2012 Evaluation of EnergySaveOhio Commercial and Industrial Energy Efficiency Incentive Programs

Evaluation Report

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1. Executive Summary

During 2012, the Ohio Operating companies The Cleveland Electric Illuminating Company (CEI), Ohio Edison (OE), and The Toledo Edison (TE) (collectively "Companies"), implemented commercial and industrial programs These programs (collectively "C/I Equipment Programs") include the following:

- Large Enterprise Equipment Program
- Small Enterprise Equipment Program
- Motors and Drives Program
- Government Lighting Program

The main features of the approach used for the evaluation are as follows:

- Data for the study were collected through review of program materials, on-site inspections, end-use metering, and interviews with the Companies' staff members, program implementation contractor staff members, and participating customers and contractors. Based on data provided by the Companies' and their program implementation contractor, a sample design was developed for on-site data collection. Samples were drawn that provide savings estimates for each program providing energy savings estimation with ±10% statistical precision at the 90% confidence level. Table 1-1 shows the total sample sizes for different types of data collection employed for this study for the C/I Equipment Programs.
- On-site visits were used to collect data for savings impact calculations, to verify measure installation, and to determine measure operating parameters. Facility staff were interviewed to determine the operating hours of installed systems and to locate any additional benefits or shortcomings with the installed systems. For many of the sites, energy efficient equipment was monitored in order to obtain accurate information on equipment operating characteristics. The 127 projects, for which on-site measurements and verification data were collected, account for approximately 56% of the Large Enterprise Equipment Program's ex ante kWh savings, 21% of the Small Enterprise Equipment Program's ex ante kWh savings, 95% of the Motors and Drives Program's ex ante kWh savings, and 33% of the Government Lighting Program's ex ante kWh savings.
- Customer surveys provided the information for process evaluation. A total of 321 customer decision makers who completed 327 surveys for Small and Large Enterprise Equipment were interviewed, and 71 trade allies were interviewed. Additionally, relevant Company and implementation contractor staff members were interviewed to provide information for the process evaluation.

Table 1-1 Sample Sizes for Data Collection Efforts

Type of Data Collected	*Large Enterprise*	*Small Enterprise*	*Motors and Drives*	*Government Lighting*	*Total*
Project On-Site Measurement and Verification	51	60	9	7	127
Customer Decision Maker Survey	67	260	0	0	327
Trade Ally Survey	71				71

Gross savings were estimated using proven techniques, including industry standard engineering calculations and verification of computer simulations developed by program contractors to determine energy savings. The realized energy savings for each program are summarized in Table 1-2.

Table 1-2 Gross Savings by Program

Program	Ex Ante kWh Savings	Ex Post kWh Savings	Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
Large Enterprise	93,218,469	96,593,825	104%	11,460	13,497	118%
Small Enterprise	115,436,084	105,367,329	91%	21,464	22,877	107%
Motors & Drives	13,845,460	6,544,372	47%	1,529	403	26%
Government Lighting	1,092,169	1,069,080	98%	125	122	98%
Total	223,592,181	209,574,607	94%	34,577	36,899	107%

The realized energy savings of the 2012 Large Enterprise Equipment Program from the three service territories are summarized in Table 1-3. For the entire program, the realized gross energy savings totaled 96,593,825 kWh. The gross realization rate for the program is 104%.

Table 1-3 Summary of Annualized kWh Savings for Large Enterprise Equipment Program

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
CEI	22,866,952	25,141,027	110%
OE	53,497,996	54,764,404	102%
TE	16,853,521	16,688,394	99%
Total Companies	93,218,469	96,593,825	104%

The realized gross peak kW reductions of the 2012 Large Enterprise Equipment Program from the three service territories are summarized in Table 1-4. The achieved gross peak demand savings for the program are 13,497.40 kW. The gross realization rate for the program is 118%

Table 1-4 Summary of Annualized Peak kW Savings for Large Enterprise Equipment Program

Operating Company	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
CEI	2,715.30	3,526.04	130%
OE	6,698.34	7,758.56	116%
TE	2,045.92	2,212.80	108%
Total Companies	11,459.57	13,497.40	118%

After the date of implementation for a measure under the Large Enterprise Equipment Program, the number of months remaining in 2012 for which annual savings could be attributed is referred to as first year pro rata savings. The first year pro rata ex post kWh savings for the Large Enterprise Equipment Program is summarized in Table 1-5. For the first year pro rata, the realized gross energy savings totaled 56,844,751 kWh.

Table 1-5 Summary of First Year Pro Rata kWh Savings for Large Enterprise Equipment Program

Operating Company	*First Year Ex Post Pro Rata kWh Savings*
CEI	15,344,743
OE	29,348,992
TE	12,151,016
Total Companies	56,844,751

The realized energy savings of the 2012 Small Enterprise Equipment Program from the three service territories are summarized in Table 1-6. For the entire program, the realized gross energy savings totaled 105,367,329 kWh. The gross realization rate for the program is 91%.

Table 1-6 Summary of Annualized kWh Savings for Small Enterprise Equipment Program

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
CEI	55,645,274	50,208,339	90%
OE	47,231,605	43,773,299	93%
TE	12,559,206	11,385,692	91%
Total Companies	115,436,084	105,367,329	91%

The realized gross peak kW reductions of the 2012 Small Enterprise Equipment Program from the three service territories are summarized in Table 1-7. The achieved gross peak demand savings for the program are 22,876.81 kW. The gross realization rate for the program is 107%

Table 1-7 Summary of Annualized Peak kW Savings for Small Enterprise Equipment Program

Operating Company	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
CEI	10,603.14	11,040.50	104%
OE	8,505.52	9,323.51	110%
TE	2,355.57	2,512.80	107%
Total Companies	21,464.23	22,876.81	107%

The accrued savings during the remaining months in 2012, after the date of implementation for a measure under the Small Enterprise Equipment Program, is referred to as first year pro rata savings. The first year pro rata ex post kWh savings for the Small Enterprise Equipment Program is summarized in Table 1-8. For the first year pro rata, the realized gross energy savings totaled 65,996,641 kWh.

Table 1-8 Summary of First Year kWh Pro Rata Savings for Small Enterprise Equipment Program

Operating Company	First Year Ex Post Pro Rata kWh Savings
CEI	29,099,387
OE	29,767,137
TE	7,130,118
Total Companies	65,996,641

The realized energy savings of the 2012 Motors and Drives Program from the three service territories are summarized in Table 1-1. For the entire program, the realized gross energy savings totaled 6,544,372 kWh. The gross realization rate for the program is 47%.

Table 1-9 Summary of Annualized kWh Savings for Motors and Drives Program

Operating Company	Ex Ante kWh Savings	Ex Post kWh Savings	Realization Rate
CEI	735,251	526,177	72%
OE	5,454,324	5,345,533	98%
TE	7,655,885	672,662	9%
Total Companies	13,845,460	6,544,372	47%

The realized gross peak kW reductions of the 2012 Motors and Drives Program from the three service territories are summarized in Table 1-10. The achieved gross peak demand savings for the program are 402.88 kW. The gross realization rate for the program is 26%

Table 1-10 Summary of Annualized Peak kW Savings for Motors and Drives Program

Operating Company	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate

Operating Company	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
CEI	179.12	82.97	46%
OE	1,093.00	241.18	22%
TE	256.49	78.73	31%
Total Companies	1,528.62	402.88	26%

After the date of implementation for a measure under the Motors and Drives Program, the number of months remaining in 2012 for which annual savings could be attributed is referred to as first year pro rata savings. The first year pro rata ex post kWh savings for the Motors and Drives Program is summarized in Table 1-11. For the first year pro rata, the realized gross energy savings totaled 3,286,513 kWh.

Table 1-11 Summary of First Year Pro Rata kWh Savings for Motors and Drives Program

Operating Company	First Year Ex Post Pro Rata kWh Savings
CEI	517,606
OE	2,145,902
TE	623,005
Total Companies	3,286,513

The realized energy savings of the 2012 Government Lighting Program from the three service territories are summarized in Table 1-12. For the entire program, the realized gross energy savings totaled 1,069,080 kWh. The gross realization rate for the program is 98%.

Table 1-12 Summary of Annualized kWh Savings for Government Lighting Program

Operating Company	Ex Ante kWh Savings	Ex Post kWh Savings	Realization Rate
CEI	134,960	134,887	100%
OE	957,208	934,193	98%
TE	-	-	-
Total Companies	1,092,169	1,069,080	98%

The realized gross peak kW reductions of the 2012 Government Lighting Program from the three service territories are summarized in Table 1-13. The achieved gross peak demand savings for the program are 122.05 kW. The gross realization rate for the program is 98%

Table 1-13 Summary of Annualized Peak kW Savings for Government Lighting Program

Operating Company	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
CEI	15.41	15.40	100%
OE	109.27	106.66	98%
TE	-		
Total Companies	124.68	122.05	98%

After the date of implementation for a measure under the Government Lighting Program, the number of months remaining in 2012 for which annual savings could be attributed is referred to as first year pro rata savings. The first year pro rata ex post kWh savings for the Government Lighting Program is summarized in Table 1-14. For the first year pro rata, the realized gross energy savings totaled 761,585 kWh.

Table 1-14 Summary of First Year Pro Rata kWh Savings for Government Lighting Program

Operating Company	*First Year Ex Post Pro Rata kWh Savings*
CEI	53,585
OE	708,000
TE	-
Total Companies	761,585

The second year of program operations saw fairly steady increases in program activity during the program year. While comments were made by some customers and trade allies about the incentive change that occurred during the previous program year, this issue was not as strongly emphasized in their responses as it was last year. Moreover, trade ally satisfaction with the program increased in comparison to last year.

The following presents a selection of key conclusions from the first year of program operations:

- **Progress in Overcoming Market Barriers:** Interviews and surveys with customers and trade allies suggest that progress has been made in overcoming traditional market barriers to the adoption of energy efficiency equipment. Trade allies reported that the programs led them to offer more energy efficient products and increase inventories of energy efficient equipment, changes that point to the increased availability and energy efficient products. Furthermore, nearly all customers felt the equipment met their expectations and that they were satisfied with it. Satisfaction with the equipment may lead participants to adopt similar equipment in the future as well as lead them to discuss the benefits of energy efficient equipment with colleagues.

  There was evidence that the program may be more effectively reaching customers in some facility types this year. The share of savings in the Small Enterprise Equipment Program attributable to offices and retail facilities increased from last year.

- **Program Services are Comprehensive:** The types of equipment covered by the programs is comprehensive and similar to the options available through other utility programs. As was the case last year, surveys of program participants also suggest that the programs met their needs. A fairly small share of participant survey respondents (16% or less) stated that there was additional equipment that they wanted to install that was not covered by the programs. Trade allies reported that

customers were interested in LED lighting measures which are not currently a prescriptive offering under the program.

- **Lighting Measures Account for Most of the kWh Savings:** There was a strong emphasis on cost effective measures during the 2012 Program Year. Most of the savings generated in the 2012 Program Year were from lighting measures, which generally have lower costs relative to the savings potential. Additionally, the majority of customers reported using a simple payback method to evaluate the implementation of efficiency measures and most require a short payback period. This was also the case last year and suggests that there will be continued focus on high-payback projects with short payback periods in the coming year.
- **Customers are Less Satisfied with the Amount of the Incentive:** Although customers were generally satisfied with the program, a larger share indicated dissatisfaction with the amount of the incentive than was the case last year. The increased dissatisfaction with the amount of the incentive may have been because none of this year's participants received the high incentive rate that was offered at the launch of the program in 2011. Additionally, survey responses indicated that at least some participants were aware of what the old incentive level was and may be comparing what they received this year with what they would have received under the old incentive rate. However, the $0.05 per kWh custom incentive rate is not atypical for energy efficiency programs.
- **Some Evidence that Program has Promoted Energy Efficiency Behaviors and Awareness:** The C/I Equipment Programs appear to have continued to have increased awareness of the benefits of energy efficient equipment. In comparison to last year, a larger share of trade allies reported that the program affected the equipment or services offered. These trade allies said that they had expanded their inventories of energy efficient equipment or offered more energy efficient equipment options.

  Among program participants, nearly all survey respondents said that the equipment they installed through the program remained installed, that the equipment met or exceeded their expectations, and that they were satisfied with the equipment. The positive experience with the equipment suggests that the equipment will remain installed in the future.
- **Improved Satisfaction Among Trade Allies:** The proportion of trade allies who reported that they were satisfied with the program increased from last year. Additionally, fewer trade allies raised concerns about the incentive change that had occurred in the prior year.

  However, there were some aspects of the program that trade allies felt could be improved. They were displeased with the length of time required to receive the incentive payments, a lack of communication about the program, and the effort required for the application process.

Survey findings indicate that the program has improved its operations during the 2012 program year. However, some issues remain and the following recommendations may provide strategic advantage during future program operations:

- **Streamline Participation Process:** Although improvements have been made, trade allies and customers continued to express dissatisfaction with the application process and with the length of time for payment of the incentives in particular. Additional steps taken to decrease the time required to process incentives would likely lead to increased customer satisfaction.
- **Continue to Foster Greater Trust among Trade Allies and Customers:** Trade ally satisfaction with the program increased during the 2012 program year. Continued consistency in program offerings and steady improvements in operations will continue to improve both trade ally and customers satisfaction.
- **Savings Calculations for Motor and Drives Projects:** The overall realization rate for Motors and Drives Program projects was 47%. ADM staff noted that the project documentation did not include the calculations used to estimate ex ante savings for many of the completed projects. Without calculations it was difficult to determine specifically why the realization rate was low for the projects completed. It is recommended that calculations used to estimate savings from motor and drive projects are included in the project documentation. Providing calculations for savings estimates will allow engineering staff to identify why realization rates are low to improve the estimation of ex ante savings.

2. Introduction and Purpose of Study

This report presents the results of the impact and process evaluations of the Large Enterprise Equipment Program, the Small Enterprise Equipment Program, the Motors and Drives Program, and the Government Lighting Program (collectively "C/I Equipment Programs") for activity during the 2012 program year.

2.1 Overview of Evaluation Approach

The overall objective for the impact evaluation of the Large Enterprise Equipment Program, the Small Enterprise Equipment Program, the Motors and Drives Program, and the Government Lighting Program was to verify the gross energy savings and peak demand (kW) reduction resulting from participation in the program during the 2012 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 particular 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.
- Gross savings were estimated using proven techniques:
  - 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 on operating parameters collected on-site and, if appropriate, industry standards.
  - For HVAC measures, the original analyses used to calculate the expected savings were reviewed and the operating and structural parameters of the analysis were verified. For custom measures or relatively more complex measures, simulations with the DOE-2 energy analysis model were used to develop estimates of energy use and savings from the installed measures.
- 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. Description of Programs

3.1 Description of Large Enterprise Equipment Program and Small Enterprise Equipment Program

To be eligible to participate in the Large Enterprise Equipment Program, a customer had to be considered "large" as defined by the customer's rate code. To be eligible to participate in the Small Enterprise Equipment Program, a customer had to be considered "small" as defined by the customer's rate code. Rate codes and corresponding customer sizes are presented in Table 3-1.

Table 3-1 Rate Code by Customer Size

Rate Code	*Customer Size*
GPD	Large[1]
GPF	Large
GSD	Small
GSF	Small
GSMAND	Large
GSMANF	Large
GSUD	Large
GSUF	Large
GTD	Large
GTF	Large

The energy efficiency measures (EEMs) that were implemented by the Large Enterprise Equipment Program and the Small Enterprise Equipment Program are organized into three categories: standard measures, non-standard measures, and custom measures.

Standard measures include lighting equipment for which the program uses "deemed" or "partially deemed" protocols with stipulated algorithms and assumptions to estimate measure gross energy savings and peak load reductions. Non-standard measures capture lighting projects that are not included in the list of standard lighting measures. Both non-standard and custom measures were evaluated on an implementation-by-implementation basis, using site-specific data and algorithms tailored to the nature of the EEM and its implementation.

Standard and non-standard measures were targeted at customers that will purchase lighting equipment that will result in energy efficiency and/or peak demand

[1] Several Small Enterprise Equipment Program applicants' rate codes were updated to GPD during the course of project implementation; these projects were all previously completed when the customers were coded as GSD.

reductions. Incentives for custom measures also require a payback period between one and seven years.

There are six forms which can be completed for the Large Enterprise Equipment Program. These forms are for standard lighting, nonstandard lighting, refrigeration/food service, specialty equipment, HVAC, and custom incentives. There are seven forms which can be completed for the Small Enterprise Equipment Program. These forms are for standard lighting, nonstandard lighting, HVAC, motors and drives, refrigeration/food service, specialty equipment, and custom incentives.

For the standard and non-standard lighting measures, any projects with incentive amounts totaling $3,000 or more required pre-approval before equipment was purchased and installed. Projects with total incentives which were less than $3,000 only needed to submit an application and implement the project. For custom incentives, all projects underwent pre-approval. Once applications were approved, they were sent to the Companies for approval as the last step in the implementation process.

For the Large Enterprise Equipment Program, the expected gross savings by measure type are shown in Table 3-2. There were 225 projects in the program which were expected to provide savings of 93,218,469 kWh.

Table 3-2 Ex Ante Annual Energy Savings of 2012 Large Enterprise Equipment Program

Measure Type	*Ex Ante kWh Savings*			
	CEI	*OE*	*TE*	*Total Companies*
Non-Standard Lighting	16,144,632	46,531,413	14,474,648	77,150,693
Custom	6,714,032	6,914,005	2,279,527	15,907,564
Standard Lighting	7,978	52,578	99,346	159,902
HVAC	310	-	-	310
Total	22,866,952	53,497,996	16,853,521	93,218,469

For the Small Enterprise Equipment Program, the expected gross savings by measure type are shown in Table 3-3. There were 1,471 projects in the program which were expected to provide savings of 115,436,084 kWh.

Table 3-3 Ex Ante Annual Energy Savings of 2012 Small Enterprise Equipment Program

Measure Type	*Ex Ante kWh Savings*			
	CEI	*OE*	*TE*	*Total Companies*
Non-Standard Lighting	50,752,696	42,025,219	11,489,445	104,267,360
Custom	4,043,869	2,921,785	385,318	7,350,972
Standard Lighting	721,618	1,317,640	487,766	2,527,024

Measure Type	*Ex Ante kWh Savings*			
	CEI	*OE*	*TE*	*Total Companies*
Motor	121,001	934,425	196,677	1,252,103
HVAC	6,090	14,753	-	20,842
Specialty Equipment	-	16,118	-	16,118
Refrigeration	-	1,664	-	1,664
Total	55,645,274	47,231,605	12,559,206	115,436,084

Figure 3-1 shows the Large Enterprise Equipment Program's ex post kWh savings by the date of application submission.

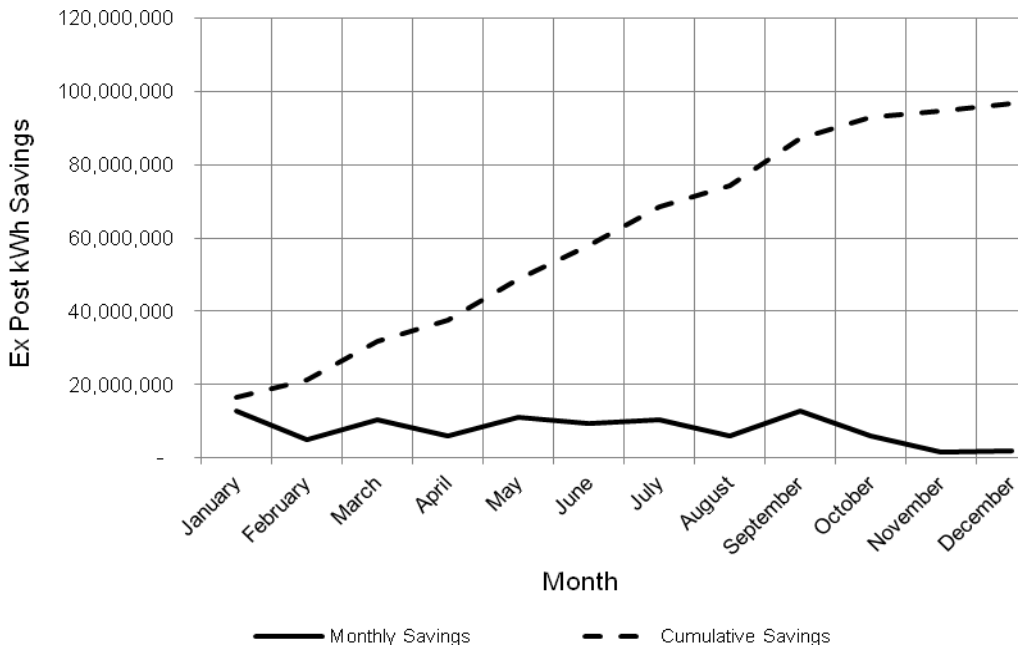

Figure 3-1 Large Enterprise Equipment Program Cumulative Ex Post kWh Savings by Date of Application Submission

Figure 3-2 shows the Small Enterprise Equipment Program's ex post kWh savings by the date of application submission.

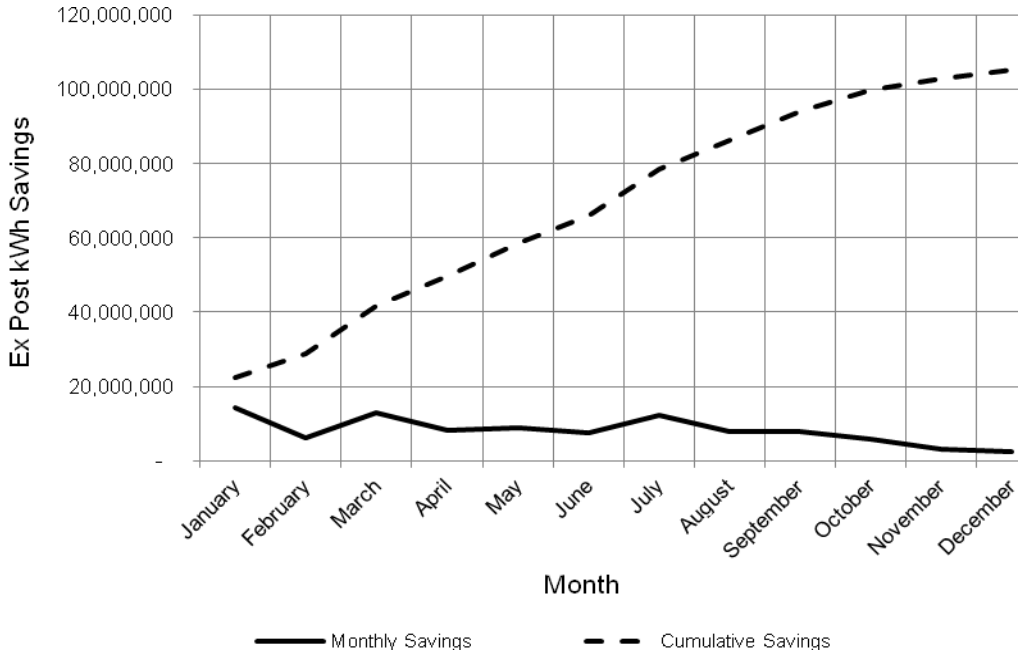

Figure 3-2 Small Enterprise Equipment Program Cumulative Ex Post kWh Savings by Date of Application Submission

3.2 Description of the Motors and Drives Program

To be eligible to participate in the Motors and Drives Program, a customer had to be considered "large" as defined by the customer's code. Rate codes and corresponding customer size are presented in Table 3-1.

The EDCs offered the Motors and Drives Program in Ohio to encourage the company's commercial and industrial customers to:

- Upgrade their existing motors to NEMA Premium® motors when switching out old motors due to breakdowns and or programmed replacements; and
- Install variable speed drives on motors that do not always operate at the same load.

The Motors and Drives Program is designed for commercial and industrial energy customers whose motors are utilized for high operating hours (i.e., over 2,000 hours) and have a higher variability of loads on the system (e.g., centrifugal pumps and fans) or the application of use includes mechanical throttling (valves, dampers, etc). This is because variable speed drives match the speed of the motor-driven equipment to the process requirement. Applications with low variability of loads such as vibrating conveyors, punch presses, rock crushers, machine tools and other applications where the motor runs at constant speed were not good candidates for a variable-speed drive.

Incentives were available to customers through motor distributors as a rebate per unit replaced on a first come first serve basis and were limited to the Company's motor upgrade budget.

To have been eligible to participate in the Motors and Drives Program, a customer must have met the following criteria:

- Motor(s) must operate a minimum of 2,000 hours annually.
- Projects must be a "one-for-one" replacement of a motor with a new, NEMA Premium® motor. The sizes (hp) of the existing and new motors may vary, but the project must involve replacing a quantity of motors for the same quantity of new motors. For new construction, the baseline motor should be a code-compliant option that is less efficient than the NEMA Premium® motor that is being installed.
- Project does not involve a change in annual run hours.
- Project includes the installation of a new NEMA Premium® motor of up to 200hp.
- The motor upgrade program's individual incentives per motor start at $25 for a 1HP.
- The variable-speed drive incentive is $35 per horsepower (up to 500hp) of the motor being used.
- Variable Frequency Drives (VFDs) incentives were available only for the installation of a new VFD on applications where no existing speed control existed on applications controlling a maximum of 500 hp.

Standard motor and drive measures include equipment for which the program uses "deemed" or "partially deemed" protocols with stipulated algorithms and assumptions to estimate measure gross energy savings and peak load reductions. The measures were evaluated on an implementation-by-implementation basis, using site-specific data and algorithms tailored to the nature of the EEM and its implementation.

Measures were targeted at customers that have purchased motor or drive equipment which will result in energy efficiency and/or peak demand reductions. Incentives for custom measures require a payback between one and seven years.

Any projects with incentive amounts totaling $3,000 or more required pre-approval before equipment was purchased and installed. Projects with total incentives which were less than $3,000 only needed to submit an application and implement the project. Once applications were approved, they were sent to the Companies for approval as the last step in the implementation process.

For the Motors and Drives Program, there is only one category of equipment; there were 16 projects in the program which were expected to provide savings of 13,845,460 kWh.

Figure 3-3 shows the Motors and Drives Program's ex post kWh savings by the date of application submission.

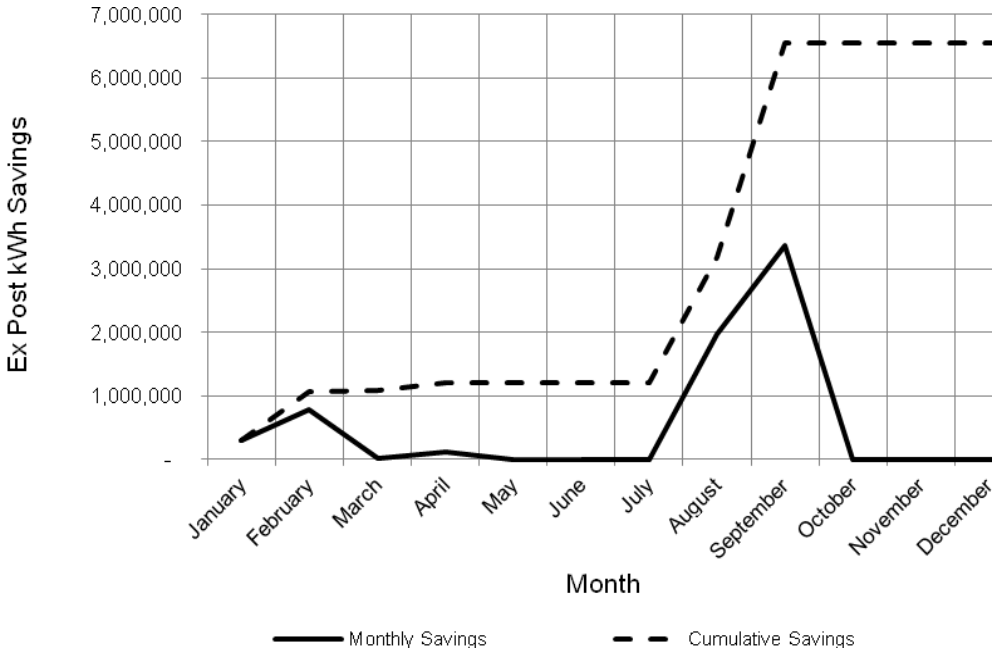

Figure 3-3 Motors and Drives Program Cumulative Ex Post kWh Savings by Date of Application Submission

3.3 Description of the Government Lighting Program

To be eligible to participate in the Government Lighting Program, a non-residential retail customer must convert existing fixtures to the following types of lighting technologies:

- LED Round Signals
  - 8" and 12" Red, Yellow & Green Signals
- LED Pedestrian Sign

Furthermore, equipment must have been purchased on or after April 11, 2011.

For the Government Lighting Program there is only one category of equipment; there were 63 projects in the program which were expected to provide savings of 1,092,169 kWh.

Figure 3-4 shows the Government Lighting Program's ex post kWh savings by the date of application submission.

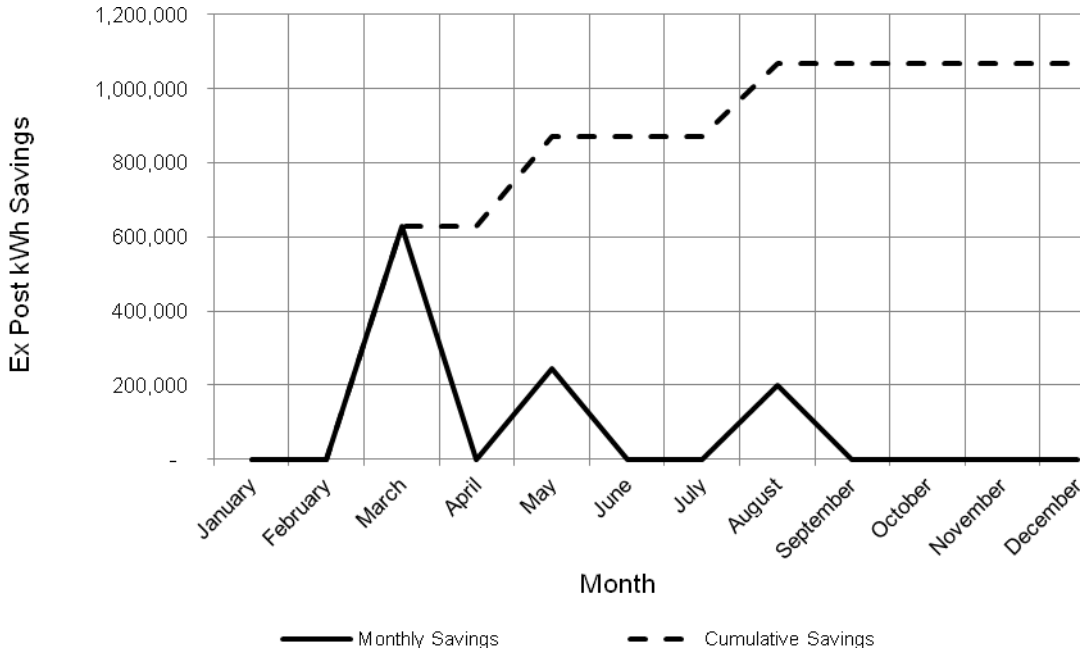

Figure 3-4 Government Lighting Program Cumulative Ex Post kWh Savings by Date of Application Submission

4. Methodology

ADM's evaluation of the 2012 C/I Equipment Programs consisted of both an impact evaluation and a process evaluation. The impact evaluation methodology is described in section 4.1 and the process evaluation methodology is described in section 4.2 of this chapter.

4.1 Impact Methodology

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

4.1.1 Sampling Plans - C/I Equipment Programs

Data used to estimate the gross savings achieved through the Large Enterprise Equipment Program were collected for samples of projects completed during the 2012 program year. Data provided by the implementation contractor showed that during 2012, there were 225 projects for the program, which were expected to provide savings of 93,218,469 kWh annually.

Data used to estimate the gross savings achieved through the Small Enterprise Equipment Program were collected for samples of projects completed during the 2012 program year. Data provided by the implementation contractor showed that during 2012, there were 1,471 projects for the program, which were expected to provide savings of 115,436,084 kWh annually.

Data used to estimate the gross savings achieved through the Motors and Drives Program were collected for samples of projects completed during the 2012 program year. Data provided by the implementation contractor showed that during 2012, there were 16 projects for the program, which were expected to provide savings of 13,845,460 kWh annually.

Data used to estimate the gross savings achieved through the Government Lighting Program were collected for samples of projects completed during the 2012 program year. Data provided by the implementation contractor showed that during 2012, there were 63 projects for the program, which were expected to provide savings of 1,092,169 kWh annually.

For both programs, inspection of data on kWh savings for individual projects provided by implementation contractor indicated that the distribution of savings was generally positively skewed, with a relatively small number of projects accounting for a high percentage of the estimated savings. Estimation of savings for each program is based on a ratio estimation procedure, which allows precision/confidence requirements to be met with a smaller sample size. ADM selected a sample with a sufficient number of projects to estimate the total achieved savings with 10% precision at 90% confidence. For the Large Enterprise Equipment Program sample, the actual precision is ±7%. For the Small Enterprise Equipment Program sample, the actual precision is ±8%. For the

Motors and Drives Program sample, the actual precision is ±3%. For the Government Lighting Program sample, the actual precision is ±5%.

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

Table 4-1 shows the number of projects and expected energy savings of the sampled projects by stratum for the Large Enterprise Equipment Program. Table 4-2 shows the number of projects and expected energy savings of the sampled projects by stratum for the Small Enterprise Equipment Program. Table 4-3 shows the number of projects and expected energy savings of the sampled projects by stratum for the Motors and Drives Program. Table 4-4 shows the number of projects and expected energy savings of the sampled projects by stratum for the Government Lighting Program

Table 4-1 Population Statistics Used for Sample Design for Large Enterprise Equipment Program

	Stratum 1	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Stratum 5*	*Totals*
Strata boundaries (kWh)	< 52310	52310 - 131599	131600 - 261669	261670 - 709649	> 709650	
Number of projects	51	44	32	57	41	225
Total kWh savings	1,101,004	3,962,587	5,663,995	24,430,291	58,060,592	93,218,469
Average kWh Savings	21,588	90,059	177,000	428,602	1,416,112	414,304
Standard deviation of kWh savings	14,872	25,670	33,347	127,861	732,353	589,705
Coefficient of variation	0.69	0.29	0.19	0.30	0.52	1.42
Final design sample	4	4	5	4	34	51

Table 4-2 Population Statistics Used for Sample Design for Small Enterprise Equipment Program

	Stratum 1	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Stratum 5*	*Totals*
Strata boundaries (kWh) Savings	< 21020	21020 - 80419	80420 - 231049	231050 - 501419	> 501420	
Number of projects	558	521	272	95	25	1471
Total kWh savings	5,421,044	23,143,851	36,928,881	29,499,958	20,442,349	115,436,084
Average kWh Savings	9,715	44,422	135,768	310,526	817,694	78,475
Standard deviation of kWh savings	6,184	16,868	41,939	67,290	325,694	134,339
Coefficient of variation	0.64	0.38	0.31	0.22	0.40	1.71
Final design sample	9	13	8	6	24	60

Table 4-3 Population Statistics Used for Sample Design for Motors and Drives Program

	Stratum 1	*Stratum 2*	*Stratum 3*	*Totals*
Strata boundaries (kWh) Savings	< 110390	110390 - 1828229	> 1828230	
Number of projects	6	6	4	16
Total kWh savings	325,348	1,316,087	12,204,025	13,845,460
Average kWh Savings	54,225	219,348	3,051,006	865,341
Standard deviation of kWh savings	36,250	98,784	1,352,493	1,439,975
Coefficient of variation	0.67	0.45	0.44	1.66
Final design sample	2	3	4	9

Table 4-4 Population Statistics Used for Sample Design for Government Lighting Program

	Stratum 1	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Totals*
Strata boundaries (kWh) Savings	< 13100	13100 - 17469	17470 - 265279	> 265280	
Number of projects	24	25	13	1	63
Total kWh savings	218,373	375,084	233,435	265,277	1,092,169
Average kWh Savings	9,099	15,003	17,957	265,277	17,336
Standard deviation of kWh savings	1,441	696	1,426	N/A	31,960
Coefficient of variation	0.16	0.05	0.08	N/A	1.84
Final design sample	2	1	3	1	7

As shown in Table 4-5, the Large Enterprise Equipment Program sample projects account for approximately 56% of the expected kWh savings. As shown in Table 4-6, the Small Enterprise Equipment Program sample projects account for approximately 21% of the expected kWh savings. As shown in Table 4-7, the Motors and Drives Program sample projects account for approximately 95% of the expected kWh savings. As shown in Table 4-8, the Government Lighting Program sample projects account for approximately 33% of the expected kWh savings.

Table 4-5 Expected kWh Savings for Sampled Projects by Stratum for Large Enterprise Equipment Program

Stratum	*Ex Ante kWh Savings (Population)*	*Ex Ante kWh Savings (Sample)*	*Percent of Ex Ante Peak kWh Savings in Sample*
5	58,060,592	48,518,216	84%
4	24,430,291	2,196,783	9%
3	5,663,995	837,923	15%
2	3,962,587	491,876	12%
1	1,101,004	105,817	10%
Total	93,218,469	52,150,615	56%

Table 4-6 Expected kWh Savings for Sampled Projects by Stratum for Small Enterprise Equipment Program

Stratum	Ex Ante kWh Savings (Population)	Ex Ante kWh Savings (Sample)	Percent of Ex Ante Peak kWh Savings in Sample
5	20,442,349	19,782,781	97%
4	29,499,958	2,204,268	7%
3	36,928,881	1,433,085	4%
2	23,143,851	952,630	4%
1	5,421,044	97,689	2%
Total	115,436,084	24,470,453	21%

Table 4-7 Expected kWh Savings for Sampled Projects by Stratum for Motors and Drives Program

Stratum	Ex Ante kWh Savings (Population)	Ex Ante kWh Savings (Sample)	Percent of Ex Ante Peak kWh Savings in Sample
3	12,204,025	12,204,025	100%
2	1,316,087	865,483	66%
1	325,348	114,985	35%
Total	13,845,460	13,184,494	95%

Table 4-8 Expected kWh Savings for Sampled Projects by Stratum for Government Lighting Equipment Program

Stratum	Ex Ante kWh Savings (Population)	Ex Ante kWh Savings (Sample)	Percent of Ex Ante Peak kWh Savings in Sample
4	265,277	265,277	100%
3	233,435	58,740	25%
2	375,084	16,232	4%
1	218,373	20,528	9%
Total	1,092,169	360,776	33%

As shown in Table 4-9, the Large Enterprise Equipment Program sample projects account for approximately 52% of the expected peak kW savings. As shown in Table 4-10, the Small Enterprise Equipment Program sample projects account for approximately 17% of the expected peak kW savings. As shown in Table 4-11, the Motors and Drives Program sample projects account for approximately 95% of the expected peak kW savings. As shown in Table 4-12, the Motors and Drives Program sample projects account for approximately 33% of the expected peak kW savings.

Table 4-9 Expected Peak Demand kW Savings for Sampled Projects by Stratum for Large Enterprise Equipment Program

Stratum	Ex Ante Peak kW Savings (Population)	Ex Ante Peak kW Savings (Sample)	Percent of Ex Ante Peak kW Savings in Sample
5	6,632	5,603	84%
4	3,342	179	5%
3	723	154	21%
2	532	39	7%
1	231	25	11%
Total	11,460	6,000	52%

Table 4-10 Expected Peak Demand kW Savings for Sampled Projects by Stratum for Small Enterprise Equipment Program

Stratum	Ex Ante Peak kW Savings (Population)	Ex Ante Peak kW Savings (Sample)	Percent of Ex Ante Peak kW Savings in Sample
5	2,881.91	2,791.83	97%
4	5,098.78	362.35	7%
3	6,899.99	231.18	3%
2	5,140.63	201.48	4%
1	1,442.92	23.76	2%
Total	21,464.23	3,610.60	17%

Table 4-11 Expected Peak Demand kW Savings for Sampled Projects by Stratum for Motors and Drives Program

Stratum	Ex Ante Peak kW Savings (Population)	Ex Ante Peak kW Savings (Sample)	Percent of Ex Ante Peak kW Savings in Sample
3	1,262.50	1,262.50	100%
2	197.34	159.95	81%
1	68.78	27.30	40%
Total	1,528.62	1,449.75	95%

Table 4-12 Expected Peak Demand kW Savings for Sampled Projects by Stratum for Government Lighting Program

Stratum	Ex Ante Peak kW Savings (Population)	Ex Ante Peak kW Savings (Sample)	Percent of Ex Ante Peak kW Savings in Sample
4	30.28	30.28	100%
3	26.65	6.71	25%
2	42.82	1.85	4%

Stratum	*Ex Ante Peak kW Savings (Population)*	*Ex Ante Peak kW Savings (Sample)*	*Percent of Ex Ante Peak kW Savings in Sample*
1	24.93	2.34	9%
Total	124.68	41.18	33%

4.1.2 Review of Documentation

After the samples of projects were selected, the program implementation contractor provided documentation pertaining to the projects. The first step in the evaluation effort was to review this documentation and other program materials that were relevant to the evaluation effort.

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

- Documentation for the equipment changed, including (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information
- Documentation for the new equipment installed, including (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information
- Information about the savings calculation methodology, including (1) what methodology was used, (2) specifications of assumptions and sources for these specifications, and (3) correctness of calculations

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

4.1.3 On-Site Data Collection Procedures

On-site visits were used to collect data that were used in calculating savings impacts. The visits to the sites of the sampled projects were used to collect primary data on the facilities participating in the program.

When projects were selected for the M&V sample, ADM notified the Companies in two ways:

1) The Companies Customer Service Representatives (CSR) were provided with a list of all sites for which ADM attempted to schedule M&V activities for which there was a CSR. This list includes the company name, the respective CSR for the customer, the site address or other premise identification, as well as the respective contact

information for the customer representative ADM intended to contact in order to schedule an appointment.

2) ADM provided 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 notification also served as a request to the implementation contractor for any documentation relating to the projects. 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 in order to schedule an appointment.

Typically, for customers with CSRs, notification was provided at least two weeks prior to ADM contacting customers in order to schedule M&V visits. Upon CSR request, ADM coordinated its scheduling and M&V activities with the CSR.

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

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

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

4.1.4 Procedures for Estimating Savings from Measures

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

- Lighting
- HVAC
- Motors
- VFDs
- Compressed-Air
- Refrigeration

- Process Improvements

ADM uses a specific set of methods to determine gross savings for projects that depend on the type of measure being analyzed. These typical methods are summarized in Table 4-13.

Table 4-13 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

The activities specified in Table 4-13 produced two estimates of gross savings for each sample project: an expected gross savings estimate (as reported in the project documentation and program tracking system) and the verified gross savings estimates developed through the M&V procedures employed by ADM. ADM developed estimates of program-level gross savings by applying a ratio estimation procedure in which achieved savings rates estimated for the sample projects were applied to the program-level expected savings.

Energy savings realization rates[2] 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 expected and realized energy savings.

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

[2] 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).

Plan for Analyzing Savings from 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 are 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 retrofit and (2) hours of operation before and after the retrofit. Fixture wattages are taken from a table of standard wattages, with corrections made for non-operating fixtures. Hours of operation are determined from 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 uses in-house data on standard 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.

As noted, ADM collects data with which to determine average operating hours for retrofitted fixtures by using Time-of-Use (TOU) data loggers to monitor a sample of “last points of control” for unique usage areas in the sites where lighting efficiency measures have been installed. Usage areas are defined to be those areas within a facility that are expected to have comparable average operating hours. For industrial customers, expected usage areas include fabrication areas, clean rooms, office space, hallways/stairways, and storage areas. Typical usage areas are designated in the forms used for data collection.

ADM uses 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 on-off profile 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. The PUCO established summer on-peak period occurs during the months of June through August, on weekdays from 3:00-6:00 p.m.

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

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

ADM calculates 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 monitoring data are used to calculate the average operating hours of the metered lights for every unique building type/usage area. The monitoring 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 of 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 in order to calculate total savings attributable to lighting measures, inclusive of impacts on HVAC operation

Plan for Analyzing Savings from HVAC Measures: Savings estimates for HVAC measures installed at a facility are derived by using the energy use estimates developed through DOE-2 simulations and engineering calculations. The HVAC simulations also allow calculation of the primary and secondary effects of lighting measures on energy usage. Each simulation produces estimates of HVAC energy and demand usage to be expected under different assumptions about equipment and/or construction conditions. There may be cases in which DOE-2 simulation is inappropriate because data are not available to properly calibrate a simulation model, and engineering analysis provides more accurate M&V results.

For the analysis of HVAC measures, the data collected through on-site visits and monitoring are utilized. Using these data, ADM prepares estimates of the energy savings for the energy efficient equipment and measures installed in each of the participant facilities. Engineering staff develop independent estimates of the savings through engineering calculations or through simulations with energy analysis models. By using energy simulations for the analysis, the energy use associated with the end use affected by the measure(s) being analyzed can be quantified. With these quantities in hand, it is a simple matter to determine what the energy use would have been without the measure(s).

Before making the analytical runs for each site with sampled project HVAC measures, engineering staff prepared a model calibration run. This is a base case simulation to ensure that the energy use estimates from the simulations have been reconciled against actual data on the building's energy use. This run is based on the information collected in an on-site visit pertaining to types of equipment, their efficiencies and capacities, and their operating profiles. Current operating schedules are used for this simulation, as are

local (TMY) weather data covering the study period. The model calibration run is made using actual weather data for a time period 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 particular facilities (e.g., multiple buildings, discontinuous occupancy patterns, etc.).

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

- First, an analysis of energy use at a facility under the assumption that the energy efficiency measures are not installed is performed.
- 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.

Plan for Analyzing Savings from Motors: Estimates of the energy savings from use of high efficiency motors on HVAC and non-HVAC applications are derived through an "after-only" analysis. With this method, 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.* In effect, the after-only analysis is a reversal of the usual design calculation used to estimate the savings that would result from installing a high efficiency motor. That is, at the design stage, the question addressed is how would energy use change for an application if an high efficiency motor is installed, whereas the after-only analysis addresses what the level of energy use would have been had the high efficiency motor not been installed.

For the “after only” analysis, it is not possible to use a comparison of direct measurements to determine savings, since measured data are collected only for the high efficiency motor. However, savings attributable to installation of the high efficiency motor can be estimated using information on the efficiencies of the high efficiency motor and on the motor it replaced. In particular, demand and energy savings can be calculated as follows:

$$\text{Demand Savings} = kW_{peak} \times (1/Eff_{old} - 1/Eff_{new})$$

where kW_{peak} = Volts x $Amps_{peak}$ x Power Factor, and $Amps_{peak}$ is the interval with the maximum recorded Amps during the monitoring period

$$\text{Energy Savings} = kW_{ave} \times (1/Eff_{old} - 1/Eff_{new}) \times \text{Hours of use}$$

where kW_{ave} = Volts x $Amps_{ave}$ x Power Factor and $Amps_{ave}$ is the average measured Amps for the duration of the monitored period.

Annual Energy Savings = kW_{ave} x ($1/Eff_{old}$ -$1/Eff_{new}$) x (days of operation per year/ days metered) x Annual Adjustment Factor

where kW_{ave} = Volts x $Amps_{ave}$ x Power Factor for the monitoring period
$Amps_{ave}$ = the average measured Amps for the duration of the monitored period, and use factor is determined from interviews with site personnel.

Annual Adjustment Factor is 1 if the monitoring period is typical for the yearly operation, less than 1 if the monitoring period is expected to be higher use than typical for the rest of the year, and more than 1 if the monitoring period is expected to be lower than typical for the rest of the year.[3]

The information on motor efficiencies needed for the calculation of savings is obtained from different sources.

Data on the efficiencies of high efficiency motors installed under the program should be available from program records.

Care must be taken using nameplate efficiency ratings of replaced motors, unless the company maintains good documentation of their equipment. If a motor has been rewound it may not operate as originally rated. However, if the efficiencies of the old motors are not directly available, the efficiency values can be imputed by using published data on average efficiency values for motors of given horsepower. If the motor replacement is for normal replacement, the baseline efficiency is established as the efficiency of a new, standard efficiency motor. However, in cases of early replacement, the efficiency of the old motor is used for the length of the remaining life. [4]

Because most motors monitored run only under full load conditions, some adjustments must be made from the “industry averages” of full load efficiencies. Motor efficiency curves of typical real motors that have the same full load efficiencies are used for determining part load efficiencies.

Like motor efficiency, the power factor varies with motor loading. Motor power factor curves of typical real motors that have the same full load power factor are used for determining part load power factor.

Another factor to consider in demand and energy savings comparisons of motor change out programs is the rotor slip. Full load RPM ratings of motors vary. For centrifugal loads such as fans and pumps, the power supplied is dependent on the speed of the driven equipment. The power is theoretically proportional to the cube of the speed, but

[3] Current year weather data were compared with the *Typical Meteorological Year* from the National Oceanic & Atmospheric Administration (NOAA).

[4] Assumptions regarding measure expected useful life were taken from the most recent Database for Energy Efficiency Resources (DEER). See http://www.deeresources.com/.

in practice acts more like the square of the speed. In general high efficiency motors have slightly higher full load RPM ratings (lower slip) than standard motors. Where nameplate ratings of full load RPM are available for replaced motors, a de-rating factor can be applied.[5]

The data needed to carry out these plans for determining savings are collected from several sources.

- The first source of data is the information from each project's documentation. This information is expected to include aggregate energy used at a site, disaggregated energy usage data for certain targeted processes (if available), before (actual) and after (projected) data on production, scrap, and other key performance indicators, and final reports (which include process improvement recommendations, analyses, conclusions, performance targets, etc.).
- The second source of data is the energy use data that the Companies collect for these customers.
- The third source is information collected through on-site inspections of the facilities. ADM staff collects the data during on-site visits using a form that is comprehensive in addressing a facility's characteristics, its modes and schedules of operation, and its electrical and mechanical systems. The form also addresses various energy efficiency measures, including high efficiency lighting (both lamps and ballasts), lighting occupancy sensors, lighting dimmers and controls, air conditioning, high efficiency motors, etc.
- As a fourth source of data, selected end-use equipment are monitored to develop information on operating schedules and power draws.

Plan for Analyzing Savings from VFDs: 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

[5]As an example, take the case where a new motor has a full load RPM rating of 1770 and the old motor had a full load RPM rating of 1760. The derating factor would be:

Derating factor = $(RPM_{old})^2 / (RPM_{new})^2 = 1760^2 / 1770^2 = 0.989$

fans, centrifugal pumps, centrifugal blowers, and other centrifugal loads, most usually where the duty cycle of the process provided a wide range of speeds of operation.

ADM's approach to determining savings from 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 in order 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.

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

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

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

ADM used AirMaster+ to calculate the savings due to the energy efficiency measures installed within each compressed air system. The AirMaster+ as-built and baseline compressor types were inputted into the model using data points collected during on-site verification. The as-built model was then calibrated to a typical daily schedule, derived from at least two weeks of trending data. Project energy savings were calculated by subtracting the as-built from the baseline energy consumption.

Plan for Analyzing Savings from Refrigeration and Process Improvements: Analysis of savings from refrigeration and process improvements is inherently project-specific. 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.

4.2 Process Evaluation Methodology

The purpose of the process evaluation is to examine program operations and results throughout the program operating year, and to identify potential program improvements that may prospectively increase program efficiency or effectiveness in terms of customer participation and satisfaction levels. This process evaluation was designed to document the operations and delivery of the C/I Equipment Programs during the 2012 Program Year. Figure 4-1 provides an overview of the evaluation process, including the specific research activities performed.

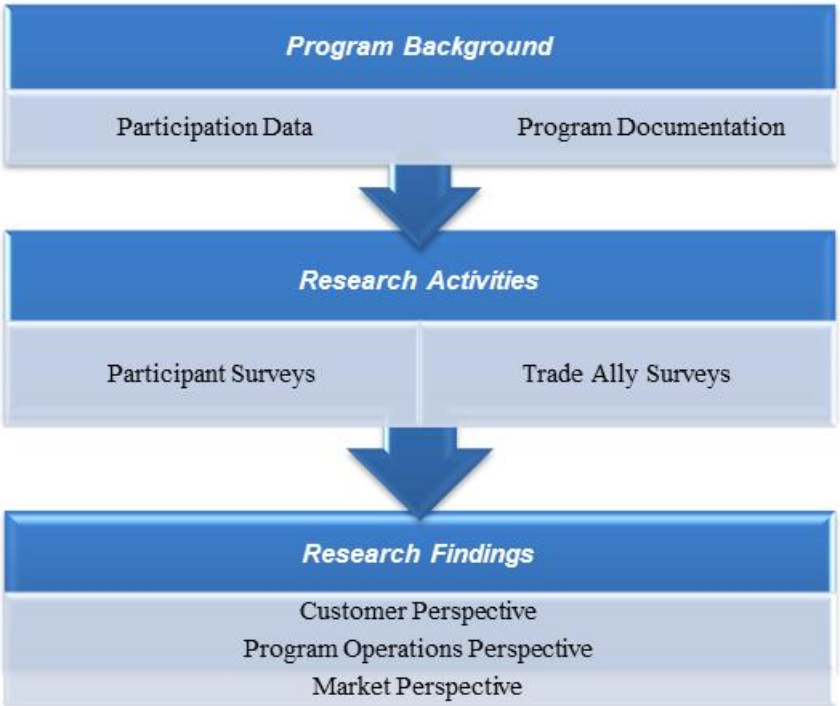

Figure 4-1. Process Evaluation Overview

Key research questions to be addressed by this evaluation of the 2012 Program Year activity include:

- *Where was the C/I Equipment Programs delivery effective and successful?*
- *Are there areas of the C/I Equipment Programs that could be improved?*
- *Did the C/I Equipment Programs reduce barriers to increased energy efficiency project implementation?*

During the evaluation, data and information from multiple sources were analyzed to achieve the stated research objectives. Insight into the customer experience with the C/I Equipment Programs was developed from an online and telephone survey of program participants. The market perspective was developed through in-depth interviews with trade allies that market the program to their customers, worked with participants to prepare incentive applications, and assisted with project implementation. Customer and trade ally surveys also provide insight into the effectiveness of program operations.

5. Detailed Evaluation Findings

This chapter reports ADM's impact evaluation findings and process evaluation findings for the Large Enterprise Equipment Program, the Small Enterprise Equipment Program, the Motors and Drives Program, and the Government Lighting Program during the 2012 program year.

5.1 Impact Evaluation Findings

This section provides the results of gross savings for the Large Enterprise Equipment Program, the Small Enterprise Equipment Program, the Motors and Drives Equipment Program, and the Government Lighting Program during the 2012 program year. Table 5-1 summarizes the gross savings for each program.

Table 5-1 Gross Savings by Program

	Ex Ante kWh Savings	Ex Post kWh Savings	Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
Large Enterprise	93,218,469	96,593,825	104%	11,460	13,497	118%
Small Enterprise	115,436,084	105,367,329	91%	21,464	22,877	107%
Motors & Drives	13,845,460	6,544,372	47%	1,529	403	26%
Government Lighting	1,092,169	1,069,080	98%	125	122	98%
Total	223,592,181	209,574,607	94%	34,577	36,899	107%

5.1.1 Gross Savings

To estimate gross kWh savings and peak kW reductions for the Large Enterprise Equipment Program, data were collected and analyzed for samples of 52 incentive projects. To estimate gross kWh savings and peak kW reductions for the Small Enterprise Equipment Program, data were collected and analyzed for samples of 60 incentive projects. To estimate gross kWh savings and peak kW reductions for the Motors and Drives Program, data were collected and analyzed for samples of 9 incentive projects. To estimate gross kWh savings and peak kW reductions for the Government Lighting Program, data were collected and analyzed for samples of 7 incentive projects

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

5.1.2 Realized Gross kWh Savings

The gross kWh savings of the 2012 Large Enterprise Equipment Program are summarized by sampling stratum in Table 5-2. Overall, the achieved gross savings of 96,593,825 kWh were equal to 104% of the expected savings.

The gross kWh savings of the 2012 Small Enterprise Equipment Program are summarized by sampling stratum in Table 5-3. Overall, the achieved gross savings of 105,367,329 kWh were equal to 91% of the expected savings.

The gross kWh savings of the 2012 Motors and Drives Program are summarized by sampling stratum in Table 5-4. Overall, the achieved gross savings of 6,544,372 kWh were equal to 47% of the expected savings.

The gross kWh savings of the 2012 Government Lighting Program are summarized by sampling stratum in Table 5-5. Overall, the achieved gross savings of 1,069,080 kWh were equal to 98% of the expected savings.

Table 5-2 Expected and Gross Realized kWh Savings for Large Enterprise Equipment Program by Sample Stratum

Stratum	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
5	58,060,592	55,911,504	96%
4	24,430,291	31,184,594	128%
3	5,663,995	5,385,846	95%
2	3,962,587	3,039,523	77%
1	1,101,004	1,072,359	97%
Total	93,218,469	96,593,825	104%

Table 5-3 Expected and Gross Realized kWh Savings for Small Enterprise Equipment Program by Sample Stratum

Stratum	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
5	20,442,349	17,654,438	86%
4	29,499,958	28,092,136	95%
3	36,928,881	35,245,946	95%
2	23,143,851	20,071,302	87%
1	5,421,044	4,303,508	79%
Total	115,436,084	105,367,329	91%

Table 5-4 Expected and Gross Realized kWh Savings for Motors and Drives Program by Sample Stratum

Stratum	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
3	12,204,025	5,577,309	46%
2	1,316,087	763,666	58%
1	325,348	203,397	63%
Total	13,845,460	6,544,372	47%

Table 5-5 Expected and Gross Realized kWh Savings for Government Lighting Program by Sample Stratum

Stratum	Ex Ante kWh Savings	Ex Post kWh Savings	Realization Rate
4	265,277	242,922	92%
3	233,435	234,804	101%
2	375,084	370,001	99%
1	218,373	221,353	101%
Total	1,092,169	1,069,080	98%

Table 5-6 shows the expected and realized energy savings by project for the Large Enterprise Equipment Program. Table 5-7 shows the expected and realized energy savings by project for the Small Enterprise Equipment Program. Table 5-8 shows the expected and realized energy savings by project for the Motors and Drives Program. Table 5-9 shows the expected and realized energy savings by project for the Government Lighting Program.

Table 5-6 Expected and Gross Realized kWh Savings for Large Enterprise Equipment Program by Project

Project ID	Expected kWh Savings	Realized Gross kWh Savings	Project Gross Realization Rate
OH-CI8519	1,478,199	1,086,187	73%
OH-CI29442	2,116,156	2,774,909	131%
OH-NSLB5727	750,560	1,075,533	143%
OH-NSLB7368	894,781	917,249	103%
OH-NSLB8512	1,440,726	945,993	66%
OH-NSLB14276	733,773	674,141	92%
OH-NSLB18198	1,046,145	823,397	79%
OH-NSLB29411	1,311,942	1,163,558	89%
OH-CI17329	813,868	746,062	92%
OH-CI19169	1,495,317	1,349,390	90%
OH-CI31153	929,682	795,999	86%
OH-CI31154	929,682	795,999	86%
OH-NSLB4527	2,003,135	1,581,607	79%
OH-NSLB12164	3,726,271	2,687,890	72%
OH-NSLB8574	901,692	905,962	100%
OH-NSLB12114	709,653	654,760	92%
OH-NSLB13933	1,233,304	607,301	49%
OH-NSLB13900	1,304,106	738,604	57%
OH-NSLB13603	1,661,492	1,425,305	86%
OH-NSLB13012	1,549,726	1,248,426	81%
OH-NSLB13723	1,087,170	949,019	87%
OH-NSLB13938	779,014	738,191	95%
OH-NSLB13409	4,008,132	5,454,638	136%
OH-NSLB14531	1,320,010	1,275,936	97%
OH-NSLB15869	1,079,831	1,781,844	165%

Project ID	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Project Gross Realization Rate*
OH-NSLB18159	976,646	930,903	95%
OH-NSLB18156	827,980	872,362	105%
OH-NSLB29505	1,929,868	2,386,525	124%
OH-NSLB16464	2,002,413	2,034,395	102%
OH-CI13636	935,495	662,088	71%
OH-NSLB12172	1,837,358	1,871,600	102%
OH-NSLB13824	1,694,361	2,304,555	136%
OH-NSLB13626	2,208,019	1,712,852	78%
OH-NSLB15157	801,709	749,155	93%
OH-CI23376	363,279	816,374	225%
OH-NSLB12062	681,291	726,417	107%
OH-NSLB12474	653,241	579,891	89%
OH-NSLB22360	498,972	681,451	137%
OH-NSLB13926	133,870	223,669	167%
OH-NSLB14668	240,478	229,441	95%
OH-CI9944	157,217	156,854	100%
OH-NSLB16339	159,724	115,926	73%
OH-NSLB31496	146,634	70,884	48%
OH-NSLB13008	120,625	91,365	76%
OH-NSLB14133	128,416	186,613	145%
OH-NSLB14068	125,403	52,621	42%
OH-NSLB12432	117,432	46,697	40%
OH-NSLB25046	49,603	52,195	105%
OH-NSLB12189	19,608	17,502	89%
OH-NSLB13557	24,267	20,284	84%
OH-NSLB23294	12,339	13,083	106%
Non-Sample Projects	41,067,854	45,790,223	111%
Total	93,218,469	96,593,825	104%

Table 5-7 Expected and Gross Realized kWh Savings for Small Enterprise Equipment Program by Project

Project ID	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
OH-CI18116	1,051,814	699,823	67%
OH-NSLB7973	764,703	884,289	116%
OH-NSLB12130	789,405	550,682	70%
OH-NSLB12438	1,291,231	767,013	59%
OH-NSLB12157	823,679	557,373	68%
OH-NSLB13759	517,404	483,307	93%
OH-NSLB13763	762,506	654,295	86%
OH-NSLB15952	618,168	602,744	98%

Project ID	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
OH-NSLB18978	710,544	338,258	48%
OH-NSLB29589	503,696	571,255	113%
OH-CI29443	1,673,121	1,215,713	73%
OH-NSLB12256	614,154	1,052,836	171%
OH-NSLB23322	1,538,339	960,628	62%
OH-NSLB16193	501,421	726,258	145%
OH-NSLB16194	579,371	535,430	92%
OH-NSLB16195	640,814	656,479	102%
OH-NSLB17115	552,821	577,721	105%
OH-NSLB23348	1,133,292	1,116,708	99%
OH-NSLB28360	547,086	331,459	61%
OH-NSLB28310	691,309	798,234	115%
OH-NSLB31462	1,134,274	951,820	84%
OH-NSLB28355	1,095,740	949,094	87%
OH-NSLB31187	586,246	507,173	87%
OH-NSLB31189	661,643	596,229	90%
OH-NSLB14147	428,738	388,605	91%
OH-NSLB14492	389,534	366,176	94%
OH-NSLB15913	378,398	309,842	82%
OH-NSLB6448	279,850	296,138	106%
OH-NSLB16277	233,844	432,244	185%
OH-NSLB29506	493,904	306,069	62%
OH-CI16460	229,214	201,133	88%
OH-NSLB14120	215,593	140,396	65%
OH-NSLB16147	210,739	184,318	87%
OH-NSLB20219	227,051	96,343	42%
OH-NSLB19160	130,183	469,124	360%
OH-NSLB23280	103,194	63,179	61%
OH-NSLB24491	169,783	90,015	53%
OH-NSLB12365	147,328	123,268	84%
OH-NSLB11105	76,690	101,751	133%
OH-NSLB14288	76,280	88,383	116%
OH-NSLB8006	78,348	89,288	114%
OH-NSLB13711	77,449	31,393	41%
OH-NSLB13781	77,172	36,256	47%
OH-NSLB13794	77,825	56,439	73%
OH-NSLB14517	77,612	58,882	76%
OH-NSLB12950	78,896	84,057	107%
OH-NSLB12688	75,742	57,474	76%
OH-NSLB18996	79,983	107,991	135%
OH-NSLB15920	76,391	29,466	39%
OH-NSLB25063	78,306	58,515	75%
OH-NSLB28819	21,936	26,265	120%

Project ID	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
OH-NSLB13833	18,506	16,137	87%
OH-NSLB33886	15,494	14,312	92%
OH-SLB31539	3,309	5,525	167%
OH-SLB16607	2,647	3,170	120%
OH-NSLB14510	5,310	3,106	58%
OH-NSLB16925	20,861	10,839	52%
OH-NSLB28476	9,353	10,502	112%
OH-NSLB16545	19,798	11,260	57%
OH-NSLB31433	2,412	2,700	112%
Non-Sample Projects	90,965,630	83,911,947	92%
Total	115,436,084	105,367,329	91%

Table 5-8 Expected and Gross Realized kWh Savings for Motors and Drives Program by Project

Project ID	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Project Gross Realization Rate*
OH-MD8166	3,104,065	3,369,597	109%
OH-MD16417	2,350,259	1,975,936	84%
OH-MD16367	4,921,476	66,966	1%
OH-MD16369	1,828,226	164,810	9%
OH-MD12235	390,095	312,841	80%
OH-MD18968	230,171	141,451	61%
OH-MD16378	245,217	47,909	20%
OH-MD4826	19,119	32,735	171%
OH-MD4827	95,867	39,150	41%
Non-Sample Projects	660,967	392,977	59%
Total	13,845,460	6,544,372	47%

Table 5-9 Expected and Gross Realized kWh Savings for Government Lighting Program by Project

Project ID	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Project Gross Realization Rate*
OH-TS20095	265,277	242,922	92%
OH-TS19096	18,707	18,680	100%
OH-TS19100	17,470	17,657	101%
OH-TS19126	22,563	22,747	101%
OH-TS19149	16,232	16,012	99%
OH-TS18966	11,865	11,857	100%
OH-TS19086	8,663	8,951	103%
Non-Sample Projects	731,392	730,254	100%

Project ID	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Project Gross Realization Rate*
Total	1,092,169	1,069,080	98%

Gross realized kWh savings of the Large Enterprise Equipment Program are shown by building type in Table 5-10. Among discrete building types, manufacturing facilities account for the largest percentage of incentive gross energy - 72%.

Gross realized kWh savings of the Small Enterprise Equipment Program are shown by building type in Table 5-11. Among discrete building types, manufacturing facilities account for the largest percentage of incentive gross energy - 38%.

Gross realized kWh savings of the Motors and Drives Program are shown by building type in Table 5-12. Among discrete building types, manufacturing facilities account for the largest percentage of incentive gross energy - 58%

The Government Lighting Program does not contain discrete building types.

Table 5-10 Realized Gross kWh Savings by Facility Type for Large Enterprise Equipment Program

Facility Type	*Ex Ante kWh Savings*				*Ex Post kWh Savings*				*Percent of Total Ex Post kWh Savings*	*Realization Rate*
	CEI	*OE*	*TE*	*Total Companies*	*CEI*	*OE*	*TE*	*Total Companies*		
Manufacturing	16,545,646	36,820,019	14,007,933	67,373,598	17,251,100	38,532,429	14,037,332	69,820,862	72%	104%
Warehouse	862,086	10,776,651	1,655,274	13,294,011	999,479	10,354,525	1,570,905	12,924,909	13%	97%
Other	2,182,340	3,775,103	263,782	6,221,225	2,718,763	3,976,278	186,076	6,881,117	7%	111%
Grocery	2,116,156	205,870	185,604	2,507,630	2,774,909	159,567	142,368	3,076,844	3%	123%
University	81,752	847,206	224,477	1,153,435	79,625	765,520	191,867	1,037,012	1%	90%
Office	659,177	178,839	-	838,016	840,758	170,057	-	1,010,814	1%	121%
Retail	-	203,228	224,315	427,543	-	114,743	194,102	308,845	0%	72%
Community College	49,603	82,276	268,466	400,345	52,195	65,471	342,689	460,355	0%	115%
Multi-Family Common Areas	-	391,588	-	391,588	-	452,620	-	452,620	0%	116%
K-12 Education	94,895	217,216	23,670	335,781	72,790	173,195	23,054	269,038	0%	80%
Hospital	275,297	-	-	275,297	351,409	-	-	351,409	0%	128%
Total	22,866,952	53,497,996	16,853,521	93,218,469	25,141,027	54,764,404	16,688,394	96,593,825	100%	104%

Table 5-11 Realized Gross kWh Savings by Facility Type for Small Enterprise Equipment Program

Facility Type	*Ex Ante kWh Savings*				*Ex Post kWh Savings*				*Percent of Total Ex Post kWh Savings*	*Realization Rate*
	CEI	*OE*	*TE*	*Total Companies*	*CEI*	*OE*	*TE*	*Total Companies*		
Manufacturing	25,555,876	14,113,815	3,365,309	43,035,000	23,602,357	13,085,812	3,166,722	39,854,891	38%	93%
Other	5,844,021	5,716,368	3,072,907	14,633,296	5,224,482	5,910,176	2,764,049	13,898,707	13%	94%
Warehouse	2,938,916	8,094,367	1,805,998	12,839,281	2,729,494	7,381,139	1,589,566	11,700,199	11%	91%
Retail	4,871,983	5,559,781	1,365,942	11,797,706	4,421,366	5,004,511	1,205,365	10,631,242	10%	90%
Office	5,540,004	4,936,633	898,285	11,374,922	4,760,981	4,800,749	816,154	10,377,884	10%	91%
K-12 Education	4,280,503	1,723,335	665,714	6,669,553	3,800,647	1,557,671	590,909	5,949,227	6%	89%
Hospital	2,064,570	3,759,645	469,666	6,293,881	1,461,339	3,088,892	448,262	4,998,493	5%	79%
Grocery	3,543,739	1,507,466	266,357	5,317,562	3,310,634	1,392,145	226,423	4,929,202	5%	93%

Facility Type	Ex Ante kWh Savings				Ex Post kWh Savings				Percent of Total Ex Post kWh Savings	Realization Rate
	CEI	OE	TE	Total Companies	CEI	OE	TE	Total Companies		
Food Service	271,974	1,410,330	412,584	2,094,888	233,823	1,301,734	362,252	1,897,808	2%	91%
University	377,724	19,183	-	396,907	354,509	15,228	-	369,738	0%	93%
Multi-Family Common Areas	291,250	-	56,013	347,263	254,140	-	44,466	298,607	0%	86%
Community College	-	75,742	176,175	251,917	-	57,474	168,146	225,620	0%	90%
Medical Clinic	33,593	129,610	4,255	167,458	28,286	111,125	3,378	142,789	0%	85%
Lodging	30,303	76,844	-	107,147	26,280	66,642	-	92,922	0%	87%
Total	55,644,456	47,123,119	12,559,206	115,326,780	50,208,339	43,773,299	11,385,692	105,367,329	100%	91%

Table 5-12 Realized Gross kWh Savings by Facility Type for Motors and Drives Program

Facility Type	Ex Ante kWh Savings				Ex Post kWh Savings				Percent of Total Ex Post kWh Savings	Realization Rate
	CEI	OE	TE	Total Companies	CEI	OE	TE	Total Companies		
Manufacturing	620,266	3,104,065	-	3,724,331	454,292	3,369,597	-	3,823,889	58%	103%
Hospital	-	2,350,259	-	2,350,259	-	1,975,936	-	1,975,936	30%	84%
Other	19,119	-	7,159,516	7,178,634	32,735	-	382,586	415,321	6%	6%
Retail	-	-	340,212	340,212	-	-	197,409	197,409	3%	58%
University	95,867	-	156,158	252,025	39,150	-	92,667	131,817	2%	52%
Total	735,251	5,454,324	7,655,885	13,845,460	526,177	5,345,533	672,662	6,544,372	100%	47%

5.1.3 Realized Gross Peak kW Savings

The realized gross peak kW reductions of the 2012 Large Enterprise Equipment Program are shown in Table 5-13. The achieved gross peak demand savings for the program are 13,497.40 kW.

The realized gross peak kW reductions of the 2012 Small Enterprise Equipment Program are shown in Table 5-14. The achieved gross peak demand savings for the program are 22,876.81 kW.

The realized gross peak kW reductions of the 2012 Motors and Drives Program are shown in Table 5-15. The achieved gross peak demand savings for the program are 402.88 kW.

The realized gross peak kW reductions of the 2012 Government Lighting Program are shown in Table 5-16. The achieved gross peak demand savings for the program are 122.05 kW.

Table 5-13 Expected and Gross Realized Peak kW Savings for Large Enterprise Equipment Program

Stratum	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
5	6,631.93	7,214.87	109%
4	3,342.17	4,892.00	146%
3	722.74	888.17	123%
2	531.89	213.06	40%

Stratum	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
1	230.84	289.30	125%
Total	11,459.57	13,497.40	118%

Table 5-14 Expected and Gross Realized Peak kW Savings for Small Enterprise Equipment Program

Stratum	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
5	2,881.91	3,245.01	113%
4	5,098.78	4,900.38	96%
3	6,899.99	7,891.20	114%
2	5,140.63	5,397.56	105%
1	1,442.92	1,442.66	100%
Total	21,464.23	22,876.81	107%

Table 5-15 Expected and Gross Realized Peak kW Savings for Motors and Drives Program

Stratum	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
3	1,262.50	269.18	21%
2	197.34	104.32	53%
1	68.78	29.38	43%
Total	1,528.62	402.88	26%

Table 5-16 Expected and Gross Realized Peak kW Savings for Government Lighting Program

Stratum	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Realization Rate
4	30.28	27.73	92%
3	26.65	26.82	101%
2	42.82	42.29	99%
1	24.93	25.21	101%
Total	124.68	122.05	98%

5.1.4 Discussion of Gross Savings Analysis

The project realization rates were reviewed to assess whether there were factors that were causing systematic differences in the realization rates. An analysis was conducted to determine whether realization rates for projects differed systematically by expected kWh savings for the Large Enterprise Equipment Program and the Small Enterprise Equipment Program.

For the Large Equipment Program, sample project realization rates and expected kWh savings are plotted in Figure 5-1. There is not a strong association between realization rates and expected kWh savings. Figure 5-2 plots the project realized energy savings against the expected energy savings for each sample point.

For the Small Enterprise Equipment Program, sample project realization rates and expected kWh savings are plotted in Figure 5-3. There is not a strong association between realization rates and expected kWh savings. Figure 5-4 plots the project realized energy savings against the expected energy savings for each sample point.

For the Motors and Drives Program, sample project realization rates and expected kWh savings are plotted in Figure 5-5. There is not a strong association between realization rates and expected kWh savings. Figure 5-6 plots the project realized energy savings against the expected energy savings for each sample point.

For the Government Lighting Program, sample project realization rates and expected kWh savings are plotted in Figure 5-7. There is not a strong association between realization rates and expected kWh savings. Figure 5-8 plots the project realized energy savings against the expected energy savings for each sample point.

Case-by-case examination showed that project-specific factors were more likely to cause realized kWh savings to differ from expected savings. Project-specific factors include type of measure implemented, building type, facility operating schedule, and other parameters that may affect energy efficiency measure savings.

Figure 5-1 Sample Project Realization Rate versus Expected kWh Savings for Large Enterprise Equipment Program

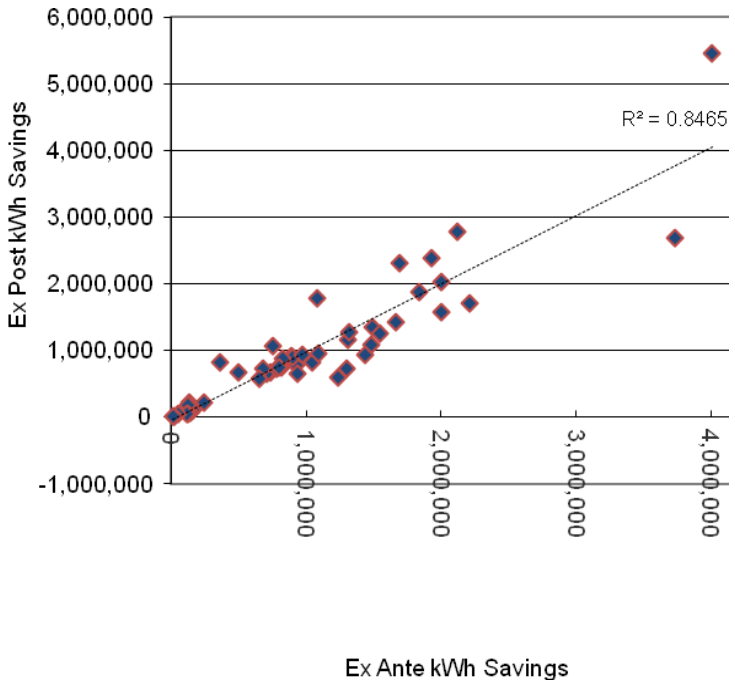

Figure 5-2 Sample Project Realized kWh Savings versus Expected kWh Savings for Large Enterprise Equipment Program

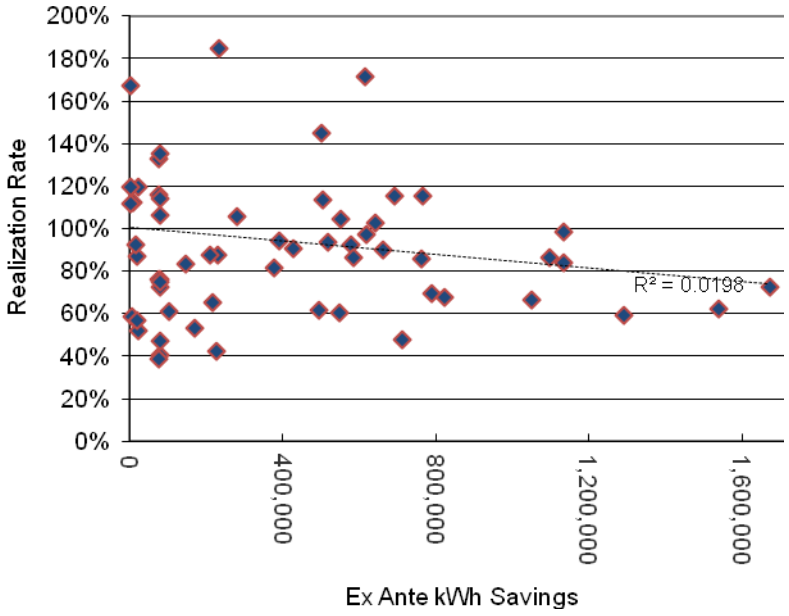

Figure 5-3 Sample Project Realization Rate versus Expected kWh Savings for Small Enterprise Equipment Program

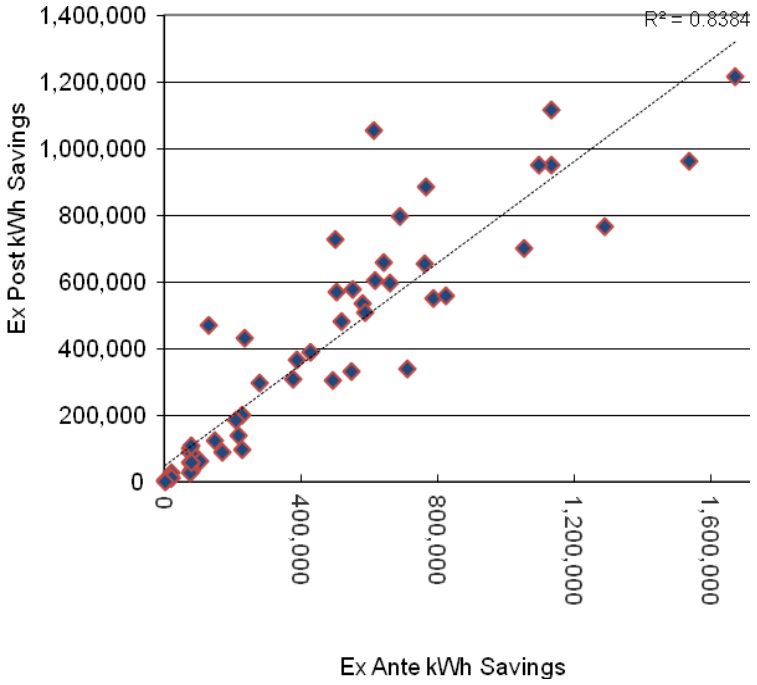

Figure 5-4 Sample Project Realized kWh Savings versus Expected kWh Savings for Small Enterprise Equipment Program

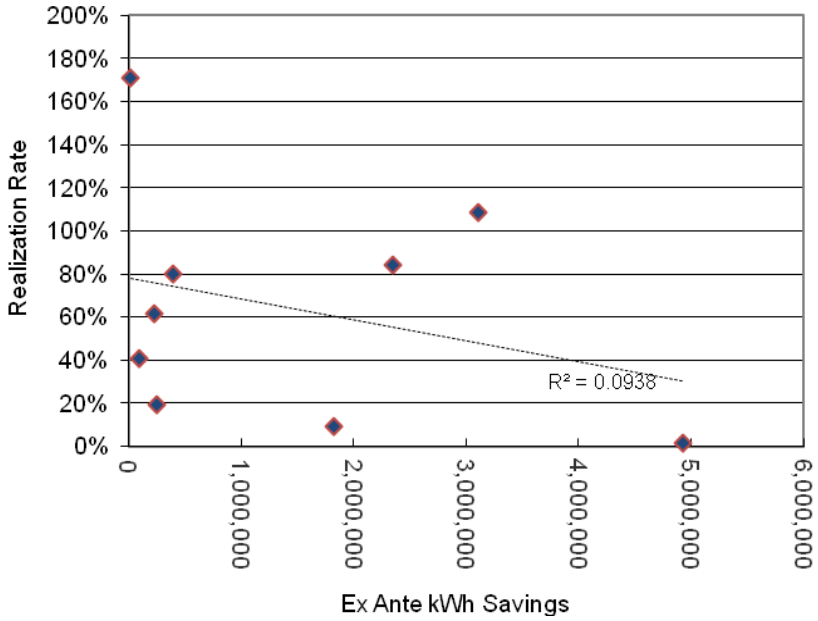

Figure 5-5 Sample Project Realization Rate versus Expected kWh Savings for Motors and Drives Program

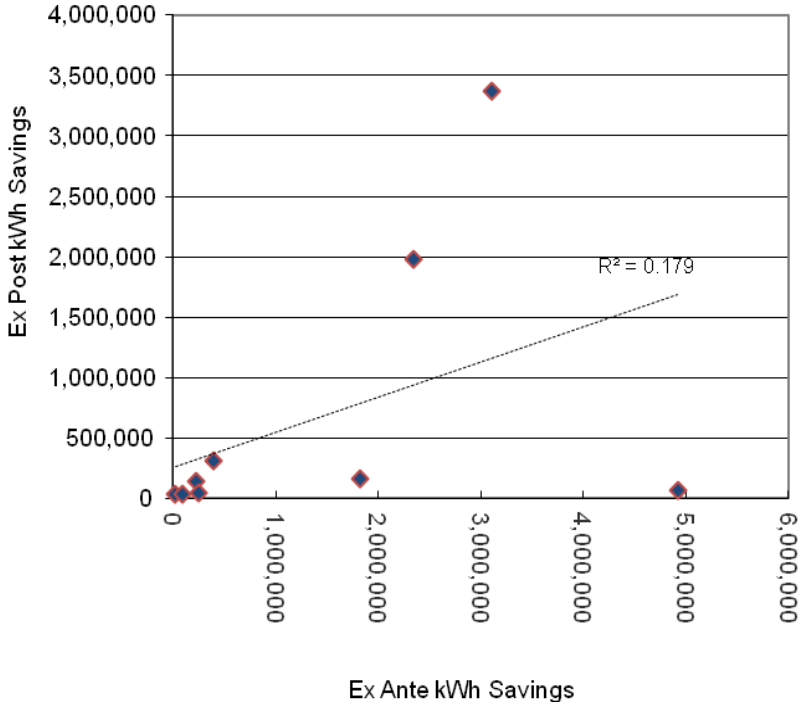

Figure 5-6 Sample Project Realized kWh Savings versus Expected kWh Savings for Motors and Drives Program

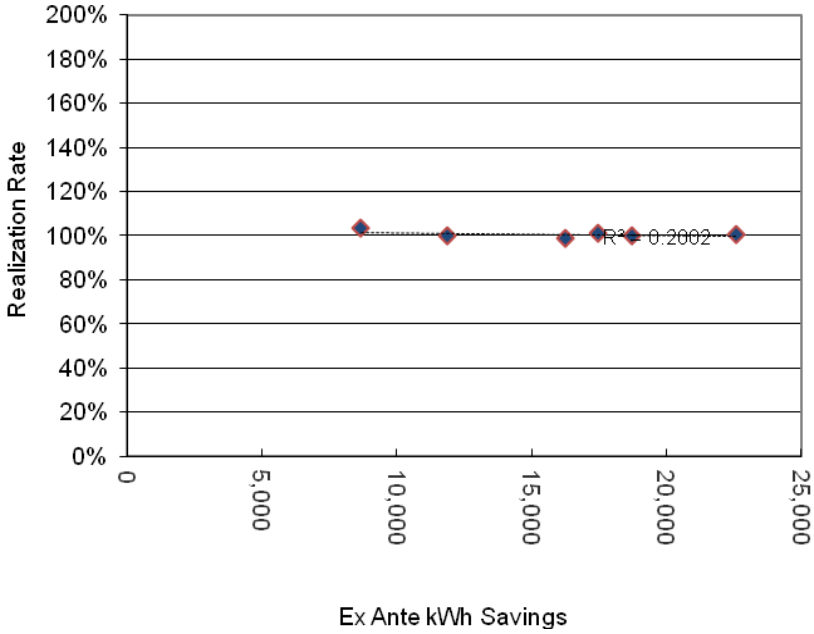

Figure 5-7 Sample Project Realization Rate versus Expected kWh Savings for Government Lighting Program

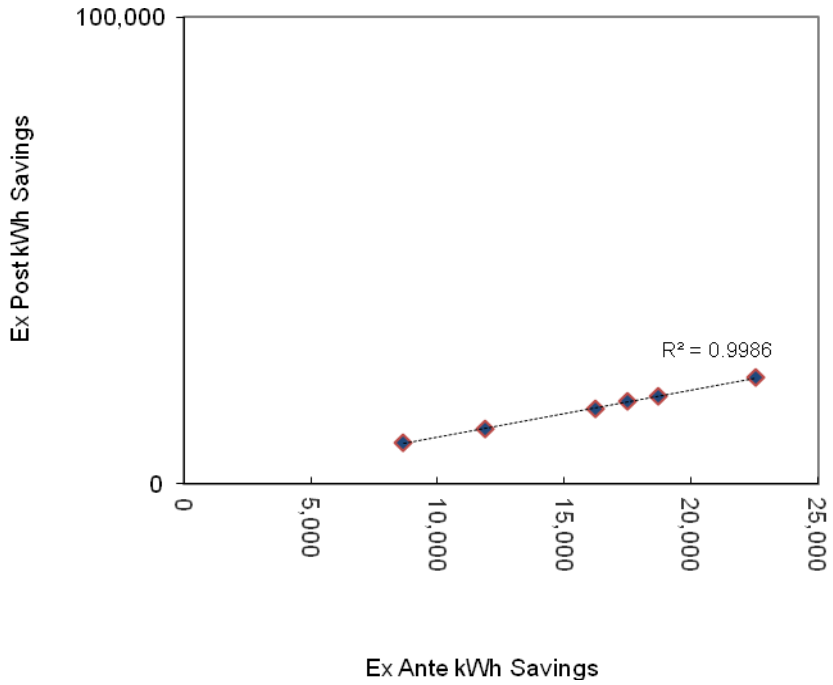

Figure 5-8 Sample Project Realized kWh Savings versus Expected kWh Savings for Government Lighting Program

The gross savings by measure type and company for the Large Enterprise Equipment Program are summarized in *Table 5-17*. Non-standard lighting accounts for most (83%) of the ex post kWh savings.

The gross savings by measure type and company for the Small Enterprise Equipment Program are summarized in *Table 5-18.* Non-standard lighting accounts for most (91%) of the ex post kWh savings.

Table 5-18 Realized kWh Savings by Measure Type and Company for Large Enterprise Equipment Program

Measure Type	Ex Ante kWh Savings				Ex Post kWh Savings				Percent of Total Ex Post kWh Savings	Realization Rate
	CEI	OE	TE	Total Companies	CEI	OE	TE	Total Companies		
Non-Standard Lighting	16,144,632	46,531,413	14,474,648	77,150,693	17,413,902	47,899,262	14,646,666	79,959,830	83%	104%
Custom	6,714,032	6,914,005	2,279,527	15,907,564	7,719,053	6,813,933	1,956,371	16,489,357	17%	104%
Standard Lighting	7,978	52,578	99,346	159,902	7,771	51,210	85,357	144,337	0%	90%
HVAC	310	-	-	310	302	-	-	302	0%	97%
Total	22,866,952	53,497,996	16,853,521	93,218,469	25,141,027	54,764,404	16,688,394	96,593,825	100%	104%

Table 5-17 Realized kWh Savings by Measure Type and Company Small Enterprise Equipment Program

Measure Type	Ex Ante kWh Savings				Ex Post kWh Savings				Percent of Total Ex Post kWh Savings	Realization Rate
	CEI	OE	TE	Total Companies	CEI	OE	TE	Total Companies		
Non-Standard Lighting	50,752,696	42,025,219	11,489,445	104,267,360	45,959,265	39,349,968	10,452,060	95,761,294	91%	92%
Custom	4,043,869	2,921,785	385,318	7,350,972	3,498,465	2,395,652	345,831	6,239,948	6%	85%
Standard Lighting	721,618	1,317,640	487,766	2,527,024	630,344	1,112,436	410,147	2,152,927	2%	85%
Motor	121,001	934,425	196,677	1,252,103	115,430	889,414	177,655	1,182,499	1%	94%
HVAC	6,090	14,753	-	20,842	4,834	11,712	-	16,546	0%	79%
Specialty Equipment	-	16,118	-	16,118	-	12,796	-	12,796	0%	79%
Refrigeration	-	1,664	-	1,664	-	1,321	-	1,321	0%	79%
Total	55,645,274	47,231,605	12,559,206	115,436,084	50,208,339	43,773,299	11,385,692	105,367,329	100%	91%

5.2 Process Evaluation Findings

This section presents the results of the process evaluation for the Companies' C/I Equipment Programs during the 2012 Program Year. The process evaluation focuses on the effectiveness of program policies and organization, as well as the program delivery framework. The purpose of the process evaluation is to assess the design and recent results of the program in order to determine how effectively it is achieving its intended outcomes. This evaluation is based upon analysis of program structure, surveys of participating customers and trade allies, and analysis of program tracking data.

5.2.1 Summary of Primary Data Collection

- **Participant surveys**: Participant surveys are the primary data source for many components of this process evaluation, and serve as the foundation for understanding the customer perspective. The participant surveys provide customer feedback and insight regarding customer experiences with the C/I Equipment Programs. Respondents report on their satisfaction with the program, detail their motivations and the factors affecting their decision making process, and provide recommendations related to improving the program.
- **Trade ally surveys:** Interviews and surveys with trade allies provide data with which the program was analyzed from the market perspective. The objective of the interviews and surveys is to gain insight into the application and project implementation process and to develop a sense of program satisfaction levels. Trade allies report on their experiences with customers, program marketing strategies, and provide opinions of how the program could be improved.

5.2.2 High Level of Early Activity

Figure 5-9, Figure 5-10, Figure 5-11, and Figure 5-12 display program activity in terms of ex post kWh savings associated with the month applications and invoices were submitted. The figures show that the applications submitted prior to the January start of the program year accounted for a large share of the saving generated by the Motors and Drives Program, the Small Enterprise Equipment Program, and the Large Enterprise Equipment Program. Application submission activity for the Government Program accelerated during the first part of the program year and then plateaued in mid-summer. It should be noted that because these figures only reflect approved projects, they do not reflect the high levels of activity associated with applications that were submitted but did not proceed beyond preapproval.

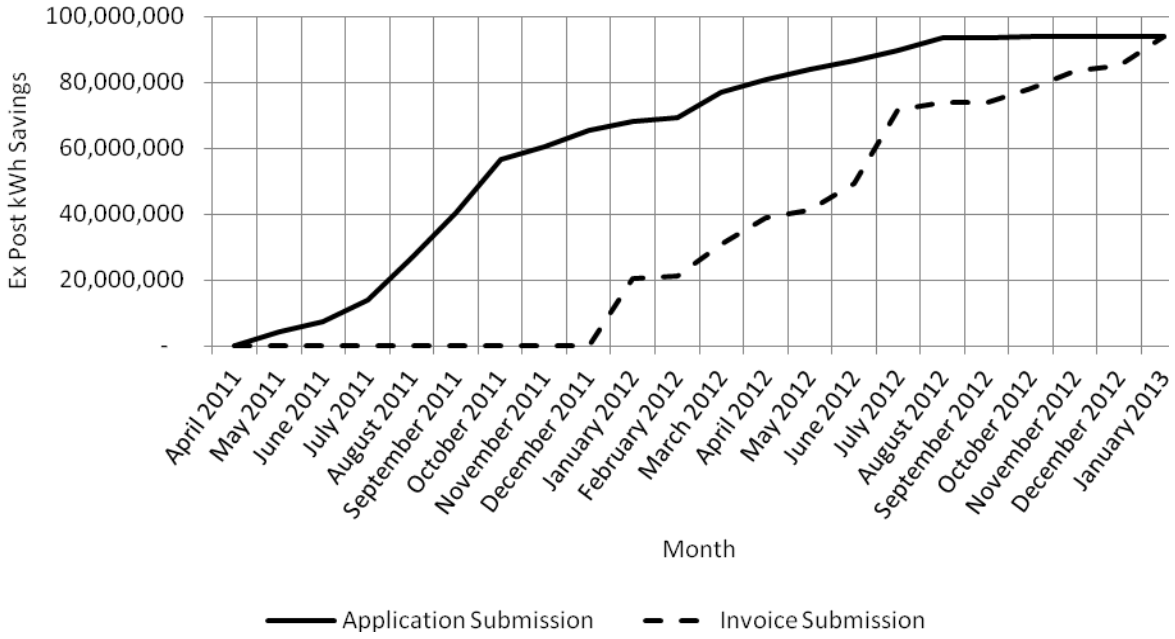

Figure 5-9 Cumulative Savings Associated with Application and Invoice Submissions by Month during 2012 for Large Enterprise Equipment Program

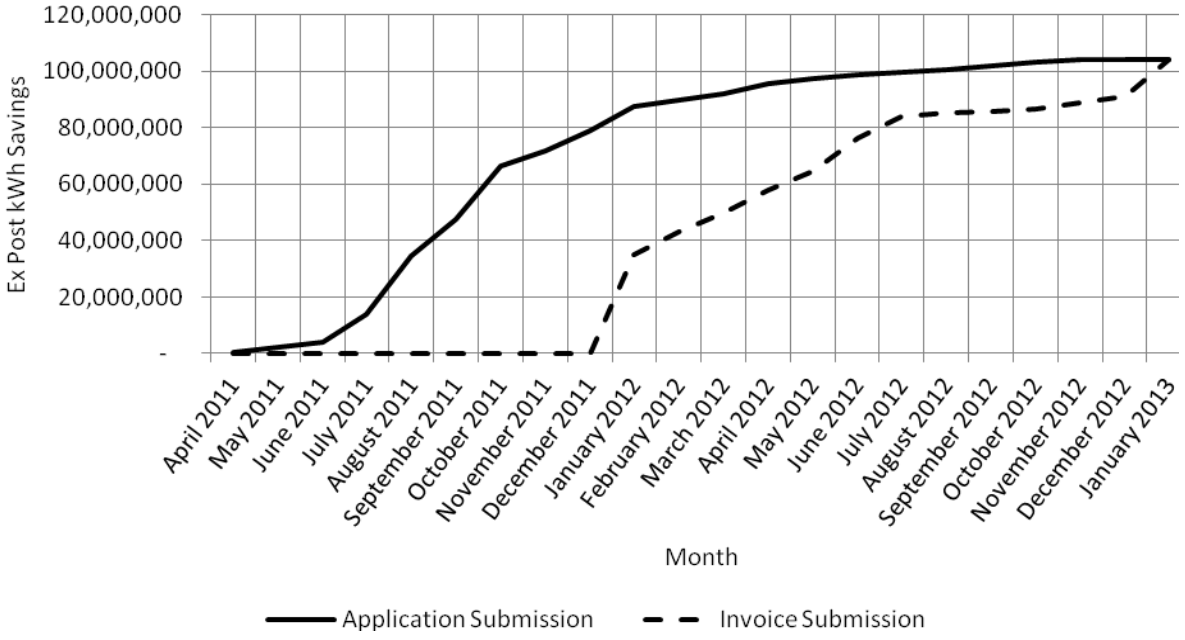

Figure 5-10 Cumulative Savings Associated with Application and Invoice Submissions by Month during 2012 for Small Enterprise Equipment Program

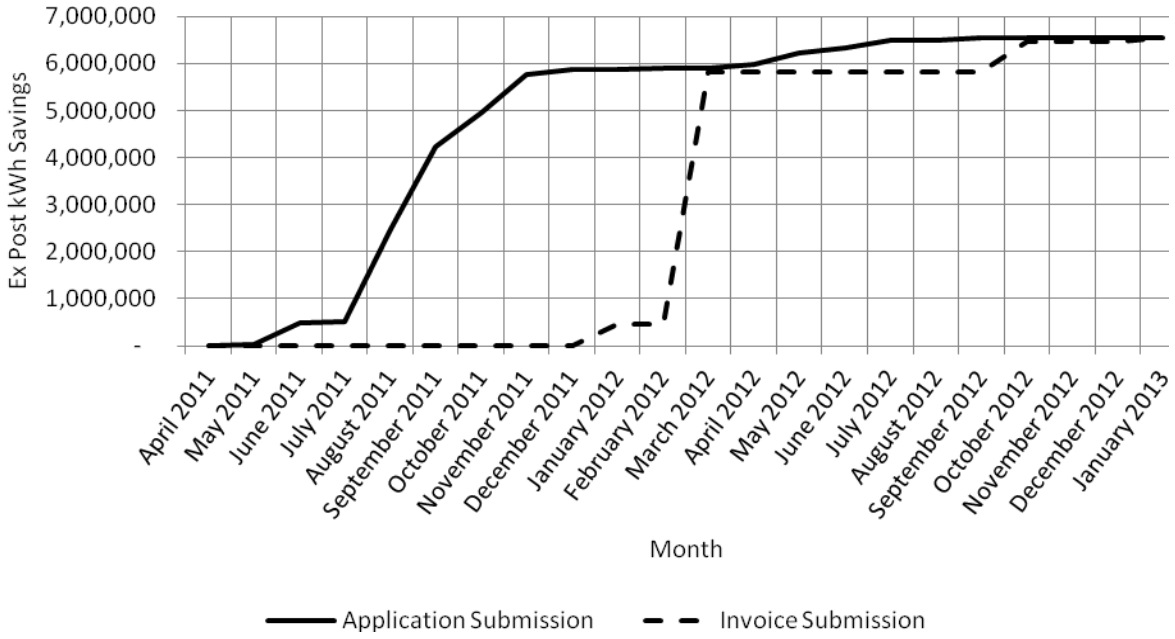

Figure 5-11 Cumulative Savings Associated with Application and Invoice Submissions by Month during 2012 for Motors and Drives Program

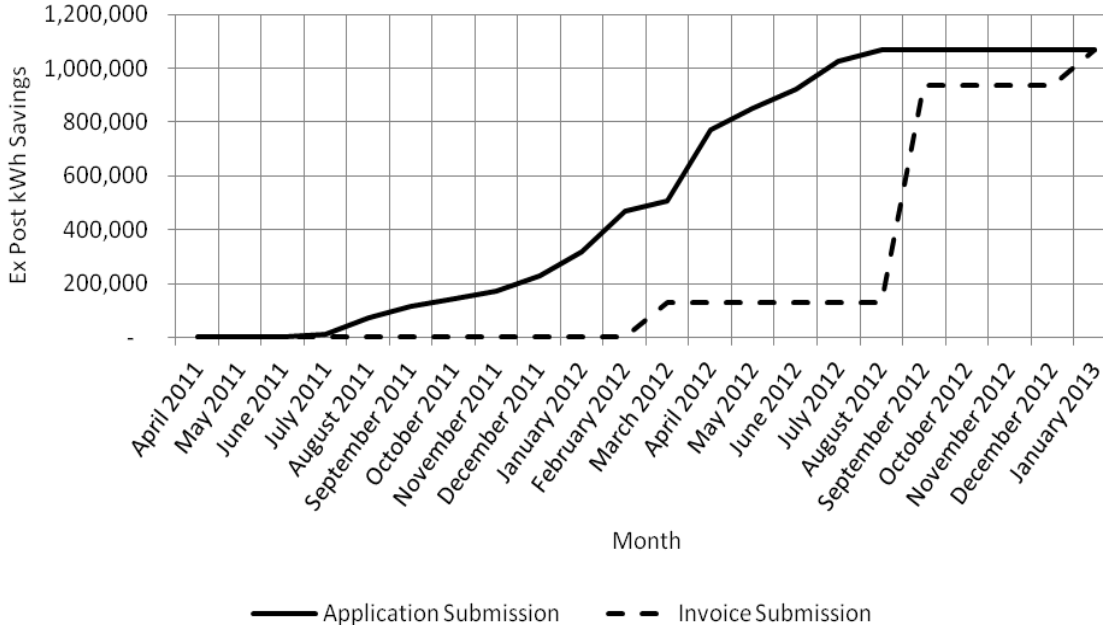

Figure 5-12 Cumulative Savings Associated with Application and Invoice Submissions by Month during 2012 for Government Lighting Program

5.2.3 Lighting Measures Account for Most Program Activity

There was a strong emphasis on high payback measures during the 2012 Program Year. As show in Table 5-19 and Table 5-20 lighting measures, which generally have lower costs relative to the savings potential, were the most frequently implemented

measure for participants in the Large Enterprise Equipment Program and Small Enterprise Equipment Program during 2012 Program Year.

Table 5-19 Large Enterprise Equipment Program Incentive Characteristics by Equipment Type

Equipment Type	Number of Applications	Average	Median	Range
Non-Standard Lighting	193	$22,323	$9,343	$62 - $261,077
Standard Lighting	7	$1,441	$1,056	$120 - $3,000
HVAC	1	$150	$150	$150 - $150
Custom	24	$51,389	$33,676	$5,498 - $130,018
All Equipment Types	225	$24,751	$11,850	$62 - $261,077

Table 5-20 Small Enterprise Equipment Program Incentive Characteristics by Equipment Type

Equipment Type	Number of Applications	Average	Median	Range
Non-Standard Lighting	1212	$5,254	$2,524	$41 - $208,896
Standard Lighting	184	$867	$535	$10 - $3,000
HVAC	12	$588	$400	$250 - $1,500
Refrigeration and Food Service	1	$250	$250	$250 - $250
Specialty Equipment	1	$250	$250	$250 - $250
Custom	48	$11,505	$5,655	$441 - $98,025
Motors and Drives	13	$1,736	$1,395	$70 - $5,075
All Equipment Types	1471	$4,830	$2,135	$10 - $208,896

Table 5-21 Motors and Drives Program Incentive Characteristics by Equipment Type

Equipment Type	Number of Applications	Average	Median	Range
Motors and Drives	16	$10,044	$2,349	$1,050 - $41,796

Table 5-22 Government Lighting Program Incentive Characteristics by Equipment Type

Equipment Type	Number of Applications	Average	Median	Range
Traffic Signal	63	$647	$470	$200 - $13,565

Customer survey responses also support the importance of high payback measures among participants. As shown in Table 5-23 and Table 5-24, the majority of customers reported using simple payback to evaluate the implementation of efficiency measures and as displayed in Figure 5-13, participants required relatively short periods with less

than one-third of respondents indicating that their required payback period exceeded three years.

Table 5-23 Financial Methods to Evaluate Energy Efficiency Improvements, Large Enterprise Equipment Programs

	Response	*(n=67)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?	Initial Cost	30	45%	28%
	Simple payback	49	73%	82%
	Internal rate of return	24	36%	31%
	Life cycle cost	24	36%	18%
	None of these	0	0%	0%
	Don't know	1	1%	4%

Table 5-24 Financial Methods to Evaluate Energy Efficiency Improvements, Small Enterprise Equipment Programs

	Response	*(n=260)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?	Initial Cost	107	41%	42%
	Simple payback	151	58%	58%
	Internal rate of return	72	28%	29%
	Life cycle cost	82	32%	27%
	None of these	11	4%	2%
	Don't know	17	7%	7%

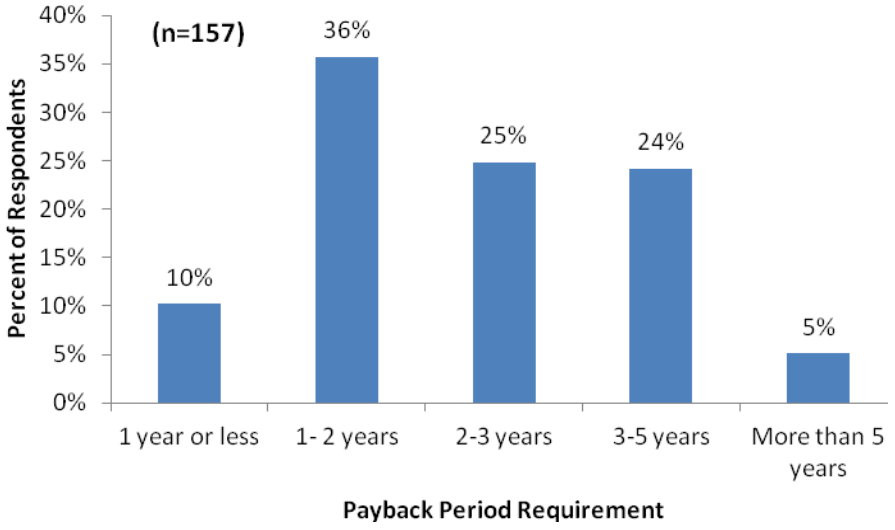

Figure 5-13 Required Payback Period

5.2.4 Program Marketing

Respondents were asked where they get information about energy efficient equipment, materials, and design features. The results for the Large Enterprise C/I Equipment Program participants are shown in Table 5-25. Decision makers relied upon a variety of sources, but most heavily upon equipment vendors or building contractors (73%). Other common sources for information were from architect, engineer or energy consultant (37%) and friends and colleagues (30%).

Table 5-25 Where Decision Makers get Information about Energy Efficient Equipment, Materials, and Design Features, Large Enterprise Equipment Program

	Response	(n=67)	Percent of Respondents	Percent of Ex Post kWh Savings
What are the sources your organization relies on for information about energy efficient equipment, materials, and design features?	(EDC) Energy Specialist	8	12%	18%
	(EDC) Account Representative	16	24%	21%
	(EDC) website	9	13%	15%
	Brochures or advertisements	17	25%	29%
	Trade associations or business groups you belong to	15	22%	30%
	Trade journals or magazines	11	16%	18%
	Friends and colleagues	20	30%	41%
	An architect, engineer or energy consultant	25	37%	32%
	Equipment vendors or building contractors	49	73%	74%
	Other	5	7%	8%

As shown in Table 5-26, similar results were found for participants in the Small Enterprise C/I Equipment Program. Decision makers most heavily relied upon equipment vendors or building contractors (56%), friends and colleagues (39%), an architect, engineer, or energy consultant (30%), trade associations or business groups (20%), trade journals or magazines (15%), and brochures and advertisements (17%). Between 9% and 12% of the respondents get information from the Companies ("EDC"), either the EDC website, an account representative, or an energy specialist.

Table 5-26 Where Decision Makers get Information about Energy Efficient Equipment, Materials, and Design Features, Small Enterprise Equipment Program

	Response	(n=260)	Percent of Respondents	Percent of Ex Post kWh Savings
What are the sources your organization relies on for information about energy	(EDC) Energy Specialist	31	12%	11%
	(EDC) Account Representative	31	12%	12%
	(EDC) website	24	9%	8%

	Response	(n=260)	Percent of Respondents	Percent of Ex Post kWh Savings
efficient equipment, materials, and design features?	Brochures or advertisements	43	17%	20%
	Trade associations or business groups you belong to	51	20%	16%
	Trade journals or magazines	38	15%	13%
	Friends and colleagues	101	39%	45%
	An architect, engineer or energy consultant	77	30%	24%
	Equipment vendors or building contractors	146	56%	70%
	Other	24	9%	8%

Consistent with last year's findings, the survey responses show that decision makers tend to rely on multiple sources of information and that they most heavily rely upon non-EDC sources such as vendors, contractors, friends, and colleagues. The reliance upon vendors and contractors fits well with the program marketing model that utilizes trade allies to promote the program. The reliance on friends and colleagues points to the importance of social networks for learning about energy efficient equipment, materials, and design features. Given the importance of these networks, positive experiences with the program and the energy efficiency equipment implemented through it, may drive additional interest as participants discuss their experiences with friends and colleagues. Moreover, a satisfactory experience with the program can lead customers to complete additional projects in future program years. Consistent with this, a relatively large share of Large Enterprise C/I Equipment Customer survey respondents (21%) reported that they were aware of the program because of their participation last year. Although, a comparatively smaller share, a number of Small C/I Equipment Customer survey respondents (8%) also indicated that they were aware of the program because of their participation in the prior year.

To further understand the effectiveness of program marketing, trade allies were asked whether or not the programs could be marketed more effectively, if they actively market them, and how aware customers were of the programs. The results are shown in Table 5-27.

Table 5-27 Trade Ally's Views of Program Marketing and Customer Awareness

Question	*Percentage of Respondents Saying Yes*	
	Percent of Respondents	*Percent of Ex Post kWh Savings*
Are there ways in which (EDC) could market the business incentive programs more effectively? (n=71)	34%	29%

Question	*Percentage of Respondents Saying Yes*	
	Percent of Respondents	*Percent of Ex Post kWh Savings*
Do you actively market (EDC)'s business incentive programs to your customers? (n=71)	62%	70%
Do you find that customers are generally aware of (EDC)'s business incentive programs? (n=44)	36%	41%

Thirty-four percent of the trade allies thought that the Companies could market the programs more effectively, a decline from the 57% of trade allies who stated that the program could be marketed better last year. The most frequently made suggestion was to directly promote the program with customers. Some examples of these types of comments were:

> *Reach out to customers.*
>
> *More customers need to be informed about the programs, maybe through their monthly bill, or emails.*
>
> *Customers were not aware, so something to make customers aware.*
>
> *Most companies do not know the incentives exist at all. Market the incentives better.*

Another recommendation made by trade allies was to improve the program participation process by decreasing the time until incentives are received or by streamlining the application process.

Other suggestions for improving the marketing of the program, each mentioned by one or two respondents, include increase the incentive, promote trade allies, and provide case stories describing savings achieved by customers.

Sixty-two percent of trade allies stated that they actively market the program to customers. The share of trade allies marketing the program declined from 77% last year. The decline may be due to increased awareness of the program among trade allies' customers; however, only 36% of trade allies indicated that customers were generally aware of the program. The share of trade allies reporting that customers were aware of the program increased from 30% last year.

5.2.5 Adequacy of Incentives

Trade allies were asked about their perspectives on the impact of the incentives on customers' decision making. Responses are shown in Table 5-28. A majority of trade allies (54%) thought the incentive levels were adequate to encourage customers to select energy efficient equipment options.

Table 5-28 Trade Allies Perspective on Incentive Levels

Question	*Percentage of Respondents Saying Yes*	
	Percent of Respondents	*Percent of Ex Post kWh Savings*
Are the incentive levels adequate to encourage customers to select energy efficient equipment options?	54%	66%
Are there specific technologies or measures for which incentives should be higher?	52%	46%
Are there any energy efficient technologies or measures that customers would generally install even without the incentive?	11%	9%

Trade allies were also asked if there were specific technologies or measures for which the incentives should be higher. About half of the trade allies thought that there were and they gave a variety of suggestions. Most frequently, respondents stated that there should be incentives for LEDs. Other types of lighting that trade allies suggested should receive higher incentives included high efficiency T8, T5, and super metal halide lamps. Higher incentives for exterior lighting were also mentioned by two trade allies (these comments may have been influenced by the change in exterior lighting incentives that occurred in late 2011).

A few trade allies stated that controls such as occupancy sensors or daylight sensors should receive higher incentives. Other equipment mentioned by trade allies included VFDs, HVAC, outdoor lighting, and renewables.

5.2.6 Program Services are Comprehensive

The type of equipment covered by the program is comprehensive and similar to the options available through other utility programs. Surveys of program participants suggest that the programs met their needs. As shown in Table 5-29 and Table 5-30, a fairly small share of participant survey respondents (16%, Large Enterprise, 15% Small Enterprise) stated that there was additional equipment that they wanted to install that was not covered by the programs.

Table 5-29 Equipment not Covered by Incentives, Large Enterprise Equipment Program

	Response	*(n=67)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
Was there any additional energy efficient equipment you wanted to install, but didn't because no financial incentive was offered by (EDC)?	Yes	11	16%	15%
	No	40	60%	63%
	Don't Know	16	24%	22%

Table 5-30 Equipment not Covered by Incentives, Small Enterprise Equipment Program

	Response	(n=260)	Percent of Respondents	Percent of Ex Post kWh Savings
Was there any additional energy efficient equipment you wanted to install, but didn't because no financial incentive was offered by (EDC)?	Yes	40	15%	10%
	No	186	72%	74%
	Don't Know	34	13%	17%

When asked what kind of equipment they wanted to install, many respondents referred to equipment that was covered by the programs (e.g., lighting equipment and chillers). Equipment that participants mentioned that was not covered by the programs included solar and LED lighting. Additionally, when asked what trends in equipment choices they had noticed, one-third of trade allies mentioned LED lighting.

5.2.7 Energy Efficiency Attitudes, Behaviors, and Decision Making

Program participant survey respondents were asked what policies and procedures they had for energy efficiency improvements. The responses from Large Enterprise Equipment Program participants shown in Table 5-31 indicates that 21% of respondents' organizations did not have any policies or procedures in place regarding energy efficiency improvements. The most commonly mentioned policy or procedure, indicated by 45% of the respondents, was policies that incorporate energy efficiency in operations and procurement. While this finding suggests that the large enterprise customers are focused on managing their energy consumption, a smaller share stated that their firms had numeric energy saving goals (28%) or goals for energy cost reduction (25%).

Table 5-31 Policies and Procedures Regarding Energy Efficiency Improvements, Large Enterprise Equipment Program

	Response	(n=67)	Percent of Respondents	Percent of Ex Post kWh Savings
Which of the following policies or procedures does your organization have in place regarding energy efficiency improvements at this facility?	An energy management plan	19	28%	30%
	Corporate policies that incorporate energy efficiency in operations and procurement	30	45%	59%
	Active training of staff	7	10%	4%
	A numeric goal for energy savings	19	28%	32%
	A numeric goal for energy cost reduction	17	25%	40%
	Other	5	7%	5%
	None	14	21%	17%

Participants in the Small Enterprise Equipment program were less likely to say that they had policies or procedures in place regarding energy efficiency improvements. As shown in Table 5-32, the most frequently mentioned were policies that incorporate

energy efficiency in operations and procurement, which 26% of respondents indicated their firms had in place.

Table 5-32 Policies and Procedures Regarding Energy Efficiency Improvements, Small Enterprise Equipment Program

	Response	*(n=71)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
Which of the following policies or procedures does your organization have in place regarding energy efficiency improvements at this facility?	An energy management plan	43	17%	25%
	Corporate policies that incorporate energy efficiency in operations and procurement	67	26%	30%
	Active training of staff	47	18%	26%
	A numeric goal for energy savings	45	17%	21%
	A numeric goal for energy cost reduction	50	19%	18%
	Other	21	8%	8%
	None	75	29%	25%

Respondents were asked to rate a list of factors in terms of importance for their decision making about energy efficient improvements. Their responses are shown in Table 5-33 and Table 5-34. Although respondents considered all of the factors to be important, one of the most important factors for Large Enterprise and Small Enterprise Equipment Program participants was incentive payments from their EDC. Ninety-four percent of Large Enterprise participants and 95% of Small Enterprise participants said that incentive payments were very or somewhat important to their decision making. Participants also indicated that previous experience with energy efficiency equipment was important for their decision making and that advice from EDC representatives or from equipment vendors were relatively less important. These finding attests to the importance of the incentives available through the C/I Equipment programs for encouraging the adoption of energy efficiency measures.

Table 5-33 Factors Influencing the Decision to Participate, Large Enterprise C/I Equipment Program

Energy Efficiency Decision Factor	*Very important*	*Somewhat important*	*Only slightly important*	*Not important at all*	*Don't know*	*n*
Incentive payments from (EDC)	72%	22%	6%	0%	0%	67
Past experience with energy efficient equipment	72%	24%	4%	0%	0%	67
Advice and/or recommendations from (EDC)	36%	46%	10%	4%	3%	67

Energy Efficiency Decision Factor	*Very important*	*Somewhat important*	*Only slightly important*	*Not important at all*	*Don't know*	*n*
Advice and/or recommendations from equipment vendors	36%	48%	13%	1%	1%	67

Table 5-34 Factors Influencing the Decision to Participate, Small Enterprise Equipment Program

Energy Efficiency Decision Factor	*Very important*	*Somewhat important*	*Only slightly important*	*Not important at all*	*Don't know*	*n*
Incentive payments from (EDC)	72%	23%	4%	0%	1%	260
Past experience with energy efficient equipment	62%	27%	8%	2%	2%	260
Advice and/or recommendations from (EDC)	32%	45%	11%	6%	6%	260
Advice and/or recommendations from equipment vendors	45%	48%	5%	2%	0%	260

5.2.8 Customers Satisfied with Program

Overall, customers were generally satisfied with the Large Enterprise Equipment Program and the Small Enterprise Equipment Program. Table 5-35 shows participant satisfaction with the Large Enterprise Equipment Program and Table 5-36 shows satisfaction with the Small Enterprise Equipment Program. Large enterprise customers were least satisfied with the incentive amount and the elapsed time until the incentive was received. Large enterprise customers were most satisfied with the performance of the equipment installed through the program.

Table 5-35 Participant Satisfaction, Large Enterprise Equipment Program

	Very Satisfied	*Somewhat Satisfied*	*Neither Satisfied nor Dissatisfied*	*Somewhat Dissatisfied*	*Very Dissatisfied*	*Don't know*
Performance of the equipment installed	73%	24%	1%	0%	1%	0%
Savings on your monthly bill	33%	48%	9%	4%	1%	4%
Incentive amount	37%	30%	3%	21%	9%	0%
The effort required for the application process	13%	42%	15%	12%	10%	7%
Information provided by (EDC) account representative	27%	34%	12%	0%	6%	21%
Elapsed time until you received the incentive -	24%	33%	10%	18%	12%	3%
The (EDC)'s energy efficiency website	12%	31%	25%	6%	0%	25%
The overall experience with the programs	36%	39%	10%	6%	9%	0%

Small enterprise customers were least satisfied with the time it took to receive the incentive followed by the incentive amount and the effort for the application process. The reasons for dissatisfaction were similar to those given by large enterprise customers; respondents stated that the incentive amount was less than what they expected and the time it took too long to receive it. Many of the customers dissatisfied with the effort required to complete the application elaborated little on the reasons for their dissatisfaction and only emphasized that it was difficult or took a long time. A few customers noted more specific issues such as having to submit materials multiple times, receiving multiple requests for supporting documentation, and not being able to get clear information about what was required for the application.

Table 5-36 Participant Satisfaction, Small Enterprise Equipment Program

	Very Satisfied	*Somewhat Satisfied*	*Neither Satisfied nor Dissatisfied*	*Somewhat Dissatisfied*	*Very Dissatisfied*	*Don't know*
Performance of the equipment installed	71%	25%	2%	1%	0%	1%
Savings on your monthly bill	33%	45%	10%	3%	1%	8%
Incentive amount	26%	37%	10%	15%	8%	3%
The effort required for the application process	26%	30%	16%	14%	8%	6%
Information provided by (EDC) account representative	27%	23%	16%	4%	3%	26%
Elapsed time until you received the incentive -	23%	30%	15%	12%	12%	8%
The (EDC)'s energy efficiency website	15%	25%	21%	3%	1%	35%
The overall experience with the programs	40%	38%	12%	5%	4%	1%

5.2.9 Progress in Overcoming Market Barriers

Interviews and surveys with customers and trade allies suggest that progress has been made in overcoming traditional market barriers to the adoption of energy efficiency equipment. Twenty-eight percent of trade allies indicated that their involvement in the C/I Equipment Programs affected the type of equipment or services that they provide. These impacts included offering more energy efficient products, increasing inventories of energy efficient products, changes in what they offer customers, selling more VSDs and controls, and offering additional energy efficiency services such as more facility audits. Some examples of the trade allies' remarks were:

> *Prompted us as a distributor to stock more of these products.*
>
> *Affected inventory of lamps and ballasts that are approved within the program*

If not for the programs we would be offering a less efficient product. This program allows customers to maximize on the most energy efficient products.

We have been able to offer drives and controls on motors. We have also been able to add occupancy sensors.

Figure 5-14 displays the share of projects completed by facility type for customers in the C/I Equipment Programs. In comparison to last year, the program has seen increasing activity from some facility types. As was the case last year, manufacturing firms accounted for the majority of savings projects for the Large Enterprise Equipment Program. However, for the Small Enterprise Equipment Program, 29% of the projects were completed in office facilities and 22% were completed in retail facilities. This differed from last year when office and retail facilities each accounted for 16% of the projects and manufacturing and warehouse / storage facilities accounted for nearly half of the program activity. These findings suggest that the program activity is being generated by a different mix of facility types.

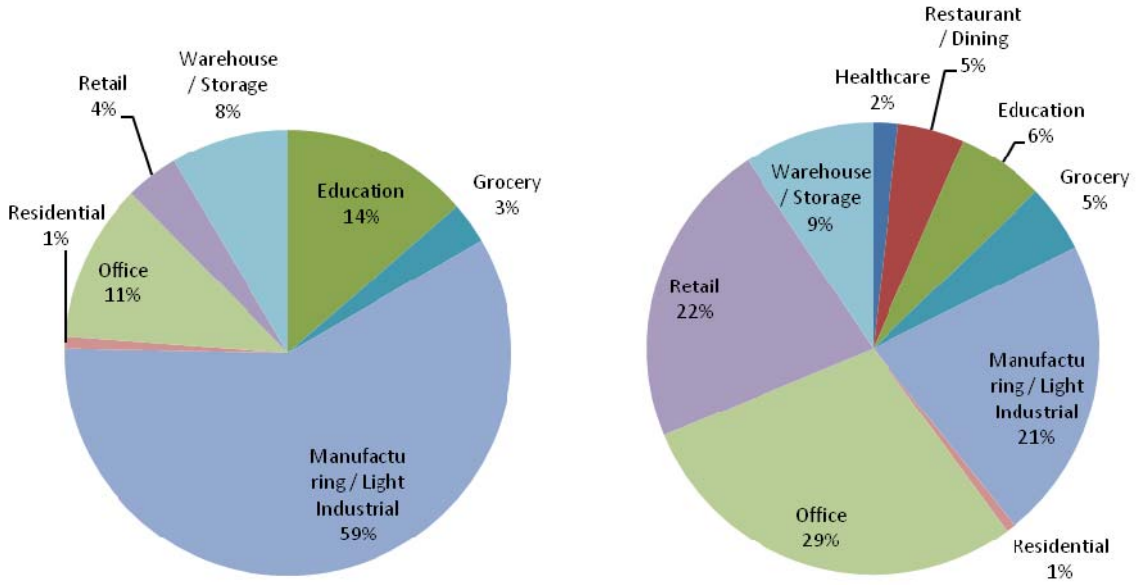

Figure 5-14 Projects by Facility Type, Large (Left Side) and Small (Right Side) Enterprise Equipment Program

5.2.10 Promotion of Energy Efficiency Behaviors and Awareness

There is evidence that the programs have improved energy efficiency awareness and behavior. Among trade allies, approximately 28% said that the program had affected the equipment or services that they offer. These trade allies said that because of the program they provided more energy efficient equipment options and services and that they have increased their stocking of energy efficient equipment.

Among program participants, all survey respondents in the C/I Equipment Programs said that the equipment they installed through the program remained installed. Moreover, 82% of Small Enterprise Equipment Program participants and 91% of Large Enterprise Equipment Program participants stated that the equipment met or exceeded their expectations, and that they were satisfied with the equipment. The positive experience with the equipment suggests that the equipment will remain installed in the future. Furthermore, the experience may foster positive attitudes towards energy efficient equipment that leads to additional adoption of efficient equipment. In fact, 24% of Large Enterprise Equipment Program participants and 17% of the Small Enterprise Equipment Program participants indicated that they had implemented additional equipment that they did not receive incentives for as a result of participating in the programs.

5.2.11 Improved Satisfaction among Trade Allies

In their survey responses, a smaller share of the participating trade allies indicated that they were dissatisfied with the program than was the case last year. Specifically, 25% reported dissatisfaction, as shown in Table 5-37. More than one-half of trade allies were either satisfied or very satisfied with their experience in working with the programs. In their open-ended comments, most trade allies noted that the process took longer than expected and that completing the paperwork was difficult. A few trade allies stated that the incentives were too low.

Table 5-37 Trade Ally Satisfaction by Level of Program Activity

	Very Satisfied	*Satisfied*	*Neither Satisfied nor Dissatisfied*	*Dissatisfied*	*Very Dissatisfied*
Most Active Trade Allies (n=16)	19%	50%	6%	13%	13%
Moderately Active Trade Allies (n=9)	33%	33%	22%	0%	11%
Least Active Trade Allies (n=46)	9%	41%	22%	22%	7%
All Trade Allies (n=71)	14%	42%	18%	17%	8%

* Trade Ally activity was based on the ex post kWh savings associated with applications submitted. Specifically, the savings associated with each activity level were: most active trade allies (>750,000 kWh), moderately active trade allies (200,000-750,000 kWh), and least active trade allies (<200,000 kWh).

Although trade allies were more satisfied with the program this year, a smaller share of the dissatisfied trade allies indicated that they actively market the program to their customers. As shown in Table 5-38, among dissatisfied trade allies, 33% indicated that they actively market the program. In comparison, last year, approximately 71% of dissatisfied trade allies indicated that they actively market the program to their customers. However, the share of dissatisfied trade allies who expected to be as active or more active in the coming year was greater than last year. Sixty-one percent of

dissatisfied trade allies expected to remain active this year compared to 45% in the prior year.

Table 5-38 Satisfied and Dissatisfied Trade Allies' Engagement in the C/I Equipment Programs

	Among those Satisfied with Programs (n=40)	*Among those Dissatisfied with Programs (n=18)*
Do you actively market (EDC)'s business incentive programs to your customers?	73%	33%
Expects to be as active or more active in the business incentive programs during the next year	90%	61%

* Satisfied trade allies were those who said they were either satisfied or very satisfied with the programs. Dissatisfied trade allies were those who said they were either dissatisfied or very dissatisfied with the programs.

When asked to elaborate on their overall impression of the programs, several trade allies provided suggestions as to how they would improve the programs. Many of these suggestions focused on issues already discussed such as improve application processing times and simplifying the application process. A few trade allies also asked for additional communication about the status of the program.

6. Summary and Conclusions

The second year of program operations saw fairly steady increases in program activity during the program year. While comments were made by some customers and trade allies about the incentive change that occurred during the previous program year, this issue was not as strongly emphasized in their responses as it was last year. Moreover, trade ally satisfaction with the program increased in comparison to last year.

The following presents a selection of key conclusions from the second year of program operations:

- **Progress in Overcoming Market Barriers:** Interviews and surveys with customers and trade allies suggest that progress has been made in overcoming traditional market barriers to the adoption of energy efficiency equipment. Trade allies reported that the programs led them to offer more energy efficient products and increase inventories of energy efficient equipment, changes that point to the increased availability of energy efficient products. Furthermore, nearly all customers felt the equipment met their expectations and that they were satisfied with it. Satisfaction with the equipment may lead participants to adopt similar equipment in the future as well as lead them to discuss the benefits of energy efficient equipment with colleagues.

  There was evidence that the program may be more effectively reaching customers in some facility types this year. The share of savings in the Small Enterprise Equipment Program attributable to offices and retail facilities increased from last year.

- **Program Services are Comprehensive:** The types of equipment covered by the programs is comprehensive and similar to the options available through other utility programs. As was the case last year, surveys of program participants also suggest that the programs met their needs. A fairly small share of participant survey respondents (16% or less) stated that there was additional equipment that they wanted to install that was not covered by the programs. Trade allies reported that customers were interested in LED lighting measures which are not currently a prescriptive offering under the program.

- **Lighting Measures Account for Most of the kWh Savings:** There was a strong emphasis on high payback measures during the 2012 Program Year. Most of the savings generated in the 2012 Program Year were from lighting measures, which generally have lower costs relative to the savings potential. Additionally, the majority of customers reported using simple payback to evaluate the implementation of efficiency measures and most require a short payback period. This was also the case last year and suggests that there will be continued focus on high-payback projects in the coming year.

- **Customers Less Satisfied with the Amount of the Incentive:** Although customers were generally satisfied with the program, a larger share indicated dissatisfaction

with the amount of the incentive than was the case last year. The increased dissatisfaction with the amount of the incentive may have been because none of this year's participants received the high incentive rate that was offered at the launch of the program in 2011. Additionally, survey responses indicated that at least some participants were aware of what the old incentive level was and may be comparing what they received this year with what they would have received under the old incentive rate. However, the $0.05 per kWh custom incentive rate is not atypical for energy efficiency programs.

- **Some Evidence that Program has Promoted Energy Efficiency Behaviors and Awareness:** The C/I Equipment Programs appear to have continued to have increased awareness of the benefits of energy efficient equipment. In comparison to last year, a larger share of trade allies reported that the program affected the equipment or services offered than. These trade allies said that they had expanded their inventories of energy efficient equipment or offered more energy efficient equipment options.

  Among program participants, nearly all survey respondents said that the equipment they installed through the program remained installed, that the equipment met or exceeded their expectations, and that they were satisfied with the equipment. The positive experience with the equipment suggests that the equipment will remain installed in the future.

- **Improved Satisfaction Among Trade Allies:** The share of trade allies who reported that they were satisfied with the program increased from last year. Additionally, fewer trade allies raised concerns about the incentive change that had occurred in the prior year.

  However, there were some aspects of the program that trade allies felt could be improved. They were displeased with the length of time required to receive the incentive payments, a lack of communication about the program, and the effort required for the application process.

Survey findings indicate that the program has improved its operations during the 2012 program year. However, some issues remain and these recommendations may provide strategic advantage during future program operations:

- **Streamline Participation Process:** Although improvements have been made, trade allies and customers continued to express dissatisfaction with the application process and with the length of time for payment of the incentives in particular. Additional steps taken to decrease the time required to process incentives would likely lead to increased customer satisfaction.

- **Continue to Foster Greater Trust among Trade Allies and Customers:** Trade ally satisfaction with the program increased during the 2012 program year. Continued consistency in program offerings and steady improvements in operations will continue to improve both trade ally and customers satisfaction.

- **Savings Calculations for Motor and Drives Projects:** The overall realization rate for Motors and Drives Program projects was 47%. ADM staff noted that the project documentation did not include the calculations used to estimate ex ante savings for many of the completed projects. Without calculations it was difficult to determine specifically why the realization rate was low for the projects completed. It is recommended that calculations used to estimate savings from motor and drive projects are included in the project documentation. Providing calculations for savings estimates will allow engineering staff to identify why realization rates are low to improve the estimation of ex ante savings.

Appendix A: Required Savings Tables

This appendix contains annualized gross kWh savings, first year gross kWh savings, and peak demand savings for the Large Enterprise Equipment Program, the Small Enterprise Equipment Program, the Motors and Drives Program, and the Government Lighting Program.

Table A-1 Gross Savings by Program

Program	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
Large Enterprise	93,218,469	96,593,825	104%	11,460	13,497	118%
Small Enterprise	115,436,084	105,367,329	91%	21,464	22,877	107%
Motors & Drives	13,845,460	6,544,372	47%	1,529	403	26%
Government	1,092,169	1,069,080	98%	125	122	98%
Total	223,592,181	209,574,607	94%	34,577	36,899	107%

Table A-2 Summary of Annualized kWh Savings for Large Enterprise Equipment Program

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
CEI	22,866,952	25,141,027	110%
OE	53,497,996	54,764,404	102%
TE	16,853,521	16,688,394	99%
Total Companies	93,218,469	96,593,825	104%

Table A-3 Summary of Annualized Peak kW Savings for Large Enterprise Equipment Program

Operating Company	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
CEI	2,715.30	3,526.04	130%
OE	6,698.34	7,758.56	116%
TE	2,045.92	2,212.80	108%
Total Companies	11,459.57	13,497.40	118%

Table A-4 Summary of First Year Pro Rata kWh Savings for Large Enterprise Equipment Program

Operating Company	*First Year Ex Post Pro Rata kWh Savings*
CEI	15,344,743
OE	29,348,992
TE	12,151,016
Total Companies	56,844,751

Table A-5 Summary of Lifetime kWh Savings for Large Enterprise Equipment Program

Operating Company	*Lifetime Ex Post kWh Savings*
CEI	377,115,405
OE	821,466,060
TE	250,325,910
Total Companies	1,448,907,375

Table A-6 Summary of Annualized kWh Savings for Small Enterprise Equipment Program

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
CEI	55,645,274	50,208,339	90%
OE	47,231,605	43,773,299	93%
TE	12,559,206	11,385,692	91%
Total Companies	115,436,084	105,367,329	91%

Table A-7 Summary of Annualized Peak kW Savings for Small Enterprise Equipment Program

Operating Company	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
CEI	10,603.14	11,040.50	104%
OE	8,505.52	9,323.51	110%
TE	2,355.57	2,512.80	107%
Total Companies	21,464.23	22,876.81	107%

Table A-8 Summary of First Year kWh Pro Rata Savings for Small Enterprise Equipment Program

Operating Company	*First Year Ex Post Pro Rata kWh Savings*
CEI	29,099,387
OE	29,767,137
TE	7,130,118
Total Companies	65,996,641

Table A-9 Summary of Lifetime kWh Savings for Small Enterprise Equipment Program

Operating Company	*Lifetime Ex Post kWh Savings*
CEI	753,125,085
OE	656,599,485
TE	170,785,380

Operating Company	*Lifetime Ex Post kWh Savings*
Total Companies	1,580,509,950

Table A-10 Summary of Annualized kWh Savings for Motors and Drives Program

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
CEI	735,251	526,177	72%
OE	5,454,324	5,345,533	98%
TE	7,655,885	672,662	9%
Total Companies	13,845,460	6,544,372	47%

Table A-11 Summary of Annualized Peak kW Savings for Motors and Drives Program

Operating Company	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
CEI	179.12	82.97	46%
OE	1,093.00	241.18	22%
TE	256.49	78.73	31%
Total Companies	1,528.62	402.88	26%

Table A-12 Summary of First Year Pro Rata kWh Savings for Motors and Drives Program

Operating Company	*First Year Ex Post Pro Rata kWh Savings*
CEI	517,606
OE	2,145,902
TE	623,005
Total Companies	3,286,513

Table A-13 Summary of Lifetime kWh Savings for Motors and Drives Program

Operating Company	*Lifetime Ex Post kWh Savings*
CEI	4,830,305
OE	49,071,993
TE	6,175,037
Total Companies	60,077,335

Table A-14 Summary of Annualized kWh Savings for Government Lighting Program

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
CEI	134,960	134,887	100%

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
OE	957,208	934,193	98%
TE	-	-	-
Total Companies	1,092,169	1,069,080	98%

Table A-15 Summary of Annualized Peak kW Savings for Government Lighting Program

Operating Company	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
CEI	15.41	15.40	100%
OE	109.27	106.66	98%
TE	-		
Total Companies	124.68	122.05	98%

Table A-16 Summary of First Year Pro Rata kWh Savings for Government Lighting Program

Operating Company	*First Year Ex Post Pro Rata kWh Savings*
CEI	53,585
OE	708,000
TE	-
Total Companies	761,585

Table A-17 Summary of Lifetime kWh Savings for Government Lighting Program

Operating Company	*Lifetime Ex Post kWh Savings*
CEI	2,023,305
OE	14,012,895
TE	-
Total Companies	16,036,200

Appendix B: Survey Instruments

EnergySaveOhio 2012 Incentive Programs Participant Survey

1) Did your company participate in [EDC(s)]'s business incentive programs by installing [Equipment Type(s)] measure(s)?

( ) Yes

( ) No

1a) What type of equipment did you install (please correct as appropriate)?

2) Is this equipment still installed and operating?

( ) Yes

( ) No

2a) Why is the equipment no longer installed or operating?

3) What was your role in the decision making process to install [Equipment Type(s)] measure(s)?

( ) Main decision maker

( ) Assisted with the decision to install the equipment

( ) Was not part of the decision process

3a) Who was the main decision maker?

3b) If multiple people were responsible for the decision, please provide the name of the person you think is most knowledgeable about the decision making process to install energy efficient [Equipment Type(s)].

3c) What is this person's telephone number?

3d) What is this person's email address?

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

( ) [EDC] Energy Specialist

( ) [EDC] Account Representative

( ) [EDC] website

( ) Brochures or advertisements

( ) Trade associations or business groups you belong to

( ) Trade journals or magazines

( ) Friends and colleagues

( ) An architect, engineer or energy consultant

( ) Equipment vendors or building contractors

( ) Other (please describe)

5) Which of the following policies or procedures does your organization have in place regarding energy efficiency improvements at this facility? (Select all that apply)

( ) An energy management plan

( ) Corporate policies that incorporate energy efficiency in operations and procurement

( ) Active training of staff

( ) A numeric goal for energy savings

( ) A numeric goal for energy cost reduction

( ) Other (please specify)

( ) None

6) How does your organization typically decide to make energy efficiency improvements for this facility? Is the decision:

( ) Made by one or two key people

( ) Based on staff recommendations to a decision maker

( ) Made by a group or committee

( ) Made in some other way

( ) Depends on how much the investment is

( ) Don't know

7) How important are incentive payments from [EDC(s)] for your decision making regarding energy efficiency improvements?

( ) Very important

( ) Somewhat important

( ) Only slightly important

( ) Not important at all

( ) Don't know

8) When deciding whether to make energy efficiency improvements, how important is your past experience with energy efficient equipment?

( ) Very important

( ) Somewhat important

( ) Only slightly important

( ) Not important at all

( ) Don't know

9) How important is advice and/or recommendations from [EDC(s)] for your decision making regarding energy efficiency improvements?

( ) Very important

( ) Somewhat important

( ) Only slightly important

( ) Not important at all

( ) Don't know

10) How important is advice and/or recommendations from equipment vendors for your decision making regarding energy efficiency improvements?

( ) Very important

( ) Somewhat important

( ) Only slightly important

( ) Not important at all

( ) Don't know

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

( ) Initial Cost

( ) Simple payback

( ) Internal rate of return

( ) Life cycle cost

( ) None of these

( ) Don't know

11a) What payback length of time do you normally require in order to proceed with an energy efficiency project?

11b) What rate of return do you normally require in order to proceed with an energy efficiency project?

12) How did you learn of [EDC(s)]'s business incentive programs? (Select all that apply)

( ) Approached directly by representative of [EDC] incentive programs

( ) Received an information brochure on [EDC] incentive programs

( ) Representative of [EDC] mentioned it

( ) [EDC] website

( ) Friends or colleagues

( ) An architect, engineer or energy consultant

( ) An equipment vendor or building contractor

( ) Past experience with the programs

( ) Other (please explain)

13) Before participating in [EDC]'s business incentive programs, had you installed any equipment or measure similar to the energy efficient [Equipment Type(s)] measure(s) at this facility?

( ) Yes

( ) No

( ) Don't know

13a) Did you receive an incentive, and if so, what?

14) Did the energy efficient equipment you installed through [EDC]'s business incentive programs meet your expectations?

( ) My expectations were exceeded

( ) My expectations were met

( ) My expectations were mostly met

( ) My expectations were not met

( ) Don't know

14a) Please explain in what ways the energy efficient equipment did not meet your expectations.

15) As a result of your experience with this programs, have you installed any equipment at this or other facilities for which you haven't applied for a financial incentive through [EDC(s)]?

( ) Yes

( ) No

( ) Don't know

15a) Why didn't you apply for a financial incentive?

16) Was there any additional energy efficient equipment you wanted to install, but didn't because no financial incentive was offered by [EDC(s)]?

( ) Yes

( ) No

( ) Don't know

16a) What additional energy efficient equipment would you have installed?

17) Did anyone from [EDC(s)] or SAIC come to this facility to do a pre-inspection?
( ) Yes
( ) No
( ) Don't know

17a) What did the pre-inspection consist of?

17b) Did anything change in the project design as a result of the pre-inspection?
( ) Yes
( ) No
( ) Don't know

17c) What changed as a result of the pre-inspection?

17d) How satisfied where you with the pre-inspection process?
( ) Very Satisfied
( ) Somewhat Satisfied
( ) Neither Satisfied nor Dissatisfied
( ) Somewhat Dissatisfied
( ) Very Dissatisfied
( ) Don't know

17e) Please describe in what ways you were not satisfied.

18) Did anyone from [EDC(s)] or SAIC come to this facility to do a post-inspection?
( ) Yes
( ) No
( ) Don't know

18a) What did the post-inspection consist of?

18b) Did anything change in the incentive amount as a result of the post-inspection?
( ) Yes
( ) No
( ) Don't know

18c) Please explain how the incentive amount changed as a result of the post-inspection.

18d) How satisfied where you with the post-inspection process?

( ) Very Satisfied

( ) Somewhat Satisfied

( ) Neither Satisfied nor Dissatisfied

( ) Somewhat Dissatisfied

( ) Very Dissatisfied

( ) Don't know

18e) Please describe in what ways you were not satisfied.

19) Were there any issues receiving the incentive check?

( ) Yes

( ) No

( ) Don't know

19a) Please describe the issues you had with receiving the incentive check.

20) How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?

	Very Satisfied	*Somewhat Satisfied*	*Neither Satisfied nor Dissatisfied*	*Somewhat Dissatisfied*	*Very Dissatisfied*	*Don't know*
Performance of the equipment installed	( )	( )	( )	( )	( )	( )
Savings on your monthly bill	( )	( )	( )	( )	( )	( )
Incentive amount	( )	( )	( )	( )	( )	( )
The effort required for the application process	( )	( )	( )	( )	( )	( )
Information provided by [EDC(s)] Account Representative	( )	( )	( )	( )	( )	( )
The elapsed time until you	( )	( )	( )	( )	( )	( )

received the incentive						
The [EDC(s)]'s Energy Efficiency website	( )	( )	( )	( )	( )	( )
Overall experience with the programs	( )	( )	( )	( )	( )	( )

20a) Please describe in what ways you were not satisfied with the programs.

21) Did you have any issues with the process required to receive the financial incentive (e.g., paperwork) for your energy efficiency project?

( ) Yes

( ) No

( ) Don't know

21a) Could you explain what issues you had with the process?

21b) How were these issues resolved?

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

23) About how many full-time equivalent employees work at the facility or facilities where the equipment that you received an incentive for was installed?

( ) Less than 10

( ) 11 to 25

( ) 26 to 40

( ) 41 to 75

( ) 76 to 100

( ) More than 100

( ) Don't Know

24) What is the principal activity your firm conducts at the location(s) where you installed the equipment that you received an incentive for? This may not be the main activity of your organization, but should be the main activity that occurs at the location the equipment was implemented at.

( ) Agricultural

( ) College/university

( ) Community Service/ Church/ Temple/Municipality

( ) Condo Assoc/Apartment Mgmt

( ) Convenience store

( ) Grocery store

( ) Health care/hospital

( ) Hotel or motel

( ) Industrial Electronic & Machinery

( ) Industrial Mining, Metals, Stone, Glass, Concrete

( ) Industrial Petroleum, Plastic, Rubber and Chemicals

( ) Office

( ) Other Industrial

( ) Personal Service

( ) Restaurant

( ) Retail (non-food)

( ) School

( ) Warehouse

( ) Other (please specify): _____

( ) Don't Know

THANK YOU!

Thank you for taking this survey of [EDC(s)] customers participating in the business incentive programs.

Your response is very important to us.

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

EnergySaveOhio 2012 Incentive Programs Trade Ally Survey

2) Approximately how many employees work at your firm?

( ) 1 to 4 employees

( ) 5 to 9 employees

( ) 10 to 19 employees

( ) 20 to 99 employees

( ) 100 to 499 employees

( ) 500 or more employees

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

( ) Lighting

( ) HVAC

( ) Motors and drives

( ) Refrigeration equipment

( ) Other (please specify)

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

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

( ) Yes

( ) No

( ) Don't know

5a) How many incentive applications has your firm completed, or assisted in the completion of any [EDC(s) Associated with Applications] project incentive applications?

5b) Are there any aspects of the business incentive application process that you would recommend be modified? (You helped complete the following applications: [Applications Processed per SAIC Data])

( ) Yes

( ) No

( ) Don't know

5c) In what ways would you recommend the application process be changed? (You helped complete the following applications: [Applications Processed per SAIC Data])

6) Does the [Applications Processed per SAIC Data] help you to sell your services or products?

( ) Yes

( ) No

( ) Don't know

6a) In what ways does the program help you to sell your services or products?

7) Has your involvement in the [EDC(s) Associated with Applications] business incentive program affected the types of equipment or services that you provide?

( ) Yes

( ) No

( ) Don't know

7a) In what ways has your involvement in the business incentive programs affected the types of equipment or services that you provide?

8) Are the incentive levels adequate to encourage customers to select energy efficient equipment options?

( ) Yes

( ) No

( ) Don't know

9) Are there specific technologies or measures for which incentives should be higher?

( ) Yes

( ) No

( ) Don't know

9a) For which technologies or measures should customers receive higher incentives?

9b) How much higher should the incentive be for [technology or measure]? Why?

10) Are there specific technologies or measures for which customers should receive incentives, but incentives are not offered by the program?

( ) Yes

( ) No

( ) Don't know

10a) For which technologies or measures should customers receive incentives that are not currently incentivized?

11) Have you noticed any recent trends relating to equipment choices that customers are making?

( ) Yes

( ) No

( ) Don't know

11a) What trends relating to equipment choices that customers are making have you noticed?

12) Are there ways in which [EDC(s) Associated with Applications] could market the business incentive programs more effectively?

( ) Yes

( ) No

( ) Don't know

12a) Please describe how [EDC(s) Associated with Applications] could more effectively market the business incentive program.

13) Do you actively market [EDC(s) Associated with Applications] business incentive programs to your customers?

( ) Yes

( ) No

( ) Don't know

13b) Through what means do you actively market the business incentive program to your customers?

14) Do you find that customers are generally aware of [EDC(s) Associated with Applications] business incentive programs, or do you more frequently bring these to their attention?

( ) Customers are generally aware of the program

( ) More frequently, the program is brought to their attention

( ) Don't know

15) How active do you expect your firm to be in [EDC(s) Associated with Applications]'s business incentive programs during the next year?

( ) More active

( ) About the same level of activity

( ) Less active

( ) Don't know

16) Based on your experience this year, approximately what percentage of the projects that you sell or install in 2013 do you estimate will apply for project incentives?

17) What would be the main reasons that [the percentage you estimate will not apply] of the projects will not apply?

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

	Very Satisfied	*Somewhat Satisfied*	*Neither Satisfied nor Dissatisfied*	*Somewhat Dissatisfied*	*Very Dissatisfied*
Overall Program Experience	( )	( )	( )	( )	( )

18a) Please describe in what ways you were not satisfied with the program.

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

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

THANK YOU!

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

Your response is very important to us.

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