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Energy Efficiency / Demand Response Plan: Plan Year 3 (6/1/2010-5/31/2011)

Evaluation Report: Smart Ideas for Your Business Custom Program

Presented to

Commonwealth Edison Company

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Section E. Executive Summary

E.1 Evaluation Objectives

ComEd's three-year Energy Efficiency and Demand Response Plan, filed in November 2007 and approved in February 2008,[1] anticipates that the Custom program will provide 24% of the business portfolio nonresidential energy savings.

The goal of this report is to present a summary of the findings and results from the evaluation of the Program Year 3 C&I Custom program[2]. The primary objectives of this evaluation are to quantify gross and net impacts and to determine key process-related program strengths and weaknesses and identify ways in which the program can be improved.

E.2 Evaluation Methods

For the PY3 impact evaluation, gross program impact results were developed based on detailed M&V for a selected sample of 32 projects and net impact results were developed based on survey data collected for 67 projects. Six research activities were conducted in support of the process evaluation: (1) interviews with program and implementation staff, (2) in-depth interviews with participating market actors, (3) in-depth interviews with ComEd Account Managers, (4) a quantitative telephone survey with 61 participating customers, (5) a quantitative telephone survey with 70 non-participating customers, and (6) a literature review and utility staff interviews regarding upstream bonuses for trade allies. Additional information about the evaluation data sources can be found in Appendix 5.2.

E.3 Key Impact Findings and Recommendations

The Custom program's third year (PY3) began in June 2010 and ended May 31, 2011. Combined the Custom and Prescriptive programs exceeded PY3 goals.

Table E-1 below provides reported ex ante and evaluation-adjusted net savings impacts for the PY3 Custom program. As shown in Table E-1, the PY3 evaluation found that verified gross energy savings were 15 percent lower than savings in ComEd's tracking system, as indicated by the realization rates (realization rate = verified gross / tracking system gross). The verified net-to-gross ratio, 0.56 for energy savings, was significantly lower than ComEd's planning value of 0.80.

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[1] Commonwealth Edison Company's 2008 – 2010 Energy Efficiency and Demand Response Plan, Docket No. 07-0540, ComEd Ex. 1.0, November 15, 2007.

[2] The Program Year 3 (PY3) program year began June 1, 2010 and ended May 31, 2011.

Table E-1. Program-Level Evaluation-Adjusted Net Impacts for PY3

Segment	Ex Ante Gross *	Ex Post Gross	RR	Ex Ante Net **	Ex Post Net	NTGR (ex post gross)
kWh	55,555,278	47,432,812	0.85	44,444,223	26,434,465	0.56
kW	5,794	5,060	0.87	4,635	2,324	0.46

** Source: Ex ante savings from ComEd online tracking system, August 12, 2011*

*** Reported: Communication from ComEd. ComEd's reported net savings include a net-to-gross ratio of 0.8.*

The relative precision at a 90% confidence level for the 32 Custom projects in the gross impact sample is ± 16% for the kWh Realization Rate[3] and ±7% for the kW Realization Rate. The relative precision at a 90% confidence level for the program NTG ratio is ± 9% for kWh and ± 18% for kW.

Table E-2 below provides an overview of gross impacts, net impacts, and other results that illustrate program accomplishments over the first three years of implementation.

Table E-2. Custom Program Results from PY1, PY2, and PY3

Program Result	PY1	PY2	PY3	Total
Ex Ante Gross kWh	8,410,846	26,805,344	55,555,278	90,771,468
Ex Post Gross kWh	6,606,461	22,697,187	47,432,812	76,736,460
Realization Rate	0.79	0.85	0.85	0.85
Ex Post Net kWh	4,760,526	17,255,274	26,434,465	48,450,265
Net-to-Gross Ratio	0.72	0.76	0.56	0.63
Number of Projects	75	345	887	1,307
Incentives Paid†	$256,419	$1,765,763	$3,588,001	$5,610,183

Source: Evaluation reports and ComEd program tracking system. Values shown have been rounded.
† Incentives as recorded in the ComEd program tracking system

Based on the sample size of 32 custom projects evaluated in PY3, the gross impact results yielded an energy realization rate of 0.85 which is considered to be high for a custom program. This shows that ComEd is continuing to do a good job of estimating gross impacts for Custom energy efficiency projects in the program. In general the implementation team did a very good job of ensuring that all measures are installed and operational. PY3 energy savings realization rate results indicate that the smallest projects (stratum 3, RR = 1.14) realized a greater proportion of the ex ante claims than the largest (stratum 1, RR = 0.81) and medium projects (stratum 2, RR = 0.57). The evaluation team hypothesizes that this may be due to the complexity

[3] Note that the evaluation plan was designed to achieve 90/8 precision levels over the three year evaluation period from PY1 through PY3. Therefore, no precision targets were set for PY3 alone.

and additional uncertainty associated with the large projects in strata 1 and strata 2. The program can further improve the gross impact results by using improved data collection methods and enhanced calculation models. Key evaluation conclusions and recommendations include the following:

Improvements to Ex Ante Impact Estimates[4]

Finding. The program savings calculations did not always represent annual operating conditions. For example, the ex ante calculations were found to not accurately represent facility operating hours (e.g. #8557, and #5311, #5613 and #4367).

- **Recommendation.** To improve program calculations and realization rates, the program could do a better job of verifying operating hours and to examine whether or not the data collected represents typical annual operating conditions for the installed equipment. Adjustments should be made to energy usage calculations (if appropriate) based on information provided by the customer or other available sources.

Finding. The program calculations (specifically for compressed air projects) are not normalized to account for changes in facility production levels or equipment load profiles (e.g. # 7339, #6997 and #4371).

- **Recommendation.** Determine whether pre or post measurement data will require normalization to properly adjust for production differences including appropriate adjustments for weekly or seasonal variation or for market fluctuations. For compressed air projects energy usage calculations should be normalized if the airflow profile has changed from pre retrofit period to the post retrofit period.

Finding. The program calculations did not perform reasonable sanity or reality checks to verify the reasonableness and the range of estimated savings for projects that involved estimation of critical parameters (e.g. #2559, #8359 and #7461).

- **Recommendation.** Where possible collect site specific data through measurements in support of critical model parameters. Avoid using rules of thumb or percent savings from manufacturer literature. At a minimum verify all assumptions and estimates with appropriate considerations of site specific conditions. Additionally, implementers can obtain manufacturer performance data sheets or use Air Master+ software for compressor units and use them as needed to aid the ex ante calculations. When performing billing analysis, collect information to ensure that other factors

[4] Additional specific site information is not available to protect customer confidentiality

(that might skew the savings) are accounted (i.e. miscellaneous loads, other energy efficiency measures and addition of new loads, etc.).

Finding. The peak kW calculations were not always consistent with PJM requirements or were not representative of the actual operation of the system during the peak period (e.g. # 6215, #3554 and #8568). Peak kW estimates were often set to zero.

- **Recommendation.** Calculate peak kW savings for all projects and ensure that the estimated savings meet PJM peak demand calculation requirements for weather and non weather dependent projects.

Finding. There were a number of cases where the sources of inputs used in the program calculations were not documented (e.g. #8557, #2234, #6215 and #5613). Also, sources for electric unit cost ($/kWh) were not available and were found to vary considerably site-to-site.

- **Recommendation.** Provide sources for all the inputs and assumptions used for program calculations (especially for any critical parameters such as load factors, power factor, full load amps, temperature set points and operating hours). Collect nameplate or manufacturer information for all the equipment; the nameplate information can be used to verify inputs used for ex ante savings calculations.

Baseline Selection Issues

Finding. The baseline condition was adjusted (in the evaluation) for four projects, which had a significant effect on the total realized savings for two (#391 and #3820) projects. The most common problem observed is the use of pre-existing equipment as the baseline.

- **Recommendation.** One step that would improve the realization rate would be adjusting the baseline condition consistent with the evaluation approach when the existing equipment being removed has a relatively short remaining useful life or generally requires replacement.
    - Identify projects explicitly in program files as replace-on-burnout, natural turnover, or early replacement.
    - The age, remaining useful life, operating condition of the existing equipment and the estimated time at which the existing equipment would have been replaced in the future should be verified before selecting the existing equipment as the baseline condition.
    - The true test for early replacement should be whether or not there is strong evidence pointing to program induced accelerated adoption.
    - For the replace-on-burnout and natural turnover cases, baselines should be based on the efficiency of alternative new equipment or code requirements and not the existing in situ equipment.

Program Eligibility Requirements

- **Recommendation**. Program implementers should provide strong evidence and supporting documentation that clearly demonstrates that the installed higher efficiency equipment exceeds the efficiency of standard practice.

Data Collection

Finding. When the program collects measured data in support of ex ante impact calculations and uses that as a source for estimating savings or for model calibration, the resulting ex ant savings estimates were found to be more accurate (e.g. #8359, #1030, #3554 and #3454).

- **Recommendation.** The program should continue to take measurements for pre retrofit and post retrofit equipment. Measured performance of PY3 projects resulted in accurate savings calculations and high realizations rates (also reflected by the resulting high program RR). Projects with measured program data (obtained from logging or from a customer's SCADA system) were used by the evaluators to inform modeling and assign values to critical parameters. Evaluators do not have access to pre-installation equipment and conditions; therefore, ex ante measured data can greatly benefit the accuracy of ex post savings calculations. However, it is recommended that the program collect kW measurements and use amperage metering sparingly, such as when the panel size is too small to install kW current transducers or when only amperage data is collected in the SCADA system.

Net Impacts

Finding. Free-ridership levels for PY3 custom program are 44%, which represents a significant increase from 24% in PY2. Mean free-ridership was relatively high across the two largest projects (sampling strata 1).

- **Recommendation**. One approach to reducing free ridership is for program administrators to simply exclude projects from the program that they believe have a high probability of being free riders. For example, incentives should not be provided to projects that are already installed. Similarly, if there is evidence that the program did not contribute significantly to the decision to install a particular project or equipment type then an incentive may not be warranted. Incentives might only be provided if the program process leads to a higher efficiency level than initially planned. Consider tying performance of the program implementation staff (or implementer in general) not only with the gross impact but also with the verified net savings.

E.4 Key Process Findings and Recommendations

Trade Ally Network

Finding. PY3 marked the introduction of new trade ally requirements. While most interviewed trade allies saw no problems with these requirements, active non-trade ally contractors most often cite the time burden of attending the training in person as the main reason for not becoming a trade ally.

- **Recommendation.** Consider offering basic trainings online. If disseminating the information provided in the training is considered important to continue to increase the quality of applications, then the program should consider offering trainings via a web portal. This will allow more contractors to take advantage of the training opportunities and would reduce a barrier to becoming a trade ally.

Trade Ally Bonus

Finding. Additional research into trade ally bonuses offered by other utilities found that apart from the bonus structure, strong communication and clear expectations are crucial to the success of such an effort.

- **Recommendation.** The Smart Ideas program has already modified its bonus offering for PY4, adopting a tiered system modeled after Ameren Illinois' trade ally incentive structure. The program should strive to communicate the new bonus program early and clearly to both trade allies and non-ally contractors, and provide sufficient lead time for contractors to increase their promotion and take advantage of the offering to the fullest extent.

Program Marketing and Outreach

Finding. Lack of program awareness is still a key barrier to participation in the Smart Ideas program. In addition, reaching the correct decision-maker is a major hurdle both in increasing awareness of the program and encouraging participation. However, opportunities exist to increase participation in the Smart Ideas program among current non-participants. Almost two-thirds of non-participants indicate that there have been installations of equipment, or other upgrades, at their facility in the past three years. Despite the economic climate, customers are active in installing new equipment and have an interest in energy efficiency.

- **Recommendation.** The program should attempt to develop a more targeted database of energy decision makers for their larger customers. To start this database, Account Managers could be engaged to provide decision maker contact information for each of their managed accounts.

E.5 Cost Effectiveness Summary

ComEd uses DSMore™ software for the calculation of the Illinois TRC test. Table E-3 summarizes the unique inputs used in the DSMore model to assess the TRC ratio for the Custom program in PY3. Most of the unique inputs come directly from the evaluation results presented previously in this report. Measure life estimates and program costs come directly from ComEd. All other inputs to the model, such as avoided costs, come from ComEd and are the same for this program and all programs in the ComEd portfolio.

Table E-3 Inputs to DSMore Model for Custom Program

Item	Value Used
Measure Life	12
Utility Administration and Implementation Costs	$684,212
Utility Incentive Costs†	$2,878,922
Net Participant Costs	$12,317,152

† Incentives from the ComEd accounting system based on actual invoices

Based on these inputs, the Illinois societal TRC for this program is 0.99 and the program does not pass the Illinois TRC test.

Section 1. Introduction to the Program

This evaluation report covers the Custom program element of the ComEd Smart Ideas for Your Business incentive program.

1.1 Program Description

The Commonwealth Edison Company (ComEd) Smart Ideas for Your Business program provides incentives for business customers who upgrade their facilities with energy efficient equipment. This incentive program is available to all eligible, nonpublic, commercial and industrial customers in ComEd's service territory. There were two specific program elements that were available to ComEd customers during program year 3 (PY3) under the ComEd Smart Ideas for Your Business incentives program:

Prescriptive Incentives were available for energy-efficiency equipment upgrades and improvements including lighting, cooling, refrigeration, and motors. Incentives were paid based on the quantity, size, and efficiency of the equipment. Incentives were provided for qualified equipment commonly installed in a retrofit or equipment replacement situation.

Custom Incentives were available to customers for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects. Custom measure incentives were paid based on the first year energy (kWh) savings. All projects were required to meet ComEd's cost-effectiveness and other program requirements.

Measures that are available through the Prescriptive program are not eligible for custom incentives. However, the applicant has the option to apply for a custom incentive if the entire project involves a combination of prescriptive and custom measures. The Prescriptive and Custom programs continued into program year 3, with minor changes to custom incentive levels and rebate options The PY3 program included bonus payments to the trade allies. The bonus was in effect from September 1st through November 30th, 2010 (the day by which final applications had to be submitted). It was only available to trade allies and consisted of 5% of the total incentive amount for projects with incentives of $10,000 or more.

Additional ComEd program offerings are provided under the Smart Ideas business program umbrella, including retrocommissioning and new construction services. The Illinois Department of Commerce and Economic Opportunity (DCEO) is responsible for delivering programs to ComEd customers targeted towards public nonresidential buildings such as

government, municipal, and public schools.[5] These ComEd and DCEO programs are evaluated and reported separately.

The Smart Ideas for Your Business program is a key part of ComEd's overall portfolio of programs approved by the Illinois Commerce Commission (ICC) as part of ComEd's Energy Efficiency and Demand Response Plan, filed in November 2007 and approved in February 2008.[6] The program is funded on an annual basis from June 1 to May 31 of each year.[7] Funding in any given program year is limited to that year's budgeted amount and, therefore, incentives are paid on a first-come, first-served basis until the program year's incentive funds are exhausted. It should be noted that the Custom program is administered in conjunction with the Prescriptive program, which allows considerable flexibility to adjust program funding as needed between the Custom and Prescriptive programs. No Custom applicants were wait-listed in PY3, as funding was available to address all viable custom projects.

The net MWh savings goals and budgets for the 2011 (PY3) Prescriptive and Custom incentives program are presented in Table 1-1.

Table 1-1. Smart Ideas for Your Business PY3 Planned Savings Goals and Budgets

Program Element	Plan Target Net MWh	Plan Target Net MW	Plan Target Total Cost
Prescriptive Incentives	167,613	47.8	27,000,000
Custom Incentives	95,244	17.6	13,400,000
Total	262,857	65.4	40,400,000

Source: Commonwealth Edison Company's 2008 – 2010 Energy Efficiency and Demand Response Plan, Docket No. 07-0540, ComEd Ex. 1.0, November 15, 2007. The program's net savings goals include a net-to-gross ratio of 0.8 and a gross realization rate of 0.95.

1.1.1 Implementation Strategy

ComEd retained KEMA Services Inc. as its program administrator responsible for day-to-day operations. The Custom program was launched in June 2008.

ComEd has provided the evaluation team with a detailed Operations Manual and a Policies and Procedures Manual that describe the details of program implementation. Important aspects of program implementation are summarized in Appendix 5.3.1.

[5] For more information on the DCEO programs please refer to (www.illinoisenergy.org).
[6] Commonwealth Edison Company's 2008 – 2010 Energy Efficiency and Demand Response Plan, Docket No. 07-0540, ComEd Ex. 1.0, November 15, 2007.
[7] Program year 3 ran from June 1, 2010 through May 31, 2011.

1.1.2 Measures and Incentives for PY3

ComEd's Smart Ideas for Your Business Custom incentive program provides incentive payments for eligible energy efficiency projects. Custom program incentives are intended for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects. Custom incentives are available based on the project's kWh savings, assuming the project meets all program requirements. Incentives are based on the following formula:

For projects with less than a 5-year life, or for any involving Energy Management System programming, the program pays an incentive of $0.03/kWh

For equipment with a 5-year life or greater, the program pays an incentive of $0.07/kWh down to a minimum payback of one year and up to a maximum payback of 7 years.

The Custom incentive amounts noted above are applied for the first $100,000 in incentives and then half that amount for the next $100,000 in incentives up to the project cost cap.

Additionally, $200,000 in incentives is available for Prescriptive measure installations, up to a total project incentive cap of $400,000 per customer. Project incentives cannot exceed 50 percent of the total project cost (includes costs of equipment and contractor labor; excludes in-house labor) and 100 percent of the incremental measure cost.

The PY3 program application form is provided in Appendix 5.1, and includes a listing of project eligibility criteria, incentive levels and the general application process.

1.2 Evaluation Questions

The evaluation sought to answer the following key researchable questions.

Impact Questions:

1. What are the gross impacts from this program?
2. What are the net impacts from this program?
3. Did the program meet its energy and demand goals? If not, why not?

Process Questions:

The process evaluation questions for PY3 focused on the following key areas:

1. Program design and implementation changes in PY3
2. Changes to customer and trade ally program participation between PY2 and PY3
3. Effectiveness of program design and processes
4. Effectiveness of program implementation
5. Effectiveness of program marketing and outreach
6. Barriers to participation
7. Participant satisfaction

Section 2. Evaluation Methods

This section describes the analytic methods and data collection activities implemented as part of the PY3 process and impact evaluation of the Custom program, including the data sources and sample designs used as a base for the data collection activities.

A total of 887 Custom tracking records were reported. These records were submitted for incentive payments in a total of 884 unique Custom projects. They included HVAC measures (such as VSDs/VFDs, free cooling installations, chiller upgrades, and centralized thermostat control systems,) large commercial refrigeration measures, air compressor system upgrades, high-rise building domestic water pumping systems, industrial process renovations and custom, non-prescriptive lighting measures. Custom lighting measures are measures that are either not included under the Prescriptive program, or lighting measures that operate on a different schedule (i.e., 24/7) than the Prescriptive assumptions. Sometimes they include lighting measures that would qualify for the Prescriptive program, but the customer preferentially applies for the rebate under the Custom program. It is also noted that there are typically multiple lighting measures per tracking system record.

To support the gross impact evaluation objectives the PY3 evaluation activities performed on-site visits and detailed M&V for 26 Custom projects and thorough desk reviews for six (6) lighting projects. Furthermore, telephone surveys were completed for 67 Custom projects to address evaluation process and net-to-gross objectives. The key evaluation activities were:

Conduct on-site visits, M&V activities and desk reviews. These activities seek to develop independent ex post estimates of savings, and to update, refine or replace the calculation procedures that were submitted as part of the final application submittal.

Conduct CATI telephone surveys for 67 Custom projects to support the net impact approach (as described in greater detail in the Net Program Savings section, 2.1.2 below). Survey data collection purposefully includes all 32 gross impact points in an effort to coordinate NTG and gross impact estimates, conclusions and to obtain the best possible story line supporting both efforts. As was the case for PY1 and PY2, the Basic rigor NTG approach was predominantly used in PY3. For PY3 evaluation, only two Custom projects were sufficiently large to trigger a Standard rigor approach.

These same CATI surveys support the process evaluation. While additional process only surveys were originally envisioned in order to ensure more robust process findings, only a total of 67 completes was feasible.

The sections that follow provide greater detail on the methods deployed.

2.1 *Analytical Methods*

2.1.1 Impact Evaluation Methods

Gross Program Savings

The objective of this element of the impact evaluation is to verify the veracity and accuracy of the PY3 ex ante gross savings estimates in the Custom program tracking system. The savings reported in ComEd's online tracking system were evaluated using an M&V approach in some instances and desk reviews in others. The following M&V steps also apply to desk reviews except where noted:

1. Develop a site-specific M&V plan for a representative sample of program projects. Each M&V plan details the data collection and analysis approach to be undertaken, following a careful review of relevant documents stored in ComEd's online tracking system, including the Final Application submittal and the application-based calculations. Sometimes each plan is further refined based on a brief interview with the customer representative over the phone.
2. Implement a site-specific data collection approach for each sampled project. The focus of the data collection is to verify and/or update the assumptions that feed into engineering algorithms of measure level savings. Data collection also includes verification of measure installation and that the systems are functioning and operating as planned, and if not then in what way(s) there is variance.
3. Perform on-site measurement or obtain customer-stored data to support downstream M&V calculations. Measurement data obtained from the sites are used to calibrate the analyses, as measured parameters typically have the least uncertainty of any of the data elements collected. Measurement includes spot measurements, run-time hour data logging, and post-installation interval metering. Customer-supplied data from energy management systems (EMS) or supervisory control and data acquisition (SCADA) systems are often used when available. Desk reviews do not incorporate on-site data collection. Desk reviews instead involve customer interviews to collect operating schedules, review invoices to confirm quantity of installed fixtures, use manufacturer data or the standard wattage tables to verify fixture wattages and review of ex ante calculations to verify the reported savings.
4. Complete ex post engineering-based estimates of gross annual energy (kWh) and summer peak demand (kW) impact for each sampled project. A site specific analysis is performed for each point in the impact sample. The engineering analysis methods and degree of monitoring will vary from project to project, depending on the complexity of the measures installed, the size of the associated savings and the availability and reliability of existing data. Gross impact calculation methodologies are generally based on IPMVP protocols, options A through D. At a minimum, the ex post impact evaluation

incorporates the following additional information that may not have been feasible to incorporate in Final Application submittal:

a. Verification that measures are installed and operational, and whether or not the as-built condition will generate the predicted level of savings.
b. Observed post-installation operating schedule and system loading conditions.
c. A thorough validation of baseline selection, including appropriateness of a retrofit vs. replace on burnout claim.
d. Development of stipulated and measured engineering parameters that contribute to the impact calculations.

5. Prepare a detailed, site-specific impact evaluation report for each sampled site.
6. Carry out a quality control review of the ex post impact estimates and the associated draft site reports and implement any necessary revisions.

A verified gross realization rate (which is the ratio of the ex post gross savings-to-reported tracking savings) was then estimated for the sample, by sampling stratum, and applied to the population of reported tracking savings, using sampling-based approaches that are described in greater detail in Sections 2 and 3 below. The result is an ex post estimate of gross savings for the Custom program.

Additional information regarding the gross impact methods can be found in Appendix 5.3.2 including baseline assessment, production adjustments, data collection and quality control methods.

Net Program Savings

Net Program Savings

The primary objective of the net savings analysis for the Custom program was to determine the program's net effect on customers' electricity usage. After gross program impacts have been assessed, net program impacts are derived by estimating a Net-to-Gross (NTG) ratio that quantifies the percentage of the gross program impacts that can reliably be attributed to the program. A customer self-report method, based on data gathered during participant phone surveys, was used to estimate the NTG ratio for this evaluation.

For PY3, the net program impacts were quantified solely on the estimated level of free-ridership. This requires estimating what would have happened in the absence of the program. The existence of participant spillover was examined in PY3 but spillover was not quantified.

Once free-ridership has been estimated the Net-to-Gross (NTG) ratio is calculated as follows:

NTG Ratio = 1 – Free-ridership Rate

Additional information regarding the net impact evaluation methodology can be found in Appendix 5.3.3 including the table with summarized scoring approach and spillover assessment methodology.

2.1.2 Process Evaluation Methods

Six research activities were conducted in support of the process evaluation: (1) interviews with program and implementation staff, (2) in-depth interviews with participating market actors, (3) in-depth interviews with ComEd Account Managers, (4) a quantitative telephone survey with 61 participating customers, (5) a quantitative telephone survey with 70 non-participating customers, and (6) a literature review and utility staff interviews regarding upstream bonuses for trade allies. These activities are further described in Appendix 5.3.4.

2.2 *Sampling*

ComEd's tracking database extract dated 4/5/2011 was used to select 17 M&V sample points. The tracking database extract dated 7/13/2011 was used to select 16 more M&V sample points, for a total of 33. After completing the site visits, one of the original 17M&V sample points was moved into PY4. Therefore, a total of 32 M&V sample points were evaluated in PY3. For telephone surveys, 33 sample points were selected using the 4/5/2011 database extract, and 34 additional sample points were selected using the 7/13/2011 database extract.

2.2.1 Profile of Population

Using the 4/5/2011 tracking extract, custom records were sorted and placed in three strata using ex ante savings kWh to create roughly equal contributions to total program savings. When the 7/13/2011 extract became available, the strata boundaries defined on 4/5/2011 were preserved. The 16 additional M&V sample points were selected so that the sample reflects the final population distribution of savings within each stratum.

Sampling for the Custom program was completed for ex post gross M&V-based evaluation, as well as a telephone survey supporting ex post net impact evaluation and the process evaluation.

Table 2-1 presents each of three strata developed for sampling within the Custom Program, which consists of a total of 887 tracking records comprising 884 unique Custom projects. The number of records is presented by strata, along with ex ante gross kWh claimed, ex ante gross kW claimed, and the amount of incentive paid. Note that the Custom tracking system based peak demand estimates are populated more completely than in PY2, with only 346 out of 887 records showing zero ex ante kW savings. Because ComEd's application form does not request that the applicant submit an estimate of kW savings, it is unknown if some of the 346 records have ex ante kW savings different than zero. This might mean that ComEd is underestimating the Custom program's ex ante kW savings, and makes the estimation of ex post gross kW impacts less accurate than optimum.

Table 2-1. PY3 Custom Program Participation by Sampling Strata

Sampling Strata	Ex Ante kWh Impact Claimed	Ex Ante kW Impact Claimed	Tracking Records	Incentive Paid to Applicant
1	10,694,836	897	2	$626,358
2	22,036,229	2,031	27	$1,525,331
3	22,824,213	2,865	858	$1,436,311
TOTAL	55,555,278	5,794	887	$3,588,001

Source: Evaluation analysis of tracking savings from ComEd online tracking system, August 2, 2011.

2.2.2 Gross Impact M&V Sample

Before final sample selection, the tracking extract was reviewed to check for outliers and missing values, and then matched to ComEd's reported energy savings. Some projects contain both Custom and Prescriptive measures (combined projects). The Custom and Prescriptive programs were evaluated through different approaches by necessity, so the evaluation team included all custom measures within the Custom evaluation, and all prescriptive measures within the Prescriptive evaluation. As a result, 314 combined projects have measures within each of the two evaluations. Site visits and phone surveys were coordinated by assigning combined projects to one evaluation or the other to avoid multiple contact attempts.

Program-level Custom savings data were analyzed by project size to inform the sample design for this population of heterogeneous measures. Using the 4/5/2011 extract, projects were stratified at tracking record level using the ex ante kWh impact claim. Records were sorted from largest to smallest Custom kWh claim, and placed into one of three strata such that each contains one-third of the program total kWh claim. The project distribution changed between 4/5/2011 and the final extract dated 8/2/2011, but the strata boundaries defined using the 4/5/2011 extract were preserved. In the final extract, the two largest records were assigned to "strata 1," the next largest 27 records were assigned to "strata 2," and the smallest 858 records were assigned to "strata 3."

The Custom evaluation plan called for a target sample of 33 records in the ex post gross impact M&V sample. This sample was drawn such that the sample represents the final population distribution by strata: the two records in strata 1 were selected, 15 records out of 27 were randomly selected in strata 2, and 15 records out of 858 were randomly selected in strata 3. Each of the records selected represents just one Custom project. Note that a third project from stratum 1 was moved into PY4 after the impact team had completed the field work, so the final impact sample only contains 32 records representing PY3.

Profile of the Gross Impact M&V Sample

Table 2-2 provides a profile of the gross impact M&V sample for the Custom program in comparison with the Custom program population. Shown is the resulting sample that was drawn, consisting of 32 applications, responsible for 24.9 million kWh of ex ante impact claim and representing 45% of the ex ante impact claim for the program population. Also shown is the ex ante-based kWh sample weights for each of three strata.

Table 2-2. PY3 Custom Program Gross Impact Sample by Strata

Custom Population Summary				Impact Sample		
Sampling Strata	Number of Records (N)	Ex Ante kWh Impact Claimed	kWh Weights	Number of Records (n)	Ex Ante kWh	Sampled % of Population kWh
1	2	10,694,836	0.19	2	10,694,836	100%
2	27	22,036,229	0.40	15	13,058,181	59%
3	858	22,824,213	0.41	15	1,178,003	5%
TOTAL	887	55,555,278	-	32	24,931,021	45%

2.2.3 CATI Telephone Survey

Sampling

Per the evaluation plan, the target for the participant survey was to complete 66 interviews in support of the net impact evaluation and 104 interviews in support of the process evaluation.

For telephone surveys, the unit of sampling is the project contact. To develop the sample of unique project contacts, duplicate contact names were removed from the sample where a single person was involved in more than one project application. In addition, contacts who also completed Prescriptive Program projects could only be contacted once regarding one of the projects (or project components if the project yielded both Prescriptive and Custom savings). Because fewer Custom projects were completed compared to the Prescriptive Program, Custom projects were given preference over Prescriptive ones. Ultimately, the Custom sample frame included 200 unique contacts.

To best support the net impact analysis, projects from the April 5, 2011 database (wave 1) extract were sorted from largest to smallest Custom kWh claim and placed into three strata such that each stratum contained approximately one-third of the savings. The final August 2, 2011 extract indicated that two of the largest projects had been moved into PY4. Since the strata boundaries from the first wave were retained for the second wave, the stratum with the largest

projects contained only approximately 20% of overall PY3 savings, while the other two strata each contained 40%.

Three contacts (two representing stratum 1 projects and one representing a stratum 2 project) were not included in the CATI survey but were interviewed by a Senior Consultant.[8] As a result, the final sample frame for the CATI survey included 197 contacts, 22 in stratum 2 and 175 in stratum 3.

The CATI survey was conducted in two waves: the first wave focused on 56 applications that were part of the impact field sample, yielding 22 completed interviews (7 from stratum 2 and 15 from stratum 3). Given that the Custom program only had 197 unique contacts, in order to obtain enough survey responses for our analysis, the second wave included *all* remaining 141 contacts, yielding an additional 39 completed interviews, for a total of 61 survey responses.

Given that the ultimate sampling approach for the participant survey was a census attempt, there is no need for estimating precision levels for the sampling effort. In other words, there is no sampling error and the error bounds are zero.

Sample Weights

Table 2-3 summarizes the 67 participant interviews completed in support of the NTG analysis. The completed interviews represent 25.5 million kWh of ex ante impact claim, which is 46% of the ex ante impact claim of the program population.

Table 2-3. Profile of the Participant Survey Net-to-Gross Sample by Strata

Program Population Summary				Completed Interviews		
Sampling Strata	Number of Records (N)	Ex Ante kWh Impact Claimed	kWh Weights by Strata	n	Ex Ante kWh	% of Population Impacts Surveyed
1	2	10,694,836	0.19	2	10,694,836	100%
2	27	22,036,229	0.40	13	10,675,623	48%
3	858	22,824,213	0.41	52	4,172,633	18%
TOTAL	887	55,555,278	-	67	25,543,092	46%

Source: Program tracking database; results of CATI telephone survey.

[8] These interviews included net impact questions as well as a subset of process questions.

Table 2-4 provides a summary of the survey results for the process analysis. The table shows that the 61 completed interviews represent 31% of unique contacts in the population.

Table 2-4. Summary of Sampling Approach for Process Analysis

Sampling Strata	Number of Unique Contacts in Population (N)	Number of Surveyed Contacts (n)	% of Contacts Surveyed
1	2	-	-
2	23	11	48%
3	175	50	29%
TOTAL	200	61	31%

Source: Program tracking database; results of CATI telephone survey.

For the process analysis, the evaluation team concluded that an un-weighted analysis provided the best representation of results.

Survey Disposition

Table 2-5 below shows the final disposition of the participant survey. The dispositions show the concerted effort made to complete the target number of interviews with a very small sample. The resulting response rate was 34% (computed as the number of completed surveys divided by the number of eligible respondents[9]).

[9] Eligible respondents include the following dispositions: (1) Completed Survey, (2) Unable to Reach, (3) Callback, and (4) Refusal.

Table 2-5. Sample Disposition for NTG and Process Analyses

Sample Disposition	Customers	%
Population of Unique Customer Contacts	200	
Completed Survey	64	32%
Not Dialed	-	-
Unable to Reach	56	28%
Callback	35	18%
Refusal	34	17%
Phone Number Issue	11	6%
Response Rate	*34%*	

Source: ODC CATI Center.

Profile of Survey Respondents

The highest number of survey respondents is from heavy industry (25%). This sector is overrepresented among survey respondents, relative to its representation in the population (16%). This is not surprising, given that the Wave 1 sampling strategy focused first on projects included in the gross impact sample (generally those with the highest savings), and projects in this sector are significantly larger than projects in the other sectors. Conversely, the retail/service sector, which has among the smallest per project savings, is underrepresented in survey responses. Overall, the distribution is largely similar to that of the population of PY3 Custom Program participants.

Table 2-6 presents the comparison of business sectors for survey respondents and the overall population of participants.

Table 2-6. Business Sector of Survey Respondents

Sector	Respondents (n=61)	Population* (N=200)
Heavy Industry	25%	16%
Light Industry	16%	18%
Office	15%	13%
Retail/Service	15%	24%
Restaurant	7%	7%
Warehouse	5%	6%
Grocery	5%	3%
School/College	2%	1%
Medical	0%	4%
Hotel / Motel	0%	2%
Miscellaneous	11%	8%

**Note: The population is based on the final sample frame and excludes the 4 contacts that were set aside for the Prescriptive participant survey.*
Source: Program Tracking Database.

2.2.4 CATI Telephone Survey of Non-Participating Customers

A quantitative telephone survey was implemented with a random sample of business customers who have not participated in the Smart Ideas for Your Business Program in the first three program years. This survey resulted in 70 completed interviews.

Sampling

The sample of non-participants was based on the database of all business customers provided by ComEd. One of the objectives of the Smart Ideas for Your Business Program in PY3 was to generate more large projects. The non-participant survey therefore focused on delivery service classes for customers with medium and large energy demand (including rate classes C29, C30, C31, and C32). Excluded from the sample frame were customers with small energy demand (class C28, <100 kW).

Removing the small class customers resulted in 23,130 records in the sample frame. We also removed from the sample frame 11,272 records associated with customers who participated in the program, or submitted applications, in the first three program years (based on account number, telephone number, or company name). We then randomly selected 1,500 customers for the sample frame. After removing duplicate contacts, our final sample frame consisted of 1,439 unique contacts.

Table 2-7 compares the distribution of all ComEd business customers with the distribution of Smart Ideas for Your Business Program participants, by delivery service class. The table shows that more than 90% of ComEd customers are in the small class, compared with 53% of all participants.

Table 2-7. Summary of Participation in Smart Ideas for Your Business Program

Delivery Service Class	All Customers		Participants	
	Freq.	Percent	Freq.	Percent
C28-Small (0 - 100)	242,041	91%	2,795	53%
C29-Med (100 - 400)	17,478	7%	1,282	24%
C30-Large (400 - 1000)	4,121	2%	758	14%
C31-Very Large (1000 - 10,000)	1,517	1%	453	9%
C32-Extra Large (> 10 MW)	14	<1%	3	<1%
Total	**265,171**		**5,291***	**100%**

**Note: Participants were assigned a delivery service class by matching their account number to the ComEd customer database. Of the 5,902 unique participant account numbers, 611 did not match to the customer database.*
Source: Customer Database; Program tracking databases

Survey Disposition

Table 2-8 below shows the final disposition of the 1,439 unique contacts included in the sample frame for the non-participant survey. Contact with 100% of the sample was attempted at least once, resulting in 70 completed surveys.

Overall the response rate for this survey was 6% computed as the number of completed surveys divided by the number of eligible respondents.[10]

[10] Eligible respondents include the following dispositions: a) Completed Surveys, b) Unable to Reach, c) Callback, and d) Refusal.

Table 2-8. Sample Disposition for Non-Participant Survey

Sample Disposition	Customers	%
Total Sample	1,439	
Completed Survey	70	5%
Not Dialed	-	-
Unable to Reach	274	19%
Callback	369	26%
Refusal	534	37%
Phone Number Issue	187	13%
Language Problems	5	3%
Response Rate	*6%*	

Source: ODC CATI Center.

Profile of Non-Participant Survey Respondents

Surveyed non-participants come from a variety of business sectors. Sixteen percent classify their business as a government/public sector or non-profit entity, 11% as retail/service, and 10% as light industry. A majority of respondents (80%) own their facility. In addition, 44% of the businesses only operate at one location, 43% have several locations, and 10% are located at the headquarters of their company. It should be noted that the 16% of non-participants classified as government/ public sector are not eligible to participate in ComEd's program. The Illinois Department of Commerce and Economic Opportunity (DCEO) is responsible for delivering programs to ComEd customers classified as government/ public sector customers.

Section 3. Program Level Results

This section presents the Custom program impact and process evaluation results.

3.1 Impact

3.1.1 Tracking System Review

To support the impact evaluation, the evaluation team was given direct access to ComEd's on-line tracking system and data. The on-line system was easy to work with and provided viewing access to the project tracking data plus downloading rights to project documentation in electronic format for each project. This documentation was complete and greatly facilitated the evaluation, while removing a step that commonly impedes evaluation progress: a data request for the very information that ComEd made available in the tracking database itself. This level of access and documentation is highly commendable and represents best practice in this area for a Custom program.

The evaluation team worked off of a copy of the tracking system data uploaded by ComEd to their secure SharePoint site on a periodic basis. While working with the database, the most important issue for the evaluation team is consistency of the data.

Peak Demand. The tracking data appears not to be completely populated for peak demand impact (kW). Demand savings were listed as zero kW in 346 out of 887 records. Note that the application form doesn't require the applicant to estimate and provide peak demand impacts. Furthermore, there is evidence from the sample that some peak demand impact estimates that are prepared as part of the custom ex ante impact calculations are not subsequently data entered, leading to another potential source of under-reporting of peak demand savings.

In the impact sample, nine projects had an ex ante peak demand savings estimate of zero. Of those nine projects, five were estimated by ComEd to be zero, three were not estimated but had savings set equal to zero, and for project #7465 the tracking database reports zero peak savings but the supporting program calculations include a positive estimate of peak demand savings. Of these nine projects, the ex post evaluation found positive peak demand savings in four cases.

The preponderance of cases with peak demand set equal to zero may lead to less reliable evaluation-based peak demand estimates (if the zeros are truly missing, not estimated, or not data-entered in some instances). For example, out of the nine records with zero ex ante kW impacts included in the impact sample, the evaluation found four records with non-zero ex-post kW impacts, totaling 160 kW. Due to the inconsistent way in which the kW ex-ante impacts are populated in the tracking database, these additional findings could not be included in the final ex post peak demand savings estimate.

- **Recommendation**. Enhanced efforts are needed to report peak demand savings for all the projects. To provide consistent estimates of peak demand savings, the program should include dedicated fields in the custom application form for the applicant to report peak demand savings. We recommend that the implementers populate the ex ante demand savings variable in the tracking system with non-zero values where appropriate, so that the program does not under-report demand accomplishments

Measure Descriptions. Measure description information is reasonably populated in the tracking system but there is room for improvement in consistently labeling individual measures and recording measure end use. Currently, applications involving more than one measure appear as a single record, and therefore the measure descriptions tend towards a mixture of rough information concerning the measures installed. ComEd should consider tracking modifications that would isolate individual records for each measure installed and achieve greater levels of consistency in reporting variables that describe measures and end uses affected. ComEd did not populate end use consistently, as it is left blank many times, or populated with a value that is inconsistent with the measure description (e.g. "Other" or "Blank").

- **Recommendation**. ComEd should consider tracking modifications that would isolate individual records for each measure installed and achieve greater levels of consistency in reporting variables that describe measures and end uses affected. ComEd should also populate end-use consistently, as it is left blank many times, or populated with a value that is inconsistent with the measure description (e.g. "Other" or "Blank"). With these improvements in place, it would be possible for either the program staff or the evaluation team to produce measure-based summary statistics and more precisely track program accomplishments.

3.1.2 Gross Program Impact Parameter Estimates

Ex post gross program impacts were developed for this evaluation for the Custom program based on detailed M&V for a selected sample of 32 projects.

Realization Rates for the Custom Program

There are two basic statistical methods for combining individual realization rates from the sample projects into an estimate of verified gross kWh savings for the population when stratified random sampling is used. These two methods are called "separate" and "combined" ratio estimation.[11] In the case of a separate ratio estimator, a separate gross kWh savings

[11] A full discussion and comparison of separate vs. combined ratio estimation can be found in Sampling Techniques, Cochran, 1977, pp. 164-169.

realization rate is calculated for each stratum and then combined. In the case of a combined ratio estimator, a single gross kWh savings realization rate is calculated directly without first calculating separate realization rates by stratum.

The separate ratio estimation technique was used to estimate verified gross kWh savings for the Custom program. The separate ratio estimation technique follows the steps outlined in the California Evaluation Framework. These steps are matched to the stratified random sampling method that was used to create the sample for the program. The standard error was used to estimate the error bound around the estimate of verified gross kWh. The results are summarized in Table 3-1, Table 3-2, and Table 3-3 below. The realization rate for demand savings is 0.87, while the realization rate for energy is 0.85 which is high for a custom program. This shows that ComEd is continuing to do a good job of estimating gross impacts for Custom energy efficiency projects in the program. In general the implementation team did a very good job of ensuring the all measures are installed and operational. PY3 energy savings realization rate results indicate that the smallest projects (stratum 3) (RR = 1.14) realized a greater proportion of the ex ante claims than the largest (stratum 1) (RR = 0.81) and medium projects (stratum 2) (RR = 0.57). The evaluation team hypothesizes that this may be due to complexity of the large projects in strata 1 and strata 2.

The relative precision at a 90% confidence level for the 32 Custom projects in the gross impact sample is ± 16% for the kWh Realization Rate. One factor that contributes to this relatively high precision result is the wide range of PY3 project realization rates that varied from 0 to 2.58. It should be noted that the evaluation plan was designed to achieve 90/8 precision over the cumulative three year evaluation period from PY1 through PY3. No precision targets were set for PY3 alone.

As mentioned previously, the tracking system records for ex ante peak demand impact (kW) were often populated with zeroes in the Custom program population. The estimation of precision around the ex post peak demand realization rate is based on all non-zero kW estimates. This led to less sample-based coverage for demand realization rate estimates in comparison with energy realization rate coverage, especially in stratum 3, but a narrower relative precision estimate than the kWh result. Note that, out of the nine records with zero ex ante kW impacts in the impact sample, the evaluation found four records with non-zero ex-post kW impacts, totaling approximately 160 kW. Due to the inconsistent way in which the kW ex-ante impacts are populated in the tracking database, these additional findings could not be included in the estimation of the program realization rate, and therefore could not be credited to the program.

Strata 1 and 2 of the sample were collapsed for the purpose of calculating realization rates for demand savings so that the standard deviation of the result can be estimated. There can be no standard deviation estimate if the sample comprises only one point, as is the case here for stratum 1. Project #7739, which is one of the two projects in strata 1, has zero demand savings.

Table 3-1. Gross Impact Realization Rate Results for the Selected Custom Sample

Sampled Project ID	Sample-Based Ex Ante kWh Impact Claimed	Sample-Based Ex Ante kW Impact Claimed	Sampling Strata	Ex Ante-Based kWh Gross Impact Weights by Strata	Sample-Based Ex Post Gross kWh Impact	Sample-Based Ex Post Gross kW Impact	Application-Specific Ex Post Gross kWh Realization Rate	Sample-Based Ex Post Gross kWh Realization Rate	Application-Specific Ex Post Gross kW Realization Rate	Sample-Based Ex Post Gross kW Realization Rate
2559	7,637,833	897	1	0.71	5,948,392	645	0.78	0.81	0.72	0.85
7739	3,057,003	0	1	0.29	2,755,759	0	0.90		N/A	
391	2,549,903	0	2	0.20	0	0	0.00	0.57	N/A	
1030	1,433,405	118	2	0.11	1,371,913	210	0.96		1.78	
4036	971,096	121	2	0.07	880,145	102	0.91		0.85	
3820	968,368	133	2	0.07	491,623	75	0.51		0.57	
2996	648,074	74	2	0.05	647,348	74	1.00		1.00	
4367	556,999	64	2	0.04	271,316	65	0.49		1.02	
2412	456,836	0	2	0.03	19,248	2.5*	0.04		N/A	
5311	430,117	64	2	0.03	351,516	64	0.82		1.00	
8359	1,046,272	119	2	0.08	1,043,067	124	1.00		1.03	
4371	1,041,405	113	2	0.08	951,399	107	0.91		0.95	
7461	795,010	47	2	0.06	213,949	48	0.27		1.04	
7339	751,946	75	2	0.06	162,349	24	0.22		0.33	
6997	537,305	51	2	0.04	383,042	45	0.71		0.89	
7465	457,682	0	2	0.04	389,392	62*	0.85		N/A	
8568	413,764	0	2	0.03	691,504	96*	1.67		N/A	
3176	342,665	39	3	0.03	342,060	39	1.00	1.14	1.00	0.90
5804	55,875	0	3	0.00	24,915	0	0.45		N/A	
4081	84,421	10	3	0.01	81,582	9	0.97		0.96	
2234	138,035	5	3	0.01	356,233	9	2.58		1.89	
6215	60,559	0	3	0.00	89,478	0	1.48		N/A	
5186	3,889	0	3	0.00	3,889	0	1.00		1.00	
3554	94,669	16	3	0.01	84,455	12	0.89		0.77	
5613	10,793	3	3	0.00	3,912	2	0.36		0.60	
6011	360	0	3	0.00	360	0.1*	1.00		N/A	
5872	109,799	16	3	0.01	113,107	17	1.03		1.05	
7109	25,097	0	3	0.00	14,266	0	0.57		N/A	
8210	132,867	20	3	0.01	126,922	17	0.96		0.84	
8557	14,235	2	3	0.00	1,480	1	0.10		0.53	
8569	710	0	3	0.00	1,077	0	1.52		0.00	
3454	138,299	112	3	0.01	142,408	94	1.03		0.84	
TOTAL	24,965,290	2,096	-	-	17,958,106	1,784	-	0.85	-	0.87

** Within the impact sample we found four projects with 160 kW total ex post kW savings, but zero ex ante kW savings. These observations could not be used to estimate a kW realization rate, and also could not be applied to the program population using a ratio estimation approach.*

Table 3-2. Gross kWh Realization Rates and Relative Precision at 90% Confidence Level

Stratum	Relative Precision ± %	Low	Mean	High
Stratum 1	0%	0.81	0.81	0.81
Stratum 2	28%	0.41	0.57	0.73
Stratum 3	26%	0.84	1.14	1.44
Total kWh RR	16%	0.72	0.85	0.99

Table 3-3. Gross kW Realization Rates and Relative Precision at 90% Confidence Level

Stratum	Relative Precision ± %	Low	Mean*	High
Stratum 1	12%	0.74	0.85	0.95
Stratum 2				
Stratum 3	8%	0.83	0.90	0.98
Total kW RR	7%	0.81	0.87	0.94

3.1.3 Gross Program Impact Results

Based on the gross impact parameter estimates described previously, gross program impacts were derived for the PY3 Custom program. The results are provided in Table 3-4.

Table 3-4. Gross Parameter and Savings Estimates

Sampling Strata	kWh, Ex Ante	kWh, Ex Post	kWh RR	kW, Ex Ante	kW, Ex Post	kW RR
1	10,694,836	8,704,151	0.81	897	758	0.85
2	22,036,229	12,630,862	0.57	2,031	1,717	
3	22,824,213	26,097,800	1.14	2,865	2,585	0.90
Total	55,555,278	47,432,812	0.85	5,794	5,060	0.87

The evaluation team has provided to ComEd site-specific M&V reports for each Custom gross impact sample point. These site-specific impact evaluation reports summarize the ex ante savings in the Final Application submitted, the ex post M&V plan, the data collected at the site, and all of the calculations and parameters used to estimate savings.

Some general observations from the gross impact sample:

- For projects #4036, #5613, #8557 and #7465, the ex ante hours of operation differed substantially from the ex post findings (which were based on on-site verification and metered data), which reduced the kWh realization rates. For project #5311, the bifurcation of emergency fixtures' hours of operation was not made in the ex ante calculations, which along with different ex ante and ex post facility hours of operation resulted in a reduced kWh realization rate.

- For outdoor lighting projects #8569 and #6215, the ex ante assumed hours were adjusted based on ex post verified operating conditions. This adjustment significantly increased the total realized savings (#8569 RR = 152%, #6215 RR = 148%) for these projects. However, the demand savings for project #6215 and #8569 were reduced to zero due to the fact that the lights do not operate during peak hours.

- In some cases, the ex ante reported operating conditions were found to be different than actual ex post verified conditions. For projects #4367 and #2412, the ex ante assumed operating conditions were different from the ex post verified operating conditions which reduced the total realized savings. For projects #2234 and #3554 the ex ante assumed operating conditions were different from the ex post verified operating conditions and resulted in an increase in the total realized savings.

- Ex ante selected baseline conditions for projects #391, #3820, #4081 and #2234 were adjusted consistent with the evaluation baseline selection approach. The adjusted baseline condition significantly reduced savings for two (#391 and #3820) of the four projects. The baseline equipment selected by the program in both cases was the existing system, but was found to be very old and in need of replacement.

- For projects with baseline issues, the most common problem observed is the use of pre-existing (often referred to as "in situ") equipment as the baseline for estimating program savings and incentives. In many cases, savings were calculated relative to an in situ baseline and then assumed to occur over the entire period of the effective useful life (EUL) of the new equipment. This assumption would only be justifiable in situations where the program induced an early replacement of equipment and for cases where the equipment has a very high probability of continuing in operation for a predominant portion of the EUL of the new equipment. Instead, in some cases it was found that the existing equipment had a relatively short remaining useful life or generally required replacement, which means that the program should have treated the project as replace-on-burnout, not early retirement.

- Ex ante calculations did not normalize savings to account for differences between the post retrofit conditions and pre retrofit conditions. For project #6997 and #7339, the ex

ante measured pre retrofit airflow profile was different from the post retrofit airflow profile. However, ex ante savings calculations did not normalize savings for post retrofit conditions. For project #4371, the measured pre retrofit period production levels were different from the measured post retrofit period production levels as shown in program documents. Ex ante calculations did not normalize the energy usage estimates and thereby report representative savings for a given annual production level.

- A spreadsheet cell reference error in the ex ante baseline calculations for project # 7461 resulted in higher savings than appropriate, producing a much lower realization rate (than would have been if the reference error were absent). Also, a similar cell reference error was observed for project #391 that reduced the total reported ex ante savings.

- For project #7109, ex ante savings estimated a reduction in cooling energy that was not re-calibrated for typical operation. The ex ante calculation energy savings reduction factor of 19% was assumed based on manufacturer's literature claims, which state that energy savings can range between 4% and 23% of the total HVAC energy usage. The ex ante savings were stated to be conservative which was not the case as the reported savings were close to the upper bound of that range. At a minimum, simple engineering models should be developed to estimate savings for small projects or to verify the accuracy of manufacturer claims.

- The power factor (PF) values estimated in the ex ante calculations for project #3554 and #2559 were revised in the ex post calculations based on the data collected from the motor or equipment nameplates and confirmed with the manufacturers.

- For VSD and controls projects (#2234, #5804 and #7461), it was found that the control strategies were not accurately modeled in the ex ante calculations.

- The peak kW calculations were not always consistent with PJM requirements or were not representative of the actual operation of the system during the peak period (e.g. # 6215, #3554 and #8568).

- There were program projects where incremental or project cost was not accurately reported. Additionally, the electric unit cost ($/kWh) varied considerably across projects. Since these factors are important inputs to estimating payback, and since payback is a project eligibility screening criteria, greater care is needed in reporting such figures, including the provision of verification sources.

- In summary, estimates should be based upon appropriate representation of installed equipment operation, baseline condition, peak demand period, accurate estimation of equipment operating hours, normalization of equipment operating profiles or production, and careful application of assumptions made when estimating energy savings.

3.1.4 Net Program Impact Parameter Estimates

The separate ratio estimation technique was used to estimate Net-to-Gross (NTG) Ratios for the Custom program. The separate ratio estimation technique follows the steps outlined in the California Evaluation Framework. These steps are matched to the stratified random sampling method that was used to create the sample for the program. The standard error was used to estimate the error bound around the estimate of verified NTG Ratio. The stratum and program level NTG Ratios, along with precision estimates, are shown in Table 3-5 (kWh impacts) and in Table 3-6 (kW impacts).

A quantification of spillover was not included in the calculation of NTG ratio for PY3. However spillover effects were examined in this evaluation and their magnitude was found to be quite small as discussed below.

Once gross and NTG program impacts have been estimated, net program impacts are calculated by multiplying the gross impact estimate by the program NTG ratio.

Table 3-5. kWh NTG Ratio and Relative Precision at 90% Confidence Level

Sampling Strata	Relative Precision ± %	Low	Mean	High
1	0%	0.18	0.18	0.18
2	15%	0.59	0.69	0.79
3	10%	0.56	0.62	0.68
1, 2, 3 (All)	9%	0.51	0.56	0.61

Table 3-6. kW NTG Ratio and Relative Precision at 90% Confidence Level

Sampling Strata	Relative Precision ± %	Low	Mean	High
1	38%	0.23	0.36	0.50
2				
3	15%	0.47	0.55	0.63
1, 2, 3 (All)	18%	0.38	0.46	0.54

The measured Year 3 NTG ratio of 0.56 was lower than in PY2 (0.76), meaning free-ridership was higher. Significant free-ridership (above 40%) was found in 26 out of 67 evaluated projects, of which only seven had a resulting NTG ratio below 0.30. Two large projects from strata 1 with

substantial free-ridership had very low Program Influence[12] and No-Program[13] scores resulting in the NTG ratio of 0.16 (#2559) and 0.25 (#7739). The other five projects with substantial free-ridership all had zero scores as No-Program scores (on a scale of 0 to 10).

Projects with the lowest Program Components[14] scores tend to have lower NTG ratios, while those with higher Program Component scores have NTG ratios that are among the highest. For example, all projects with Program Components scores of 7 or lower have NTG ratios that are somewhat low, below 0.7. The average NTG ratio across all of these projects is 0.38. In contrast, the mean NTG ratio in the group with a Program Components score of 9 or greater is 0.76.

Relatively high and relatively low NTG scores in the sample are not directly affected to the same extent by the Program Influence score. That is, the correlation between the Program Influence score and resulting NTG is not as significant as is the correlation with the No-Program and Program Components scores.

Program influence was low for a number of different reasons. In some cases, participants report that program implementers arrived late in the decision making process and offered incentives for projects that had already been decided upon. We also found several cases where the customer reported that they would have installed the same equipment at the same time in the absence of the program incentives. The evidence also indicates that program claims were made for projects that customers initiated for non-energy savings reasons and for which no alternative was ever considered.

Spillover

Spillover effects were addressed qualitatively in the PY3 evaluation, based on responses to a battery of spillover questions in the phone survey. The evidence of spillover for the Custom program is presented in Table 3-7 below.

[12] A Program Influence score reflects the degree of influence the program had on the customer's decision to install the specified measures.

[13] A No-Program score captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available.

[14] A Program Components score reflects the importance of various program and program-related elements in the customer's decision and timing of the decision in selecting specific program measures.

Table 3-7. Evidence of Spillover in PY3

Spillover Question	Evidence of Spillover
Since your participation in the ComEd program, did you implement any additional energy efficiency measures at this facility that did NOT receive incentives through any utility or government program?	Of the 64 surveyed customers that responded to this question, 26 said "Yes" (41%). These 26 respondents implemented a total of 36 energy efficiency measures. Two respondents were unable to elaborate surrounding the measure installed.
What type of energy efficiency measure was installed without an incentive?	(11) Lighting Measures (5 LED lamps, 2 T-5 lamps, 1 CFL, 1 emergency lighting, 1 LED traffic signal, 1 low wattage metal halide lamps) (8) HVAC measures (2 Boiler economizers, 2 VFDs on HVAC motors, 1 programmable thermostat, 2 Unitary/Split AC Systems, 1 Boilers) (4) Lighting Controls (2 occupancy sensors, 1 time clock on lighting) (3) Energy Management System/Building Automation System/Intelligent power distribution system (2) Blast fan motor for process freezer (1) Motor (1) Pump (1) Large ceiling fan (1) Cooler (1) Oven (affecting gas consumption) (1) Improve the oxidizer (1) Water reduction program (1) Ammonia refrigeration system
On a scale of 0 to 10, where 0 means "not at all significant" and 10 means "extremely significant," how significant was your experience in the ComEd program in your decision to implement this energy efficiency measures?	For the 36 implemented measures: (19) Rating between 0 and 3 (7) Rating between 4 and 6 (5) Rating between 7 and 10 (5) Refused/Don't know
If you had not participated in the ComEd program, how likely is it that your organization would still have implemented this measure? Use a 0 to 10, scale where 0 means you definitely would NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	For the 36 implemented measures: (3) Rating between 0 and 3 (5) Rating between 4 and 6 (22) Rating between 7 and 10 (6) Refused/Don't know

Spillover Question	Evidence of Spillover
Why did you purchase this energy efficiency measure without the financial assistance available through the ComEd's program?	For the 36 implemented measures: (12) No program offers this measure/gas measure (10) Rebate too small/Wasn't worth the time (4) Project was too small (2) Not enough time/needed measure ASAP (2) "We didn't qualify" (6) Don't know

These findings suggest that spillover effects for PY3 are relatively small. While participating customers are installing other energy efficiency improvements outside of the program, they attribute little influence to the program in their decision to install these additional measures and further state that these actions generally would have been implemented regardless of their program participation experiences. In addition, the respondents indicated that they did not pursue rebates through the ComEd program due to the lack of a program offering for the measure they installed or that the rebate amount was too small to spend their time on the application process. The evaluation team will likely collect spillover data in this same manner for the PY4 evaluation. The decision to conduct additional evaluation activities to quantify spillover in PY4 will be examined as part of the evaluation planning effort.

3.1.5 Net Program Impact Results

Net program impacts were derived by multiplying gross program savings by the estimated NTG ratio. Table 3-8 and Table 3-9 provide the program-level evaluation-adjusted net impact results for the PY3 Custom program. The NTG ratio for energy savings is 0.56 and for demand savings is 0.46, and is based upon responses from each contributing participant in the sample (and other sources) and the use of kWh-based weights. The chained realization rate (gross RR * NTG Ratio) is 0.48 for kWh and 0.40 for kW.

Table 3-8. Program-Level Evaluation-Adjusted Net kWh Impacts for PY3

Sampling Strata	Ex Ante Gross kWh	Ex Post Gross kWh	kWh RR	Ex Post Net kWh	NTGR (ex post gross)
1	10,694,836	8,704,151	0.81	1,606,223	0.18
2	22,036,229	12,630,862	0.57	8,708,567	0.69
3	22,824,213	26,097,800	1.14	16,119,675	0.62
Total	55,555,278	47,432,812	0.85	26,434,465	0.56

Table 3-9. Program-Level Evaluation-Adjusted Net kW Impacts for PY3

Sampling Strata	Ex Ante Gross kW	Ex Post Gross kW	kW RR	Ex Post Net kW	NTGR (ex post gross)
1	897	758	0.85	275	0.36
2	2,031	1,717		622	
3	2,865	2,585	0.90	1,427	0.55
Total	5,794	5,060	0.87	2,324	0.46

3.2 Process Evaluation Results

The process component of the Smart Ideas for Your Business Custom program evaluation focused on program participation, program design and implementation, the trade ally network, marketing and outreach, barriers to participation, and participant satisfaction. The primary data sources for the process evaluation included the telephone survey with 61 program participants, the survey with 70 non-participants, and the in-depth interviews with market actors and Account Managers. Please refer to Section **Error! Reference source not found.** for more information on the primary research conducted in support of this evaluation.

3.2.1 Participant Profile

PY3 Participation by Sector

In PY3, 222 companies completed a total of 884 custom projects that accounted for 55,555,278 kWh and 5,794 KW of ex ante gross savings.[15] PY3 participants represent a range of business sectors. Key observations, by business sector, are:

- Heavy industry accounts for the highest share of energy savings (26%) and demand savings (32%). However, this sector represents only 4% of all projects and 13% of all participants. It is therefore not surprising that heavy industry has the highest kWh per project which is largely driven by one large project that received over $500,000 in ComEd incentives in PY3.
- The retail/service sector represents the highest share of both projects (79%) and participants (25%), resulting in the highest number of projects per participant (12.6) – this is driven by the high involvement of chain companies. Four retail chains completed more than 45 projects in the Custom program, with two completing more than 200

[15] Gross savings reported in this section are based on the program tracking database.

projects each. However, the average energy savings per project are the smallest of any sector (16,437 kWh).

Table 3-10 summarizes the distribution of PY3 participants, projects, and energy and demand savings by business sector.

Table 3-10. Participants, Projects, and Ex Ante Savings by Business Sector

Sector	Projects		Participants		Project/ Part.	Ex Ante Gross Energy Savings		kWh/ Project	Ex Ante Demand Savings	
	#	%	#	%		kWh	%		kW	%
Heavy Industry	38	4%	29	13%	1.3	20,057,559	36%	527,831	1,867	32%
Retail/Service	694	79%	55	25%	12.6	11,407,017	21%	16,437	1,491	26%
Office	31	4%	30	14%	1.0	6,810,598	12%	219,697	401	7%
Light Industry	41	5%	39	18%	1.1	6,598,719	12%	160,944	792	14%
Medical	10	1%	9	4%	1.1	2,156,535	4%	215,654	219	4%
Warehouse	16	2%	13	6%	1.2	1,348,254	2%	84,266	270	5%
Hotel / Motel	5	1%	4	2%	1.3	1,032,505	2%	206,501	143	2%
Grocery	7	1%	7	3%	1.0	400,343	1%	57,192	52	1%
Restaurant	17	2%	16	7%	1.1	298,130	1%	17,537	58	1%
School/College	2	0%	2	1%	1.0	65,705	0%	32,853	1	0%
Miscellaneous	23	3%	18	8%	1.3	5,379,912	10%	233,909	499	9%
TOTAL	**884**	**100%**	**222**	**100%**	**4.0**	**55,555,278**	**100%**	**62,845**	**5,794**	**100%**

Source: Program Tracking Database.

Participation Trends by Sector

Program participation increased substantially compared to PY2, from 340 projects completed by 110 companies to 884 projects completed by 222 companies. The average size of PY3 projects (62,845 kWh) remained relatively stable compared to PY2 (78,839 kWh). Notably, thirteen percent of surveyed Custom Program participants reported that the scope of their project was limited by the incentive cap.

Ex ante energy savings more than doubled from 26.8 GWh to 55.6 GWh, while ex ante demand savings increased from 2,910 kW to 5,794 kW. These increases are expected, as the goals and budgets greatly increased in PY3, and the program was not limited by oversubscription. Additionally, program staff noted that the increased outreach was paramount in bringing in more Custom projects, especially in industrial process work and compressed air upgrades.

Key participation characteristics include:

- The increase in participation from the heavy industry had the largest impact on overall program savings; energy savings doubled from heavy industry from PY2 to PY3.
- The retail/service sector had the largest increase in the number of projects and participants generating 21% of all PY3 energy savings.
- Lodging, medical, and Schools/colleges still have relatively stagnant growth. Such hard to reach industries might benefit from specialized program offerings.

The figures below compare the number of projects, participants, and ex ante energy and demand savings by business sector and program year.

Figure 3-1. Projects by Business Sector and Program Year

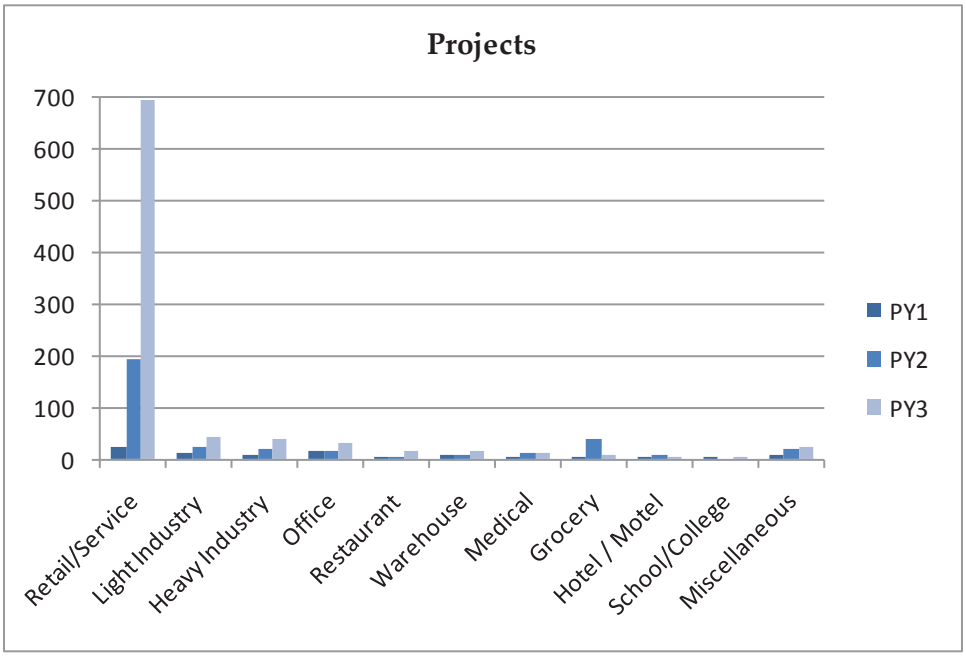


Figure 3-2. Participants by Business Sector and Program Year

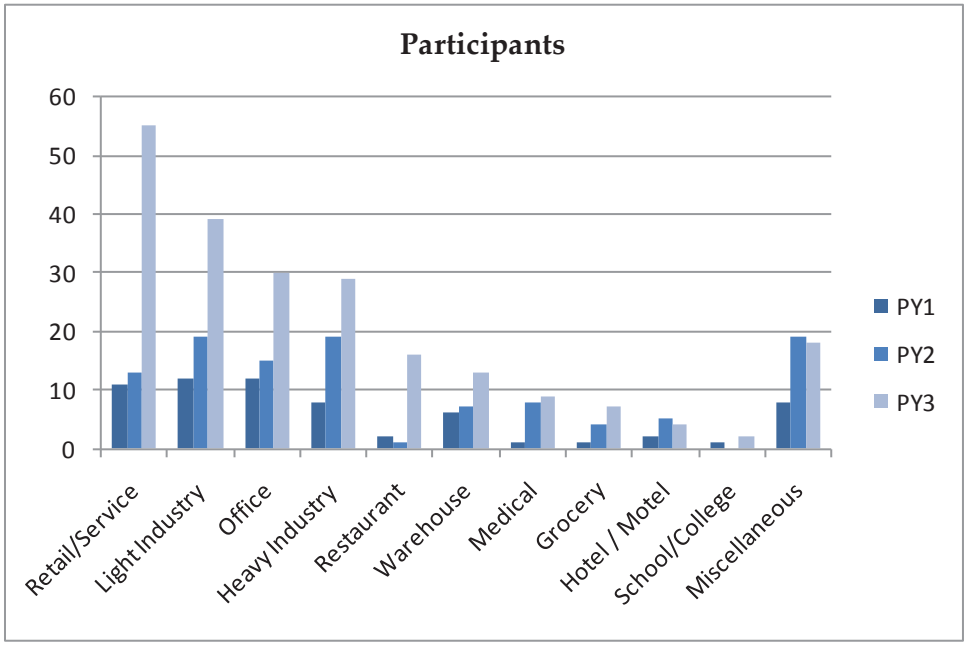


Figure 3-3. Energy Savings by Business Sector and Program Year

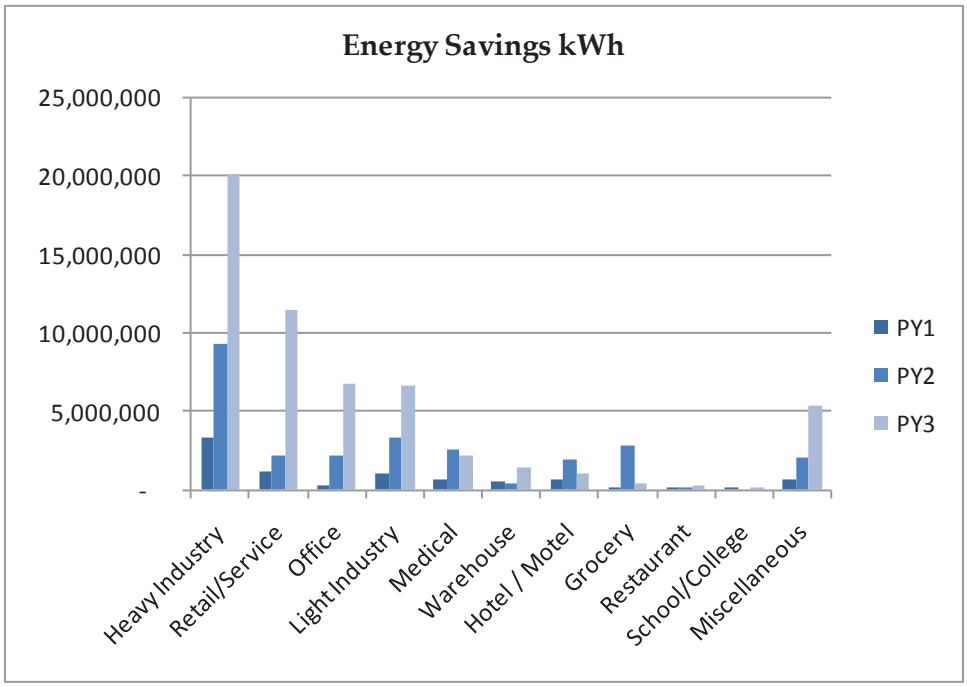


Figure 3-4. Demand Savings by Business Sector and Program Year

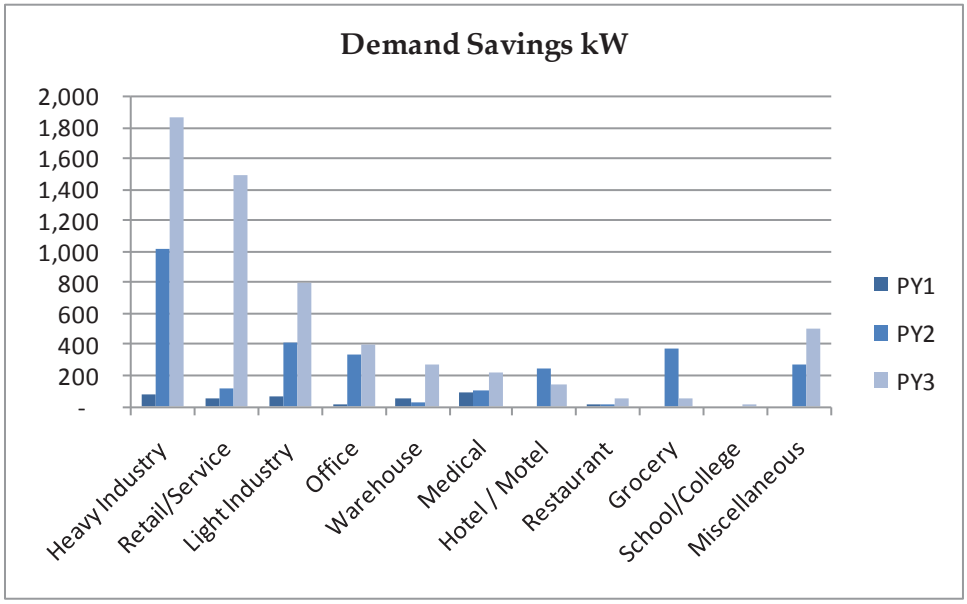
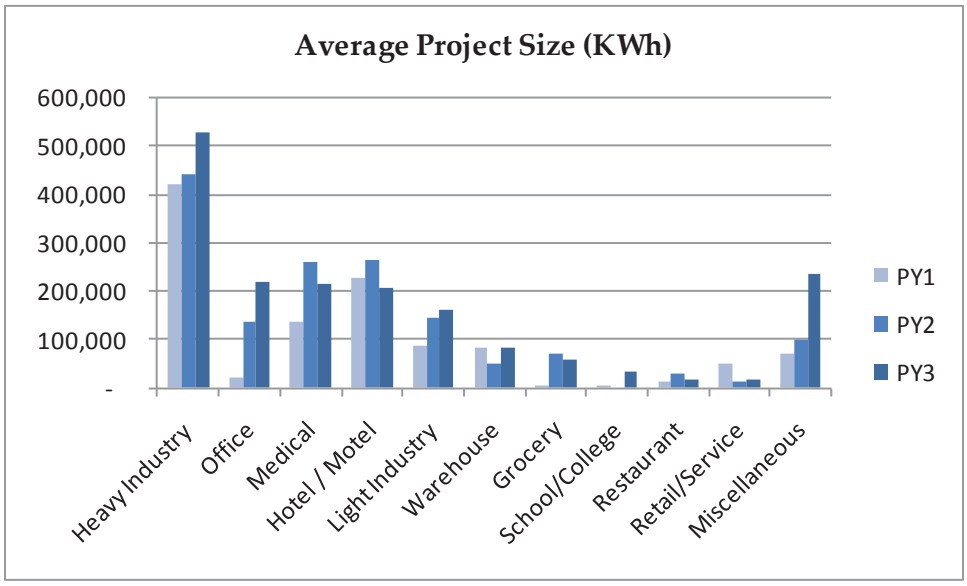


Figure 3-5. Average Project Size by Business Sector and Program Year



Source: PY3 Program Tracking Database.

3.2.2 Program Design and Implementation

ComEd's Smart Ideas for Your Business Custom Program offers incentives designed to encourage implementation of energy-efficiency measures. The Custom Program offers incentives for those eligible improvements that are not included in the prescriptive measure list. The participation process for the Custom Program did not change in PY3. Program staff did indicate, however, that the product mix is changing – more lighting measures were moved from the Custom Program to the standard Prescriptive Program.

Application Process

The application process did not change compared to PY2. All projects have to submit a pre-approval application as well as a final application. Program guidelines stipulate that projects must be completed within 90 days of pre-approval; however, many projects apply for and are granted an extension.

A majority of participants filled out either the initial or final program paperwork themselves (66%). Of these participants, most feel that the application forms clearly explain the program requirements and participation process (90%) and rate the application process as easy (70%).[16] When participants do not fill out the pre-approval and final applications themselves, this is most often done by a contractor (43%).

However, some participating contractors think that the Custom Program application is still rather onerous and time-consuming. As part of recommendations on how to improve the program, many cited that a streamlined application would be beneficial, and that some measures that still fall under the Custom Program should be considered a Prescriptive measure. As one contractor explained:

> *"The EMS or the controls that I file for come under the custom program, which is quite complicated to file. Some utilities have this as a prescriptive program; I'm talking about energy management systems; and that might be something to consider just to make it a bit easier."*

Customer Service

The Smart Ideas for Your Business Program employs the KEMA call center to field questions from program participants. ComEd's call center forwards questions from program participants to the KEMA call center. Only 25% percent of PY3 participants report having called the call center during the participation process. Almost all of the customers who contacted the call center were satisfied with the call center's ability to answer questions.

[16] A score of 7 or higher on a scale from 0 to 10, where 0 is "very difficult" and 10 is "very easy."

Account Managers

In PY2, program staff began to more actively engage ComEd Account Managers. The program developed a toolkit for Account Mangers and also began providing training opportunities and "Lunch and Learns." In PY3, program staff continued to work to improve the relationship between Account Managers and the Smart Ideas Program. Given their pre-existing relationship with customers who are the largest users of energy, the main goal for PY3 was to *"provide them with better tools to sell the program."* Program staff has simplified the "tool-kit" as they found that Account Managers were not using it. The addition of more KEMA outreach staff has allowed Account Managers to now have one point of contact for all questions pertaining to the program in an effort to increase communication and provide greater outreach support.

Additionally, PY3 marked the introduction of Smart Ideas goals for Account Managers. PY3 goals included recruiting customers to attend the Energy Efficiency Expo and attending "Lunch and Learns."[17] All interviewed Account Managers were generally receptive to the introduction these goals; they thought the goals were both realistic and achievable. As one Account Manager noted: *"I think the goals were realistic. It's good for us to support our company goal. So it's good that we have a stake in supporting our company's goals"*. However, three of the five did note that continuing to recruit customers to the Energy Efficiency Expo will become increasingly difficult, unless the Expo offers something new to entice customers to return again.

The Account Managers also agreed that the "Lunch and Learns" were very successful and helpful in providing information about the program. One Account Manager specifically mentioned that the "Lunch and Learns" were especially valuable when other Account Mangers discussed different approaches that have been successful in promoting the program to their customers. Interviewed Account Managers feel that, overall, they have enough knowledge of the program to effectively promote it and assist their customers through the participation process. Given that all five Account Managers consider themselves very knowledgeable about the program, it is not surprising that all of them promote the program to their customers quite frequently.

Overall, 79% of PY3 Custom projects were associated with customers who have an Account Manager. Program participants report the following involvement of Account Managers during PY3:[18]

- Thirty-three percent of participants with an Account Manager first heard about the Smart Ideas program from their Account Manager.

[17] In early PY3, an additional savings goal for Account Managers was contemplated but ultimately not implemented.
[18] It should be noted that of the 61 interviewed participants, 25 gave information about having or not having an Account Manager that contradicts information in the participant tracking database.

- Sixty percent of participants with an Account Manager discussed the program with their Account Manager.
- Thirty percent of participants with an Account Manager indicate that their Account Manager assisted with the project implemented through the Custom Program.

In general, despite efforts to better engage Account Managers, program staff noted that there is still large variability in the efforts of Account Managers and that they are still trying to strengthen their relationship with the Account Managers.

3.2.3 ComEd Trade Ally Network

Trade allies, i.e., contractors and other market actors registered with the Smart Ideas Program, continue to be an important part of the Custom Program. In PY3, in order to remain a trade ally a contractor[19] had to complete one project through the program and attend a basic training. These new requirements were initiated as program staff shifted their focus from the quantity of trade allies to the quality of the applications (i.e., projects) submitted. While the total number of trade allies did not go down as a result of the new requirements, PY3 trade allies are generally more active compared to PY2 ones, as about 75 to 100 of the least active PY2 trade allies were dropped at the end of the program year. Program staff also noticed an improvement in the quality of applications received in PY3.

Eight of fifteen contractors interviewed for this evaluation are trade allies. Only five of the eight trade allies were aware of the new requirements for becoming a trade ally. Trade allies generally did not report a change in their business practices as a result of their trade ally designation. However, two did indicate a change in their marketing as a result of their participation in the trade ally network. When asked about the main benefits of becoming a trade ally, increased credibility in the eyes of the customer and use of branded marketing materials were frequently cited.

> *"I just think that in an area like Chicago, or any other part of the country, that your power company is one of your most recognizable brand names that are out there. And if somebody wants to decide whether or not they want to trust you, if you're good enough to be working with the power company, you're probably good enough for them."*

Seven of the interviewed contractors participated in the Custom Program in PY3 but they are not trade allies. Reasons for not becoming a ComEd trade ally range from lack of knowledge of the new requirements to difficulty attending the training because of their distance from the training locations. Most interviewed non-trade allies were not aware of the benefits of becoming

[19] Most of the Smart Ideas trade allies are contractors. However, in some cases, other market actors assist customers in implementing Smart Ideas projects, including consultants, engineers, suppliers, and manufacturers.

a registered ally; two cited trust and having their company name on the website as the perceived benefits.

Based on the Custom Program database, 111 unique contractors submitted an application in PY3, up from 71 in PY2 and 44 in PY1. Of the 111 PY3 contractors, 47 were trade allies. Overall, 66% of all Custom projects (584) were implemented with the support of a contractor, 440 by a trade ally. Most of the contractors involved in custom projects (64%) implemented a single project in PY3, while nine contractors (8%) completed ten or more projects (seven of the nine are trade allies). However, the nine contractors that completed ten or more projects accounted for 70% of all contractor projects. Notably, two contractors, both trade allies, completed over 100 projects each. However, all of these projects were for a single retail chain company.

Table 3-11. PY3 Contractor Projects

Contractors with…	Custom Projects		
	Number of Contractors	Percent of Contractors (n=111)	Percent of Contractor Projects (n=584)
1 project	71	64%	12%
2 projects	14	13%	5%
3 projects	8	7%	4%
4-9 projects	9	8%	9%
10+ projects	9	8%	70%

Source: Program Tracking Database.

The telephone survey with program participants included questions about their use of contractors, their contractors' affiliation with the ComEd Trade Ally Network, and their satisfaction with their contractors. Eighty-five percent of interviewed participants report having used a contractor to complete the project. Responses to the survey show that contractors continue to play an integral role in the implementation of custom projects. Additionally, contractors are becoming more active promoters of the Smart Ideas program. However, many participants still do not believe that it is important that the contractor is a ComEd trade ally. Specific findings from the participant survey include:

Participants in the Custom Program are satisfied with their contractors: Almost all interviewed program participants (96%) who used a contractor to install their project report that their contractor met their needs (a score of 7 or higher on a scale from 0 to 10). Ninety-four percent of participants would recommend their contractor to others.

Participants discuss the program with their contractor: 82% of custom participants report having discussed the Custom Program with a contractor or trade ally.

Contractors are more actively promoting the program: 20% of custom participants first heard about the program through a contractor, significantly more than in PY2 when only 7% of participants cited a contractor as their source of program information.

Contractors play an important role in designing or specifying the installed equipment: 41% of participants report that a contractor, consultant, or engineer provided the most assistance in the design or specification of the equipment installed through the Smart Ideas program.

Participants do not believe it is important for their contractor to be a ComEd trade ally: Although significantly more custom participants indicate that their contractor is affiliated with the program (31% as compared to only 15% in PY2), still 37% do not know if their contractor is a trade ally. Thirty percent of custom participants believe that when implementing an energy efficiency project it is not at all important (a score of 0 on a scale from 0 to 10) to use a contractor that is affiliated with the Smart Ideas for Your Business Program.

Similar to participants, non-participants most often look towards contractors (43%) for information and guidance when purchasing new equipment. [20]

Of the nine contractors who completed ten or more custom projects, eight also completed projects that received incentives from the Prescriptive program. These active contractors clearly have a large market presence and are involved in projects supported by both the Custom Program and the Prescriptive Program. In PY2 only 28% of contractors involved in a custom project in PY2 also completed a project for the Prescriptive Program. However, in PY3 most Custom contractors also worked on projects through the Prescriptive Program (63%).

Most interviewed contractors indicated that the Smart Ideas for Your Business Program influenced their business. While many of these contractors had already adopted business models that focused on energy efficiency and were recommending energy efficient equipment before participating in the program,[21] most (8 of 15) believe that the program was influential in increasing their overall sales. Additionally, five contractors changed their marketing practices, and two trade allies report that they hired additional staff due to their participation in the Smart Ideas program.

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[20] Note that the research with non-participants excluded customers with demand of <100 kW (delivery service class C28). As such, any non-participant findings presented in this report only represents customers with demand of 100 kW or more.

[21] It should be noted that while the respondents considered the recommended equipment energy efficient, it is unknown if the equipment would have met the efficiency standards of the Smart Ideas Program.

Trade Ally Bonus

PY3 also marked the introduction of a trade ally bonus. The bonus was in effect from September 1st through November 30th, 2010 (the day by which final applications had to be submitted). It was only available to registered trade allies and consisted of 5% of the total incentive amount for projects with incentives of $10,000 or more. The trade ally bonus was designed to encourage implementation of larger projects. However, program staff believes that the main outcome was to clear the project pipeline more quickly, rather than to generate additional large projects.

Knowledge of the trade ally bonus offering in PY3 was not widespread amongst interviewed contractors. Only five of the eight interviewed trade allies and none of the interviewed non-trade ally contractors were aware of the bonus. However, some of these non-trade ally contractors expressed interest in the bonus offering and indicated that they would have increased promotion of the program had they been aware of the offering. These responses indicate that trade ally bonuses have the potential to increase promotion of the program and also provide a reason for more contractors to register as a trade ally.

In order to inform potential changes to the trade ally bonus offering, the evaluation team conducted in-depth telephone interviews with utility program managers who oversee programs with similar contractor bonus offerings across the country. These programs varied in both incentive size and savings targets. Two of the most relevant structures for encouraging greater trade ally activity and larger C&I projects were implemented by two utilities in the Midwest and the Northeast, respectively:

- The Midwest utility has a C&I electric trade ally bonus structure that is based on two tiers: Tier 1 trade allies are those who have implemented projects with combined savings of at least one million kWh in the previous program year. They are eligible for a bonus equal to 10% of the customer incentive, for all savings above one million kWh. Tier 2 trade allies are eligible for a bonus of between $500 and $4,000, depending on the amount of savings they achieve in the program year. This is a significant change from the previous program year, when both Tier 1 and Tier 2 trade allies were eligible for a flat $2,500 incentive per project. The utility made the change after determining that the previous incentives were not spurring as many projects as anticipated. In addition, the incentives were not offered for the full program year and had a number of requirements which were somewhat difficult to communicate to trade allies. The new structure was designed to be more straightforward and predictable for trade allies.
- The Northeast utility also has a bonus based on savings. Once a project reaches 500,000 kWh savings, trade allies are eligible to receive one cent per kilowatt hour saved. This was recently increased from a half cent incentive in July 2011, which was found to be too small to encourage the implementation of larger projects.

Other utility program managers had several pieces of advice for any utility looking to start a trade ally bonus program. Several mentioned the need for clear communication and setting expectations at the beginning of the bonus offering. This minimized trade ally confusion and let them set realistic goals. Further, face-to-face communication, as well as frequent contact, was mentioned. Finally, clear deadlines for when an incentive period would start and end increased trade ally confidence and gave them a measure of budgetary stability. Program managers believed that strong bonds between their program and trade allies increased the likelihood that new and larger projects would be generated.

3.2.4 Program Marketing and Outreach

In the first two program years, the Smart Ideas program experienced oversubscription relatively early in the program year, stymieing any program marketing efforts. However, with an increased budget and goals the marketing and outreach plans changed substantially for PY3. As a result, the marketing and outreach staff increased from one dedicated staff person to five by the end of the program year.

The marketing plan for PY3 included trigger tactics that were initiated throughout the program year. These tactics included increased outreach to targeted customer groups such as trade associations and customers who attended the Energy Efficiency Expo. Program staff also followed up on leads from PY1 and PY2 by checking in on those that submitted applications but cancelled their projects. The frequency with which staff sent the electronic newsletter increased from quarterly to six times a year in PY3. Additionally, program staff implemented a direct mailing, sending program information to approximately 5,000 of their larger customers. However, program staff noted that the mailing was largely ineffective because their database contains billing addresses and is not meant as a marketing database.

As a result of the increased marketing, almost half (49%) of Custom participants recall having been directly contacted by ComEd or KEMA. Other findings from the participant survey include:

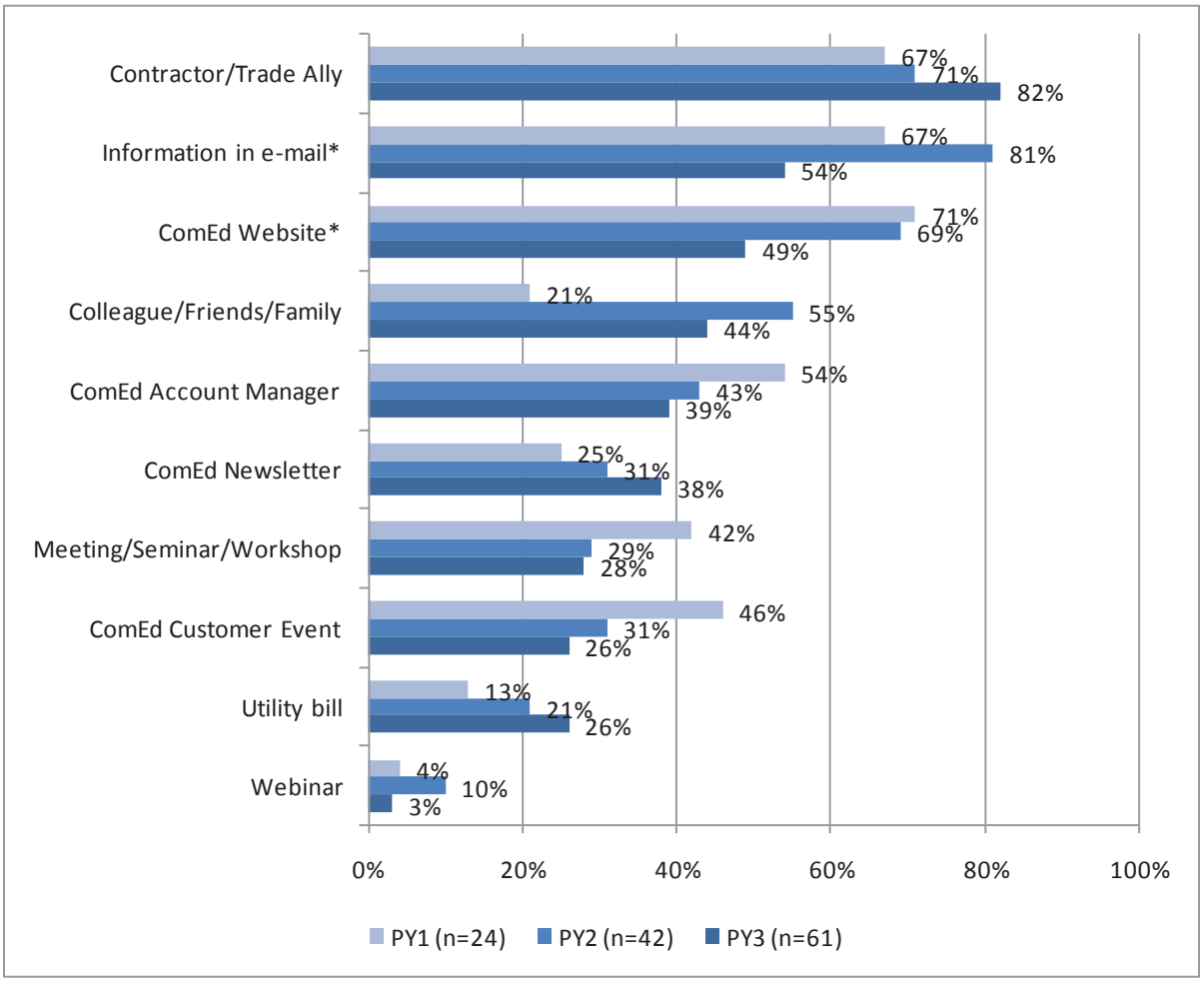
Contractors are the greatest source of program awareness in PY3; 82% indicate that they have discussed the program with a contractor or trade ally.

Despite the increase in frequency with which program emails were sent out, significantly fewer participants in PY3 recall having received program information in an email (67% vs. 81% in PY2). However, email still is an integral component to marketing and outreach as it is preferred by almost half of participants (see below).

Fewer participants visit the ComEd website for program information than in PY2 (49% vs. 69%)

Figure 3-6 summarizes participant responses about program information sources.

Figure 3-6. Sources of Program Information (Prompted)



*Note: * Denotes a significant difference between PY2 and PY3 at the 90% confidence level.*
Source: PY1, PY2, and PY3 CATI Participant Surveys.

Most participants (80%) found the marketing materials to be useful[22] and significantly more participants found the materials *very* useful than in PY2 (31% vs. 17%, respectively). Only a few participants noted that the program materials could have more detailed information.

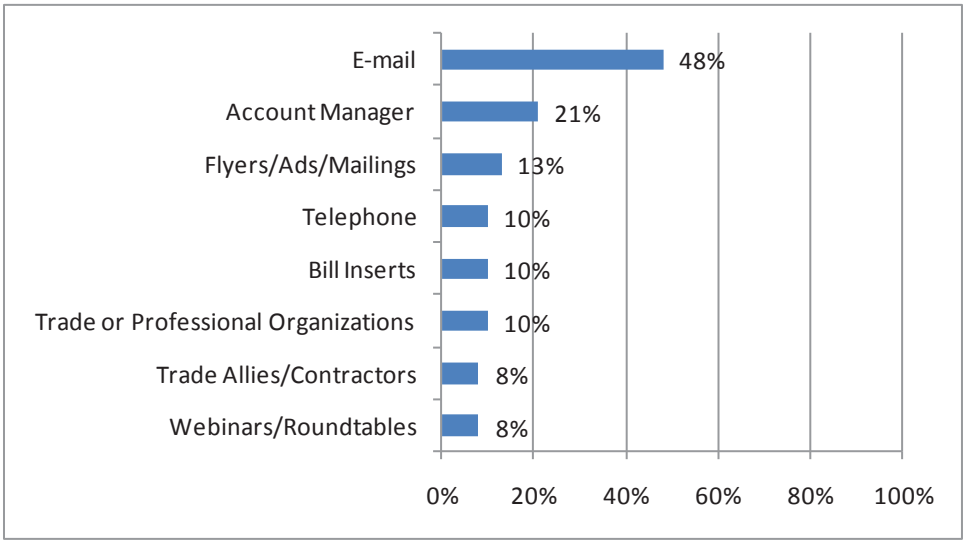
The five interviewed Account Managers also found the program's marketing materials very helpful and easily accessible on the ComEd Smart Ideas for Your Business website. Interviewed Account Managers most often utilize the program's fact sheets and case studies.

[22] Includes participants who rated the program materials as "very useful" or "somewhat useful"

Only eight of the 15 interviewed contractors indicate that they utilize promotional materials from the program. Of those that do not currently utilize ComEd's program materials, three contractors prefer that no marketing material be sent, while the remaining four would like to see various marketing aids including white papers and a timeline of the rebate process and how it works.

Although contractors are the most common source of program awareness, participants generally do not believe that contractors are the best ways to provide them with information regarding energy efficiency opportunities. Instead participants indicate that they prefer to receive this information through email (48%) or ComEd Account Manager (21%).

Figure 3-7. Preferred Methods of Contact (Multiple Response, Unprompted)



Source: PY3 CATI Participant Survey, note that responses under 5% are not included.

Non-participants also note that, in general, email (50%) and flyers/mailings (37%) are the best ways to reach them regarding energy efficient offerings. Overall, 57% of non-participating customers are aware that ComEd offers energy efficiency programs to their commercial customers, and 31% have heard of the Smart Ideas for Your Business Program. Of those who have heard of the program, almost one-third (32%) indicate that they are either not very familiar or not at all familiar with the program.

Interviewed contractors were asked to gauge their customer's awareness of the Smart Ideas for Your Business Program. A majority of the contractors say their customers are aware of the program, either somewhat or very aware (10 of 15). One respondent noted that realty companies are more aware than any other sector they are involved with. Many of the interviewed contractors do agree that awareness of ComEd's program offerings has increased over the years. As one registered trade ally explained:

> *"We've noted in the last year and a half or so that it's become something they're much more aware of. The first couple of years of the program they had no idea what we were talking about, and now we actually have customers that call us looking to try to utilize the benefits of that program."*

Despite reporting varied awareness of the program, almost all (14 of 15) interviewed contractors report that they always promote the program when discussing the possibility of implementing a project with customers that falls under the scope of the Smart Ideas for Your Business Program. The one contractor who rarely promotes the program reasons that because he works with large national accounts, one decision maker at the corporate office may decide to implement a project in all stores nation-wide, thus negating the need to promote ComEd's program.

3.2.5 Barriers to Participation

Customer barriers

Lack of program awareness is a key barrier to participation in the Smart Ideas program, with 43% of non-participants not aware that ComEd offers energy efficiency programs for business customers and 69% not aware of the Smart Ideas program. Of those aware of the Smart Ideas program, approximately two-thirds (68%) consider themselves very or somewhat familiar with the program.

Reaching the correct decision-maker is a major hurdle both in increasing awareness of the program and encouraging participation. Program staff noted that broad-based outreach to business customers is difficult as their database only contains contact information for billing purposes; as a result, program-related communications often do not reach the energy decision-maker. Account Managers also noted that the decision-making process in some cases presents a barrier to participation:

> *"For the customer, especially with the national accounts, they in turn cannot just make a decision based on their store. They have to go through corporate, and it becomes a much more time consuming process."*

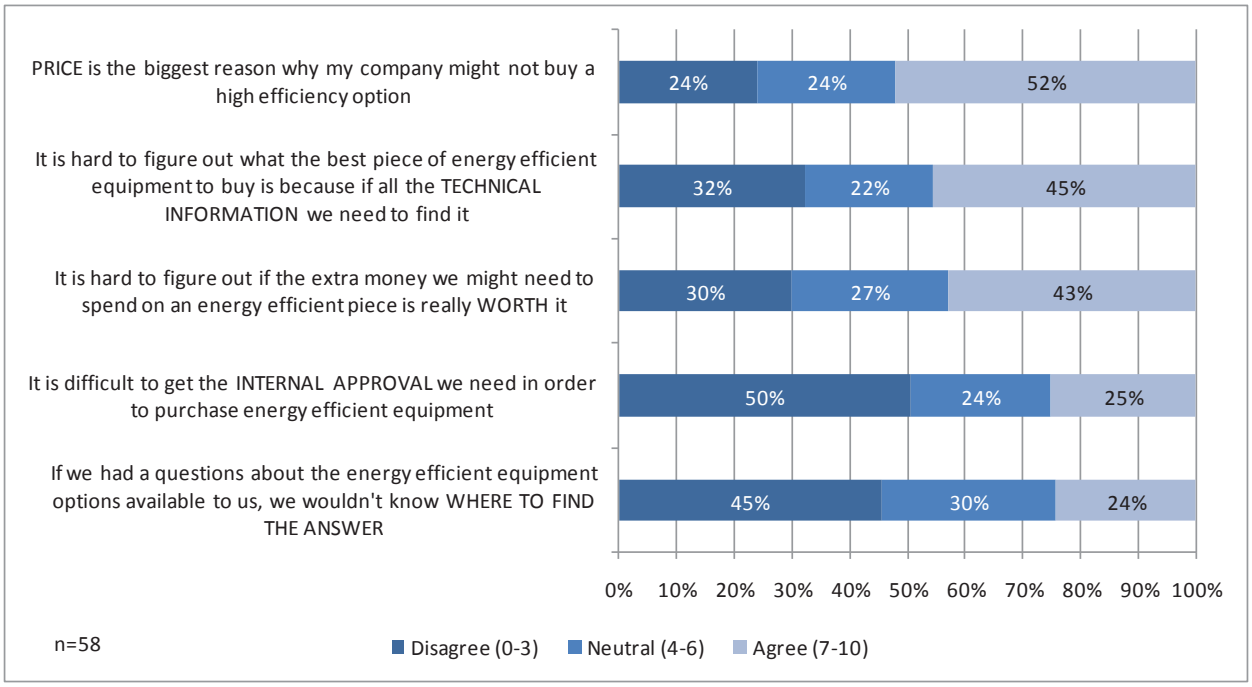
According to interviews with non-participants, 63% have the decision-maker for equipment installations at their facility. An additional 13% noted that the decision-maker was within their company but at a different location (possibly a corporate office). Only 19% indicated that equipment decisions were made by a landlord or property management firm.[23]

[23] Note that the non-participant survey excluded customers in the small delivery service class (<100 kW demand) who would be more likely to rent their facility and not make equipment decisions.

The non-participant survey also explored potential barriers to the installation of energy efficient equipment, including price, lack of information or technical expertise, and internal approval processes. Respondents were asked to state their agreement with a series of statements describing common barriers to becoming more efficient.

Not surprisingly, price is a major barrier to energy efficiency, with 52% of respondents agreeing that price is the biggest reason for not buying a high efficiency option. After price, respondents most often cite informational barriers: 45% of respondents agree that it is difficult to find the necessary technical information and 43% agree it is difficult to determine whether efficient equipment is worth its cost. Figure 3-8 summarizes these responses.

Figure 3-8. Non-Participant Barriers



Many interviewed contractors (11 of 15) also noted that cost is the main barrier to the installation of energy efficient equipment for their customers. Other barriers include lack of understanding and foresight, lead time/delivery, and a "do not tell me what to do" American sentiment. One contractor noted that smaller customers are less likely to invest money in energy efficiency than larger customers.

> *"Nobody wants to spend the money because a lot of them [smaller companies] feel that they don't have it. If they realize there are energy savings that will pay for itself maybe they'd find a way to do it, but the larger companies seem to be more willing to spend the money to do it."*

Not surprisingly, the current economic environment contributes to cost barriers. When asked to what extent the current economic downturn has affected investment decisions with respect to purchasing any new equipment, 29% of non-participants indicate that it has affected them "a great deal" (a rating of 10 on a scale of 0 to 10). Slightly fewer (21%) indicate that the economic situation has affected their investments in *energy efficient* equipment "a great deal."

Despite these barriers, opportunities to increase participation in the Smart Ideas program among current non-participants exist. Almost two-thirds of non-participants (64%) indicate that there have been installations of equipment, or other upgrades, at their facility in the past three years. The most frequent installations were of lighting or HVAC equipment. While most of these respondents (91%) indicate that the equipment was energy efficient, it is unlikely that all of these projects would actually have qualified for incentives through the Smart Ideas program.

Energy/money savings was cited as the major reason for choosing an energy efficient option (73%). However, it was lack of knowledge about the Smart Ideas program that prevented them from implementing these projects through the program. Sixty-three percent of those who implemented "energy efficient" equipment are not aware of the Smart Ideas program, and an additional 20% – while aware of the program – did not have enough information about the program at the time of implementation.

Looking forward, many non-participants plan to install new equipment within the next two years at their facility (58% indicate yes and another 12% say maybe). Notably, 76% of those non-participants indicate that they are very likely to install energy efficient equipment and another 12% indicate that they are somewhat likely. Whether or not this equipment would meet the standards of the Smart Ideas program is unclear. However, these responses suggest that 1) despite the economic climate, customers are active in installing new equipment and 2) there is an interest in energy efficiency. This presents an opportunity for the program to encourage customers to install equipment that will meet the standards of the Smart Ideas program and further increase its participant base.

Contractor Barriers

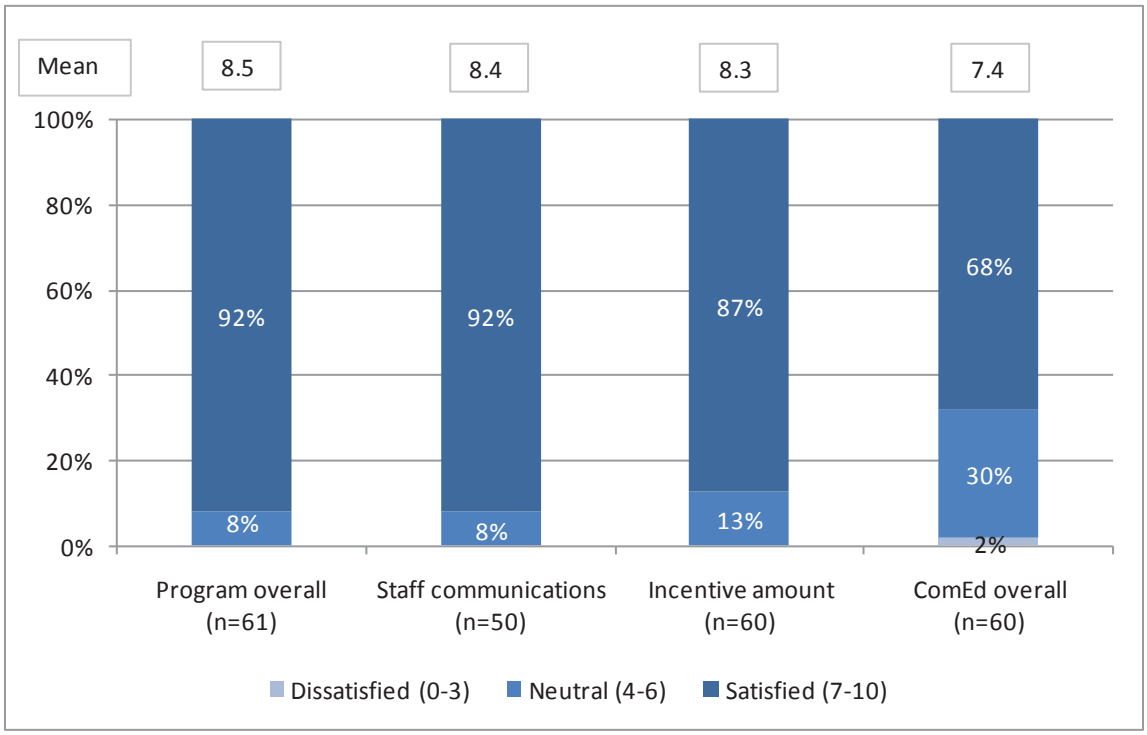
Four of the interviewed contractors had limited activity in the Smart Ideas for Your Business Program in PY3, completing less than four projects. Reasons for inactivity included economic conditions as well as a small company capacity that prevented the completion of more jobs in a given year.

3.2.6 Participant Satisfaction

Participants are satisfied with most aspects of the program. Customers were asked to rate – on a scale of 0 to 10, where 0 means "very dissatisfied" and 10 means "very satisfied" – several

aspects of the program. The highest satisfaction was with the program overall and staff communications, where 92% of participants are satisfied.

Figure 3-9. Program Satisfaction



Note: This graph presents valid percentages, i.e., don't know, refused, and not applicable responses are excluded.
Source: PY3 CATI Participant Survey.

Satisfaction with all program processes remains consistently high throughout each program year. Given the high satisfaction scores, it is not surprising that 74% of participants plan to participate again in the future. When asked what could be done to improve the program, many participants offered no recommendations (31%). Others thought that the program could improve with higher incentives (13%), greater publicity (13%), and better communication (11%).

Contractor Satisfaction

Overall interviewed contractors are satisfied with the Custom Program. When asked about the specific components that led to their level of satisfaction, a majority of respondents (9 of 15) report satisfaction with the staff, while six participants report satisfaction with the measures, incentives, and the short rebate process of the program.

Of the thirteen program allies who offered recommendations of how the Smart Ideas for Your Business Program could be improved, three recommended streamlining the application process, two recommended changes to the lighting offering (to include LED lighting and increase the

outdoor lighting incentives), and two recommend improving communication. Other recommendations include expanding incentives to include new construction, increasing incentive amounts, offering more training, allotting more time for customer interaction at the trade show, and providing more marketing materials.

3.3 Cost Effectiveness Review

This section addresses the cost effectiveness of the Custom program. Cost effectiveness is assessed through the use of the Illinois Total Resource Cost (TRC) test. The Illinois TRC test is defined in the Illinois Power Agency Act SB1592 as follows:

> *'Total resource cost test' or 'TRC test' means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases.*[24]

ComEd uses DSMore™ software for the calculation of the Illinois TRC test.[25] The DSMore model accepts information on program parameters such as number of participants, gross savings, free ridership, program costs and CO_2 reductions. It then calculates a TRC that fits the requirements of the Illinois Legislation.

One important feature of the DSMore model is that it performs a probabilistic estimation of future avoided energy costs. It looks at the historical relationship between weather, electric use and prices in the PJM Northern Illinois region and forecasts a range of potential future electric energy prices. The range of future prices is correlated to the range of weather conditions that could occur, and the range of weather is based on weather patterns seen over the historical record. This method captures the impact that extreme weather has on electricity prices. Extreme weather generally results in electricity price spikes and creates a skewed price distribution. High prices are going to be much higher than the average price while low prices are going to be

[24] Illinois Power Agency Act SB1592, pages 7-8.
[25] Demand Side Management Option Risk Evaluator (DSMore) software is developed by Integral Analytics.

only moderately lower than the average. DSMore is able to quantify the weighted benefits of avoiding energy use across years which have this skewed price distribution.

Results

Table 3-10 summarizes the unique inputs used in the DSMore model to assess the TRC ratio for the Custom program in PY3. Most of the unique inputs come directly from the evaluation results presented previously in this report. Measure life estimates and program costs come directly from ComEd. All other inputs to the model, such as avoided costs, come from ComEd and are the same for this program and all programs in the ComEd portfolio.

Table 3-10 Inputs to DSMore Model for Custom Program

Item	Value Used
Measure Life	12
Utility Administration and Implementation Costs	$684,212
Utility Incentive Costs	$2,878,922
Net Participant Costs	$12,317,152

Based on these inputs, the Illinois societal TRC for this program is 0.99 and the program does not pass the Illinois TRC test.

Section 4. Conclusions and Recommendations

This section highlights the conclusions and recommendations from the PY3 evaluation of ComEd's Smart Ideas for your Business Custom Program. The primary evaluation objectives include quantifying the gross and net energy and demand impacts resulting from the rebated measures and assessing program marketing, and delivery. Below are the key conclusions and recommendations.

4.1 Key Impact Conclusions and Recommendations

Gross Impacts

Based on the sample size of 32 custom projects evaluated in PY3, the gross impact results yielded an energy realization rate of 0.85 which is considered to be high for a custom program. This shows that ComEd is continuing to do a good job of estimating gross impacts for Custom energy efficiency projects in the program. In general the implementation team did a very good job of ensuring that all measures are installed and operational. PY3 energy savings realization rate results indicate that the smallest projects (stratum 3, RR = 1.14) realized a greater proportion of the ex ante claims than the largest (stratum 1, RR = 0.81) and medium projects (stratum 2, RR = 0.57). The evaluation team hypothesizes that this may be due to the complexity and additional uncertainty associated with the large projects in strata 1 and strata 2. The program can further improve the gross impact results by using improved data collection methods and enhanced calculation models. Key evaluation conclusions and recommendations include the following:

Improvements to Ex Ante Impact Estimates[26]

Finding. The program savings calculations did not always represent annual operating conditions. For example, the ex ante calculations were found to not accurately represent facility operating hours (e.g. #8557, and #5311, #5613 & #4367).

- **Recommendation.** To improve program calculations and realization rates, the program could do a better job of verifying operating hours and to examine whether or not the data collected represents typical annual operating conditions for the installed equipment. Adjustments should be made to energy usage calculations (if appropriate) based on information provided by the customer or other available sources.

[26] Additional specific site information is not available to protect customer confidentiality

Finding. The program calculations (specifically for compressed air projects) are not normalized to account for changes in facility production levels or equipment load profiles (e.g. # 7339, #6997 and #4371).

- **Recommendation.** Determine whether pre or post measurement data will require normalization to properly adjust for production differences including appropriate adjustments for weekly or seasonal variation or for market fluctuations. For compressed air projects energy usage calculations should be normalized if the airflow profile has changed from pre retrofit period to the post retrofit period.

Finding. The program calculations did not perform reasonable sanity or reality checks to verify the reasonableness and the range of estimated savings for projects that involved estimation of critical parameters. (e.g. #2559, #8359 and #7461)

- **Recommendation.** Where possible collect site specific data through measurements in support of critical model parameters. Avoid using rules of thumb or percent savings from manufacturer literature. At a minimum verify all assumptions and estimates with appropriate considerations of site specific conditions. Additionally, implementers can obtain manufacturer performance data sheets or use Air Master+ software for compressor units and use them as needed to aid the ex ante calculations. When performing billing analysis, collect information to ensure that other factors (that might skew the savings) are accounted (i.e. miscellaneous loads, other energy efficiency measures and addition of new loads, etc).

Finding. The peak kW calculations were not always consistent with PJM requirements or were not representative of the actual operation of the system during the peak period (e.g. # 6215, #3554 and #8568). Peak kW estimates were often set to zero.

- **Recommendation.** Calculate peak kW savings for all projects and ensure that the estimated savings meet PJM peak demand calculation requirements for weather and non weather dependent projects.

Finding. There were a number of cases where the sources of inputs used in the program calculations were not documented (e.g. #8557, #2234, #6215 and #5613). Also, sources for electric unit cost ($/kWh) were not available and were found to vary considerably site-to-site.

- **Recommendation.** Provide sources for all the inputs and assumptions used for program calculations (especially for any critical parameters such as load factors, power factor, full load amps, temperature set points and operating hours). Collect nameplate or manufacturer information for all the equipment; the nameplate information can be used to verify inputs used for ex ante savings calculations.

Finding. We found spreadsheet cell reference errors in the ex ante baseline calculations for project # 7461 resulted in higher savings than appropriate, producing a much lower realization rate than it should have been if the reference error were absent. Also, a similar cell reference error was observed for project #391 that reduced the total reported ex ante savings.

- **Recommendation.** Double-check spreadsheets to watch for calculation errors.

Finding. For outdoor lighting, we found that for the lights controlled by a photocell, which entailed dusk-to-dawn operation, the hours of operation and peak demand savings were incorrectly estimated.

- **Recommendation.** Calculate hours of operation using the actual dusk to dawn schedule. Use the geographical location specific sunrise and sunset times for each day to estimate the annual hours of operation. There are no peak demand savings for most outdoor lighting measures.

Finding. For VSD and controls projects, it was found that the control strategies were not accurately modeled in the ex ante calculations.

- **Recommendation.** For estimating savings accurately for VSD projects, use the equipment control strategy (throttling, bypass or cycling) that is consistent with the site conditions for estimating the baseline energy usage. For post retrofit conditions determine if the VFD is manually set to operate at constant speeds or is programmed to operate within a set speed range. Examples include projects #7461 and #4081.

- **Recommendation.** For control projects, include sources for all the temperature, pressure or other equipment control settings in the ex ante documentation and verify that the reported settings were actually implemented. Avoid using manufacturer claimed savings in ex ante calculations without performing calculations (at a minimum simple engineering calculation) based on actual site specific conditions (e.g. #5804, #7109 and #2234).

Baseline Selection Issues

Finding. The baseline condition was adjusted (in the evaluation) for four projects, which had a significant effect on the total realized savings for two (#391 and #3820) projects. The most common problem observed is the use of pre-existing equipment as the baseline.

- **Recommendation.** One step that would improve the realization rate would be adjusting the baseline condition consistent with the evaluation approach when the existing equipment being removed has a relatively short remaining useful life or generally requires replacement.

- Identify projects explicitly in program files as replace-on-burnout, natural turnover, or early replacement.
- The age, remaining useful life, operating condition of the existing equipment and the estimated time at which the existing equipment would have been replaced in the future should be verified before selecting the existing equipment as the baseline condition.
- The true test for early replacement should be whether or not there is strong evidence pointing to program induced accelerated adoption. For the replace-on-burnout and natural turnover cases, baselines should be based on the efficiency of alternative new equipment or code requirements and not the existing in situ equipment.

Strengthen Evaluation Participation

Finding. In the course of conducting the evaluation, a few participants mentioned that they wanted us to limit evaluation data collection activities since they had already spent considerable resources to meet the program requirements. While the evaluation activities for PY3 were not affected by this issue it could potentially affect future evaluations. For large projects, if the customer refuses to provide critical data or access to the site it may limit evaluation activities and affect the estimation of project savings. In some cases, the evaluation may require additional data (not previously collected by the program) to verify the savings. There were also a couple of cases where the customer was contacted multiple times but did not respond to evaluation data requests. Examples include projects #2559, #5804 and Project #3554.

- **Recommendation.** Evaluation participation requirements need to be clearly explained to participants, both at the time of final project application submission and when they are paid incentives.

Data Collection

Finding. When the program collects measured data in support of ex ante impact calculations and uses that as a source for estimating savings or for model calibration, the resulting ex ant savings estimates were found to be more accurate (e.g. #8359, #1030, #3554 and #3454).

- **Recommendation.** The program should continue to take measurements for pre retrofit and post retrofit equipment. Measured performance of PY3 projects resulted in accurate savings calculations and high realizations rates (also reflected by the resulting high program RR). Projects with measured program data (obtained from logging or from a customer's SCADA system) were used by the evaluators to inform modeling and assign values to critical parameters. Evaluators do not have access to pre-installation equipment and conditions; therefore, ex ante measured data can greatly benefit the accuracy of ex post savings calculations. However, it is

recommended that the program collect kW measurements and use amperage metering sparingly, such as when the panel size is too small to install kW current transducers or when only amperage data is collected in the SCADA system.

Program Eligibility Requirements

- **Recommendation**. Program implementers should provide strong evidence and supporting documentation that clearly demonstrates that the installed higher efficiency equipment exceeds the efficiency of standard practice.

Projects with Program Rules Issues

Finding. There were a few sites in the impact sample where the evaluation team concluded that the project did not adhere to the program rules. Ex post gross savings were not disallowed for these projects.

Finding. Applicants are required to submit the final application within 60 days of the project completion date. Final applications submitted for the two projects (#7109 and #7739) exceeded this 60 day limit. For project #7739, the final application was submitted about 300 days after the installation of the measure.

- **Recommendation**. Program implementers should ensure that all project final applications are submitted in time as required by the program.

Finding. There were also potential issues with the accuracy of program reported project costs or incremental costs. Payback calculations used to screen projects for eligibility and the incentives cap for projects are affected due to these inconsistencies. For example (#5872), the incremental cost estimation accounted for only the incremental labor cost and did not account for incremental material cost. The project cost (e.g. #391 and #1030) used for payback calculations was not the project cost in the final application. Furthermore, we found variability in price per kWh that can also affect the outcome of payback screening results.

- **Recommendation**. Program payback calculations should use the accurate project cost or incremental cost for all projects.

- **Recommendation.** Typically electric unit cost ($/kWh) for each customer can vary based on the utility rate schedule. During this evaluation we observed a wide range of variation of the electric unit cost ($/kWh) across customers and most of the sources for these values were provided by the customer. It is not clear if the implementers have taken additional steps to verify customer reported electric unit cost ($/kWh) values. Ex ante project documentation should include the customer energy billing information that includes electric unit cost ($/kWh) to confirm that the customer reported cost is consistent. Note that in some cases, the electric unit cost ($/kWh) may vary with seasons

or time of use. This will ensure that the payback calculation is accurate and would be used to confirm the eligibility of the project.

Net Impacts

Finding. Free-ridership levels for PY3 custom program are 44%, which is a significant increase from 24% in PY2. Mean free-ridership was relatively high across the two largest projects (sampling strata 1). Program influence was low for a number of different reasons. In some cases, participants report that program implementers arrived late in the decision making process and offered incentives for projects that had already been decided upon. There were also several cases where the customer reported that they would have installed the same equipment at the same time in the absence of the program incentives. The evidence also indicates that program claims were made for projects that customers initiated for non-energy savings reasons and for which no alternative was ever considered.

- **Recommendation**. One approach to reducing free ridership is for program administrators to simply exclude projects from the program that they believe have a high probability of being free riders. For example, incentives should not be provided to projects that are already installed. Similarly, if there is evidence that the program did not contribute significantly to the decision to install a particular project or equipment type then an incentive may not be warranted. Incentives might only be provided if the program process leads to a higher efficiency level than initially planned. Also, ensure that program incentives are not offered for measures and technologies that are industry standard practice or projects that were being implemented by end users in response to mandates from other regulatory agencies, for example, state building code requirements.

- **Recommendation.** Consider tying performance of the program implementation staff (or implementer in general) not only with the gross impact but also with the verified net savings. Tying performance to verified net savings as reported through the impact evaluation process is likely to increase project quality and the accuracy of initial savings estimates.

Tracking System

Peak Demand. About forty percent of the tracking records were populated with zeros for peak demand impact (kW), affecting the reliability and accuracy of the evaluation results. It was not clear whether the PY3 tracking system demand savings estimates that are set to zero truly reflect an estimate of zero demand savings, or rather are set to zero when they should be set to missing. Currently, the custom application form does not have fields to report peak demand savings and it is unclear how the non-zero demand savings are populated into the tracking database. Furthermore, there is evidence from the sample that some peak demand impact

estimates that are prepared as part of the custom ex ante impact calculations are not subsequently data entered, leading to another potential source of under-reporting of peak demand savings.

- **Recommendation**. Enhanced efforts are needed to report peak demand savings for all the projects. To provide consistent estimates of peak demand savings, the program should include dedicated fields in the custom application form for the applicant to report peak demand savings. We recommend that the implementers populate the ex ante demand savings variable in the tracking system with non-zero values where appropriate, so that the program does not under-report demand accomplishments

Measure Descriptions. Measure description information is reasonably populated in the tracking system but there is room for improvement in consistently labeling individual measures and recording measure end use. Currently, projects involving more than one measure appear as a single record, and therefore the measure descriptions tend towards a mixture of rough information concerning the measures installed. Implementation staff did not populate end use consistently, as it is left blank many times, or populated with a value that is inconsistent with the measure description (e.g., "Other" or "Blank").

- **Recommendation**. ComEd should consider tracking modifications that would isolate individual records for each measure installed and achieve greater levels of consistency in reporting variables that describe measures and end-uses affected. ComEd should also populate end use consistently. With these improvements in place, it would be possible for either the program staff or the evaluation team to produce measure-based summary statistics and more precisely track program accomplishments.

4.2 Key Process Conclusions and Recommendations

Program Participation

Finding. Despite a 160% increase in the number of completed projects, some sectors (e.g., lodging, medical, and schools/colleges) have experienced stagnant growth in participation in the Custom Program. Some of these (lodging and medical) have had relatively high per project savings.

- **Recommendation.** Consider special offerings for sectors with limited participation but high savings potential. Hard-to-engage industries with high savings potential might benefit from specific offerings to encourage more participation. Such an approach has been successfully employed by other utility programs, e.g., through targeted RFP programs that have packaged prescriptive and custom measures into one comprehensive offering. Further research might be required to identify industries to target for special promotions and identify their specific barriers to participation.

Participant Satisfaction

Finding. Participants and contractors are satisfied with most aspects of the program. The highest participant satisfaction was with the program overall and staff communications. Seventy-four percent of PY3 participants plan to participate again in the future. Participant recommendations for improvements included higher incentives (13%), greater publicity (13%), and better communication (11%).

Trade Ally Network

Finding. Most interviewed contractors indicated that the Smart Ideas for Your Business Program influenced their business. While many of these contractors had already adopted business models that focused on energy efficiency and were recommending energy efficient equipment before participating in the program (although not necessarily equipment that would have qualified for the program), most thought that the program was influential in increasing their overall sales. Additionally, a few contractors changed their marketing practices or hired additional staff due to their participation in the Smart Ideas program.

Finding. PY3 marked the introduction of new trade ally requirements. While most interviewed trade allies saw no problems with these requirements, active non-trade ally contractors most often cite the time burden of attending the training in person as the main reason for not becoming a trade ally.

- **Recommendation.** Consider offering basic training online. If disseminating the information provided in the training is considered important to continue to increase the quality of applications, then the program should consider offering training via a web portal. This will allow more contractors to take advantage of the training opportunities and would reduce a barrier to becoming a trade ally.

Finding. The requirements and benefits of becoming a ComEd trade ally do not always seem to be communicated well to contractors. Several of the interviewed trade allies were not aware of their status in the network and the new requirements of becoming or remaining a trade ally. Interviewed non-trade allies were generally not aware of the benefits of the trade ally designation.

- **Recommendation.** Attempt to enhance and better communicate the benefits of becoming a registered trade ally. By offering additional benefits, such as more co-branding opportunities, more contractors may be enticed to register with the program.

Trade Ally Bonus

Finding. Only five of 15 interviewed contractors (all of them trade allies) were aware of the PY3 trade ally bonus. However, some of the interviewed non-trade ally contractors expressed interest in the bonus offering and indicated that they would have increased promotion of the program had they been aware of the offering.

- **Recommendation.** Consider increasing the promotion of the trade ally bonus. By leaving interested contractors unaware, the program might have missed opportunities to attract more projects.

Finding. Additional research into similar bonuses offered by other utilities found that apart from the bonus structure, strong communication and clear expectations are crucial to the success of such an effort.

- **Recommendation.** The Smart Ideas program has already modified its bonus offering for PY4, adopting a tiered system modeled after Ameren Illinois' trade ally incentive structure. The program should strive to communicate the new bonus program early and clearly to both trade allies and non-ally contractors, and provide sufficient lead time for contractors to increase their promotion and take advantage of the offering to the fullest extent.

Program Marketing and Outreach

Finding. Marketing and outreach increased substantially in PY3. The marketing plan for PY3 included trigger tactics that were initiated throughout the program year. Initial tactics included several low or no cost measures such as targeted outreach to customer groups (e.g., trade associations) and customers who attended the Energy Efficiency Expo, following up on leads from PY1 and PY2, increasing the frequency of the electronic newsletter, and a direct mailing to larger customers. As a result of the increased marketing, almost half (49%) of Custom participants recall having been directly contacted by ComEd or KEMA.

Finding. Lack of program awareness is still a key barrier to participation in the Smart Ideas program. In addition, reaching the correct decision-maker is a major hurdle both in increasing awareness of the program and encouraging participation. However, opportunities exist to increase participation in the Smart Ideas program among current non-participants. Almost two-thirds of non-participants indicate that there have been installations of equipment, or other upgrades, at their facility in the past three years. Despite the economic climate, customers are active in installing new equipment and have an interest in energy efficiency. This presents an opportunity for the program to encourage customers to install equipment that will meet the standards of the Smart Ideas program and further increase its participant base.

- **Recommendation.** The program should attempt to develop a more targeted database of energy decision makers for their larger customers. To start this database, Account

Managers could be engaged to provide decision maker contact information for each of their managed accounts.

Account Managers

Finding. All interviewed Account Managers were generally receptive to the introduction of new Smart Ideas goals for Account Managers. They thought the goals were both realistic and achievable. While interviewed Account Managers generally found their new Smart Ideas goals reasonable, several noted that it would become increasingly difficult to recruit their customers to the Energy Efficiency Expo, if largely similar information was presented.

- **Recommendation.** Consider offering new attractions for future Energy Efficiency Expos. The program should find ways to keep the Expo attractive for returning customers or consider adjusting Account Manager goals with respect to Expo recruitment.

Finding. No formal process for tracking customer leads exists in the Smart Ideas Program. However, interviewed Account Managers indicated that such a system would be a useful tool for Account Managers and Smart Ideas staff alike.

- **Recommendation.** The program should attempt to develop a more formal system of tracking leads, especially among large managed accounts. This would facilitate more coordinated follow-up by program staff and could also help in building a more useful marketing database for targeted outreach towards large customers.