APPENDIX H

2011 Evaluation of EnergySaveOhio Mercantile Customer Program

Evaluation Report

Prepared for the FirstEnergy Ohio Companies:

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1. Executive Summary

The Ohio operating companies The Cleveland Electric Illuminating Company ("CEI"), Ohio Edison ("OE"), and The Toledo Edison ("TE") (collectively "Companies"), continued the Mercantile Customer Program during 2011. This report presents the results of the impact and process evaluations of the Mercantile Customer Program activity occurring during 2011.

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, participating customers and contractors. Based on data provided by the Companies 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 sample sizes for different types of data collection methods employed for this study.
- 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 these sites, energy efficient equipment was monitored in order to obtain accurate information on equipment operating characteristics. The 40 projects, for which on-site measurements and verification data were collected, account for approximately 51% of the expected kWh savings.
- Customer surveys provided the information for process evaluation. A total of 53 customer decision makers were interviewed. Additionally, relevant Company staff members were interviewed to provide information for the process evaluation.

Table 1-1. Sample Sizes for Data Collection Efforts

Type of Data Collected	*Sample Size*
On-Site Measurement and Verification	40
Customer Decision Maker Survey	53

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 of the 2011 Mercantile Customer Program from the three service territories are summarized in Table 1-2. For the entire program, the realized gross energy savings totaled 274,148,683 kWh. The gross realization rate for the program is 90%.

Table 1-2. Summary of kWh Savings for Mercantile Customer Program

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
CEI	115,162,353	105,136,279	91%
OEl	130,804,439	118,234,076	90%
TE	57,041,006	50,778,328	89%
Total Companies	303,007,798	274,148,683	90%

The realized gross peak kW reductions of the 2011 Mercantile Customer Program from the three service territories are summarized in Table 1-3. The achieved peak demand savings for the program are 40,437 kW. The gross realization rate for the program is 89%.

Table 1-3. Summary of Peak kW Savings for Mercantile Customer Program

Operating Company	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
CEI	19,029	14,743	77%
OE	18,123	18,912	104%
TE	8,514	6,782	80%
Total Companies	45,666	40,437	89%

After the date of implementation for a measure under the Mercantile Customer Program, the number of months remaining in 2011 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 Mercantile Customer Program is summarized in Table 1-4. For the first-year pro rata, the realized gross energy savings totaled 202,362,668 kWh.

Table 1-4 Summary of First Year Pro Rata kWh Savings for Mercantile Customer Program

Operating Company	*First Year Pro Rata Ex Post kWh Savings*
CEO	103,200,939
OE	110,934,939
TE	48,255,938
Total Companies	262,391,817

The interviews and surveys that were conducted provided a perspective on program operations and effectiveness during PY2. The following presents a selection of key conclusions from PY2:

- **High Program Satisfaction:** Participants were satisfied with their overall experience with the program, although some expressed dissatisfaction with the application process. About a quarter of participants were either dissatisfied or very dissatisfied with the effort required to apply for the incentives or with the application forms. Additionally, nearly a third of participants were somewhat or very dissatisfied with the time required to receive incentives. Program staff is aware of the dissatisfaction with the length of time required to receive the incentive. However, both the length of time to receive the incentive and the complexity of the application are generally due to the regulatory requirements for approving projects for incentives and not under the direct control of the Companies' staff.
- **Preference for Cash Incentive over Rider Exemption:** A large share of the PY2 savings came from participants who elected to receive the cash incentive over the rider exemption. Furthermore, a larger share of those who completed projects in 2011 chose the cash incentive instead of the rider exemption compared to those who completed projects in prior years. This may have occurred because projects completed in these years were motivated by the program whereas older projects were completed by customers on their own initiative. Participants motivated by the program may be more concerned with quickly recouping their costs through the incentive. Analysis of the reasons for electing the cash incentives found that some participants opted for the cash incentive because they could invest the money back into the business. Furthermore, some participants were uncertain about whether or not the rider would continue to be granted for a long enough period to make it worthwhile. Other participants chose the cash incentive because they thought it offered a better return than the exemption.
- **Most Savings from Older Projects:** Most of the savings achieved during PY2 came from projects completed prior to 2011. The reliance of older projects for energy savings suggests that the Mercantile Customer Program's ability to generate savings in the future may diminish. However, program staff reports that interest in the program remains strong.
- **Manufacturing Firms Account for Large Share of Savings:** Approximately half of the PY2 savings accrued through the program were from manufacturing firms. Relative to respondents from other industries, manufacturing firms were more likely to report that they heard about the Mercantile Customer Program from a representative of their EDC. This may explain their greater participation in the program because customer service representatives are one of the means

that the program is promoted. Half of the savings through the program were from manufacturing firms.

- **Customers Satisfied with Administrator Organizations:** In addition to promoting the program, the administrator organizations help participants file applications. Most survey respondents who worked with one of the administrator organizations were satisfied with the experience.

The following recommendations are offered to support ongoing program improvements:

- **Monitor Future Program Activity:** Although PY2 was an active year for the Mercantile Customer Program, it may be more difficult for the program to generate savings over the longer term. The majority of the PY2 savings were from projects implemented prior to 2011. At some point the program may work through the pool of potential participants. Program staff should continue to monitor the level of program activity with this in mind.
- **Streamline Application Process:** Some respondents reported difficulty with the application process. Problems completing the forms were often the source of the difficulty. Program staff should consider ways that the application process could be improved to make it easier for participants. In particular, staff could interview applicants or observe applicants completing forms to understand the source of the difficulty. Alternatively, staff could track errors to see if any are made more frequently than others.
- **Review of Large Projects with Uncertain Savings:** There is a higher level of uncertainty in the estimation of ex ante savings for some measure types, such as HVAC, refrigeration, VFD, and process improvements, than for other measures, such as lighting. This uncertainty may lead to ex ante savings that are higher than ex post savings and to a correspondingly lower realization rate. For these types of measures, in cases where the savings are potentially large, it is recommended that program staff have ADM review the project and the ex ante savings estimates. This review will aid in the early identification and correction of potential overestimation of ex ante savings and help to ensure a greater realization rate for the program.

2. Introduction and Purpose of Study

This report presents the results of the impact and process evaluations of the Mercantile Customer Program for activity during the 2011 program year.

2.1 Overview of Evaluation Approach

The overall objective for the impact evaluation of the Mercantile Customer Program was to verify the gross energy savings and peak demand (kW) reduction resulting from participation in the program during the 2011 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, HVAC equipment, and motors/VFDs.
- 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 on a sample of program participants to gather information on their decision making and their likes and dislikes of the program.

2.2 Organization of Report

This report on the impact and process evaluation of the Mercantile Customer Program during the 2011 program year is organized as follows:

- Chapter 3 presents a description of the Mercantile Customer Program.
- Chapter 4 presents and discusses the methods used for the impact evaluation and the process evaluation of the Mercantile Customer Program.

- Chapter 5 presents the impact evaluation and process evaluation findings for the Mercantile Customer Program.
- Chapter 0 presents a summary of the findings in this report.

3. Description of Program

Since 2009, the Companies have implemented the Mercantile Customer Program in Ohio.

To be eligible to participate in the Mercantile Customer Program, a customer had to be a “mercantile customer” as defined in R.C. § 4928.01 (A) (19). According to this definition, a mercantile customer is a commercial or industrial customer who meets either of two criteria:

- Consumes more than 700,000 kWh per year; or
- Is part of a national account involving multiple facilities in one or more states.

The Mercantile Customer Program is targeted at mercantile customers that have, since January 1, 2006, implemented projects that resulted in energy efficiency and/or peak demand reductions.

Under Rule 4901:1-39-05(F), Ohio Administrative Code (O.A.C.), a mercantile customer is allowed to file with the Public Utilities Commission of Ohio (PUCO), either individually or jointly with an electric utility, an application to commit the customer’s existing demand reduction, demand response, and energy efficiency programs for integration with the electric utility’s programs. Customers participating in the Mercantile Customer Program chose to file jointly with the Companies.

Beginning in December, 2010, mercantile customers who participated in the program chose between two types of incentives:

- An exemption from the Demand Side Energy Efficiency (DSE2) Rider established by SB 221, for a specified period of time, or
- A cash rebate option.

A customer participating in the program may have chosen to receive an exemption from the DSE2 Rider that was legislated in SB 221. To be eligible for this exemption, a customer provided sufficient data to illustrate that the customer installed self-directed energy efficiency and/or demand reduction technologies that produced energy savings and/or peak demand.

Calculations for exemption from the DSE2 rider are made on a site-by-site basis, where a site is defined as a location with one or more facilities located on one or more parcels of land, provided that the parcels are contiguous (e.g., a plant, hospital complex, or university located on one or more contiguous parcels of land would qualify as a site).

Although all accounts related to a given site were eligible for exemption, the exemption was applied only to those accounts identified by a customer on the Joint Application it files with the Company to the PUCO. Aggregate savings from projects

on the site were compared to the aggregate baseline of all accounts included in the application to determine if the site met the eligibility requirement.

Under the Cash Rebate Option that was introduced for the Mercantile Pilot Program, customers were eligible to receive a cash rebate for a mercantile customer project discounted to 75 percent of the rebate for the same project if offered by a new utility program. The rebates were capped at 50 percent of project costs or $250,000, whichever was lower. The maximum rebate that any customer could have received was $500,000 per year. The caps apply per service territory. A customer is defined by its tax identification number.

Several criteria were used to determine energy efficiency project incentive levels under the Mercantile Customer Program.

If a customer replaced equipment before its end of life, efficiency savings were eligible as measured against the as-found equipment.

If a customer replaced equipment at end of life with standard equipment, projects were not eligible for an incentive; however, utilities may count the savings as compared to as-found towards compliance goals, and the customer is eligible for a Commitment Payment.

Behavioral modifications, or operational improvements could have qualified for incentives, but only if an investment was made on the customer's part and if the savings are measurable and verifiable. If there was no investment, the customer was not eligible for an incentive; however, utilities may count measureable and verifiable savings towards compliance goals, regardless of customer incentive level.

Even though a customer may not receive an incentive for a behavioral modification or a replacement on failure to standard, they may receive instead a commitment payment so that utilities may commit those savings towards compliance.

The expected gross savings by measure type are shown in Table 3-1. There were 308 projects in the program which were expected to provide savings of 303,007,798 kWh. Figure 3-1 shows the program’s ex post kWh savings by date of implementation.

Table 3-1 Ex Ante Annual Energy Savings of the Mercantile Customer Program

Operating Company	*Ex Ante kWh Savings*
CEI	115,162,353
OE	130,804,439
TE	57,041,006
Total Companies	303,007,798

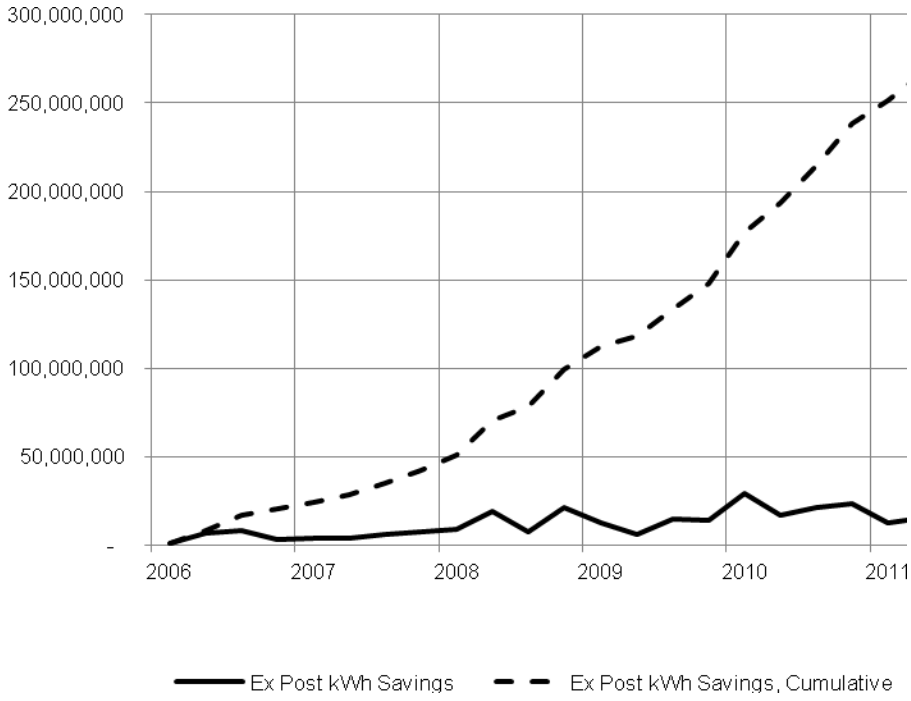

Figure 3-1. Mercantile Customer Program Expected Savings by Implementation Date

4. Methodology

ADM's evaluation of the 2011 Mercantile Customer Program consisted of both an impact evaluation and a process evaluation. The impact methodology is described in section 4.1 and the process evaluation is described in section 4.2 of this chapter.

4.1 Impact Evaluation Methodology

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

4.1.1 Sampling Plan

Data used to estimate the gross savings achieved through the Mercantile Customer Program were collected for samples of projects completed during the 2011 program year. Data provided by the Companies staff showed that during 2011, there were 308 dockets associated with the program, which were expected to provide savings of 303,007,798 kWh annually.

Inspection of the data on kWh savings for individual projects, provided by the Company staff, 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 sample, the actual precision is ±5.7%.

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 presents the number of of projects and expected energy savings of the sampled projects by stratum.

Table 4-1 Population Statistics Used for Sample Design for Mercantile Customer Program.

	Stratum 1	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Stratum 5*	*Stratum 6*	*Totals*
Strata boundaries (kWh)	< 135630	135630 - 317169	317170 - 755629	755630 - 2261849	2261850 - 6441089	> 6441090	
Number of projects	65	73	82	54	25	9	308
Total kWh savings	4,693,467	15,777,509	38,539,242	68,210,535	81,868,008	94,902,370	303,991,131
Average kWh	72,207	216,130	469,991	1,263,158	3,274,720	10,544,708	986,984

	Stratum 1	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Stratum 5*	*Stratum 6*	*Totals*
Savings							
Standard deviation of kWh savings	33,930	53,060	116,883	434,732	1,042,794	4,158,827	2,019,986
Coefficient of variation	0.47	0.25	0.25	0.34	0.32	0.39	2.05
Final design sample	2	3	3	8	15	9	40

As shown in Table 4-2, the sample projects account for approximately 51% of the expected kWh savings.

Table 4-2. Expected kWh Savings for Sampled Projects by Stratum

Stratum	*Ex Ante kWh Savings (Population)*	*Ex Ante kWh Savings (Sample)*	*Percent of Ex Ante Peak kWh Savings in Sample*
6	94,902,370	94,902,370	100%
5	81,868,008	45,040,211	55%
4	68,210,535	13,443,127	20%
3	37,776,390	1,069,340	3%
2	15,557,028	655,635	4%
1	4,693,467	60,052	1%
Total	303,007,798	155,170,735	51%

As shown in Table 4-3, the sample projects account for approximately 45% of the expected peak kW savings.

Table 4-3 Expected Peak Demand kW Savings for Sampled Projects by Stratum

Stratum	*Ex Ante Peak kW Savings (Population)*	*Ex Ante Peak kW Savings (Sample)*	*Percent of Ex Ante Peak kW Savings in Sample*
6	7,435.05	7,435.05	100%
5	14,184.94	10,097.98	71%
4	13,085.86	2,545.46	19%
3	7,313.02	235.99	3%
2	2,670.73	161.10	6%
1	976.53	12.95	1%
Total	45,666.13	20,488.54	45%

4.1.1.1. Review of Documentation

After the samples of projects were selected, the Companies' staff 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 Company staff to seek further information to ensure the development of an appropriate project-specific M&V plan.

4.1.2 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) Customer Service Representatives (CSR) which were assigned to sites were provided with a list of all sites for which ADM attempted to schedule M&V activities. 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 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.

4.1.3 Procedures for Estimating Savings from Measures Installed through the Mercantile Customer Program

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 4-4.

Table 4-4 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 produced two estimates of gross savings for each sample project: an expected gross savings estimate (as provided by the customer) 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[1] 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.

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.

[1] The savings realization rate for a project is calculated as the ratio of the achieved savings for the project (as measured and verified through the M&V effort) to the expected savings (as determined through the project application procedure and recorded in the tracking system for the program).

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 capacity 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 demand is calculated by dividing the total fixture kWh usage during the Companies' peak period by the number of hours in the peak period.

Peak period demand savings are calculated as the difference between peak period baseline demand and post-installation peak period demand of the affected lighting equipment, per the following formula:

$$\text{Peak Capacity Savings} = kW_{Before} - kW_{After}$$

The baseline and post-installation average 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:

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

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

Results from the monitored sample are used to calculate the average operating hours of the metered lights in each costing period for every unique building type/usage area.

These average operating hours are then applied to the baseline and post-installation average demand for each usage area to calculate the respective energy usage and peak period demand for each usage area.

The annual baseline energy usage is the sum of the baseline kWh consumption in 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.

Savings from lighting measures in conditioned spaces are factored by region-specific and building type-specific heating cooling interaction factors, allowing for the calculation of 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 use. 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 prepare 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, $Amps_{ave}$ is 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.[2]

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 replacement upon failure, 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. [3]

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 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

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

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

motors. Where nameplate ratings of full load RPM are available for replaced motors, a derating factor can be applied.[4]

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 collect 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 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.

[4]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 = $(RPM_{old})^2 / (RPM_{new})^2 = 1760^2 / 1770^2 = 0.989$

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 as 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 obtain 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 conduct an engineering analysis of the performance characteristics of the pre-retrofit equipment. During the on-site survey, field staff inspect 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 and any potential administrative issues. This process evaluation was designed to document the operations and delivery of the Mercantile Customer Program during program year two (PY2).

Key research questions to be addressed by this evaluation of PY2 activity include:

Was the Mercantile Customer Program delivery effective and successful?
Are there areas of the Mercantile Customer Program administration that could be improved?

During the evaluation, data and information from multiple sources were analyzed to achieve the stated research objectives. Insight into the customer experience with the Mercantile Customer Programs was developed from an online survey of program participants. Lastly, the Companies' staff was interviewed to understand the internal organization and operational efficiency.

5. Detailed Evaluation Findings

This chapter reports ADM's impact evaluation findings and process evaluation findings for the 2011 Mercantile Customer Program

5.1 Impact Evaluation Findings

This section provides the results of gross savings for the Mercantile Customer Program during the 2011 Program year.

5.1.1 Realized Gross kWh Savings

The gross kWh savings of the 2011 Mercantile Customer Program are summarized by sampling stratum in Table 5-1. Overall, the achieved gross savings of 274,148,683 kWh were equal to 90% of the expected savings. Table 5-2 shows the expected and realized energy savings by project.

Table 5-1. Expected and Gross Realized kWh Savings for Mercantile Customer Program by Sample Stratum

Stratum	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
6	94,902,370	83,669,392	88%
5	81,868,008	74,166,926	91%
4	68,210,535	55,677,360	82%
3	37,776,390	33,971,019	90%
2	15,557,028	19,804,563	127%
1	4,693,467	6,859,424	146%
Total	303,007,798	274,148,683	90%

Table 5-2. Expected and Gross Realized kWh Savings for the Mercantile Customer Program

PUCO Docket ID	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
11-2004	1,667,402	943,834	57%
11-2013	1,937,420	1,967,027	102%
11-2016	3,106,879	2,034,541	65%
11-2025	364,170	334,739	92%
11-2066	2,288,623	2,724,690	119%
11-2070	19,506,750	14,792,690	76%
11-2071	4,143,030	2,458,328	59%
11-2097	2,977,756	2,986,505	100%
11-2106	5,226,916	4,627,783	89%
11-2107	2,116,199	2,466,334	117%

PUCO Docket ID	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
11-2115	3,636,568	2,702,835	74%
11-2132	10,332,879	9,668,310	94%
11-2136	2,375,150	1,011,906	43%
11-2204	213,317	98,692	46%
11-2205	3,525,136	1,751,219	50%
11-2207	10,803,421	7,871,330	73%
11-2208	387,998	314,076	81%
11-2211	232,664	522,509	225%
11-2215	209,654	213,442	102%
11-2224	2,746,262	3,584,568	131%
11-2226	2,261,852	3,581,389	158%
11-2240	1,733,028	1,185,239	68%
11-2255	2,625,450	1,350,440	51%
11-2264	1,067,304	1,115,715	105%
11-2265	2,469,313	3,309,911	134%
11-2295	2,458,260	2,458,260	100%
11-2296	1,503,750	1,647,192	110%
11-2301	1,464,707	446,948	31%
11-3051	2,522,688	3,890,113	154%
11-3057	18,125	67,184	371%
11-3682	1,953,317	1,200,764	61%
11-3697	317,172	312,806	99%
11-3701	6,441,088	5,348,830	83%
11-3740	41,927	20,581	49%
12-0044	2,676,328	2,330,923	87%
12-0114	7,990,508	7,990,508	100%
12-0200	8,260,000	8,260,000	100%
12-0203	8,194,800	7,432,229	91%
12-0244	14,944,062	15,468,495	104%
12-0261	8,428,862	6,837,000	81%
Non-Sample Dockets	147,837,063	136,818,798	93%
Total	303,007,798	274,148,683	90%

Gross realized kWh savings of the Mercantile Equipment Program are shown by building type in Table 5-3. Among discrete building types, primary metal manufacturing facilities account for the largest percentage of incentive gross energy – 11.4%.

Table 5-3. Realized Gross kWh Savings for Mercantile Customer Program by Facility Type

Facility Type	*Ex Post kWh Savings*	*Percent of Total Ex Post kWh Savings*
Primary Metal Manufacturing	31,150,936	11.4%

Facility Type	*Ex Post kWh Savings*	*Percent of Total Ex Post kWh Savings*
Transportation Equipment Manufacturing	28,532,423	10.4%
Educational Services	26,627,209	9.7%
Chemical Manufacturing	19,961,826	7.3%
Food and Beverage Stores	12,796,408	4.7%
Fabricated Metal Product Manufacturing	11,419,078	4.2%
Plastics and Rubber Products Manufacturing	9,085,850	3.3%
Nonmetallic Mineral Product Manufacturing	8,541,879	3.1%
Real Estate	7,911,381	2.9%
Machinery Manufacturing	6,893,054	2.5%
Printing and Related Support Activities	6,320,520	2.3%
Hospitals	6,062,566	2.2%
Credit Intermediation and Related Activities	5,706,972	2.1%
Warehousing and Storage	5,614,871	2.0%
Health and Personal Care Stores	4,525,389	1.7%
Food Manufacturing	4,484,523	1.6%
Electronics and Appliance Stores	4,012,751	1.5%
Electrical Equipment, Appliance, and Component Manufacturing	3,978,815	1.5%
Miscellaneous Manufacturing	3,890,113	1.4%
Merchant Wholesalers, Durable Goods	3,721,378	1.4%
Executive, Legislative, and Other General Government Support	2,950,002	1.1%
Merchant Wholesalers, Nondurable Goods	2,799,816	1.0%
General Merchandise Stores	2,101,632	0.8%
Utilities	1,565,066	0.6%
Paper Manufacturing	1,487,782	0.5%
Professional, Scientific, and Technical Services	1,231,489	0.4%
Computer and Electronic Product Manufacturing	1,024,544	0.4%
Wood Product Manufacturing	1,000,630	0.4%
Building Material and Garden Equipment and Supplies Dealers	822,491	0.3%
Transit and Ground Passenger Transportation	813,259	0.3%
Performing Arts, Spectator Sports, and Related Industries	685,062	0.2%
Accommodation	680,343	0.2%
Sporting Goods, Hobby, Book, and Music Stores	624,861	0.2%
Management of Companies and Enterprises	599,516	0.2%
Amusement, Gambling, and Recreation Industries	587,293	0.2%
Repair and Maintenance	505,061	0.2%
Justice, Public Order, and Safety Activities	458,658	0.2%
Religious, Grantmaking, Civic, Professional, and Similar Organizations	447,261	0.2%
Publishing Industries (except Internet)	431,623	0.2%
Textile Product Mills	325,781	0.1%
Ambulatory Health Care Services	269,695	0.1%
Motor Vehicle and Parts Dealers	194,496	0.1%

Facility Type	*Ex Post kWh Savings*	*Percent of Total Ex Post kWh Savings*
Real Estate and Rental and Leasing	179,353	0.1%
Museums, Historical Sites, and Similar Institutions	178,912	0.1%
Administration of Human Resource Programs	164,562	0.1%
Food Services and Drinking Places	161,380	0.1%
Miscellaneous Store Retailers	65,806	0.0%
Monetary Authorities-Central Bank	62,306	0.0%
Insurance Carriers and Related Activities	57,812	0.0%
Clothing and Clothing Accessories Stores	54,809	0.0%
Other Facility Type	40,344,534	14.7%
Total	274,113,776	100.0%

5.1.2 Realized Gross Peak kW Savings

The realized gross peak kW reductions of the 2011 Mercantile Customer Program are shown in Table 5-4. The achieved gross peak demand savings for the program are 40,436.90 kW.

Table 5-4. Expected and Gross Realized Peak kW Savings for the Mercantile Customer Program

Stratum	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
6	7,435.05	9,279.33	125%
5	14,184.94	9,430.33	66%
4	13,085.86	11,128.82	85%
3	7,313.02	7,285.07	100%
2	2,670.73	2,428.81	91%
1	976.53	884.54	91%
Total	45,666.13	40,436.90	89%

5.1.3 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.

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.

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.

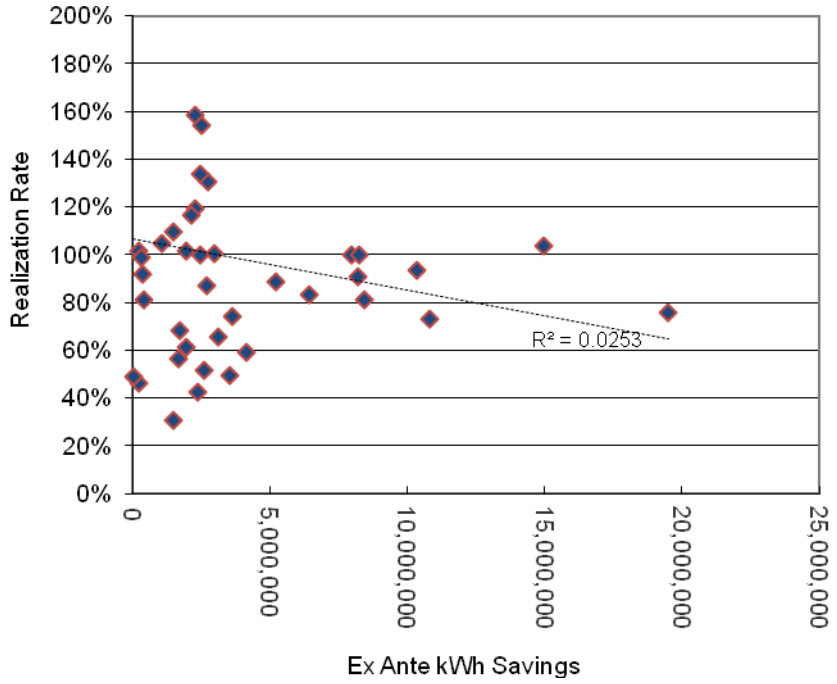

Figure 5-1. Sample Project Realization Rate versus Expected kWh Savings for the Mercantile Customer Program

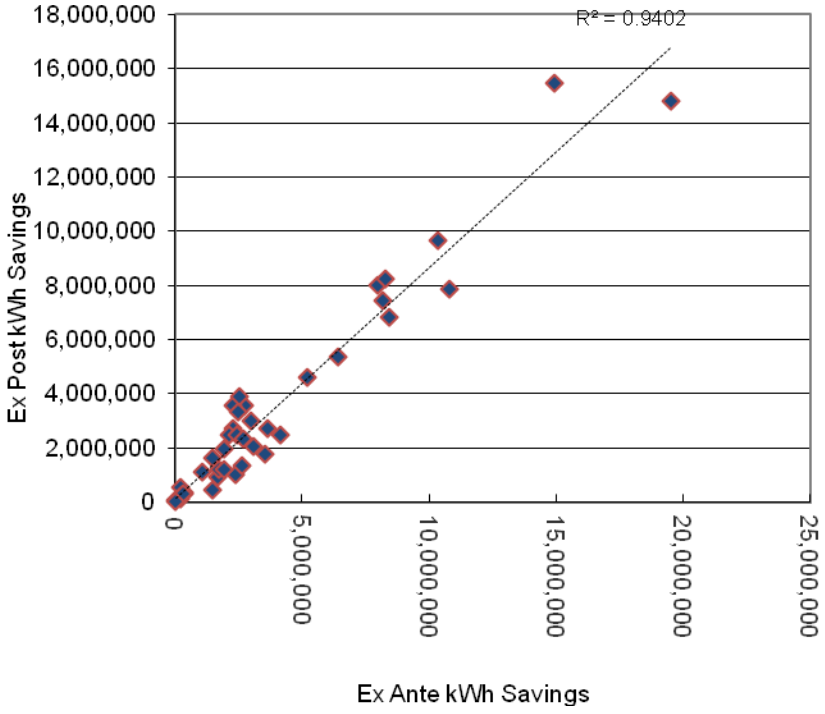

Figure 5-2 Sample Project Ex Post kWh Savings versus Ex Ante kWh Savings for the Mercantile Customer Program

5.2 Impact Evaluation Findings

This section presents the results of the process evaluation for the Companies' Mercantile Customer Program during program year two (PY2). 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 programs in order to determine how effectively it is achieving its intended outcomes. This evaluation is based upon analysis of program structure, interviews and surveys of participating Ohio customers, the Companies' energy efficiency staff, and program tracking data.

The section begins with a discussion of the overall progress of the program. This section also presents strategic planning and process recommendations, and highlights key findings from the interviews of customer participants and program operations staff.

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 Mercantile Customer Program. Respondents report their satisfaction with the programs, detail their motivations and the factors affecting their decision making process, and provide recommendations related to improving the program.

- **Interviews with the Companies' staff members:** Interviews with the Companies' staff members provide insight into various aspects of the program and its organization. The Companies' staff members also provide information regarding recent organizational and procedural improvements that have been implemented in order to enhance program efficiency and effectiveness.

5.2.2 Summary of Conclusions and Recommendations

The interviews and surveys that were conducted provided a perspective on program operations and effectiveness during PY2. The following presents a selection of key conclusions from PY2:

- **High Program Satisfaction:** Participants were satisfied with their overall experience with the program, although some expressed dissatisfaction with the application process. About a quarter of participants were either dissatisfied or very dissatisfied with the effort required to apply for the incentives or with the application forms. Additionally, nearly a third of participants were somewhat or very dissatisfied with the time required to receive incentives. Program staff is aware of the dissatisfaction with the length of time required to receive the incentive. However, both the length of time to receive the incentive and the

complexity of the application are generally due to the regulatory requirements for approving projects for incentives and not under the direct control of the Companies' staff.

- **Preference for Cash Incentive over Rider Exemption:** A large share of the PY2 savings came from participants who elected to receive the cash incentive over the rider exemption. Furthermore, a larger share of those who completed projects in 2011 chose the cash incentive instead of the rider exemption compared to those who completed projects in prior years. This may have occurred because projects completed in these years were motivated by the program whereas older projects were completed by customers on their own initiative. Participants motivated by the program may be more concerned with quickly recouping their costs through the incentive. Analysis of the reasons for electing the cash incentives found that some participants opted for the cash incentive because they could invest the money back into the business. Furthermore, some participants were uncertain about whether or not the rider would continue to be granted for a long enough period to make it worthwhile. Other participants chose the cash incentive because they thought it offered a better return than the exemption.
- **Most Savings from Older Projects:** Most of the savings achieved during PY2 came from projects completed prior to 2011. The reliance of older projects for energy savings suggests that the Mercantile Customer Program's ability to generate savings in the future may diminish. However, program staff reports that interest in the program remains strong.
- **Manufacturing Firms Account for Large Share of Savings:** Approximately half of the PY2 savings accrued through the program were from manufacturing firms. Relative to respondents from other industries, manufacturing firms were more likely to report that they heard about the Mercantile Customer Program from a representative of their EDC. This may explain their greater participation in the program because customer service representatives are one of the means that the program is promoted. Half of the savings through the program were from manufacturing firms.
- **Customers Satisfied with Administrator Organizations:** In addition to promoting the program, the administrator organizations help participants file applications. Most survey respondents who worked with one of the administrator organizations were satisfied with the experience.

The following recommendations are offered to support ongoing program improvements:

- **Monitor Future Program Activity:** Although PY2 was an active year for the Mercantile Customer Program, it may be more difficult for the program to generate savings over the longer term. The majority of the PY2 savings were from projects implemented prior to 2011. At some point the program may work

through the pool of potential participants. Program staff should continue to monitor the level of program activity with this in mind.

- **Streamline Application Process:** Some respondents reported difficulty with the application process. Problems completing the forms were often the source of the difficulty. Program staff should consider ways that the application process could be improved to make it easier for participants. In particular, staff could interview applicants or observe applicants completing forms to understand the source of the difficulty. Alternatively, staff could track errors to see if any are made more frequently than others.
- **Review of Large Projects with Uncertain Savings:** There is a higher level of uncertainty in the estimation of ex ante savings for some measure types, such as HVAC, refrigeration, VFD, and process improvements, than for other measures, such as lighting. This uncertainty may lead to ex ante savings that are higher than ex post savings and to a correspondingly lower realization rate. For these types of measures, in cases where the savings are potentially large, it is recommended that program staff have ADM review the project and the ex ante savings estimates. This review will aid in the early identification and correction of potential overestimation of ex ante savings and help to ensure a greater realization rate for the program.

5.2.3 Mercantile Customer Program Participant Profile

Mercantile Customer Program participants implemented a variety of measures as shown in Table 5-5. The most frequently implemented measure was lighting equipment, which accounted for nearly half of the measures implemented. Controls were the next most commonly implemented measure. Only six water heating equipment projects were implemented through the Mercantile Customer Program.

Table 5-5 Number and Percent of Measure Type Implemented During PY2

	Count of Measure Types Implemented	*Percent of Measure Types Implemented*
Lighting	592	48%
Controls	206	17%
Motor	115	9%
HVAC	92	8%
Other	90	7%
Process improvement	47	4%
Refrigeration	37	3%
Air compressor	36	3%
Water heating	6	0%

Participants in the program could elect to receive either a cash incentive or an exemption from the DSE2 rider. Figure 5-3 shows the savings associated with projects by customers who elected to receive the cash incentive or the rider exemption by the

year that the project was implemented. Most of the energy savings during PY2 were associated with customers who chose the cash incentive option over the rider exemption.

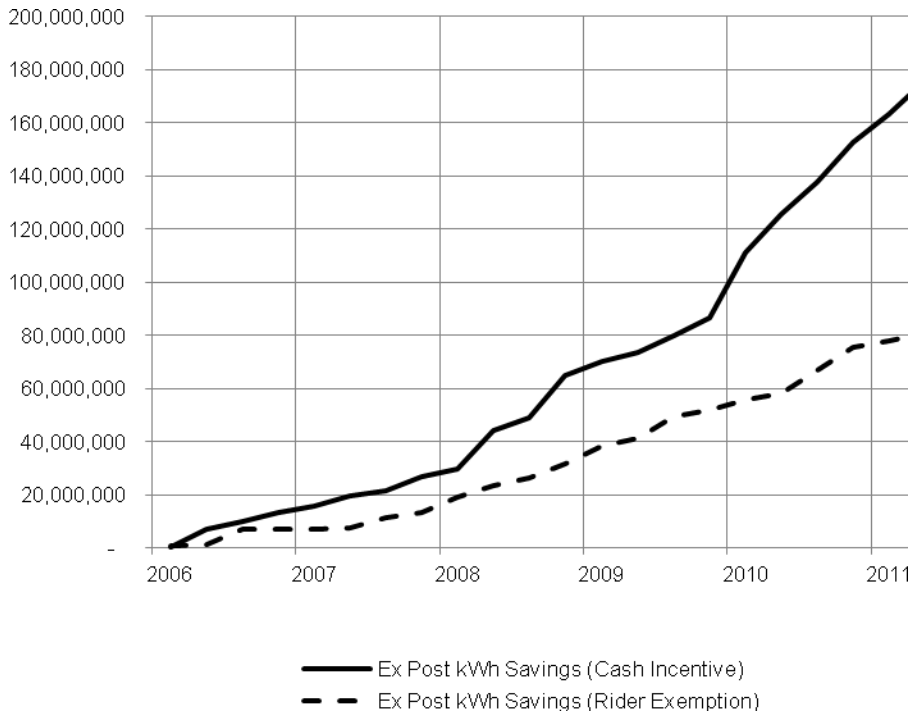

Figure 5-3 Energy Savings for Cash Incentive and Rider Exemption Options by Year Project was Implemented

The share of savings associated with cash incentive projects by the year that the project was implemented is shown in Figure 5-4. Savings associated with cash incentive projects was higher in 2011 than for projects implemented in earlier years. Eighty-four percent of the energy savings of projects completed in 2011 were associated with customers who chose the cash incentive compared to a little more than 65% of projects completed in 2006.

As discussed below, Mercantile Customer Program survey respondents eligible for the C/I Equipment Programs reported that they applied to the Mercantile Customer Program because they were not aware of the other incentive programs or because they perceived other benefits of the Mercantile Customer Program such as less difficulty with the process.

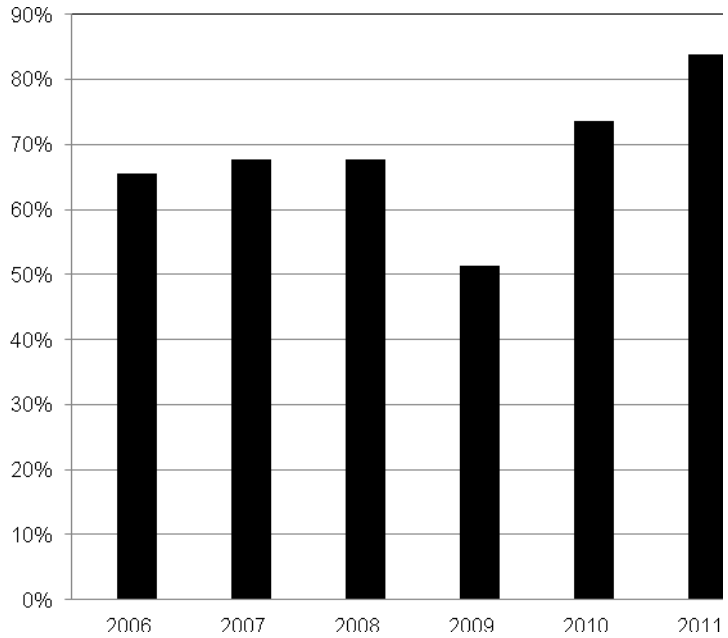

Figure 5-4 Energy Savings Associated with Projects that Elected the Cash Incentive by Year Project was Implemented

5.2.4 Mercantile Customer Program Participant Outcomes

An online survey was conducted to collect data about customer decision-making, preferences, and opinions of the Mercantile Customer Program. The program offers a rebate or an exemption from the DSE2 rider for customers who have implemented a variety of measures, including lighting, HVAC, motors, air compressors, controls, refrigeration, and process improvements. Commercial and industrial customers are eligible to participate if they used more than 700,000 kWh per year. In total, 53 customers who implemented a project under the program responded to the survey. In the following tables, the percent of respondents and percent of ex post kWh savings associated with responses are shown. Most of the discussion focuses on the percent of respondents, although the percent of savings is discussed where it is noteworthy. As shown in Table 5-6, about half of the respondents were the main decision maker while and about half assisted with the decision.

Table 5-6 Respondents Role in the Decision Making Process

	Response	*(n=53)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
What was your role in the decision making process to implement [energy efficient equipment/measure]?	Main decision maker	24	45%	32%
	Assisted with the decision to install the equipment	26	49%	58%
	Was not part of the decision process	3	6%	10%

5.2.5 How Customers Learn About the Program

Customers were asked how they learned about the Mercantile Customer Program. As shown in Table 5-7, the most common way customers learned about the program was from a representative of their EDC. This is most likely due to the program's marketing approach that utilizes customer service representatives as one of the means to promote the program. A similar share (32%) heard about the program from an architect, engineer, or energy consultant. Twenty-five percent of customers heard about the program from an equipment vendor or building contractor. Fifteen percent or less heard about the program either from a representative of the incentive program, from an EDC brochure, from the EDC website, from friends or colleagues, from past experience with the program, or in some other way.

Table 5-7 How Customers Learned about the Mercantile Customer Program

	Response	*(n=53)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
How did you learn of [EDC]'s Mercantile Customer Program?	Representative of [EDC] mentioned it	19	37%	38%
	An architect, engineer or energy consultant	17	33%	37%
	An equipment vendor or building contractor	13	25%	24%
	Other (please explain)	8	15%	7%
	Approached directly by representative of [EDC] incentive programs	7	13%	13%
	Received an information brochure on [EDC] incentive programs	6	12%	12%
	[EDC] website	6	12%	7%
	Friends or colleagues	5	10%	18%
	Past experience with the programs	1	2%	1%

A finding from the analysis of savings found that manufacturing firms accounted for a disproportionately large share of program activity. To understand why this might have been the case, we compared how respondents from manufacturing firms heard about the program with respondents from other industries. A much larger share of respondents from manufacturing firms reported that they heard about the program from a representative of their EDC. Manufacturing firms may have more contact with their EDC because they typically consume more energy than other establishments. These stronger contacts may have led to higher levels of awareness and greater participation in the program.

Table 5-8 How Customers Learned about the Mercantile Customer Program by Industry

	Response	*Manufacturing (n=26)*	*Other Industries (n=27)*
How did you learn of [EDC]'s Mercantile Customer Program?	Approached directly by representative of [EDC] incentive programs	12%	14%

	Response	Manufacturing (n=26)	Other Industries (n=27)
	Received an information brochure on [EDC] incentive programs	19%	4%
	Representative of [EDC] mentioned it	54%	18%
	[EDC] website	8%	14%
	Friends or colleagues	8%	11%
	An architect, engineer or energy consultant	23%	39%
	An equipment vendor or building contractor	23%	25%
	Past experience with the programs	4%	0%
	Other (please explain)	12%	18%

The share of respondents who heard about the program from an EDC representative or from the EDC website is shown for each EDC in Table 5-9. A larger share of respondents from each EDC heard about the program from a representative of their EDC than from the EDC website.

Table 5-9 EDC Sources for Learning about the Program by EDC

	Response	Ohio Edison (n=32)	Toledo Edison (n=6)	The Illuminating Company (n=15)
How did you learn of [EDC]'s Mercantile Customer Program?	Representative of [EDC] mentioned it	41%	33%	29%
	[EDC] website	19%	0%	0%

5.2.6 The Decision Makers

Table 5-10 displays participant responses regarding how their organizations typically make decisions about energy efficiency improvements. Respondents most frequently reported that decisions were made by one or two key people. Other common responses were that the decision depends on how much the investment is and that the decision is made based on staff recommendations to a decision maker.

Table 5-10 Decision Maker Characteristics

	Response	(n=52)	Percent of Respondents	Percent of Ex Post kWh Savings
How does your organization typically decide to make energy efficiency improvements for this facility? Is the decision:	Made by one or two key people	22	42%	32%
	Depends on how much the investment is	13	25%	20%
	Based on staff recommendations to a decision maker	10	19%	30%
	Made by a group or committee	7	13%	17%
	Made in some other way	1	2%	0%
	Don't know	0	0%	0%

5.2.7 Where Decision Makers Get Their Information

To understand how customers find out about energy efficiency improvements, respondents were asked where they get information about energy efficient equipment, materials, and design features. The results are shown in Table 5-11. Decision makers most heavily relied upon equipment vendors or building contractors (75%), an architect, engineer, or energy consultant (53%), friends and colleagues (36%), and trade journals or magazines (34%). Between 21% and 26% of the respondents get information from the EDC website, brochures or advertisements, or from trade associations or business groups.

These findings suggest that the program marketing model may not fit well with how customers find out about energy efficiency. The Mercantile Customer program is primarily promoted through a group of Administrators who are associations and/or member organizations and through EDC customer service representatives, neither of which were among the most common sources for information on energy efficient equipment, materials, and design features.

Table 5-11 Where Decision Makers get Information about Energy Efficient Equipment, Materials, and Design Features

	Response	*(n=53)*	*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?	Equipment vendors or building contractors	40	75%	72%
	An architect, engineer or energy consultant	28	53%	71%
	Friends and colleagues	19	36%	39%
	Trade journals or magazines	18	34%	39%
	[EDC] Customer Service Representative	16	30%	36%
	Trade associations or business groups you belong to	14	26%	31%
	Brochures or advertisements	13	25%	28%
	[EDC] website	11	21%	12%
	Other	4	8%	3%

Respondents' use of EDC resources for information about energy efficient equipment, materials, and design features are shown in Table 5-12 for each of the EDCs. A larger share of respondents served by Ohio Edison and Toledo Edison relied upon EDC resources than respondents served by The Cleveland Electric Illuminating Company.

Table 5-12 Utilization of EDC Resources for Information about Energy Efficient Equipment, Materials, and Design Features by EDC

	Response	*Ohio Edison (n=32)*	*Toledo Edison (n=6)*	*The Illuminating Company (n=15)*

	Response	Ohio Edison (n=32)	Toledo Edison (n=6)	The Illuminating Company (n=15)
What are the sources your organization relies on for information about energy efficient equipment, materials, and design features?	[EDC] Customer Service Representative	38%	33%	12%
	[EDC] website	25%	17%	6%

5.2.8 Energy Efficiency Attitudes, Behaviors, and Decision Making

To understand what factors customers consider when deciding to make energy efficiency improvements, we asked several questions about organizational procedures and policies, the importance of different considerations for decision making, and their past experience with energy efficient equipment.

Respondents' use of policies and procedures regarding energy efficiency improvements in their organizations is shown in Table 5-13. Forty-two percent of respondents' organizations had policies that incorporate energy efficiency in operations and procurement. About a third of respondents said they had an energy management plan, but that share of kWh savings was nearly two-thirds because respondents' projects that resulted in larger savings were more likely to have an energy management plan. Additionally, about a third of respondents said they had a numeric goal for energy savings. Several respondents also said they had a numeric goal for energy cost reduction (28%) or active training of staff (23%). Twenty-five percent of respondents said they did not have any energy efficiency policies or procedures in place. That share dropped to 11% for the share of savings because firms with larger energy savings were less likely to not have any policies or procedures regarding energy efficiency improvements.

Table 5-13 Policies and Procedures Regarding Energy Efficiency Improvements

	Response	(n=53)	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?	Corporate policies that incorporate energy efficiency in operations and procurement	22	42%	38%
	An energy management plan	19	36%	63%
	A numeric goal for energy savings	17	32%	42%
	A numeric goal for energy cost reduction	15	28%	34%
	None	13	25%	11%
	Active training of staff	12	23%	22%
	Other	5	9%	18%

Respondents were asked to rate a list of factors in terms of importance for their decision making about energy efficiency improvements. The percent of respondents and the percent of ex post kWh savings associated with responses is shown in Table 5-14 and Table 5-15, respectively. Although the Mercantile Customer Program differs from a

traditional incentive program in that its purpose is to compensate customers for energy reduction steps taken on their own instead of offering incentives to motivate efficiency improvements, respondents still considered incentive payments from their EDC to be the most important factor. Specifically, 53% of respondents said incentive payments were very important and 43% said they were somewhat important. The least important factor was advice and/or recommendations from the EDC, although 79% of respondents thought advice and/or recommendations were very important or somewhat important.

Table 5-14 Factors Influencing the Decision to Implement Energy Efficiency Improvements, Percent of Respondents

Energy Efficiency Decision Factor	*Very important*	*Somewhat important*	*Only slightly important*	*Not important at all*	*Don't know*	*n*
Incentive payments from [EDC]	53%	43%	2%	2%	0%	53
Past experience with energy efficient equipment	60%	32%	6%	0%	2%	53
Advice and/or recommendations from [EDC]	34%	45%	11%	6%	4%	53
Advice and/or recommendations from equipment vendors	38%	53%	9%	0%	0%	53

Table 5-15 Factors Influencing the Decision to Implement Energy Efficiency Improvements, Percent of Ex Post kWh Savings

Energy Efficiency Decision Factor	*Very important*	*Somewhat important*	*Only slightly important*	*Not important at all*	*Don't know*	*n*
Incentive payments from [EDC]	45%	40%	6%	9%	0%	53
Past experience with energy efficient equipment	56%	42%	3%	0%	0%	53
Advice and/or recommendations from [EDC]	34%	41%	13%	10%	2%	53
Advice and/or recommendations from equipment vendors	34%	52%	14%	0%	0%	53

Participants in the business incentive programs were asked whether or not they had implemented any energy efficient equipment measures before participating in the Mercantile Customer Program. As shown in Table 5-16, half of respondents said they had previously implemented similar equipment and most said they had not received an incentive to do so.

Table 5-16 Previous Experience with Similar Energy Efficient Equipment or Measures

	Response	*(n=53)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*

	Response	(n=53)	Percent of Respondents	Percent of Ex Post kWh Savings
Before participating in [EDC]'s Mercantile Customer Program, had you installed any equipment or measure similar to the energy efficient [energy efficient equipment/measure] at this facility?	Yes	27	51%	70%
	No	23	43%	28%
	Don't Know	3	6%	3%

5.2.9 Financial Methods Used by Decision Makers

Nearly all decision makers said they used some type of financial method to evaluate energy efficiency improvements. Simple payback was the most commonly mentioned method with 72% of the respondents saying that is how they evaluate energy efficiency improvements. Another common method, the initial cost of the project, was used by 43% of participants. The projects internal rate of return (36%) and life cycle costs were also used by several participants (25%). These responses show the importance of financial considerations in making decisions about energy efficiency improvements.

Table 5-17 Financial Methods to Evaluate Energy Efficiency Improvements

	Response	(n=53)	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?	Simple payback	38	72%	69%
	Initial Cost	23	43%	47%
	Internal rate of return	19	36%	42%
	Life cycle cost	13	25%	28%
	None of these	1	2%	0%
	Don't know	1	2%	3%

Figure 5-5 shows the payback period that respondents said they require. Most participants indicated that they required a relatively short payback period; more than half required a payback period of two years or less. The payback period requirement shows the importance of energy efficient measures that allow for a quick payback. It also points to the potential for incentive payments to influence customers to implement measures by reducing the payback period.

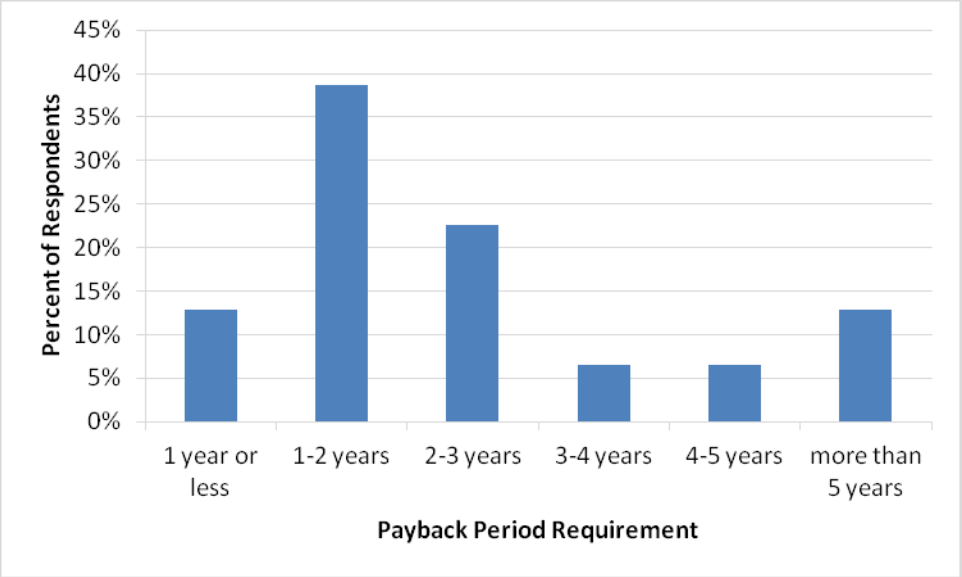

Figure 5-5 (Required Payback Period (n=31)

5.2.10 Choice of Incentive or Rider Exemption

Most survey respondents received the cash incentive (89%) instead of the rider exemption (11%). Furthermore, an analysis of ex post kWh savings found that a larger share of savings was associated with applicants who chose the cash incentive over the rider exemption, a preference that was particularly strong among those who completed projects more recently. In fact, the share of savings associated with cash incentive projects increased from about 65% for projects completed in 2006 to about 84% for projects completed in 2011. This increase may be due to more of the 2011 projects being motivated by the prospects of receiving an incentive and that those who are motivated by the incentive, place greater importance on the immediate payback of the cash incentive. Other findings support the conclusion that those who completed projects more recently were more motivated by the prospective incentive. As shown in Table 5-18, a larger share of respondents who implemented projects in 2011 said the incentives were very important to their decision making than those who implemented projects prior to 2011.

Table 5-18 Importance of Incentive Payments for 2011 and Pre-2011 Projects

	Response	*Pre-2011 Project*	*2011 Project*
How important are incentive payments from [EDC] for your decision making regarding energy efficiency improvements?	Very important	44%	83%
	Somewhat important	51%	17%
	Only slightly important	2%	0%
	Not important at all	2%	0%
	Don't know	0%	0%

Analysis of the respondents' reasons for the incentive type chosen suggests that quick reimbursement was one of the reasons why respondents chose the cash incentive.

Some wanted more immediate reimbursement because they wanted to make additional investments in the business including other energy efficient equipment and others were concerned that the rider exemption might not remain in place long enough to get a high enough payback. However, a number of respondents said they thought the cash exemption offered a better return or more generally that it was a better option for them. A few said that the rider exemption was not an option that they were aware of.

In comparison, reasons given for choosing the rider exemption were that it seemed like it was a better return for the investment and because they were not eligible for the cash incentive.

To further understand participants' reasons for choosing the cash incentive over the rider exemption, responses to questions on energy efficiency decision making were cross-tabulated with participants' choice of cash incentive or rider exemption. Table 5-19 shows that when evaluating efficiency improvements, those who elected for the cash incentive were more likely to use the initial cost, a short-term financial method, and less likely to use the life cycle cost, which involves longer term considerations. However, caution is warranted in interpreting these findings because of the small number of respondents who elected to receive the incentives. Additionally, Table 5-20 shows the greater importance given to incentive payments for participants who elected to receive the cash incentive.

Table 5-19 Financial Method for Evaluating Energy Efficiency Improvements by Incentive Type

	Response	*Cash Incentive (n=47)*	*Rider Exemption (n=6)*
Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?	Initial Cost	45%	33%
	Simple payback	72%	67%
	Internal rate of return	34%	50%
	Life cycle cost	23%	33%
	None of these	2%	0%
	Don't know	2%	0%

Table 5-20 Importance of Incentive Payments by Incentive Type

	Response	*Cash Incentive (n=47)*	*Rider Exemption (n=6)*
How important are incentive payments from [EDC] for your decision making regarding energy efficiency improvements?	Very important	55%	33%
	Somewhat important	45%	33%
	Only slightly important	0%	17%
	Not important at all	0%	17%
	Don't know	0%	0%

5.2.11 Reasons for Participating in the Mercantile Customer Program

Some of the Mercantile Customer Program participants implemented equipment for which they could have received an incentive through the C/I Equipment Programs. All of these participants elected to receive the cash incentive instead of the rider exemption. These findings raise the question of why customers elected to participate in the Mercantile Customer Program instead of the C/I Equipment Programs.

To help answer this question, respondents were asked about their reasons for participating in the Mercantile Customer Program. Nine of the customer survey respondents implemented their equipment after the C/I Equipment Programs launched and implemented equipment covered by the C/I Equipment Programs. Four of the nine respondents said they were not aware of the C/I Equipment Programs. Among the five who were aware of the programs, varied reasons were given for applying for the mercantile program instead of the C/I Equipment Programs including not wanting to delay the project or that the Mercantile Customer Program was recommended by an account representative.

5.2.12 Administrator Organizations

The Mercantile Customer Program is primarily marketed through nine administrator organizations and customers applying to the mercantile program have the option of working through one of them. As shown in Table 5-21, less than half of survey respondents reported that they worked with one of the administrator organizations. The Council of Small Enterprises (COSE) was the organization that survey respondents most frequently worked through followed by the Ohio Manufacturer's Association and Roth Brothers.

Table 5-21 Administrator Organizations

	Response	*(n=53)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
Which of the following organizations did you work with when you participated in the Mercantile Customer Program?	COSE	10	19%	23%
	Ohio Manufacturer's Association	3	6%	6%
	Roth Brothers	3	6%	9%
	County Commissioners' Association of Ohio	2	4%	3%
	Ohio Hospitals Association	1	2%	3%
	Ohio Schools Council	1	2%	1%
	The E-Group	1	2%	1%
	Industrial Energy Users – Ohio	0	0%	0%
	Association of Independent Colleges & Universities	0	0%	0%
	Did not work with any of these organizations	31	58%	54%

Respondents who worked with one of these organizations were asked how satisfied they were with that experience. As shown in Table 5-22, nearly all respondents were very satisfied or satisfied. Only one respondent was dissatisfied with the experience because of "lengthy delays and difficulty getting status reports." These findings suggest that from the customer perspective, the use of the administrator organizations to assist with the application process is generally effective.

Table 5-22 Satisfaction with Administrator Organizations

	Response	*(n=22)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
How satisfied or dissatisfied were you with your experience in working with the organization?	Very Satisfied	14	64%	56%
	Somewhat Satisfied	7	32%	22%
	Neither Satisfied nor Dissatisfied	0	0%	0%
	Somewhat Dissatisfied	1	5%	22%
	Very Dissatisfied	0	0%	0%
	Don't know	0	0%	0%
	Average Rating*		3.5	3.1

5.2.13 Customer Satisfaction with the Program

Overall, customers were satisfied with the Mercantile Customer Program. Twenty-eight percent of respondents said that they were very satisfied with their overall experience with the programs and another 47% said they were satisfied. Respondents were most satisfied with equipment that was installed and least satisfied with the time elapsed until the incentive payment was received. About a third of participants said that they were somewhat dissatisfied or very dissatisfied with the amount of time required to receive the incentive checks. Respondents also expressed some dissatisfaction with the effort required for the application process and the application forms. About a quarter of respondents were somewhat or very dissatisfied with each.

Dissatisfied participants were asked to describe the reason for their dissatisfaction. Many of the specific reasons related to the application process or forms. Some of the respondents felt that the paperwork was burdensome and others noted that it was not possible to track the status of the applications. One respondent thought that the instructions could more clearly state that the energy provider listed should be the EDC, not FirstEnergy. Another respondent thought that the audit process was overly complicated and took too much time. A final issue mentioned by one respondent was that it would be helpful if the form would calculate the amount of the rider exemption because in their case, it turned out to be lower than expected.

Table 5-23 Participant Satisfaction, Percent of Respondents

Satisfaction Element	*Very Satisfied*	*Somewhat Satisfied*	*Neither Satisfied nor Dissatisfied*	*Somewhat Dissatisfied*	*Very Dissatisfied*	*Don't know*
Performance of the equipment installed	81%	15%	2%	0%	0%	2%
Savings on your monthly bill	45%	36%	9%	2%	0%	8%
Incentive amount	38%	45%	8%	4%	4%	2%
The effort required for the application process	21%	28%	25%	15%	11%	0%
Information provided by [EDC] account representative	32%	26%	25%	8%	2%	8%
Elapsed time until you received the incentive -	11%	28%	28%	15%	17%	0%
Application forms	19%	34%	23%	8%	15%	2%
Application instructions	23%	30%	28%	8%	8%	4%
The overall experience with the programs	28%	47%	15%	6%	4%	0%

Table 5-24 Participant Satisfaction, Percent of Ex Post kWh Savings

Satisfaction Element	*Very Satisfied*	*Somewhat Satisfied*	*Neither Satisfied nor Dissatisfied*	*Somewhat Dissatisfied*	*Very Dissatisfied*	*Don't know*
Performance of the equipment installed	90%	7%	0%	0%	0%	3%
Savings on your monthly bill	53%	35%	6%	0%	0%	6%
Incentive amount	44%	31%	16%	1%	7%	0%
The effort required for the application process	24%	21%	21%	14%	20%	0%
Information provided by [EDC] account representative	28%	28%	32%	5%	3%	4%
Elapsed time until you received the incentive -	10%	24%	31%	11%	23%	0%
Application forms	23%	24%	16%	13%	23%	1%
Application instructions	28%	22%	28%	9%	12%	2%
The overall experience with the programs	28%	49%	14%	8%	1%	0%

Table 5-25 displays the average level of satisfaction with the program overall and with different program elements, disaggregated by ex post kWh savings. Specifically, respondent's ex post kWh savings were stratified into quartiles. Those with the largest savings were placed into the first quartile and those with the smallest savings were placed into the fourth quartile. Of note are the lower satisfaction ratings of the effort required for the application process and the application forms by those with projects

with the largest savings. This is likely because the paperwork for larger projects is more complicated and requires greater documentation.

Table 5-25 Average Satisfaction Ratings by Ex Post kWh Savings

Satisfaction Element	*Quartile 1 - Greatest Energy Savings*	*Quartile 2*	*Quartile 3*	*Quartile 4 - Least Energy Savings*
Performance of the equipment installed	4.0	3.5	3.8	3.6
Savings on your monthly bill	3.2	3.5	3.3	2.5
The incentive/exemption amount	3.0	3.4	3.2	2.7
The effort required for the application process	2.0	2.2	3.0	2.3
Information provided by [EDC] Account Representative	2.3	2.6	3.1	2.5
The elapsed time until your application was approved	1.8	2.3	1.8	2.1
The application forms	1.9	2.2	2.6	2.5
The application instructions	2.6	2.2	2.9	2.3
Overall experience with the program	2.8	3.0	3.3	2.5

The average satisfaction ratings for the program elements for customers serviced by each EDC are shown in Table 5-26. Participants served by Toledo Edison gave lower satisfaction ratings for several of the satisfaction elements, particularly for the effort involved in completing the application and with the forms. The lower ratings for the effort required for the application process and the forms is probably due to the larger energy savings associated with participants serviced by Toledo Edison. As previously discussed, the application process is more complicated for projects with larger savings.

Table 5-26 Average Satisfaction Ratings by EDC

Satisfaction Element	*Ohio Edison (n=32)*	*Toledo Edison (n=6)*	*The Illuminating Company (n=15)*
Performance of the equipment installed	3.7	3.2	3.5
Savings on your monthly bill	3.1	3.0	2.8
The incentive/exemption amount	3.1	3.2	2.8
The effort required for the application process	2.4	1.7	2.1
Information provided by [EDC] Account Representative	2.8	2.2	2.5
The elapsed time until your application was approved	1.8	1.7	2.1
The application forms	2.2	1.8	2.1
The application instructions	2.4	2.2	2.5
Overall experience with the program	3.0	2.7	2.6

5.2.14 Paperwork, Installation, and Incentives

As shown in Table 5-27 the majority of respondents said they did not have any issues or problems with the process required to receive the incentive or rider exemption. Of those who had issues or problems, most said that difficulty with the paperwork was the problem. Some of the issues noted by respondents were that they had to submit forms multiple times, that the paperwork was lengthy, or that the forms were confusing. Another frequently mentioned issue was that it took a long time to get the incentive or that they had not yet received it.

Several of the respondents who had issues or problems with the process said that they were resolved with help another party such as the Companies' staff or one of the administrator organizations. Two respondents who had not yet received approval for the rider exemption or cash incentive said that their issues had not yet been resolved.

Table 5-27 Decision Maker Experience with the Process to Receive Incentives

	Response	*(n=53)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
Did you have any issues or problems with the process required to receive the [incentive or rider exemption] (e.g., paperwork) for your energy efficiency project?	Yes	15	28%	29%
	No	33	62%	62%
	Don't Know	5	9%	9%

As shown in Table 5-28, all respondents said that their expectations were met. This suggests that the equipment will remain installed and continue to produce energy savings.

Table 5-28 Decision Maker Satisfaction with Equipment Installed

	Response	*(n=53)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
Did the energy efficient equipment you installed through [EDC]'s Mercantile Customer Program meet your expectations?	My expectations were exceeded	16	30%	25%
	My expectations were met	35	66%	69%
	My expectations were mostly met	2	4%	6%
	My expectations were not met	0	0%	0%
	Don't know	0	0%	0%

Participants were asked whether or not they had any issues in receiving the incentive check. Their responses are shown in Table 5-29. More than a third of the respondents said they did have an issue receiving the check. Most of the problems that respondents mentioned were related to the long time it took to receive the incentive check. Other less frequently mentioned issues included, the incentive being less than expected, difficulty with the paperwork, and not having a way to track projects.

Table 5-29 Issues in Receiving the Incentive Check

	Response	*(n=53)*	*Percent of Respondents*	*Percent of Ex Post kWh Savings*
Were there any issues receiving the incentive check?	Yes	19	36%	43%
	No	25	47%	47%
	Don't Know	9	17%	11%

5.2.15 Customer Recommendations and Overall Impressions

When responding to open-ended questions regarding their experiences with the programs, participants provided some recommendations for program improvement. Several of these comments suggested that the program should be promoted better by the Companies. Other suggestions were to make the forms easier and to provide information on the status of applications.

A number of comments offered praise for the program. These comments included praise for customer service representatives and appreciation for the program in helping businesses save energy.

5.2.16 Programs Operations Perspective

This section summarizes the core findings of interviews conducted with the Companies' program staff for the purposes of developing market environment and internal program management perspectives.

In order to gain insight into the Mercantile Customer Program operation and delivery, interviews were conducted with key members of the Companies' staff. These interviews focused on the overall effectiveness of the program process and the identification of areas for future program improvement. Interview questions related to the respondents'

individual roles in administering the programs as well as their perceptions of overall program strengths, weaknesses, and opportunities for the future.

Key trends and issues addressed by respondents include:

- **Program Activity Remains Strong:** The Mercantile Customer Program is still receiving a large number of applications. However, the savings associated with the applications has declined somewhat. Additionally, the type of applicant is changing as there have recently been more applications with multiple projects and sites.
- **Effective Program Processes have been Developed:** It was noted that there have been errors with a large number of the applications submitted. Typical errors included missing information, inconsistencies in the information reported, and improper labeling of documentation. To address these issues, program staff has developed processes and tools, such as checklists and naming conventions, for reviewing applications, identifying errors, and keeping supporting documentation organized. These steps help with the effective administration of the program.

  Participants have Complained about Length of Process: Program staff is aware that customers have been frustrated by the slow process of approving applications. However, the PUCO has greatly alleviated this issue with the inception of the Pilot Program that allows for a 60 day auto approval, with no requirement for a PUCO Commission Order.

6. Summary and Conclusions

The interviews and surveys that were conducted provided a perspective on program operations and effectiveness during PY2. The following presents a selection of key conclusions from PY2:

- **High Program Satisfaction:** Participants were satisfied with their overall experience with the program, although some expressed dissatisfaction with the application process. About a quarter of participants were either dissatisfied or very dissatisfied with the effort required to apply for the incentives or with the application forms. Additionally, nearly a third of participants were somewhat or very dissatisfied with the time required to receive incentives. Program staff is aware of the dissatisfaction with the length of time required to receive the incentive. However, both the length of time to receive the incentive and the complexity of the application are generally due to the regulatory requirements for approving projects for incentives and not under the direct control of the Companies' staff.
- **Preference for Cash Incentive over Rider Exemption:** A large share of the PY2 savings came from participants who elected to receive the cash incentive over the rider exemption. Furthermore, a larger share of those who completed projects in 2011 chose the cash incentive instead of the rider exemption compared to those who completed projects in prior years. This may have occurred because projects completed in these years were motivated by the program whereas older projects were completed by customers on their own initiative. Participants motivated by the program may be more concerned with quickly recouping their costs through the incentive. Analysis of the reasons for electing the cash incentives found that some participants opted for the cash incentive because they could invest the money back into the business. Furthermore, some participants were uncertain about whether or not the rider would continue to be granted for a long enough period to make it worthwhile. Other participants chose the cash incentive because they thought it offered a better return than the exemption.
- **Most Savings from Older Projects:** Most of the savings achieved during PY2 came from projects completed prior to 2011. The reliance of older projects for energy savings suggests that the Mercantile Customer Program's ability to generate savings in the future may diminish. However, program staff reports that interest in the program remains strong.
- **Manufacturing Firms Account for Large Share of Savings:** Approximately half of the PY2 savings accrued through the program were from manufacturing firms. Relative to respondents from other industries, manufacturing firms were more likely to report that they heard about the Mercantile Customer Program from a representative of their EDC. This may explain their greater participation in

the program because customer service representatives are one of the means that the program is promoted. Half of the savings through the program were from manufacturing firms.

- **Customers Satisfied with Administrator Organizations:** In addition to promoting the program, the administrator organizations help participants file applications. Most survey respondents who worked with one of the administrator organizations were satisfied with the experience.

The following recommendations are offered to support ongoing program improvements:

- **Monitor Future Program Activity:** Although PY2 was an active year for the Mercantile Customer Program, it may be more difficult for the program to generate savings over the longer term. The majority of the PY2 savings were from projects implemented prior to 2011. At some point the program may work through the pool of potential participants. Program staff should continue to monitor the level of program activity with this in mind.
- **Streamline Application Process:** Some respondents reported difficulty with the application process. Problems completing the forms were often the source of the difficulty. Program staff should consider ways that the application process could be improved to make it easier for participants. In particular, staff could interview applicants or observe applicants completing forms to understand the source of the difficulty. Alternatively, staff could track errors to see if any are made more frequently than others.
- **Review of Large Projects with Uncertain Savings:** There is a higher level of uncertainty in the estimation of ex ante savings for some measure types, such as HVAC, refrigeration, VFD, and process improvements, than for other measures, such as lighting. This uncertainty may lead to ex ante savings that are higher than ex post savings and to a correspondingly lower realization rate. For these types of measures, in cases where the savings are potentially large, it is recommended that program staff have ADM review the project and the ex ante savings estimates. This review will aid in the early identification and correction of potential overestimation of ex ante savings and help to ensure a greater realization rate for the program.

Appendix A: M&V Results for Projects in Analysis Sample

This appendix contains annualized gross kWh savings, first year gross kWh savings, and peak demand reductions for the Mercantile Customer Programs.

Table A-1. Summary of kWh Savings for Mercantile Customer Program

Operating Company	*Ex Ante kWh Savings*	*Ex Post kWh Savings*	*Realization Rate*
CEI	115,162,353	105,136,279	91%
OE	130,804,439	118,234,076	90%
TE	57,041,006	50,778,328	89%
Total Companies	303,007,798	274,148,683	90%

Table A-2. Summary of Peak kW Savings for Mercantile Customer Program

Operating Company	*Ex Ante Peak kW Savings*	*Ex Post Peak kW Savings*	*Realization Rate*
CEI	19,029	14,743	77%
OE	18,123	18,912	104%
TE	8,514	6,782	80%
Total Companies	45,666	40,437	89%

Table A-3 Summary of First Year kWh Savings for Mercantile Customer Program

Operating Company	*First Year Ex Post kWh Savings*
CEI	103,200,939
OE	110,934,939
TE	48,255,938
Total Companies	262,391,817