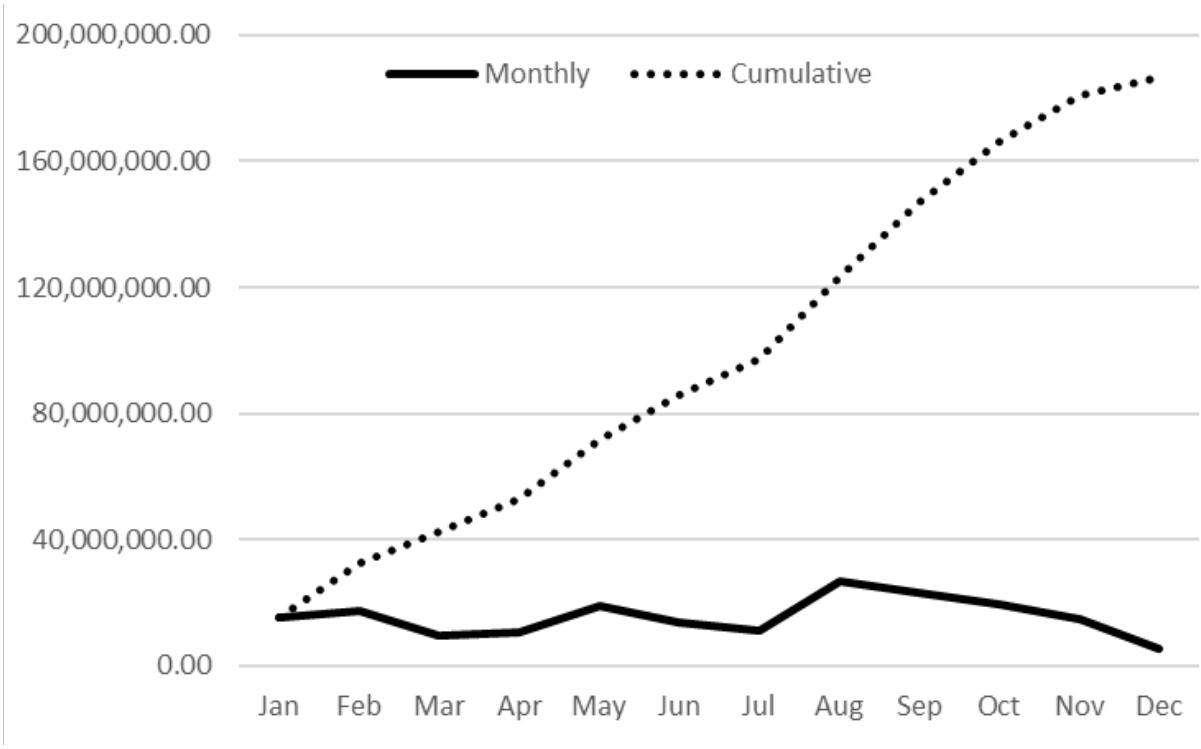


Figure 3-2 shows the monthly and cumulative SCI Program's ex-ante kWh savings by the date of application submission for all service territories. The program saw continuous growth in new applications throughout the year.

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



4. Methodology

ADM's evaluation of the 2019 C&I Programs consisted of both an impact evaluation and a process evaluation. The impact evaluation methodology and the process evaluation methodology are described in the Methodology Section of this chapter.

Prior to the impact and process evaluation, program tracking data was reviewed for completeness and accuracy. The program tracking data review provided ADM with knowledge of each program's diversity of measures as well as magnitude.

4.1. Impact Methodology

The measurement and verification (M&V) methodology used for estimating ex-post annual energy savings, peak demand reduction, and lifetime energy savings, is described in this section. The impact evaluation is achieved through pre-construction reviews, sample development, sampled project verification, findings extrapolation and reporting. Data for analysis was collected through review of program materials, on-site inspections, end-use metering, and interviews with participating customers and service providers.

4.1.1. M&V Sample Development

ADM created a stratified sample based on the amount of energy savings and type of measure installed in each project. For this approach, ADM utilized statistical algorithms to determine stratification boundaries.[4] Ratio estimation was then used to determine precision at a 90% confidence interval across numerous strata for each Company. The sample for each Company was stratified based on program, measure type, and magnitude of ex-ante annual energy savings. Realization rates (the ratio of ex-post to ex-ante savings) for projects sampled in each stratum are only extrapolated to projects within that stratum. Verification of sample precision, by means of each stratum's contribution to variance, is then performed on the ex-post extrapolated annual energy savings (kWh) for the program. Sample size for each stratum was designed to meet ex-ante annual energy savings at $\pm$10% precision at the 90% confidence level for each Company. Upon completion of the impact evaluation, precision is calculated based on ex-post annual energy savings.

Occasionally the energy savings for a given project are impacted by circumstances that are not consistent with similar projects. In these situations, the verified energy savings are held for the project but are not extrapolated to any other projects. An example of this situation may be the destruction of the facility through natural disasters. This was applied to two projects in 2019.

[4] https://cran.r-project.org/web/packages/SamplingStrata/index.html

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. For example, LCI consisted of 14% of projects, but accounted for 33% of total ex-ante energy savings. Ex-post 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 enough projects to estimate the total achieved savings with ±10% precision at 90% confidence. For each service territory, the precisions are designed to be less than ±10%. Selected sample projects are chosen randomly based on a stratification approach.

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 (quarterly) as projects in the program were completed.

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.

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	3,034,991	477 – 98,464	90	2
Custom - SCI 2	0	0	0	0
Custom - SCI 3	3,054,911	20,444 – 125,492	26	2
Custom - SCI 4	4,472,341	169,428 – 466,576	13	2
Custom - LCI 1	4,000,217	5,424 – 535,145	23	2
Custom - LCI 3	15,198,384	1,024,907 – 41,75,387	6	5
HVAC - SCI 1	152,788	123 – 15,207	25	2
HVAC - LCI 1	30,137	12,008 – 17,651	2	1
Lighting - LCI 1	2,395,619	404 – 155,105	52	3
Lighting - LCI 2	5,259,313	140,449 – 505,709	15	2
Lighting - LCI 4	5,126,312	872,754 – 1,375,654	5	2
Lighting - SCI 1	4,626,683	288 – 27,852	370	3
Lighting - SCI 2	9,110,719	27,439 – 81,027	171	3
Lighting - SCI 3	9,246,371	83,611 – 170,807	78	2
Lighting - SCI 4	14,493,811	158,901 – 523,642	55	5
Lighting - SCI 5	15,702,776	722,259 – 1,390,929	19	2
Appliance Turn-In	273,214	161 – 1,383	155[5]	10
Audits & Education	699,480	< 87,792	870	7
Certainty	6,008,300	< 6,016,457	1	1
Gov't Lighting	210,761	194 – 58,850	17	0
Total	**103,097,128**		**1,993**	**56**

[5] Represents the number of individual participants in the Appliance Turn-In Program (CEI).

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	521,214	111 – 16,038	46	2
Custom - SCI 2	3,430,805	23,241 – 89,963	68	2
Custom - SCI 3	7,725,554	76,049 – 756,239	36	3
Custom - LCI 1	2,068,084	5,497 – 136,261	42	2
Custom - LCI 2	7,705,407	117,220 – 771,788	27	4
Custom - LCI 3	10,379,552	771,788 – 7,264,377	3	2
HVAC - LCI 1	43,797	1,867 – 21,644	34	2
HVAC - SCI 1	377,437	356 – 56,133	3	2
Lighting - LCI 1	1,806,309	491 – 99,097	78	2
Lighting - LCI 2	5,304,339	76,977 – 259,127	34	2
Lighting - LCI 3	9,279,447	251,282 – 564,405	23	2
Lighting - LCI 4	14,237,095	597,541 – 4,356,480	11	6
Lighting - SCI 1	7,033,829	559 – 31,800	522	3
Lighting - SCI 2	13,717,106	23,725 – 60,788	266	2
Lighting - SCI 3	11,542,230	69,636 – 129,926	109	2
Lighting - SCI 4	17,807,039	150,515 – 481,612	79	2
Lighting - SCI 5	22,035,809	495,385 – 1,141,843	29	3
Appliance Turn-In	332,528	162 – 1,339	203[6]	19
Audits and Education	1,054,746	< 59,222	1883	60
Certainty	18,002,513	< 17,221,671	1	1
Gov't Lighting	363,446	3,228 – 84,614	14	1
Total	**154,768,284**		**3,511**	**125**

[6] Represents the number of individual participants in the Appliance Turn-In Program (OE).

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	629,220	1,919 – 22,298	48	2
Custom - SCI 2	863,765	< 45,668	21	2
Custom - SCI 3	1,592,994	93,523 – 190,680	13	2
Custom - SCI 4	1,542,387	215,377 – 906,530	3	1
Custom - LCI 1	2,339,646	< 298,520	19	3
Custom - LCI 2	9,246,295	423,240 – 1,355,726	13	5
HVAC - SCI 1	76,342	558 – 26,924	14	2
Lighting - LCI 1	1,041,673	1,971 – 72,856	33	2
Lighting - LCI 2	1,884,253	73,409 – 209,380	14	2
Lighting - LCI 3	894,565	267,758 – 357,363	3	1
Lighting - LCI 4	3,803,179	678,946 – 1,472,101	4	2
Lighting - SCI 1	2,874,778	1,022 – 27,511	210	4
Lighting - SCI 2	4,637,676	27,951 – 73,345	88	2
Lighting - SCI 3	3,724,454	88,068 – 152,653	33	3
Lighting - SCI 4	7,069,105	162,153 – 328,507	35	3
Lighting - SCI 5	6,668,499	329,138 – 799,084	13	3
Appliance Turn-In	83,856	162 – 1339	49[7]	10
Audits & Education	94,122	< 12,144	217	20
GTL – 1	1,147,821	344 – 929,381	3	0
Total	**50,214,628**		**833**	**70**

As shown in Table 4-4, the CEI sample projects account for approximately 25% 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 26% and 22%, respectively, of the claimed ex-ante savings within those territories.

[7] Represents the number of individual participants in the Appliance Turn-In Program (TE).

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

Stratum Name	Ex-ante kWh Savings (population)	Ex-ante kWh Savings (Sample)	Percent of Ex-ante kWh in Sample
Custom - SCI 1	3,034,991	60767.06	2%
Custom - SCI 3	3,054,911	228861.65	7%
Custom - SCI 4	4,472,341	815299.49	18%
Custom - LCI 1	4,000,217	209,722	5%
Custom - LCI 3	15,198,384	11,071,796	73%
HVAC - SCI 1	152,788	19,720	13%
HVAC - LCI 1	30,137	12,201	40%
Lighting - LCI 1	2,395,619	295,965	12%
Lighting - LCI 2	5,259,313	612,475	12%
Lighting - LCI 4	5,126,312	1,757,776	34%
Lighting - SCI 1	4,626,683	43,791	1%
Lighting - SCI 2	9,110,719	200,157	2%
Lighting - SCI 3	9,246,371	266,906	3%
Lighting - SCI 4	14,493,811	1,278,402	9%
Lighting - SCI 5	15,702,776	2,031,667	13%
Appliance Turn-In	273,214	264,624	97%
Audits & Education	699,480	730,284	104%
Certification	6,008,300	6,008,300	100%
Gov't Lighting	210,761	210,761	100%
Total	**103,097,128**	**26,119,474**	**25%**

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

Stratum Name	Ex-ante kWh Savings (population)	Ex-ante kWh Savings (Sample)	Percent of Ex-ante kWh in Sample
Custom - SCI 1	521,214	22,825	4%
Custom - SCI 2	3,430,805	155,303	5%
Custom - SCI 3	7,725,554	447,474	6%
Custom - LCI 1	2,068,084	70,040	3%
Custom - LCI 2	7,705,407	1,175,585	15%
Custom - LCI 3	10,379,552	8,999,391	87%
HVAC - SCI 1	377,437	8,276	2%
HVAC - LCI 1	43,797	24,192	55%
Lighting - LCI 1	1,806,309	19,911	1%
Lighting - LCI 2	5,304,339	274,194	5%
Lighting - LCI 3	9,279,447	987,469	11%
Lighting - LCI 4	14,237,095	5,832,350	41%
Lighting - SCI 1	7,033,829	39,220	1%
Lighting - SCI 2	13,717,106	125,493	1%
Lighting - SCI 3	11,542,230	187,715	2%
Lighting - SCI 4	17,807,039	362,563	2%
Lighting - SCI 5	22,035,809	2,419,077	11%
Appliance Turn-In	332,528	319,014	96%
Audits & Education	1,054,746	1,064,758	101%
Certification	18,002,513	18,002,513	100%
Gov't Lighting	363,446	29,591	8%
Total	**154,768,284**	**40,566,955**	**26%**

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

Stratum Name	Ex-ante kWh Savings (population)	Ex-ante kWh Savings (Sample)	Percent of Ex-ante kWh in Sample
Custom - SCI 1	629,220	23,916	4%
Custom - SCI 2	863,765	94,693	11%
Custom - SCI 3	1,592,994	209,561	13%
Custom - SCI 4	1,542,387	420,481	27%
Custom - LCI 1	2,339,646	401,438	17%
Custom - LCI 2	9,246,295	3,118,302	34%
HVAC - SCI 1	76,342	2,423	3%
Lighting - LCI 1	1,041,673	54,867	5%
Lighting - LCI 2	1,884,253	316,730	17%
Lighting - LCI 3	894,565	357,363	40%
Lighting - LCI 4	3,803,179	2,150,967	57%
Lighting - SCI 1	2,874,778	74,267	3%
Lighting - SCI 2	4,637,676	131,962	3%
Lighting - SCI 3	3,724,454	375,244	10%
Lighting - SCI 4	7,069,105	537,373	8%
Lighting - SCI 5	6,668,499	1,497,299	22%
Appliance Turn-In	83,856	80,262	96%
Audits & Education	94,122	101,738	108%
GTL – 1	1,147,821	1,147,821	100%
Total	**50,214,628**	**11,096,704**	**22%**

4.1.2. Review of Documentation

Individual projects may go through multiple documentation reviews depending on the scope of the project. Above threshold projects (750,000 kWh for lighting, and 500,000 kWh for non-lighting) undergo a pre-construction review. During this review, a documentation review and desk review on the ex-ante analysis is completed as part of the evaluation. If the project is found to have a low level of evaluation risk, then the project moves forward to the installation phase. If this same project were to be randomly selected in the evaluation sample, then another documentation review is completed.

In some situations, the evaluation pre-construction review has determined that there is a high level of realization risk, in which case the project is selected for post-implementation review; thus, the incentive is held until the measure has been installed. After installation, ADM performs a post-implementation review to determine a level of savings that represents low evaluation risk. The post-implementation review consists of a post energy savings analysis and a review of any current documentation.

After the samples of projects for evaluation 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 was 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 descriptions, schematics, performance data, and other supporting information
- Documentation for the new equipment installed, including descriptions, schematics, performance data, and other supporting information
- Information about the savings calculation methodology, including what methodology was used, specifications of assumptions and sources for these specifications, and 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.

During the 2019 program year, pre-construction reviews of projects resulted in a savings risk reduction of 11,908,858 kWh. Pre-construction reviews and any necessary post-installation reviews were conducted on 81 projects (54 projects with post-installation reviews) in 2019 for a total of 89,806,749 kWh estimated annual energy savings.

4.1.3. Data Collection Verification

On-site verification 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. ADM utilized opportunities to collect verification data virtually when feasible. This included the collection of energy management system (EMS) data, production data, or any other previously collected data directly from the customer.

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 Companies' 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 was collected using a project specific form that was prepared 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.

Appliance Turn-In Measures

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

- Validated program tracking data provided in the VisionsDSM and SSRS reporting systems 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.
- ADM conducted on-site verification through combined efforts with the implementation team. ADM spent three days with the group collecting recycled

equipment throughout the three Companies territory. Since, schedules were determined the day-of, and the group collected both residential and commercial equipment, these efforts resulted in three commercial project verifications.

The numbers of refrigerators, freezers, RACs, and dehumidifiers reported in the program tracking data that were recycled during 2019 are shown in Table 4-7.

Table 4-7: Appliances Recycled in 2019

Utility	Number of Refrigerators Collected	Number of Freezers Collected	Number of RACs Collected	Number of Dehumidifiers Collected
CEI	167	27	18	8
OE	191	47	16	10
TE	47	11	2	6
All Companies	**405**	**85**	**36**	**24**

Most program participation was represented by recycled refrigerators. Freezer units were the second most common recycled appliance, and RACs were the third, while dehumidifiers represented the smallest portion of program participation. Refrigerators represent approximately 81% of the ex-ante kWh savings claimed for the program, freezers represent approximately 15%, dehumidifiers represent approximately 3%, and RACs represent less than 1%.

4.1.4. Procedures for Estimating Savings

The method ADM employs to determine ex-post savings impacts depends on the types of measures being analyzed. 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 4-8.

Table 4-8: Typical Methods to Determine Savings for Custom Measures

Type of Measure	Method to Determine Savings
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
Data Centers	Analysis approach based on ASHRAE 90.4
Grow Facility Lighting	Analysis approach based on the Photosynthetic Photon Flux Density (PPFD)

The activities specified in Table 4-8 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[8] 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.

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.

[8] 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).

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:

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

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 is 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 this 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 historic 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.).

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 is 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.

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

$$UEC = function\ of\ (V_1, V_2, V_3, \ldots, V_n)$$

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

This regression-based approach to estimating refrigerator and freezer energy use is described in the U.S. Department of Energy's (DOE) *Uniform Methods Project Refrigerator Recycling Evaluation Protocol.*[9] 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).

[9] http://www1.eere.energy.gov/wip/pdfs/53827-7.pdf

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 2019. The program tracking data collected by Recleim and stored in the VisionDSM database contained much of the necessary appliance characteristic data needed to use the UMP model. ADM supplemented the program tracking data with survey data from program participants regarding primary/secondary usage, and appliance location.

It is important to note that the UMP model only considers refrigerators. Accordingly, ADM used a refrigerator-to-freezer ratio factor to determine the average UEC for freezers. This refrigerator-to-freezer factor methodology is like that used by the NMR Group, Inc. in a recent evaluation of the Massachusetts Appliance Turn-in Program.[10] Using relevant secondary sources, ADM concluded that freezers on average use 15% less energy annually than refrigerators. This implies a refrigerator-to-freezer factor of 0.85. The analysis supporting this refrigerator-to-freezer factor is detailed in the previously mentioned Massachusetts Appliance Turn-In 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 2019 based on the average refrigerator characteristics established from Recleim tracking data and participant surveying.
2) Freezer UEC was obtained by multiplying the estimated refrigerator UEC by the refrigerator-to-freezer factor of 0.85 to obtain estimates of the average freezer UECs.

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

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 kWh savings for recycled room air conditioners was completed in accordance with the algorithms in the ENERGY STAR Room AC Calculator.[11] 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 OH TRM. The standard OH TRM algorithm may not be appropriate in all cases, given the various replacement scenarios. However, because RAC recycling makes up such a small percentage of program savings, the stipulated 76% replacement value from the OH TRM was used. The following formula was used to calculate as found kWh savings for the average RAC recycled through the program:

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

$$\text{AnnualkWhSavings} = \frac{\text{EFLH}*\left(\frac{\text{CAPY}_{\text{existing}}}{\text{EER}_{\text{existing}}}\right)}{1000} - \left(\%\text{replaced}*\frac{\text{EFLH}*\left(\frac{\text{CAPY}_{\text{newbase}}}{\text{EER}_{\text{newbase}}}\right)}{1000}\right)$$

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

[11] http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorRoomAC.xls?7e02-5075

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

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

Where:

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

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

M = Maintenance Factor (0.02[13])

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[14]. The most recent year that the data was available was 2010[15]. 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 kWh savings for participating dehumidifiers was accomplished in accordance with the OH TRM[16] with updated run hours from 1,630 to 1,632 as per ENERGY STAR revisions. Savings were adjusted for units that were retired and recycled without a direct replacement. Therefore, the energy savings were the same as energy consumptions. The following equation was used to calculate kWh savings per unit based on individual capacity:

[13] 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.

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

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

[16] Source: Annual kWh calculation results for each capacity class table on Page 65 of the Ohio TRM.

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

Where:

0.473 = Constant to convert pints to liters

Hours$\mathrm{EER}_{\text{At-manufacture}}$ = Run hours per year

= 1,632

L/kWh = Liters of water per kWh consumed

The kWh energy savings per unit was taken to be equal to the Federal Standard dehumidifier energy consumptions by capacity. The average capacity across all dehumidifiers recycled through the program was 31-pints per day with the most common per-unit capacity being 25-pints per day.This resulted in an average verified *ex-post* kWh savings of 883 across all recycled units. The table below shows the Federal Standard kWh consumptions by capacity.

Table 4-9: Federal Standard Unit kWh Consumption of Dehumidifier

Capacity	kWh per Unit
<25	720.47
>25 to 35	804.10
>35 to 45	989.66
>45 to 54	1,224.71
>54 to 75	1,383.05
>75 to 185	1,326.59

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 effective useful life (EUL) of installed energy efficiency measures.

4.2. Process Evaluation Methodology

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 4-10 provides a summary of the research questions and corresponding data collection activities.

Table 4-10: 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?	■ Program staff interviews ■ Program ally interviews
Is the program being administered effectively in terms of program oversight, communication, staffing, training and/or reporting?	■ Program staff interview
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?	■ Program ally interviews ■ Participant Survey ■ Near Participant Survey
Were the program participants and program allies satisfied with their experiences?	■ Participant survey ■ Program ally interviews
What changes can be made to the program's design or delivery to improve its effectiveness in future program years?	■ Program staff interview ■ Program ally survey ■ Participant survey

ADM reviewed program documentation, administered participant and program ally surveys, and completed in-depth interviews with program staff. ADM began the process evaluation in August of 2019 with the development of data collection instruments and a review of program documentation. Data collection and analysis occurred from October 2019 through December 2019. The following tasks were completed for the process evaluation.

- **Program Documentation Review:** Program materials are an important data source for the process evaluation. We began by requesting marketing materials and any relevant program documentation from program staff.
- **Program Staff In-Depth Interviews:** ADM researchers conducted in-depth interviews with key program staff at the Companies and with the implementation team. 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 Survey:** ADM administered an online survey to 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. In total, 37 program allies completed the survey.

- **Participant Survey:** ADM administered online surveys to program participants. In total, 181 customers completed the survey. Survey topics covered program awareness, decision making, the participation process including communication with program staff, and satisfaction.

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 2019 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 2019 program year.

5.1. Evaluation Overview

This section provides the results of ex-post savings for the LCI and SCI Programs during the 2019 program year. Table 5-1 summarizes the savings by sub-program name for all EDC service territories.

Table 5-1: Savings by Sub Program for all EDCs

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
Appliance Turn In - SCI	689,597	663,900	96%	117.87	113.17	96%
Appliances - SCI	4,870	4,995	103%	0.54	0.40	73%
Audits & Education - SCI	1,848,348	1,896,779	103%	161.39	160.64	100%
Consumer Electronics - SCI	1,507,004	1,503,459	100%	202.44	174.79	86%
Custom - LCI	74,614,046	71,363,776	96%	10,397.48	10,397.25	100%
Custom - SCI	24,394,607	23,068,240	95%	4,541.75	4,159.48	92%
Custom Buildings - SCI	1,681,543	1,683,179	105%	241.15	266.20	116%
Food Service	1,499,507	1,202,654	77%	6.51	2.96	45%
Government Tariff Lighting	1,722,028	1,722,032	100%	322.93	322.93	100%
HVAC - LCI	73,934	72,224	98%	64.67	57.93	90%
HVAC - SCI	606,567	376,027	62%	386.62	217.29	56%
Lighting - LCI	45,358,155	43,674,371	96%	6,415.97	6,187.02	96%
Lighting - SCI	154,079,835	148,123,878	96%	24,148.16	22,435.93	93%
Total	**308,080,040**	**295,355,515**	**96%**	**47,007.48**	**44,495.99**	**95%**

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

Table 5-2: 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	103,097,128	99,424,766	96%	16,292.84	15,445.11	95%
OE	154,768,284	145,438,071	94%	22,890.99	21,224.43	93%
TE	50,214,628	50,492,677	101%	7,823.65	7,825.45	100%
Total	**308,080,040**	**295,355,515**	**96%**	**47,007.48**	**44,495.99**	**95%**

As part of both LCI and SCI, energy audits were performed for commercial and industrial customers. These energy audits helped businesses identify energy efficient measures. Audits were conducted in all service territories. The number of audits is shown in Table 5-3.

Table 5-3: Count of Energy Audits

Service Territory	LCI Audits	SCI Audits	Total
CEI	18	60	78
OE	3	18	21
TE	5	12	17
Total	**26**	**90**	**116**

5.2. Impact Evaluation Findings

Data was collected and analyzed for a sample of 251 incentivized equipment installation projects, including multifamily measures and recycled appliances. The methodology outlined in the OH 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 was analyzed using the methods described in the Methodology Section, 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.

5.2.1. Ex-post Gross Annual Energy Savings Findings

The statistically representative sample was stratified by measure type (Custom & Equipment, HVAC, Lighting, Appliance Turn-In, and Audits and Education), as well as ex-ante annual energy savings (kWh), for each service territory. The sample across all Companies included 249 projects. Each service territory sample was designed to meet

±10% precision at the 90% confidence interval. Precision for each sample based on kWh is shown in Table 5-5. Ex-post savings by customer class are represented in the Executive Summary of this report.

Table 5-4: Sample Precision by kWh

Service Territory	Sample Ex-ante kWh Savings	Sample Ex-post kWh Savings	Ex-post Precision
CEI	24,913,805	23,400,070	9.33%
OE	39,183,184	36,841,322	9.88%
TE	9,731,917	9,977,554	9.02%
Total	**73,828,906**	**70,218,946**	**6.06%**

The results from extrapolation are shown in Table 5-6.

Table 5-5: Extrapolated Ex-post kWh

Service Territory	Gross Program Ex-ante kWh Savings	Gross Program Ex-post kWh Savings	Realization Rate
CEI	103,097,128	99,424,766	96%
OE	154,768,284	145,438,071	94%
TE	50,214,628	50,492,677	101%
Total	**308,080,040**	**295,355,515**	**96%**

Sampled projects presented a range of realization rates across measures and project size. The impact these have on subprogram classifications is as follows.

- Small commercial HVAC measures represented the lowest realization rate by sub program in the ADM samples. The realization rate is driven by differences in baseline assumptions and efficient condition capacities. The impact of this measure type on the programs is 0.2% of ex-ante annual energy savings and therefore evaluation impact is low.
- Food service measures represent the second lowest realization in the samples. Anti-sweat door heater controls were part of the random sampling of projects. ADM found variance in these projects on the number of units controlled as well as the type (refrigerator or freezer) of the unit controlled. For sampling purposes, food service measures were included in the Custom & Equipment stratification. This subprogram makes up 0.5% of total ex-ante annual energy savings, therefore evaluation impact is low.
- Custom Projects represents the next highest variability in energy savings. Ex ante savings estimates are developed in a timely manner to support program efficiency.

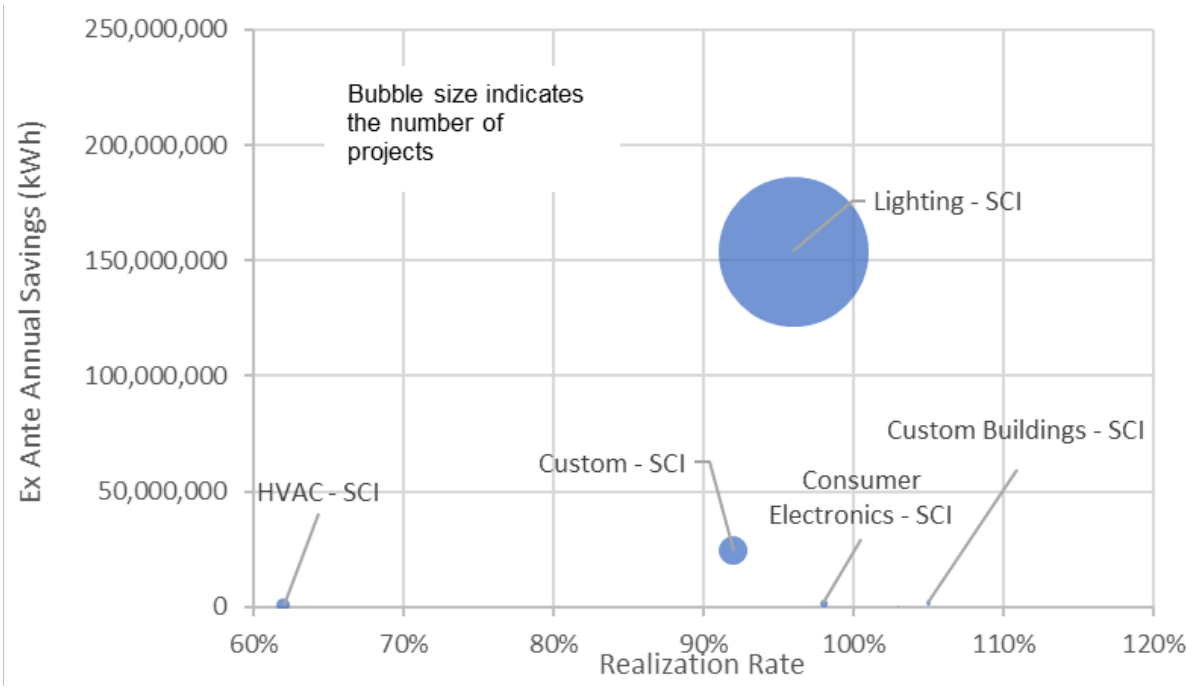
Post installation or evaluated savings have the opportunity of acquiring significant post installation operating information and data that may impact the realization rate. This was the case with a few custom projects in the evaluation sample. Custom projects span a wide range of applications, each with their own level of uncertainty. ADM sampled 43 custom projects. One custom project was removed from extrapolation, as the project's verified energy savings were isolated specifically to this project. The project consisted of a combined heat and power application that was the largest project in the population. Due to the magnitude and uniqueness of this project, it was determined that results should not be extrapolated. The realization rate for this project is 96%.

    - Realization rates were notably higher for above threshold projects (over 500,000 kWh ex-ante estimates) in which ADM performed a pre-construction review.

- Commercial lighting projects, both large and small were impacted by differences in annual hours of operation, baseline condition assumptions, and HVAC mechanical system interaction. Most impacts were due to discrepancies in annual hours of use. One lighting project was removed from extrapolation, with verified energy savings isolated to the project. This project was a large new construction lighting project. The project was removed from extrapolation due to restricted access to certain areas within the facility as well as the magnitude of the installation. Verification for the inaccessible space types was achieved through a review of final electrical schematics. The realization rate for this project is 100%.

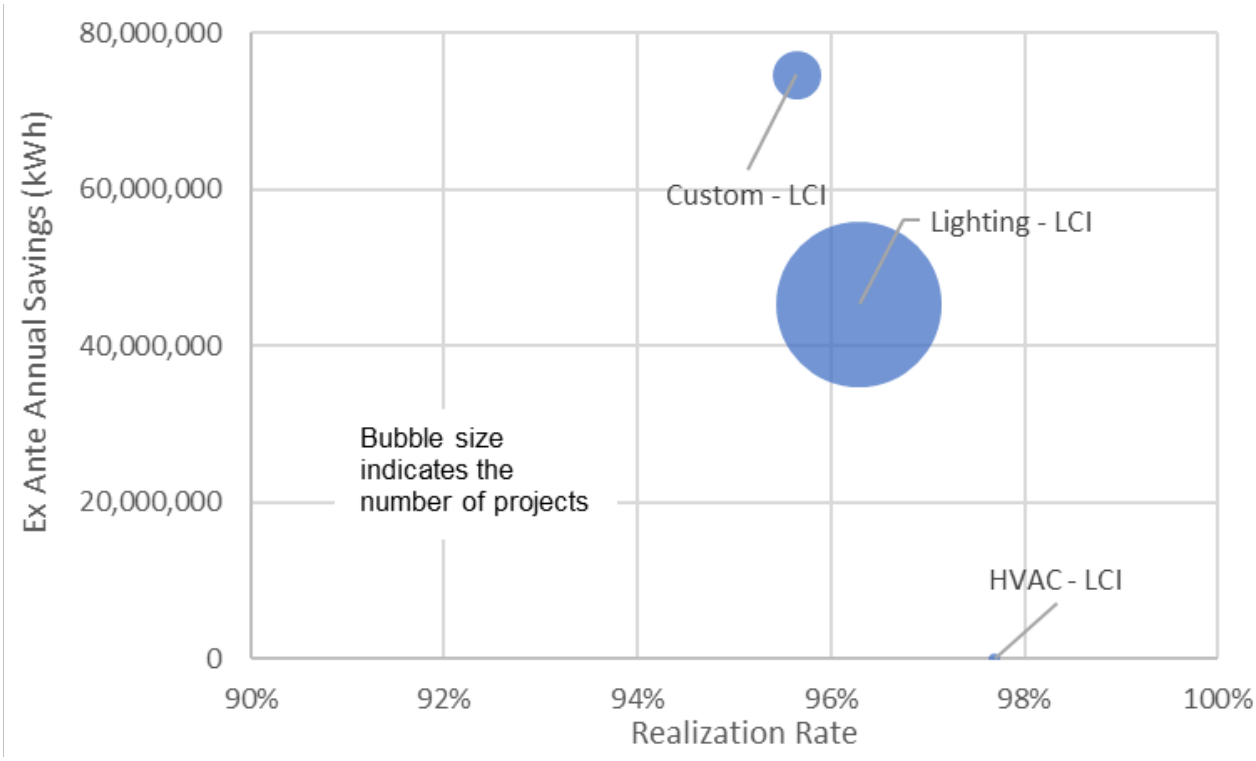
The impact on SCI savings realization rates by subprogram are represented graphically in Figure 5-1 and the impact on LCI is represented in Figure 5-2. These demonstrate the impact that lighting has on overall energy savings and realization rates. The size of the bubble indicates the number of projects, and the center of the bubble represents annual energy savings.

Figure 5-1: SCI Measure Type Realization Rate Impact



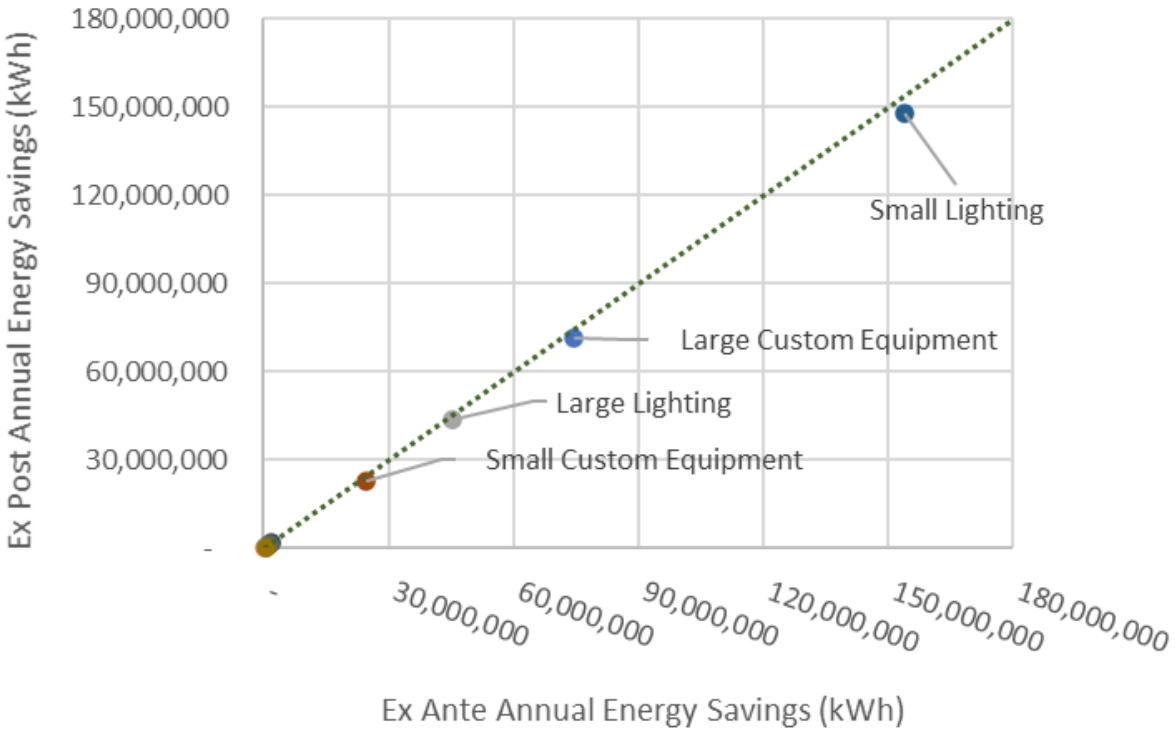
The graphic in Figure 5-2 demonstrates that there are less Large Commercial Custom projects compared to Large Commercial Lighting projects, but Custom projects represent a high magnitude of annual energy savings. Roughly 48% of large commercial custom annual energy savings comes from custom lighting projects.

Figure 5-2: LCI Measure Type Ex-post Impact



The impact of realization rate by measure type is represented in Figure 5-3 across both LCI and SCI for all Companies. The figure's points indicate the amount of savings each subprogram contributes to the overall program savings. The line presented in the figures is a theoretical 100% realization rate, with the vertical distance from this line indicative of a subprogram's individual realization rate. The programs are largely comprised of Small Commercial Lighting, Large Commercial Lighting, Large Commercial Custom Equipment, and Small Commercial Custom Equipment. Other measure types represented on the graph include Large Commercial HVAC, Small Commercial HVAC, Small Commercial Multifamily, Small Commercial Appliance Turn-In, Small Commercial Consumer Electronics, Small Commercial Custom Buildings, and Small Commercial Food Service measures. The graph demonstrates consistency between estimated and evaluated energy savings across the most impactful measure types.

Figure 5-3: LCI & SCI Program all Companies Realization Rate Impact



Realization rates by measure type indicate an overall consistency in calculation of annual energy savings between implementation and evaluation. The overall small reduction in annual energy savings determined by evaluation is driven by the availability of post-installation information. This comes from the collection of post-installation data through visual verification, interview, monitoring, and/or collection of energy management system (EMS) data.

Appliance Turn-In Findings

Gross annual energy savings for Appliance Turn-In measures across all Companies are shown in Table 5-7:

Table 5-6: Gross Annual kWh Savings per Appliance

Appliance Type	Ex-ante kWh per Unit	Ex-post kWh per Unit	Overall Ex-ante kWh	Overall Ex-post kWh	Realization Rate
Refrigerators	1,376	1,339	557,341	542,233	97%
Freezers	1,244	1,131	105,774	96,118	91%
RACs	162	162	5,824	5,824	100%
Dehumidifiers	861	826	20,658	19,724	95%
Total			**689,597**	**663,900**	**96%**

The program tracking database included information regarding configuration, size, age,[17] and pickup address for the 405 refrigerators collected in 2019. Of these 405 refrigerators, 79% were top freezer; 11% were side-by-side models; 6% were single door models;[18] and 4% were bottom freezer models. The average size was 17.64 cubic feet, while 19% percent were manufactured before 1990 and the average age was 21 years old. Across the three companies, 58% of respondents indicated the recycled unit was a primary refrigerator, while 49% of the recycled refrigerators and freezers were in spaces that are generally unconditioned, such as a garage, a basement, or outdoors. This information, along with Typical Meteorological Year 3 (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.

The difference in ex-ante annual energy savings and ex-post annual energy savings for the appliance turn-in measures stems from the differences in methodologies.

Multifamily Findings

Commercial Multifamily measures included 37 different types of equipment across lighting, faucet aerators, low-flow shower heads, power strips, and pipe insulation. These measures were directly installed through the GoodCents® implementation program. For commercial measures associated with the GoodCents® Multifamily program, ADM developed in-service rates (ISR) through survey efforts (with both owner/manager surveys and resident surveys) and field verification visits. When enough ISR information was not obtainable for measures, ADM used applicable information obtained from the GoodCents® Residential measures. Values for ISR ranged from 98% to 100%. Savings results by measure type are shown in Table 5-8.

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

[18] The complete breakdown of recycled refrigerator configuration is: 79.0% top freezer, 11.3% side-by-side, 5.7% single door, and 4.0% bottom freezer.

Table 5-7: Savings Impacts for Commercial GoodCents® Measures

Measure Type	Ex-ante kWh	Ex-post kWh	Realization Rate
Lighting In-Unit	922,737	1,033,362	112%
Lighting Office Space	11,559	10,786	93%
Lighting Common Area	854,161	792,741	93%
Faucet Aerator	12,480	12,479	100%
Low Flow Showerhead	46,217	46,217	100%
Power Strip	113	113	100%
Pipe Wrap	1,074	1,074	100%
Total	**1,848,341**	**1,896,773**	**103%**

The difference in ex-ante energy savings and ex-post energy savings is attributed mostly to a difference in ISR's. The subprogram's most impactful measures were in-unit lighting measures and common area lighting measures. Evaluation found, through survey efforts, a higher ISR for in-unit lighting then was calculated in estimated, or ex-ante, annual energy savings. For common area lighting, evaluation found a lower ISR then was used for estimated annual energy savings.

5.2.2. Ex-post Peak Demand Reduction (kW) Findings

The statistically representative sample was stratified by measure type (Custom & Equipment, 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 sample magnitude and kW precision by service territory is shown in Table 5-9. Ex-post peak reduction by customer class are represented in the Executive Summary of this report.

Table 5-8: Sample Precision by kW

Service Territory	Sample Ex-ante kW Savings	Sample Ex-post kW Savings	Ex-post Precision
CEI	4,483.84	4,025.13	15.69%
OE	5,191.52	5,065.95	16.03%
TE	1,220.08	1,252.17	18.44%
Total	**10,895.44**	**10,343.25**	**10.02%**

Sample level realization rates are extrapolated at the stratum level, causing variation from the total sample realization rate to the program level realization rate. The results of extrapolation are shown in Table 5-10.

Table 5-9: Extrapolated Ex-post kW

Service Territory	Population Ex-ante kW Savings	Extrapolated Ex-post kW Savings	Realization Rate
CEI	16,292.65	15,445.92	95%
OE	22,890.81	21,223.58	93%
TE	7,823.66	7,825.46	100%
Total	**47,007.11**	**44,494.96**	**95%**

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 OH 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 2019 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. Process Evaluation Findings

The following section provides detailed findings from the process evaluation of the C&I Energy Solutions Programs. Findings are based on surveys and in-depth interviews with program participants, program staff, and program allies.

5.3.1. Program Ally Findings

ADM researchers sent an online survey to all 322 program allies and received responses from 37 program allies that completed projects through the C&I Energy Solutions Program. Survey participants were asked questions regarding their company as well as their experience implementing projects through the C&I Energy Solutions Program. The intent of the survey was for program allies to provide feedback related to the program's design and marketing, opportunities for improvements and awareness of the program.

Program allies were satisfied with the incentive structure and levels. Program allies are also very satisfied with the support they've received from the program implementation vendor. A strong majority of program allies said implementation staff was responsive, knowledgeable, and professional when they reached out. While several program allies reported high levels of program awareness among their customers, 40% of respondents said less than half of their customers are aware that incentives are offered through the

program. The feedback suggests that program allies believe overall program awareness to be relatively low among the Companies' business customers.

5.3.2. Program Participant Findings

The following are results from a sample (181 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 5-11 below.

Table 5-10: Participant Survey Response Rate by EDC

EDC	Rebated Measures Only	Recycled Appliance Only	Rebated Measure & Recycled Appliance	Total Number of Completed Surveys	Percent of Total
OE	46	3	0	49	27%
CEI	86	4	1	91	50%
TE	39	2	0	41	23%
Total	**171**	**9**	**1**	**181**	**100%**

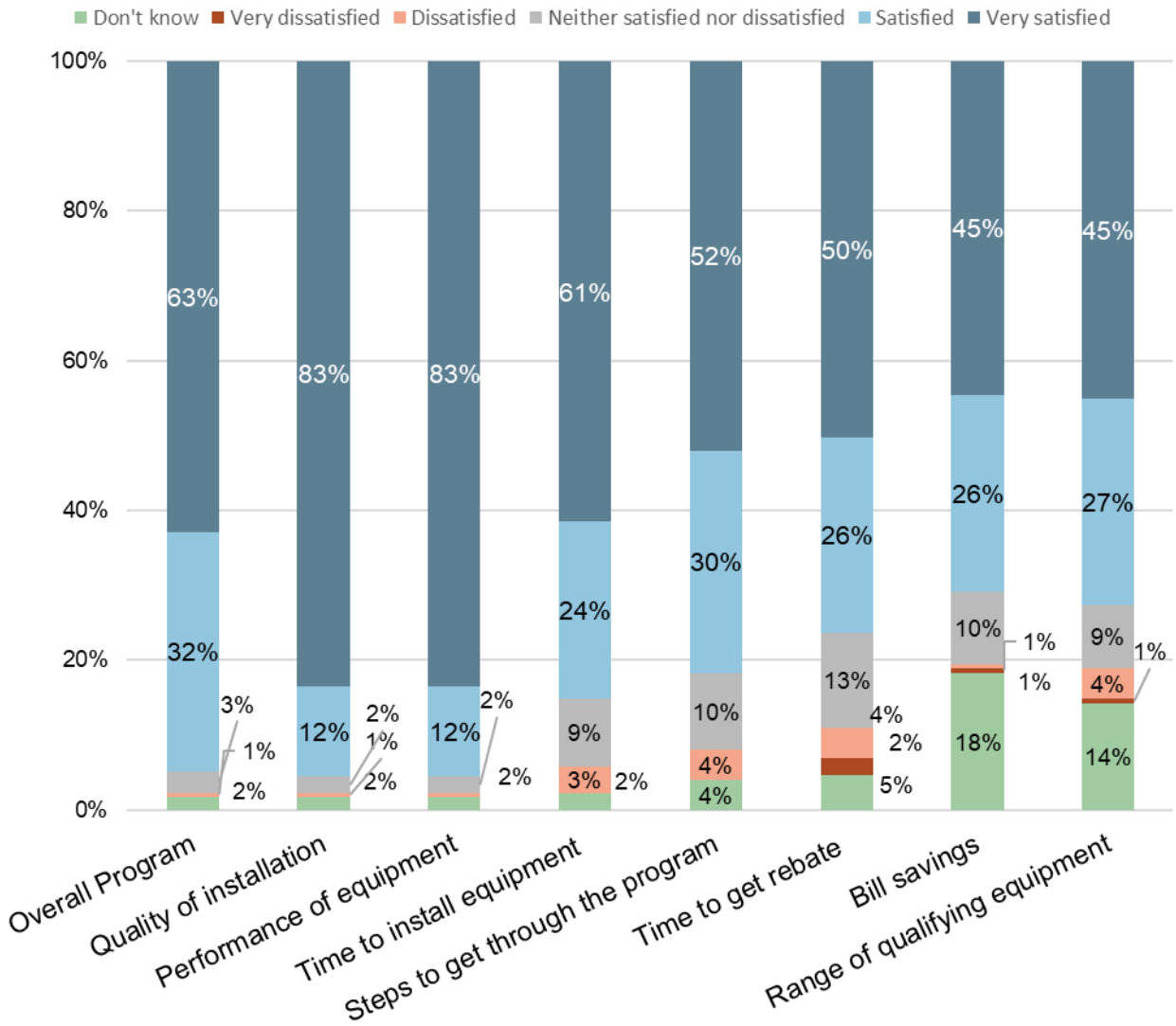
Survey Respondents represent 19.4% of the 2019 ex-ante C&I programs energy savings. The amount of savings represented by completed surveys is shown in Table 5-12.

Table 5-11: Participant Survey Representation of Energy Savings

EDC	Ex-ante Energy Savings (kWh)	Percent of Total
Large Commercial & Industrial	45,825,456.52	14.9%
Small Commercial &Industrial	13,891,955.48	4.5%
Total	**59,717,412.00**	**19.4%**

Participant survey respondents provided feedback on aspects of the project and program itself, which are summarized in Figure 5-4. Seventy-two percent of respondents indicated they were "satisfied" or "very satisfied" with the range of equipment that qualifies for the program incentives, and 76% of respondents indicated they were satisfied or very satisfied with the amount of time it took to receive their incentive. Ninety-five percent of respondents were satisfied or very satisfied with the program overall.

Figure 5-4: Project/Program Satisfaction



Respondents that indicated any level of dissatisfaction were asked to indicate the reason why. Only eleven respondents (6%) indicated they were dissatisfied; five respondents mentioned the source of dissatisfaction as the rebate amount being less than expected or not being enough to cover a significant amount of the project cost. Two respondents were dissatisfied with the amount of time it took to complete the application. The other reasons included energy savings not meeting expectations, contractor difficulties, and measures not being approved on rebate application.

Nearly all the survey respondents (92%) indicated they interacted with implementation staff in 2019. Thirty-seven respondents (82%) reported that implementation staff was knowledgeable and responsive when they reached out. Over ninety percent of respondents related that implementation staff was professional and courteous in their interaction.

The participant survey data indicates that most respondents found the application process and its various components acceptable. The effort required to provide supporting documentation, the time for application approval, and the overall application process received the highest acceptability ratings. Most respondents also reported staff as knowledgeable and prompt in answering questions. Of the participants that had their projects inspected post-installation, the majority reported that the inspector was efficient and courteous.

Program participants were highly satisfied with both the equipment installed and their experiences with the program. They reported high levels of satisfaction with the performance of the equipment installed, the quality of the installation, the amount of time for the equipment to be installed and the monthly savings on their bill. Participants were also highly satisfied with the range of equipment that qualifies for incentives, the steps to get through the program, the amount of time to receive the incentive, and the program overall.

6. Summary and Conclusions

This report presents the results of the evaluation of the Companies' LCI and SCI programs for 2019. 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	103,097,128	99,424,766	96%	9.33%
OE	154,768,284	145,438,071	94%	9.88%
TE	50,214,628	50,492,677	101%	9.02%
Total	**308,080,040**	**295,355,515**	**96%**	**6.06%**

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	16,292.84	15,446.11	95%	15.69%
OE	22,890.99	21,224.43	93%	16.03%
TE	7,823.65	7,825.45	100%	18.44%
Total	**47,007.48**	**44,495.99**	**95%**	**10.02%**

ADM offers the following conclusions for the C&I Energy Solutions Programs.

- Gross ex-post annual energy savings and peak demand reduction were consistent with ex-ante estimates, with realization rates at 96% and 95% for kWh and kw.
- Higher variability in annual energy savings measures is present in low impact measures such as HVAC and food service. The larger impact measures, such as lighting and custom projects present the typical uncertainty due to the nature of the measures.
- New measures, such as indoor agricultural lighting require the development and refinement of energy savings methodologies. Transparency and collaboration between implementation and evaluation on these measures resulted in reduced evaluation risk.
- Both participants and trade allies are generally satisfied with the program, program staff, and measures offered.

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: 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	32,009,982	29,813,544	93%	4,642.68	4,506.31	97%
Small Commercial	70,876,385	69,400,459	98%	11,601.19	10,890.82	94%
Gov't Lighting	210,761	210,762	100%	48.98	48.98	100%
Total	**103,097,128**	**99,424,766**	**96%**	**16,292.84**	**15,446.11**	**95%**

Table 7-2: 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	68,826,542	65,859,224	96%	9,463.33	9,157.99	97%
Small Commercial	85,578,296	79,215,398	93%	13,420.46	12,059.23	90%
Gov't Lighting	363,446	363,449	100%	7.21	7.21	100%
Total	**154,768,284**	**145,438,071**	**94%**	**22,890.99**	**21,224.43**	**93%**

Table 7-3: 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	19,209,610	19,437,603	101%	2,772.10	2,977.90	107%
Small Commercial	29,857,197	29,907,254	100%	4,784.79	4,580.80	96%
Gov't Lighting	1,147,821	1,147,821	100%	266.75	266.75	100%
Total	**50,214,628**	**50,492,677**	**101%**	**7,823.65**	**7,825.45**	**100%**

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

Service Territory	Ex-ante kWh Savings	Ex-post kWh Savings	Realization Rate
CEI	32,009,982	29,813,544	93%
OE	68,826,542	65,859,224	96%
TE	19,209,610	19,437,603	101%
Total	**120,046,134**	**115,110,371**	**96%**

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

Service Territory	Ex-ante kW Savings	Ex-post kW Savings	Realization Rate
CEI	4,642.68	4,506.31	97%
OE	9,463.33	9,157.99	97%
TE	2,772.10	2,977.90	107%
Total	**16,878.11**	**16,642.20**	**99%**

Table 7-6: Summary of Lifetime Ex-post kWh Savings for Large Commercial

Service Territory	Lifetime Savings (kWh)
CEI	412,347,999
OE	948,935,842
TE	224,014,715
Total	**1,585,298,555**

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

Service Territory	Ex-ante kWh Savings	Ex-post kWh Savings	Realization Rate
CEI	70,876,385	69,400,459	98%
OE	85,578,296	79,215,398	93%
TE	29,857,197	29,907,254	100%
Total	**186,311,879**	**178,523,111**	**96%**

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

Service Territory	Ex-ante kW Savings	Ex-post kW Savings	Realization Rate
CEI	11,601.19	10,890.82	94%
OE	13,420.46	12,059.23	90%
TE	4,784.79	4,580.80	96%
Total	**29,806.44**	**27,530.86**	**92%**

Table 7-9: Summary of Lifetime Ex-post kWh Savings for Small Commercial

Service Territory	Lifetime Savings (kWh)
CEI	792,914,312
OE	991,138,031
TE	315,820,276
Total	**2,099,872,619**

8. Appendix B: Participant Survey

FirstEnergy Ohio

Business Incentive Programs

2019 Participant Survey

Variables	Definition
CONTACT NAME	Primary contact full name
LOCATION	Location for selected project
ORGANIZATION	Premise Company
UTILITY	EDC
PROJECT	Either NC, RCX, EQUIPMENT for selected project
PROJECT DESCRIPTION	Insert text description
RECYCLING DATE INSTALLED	mm/dd/yy
RECYCLING FLAG	If customer recycled = 1, else = 0
APPLIANCES RECYCLED	List appliances recycled
APPLIANCE REBATE AMOUNT	Dollar amount
CUSTOM END USE	If project is custom = 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
LIGHTING END USE	If project is lighting = 1, else = 0
APPLIANCE END USE	If project is appliance = 1, else = 0
AGRICULTURE END USE	If project is agriculture equipment = 1, else = 0
ELECTRONICS END USE	If project is electronics = 1, else = 0
# OF REFRIGERATORS	0-2
# OF FREEZERS	0-2
# OF ROOM A/Cs	0-2
# OF DEHUMIDIFIERS	0-2

Mode of Administration

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

Respondent Characteristics [DO NOT DISPLAY]

1. [UTILITY] 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 not involved in the project(s)
3. No, I do not work for the company that completed the energy efficiency project; I provided services for the project
98. Don't know
99. Prefer not to answer

[SHOW Q2 IF Q1 = 2, 3, 4, 98, OR 99; 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: _____ [RECORD NAME AND EMAIL]
98. Don't know [THANK AND TERMINATE SURVEY]
99. Prefer not to answer [THANK AND TERMINATE SURVEY]

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

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]

    100. A person or persons responsible for monitoring or managing energy usage
    101. Defined energy savings goals
    102. A specific policy requiring that energy efficiency be considered when purchasing equipment
    103. Carbon reduction goals
    104. None of the above
    105. Other (Please specify)
    106. Don't know
    107. Prefer not to answer

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

    108. Made by a group or committee
    109. One-person decision
    110. Based on staff recommendations to a decision maker
    111. Depends on the amount of the investment
    112. Other (Please specify)
    113. Don't know
    114. Prefer not to answer

6. Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility? (Select all that apply)

    115. Simple payback
    116. Life cycle cost
    117. Initial cost
    118. Internal rate of return
    119. An architect, engineer, or energy consultant
    120. Other (Please specify)
    121. Don't know
    122. Prefer not to answer

7. Does your organization use an external party, like an architect, engineer, or energy consultant, to help evaluate energy efficiency improvements for this facility?

    123. Yes
    124. No

125. Don’t know
126. Prefer not to answer

8. What are the sources your organization relies on for information about energy-efficient equipment, materials and design features? (Select all that apply)

127. [UTILITY] customer service representatives
128. An architect, engineer, or energy consultant
129. Equipment vendors or building contractors
130. Program website (EnergySaveOhio.com)
131. Trade journals, magazines, brochures, or advertisements
132. Trade associations or business groups you belong to
133. Other (Please specify)
134. Don’t know
135. Prefer not to answer

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

136. Previously participated in the program
137. From the contractor, equipment vendor, or energy consultant who completed the project at the [LOCATION] location.
138. From some other contractor, equipment vendor, or energy consultant
139. From an [UTILITY] customer service representatives
140. From a program representative
141. From [UTILITY]’s website, (EnergySaveOhio.com)
142. From a search engine (Google, Yahoo, Bing)
143. An event or trade show
144. Received an email blast or electronic newsletter
145. Received an informational brochure
146. TV / radio ads sponsored by [UTILITY]
147. Friends or colleagues
148. From an industry association
149. Social media advertisement
150. Other (Please specify)
151. Don’t know
152. Prefer not to answer

[SHOW Q10 IF Q9 = 136 AND NOTHING ELSE SELECTED]

10. Do you recall how you originally learned about [UTILITY]'s incentives for efficient equipment or upgrades? [Select all that apply]

    153. From the contractor, equipment vendor, or energy consultant who completed the project at the [LOCATION] location.
    154. From some other contractor, equipment vendor, or energy consultant
    155. From an [UTILITY] customer service representative
    156. From a program representative
    157. From [UTILITY]'s website, (EnergySaveOhio.com)
    158. From a search engine (Google, Yahoo, Bing)
    159. An event or trade show
    160. Received an email blast or electronic newsletter
    161. Received an informational brochure
    162. TV / radio ads sponsored by [UTILITY]
    163. Friends or colleagues
    164. An industry association
    165. Other (Please specify)
    166. Don't know
    167. Prefer not to answer

[SHOW Q11 IF Q9 = 148 OR Q10 = 164]

11. From which of the following industry associations did you learn about [UTILITY]'s incentives for efficient equipment or upgrades? [Select all that apply]

    1. Association of Independent Colleges & Universities (AICUO)
    2. Council of Smaller Enterprises (COSE)
    3. County Commissioners' Association of Ohio (CCAO)
    4. Industrial Energy Users (IEU)
    5. Ohio Manufacturer's Association (OMA)
    97. Other (Please specify)
    98. Don't know
    99. Prefer not to answer

Cross Program Awareness [DO NOT DISPLAY]

12. In addition to incentives for [PROJECT DESCRIPTION], are you aware that [UTILITY] offers incentives for the following: [Select all the incentive opportunities you are familiar with]

    168. **[SHOW IF LIGHTING END USE = 0]** Installation of High Efficiency Lighting
    169. **[SHOW IF APPLIANCE END USE = 0]** Installation of ENERGYSTAR® certified Appliances

170. **[SHOW IF RECYCLING FLAG = 0]** Appliance Recycling
171. **[SHOW IF HVAC END USE = 0]** Installation of High Efficiency HVAC Equipment
172. **[SHOW IF KITCHEN EQUIP END USE = 0]** Installation of High Efficiency Commercial Kitchen Equipment
173. **[SHOW IF AGRICULTURE END USE = 0]** Installation of High Efficiency Agriculture Equipment
174. **[SHOW IF ELECTRONICS END USE=0]** Installation of High Efficiency Consumer Electronics
175. **[SHOW IF CUSTOM END USE = 0]** Custom Incentives that include projects that do not meet eligibility criteria for other programs
176. **[SHOW IF PROJECT <> RCX]** Retro-Commissioning Projects
177. **[SHOW IF PROJECT <> NC]** New Construction Projects that include the Installation of custom projects that do not meet eligibility criteria for other programs

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

178. Yes
179. No
180. Don't know
181. Prefer not to answer

[SHOW Q14 IF Q13 = 1]

14. What additional energy saving equipment type should be covered?

182. Open ended: _____

[SHOW Q15 IF PROJECT = NC]

15. How well did the range of new construction or major building renovation incentive options fit your needs? Please answer on a scale in which 1 means "not at all" and 5 means "completely". **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

[SHOW Q16 IF Q15 = 1 OR 2 or 3]

16. In what ways did the range of offered incentive options fail to meet your needs?

1. Open ended: _____

[SHOW Q17 IF PROJECT = RCX]

17. How well did the retro-commissioning program's range of incentive options fit your needs? Please use a scale in which 1 means "not at all" and 5 means "completely". **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

[SHOW Q18 IF Q17 = 1 OR 2 or 3]

18. In what ways did the range of offered incentive options fail to meet your needs?

    1. Open ended: _____

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 specifically 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 [DO NOT DISPLAY]

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

    183. Your organization initiated it
    184. Your vendor or contractor initiated it
    185. The idea arose in discussions between your organization and your vendor or contractor
    186. Some other way (Please specify)
    187. Don't know
    188. Prefer not to answer

20. Which of the following people or groups helped complete your application for program incentives (including gathering required documentation)? [Select all that apply]

    189. Yourself
    190. Another member of your company
    191. A contractor
    192. An equipment vendor
    193. A designer or architect
    194. [UTILITY] Account Manager
    195. An industry association
    196. Someone else (Please specify)
    197. Don't know
    198. Prefer not to answer

[SHOW Q21 IF Q20 = 7]

21. Which industry association helped with your application for incentives?

199. Association of Independent Colleges & Universities
200. Council of Small Enterprises COSE
201. County Commissioners' Association of Ohio
202. Industrial Energy Users – Ohio
203. Ohio Manufacturer's Association
204. Other (Please specify)
205. Don't know
206. Prefer not to answer

[SHOW Q22 IF Q21 = 1 - 97]

22. How satisfied or dissatisfied were you with your experience in working with the organization? Please use a scale in which 1 means "very dissatisfied" and 5 means "very satisfied". **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

[SHOW Q23 IF Q22 = 1 OR 2 or 3]

23. Why were you dissatisfied with your experience?

1. Open ended: _____

[SHOW Q24 IF Q20 = 1]

24. Thinking back to the application process, please rate the clarity of instructions on how to complete the application. Please rate the clarity of the instructions on a scale in which 1 means "not at all clear" and 5 means "completely clear". **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

[SHOW Q25 IF Q24 = 1 OR 2 or 3]

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

1. Open ended: _____

[SHOW Q26 IF Q20 = 1]

26. Using a scale where 1 means "not at all acceptable" and 5 means "completely acceptable", how would you rate the following… **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

a. The ease of finding how to apply for incentives on [UTILITY]'s website
b. The ease of using the electronic application
c. The time it took to have the application approved
d. The effort needed to provide required invoices or other supporting documentation

e. The overall application process

[SHOW Q27 IF Q20 = 1]

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

    207. Yes
    208. No
    209. Don't know
    210. Prefer not to answer

[SHOW Q28 IF PROJECT = RCX]

28. 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
    99. Prefer not to answer

29. 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
    99. Prefer not to answer

Appliance Recycling [DO NOT DISPLAY]
[SHOW Q30 IF RECYCLING FLAG > 0]

Program Participation Verification [DO NOT DISPLAY]

30. Do you recall having a [APPLIANCES RECYCLED] picked up for recycling at [LOCATION] location during 2019?

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

Program Awareness [DO NOT DISPLAY]

[SHOW Q31 - Q46 IF Q30 = 1]

31. 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
    99. Prefer not to answer

Appliance Pick-Up Satisfaction [DO NOT DISPLAY]

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

    1. Within a week
    2. 1 - 2 weeks
    3. 3 - 4 weeks
    4. More than a month
    98. Don't know
    99. Prefer not to answer

[SHOW Q33 IF Q32 = 1-4]

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

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

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

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

35. 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
    99. Prefer not to answer

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

    1. Yes
    2. No

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

[SHOW Q37 IF Q36 = 1]

37. How beneficial was the calendar reminder? Please use a scale in which 1 means “not at all beneficial” and 5 means “very beneficial”. **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON’T KNOW AND 99 = PREFER NOT TO ANSWER]**

38. 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
    99. Prefer not to answer

[SHOW Q39 IF Q38 = 1]

39. Were you contacted via text message?

    1. Yes
    2. No
    98. Don’t know
    99. Prefer not to answer

[SHOW Q40 IF Q39 = 1]

40. How beneficial was receiving a text message notification that the technician would be arriving soon? Please use a scale in which 1 means “not at all beneficial” and 5 means “very beneficial”. **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON’T KNOW AND 99 = PREFER NOT TO ANSWER]**

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

    1. Yes
    2. No
    98. Don’t know
    99. Prefer not to answer

[SHOW Q42 IF Q40 = 2]

42. Please explain why you feel they did not behave professionally.
    1. Open ended: _____

43. Using a 5-point scale, where 1 is "very dissatisfied" and 5 is "very satisfied" please rate how satisfied or dissatisfied are you with… **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**
    a. The scheduling of the pickup
    b. The crew who picked up the old appliance(s)
    c. The overall experience of having your appliance(s) picked up

[SHOW Q44 IF Q43a = 1 OR 2]

44. Why were you dissatisfied with the scheduling process?
    1. Open ended: _____

[SHOW Q45 IF Q43b = 1 OR 2]

45. Why were you dissatisfied with the crew?
    1. Open ended: _____

[SHOW Q46 IF Q43c = 1 OR 2]

46. Why were you dissatisfied with the appliance pick-up?
    1. Open ended: _____

Appliance Verification [DO NOT DISPLAY]

[SHOW Q47 IF Q30 = 1 AND # OF REFRIGERATORS > 0]

47. Program records indicate that you have recycled [# OF REFRIGERATORS] refrigerator(s) through [UTILITY]'s program in 2019. Is this correct?
    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW Q48 IF Q47 = 2]

48. How many refrigerators did you recycle?
    1. Zero
    2. One
    3. Two
    4. More than two

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

[SHOW Q49 IF Q30 = 1 AND # OF FREEZERS > 0]

49. Program records indicate that you have recycled [# OF FREEZERS] freezer(s) through [UTILITY]’s program in 2019. Is this correct?
    1. Yes
    2. No
    98. Don’t know
    99. Prefer not to answer

[SHOW Q50 IF Q49 = 2]

50. How many freezers did you recycle?
    1. Zero
    2. One
    3. Two
    4. More than two
    98. Don’t know
    99. Prefer not to answer

[SHOW Q51 IF Q30 = 1 AND # OF ROOM A/C > 0]

51. Program records indicate that you have recycled [# OF ROOM A/Cs] room air conditioner(s) through [UTILITY]’s program in 2019. Is this correct?
    1. Yes
    2. No
    98. Don’t know
    99. Prefer not to answer

[SHOW Q52 IF Q51 = 2]

52. How many room air conditioners did you recycle?
    1. Zero
    2. One
    3. Two
    4. More than two
    98. Don’t know
    99. Prefer not to answer

[SHOW Q53 IF Q30 = 1 AND # OF DEHUMIDIFIERS > 0]

53. Program records indicate that you have recycled [# OF DEHUMIDIFIERS] dehumidifier(s) through [UTILITY]'s program in 2019? Is this correct?

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW Q54 IF Q53 = 2]

54. How many dehumidifiers did you recycle?

    1. Zero
    2. One
    3. Two
    4. More than two
    98. Don't know
    99. Prefer not to answer

Refrigerator Recycling [DO NOT DISPLAY]

[SHOW IF Q48 = 2, 3 OR 4 OR # OF REFRIGERATORS >0]

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

55. According to Program records your refrigerator(s) was picked up on or around [APPLIANCE RECYCLING Date installed], does that sound accurate?

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW Q56 IF Q55 = 2]

56. When was the refrigerator(s) picked up?

    1. Record date (mm/dd/yyyy): _____
    98. Don't know
    99. Prefer not to answer

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

    1. Age in years: _____
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q48 = 3 OR 4 OR # OF REFRIGERATORS >1]

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

    1. Age in years: _____
    98. Don't know
    99. Prefer not to answer

59. At the time of recycling, was your 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 unity would be used less frequently, possibly for storage.)

    1. Primary
    2. Secondary
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q48 = 3 OR 4 OR # OF REFRIGERATORS >1]

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

    1. Primary
    2. Secondary
    98. Don't know
    99. Prefer not to answer

61. Did you replace the refrigerator you recycled with a new unit?

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q48 = 3 OR 4 OR # OF REFRIGERATORS >1]

62. Did you replace your second refrigerator that you recycled with a new unit?

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

63. At the time of recycling, where in the business was the refrigerator located?

    1. Open ended: _____
    98. Don't know

99. Prefer not to answer

[SHOW IF Q48 = 3 OR 4 OR # OF REFRIGERATORS >1]

64. At the time of recycling, where in the business was the second refrigerator located?

    1. Open ended: _____
    98. Don't know
    99. Prefer not to answer

65. During the 12 months prior to the recycling about how many months was the refrigerator plugged in?

    1. Open ended: _____
    2. All of the time
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q48 = 3 OR 4 OR # OF REFRIGERATORS >1]

66. During the 12 months prior to the recycling about how many months was the second refrigerator plugged in?

    1. Open ended: _____
    2. All of the time
    98. Don't know
    99. Prefer not to answer

67. Which of the following best describes the condition of the refrigerator? Was it …?

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

[SHOW IF Q48 = 3 OR 4 OR # OF REFRIGERATORS >1]

68. Which of the following best describes the condition of the second refrigerator? Was it …?

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

69. Had you already considered disposing the refrigerator 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.

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q48 = 3 OR 4 OR # OF REFRIGERATORS >1]

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

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

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

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

[SHOW IF Q48 = 3 OR 4 OR # OF REFRIGERATORS >1]

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

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

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

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

Freezer Recycling [DO NOT DISPLAY]

[SHOW IF Q50 = 3 OR 4 OR # OF FREEZERS >1]

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

[SHOW Q74 - Q90 IF Q49 = 1 OR Q50 = 2, 3, OR 4]

74. According to Program records your freezer(s) was picked up on or around [APPLIANCE RECYCLING Date installed], does that sound accurate?

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW Q75 IF Q74 = 2]

75. When was the freezer(s) picked up?

    1. Record date (mm/dd/yyyy): _____
    98. Don't know
    99. Prefer not to answer

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

    1. Age in years: _____
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q50 = 3 OR 4 OR # OF FREEZERS >1]

77. Approximately how old was the second freezer at the time you recycled it? [Enter "00" if less than one year]

    1. Age in years: _____
    98. Don't know
    99. Prefer not to answer

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

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q50 = 3 OR 4 OR # OF FREEZERS >1]

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

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

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

    1. Please specify: _____
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q50 = 3 OR 4 OR # OF FREEZERS >1]

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

    1. Please specify: _____
    98. Don't know
    99. Prefer not to answer

82. If you were to add up the total amount of time the freezer was running in the year prior to being picked up, how many months would that be? Your best estimate is okay.

    1. Open ended: _____
    2. All of the time
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q50 = 3 OR 4 OR # OF FREEZERS >1]

83. If you were to add up the total amount of time the second freezer was running in the year prior to being picked up, how many months would that be? Your best estimate is okay.

    1. Open ended: _____
    2. All of the time
    98. Don't know
    99. Prefer not to answer

84. Which of the following best describes the condition of the freezer? Was it …?

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

99. Prefer not to answer

[SHOW IF Q50 = 3 OR 4 OR # OF FREEZERS >1]

85. Which of the following best describes the condition of the freezer? Was it …?
    1. Worked and was in good physical condition
    2. Worked but needed minor repair
    3. Worked but needed major repair
    4. It did not work
    98. Don't know
    99. Prefer not to answer

86. Had you already considered disposing the freezer 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.
    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q50 = 3 OR 4 OR # OF FREEZERS >1]

87. Had you already considered disposing the freezer before you heard about [UTILITY]'s appliance recycling program?
    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

88. What would you have most likely done with the freezer had you not disposed of it through [UTILITY]'s program?
    1. Sold it to a private party
    2. Sold it to a used appliance dealer
    3. Kept it and continued to use it
    4. Kept it and stored it unplugged
    5. Given it away to a private party, such as a friend or a neighbor
    6. Given it away to a charity organization, such as Goodwill Industries or a church
    7. Put it on a curb with a "Free" sign on it
    8. Had it removed by the dealer you got your new or replacement freezer from

9. Taken it to a dump or recycling center
10. Hired someone to take it to a dump or recycling center
97. Gotten rid of it some other way (Please specify)
98. Don't know
99. Prefer not to answer

[SHOW IF Q50 = 3 OR 4 OR # OF FREEZERS >1]

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

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

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

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

Room Air Conditioner Recycling [DO NOT DISPLAY]
[SHOW IF Q52 = 3 OR 4 OR # OF ROOM A/C >1]

The following questions are designed to collect information about a maximum of two room A/Cs please keep the same two units in mind when providing your response.

[SHOW Q91 - Q109 IF Q51 = 1 OR Q52 = 2, 3, OR 4]

91. According to Program records your room air conditioner(s) was picked up on or around [Date installed], does that sound accurate?

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW Q92 IF Q91 = 2]

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

    1. Record date (mm/dd/yyyy): _____
    98. Don't know
    99. Prefer not to answer

93. 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]**

    1. Age in years: _____
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q52 = 3 OR 4 OR # OF ROOM A/C >1]

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

    1. Age in years: _____
    98. Don't know
    99. Prefer not to answer

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

    1. Yes
    2. No
    98. Don't know
    99. Prefer not to answer

[SHOW IF Q52 = 3 OR 4 OR # OF ROOM A/C >1]

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

    1. Yes

2. No
98. Don't know
99. Prefer not to answer

97. **Before** recycling the unit(s), how many room air conditioners were in operation in your business?

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

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

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

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

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

100. Does your business **currently** have a central air conditioning system?

1. Yes
2. No
98. Don't know
99. Prefer not to answer

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

1. Please specify: _____
98. Don't know
99. Prefer not to answer

[SHOW IF Q52 = 3 OR 4 OR # OF ROOM A/C >1]

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

1. Open ended: _____
98. Don't know
99. Prefer not to answer

103. Which of the following best describes the condition of the old unit? Was it …?

1. Worked and was in good physical condition

2. Worked but needed minor repair
3. Worked but needed major repair
4. It did not work
98. Don't know
99. Prefer not to answer

[SHOW IF Q52 = 3 OR 4 OR # OF ROOM A/C >1]

104. Which of the following best describes the condition of the old unit? Was it …?

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

105. 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.

1. Yes
2. No
98. Don't know
99. Prefer not to answer

[SHOW IF Q52 = 3 OR 4 OR # OF ROOM A/C >1]

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

1. Yes
2. No
98. Don't know
99. Prefer not to answer

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

1. Sold it to a private party
2. Sold it to a used appliance dealer
3. Kept it and continued to use it
4. Kept it and stored it unplugged
5. Given it away to a private party, such as a friend or a neighbor

6. Given it away to a charity organization, such as Goodwill Industries or a church
7. Put it on a curb with a “Free” sign on it
8. Had it removed by the dealer you got your new or replacement room air conditioner from
9. Taken it to a dump or recycling center
10. Hired someone to take it to a dump or recycling center
97. Gotten rid of it some other way (Please specify)
98. Don’t know
99. Prefer not to answer

[SHOW IF Q52 = 3 OR 4 OR # OF ROOM A/C >1]

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

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

109. 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 a friend/relative
5. Recommendation of retailer/dealer
6. Utility sponsorship of the program
7. Easy way/convenient
8. Never heard of any others/only one I know of

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

Dehumidifier Recycling [DO NOT DISPLAY]
[SHOW IF Q54 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

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

[SHOW Q110 - Q126 IF Q53 = 1 OR Q54 = 2, 3, OR 4]

110. According to Program records your dehumidifier(s) was picked up on or around [Date installed], does that sound accurate?

1. Yes
2. No
98. Don't know
99. Prefer not to answer

[SHOW Q111 IF Q110 = 2]

111. When was the dehumidifier(s) picked up?

1. Record date (mm/dd/yyyy): _____
98. Don't know
99. Prefer not to answer

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

1. Age in years: _____
98. Don't know
99. Prefer not to answer

[SHOW IF Q54 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

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

1. Age in years: _____
98. Don't know
99. Prefer not to answer

114. Did you replace the old dehumidifier with a new unit?

1. Yes

2. No
98. Don't know
99. Prefer not to answer

[SHOW IF Q54 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

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

1. Yes
2. No
98. Don't know
99. Prefer not to answer

116. Before recycling the unit, how many dehumidifiers were in operation in your business?

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

117. How many dehumidifiers are currently in operation in your business?

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

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

1. Please specify: _____
98. Don't know
99. Prefer not to answer

[SHOW IF Q54 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

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

1. Please specify: _____
98. Don't know
99. Prefer not to answer

120. Which of the following best describes the condition of the old unit? Was it …?

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

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

[SHOW IF Q54 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

121. Which of the following best describes the condition of the second unit? Was it …?

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

122. 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
99. Prefer not to answer

[SHOW IF Q54 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

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

1. Yes
2. No
98. Don't know
99. Prefer not to answer

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

1. Sold it to a private party
2. Sold it to a used appliance dealer
3. Kept it and continued to use it
4. Kept it and stored it unplugged
5. Given it away to a private party, such as a friend or a neighbor
6. Given it away to a charity organization, such as Goodwill Industries or a church

7. Put it on a curb with a “Free” sign on it
8. Had it removed by the dealer you got your new or replacement dehumidifier from
9. Taken it to a dump or recycling center
10. Hired someone to take it to a dump or recycling center
97. Gotten rid of it some other way (Please specify)
98. Don’t know
99. Prefer not to answer

[SHOW IF Q54 = 3 OR 4 OR # OF DEHUMIDIFIERS >1]

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

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

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

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

99. Prefer not to answer

Appliance Recycling Rebate Satisfaction [DO NOT DISPLAY]
[SHOW IF Recycling Flag >0 AND Q30 = 1]

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

127. Has your organization received its rebate for recycling the appliance(s) yet?

1. Yes
2. No
98. Don't know
99. Prefer not to answer

[SHOW Q128 - Q131 IF Q127 = 1]

128. How satisfied were you with the rebate amount?

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied
98. Don't know
99. Prefer not to answer

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

1. Yes
2. No
98. Don't know
99. Prefer not to answer

[SHOW Q130 IF Q129 = 1]

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

1. Yes
2. No
98. Don't know
99. Prefer not to answer

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

1. Open ended: _____
98. Don't know
99. Prefer not to answer

[SHOW Q132 IF Q131 = 1]

132. Using a 5-point scale, where 1 is "very dissatisfied" and 5 is "very satisfied" please rate how satisfied you were with how long it took to receive the rebate. **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

[SHOW IF RECYCLING FLAG >0 AND Q30 = 1]]

<u>Appliance Recycling Program Satisfaction</u> [DO NOT DISPLAY]

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

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

1. Never
2. Once
3. 2 or 3 times
4. 4 or more times
98. Don't know
99. Prefer not to answer

[SHOW Q134 - Q137 IF Q133 = 2, 3, OR 4]

134. For what reason(s) did your organization contact the [utility] or program staff?

1. Inquire about the program
2. Initial scheduling
3. Reschedule appointment/pickup
4. Verify appointment time
5. No-show for appointment
6. Rebate delays
7. Issues with the website
97. Other (Please specify)
98. Don't know
99. Prefer not to answer

135. How did you contact them?

1. Phone
2. Email
3. Letter
4. In-person
98. Don't know
99. Prefer not to answer

136. Using a 5-point scale, where 1 is "very dissatisfied" and 5 is "very satisfied" please rate how satisfied you were with the communications with [utility] or program staff. **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

[SHOW Q137 IF Q136 = 1 OR 2]

137. Why were you dissatisfied with those communications?

1. Open ended: _____

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

1. Very dissatisfied
2. Somewhat dissatisfied
3. Neither dissatisfied nor satisfied
4. Somewhat satisfied
5. Very satisfied
98. Don't know
99. Prefer not to answer

[SHOW Q139 IF Q138 = 1 OR 2]

139. Why were you dissatisfied with the program?

1. Open ended: _____

140. Have you recommended the program to others?

1. Yes
2. No
98. Don't know
99. Prefer not to answer

[SHOW Q141 IF Q140 = 2]

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

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

99. Prefer not to answer

[SHOW Q142 IF Q141 = 2]

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

1. Open ended: _____

143. What did you like best about the program?

1. Please specify: _____
98. Don't know
99. Prefer not to answer

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

1. Please specify: _____
98. Don't know
99. Prefer not to answer

Equipment Selection and Influence Factors [DO NOT DISPLAY]

145. How much effect did each of the following types of people have on your decision to install the efficient equipment? **[INSERT 1-5 SCALE AS 1 = Provided no input, 2 = Input did not affect decision, 3 = Small effect on decision, 4 = Moderate to large effect on decision, 5 = Critical effect – could not have made decision without, 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

211. Vendor (retailer)
212. Contractor (installer)
213. Industry organization staff (i.e., COSE)
214. [UTILITY] staff member, such as a customer service representative
215. Implementer Staff

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

1. Yes, who? _____
2. No
98. Don't know
99. Prefer not to answer

[SHOW Q147 IF ANY RESPONSES TO Q145 = 4 OR 5 OR Q146 = 1]

147. What did they do that affected your decision?

1. Please specify: _____
98. Don't know
99. Prefer not to answer

148. Did you buy the rebated equipment directly from a retailer?

1. Yes
2. No
98. Don't know
99. Prefer not to answer

[SHOW Q149 IF Q148 = 1]

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

1. It was 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
99. Prefer not to answer

150. 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
99. Prefer not to answer

[SHOW Q151 IF Q150 = 2, 3, OR 4]

151. Using a scale where 1 means "completely disagree" and 5 means "completely agree", please rate your agreement with the following statements: **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

1. the contractor was knowledgeable about the equipment installed
2. the contractor was knowledgeable about the program
3. the contractor was professional and courteous
4. the contractor was efficient

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

1. Yes

2. No
98. Don't know
99. Prefer not to answer

[SHOW Q153 IF Q152 = 2]

153. Why is the equipment no longer installed or operating?

1. Please specify: _____
98. Don't know
99. Prefer not to answer

Program Communication and Customer Satisfaction [DO NOT DISPLAY]

The following few questions pertain to your communications with Sodexo program staff. Sodexo is the contractor that is responsible for program outreach, technical assistance, and application processing.

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

1. Yes
2. No
98. Don't know
99. Prefer not to answer

[SHOW Q155 IF Q154 = 1]

155. Using a scale where 1 means "completely disagree" and 5 means "completely agree", please rate your agreement with the following statements: **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON'T KNOW AND 99 = PREFER NOT TO ANSWER]**

1. Sodexo program staff were knowledgeable about the equipment installed
2. Sodexo program staff answered my questions in a timely manner
3. Sodexo program staff were professional and courteous

156. In the course of doing this project did you have any interactions with [UTILITY] program staff?

1. Yes
2. No
98. Don't know
99. Prefer not to answer

[SHOW Q157 IF Q156 = 1]

157. Using a scale where 1 means “completely disagree” and 5 means “completely agree”, please rate your agreement with the following statements: **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON’T KNOW AND 99 = PREFER NOT TO ANSWER]**

1. [UTILITY] program staff were knowledgeable about the programs
2. [UTILITY] program staff answered my questions in a timely manner
3. [UTILITY] program staff were professional and courteous

158. Please use a scale in which 1 means “very dissatisfied” and 5 means “very satisfied” and indicate how satisfied or dissatisfied are you with: **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON’T KNOW AND 99 = PREFER NOT TO ANSWER]**

1. The performance of the equipment installed
2. The quality of the installations
3. The amount of time it took to deliver and install the equipment
4. The steps you had to take to get through the program
5. The amount of time it took to get your rebate or incentive
6. The range of equipment that qualifies for incentives
7. Savings on your monthly bill
8. The program, overall

[SHOW Q159 IF ANY RESPONSES TO Q158 = 1 OR 2]

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

1. Open ended: _____

Measurement and Verification [DO NOT DISPLAY]

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

1. Yes
2. No
98. Don’t know
99. Prefer not to answer

[SHOW Q161 IF Q160 = 1]

161. Using a scale where 1 is “completely disagree” and 5 is “completely agree”, please rate your agreement with the following statements: **[INSERT 1-5 SCALE AS DEFINED ABOVE, WITH 98 = DON’T KNOW AND 99 = PREFER NOT TO ANSWER]**

1. The inspector was courteous

2. The inspector was efficient

Firmographic [DO NOT DISPLAY]

162. 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
99. Prefer not to answer

163. Including all the properties, how many separate work locations does your organization own or lease space in, in [UTILITY]'s 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)

1. One
2. Two to three
3. More than three
98. Don't know
99. Prefer not to answer

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

1. Fewer 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
99. Prefer not to answer

[SHOW Q165 IF Q164 <> 1]

165. And do your company's other facilities in [UTILITY]'s service area employ fewer, about the same, or more employees?

1. Fewer
2. About the same number
3. More
98. Don't know
99. Prefer not to answer

166. 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
98. Don't know
99. Prefer not to answer

Thank you for your time today! Have a great day!

9. Appendix C: Trade Ally Survey

FirstEnergy Ohio

Commercial and Industrial Incentive Programs

2019 Program Ally Survey

Variable	Description
COMPANY	Program Ally Organization
NAME	First and Last Name
EMAIL	Primary Contact Email Address
SUM KWH	Sum of kWh savings

Mode of Administration [DO NOT DISPLAY]

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

Email Invitation [DO NOT DISPLAY]

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 Commercial and Industrial Incentive Program. Please take a few minutes to provide feedback about your experience. Your response, in combination with other program allies, will be used to develop recommendations regarding future program improvements.

Click Here to Start the Survey

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

Thank you in advance for your feedback!

Sincerely,

[ADM CONTACT]

ADM Associates, Inc./ Contractor to [Utility]

PROGRAM AWARENESS AND MARKETING [DO NOT DISPLAY]

How would you characterize your type of business?

1. Contractor – Lighting/Electrical
2. Contractor – HVAC
3. Contractor – Mechanical
4. Distributor – Lighting/Electrical
5. Distributor – HVAC
6. Distributor - Mechanical
7. Vendor/Retailer
8. Engineer
9. Manufacturer
10. Energy Service Company/ Energy Consultant
97. Other (Specify)
98. Don't know

How did you find out about [Utility]'s Commercial and Industrial Incentive Programs?

1. My company has participated in the past
2. Received an email
3. Trade Association
4. Word of Mouth
5. Radio/TV advertisement
6. Print Advertisement
7. Historical Participation
97. Other (Specify)
98. Don't know

In 2019, about what percentage of your customers were aware that they could get incentives through the program, 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

Are there ways in which the utility could improve awareness of the programs among business customers or better support your efforts in the field?

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

[SHOW Q0 IF Q0 = 1]

Please describe how the program could improve awareness or better support your efforts.

1. Open Ended: _____
98. Don't know

Did you actively market the Commercial and Industrial Incentive Programs to your customers in 2019?

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

[SHOW Q0 IF Q0 = 1]

Through what means did you actively market the program?

1. Word of mouth during the sales visit
2. On our company website
3. Send materials via US Mail
4. Send information in marketing emails
97. Other (Specify)
98. Don't know

PROGRAM OFFERINGS [DO NOT DISPLAY]

Are there additional measures that the program does not currently cover that you think it should?

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

[SHOW Q0 IF Q0 = 1]

What additional measures would you like to see the program cover?

1. Open Ended: _____

Generally speaking, how effective are current program incentives levels at motivating your customers to buy high efficiency equipment instead of standard efficiency equipment? Please answer on a scale from 1, meaning "not at all effective," to 5, meaning "very effective."

1. 1 – Not at all effective
2. 2

3. 3
4. 4
5. 5 – Very effective
98. Don't know

Are there any specific measures for which the current incentive levels do not motivate customers to buy high efficiency equipment instead of standard efficiency equipment?

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

[SHOW Q0 IF Q0 = 1]

For what types of equipment do the current incentive levels not motivate customers to buy high efficiency equipment instead of standard efficiency equipment?

1. Open Ended: _____

Are there any specific measures for which a lower incentive level would still motivate customers to buy high efficiency equipment instead of standard efficiency equipment?

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

[SHOW Q0 IF Q0 = 1]

For what measures would a lower incentive level still motivate customers to buy high efficiency equipment instead of standard efficiency equipment?

1. Open Ended: _____

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

[SHOW Q0 IF Q0 = 1]

What role do you take in the application process?

1. We take care of the entire application from application start to submission, including, audits, energy savings calculations and communication with program staff if necessary.
2. We provide an audit and energy savings calculations, but our customers submit the application themselves
3. We are not involved with the application much at all

97. Other (Specify)
98. Don't know

In 2019 did you have any interactions with Sodexo program staff? **[If needed: Sodexo is the program's implementation contractor.]**

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

[SHOW Q0 IF Q0 = 1]

Please rate your agreement with the following statements using a scale where 1 is "completely disagree" and 5 is "completely agree":

	Completely disagree				Completely agree	Don't know
a. Sodexo program staff were knowledgeable about the programs	1	2	3	4	5	98
b. Sodexo program staff answered my questions in a timely manner	1	2	3	4	5	98
c. Sodexo staff were professional and courteous	1	2	3	4	5	98

In 2019, did you have any interactions with utility program staff?

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

[SHOW Q0 IF Q0 = 1]

Please rate your agreement with the following statements using a scale where 1 is "completely disagree" and 5 is "completely agree":

	Completely disagree				Completely agree	Don't know
a. Utility program staff were knowledgeable about the programs	1	2	3	4	5	98
b. Utility program staff answered my questions in a timely manner	1	2	3	4	5	98

c.	Utility staff were professional and courteous	1	2	3	4	5	98

In what ways, if any, could your interactions with staff have been improved?
Open Ended: _____

In what ways, if any, could the program website, application tools, or participation process be improved?

1. Open Ended: _____

PROGRAM IMPACT ON PA'S BUSINESS AND MARKET FEEDBACK [DO NOT DISPLAY]

Has your involvement in the Commercial and Industrial Incentive Program affected the types of equipment or services that you provide?

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

[SHOW Q0 IF Q0 = 1]

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

1. Open Ended: _____

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

1. Open Ended: _____

Of all the jobs you completed in 2019, about what percent used program-qualifying equipment – whether or not the customer applied for program incentives?

1. 1%-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

Of all the jobs you completed in 2019 that used program-qualifying equipment, about what percent of customers did not apply for program incentives?

1. None – they all applied for incentives
2. 1%-9%
3. 10%-19%
4. 20%-29%
5. 30%-39%
6. 40%-49%
7. 50%-59%
8. 60%-69%
9. 70%-79%
10. 80%-89%
11. 90%-100%
98. Don't know

[SHOW Q0 IF Q0 <> 1]

For those clients that didn't apply, what reasons did they give?

1. Open Ended: _____

Do you think those clients are any more or less likely to do additional energy efficiency projects than clients who did apply for program incentives? Why or why not?

1. Open Ended: _____

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?

1. Open Ended: _____

COMMUNICATION OF PROGRAM CHANGES [DO NOT DISPLAY]

Please rate how effective you think the following means of communication are for providing information to you about program changes/updates. Please use a scale where 1 is "not at all effective" and 5 is "very effective."

	Not at all effective				Very effective	Don't know

a.	Email	1	2	3	4	5	98
b.	Phone calls from program representatives	1	2	3	4	5	98
c.	In-person presentations (trade show events or conferences)	1	2	3	4	5	98
d.	Webinars and other online presentations	1	2	3	4	5	98
e.	Website updates	1	2	3	4	5	98
f.	In person visits	1	2	3	4	5	98

SATISFACTION [DO NOT DISPLAY]

Please rate your agreement with the following statements using a scale where 1 is "very dissatisfied" and 5 is "very satisfied":

	Very Dissatisfied				Very Satisfied	Don't know
a. the steps you/customers take to get through the program	1	2	3	4	5	98
b. the amount of time it takes to receive the rebate	1	2	3	4	5	98
c. the range of equipment that qualifies for incentives	1	2	3	4	5	98
d. the program, overall	1	2	3	4	5	98

[SHOW Q0 IF Q158a 158b 158c 158d <> 4 OR 5]

Please describe why you were not satisfied with the program.

1. Open Ended: _____

Is there anything else you would like to tell us about your experience with [Utility]'s Commercial and Industrial Incentive Programs?

1. Open Ended: _____

We have finished with the questions we have for this survey. Thank you for your time. Have a great day!