Commonwealth Edison Company
Energy Efficiency/Demand Response Plan
Plan Year 1 (6/1/2008-5/31/2009)
Evaluation Report:
Business Custom Program

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ComEd

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Final Report

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E EXECUTIVE SUMMARY

E.1 Evaluation Objectives

The goal of this report is to present a summary of the findings and results from the evaluation of the Program Year 1 C&I Custom program[1]. 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.

The Commonwealth Edison Company (ComEd) Smart Ideas for Your Business program provides incentives for business customers who upgrade their facilities with energy efficient equipment. There were two specific program elements that were available to ComEd customers during program year 1: a Custom program and a Prescriptive program.

- Custom program incentives are available to customers for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects.
- The Prescriptive program provides an expedited application approach for nonresidential customers interested in purchasing efficient technologies. The program targets discrete retrofit and replacement opportunities in lighting, HVAC, motor, and refrigeration systems. A streamlined incentive application and quality control process is intended to facilitate ease of participation. Relationships with trade allies are a key strategy for promoting prescriptive incentive availability to customers.

Some tasks within the Prescriptive and Custom program evaluations involved close coordination between the two efforts, but the evaluations were otherwise conducted through separate approaches. The Prescriptive and Custom programs have evaluation results reported separately.

E.2 Evaluation Methods

ComEd's three-year Energy Efficiency and Demand Response Plan, filed in November 2007 and approved in February 2008,[2] anticipates that the Custom program will provide 24% of the business portfolio nonresidential energy savings. Prescriptive and Custom program goals and budgets were combined prior to PY1. However, the Prescriptive program quickly over-subscribed, which led to a reduction of activity for the Custom program compared to the plan for PY1.

Table 1 provides a summary of the principal data sources contributing to the evaluation of the PY1 Custom program. For each data element listed the table provides the targeted population, the sample frame, sample size and timing of data collection.

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[1] The Program Year 1 (PY1) program year began June 1, 2008 and ended May 31, 2009.

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

After careful examination of the Custom measures installed in PY1, it was decided to segment projects and associated measures into the following two categories, Custom-Other and Custom-Lighting measures. The tracking system-based annual kWh impact is roughly split evenly between Custom-Other and Custom-Lighting records. The original evaluation plan assumed that only measures described above as Custom-Other would be installed through the program. However, because Custom-Lighting measures are such a large component of the impact claim in PY1, the evaluation plan was changed to address both segments.

Table 1. Principal Data Sources Contributing to the PY1 Evaluation

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	Custom program customers, projects and measures	ComEd Online Tracking Database	-	All	Ongoing
In-depth Phone Interviews	ComEd Custom Program Staff	Contact from ComEd	C&I Custom Program Manager	2	April 2009
	Custom Program Implementers	Contact from ComEd	KEMA Program Implementation Staff	3	April/May 2009
CATI Phone Survey	Custom Program Participants	Tracking Database	Stratified Random Sample of Custom Program Participants	24	August/Sept. 2009
Project Application File Review	Projects in the Custom-Other segment	Tracking Database	Stratified random sample by Custom project-level kWh (2 strata)	5	September – October 2009
On-Site Visits and Measurement					

E.3   Key Findings

The Custom program launched in June 2008 and fell short of planned levels of participation and impacts due to the Custom and Prescriptive goals and budgets being combined. The Prescriptive program on the other hand far exceeded planned levels of participation and impacts.

Table 2 below provides an overview of planned, reported ex ante, and evaluation-adjusted net savings impacts for the PY1 Custom program. As shown in Tables 3 and 4, the PY1 evaluation found that verified gross impacts were 21 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, 0.72, was lower than ComEd's planning value of 0.80.

Table 2. PY1 Custom Program Net Savings

Net Savings Estimates	MWH	MW
ComEd Plan Target	18,932	3.5
ComEd Reported for PY1 (ex ante)	7,958	
Total First-Year Evaluation-Adjusted Net Savings (ex post)	4,761	0.3

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

Table 3. Program-Level Evaluation-Adjusted Net kWh Impacts for PY1

Segment	Ex Ante Gross kWh	Ex Post Gross kWh	kWh RR	Ex Post Net kWh	NTGR (ex post gross)
Other	4,226,226	2,421,841	0.57	1,708,550	0.71
Lighting	4,184,620	4,184,620	NA	3,051,976	0.73
Total	8,410,846	6,606,461	0.79	4,760,526	0.72

An ex post gross impact evaluation was not completed for the Custom-Lighting segment.
Ex post gross impacts for the Custom-Lighting segment are set equal to the ex ante gross impacts for that segment of the program population.
Source: Tracking savings from ComEd online tracking system, July 7, 2009.

Table 4. Program-Level Evaluation-Adjusted Net kW Impacts for PY1

Segment	Ex Ante Gross kW	Ex Post Gross kW	kW RR	Ex Post Net kW	NTGR (ex post gross)
Other	98	208	2.12	146	0.71
Lighting	241	241	NA	176	0.73
Total	339	448	1.32	323	0.72

An ex post gross impact evaluation was not completed for the Custom-Lighting segment.
Ex post gross impacts for the Custom-Lighting segment are set equal to the ex ante gross impacts for that segment of the program population.
Source: Tracking savings from ComEd online tracking system, July 7, 2009.

The relative precision at a 90% confidence level for the Custom-Other segment is ± 17% for both the kWh Realization Rate is and for the kW Realization Rate. Gross impacts were not evaluated for the Custom-Lighting segment of the program. The relative precision at a 90% confidence level for the program NTG ratio is ± 7%.

Key Impact Findings

- Based on the relatively small sample sizes evaluated in PY1 it appears that ComEd is doing a good job of screening viable Custom energy efficiency projects for incorporation in the program. Some common Custom program issues were <u>not</u> encountered. The project documentation presented a reasonably clear description of how a given project saves energy and the energy efficiency measures included in the program all appear to have a reasonable basis for claiming

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energy savings. Ex ante savings estimates were reasonably technically accurate, although some equations applied were not well supported or sourced. The baseline condition selected for the impact calculations was generally reasonable. No apparent project fraud or thoroughly unreasonable impact claims were encountered.

- The program needs to do a better job of estimating peak demand savings. Not only is peak demand not well populated, but for most measures it appears that accurate estimation of peak demand is given a lower priority than energy savings, due to the fact that incentive levels are tied to energy savings and not peak demand reduction. Additional effort is needed within the program to enhance the estimation of demand savings and the tracking of those resulting impact estimates.

- Free-ridership levels measured are better than expected for a Custom program at roughly 30%. Custom-Other is doing especially well – on par with the Custom-Lighting segment of the population. Participants report the program being a strong motivating factor in their decision to upgrade to efficient equipment at the time they elected to do so. Low free-ridership was observed across all project size categories (sampling strata).

- It is recommended that selected ComEd and implementation staff review the content of the site M&V reports to better understand the reasons underlying the ex post realization rate results.

Key Process Findings

Program Participation

Participation in the Custom Program was outpaced by the Prescriptive Program in PY1. Goals and incentive budgets for the two programs were combined prior to the beginning of the program year, and a majority of the savings goals were met by prescriptive lighting projects. The resulting PY1 Custom participation consists of 64 customers completing a total of 87 custom projects.

Customer Satisfaction

Customer satisfaction with various processes and components of the program was high, and few participants reported encountering problems during their participation. Some participants noted not receiving the full incentive amount as an issue, which in some cases resulted from an insufficient pre-review process by the implementer.

Program Oversubscription

The Smart Ideas for Your Business program experienced unexpectedly strong demand for prescriptive measures immediately after launch in June 2008. The program became oversubscribed in September 2008 and had to begin wait-listing projects. Because the budgets and goals for the Prescriptive and Custom Programs had been combined prior to the start of PY1, the strong demand for prescriptive measures presented several challenges to the Custom Program: the Custom Program experienced a slower than expected start and fell short of its original, individual goals for PY1.

Early results from PY2 show that the program is likely to become oversubscribed again. Assuming that each individual program in the portfolio is striving to meet their program-specific goals, the PY2 evaluation should focus on how program design and/or implementation can be adjusted to avoid the negative consequences of oversubscription on the Custom Program.

Marketing and Outreach

Necessarily, the oversubscription also meant that program implementation had to be adjusted. Specifically, some of the anticipated promotional channels (Account Managers, marketing materials) were not utilized as planned since there was no need for additional program promotion overall. However, it is noted that this de-emphasis on marketing, following oversubscription, will not generate a pipeline of Custom projects in the waitlist for PY2 and PY3. The limited marketing that was conducted during PY1 was recalled and well received by program participants. The most successful efforts were promotion via contractors/trade allies and account managers as well as the website, and e-mail.

Trade Ally Network

While ComEd laid a strong foundation for the Prescriptive program Trade Ally Network in PY1, staff for the Custom Program noted that the right supplier/trade ally support for more complex custom projects had not yet been reached by the program. This is underscored by responses to the participant survey which show that contractors play an important role in the implementation of custom-lighting projects, but less so in the implementation of custom-other projects.

1 INTRODUCTION TO 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 Illinois Service territory. There were two specific program elements that were available to ComEd customers during program year 1 (PY1) under the ComEd Smart Ideas for Your Business incentives program:

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

- **Custom Incentives** are available to customers for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects. Custom measure incentives are paid based on the first year energy (kWh) savings. All projects must 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 2, with minor changes to prescriptive incentive levels and rebate options.

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.[3] 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.[4] The program is funded on an annual basis from June 1 to May 31 of the following year.[5] Funding in any given program year is

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[3] For more information on the DCEO programs please refer to (www.illinoisenergy.org).

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

[5] Program year 1 ran from June 1, 2008 through May 31, 2009.

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.

The net MWH savings goals and budgets for the 2008 (PY1) Prescriptive and Custom incentives program are presented in Table 5.

Table 5. Smart Ideas for Your Business PY1 Planned Savings Goals and Budgets

Program Element	Plan Target Net MWH	Plan Target Net MW	Plan Target Total Cost
Prescriptive Incentives	43,255	12.3	$7,000,000
Custom Incentives	18,932	3.5	$2,500,000
Total	**62,187**	**15.8**	**$9,500,000**

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 Program Implementation

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

ComEd has provided the evaluation team with a detailed operations manual and a policies and procedures manual that describe program implementation. Important aspects of program implementation are summarized below.

Incentive Caps: Incentives are subject to annual limits or caps that are set per facility per year. A facility is defined as contiguous property for which a single customer is responsible for paying the ComEd electricity bill. The incentive cap for PY1 ending May 31, 2009 is $100,000 per facility.

Incentive Limits: 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.

Pre-approval Application Submittal: Pre-approval is required for all Custom applications to reserve funding.

Pre-Review: The program reviews pre-approval applications for eligibility and completeness. The program contacts the customer or contractor to clarify details or obtain further information, to discuss the overall process and timelines, and to explain the process for inspections where they are required.

Pre-Inspection: Pre-inspections provide the program with the opportunity to verify the existing conditions at the site. They are performed as defined by quality assurance procedures based on the type of measures that the participant submits.

Reservation: The program reserves the project funds once the pre-inspection report and/or initial project review is approved. Projects that come in after funds are fully reserved are placed on a waiting list. In the

event that a project is not completed within 90 days of the reservation and an extension has not been requested and granted, then the project is cancelled.

Final Application Submittal: The Final Application requires the submittal of documentation to demonstrate the installation of each energy efficiency improvement, including project invoices to document the costs to procure and install the project. Final applications must be submitted within 60 days of project completion and include the appropriate back-up documentation to verify the project is complete and meets the program requirements. ComEd reserves the right to request additional information from the sponsoring customer that demonstrates the effectiveness of the technology deployed. The program reviews final applications for eligibility and completeness.

Final Inspection: The program performs final inspections as defined by quality assurance/quality control procedures to verify the measure installations.

Incentive Payment: Once the program accepts a project for payment, incentives are processed and delivered.

Cancellation: When a project either does not meet the program guidelines or is cancelled by the customer, the project is moved to cancelled status. The project details remain in the database, but the project no longer counts towards the active program goals.

Wait List: If project applications and related funding requests reach the point where ComEd determines that further funding reservations can no longer be made, the program moves projects to a waiting list. Projects on the wait list will not be reserved or paid unless sufficient funding becomes available. Wait list projects are not included in the active program totals.

Hold: Projects are placed on hold when a customer with a reserved project decides not to move forward in the current program year and indicates that they may move forward with their project in the following year. Projects on hold are not included in the active program totals.

1.1.2 Projects and Incentives for PY1

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.

There are also project and measure caps of $100,000 per facility per year, and a 50% of project cost cap that is applied in the calculation.

The PY1 program application form is provided in Appendix 5.2.1, 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 focused on five key areas:

1. Effectiveness of program implementation
2. Effectiveness of program design and processes
3. Customer and program partner experience and satisfaction with the program
4. Opportunities for program improvement
5. Program awareness and potential market effects

The full list of researchable questions can be found in the Evaluation Plan.

2   EVALUATION METHODS

After careful examination of the Custom measures installed in PY1, it was decided to segment projects and associated measures into the following two categories:

- Custom-Other measures, including 14 measures installed in 13 projects: HVAC measures such as VSDs/VFDs, free cooling installations and centralized thermostat control systems, refrigeration measures in large commercial applications, air compressor system upgrades, industrial process renovations and so forth. These are "True Custom" measures in the sense that simple deemed savings and/or simple-to-apply algorithms do not already exist for this homogenous measure segment of the program population. The evaluation seeks to update, refine or replace the calculation procedures that were submitted as part of the final application submittal.

- Custom-Lighting measures are "Prescriptive-like" measures for which energy savings can be estimated using simple algorithms involving the number of units installed, lighting equipment connected load information and the operating profile of a particular customer or class of customers. This includes 82 lighting records installed in 75 projects and refers to lighting measures that are either not allowed under the Prescriptive program, or lighting measures that operate on a different schedule (i.e., 24/7) than the Prescriptive assumptions, or sometimes lighting measures that would qualify for the Prescriptive program but a given 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.

The tracking system-based annual kWh impact is roughly split evenly between Custom-Other and Custom-Lighting records. The original evaluation plan assumed that only measures described above as Custom-Other would be installed through the program. However, because Custom-Lighting measures are such a large component of the impact claim in PY1, the evaluation plan was changed to address both segments.

The evaluation plan originally called for on-site visits and detailed M&V for 5 Custom projects to address the gross impact evaluation objectives, plus telephone surveys with 10 Custom projects to address evaluation process and net objectives. In light of the fact that Custom-Lighting measures are of roughly equal importance, on an annual kWh claim basis, in the Custom program in PY1, the original evaluation plan was modified as follows.

- Conduct on-site visits and M&V activities for 5 Custom-Other projects, with a reduced level of gross impact evaluation effort.

- Where possible, apply lighting gross impact realization rates from the Prescriptive evaluation to the Custom-Lighting measures.

- Conduct a census of telephone surveys for all 13 Custom-Other projects using a Basic CATI (Computer Aided Telephone Interview) net impact approach (as described in greater detail in the Net Program Savings section, 2.1.2 below). The Basic approach is appropriate since the PY1 Custom-Other projects are all relatively small. The extra large net impact approach or the Enhanced approach will be applied in PY2 and 3, based on project size where warranted.

- Conduct 20 Custom-Lighting project telephone surveys using the Basic CATI net impact approach.

- Telephone survey data were also collected in each survey described above to support the process evaluation.

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

2.1   Analytical Methods

2.1.1 Gross Program Savings

Separate analytical approaches were taken for estimating gross savings for the Custom-Other and Custom-Lighting segments. For the Custom-Lighting segment it was decided that application of a lighting realization rate from the Prescriptive evaluation was inappropriate, as Custom-Lighting measure impact calculation inputs differ by site and are for technologies not covered by the prescriptive program. For the Custom-Lighting segment, the ex ante gross impacts were adopted and reported as the ex post gross impacts.

The remainder of this section applies only to the Custom-Other segment.

The objective of this element of the impact evaluation is to verify the PY1 ex ante gross savings estimates in the Custom program tracking system for the Custom-Other segment. The savings reported in ComEd's online tracking system was evaluated using the following steps:

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.
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.
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:

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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 segment and sampling strata, 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.

Selection of IPMVP Approach

Ex post gross annual energy and demand impacts were assessed using an array of methods that are compliant with and defined by the International Performance Measurement and Verification Protocols (IPMVP). Flexibility was also considered in applying these protocols, with an eye towards deployment of a cost-effective M&V approach (i.e., reduction in uncertainty per evaluation dollar spent). Choices include IPMVP Option A (simple engineering model), Option B (retrofit isolation model), Option C (normalized annual consumption model or a fully specified regression model) and Option D (calibrated building energy simulation models).

Baseline Assessment

Development of baseline is a crucial step in accurately assessing custom measure ex post savings, and it is sometimes the case that the ex post evaluation-defined baseline does not agree with the program-defined baseline. For example, it is common in site-specific custom measure analyses for the program baseline to be defaulted as the *in situ* equipment, no matter what the age of the existing equipment that are subsequently removed. In each case an investigation is needed to determine whether the existing equipment was at the end of its life and whether there is an efficiency increment among new equipment available on the market. If the equipment is at the end of its life and there is variation among new equipment efficiencies, then the savings should be based on the delta between the efficiency of the standard baseline equipment and program induced installation. In such cases the efficiency of the *in situ* equipment is irrelevant. If it the equipment is at the end of its life (i.e., no evidence of program-induced early replacement) and there is little or no difference in efficiencies among new equipment choices, then the savings will essentially be zero. The point here is to simply illustrate that baseline determination and analysis are an integral and extremely important part of custom impact evaluation.

Review Applications and Prepare Analysis Plans

For each selected application, an in-depth application review is performed to assess the engineering methods, parameters and assumptions used to generate all ex ante impact estimates. Application review serves to familiarize the assigned engineer with the gross impact approach applied in the program calculations. This will also forms the basis for determining the additional data and monitoring needs that are required to complete each analysis and the likely sources for obtaining those analytic inputs. For most projects on-site sources include interviews that are completed at the time of the on-site, visual inspection of the systems and equipment, EMS data downloads, spot measurements, and short-term monitoring (e.g.,

less than four weeks). For some projects data sources also include program implementers, interviews with vendors and other Energy Efficiency Service Providers (EESPs)[6] that participated in a given project.

Each review results in a formal analysis plan. Each plan explains the general gross impact approach used (including monitoring plans), provides an analysis of the current inputs (based on the application and other available sources at that time), and identifies sources that will be used to verify data or obtain newly identified inputs for the ex post gross impact approach.

Schedule and Conduct On-Site Data Collection

On-site surveys are completed for each of the customer applications sampled. The engineer assigned to each project first calls to set up an appointment with the customer.

During the on-site audit, data identified in the analysis plan is collected, including monitoring records (such as instantaneous spot watt measurements for relevant equipment, measured temperatures, data from equipment logs and EMS/SCADA system downloads), equipment nameplate data, system operation sequences and operating schedules, and, of course, a careful description of site conditions that might contribute to baseline selection.

All engineers who conduct audits are trained and experienced in completing inspections for related types of projects. Each carries all equipment required to conduct the planned activities. They check in with the site contact upon arrival at the building, and check out with that same site contact, or a designated alternate, on departure. The on-site audit consists of a combination of interviewing and taking measurements. During the interview, the engineer meets with a building representative who is knowledgeable about the facilities' equipment and operation, and asks a series of questions regarding operating schedules, location of equipment, and equipment operating practices. Following this interview, the engineer makes a series of detailed observations and measurements of the building and equipment. All information is recorded and checked for completeness before leaving the site.

Conduct Site-Specific Impact Calculations and Prepare Draft Site Reports

After all of the field data is collected, including any monitoring data, energy and demand impacts are developed based on the on-site data, monitoring data, application information, and, in some cases, billing or interval data. Each program engineering analysis is based on calibrated engineering models that make use of hard copy application review and on-site gathered information surrounding the equipment installed through the program (and the operation of those systems).

Energy savings calculations are accomplished using methods that include short-term monitoring-based assessments, simulation modeling (e.g., DOE-2), bin models, application of ASHRAE methods and algorithms, analysis of pre- and post-installation billing and interval data, and other specialized algorithms and models.

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[6] Energy Efficiency Service Providers are supply-side market actors that might assist customers in completing one or more tasks for a given project. This might include consultants, designers, vendors, contractors and energy services companies (ESCO's).

After completion of the engineering analysis, a site-specific draft impact evaluation report is prepared that summarizes the M&V plan, the data collected at the site, and all of the calculations and parameters used to estimate savings.

Quality Control Review and Final Site Reports

The focus of the engineering review is on the quality and clarity of the documentation and consistency and validity of the estimation methods.

Each draft site report underwent extensive senior engineer review and comment, providing feedback to each assigned engineer for revisions or other improvements. Each assigned engineer then revised the draft reports as necessary to produce the final site reports.

2.1.2 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 PY1, 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 qualitatively in PY1.

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

NTG Ratio = 1 – Free-ridership Rate

Free-Ridership

Free ridership was assessed using customer self-report approach following a framework that was developed for evaluating net savings of California's 2006-2008 nonresidential energy efficiency programs. This method calculates free-ridership using data collected during participant phone surveys concerning the following three items:

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

- A **Program Influence** score that reflects the degree of influence the program had on the customer's decision to install the specified measures. This score is cut in half if they learned about the program after they decided to implement the measures.

- A **No-Program** score that 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. This score accounts for deferred free ridership by incorporating the likelihood that the customer would have installed program-qualifying measures at a later date if the program had not been available.

Each of these scores represents the highest response or the average of several responses given to one or more questions about the decision to install a program measure. The rationale for using the maximum value is to capture the most important element in the participant's decision making. This approach and scoring algorithm is identical to that used by the Ameren Illinois evaluators with the exact same questions.

The calculation of free-ridership for the Custom program is a multi-step process. The survey covers a battery of questions used to assess net-to-gross ratio for a specific end-use and site.

Responses are used to calculate a Program Components score, a Program Influence score and a No-Program score for each project covered through the survey. These three scores can take values of 0 to 10 where a lower score indicates a higher level of free-ridership. The calculation then averages those three scores to come up with a project-level net-to-gross ratio. If the customer has additional projects at other sites covering the same end-use, the survey asks whether the responses also apply to the other projects. If that is the case, the additional projects are given the same score.

This scoring approach is summarized in Table 6.

Table 6. Net-to-Gross Scoring Algorithm for the PY1 Custom Program

Scoring Element	Calculation
Program Components score. The maximum score (on a scale of 0 to 10 where 0 equals not at all influential and 10 equals very influential) among the self-reported influence level the program had for: A. Availability of the program incentive B. Technical assistance from utility or program staff C. Recommendation from utility or program staff D. Information from utility or program marketing materials E. Endorsement or recommendation by a utility account rep	Maximum of A, B, C, D, and E
Program Influence score. "If you were given a TOTAL of 100 points that reflect the importance in your decision to implement the <ENDUSE>, and you had to divide those 100 points between: 1) the program and 2) other factors, how many points would you give to the importance of the PROGRAM?"	Points awarded to the program (divided by 10) Divide by 2 if the customer learned about the program AFTER deciding to implement the measure that was installed

Scoring Element	Calculation
No-Program score: "Using a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely", if the utility program had not been available, what is the likelihood that you would have installed exactly the same equipment?" Adjustments to the "likelihood score" are made for timing: "Without the program, when do you think you would have installed this equipment?" Free-ridership diminishes as the timing of the installation without the program moves further into the future.	Interpolate between No Program Likelihood Score and 10 where "At the same time" or within 6 months equals No Program score, and 48 months later equals 10 (no free-ridership)
Project-level Free-ridership (ranges from 0.00 to 1.00)	1 – Sum of scores (Program Components, Program Influence, No-Program)/30
PY1 Project level Net-to-Gross Ratio (ranges from 0.00 to 1.00)	1 – Project level Free-ridership
Apply score to other end uses within the same project?	If yes, assign score to other end-uses of the same project
Apply score to other projects of the same end-use?	If yes, assign score to same end-use of the additional projects

Spillover

For the PY1 Custom program evaluation, a battery of questions was asked to qualitatively assess spillover Below are paraphrased versions of the spillover questions that were asked:

1. 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?
2. What specifically were the measures that you implemented?
3. Why are you not expecting an incentive for these measures?
4. Why did you not install this measure through the ComEd Program?
5. Please describe the SIZE, TYPE, and OTHER ATTRIBUTES of these measures.
6. Please describe the EFFICIENCY of these measures.
7. Please describe the QUANTITY installed of these measures.
8. Were these measures specifically recommended by a program related audit, report or program technical specialist?
9. How significant was your experience in the ComEd Program in your decision to implement this Measure, using a scale of 0 to 10, where 0 is not at all significant and 10 is extremely significant?
10. Why do you give the ComEd program this influence rating?
11. If you had not participated in the ComEd program, how likely is it that your organization would still have implemented this measure, using 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?

Responses to these questions allow us to assess whether spillover may be occurring and the type of equipment involved, but do not offer enough detail to quantify the spillover. Spillover could be quantified through follow-up questioning and site visits on potential spillover occurrences reported by the participants.

2.2　Data Sources

Table 7 provides a summary of the principal data sources contributing to the evaluation of the PY1 Custom program. For each data element listed table provides the targeted population, the sample frame, sample size and timing of data collection.

Table 7. Principal Data Sources Contributing to the PY1 Evaluation

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	Custom program customers, projects and measures	ComEd Online Tracking Database	-	All	Ongoing
In-depth Phone Interviews	ComEd Custom Program Staff	Contact from ComEd	C&I Custom Program Manager	2	April 2009
	Custom Program Implementers	Contact from ComEd	KEMA Program Implementation Staff	3	April/May 2009
CATI Phone Survey	Custom Program Participants	Tracking Database	Stratified Random Sample of Custom Program Participants	24	August/Sept. 2009
Project Application File Review	Projects in the Custom-Other segment	Tracking Database	Stratified random sample by Custom project-level kWh (2 strata)	5	September – October 2009
On-Site Visits and Measurement					

Tracking Data

The tracking data delivered for this evaluation was extracted from a copy of the ComEd online database uploaded to the evaluation team SharePoint site on a periodic basis. Program samples were drawn from the version uploaded by ComEd on July 7, 2009. The most recent version supplied to the evaluation team was uploaded September 21, 2009.

Program and Implementer Staff Interviews

Five in-depth interviews were conducted as part of this evaluation. Two of these interviews were conducted with the ComEd C&I Program Manager (Steve Baab) and the ComEd Custom Program

Manager (Sandra Henry); the other three interviews were conducted with KEMA implementation staff (Operations Manager Charley Budd, and Directors Dan Waintroob and Wendy Tobiasson). These interviewers were completed over the phone in April and May of 2009. The interviews with the ComEd Program Managers focused on program processes to better understand the goals of the program, how the program was implemented, the perceived effectiveness of the program, and also verified evaluation priorities. The interview with the implementation staff explored the implementation of the program in more detail and also covered areas of data tracking and quality assurance. The interview guide used for these interviews is included in Appendix 5.1.1.

The evaluation team also reviewed program materials developed by KEMA and ComEd, including: KEMA's operations manual, a policies and procedures manual, a random sample of Custom Application documents, program tracking database documentation, and program scorecard reports. ComEd's tracking system database contractor conducted user training for program staff and evaluators in February 2009.

CATI Phone Survey

A CATI telephone survey was conducted with a stratified random sample of Custom Program participants. This survey focused on questions to estimate net program impacts and to support the process evaluation. All CATI surveys were completed in August and September of 2009.

The CATI survey was directed toward unique customer contact names drawn from the tracking system for PY1 paid Custom projects. The survey data collected supports PY1 free-ridership estimation, process evaluation inputs (including business demographics), and a qualitative assessment of spillover. The CATI survey instrument used for this evaluation is included in Appendix 5.1.2.

Project Application File Review

To support Final Application file review, project documentation in electronic format was obtained from the online tracking system, for each sampled project and several others that were randomly inspected. Documentation included some or all of scanned files of hardcopy application forms and supporting documentation from the applicant (ex ante impact calculations, invoices, measure specification sheets, vendor proposals), pre-inspection reports and photos (when required), post inspection reports and photos (when conducted), and important email and memoranda.

On-Site Visits and Measurement

On-site surveys were completed for each of the applications sampled for M&V. During each on-site visit, data identified in the analysis plan is collected, including monitoring records (such as instantaneous spot watt measurements for relevant equipment, measured temperatures, data from equipment logs and EMS/SCADA system downloads), equipment nameplate data, system operation sequences and operating schedules, and a careful description of site conditions that might contribute to baseline selection.

2.3   Sampling

The tracking data delivered for this evaluation was extracted from a copy of the ComEd online database uploaded to the evaluation team SharePoint site by ComEd on July 7, 2009.

Profile of Population

Tables 8 and 9 below provide a profile of PY1 Custom program participation. As noted above participants are first segmented for sampling purposes into Custom-Other[7] and Custom-Lighting. Tracking records falling under Custom-Other were then sorted and placed in two strata using ex ante savings kWh to create two strata with roughly equal contributions to total program savings. Tracking records falling under Custom-Lighting were also sorted and stratified using ex ante kWh to create three strata with roughly equal contributions to program savings.

Sampling in the Custom-Other segment 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. Sampling in the Custom-Lighting segment was completed for a telephone survey supporting ex post net impact evaluation and process evaluation. Due to overlapping customers in both the Prescriptive and Custom programs, those two samples were carefully coordinated to avoid contacting customers more than once.

Table 8 presents each of the 13 tracking records that are included in the Custom-Other segment, sorted on the ex ante gross kWh claimed by the program for each application. Also shown is the ex ante peak demand impact claimed by the program, the kWh-based strata used in the sample design, the incentive paid, and a measure description provided by the tracking system. It should be noted that the tracking system-based peak demand estimate is poorly populated, often appearing as a blank. It is unclear if blanks are equivalent to zero impact claimed or if there is some alternate meaning to infer from these missing values. It should be noted that this deficiency made it problematic to estimate peak savings for the program overall, as will be discussed at greater length in the results in Chapter 3.

Table 9 presents each of three strata developed for sampling within the Custom-Lighting segment, which consists of a total of 82 tracking records, consisting of 75 unique Custom applications. The number of unique applications is presented by strata, along with ex ante gross kWh claimed, ex ante gross kW claimed, and the amount of incentive paid. As with the Custom-Other segment, tracking system-based peak demand estimates are also poorly populated in the Custom-Lighting segment, being blank in 46 out of 82 records and set to zero in another 20 records. Again, this can make estimating gross kW impacts for the program problematic.

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[7] One application had both a lighting measure record and one additional battery charger measure record, and was subsequently classified under Custom-Other because a larger ex ante impact is associated with the non-lighting measure. Note that the one application with two records is labeled in Table 8 as 10a and 10b.

Table 8. PY1 Custom-Other Participation by Application Submitted

Application ID	Measure Description	Ex Ante kWh Impact Claimed	Ex Ante kW Impact Claimed	Sampling Strata	Incentive Paid to Applicant
1	Combining two chilled water systems	1,596,269	59.00	1	$100,000
2	Compressed air management system	621,187	0.00	1	$43,483
3	Occupancy sensor assisted thermostats	465,138		2	$32,560
4	Plate and frame heat exchanger for free cooling in chilled water system	287,780		2	$20,145
5	Air compressor replacement	226,009		2	$15,821
6	VFD's on process chilled water plant pumps and fans	218,324		2	$15,283
7	Install Communicating programmable thermostat with web based controller	207,494		2	$14,525
8	Occupancy sensor assisted thermostats	204,653	0.00	2	$14,326
9	VSD's on evaporator and condenser fans	137,158	25.30	2	$9,601
10a	High frequency battery chargers	94,455	0.88	2	$6,612
10b	High efficiency lighting	23,730	4.07	2	$1,661
11	Energy management system	87,873	4.70	2	$6,133
12	Energy management system	31,276	4.00	2	$2,189
13	High efficiency motors	24,880		2	$1,742
TOTAL	-	4,226,226	97.95	-	$284,078

Source: Evaluation analysis of tracking savings from ComEd online tracking system, July 7, 2009.

Table 9. PY1 Custom-Lighting Program Participation by Sampling Strata

Sampling Strata	Ex Ante kWh Impact Claimed	Ex Ante kW Impact Claimed	Applications	Incentive Paid to Applicant
1	1,337,762	38.56	4	$84,581
2	1,435,645	139.68	7	$92,602
3	1,411,213	62.41	64	$79,236
TOTAL	4,184,620	240.65	75	$256,419

Source: Evaluation analysis of tracking savings from ComEd online tracking system, July 7, 2009.

2.3.1 Gross Impact M&V Sample

The sample for the PY1 Custom program projects was selected from data in the ComEd online tracking system for the Custom-Other evaluation segment. Data review was undertaken before the sample was pulled to check for outliers and missing values, and then matched to ComEd's reported demand and 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, 63 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 contacts.

Program-level Custom savings data were analyzed by project size to inform the sample design for this population of heterogeneous measures. Projects were stratified by tracking record size using the ex ante kWh impact claim. Records were sorted from largest to smallest Custom kWh claim, and placed into one of two strata such that each contains one-half of the program total kWh claim. Thus, the 2 largest records comprising one-half of program savings were assigned to "strata 1," and the smallest 12 records were assigned to "strata 2."

The Custom evaluation plan called for a target sample of 5 applications in the ex post gross impact M&V sample. This sample was drawn as follows: the 2 records in strata 1 were selected, and 3 records out of 12 were randomly selected in strata 2. The application with more than one tracking record was not selected, and thus each of the five records selected each represent just one Custom application.

Profile of the Gross Impact M&V Sample

Table 10 provides a profile of the gross impact M&V sample for the Custom program in comparison with the Custom-Other segment population. Shown is the resulting sample that was drawn, consisting of 5 applications, responsible for 2.9 million kWh of ex ante impact claim and representing 70% of the ex ante impact claim for this segment of the program population. Also shown are the ex ante-based kWh sample weights for each strata. Ex ante-based kW weights were not developed due to the preponderance of missing demand impact estimates in the program tracking system.

Table **10. Profile of the Gross Impact M&V Sample by Strata**

Custom-Other Segment Population Summary				Target Sample		
Sampling Strata	Number of Applications (N)	Ex Ante kWh Impact Claimed	kWh Weights	n	Ex Ante kWh	Sampled % of Population
1	2	2,217,456	0.52	2	2,217,456	100%
2	11	2,008,770	0.48	3	721,283	36%
TOTAL	13	4,226,226	-	5	2,938,739	70%

2.3.2 CATI Telephone Survey

A CATI telephone survey was implemented with a stratified random sample of 24 Custom Program participants. This survey focused on questions to estimate net program impacts and to support the process evaluation. All CATI surveys were completed in August and September of 2009.

Sampling

The CATI phone survey drew a sample from the Custom program population, with a target to achieve 26 completed telephone interviews with unique program participants. Duplicate contact names were removed from the sample where a single person was involved in more than one project application.

For the Custom-Other segment a census was attempted with all thirteen applications, with a target of six completes.

A stratified random sampling approach was employed for the Custom-Lighting segment. Program-level Custom savings data were analyzed by project size to inform the sample design for this population of lighting measures. Projects were stratified by tracking record size 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. Thus, the 4 largest applications comprising one-third of program savings were assigned to "strata 1," the next 7 largest applications were assigned to "strata2," and the smallest 64 applications were assigned to "strata 3."

The Custom evaluation plan called for a target sample of 20 applications in the ex post net impact and process evaluation sample. This sample was drawn as follows: 3 applications in strata 1 were selected, 6 applications out of 7 were randomly selected in strata 2, and 11 applications out of 64 were randomly selected in strata 3. After initially targeting completes with just the targeted applications, the sample was eventually opened up to the remaining points in each strata in an attempt to collect the full number of targeted completes.

The evaluation team concluded that an un-weighted analysis provided the best representation for process results. The analysis largely features the reporting of response frequencies, and it was decided to give equal weight to each response. Had the evaluation approach instead featured the reporting of mean scores then further consideration would have been given to applying weights.

Survey Disposition

Table 11 provides the net impact and process evaluation sample disposition for the Custom-Other and Custom-Lighting segment populations. Shown is the resulting number of survey completes, consisting of 7 Custom-Other applications (out of a target of 6) and 17 Custom-Lighting applications (out of a target of 20). For both segments of the Custom program the resulting survey completes represent 3.9 million kWh of ex ante impact claim which is 46% of the ex ante impact claim of the program population. Also shown are the resulting ex ante-based kWh sample weights for each of two Custom-Lighting strata. It should be noted that in the Custom-Lighting segment it was only possible to complete 1 out of 3 targeted completes in strata 1, which resulted in the need to collapse strata 1 and 2 for all analyses completed. Ex ante-based kW weights were not developed due to the preponderance of missing demand impact estimates in the program tracking system.

Table 11. Profile of the Participant Survey Sample by Strata

	Program Population Summary				Target Sample		
Segment	Sampling Strata	Number of Applications (N)	Ex Ante kWh Impact Claimed	kWh Weights by Segment	N	Ex Ante kWh	Sampled % of Population
Other	1, 2	13	4,226,226	1.00	7	2,875,272	68%
Lighting	1, 2	11	2,773,407	0.66	4	760,724	27%
Lighting	3	64	1,411,213	0.34	13	271,552	19%
TOTAL	-	88	8,410,846	NA	24	3,907,548	46%

Table 12 below shows the final disposition of the 62 unique contact names in the Custom Program. Contact with all but 29% of the sample was attempted at least once, and these contacts resulted in 24 completed surveys. The survey center was unable to make contact with 15% of contacts for a variety of reasons such as that: no one answered the phone, an answering machine picked up, or the phone line was busy.

Overall, the response rate for this survey was 59%, computed as the number of completed surveys divided by the number of eligible respondents.[8]

Table 12: Sample Disposition

Sample Disposition	Customers	%
Population of Unique Customers	62	100%
Completed Survey	24	39%
Not Dialed/Interviewed in Prescriptive Sample	18	29%
Unable to Reach	9	15%
Non-Specific Callback	6	10%
Refusal	2	3%
Phone Number Issue	2	3%
Could Not Confirm Participation	1	2%

Source: ODC CATI Center.

Profile of Survey Respondents

Over 70% of survey respondents represent one of four business sectors: retail/service (21%), office (17%), warehousing (17%), and heavy industry (17%). This distribution is similar to that of all 64 companies[9] that participated in the Custom Program in PY1, with a slight over-representation of

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[8] Eligible respondents include the following dispositions: a) Completed Survey, b) Unable to Reach, c) Non-Specific Callback, and d) Refusal.

[9] While there were 62 unique contact names in the population of Custom Projects, there are 64 unique companies that participated in PY1.

warehouses and a slight under-representation of other sectors in the sample of respondents compared to the population.

Table 13 presents the comparison of business sectors for survey respondents and the population of participants.

Table 13: Business Sector of Survey Respondents

Sector	Survey Respondents (n=24)	Population (N=64)
Retail/Service	21%	17%
Office	17%	19%
Warehouse	17%	9%
Heavy Industry	17%	13%
Light Industry	13%	19%
Hotel/Motel	8%	3%
Other	8%	20%

Source: Program Tracking Database.

3   PROGRAM LEVEL RESULTS

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

3.1   Impact

3.1.1 Verification and Due Diligence

This section provides a summary of the results of Task 3 – Verification and Due Diligence. Under this task, the quality assurance and verification activities currently carried out by program and implementation staff are explored. These activities are compared to industry best practices[10] for similar C&I programs to determine:

1. If any key quality assurance and verification activities that should take place are currently not being implemented.

2. If any of the current quality assurance and verification activities are biased (i.e., incorrect sampling that may inadvertently skew results, purposeful sampling that is not defendable, etc.).

3. If any of the current quality assurance and verification activities are overly time-consuming and might be simplified or dropped.

This assessment primarily relied on in-depth interviews with program and implementation staff and documentation of current program processes, where available.

The complete report on this task is provided in Appendix 5.2.2. The report includes a summary of key quality assurance and verification activities currently conducted by ComEd's Smart Ideas for Your Business programs and recommendations for improvement; an overview of data collection activities carried out for this task; and detailed findings on current quality assurance and verification activities by the program. The summary and recommendations section of the report is copied below.

Summary and Recommendations for the Custom Program

Overall, ComEd's quality control and verification procedures for the C&I Prescriptive and Custom Incentive Programs are rigorous and ensure high quality projects and tracking data. In particular, the programs are strongest in the area of post-inspection and access to project documentation in electronic format. Suggested improvements focus on the technical review at the pre-approval stage, maintaining accurate measure quantities in the tracking system throughout the various stages of project completion, verifying qualifying specifications, and potentially refining sampling practices for inspections.

Table 14 summarizes the quality assurance and verification activities currently carried out by the C&I Prescriptive and Custom Programs. It also features recommended changes to current procedures, as well

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[10] See the Best Practices Self Benchmarking Tool developed for the Energy Efficiency Best Practices Project: http://www.eebestpractices.com/benchmarking.asp.

as suggestions regarding additional activities that ComEd could implement to enhance current quality assurance and verification.

Table 14. Summary of QA Activities in Place and Recommendations

QA Activities in Place	Recommended Changes
Pre-Approval • Eligibility and completeness checks • Technical review • Pre-inspections	**Pre-Approval** • Revise procedures for technical review, pre-inspection, and tracking system data entry to minimize adjustment of incentives at final approval stage. • Consider adding screening procedures to reduce free-ridership. • Revise eligibility and completeness check for lighting to ensure that lamps and ballasts (if part of measure) meet all required qualifying specifications. • For prescriptive HVAC measures, develop a consistent approach for entering tracking system data on equipment type, make, and model. • For custom projects, consider an enhanced pre-review of the appropriate baseline. • After the pre-inspection, include a consistency check on measure quantities between pre-review, pre-inspection, and the tracking system.
Final Approval • Eligibility and completeness checks • Engineering review • Post-inspections	**Final Approval** • Consider post-inspections for contractors new to the program • Consider post-inspections for a random selection of projects by measure type. • Revise eligibility and completeness check for lighting to ensure that lamps and ballasts (if part of measure) meet all required qualifying specifications. • Ensure that tracking system quantities match final approval and post-inspection amounts. • For occupancy sensors, confirm both the number of fixtures and lamps per fixture controlled.

3.1.2 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 for a first-year program and represent 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. There were some instances of inconsistency regarding field names and data input. Both must be consistent or the data may not be properly analyzed if the evaluation team does not catch the inconsistency.

When pulling datasets into SAS, if the field names change for the same information it takes several steps to correct this. The first step requires contacting the person who created the dataset to make sure it is the same information. The next step is to alter the SAS programming to account for the field name change. Complete documentation that explains the field names and how they are used in tracking data reporting would be useful.

The tracking data is not completely populated for peak demand impact (kW). Missing data was common and prevents evaluators from confidently and accurately representing the program population using a sample of selected projects. Furthermore, it has been communicated that ComEd may bid the program into the PJM power pool. To do so it will be important to more consistently estimate and populate ex ante peak demand savings.

Measure description information is reasonably populated in the tracking system but there is room for improvement in consistently labeling individual measures. 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. With these improvements in place it would be possible to provide measure-based summary statistics and track program accomplishments. Given current measure labeling practices such evaluation efforts were not deemed reasonable to produce.

3.1.3 Gross Program Impact Parameter Estimates

Ex post gross program impacts were developed for this evaluation for the Custom-Other segment based on detailed M&V for a selected sample of five applications. The Custom-Lighting segment was not evaluated, and the ex ante savings were passed through for that segment of the population. This was done in part due to a limited evaluation effort planned in PY1. Depending upon the characteristics of measure installations in PY2, the evaluation plan for the Custom program in PY2 should revisit this decision.

Realization Rates for the Custom-Other Segment

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 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-Other segment of 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 Tables 15, 16 and 17 below. The realization rates for demand savings are much greater than energy, above 2 vs. below 1, with the high demand realization rate being driven by a strongly positive realization rate in strata 1.

It should be noted that tracking system records for ex ante peak demand impact (kW) were not well populated, in both segments of the Custom program population. These spotty peak demand records in the tracking system precluded the development of kW weights and so the estimation of ex post peak demand impacts was accomplished, in part, through the transfer of a kWh realization rate in strata 2 of the Custom-Other segment and through transfer of relative precision in that same sampling cell.

Table 15. Gross Impact Realization Rate Results for the Selected Custom-Other Sample

Sampled Application 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
1	1,596,269	59.00	1	0.72	771,776	110.70	0.48	0.59
2	621,187	0.00	1	0.28	539,704	75.40	0.87	
4	287,780	-	2	0.40	156,278	0.00	0.54	
5	226,009	-	2	0.31	185,464	8.33	0.82	0.55
7	207,494	-	2	0.29	56,952	0.00	0.27	
TOTAL	2,938,739	59.00	-	NA	1,710,174	194.43	NA	0.57

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

Table 16. Gross kWh Realization Rates and Relative Precision at 90% Confidence Level for the Custom-Other Segment

Sampling Strata	Relative Precision ± %	Low	Mean	High
1	-	0.59	0.59	0.59
2	36%	0.35	0.55	0.75
Total kWh RR	17%	0.48	0.57	0.67

Table 17. Gross kW Realization Rates and Relative Precision at 90% Confidence Level for the Custom-Other Segment

Sampling Strata	Relative Precision ± %	Low	Mean	High
1	-	3.15	3.15	3.15
2	36%	0.35	0.55	0.75
Total kW RR	17%	1.77	2.12	2.47

Stratum 2 gross kW realization rate and relative precision is transferred from the gross kWh result.

3.1.4   Gross Program Impact Results

Based on the gross impact parameter estimates described in the previous section gross program impacts were derived for the PY1 Custom program. The results are provided in Tables 18.

Table 18. Gross Parameter and Savings Estimates

Segment	Sampling Strata	kWh, Ex Ante	kWh, Ex Post	kWh RR	kW, Ex Ante	kW, Ex Post	kW RR
Other	1	2,217,456	1,311,480	0.59	59	186	3.15
Other	2	2,008,770	1,110,361	0.55	39	22	0.55
Lighting	1, 2, 3	4,184,620	4,184,620	NA	241	241	NA
Total		8,410,846	6,606,620	0.79	339	448	1.32

An ex post gross impact evaluation was not completed for the Custom-Lighting segment.
Ex post gross impacts for the Custom-Lighting segment are set equal to the ex ante gross impacts for that program element.

The EM&V team created site-specific M&V reports for each Custom gross impact sample point. These site-specific draft 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. While it probably is not reasonable to draw generalized conclusions in this section from a PY1 sample size of just five projects, there may be valuable lessons to be learned in those reports, as they relate to submitted impact calculations, the approach applied and parameters used. With larger sample sizes in PY2 and PY3 it should be feasible to summarize the cumulative lessons learned.

3.1.5   Net Program Impact Parameter Estimates

Once gross program impacts have been estimated, net program impacts are calculated by multiplying the gross impact estimate by the Program Net-to-Gross (NTG) ratio. As mentioned above, the NTG ratio for the PY1 Custom program was estimated using a customer self-report approach. This approach relied on

responses provided by program participants during the CATI phone survey to determine the fraction of measure installations that would have occurred by participants in the absence of the program (free-ridership).

A quantification of spillover was not included in the calculation of NTG ratio for PY1.

The relative precision at a 90% confidence level is provided in Table 19.

Table 19. NTG Ratio and Relative Precision at 90% Confidence Level

Segment	Sampling Strata	Relative Precision ± %	Low	Mean	High
Other	1, 2 (All)	8%	0.65	0.71	0.76
Lighting	1, 2	18%	0.61	0.74	0.87
Lighting	3	8%	0.65	0.71	0.76
Lighting	1, 2, 3 (All)	12%	0.64	0.73	0.82
Population		7%	0.66	0.72	0.77

The measured NTG ratio in the Custom-Other segment was higher than expected, with substantial free-ridership (above about 40%) observed in only 1 out of 7 completed estimates. That one estimate had a resulting NTG ratio of 18%. That one observation had a very low Program and No-Program score. The other six observations all had Program scores of 8 or greater and only one other point had a low No-Program score.

In the Custom-Lighting segment only one NTG ratio (from a sample of 17 estimated points) fell below 50%. All but two of the Program scores were 8-10. The No-Program and Influence scores, however, varied substantially point-to-point across this sample.

Spillover

A quantification of spillover was not included in the calculation of NTG ratio for PY1. The phone survey was designed to identify evidence of spillover, and if so, did it appear significant enough to attempt to quantify it in future evaluations. The evidence of spillover for the Custom program is summarized in Table 20 below.

Table 20. Evidence for Spillover in PY1

Spillover Question for Lighting	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 24 survey respondents that responded to this question, 4 said "Yes" (17%). These 4 respondents implemented a total of 9 energy efficiency measures.
What type of energy efficiency measure was installed without an incentive?	(3) Lighting Controls (3) Linear fluorescent (2 T-8's, 1 T-5) (1) CFLs (1) LED lamps (1) Practicing curtailment
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 9 implemented measures: (4) Rating between 0 and 3 (2) Rating between 4 and 6 (3) Rating between 7 and 10
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 9 implemented measures: (1) Rating between 0 and 3 (2) Rating between 4 and 6 (6) Rating between 7 and 10
Why did you purchase this energy efficiency measure without the financial assistance available through the ComEd's program?	The 4 survey respondents gave the same responses for each of the measures they implemented: -Job was too small to go through the trouble of the applying to program (1 respondent, 3 measures) -The program was not available (1 respondent, 2 measures) -Unaware of the program (1 respondent, 2 measures) -Did the work after the deadline (1 respondent, 2 measures)

The results of the phone survey suggest that spillover effects for PY1 would have been small. Spillover impacts will be quantified for the PY2 evaluation.

3.1.6 Net Program Impact Results

Net program impacts were derived by multiplying gross program savings by the estimated NTG ratio. Table 21 provides the program-level evaluation-adjusted net impact results for the PY1 Custom program. The chained realization rate (gross RR * NTG Ratio) is 0.57 for kWh, and 0.95 for kW.

Table 21. Program-Level Evaluation-Adjusted Net kWh Impacts for PY1

Segment	Sampling Strata	Ex Ante Gross kWh	Ex Post Gross kWh	kWh RR	Ex Post Net kWh	NTGR (ex post gross)
Other	1	2,217,456	1,311,480	0.59	925,217	0.71
Other	2	2,008,770	1,110,361	0.55	783,333	0.71
Lighting	1	1,337,762	1,337,762	NA	990,902	0.74
Lighting	2	1,435,645	1,435,645	NA	1,063,406	0.74
Lighting	3	1,411,213	1,411,213	NA	997,668	0.71
Total		8,410,846	6,606,461	0.79	4,760,526	0.72

An ex post gross impact evaluation was not completed for the Custom-Lighting segment.
Ex post gross impacts for the Custom-Lighting segment are set equal to the ex ante gross impacts for that element of the program population.

Table 22. Program-Level Evaluation-Adjusted Net kW Impacts for PY1

Segment	Sampling Strata	Ex Ante Gross kW	Ex Post Gross kW	kW RR	Ex Post Net kW	NTGR (ex post gross)
Other	1	59	186	3.15	131	0.71
Other	2	39	22	0.55	15	0.71
Lighting	1	39	39	NA	29	0.74
Lighting	2	140	140	NA	103	0.74
Lighting	3	62	62	NA	44	0.71
Total		339	448	1.32	323	0.72

An ex post gross impact evaluation was not completed for the Custom-Lighting segment.
Ex post gross impacts for the Custom-Lighting segment are set equal to the ex ante gross impacts for that element of the program population.
Stratum 2 gross kW realization rate for the Custom-Other segment is transferred from the gross kWh result.
Net-to-gross (NTGR) results derived using kWh weights were transferred to derive ex post net kW impacts by segment and strata.

3.2 Process

The process component of the Smart Ideas for Your Business Custom program evaluation focused on program design and processes, program implementation, marketing and outreach, and participant satisfaction. Data sources for the process component include a review of program materials, five in-depth interviews with program staff and implementers, and a telephone survey with 24 program participants.

The sampling unit for the participant survey was a unique customer contact name. The participant survey sample was divided into contacts who completed one or more custom-lighting projects and those that completed one or more custom-other projects. We interviewed 17 out of 51 contacts (33%) with custom-lighting projects and 7 out of 11 contacts (64%) with custom-other projects.

3.2.1 Program Theory and Logic Model

This section contains the program theory, logic model, and performance indicators of the Smart Ideas for Your Business Prescriptive Program. We created this model using discussions with program management and implementers as well as program documentation. The purpose of program theory and logic models is to serve as:

- A communication tool by
  - allowing the implementer to show reasoning to other stakeholders
  - bringing common understanding between implementer and evaluator

- An evaluation tool to
  - Focus evaluation resources
  - Clearly show what evaluation will do and expected answers from evaluation
  - Provide a way to plan for future work effort

The logic model (LM) is a graphic presentation of the intervention – what occurs and clear steps as to what change the activities undertaken by the intervention are expected to bring about in the targeted population. Logic models can be impact or implementation oriented. An impact model is sparse in terms of how the programs works, but clearly shows the outputs of the program and what they are aimed at affecting. Outcomes are changes that could occur regardless of the program and are generally written as such. The implementation model is how the program works and typically resembles a process flow chart. The model included here is an impact model.

We use numbered links with arrows between each box in the logic model. These numbers allow us to:

- clearly discuss different areas of the model,

- describe why moving from one box to the other brings about the description in the later box, and

- if hypothesis testing occurs within the evaluation, the model helps to indicate specific numbered links for hypotheses testing and the evaluation plan would explicate what we will and will not be tested within the evaluation. The main hypothesis testing for the ComEd programs is around energy impacts due to the program.

The program theory (PT) is a description of why the intervention is expected to bring about change. It may reference theories of behavioral change (e.g., theory of planned behavior, normative theory) or be based on interviews with the program managers as they describe their program. In this case, any reasons behind expected program change is based on our depth interviews with the program managers and implementers.

Creation of the logic model

There are several different "looks" to logic models. For this evaluation, we are using a multi-level model that has a generic statement about resources in the header, activities in the first row, outputs of those activities in the second row, and outcomes in the third (proximal) and fourth (distal) rows. External factors are shown on the bottom of the diagram.

When we created the boxes in the logic model, we used the following "road-map".

Activities – these are discrete activities that roll up to a single "box" that is shown in the model. It separates out activities that may be performed by different groups. Each activity typically has an output. We used program documentation (implementation plans) and/or discussion with program managers to determine activities.

Outputs – These are items that can be counted or seen. It may be the marketing collateral of a marketing campaign, the audits performed by a program, or the number of completed applications. All outputs do not need to lead to an outcome. We used the same sources as for activities to determine outputs.

Proximal Outcomes – these are changes that occur in the targeted population that the program directly "touches". Multiple proximal outcomes may lead to one or more distal outcomes.

Distal Outcomes – these are changes that are implicitly occurring when the proximal outcome occurs. For example, an energy efficiency program may use marketing to bring about changes in Awareness, Knowledge, or Attitudes as a proximal outcome which leads to the distal outcomes of intent to take actions, which leads to actual installation of EE equipment, which leads to energy impacts.

External Factors – these are known areas that can affect the outcomes shown, but are outside of the programs influence. Typically, these are big areas such as the economy, environmental regulations, codes/standards for energy efficiency, weather, etc. Sometimes these can arise from our discussions with the program managers, but often they were thought about and included based on our knowledge.
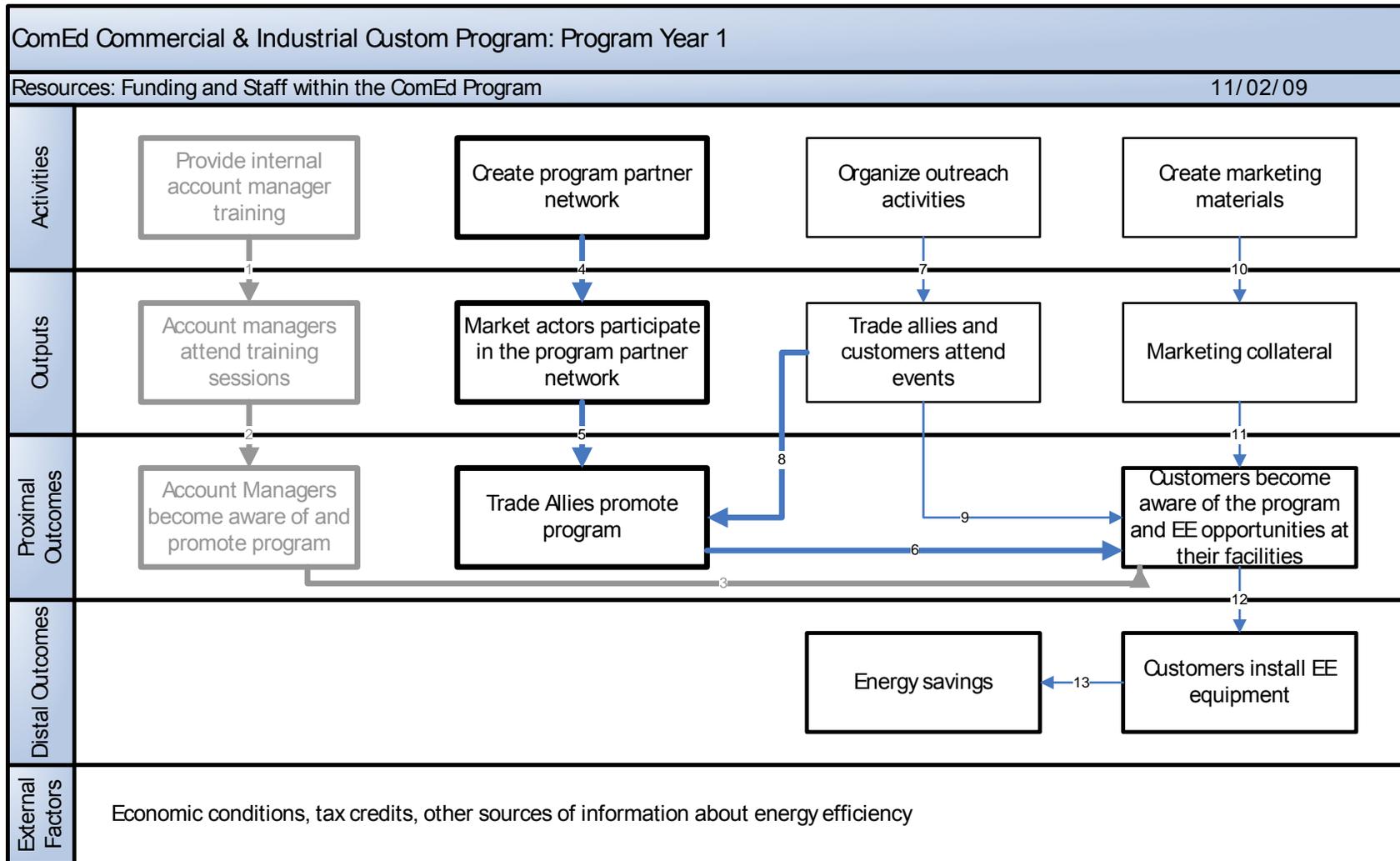
Expanding the Impact Logic Model

Once the impact logic model was drafted, a table was created that describes the links, the potential performance indicators that could be used to test the link, the potential success criteria that would indicate the link was successful, and potential data sources of the link.

When thinking about how to write each of the performance indicators, we asked ourselves "What might we look at to judge whether the link description actions are occurring" and wrote the answer as the performance indicator.

Success criteria were created by us and are thought to be reasonable. Inclusion of success criteria in the model does not necessarily mean that the evaluation has current plans for examining the program's progress on those criteria. These criteria merely indicate how the particular program theory component **could** be evaluated.

The logic model provides an indication of the relative importance of the various success criteria through shading and thicknesses of links. Some are clearly more relevant than others, given the current market the program operates in. For example, given that the current program faces more demand than it can meet, the success criteria related to marketing the program are not as pertinent as other criteria.

Figure 1. Preliminary Logic Model

ComEd Commercial & Industrial Custom Program: Program Year 1

Resources: Funding and Staff within the ComEd Program   11/02/09

Activities
- Provide internal account manager training (1)
- Create program partner network (4)
- Organize outreach activities (7)
- Create marketing materials (10)

Outputs
- Account managers attend training sessions (2)
- Market actors participate in the program partner network (5)
- Trade allies and customers attend events (8)
- Marketing collateral (11)

Proximal Outcomes
- Account Managers become aware of and promote program (3)
- Trade Allies promote program (6)
- Customers become aware of the program and EE opportunities at their facilities (9) (12)

Distal Outcomes
- Energy savings (13)
- Customers install EE equipment

External Factors
- Economic conditions, tax credits, other sources of information about energy efficiency

Notes: Boxes in light gray shading represent activities that are part of the program design but were not fully implemented in PY1.
Thicker lines indicate a greater emphasis of activity in program implementation.

Table 23. Performance Indicators Table

Link	Description of Link	Potential Performance Indicator	Potential Success Criteria for Performance Indicator	Evaluator Data Collection Activities Associated with Link
1	ComEd provides internal account manager training on program opportunities at staff meetings and monthly lunch and learns.	1. Percent of account managers who participate in training	This activity was not fully implemented in Program Year 1 as the program was oversubscribed.	Not evaluated in Program Year 1
2	Training sessions provide pertinent information to account managers. Account managers become familiar with the program and promote it to their customers.	1. Percent of account managers familiar with program 2. Percent of trained account managers who promote the program to their customers	This activity was not fully implemented in Program Year 1 as the program was oversubscribed.	Not evaluated in Program Year 1
3	Customers are not aware of the program or the EE opportunities it offers. They learn about the program and the available incentives from their account manager.	1. Percent of customers with account manager who were informed of the program by their account managers	This activity was not fully implemented in Program Year 1 as the program was oversubscribed.	Not evaluated in Program Year 1
4	ComEd creates a program partner network to inform trade allies of program opportunities. Information is disseminated through a newsletter and the program website. By having a program partner network, ComEd has a captive audience that can be informed of program opportunities.	1. Percent of market actors aware of the program 2. Percent of market actors aware of the program partner network 3. Percent of Trade Allies that are high quality	1. 50% of market actors are aware of the program 2. 50% of market actors are aware of the program partner network 3. 90% of participants who use Trade Allies are satisfied with Trade Allies	1/2. Trade ally interviews - not conducted for PY1 3. Participant survey
5	Trade allies promote the program to their customers.	1. Percent of trade allies who promote the program to their customers	1. 95% of trade allies report promoting the program to their customers	1. Trade ally interviews - not conducted for PY1
6	Customers are not aware of the program or the EE opportunities it offers. They learn about the program and the available incentives from their trade ally.	1. Percent of customers who were informed of the program by their trade ally	1. 25% of customers report having heard about the program from a trade ally	1. Participant & Non-participant surveys (NP survey was not conducted for PY1)
7	ComEd hosts outreach events for customers ("Green Ribbon" kickoffs) and trade allies (trade ally forums and seminars). These events provide a venue for customers and trade allies to find out about program opportunities.	1. Number of customer events 2. Number of trade ally events	1. 6 customer events 2. 4 trade ally events	Program documentation
8	The information provided in outreach events increases trade ally awareness and knowledge of the program and allows them to promote it more effectively to their customers.	1. Percent of trade allies who found events informative 2. Percent of trade allies who think event helps them to promote the program's offerings	1. 75% of trade allies who attended an event found it informative 2. 75% of trade allies who attended an event say it helped them promote the program	1. Survey of trade allies who attended an event - not conducted for PY1
9	Customers are not aware of the program or the EE opportunities it offers. They learn about the program and the available incentives through the outreach events.	1. Percent of customers who found events informative	1. 75% of customers who attended an event found it informative	1. Survey of customers who attended an event - not conducted for PY1
10	ComEd creates and distributes marketing materials (including a website, bill inserts and newsletters) that provide information about program opportunities.	1. Marketing materials are effective 2. Number of website hits, bill inserts, and newsletters sent	1. Marketing materials provide information and contain messages that will induce customers to participate 2. 25% increase in website hits year to year, 2-4	1. Review of marketing materials 2. Program documentation

Link	Description of Link	Potential Performance Indicator	Potential Success Criteria for Performance Indicator	Evaluator Data Collection Activities Associated with Link
			bill inserts, 4 newsletters	
11	Customers are not aware of the program or the EE opportunities it offers. They view the program marketing materials and learn about the program and the available incentives.	1. Percent of customers who have seen marketing material 2. Percent of customers who found marketing material useful	1. 10% of customers report having seen marketing materials 2. 75% of customers who have seen marketing materials found it useful	1/2. Participant & Non-participant surveys (NP survey was not conducted for PY1)
12	ComEd business customers have not adopted energy efficient equipment because of awareness, information, and cost barriers. The program makes customers aware of EE opportunities and lowers the information cost as well as the up-front cost through the incentive. Customers participate in the program and install EE equipment.	1. Benefits of products offered through the program are recognized by business customers 2. Incentive offered will induce customers to install promoted products 3. Program savings realized	1. 75% of business customers who have seen program material recognize potential benefits of program-targeted measures 2. 75% of customers believe incentives are "good deal" 3. Program reaches target savings goals.	1/2. Participant & Non-participant surveys (NP survey was not conducted for PY1) 3. Program documentation
13	When EE equipment incented through the program is installed, energy savings are realized because the equipment that has been installed is more energy efficient than the equipment that it is replacing.	1. Type of equipment that was replaced 2. Program savings realized	1. 95% of the replaced equipment was less efficient than the installed equipment 2. Program meets is savings goals	1/2. Impact analysis

3.2.2 Participant Profile

In Program Year 1 (PY1) 64 customers completed a total of 87 custom projects that accounted for 8,411 MWh and 339 KW of ex ante gross savings.[12] PY1 participants represent a range of business sectors. Light industry, retail/service, and offices are among the top sectors in terms of number of participants and number of projects. Heavy industry accounts for the largest share of energy savings (40%), due to the large average size of the projects implemented in this sector (419 MWh, compared to 97 MWh for all Custom projects). Medical (25%), heavy industry (23%), and light industry (20%) account for a majority of demand savings. In the medical sector, one company implemented five projects. The retail/service sector also has several companies that implemented more than one custom project. Table 24 summarizes the distribution of PY1 participants, projects, and energy savings by business sector.

Table 24. Participants, Projects, and Ex Ante Savings by Business Sector

Sector	Participants		Projects		Projects / Participant	Ex Ante Energy Savings		kWh / Project	Ex Ante Demand Savings	
	#	%	#	%		kWh	%		kW	%
Light Industry	12	19%	12	14%	1.0	1,038,205	12%	86,517	66.8	20%
Retail/Service	11	17%	23	26%	2.1	1,121,024	13%	48,740	53.4	16%
Office	12	19%	15	17%	1.5	286,033	3%	19,069	0.7	0%
Heavy Industry	8	13%	8	9%	1.0	3,355,489	40%	419,436	77.0	23%
Warehouse	6	9%	7	8%	1.2	579,216	7%	82,745	50.9	15%
Hotel / Motel	2	3%	3	3%	1.0	687,241	8%	229,080	-	0%
Medical	1	2%	5	6%	5.0	690,101	8%	138,020	85.0	25%
Other	12	19%	14	16%	1.3	653,538	8%	46,681	4.8	1%
TOTAL	**64**		**87**		**1.4**	**8,410,846**		**96,676**	**338.6**	

Source: Program Tracking Database.

The distribution of projects and savings by business sector varies somewhat between custom-lighting and custom-other projects (see also Figure 2):
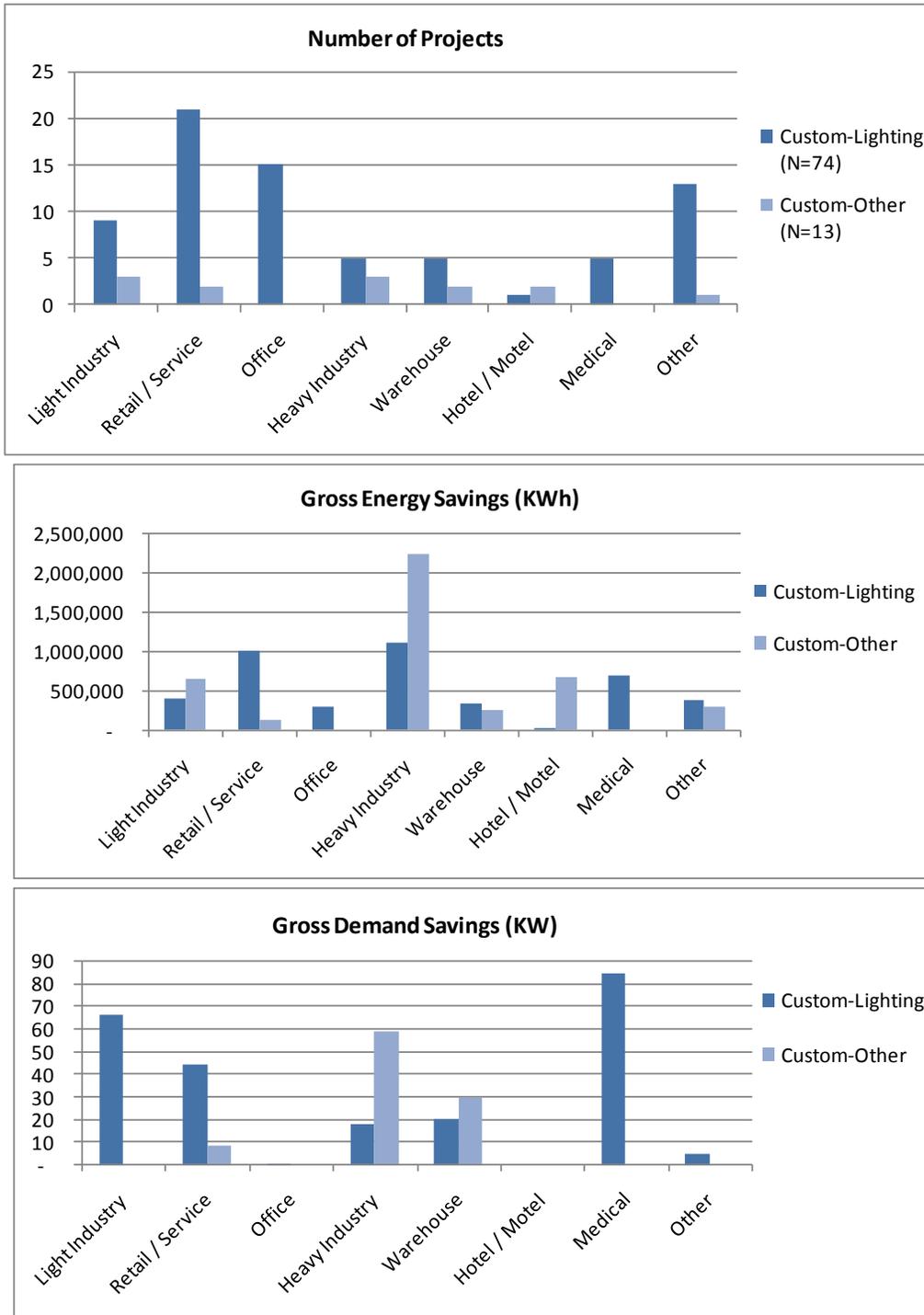
- Almost half of all custom-lighting projects (49%) were implemented in the retail/service sector and in offices. In contrast, light and heavy industry accounted for almost half of all custom-other projects (46%).

- Heavy industry accounted for the largest share of energy savings for both custom-lighting projects (27%) and custom-other projects (53%). Notably, total energy savings from custom-other projects slightly exceeded total energy savings from custom-lighting projects in PY1, even though custom-other projects only make up 15% of total custom projects. This is largely the result of one very large

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[12] Gross savings reported in this section are based on the program tracking database. See the discussion of verified net savings in the Impact Section above.

custom-other project in the heavy industry sector, which accounted for 19% of total program savings in PY1.

- The medical and light industry sectors account for almost two-thirds of demand savings from custom-lighting projects, while heavy industry makes up 60% of demand savings from custom-other projects.

Figure 2: Projects and Ex Ante Savings by Business Sector and End Use

Source: Program Tracking Database.

Other characteristics of program participants include:

- Almost three-quarters (71%) of program participants report that the participating facility is one of several facilities owned by the company.
- Nearly all participants (82% of custom-lighting and 86% of custom-other) own their facility.
- Nearly all interviewed custom program participants have a ComEd Account Manager (100% of custom-other participants and 71% of custom-lighting participants). In most cases, the account manager assisted with the implemented project.

3.2.3 Program Design and Processes

ComEd's Smart Ideas for Your Business Custom program offers incentives designed to encourage implementation of energy-efficiency measures including compressed air, motors, non-HVAC variable-speed drives, and other unique projects. In PY1, the majority of projects were custom-lighting projects, i.e., projects that include measures that are somewhat prescriptive in nature but that are not included in the list of prescriptive measures. This is to be expected for a program in its first year.

Application Process

The application process includes both a pre-approval and final approval application for all projects. Program guidelines stipulate that projects must be completed within 90 days of pre-approval; however, many projects apply for and are granted an extension. The length of extensions is based on the need of the customer and can be significant. Program participants must submit the final approval application within 60 days of project completion.

A majority of participants filled out the initial program paperwork themselves, including 59% of custom-lighting participants and 86% of custom-other participants. Of these participants, most feel that the pre-approval application clearly explains the program requirements and participation process (80% for custom-lighting and 67% for custom-other) and rate the application process as easy[13] (70% for custom-lighting and 67% for custom-other). Those that rate the process as difficult most often note a lack of information. Only 6% of custom-lighting and 14% of custom-other participants think the paperwork is too burdensome.

Similarly, 59% of custom-lighting participants and 71% of custom-other participants report filling out the final application themselves, with the majority rating the process as easy (70% for custom-lighting and 100% for custom-other).

When the participants do not fill out the pre-approval and final applications themselves, this is most often done by a consultant/engineer or contractor/trade ally.

Pre-Review of Applications

Upon receipt of an application, a pre-review is conducted by the program implementer staff (KEMA) to determine customer and measure eligibility. At the same time the application undergoes a completeness check for contact and technical information. Finally, the application is reviewed to determine if a pre-

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

inspection is needed and to verify funding availability. Every application is reviewed by KEMA administrative and technical staff. Upon completion of the pre-review the application is entered into the tracking database and a letter of reservation of funds is sent to the customer.

The procedures for reviewing technical information during the pre-review process should be revisited. Based on interviews with the program managers, projects are sometimes denied or given reduced incentives at final review because of project details that were not considered during the pre-review. Not receiving the full incentive amount was also mentioned as a problem by some participants in the Custom program who were interviewed as part of the participant survey. KEMA should implement a more thorough pre-review of the technical details of a project in order to avoid customer dissatisfaction about reduced incentive amounts in the future.

Participation Process

The program has a goal of four to six weeks between receiving the complete final application materials and issuing the rebate check. According to program staff, this time frame was rarely met during PY1. Program staff reports this occurred because the large volume of applications received at the outset of the program created a backlog of the inspections that must be completed before issuing the rebate check. In addition, the program implementers have several project milestones at which they communicate with the participant, including a reservation letter following receipt of the pre-approval application, a reminder letter and phone call when it is getting close to the date of the reservation expiring, an extension letter when an extension is granted, and a cancellation letter if the reservation expires. Waitlisted applicants were also sent a letter, and a final letter closing out the project is sent with the rebate check.

Customers were asked if they experienced any problems during the participation process. Six of the 24 interviewed customers (18% of custom-lighting participants and 43% of custom-other participants) reported that they did. Complaints included the length of the process, the final rebate amount not matching the pre-approved amount, confusion if the project was a custom or a prescriptive project, and a lack of follow-up from program/implementation staff.

Customer Service

The Smart Ideas for Your Business Program employed the ComEd call center to field questions from program participants. Forty-one percent of custom-lighting participants and 57% of custom-other participants report calling the call center during the participation process. Most of the customers who contacted the call center were satisfied with the call center's ability to answer questions.

3.2.4 Program Implementation

Program Oversubscription

The Smart Ideas for Your Business program experienced unexpectedly strong demand for prescriptive measures immediately after launch in June 2008. The program became oversubscribed in September 2008 and had to begin wait-listing projects. Because the budgets and goals for the Prescriptive and Custom Programs had been combined prior to the start of PY1, most of the program funds were taken up by prescriptive projects, since they are generally quicker to plan and complete, thus crowding out potential opportunities for custom projects.

In response to the oversubscription, certain marketing activities that are key for custom programs were de-emphasized, including promotion through Account Managers. This further contributed to the adverse

effect on the number of completed custom projects. As a result, the Custom program experienced a slower than expected start and fell short of its original goals for PY1. Note, though, that the Prescriptive and Custom programs were managed against an overall goal, which was exceeded for PY1.

Interruption of incentive programs always creates uncertainty in the market place. During PY1 some customers had to be wait-listed while others were not able to participate at all. This created a challenge for program staff as they had to manage customer expectations for PY1 while at the same time maintaining customer confidence and interest in the program for future program years.

This evaluation only included primary research with program participants; interviews with non-participants and trade allies were not conducted for the PY1 evaluation. As a result, the evaluation team could not fully assess how the program handled the oversubscription and how it affected potential participants in the Custom Program. However, interviews with program participants showed a high level of awareness (57% of custom-other participants and 82% of custom-lighting participants) that the program was oversubscribed in PY1. Most often participants were informed of this by their Account Manager (50% of custom-other participants and 29% of custom-lighting participants). Overall, 29% of custom-other participants and 18% of custom-lighting participants report that their participation was impacted by the oversubscription. Generally, participation was affected in one of two ways:

1. The timing of the project was affected, and the participant had to either accelerate completion of the project in order to be assured an incentive or hold off on a project while they waited to get off the program wait-list; or

2. The incentive funds available were either eliminated or reduced.

Early results from PY2 show that the program is likely to become oversubscribed again. Assuming that each individual program in the portfolio is striving to meet their program-specific goals, the PY2 evaluation should focus on how program design and/or implementation can be adjusted to avoid the negative consequences of the oversubscription on the Custom Program.

Account Managers

Utility Account Managers often play a key role in successful custom programs as they have established relationships with targeted customers. However, due to the oversubscription of the Smart Ideas program in PY1, emphasis was not placed on using the Account Managers to market the custom program. As a result, the program missed opportunities to recruit typical custom projects for participation.

While program delivery through Account Managers was not emphasized, the program did conduct lunch-and-learns to educate Account Managers about the program and energy efficiency. In addition, program participants report heavy involvement of Account Managers during PY1:

- All interviewed custom-other participants and 71% of interviewed custom-lighting participants report having an account manager.
- Of participants with an Account Manager, 86% of custom-other participants and 58% of custom-lighting participants report receiving assistance with implementing the project from their Account Manager.
- Of participants with an Account Manager, 57% of custom-other participants and 75% of custom-lighting participants have discussed the Custom Program with an Account Manager.
- Overall, 43% of all custom-other participants and 12% of all custom-lighting participants first heard about the program from their Account Manager.

In addition to informing customers of the opportunities available through the Custom Program, Account Managers are also in a unique position to pre-screen potential projects for free-ridership. Through conversations with their customers, they can get a sense of what plans already exist and what budgets have already been allocated. For customers that might have multiple energy efficiency projects they would like implement, Account Managers could then help guide projects into the program that would not be completed otherwise.

While Account Managers clearly played an important role in PY1, program staff noted that Account Managers have not fully bought into the program. This could be a result of the uncertainty inherent in the oversubscription of the program: Account Managers might not want to promote incentives that in the end are not available. In addition, however, Account Managers might not be interested in promoting the program because they have no goals or incentives associated with their customers' participation. The program may wish to consider rewarding Account Managers who bring customers into the program, ideally based on some measure of net savings achieved. (The PY1 evaluation did not include interviews with Account Managers, so the extent of and reasons for not promoting the program could not be explored. The role of Account Managers and their acceptance of the program should be an evaluation focus for PY2.)

ComEd Trade Ally Network

During PY1, trade allies were the main channel of promotion and communication for the Smart Ideas for Your Business program. Approximately 160 market actors joined the Trade Ally Network during PY1. To become a trade ally, market actors have to complete an application and attend a seminar or webinar that explains the program and program processes. ComEd trade allies are listed in a searchable directory on the ComEd website and can make use of the ComEd call center and technical staff. In addition, ComEd produced three trade ally newsletters during the second half of PY1. Additional support, planned for future program years, includes a trade ally certificate of participation as well as Smart Ideas decals or stickers that trade allies can display on their vehicles.

While ComEd laid a strong foundation for the Trade Ally Network in PY1, staff for the Custom Program noted that the right contractors to support custom projects had not yet been reached by the program. Review of the program tracking database shows that 92% of custom-lighting projects and all custom-other projects were implemented with contractor support. Thirty-three unique contractors participated in custom-lighting projects, and 11 unique contractors participated in custom-other projects.[14] Most of the contractors involved in custom-lighting projects (76%) implemented a single project while five contractors completed four or more projects (accounting for 43% of all custom-lighting projects completed in PY1). All but one of the five contractors with four or more custom-lighting projects implemented projects for a variety of customers, indicating high levels of program promotion among these market actors. Nearly all (91%) custom-other contractors implemented a single project in PY1 (see also Table 25).

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[14] It should be noted that the contractor used was "unknown" for eight custom-lighting projects and one custom-other project.

Table 25. PY1 Contractor Projects

Contractors with…	Custom-Lighting Projects			Custom-Other Projects		
	Number of Contractors	Percent of Contractors (n=33)	Percent of Contractor Projects (n=68)	Number of Contractors	Percent of Contractors (n=11)	Percent of Contractor Projects (n=13)
1 project	25	76%	37%	10	91%	77%
2 projects	3	9%	9%	1	9%	15%
3 projects	-	-	-	-	-	-
4+ projects	5	15%	43%	-	-	-
Unknown	n/a	n/a	12%	n/a	n/a	8%

Source: Program Tracking Database.

Since the PY1 evaluation did not include research with market actors, a formal analysis of the trade ally network could not be conducted. However, 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.

Responses to the survey show that contractors play an important role in the implementation of custom-lighting projects, but less so in the implementation of custom-other projects. Specific findings from this survey include:

- **Participants in the Custom Program are satisfied with their contractors:** All interviewed program participants 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). All custom-other participants and 87% of custom-lighting participants would recommend their contractor to others.
- **Custom-lighting participants discuss the program with their contractor:** 76% of custom-lighting participants report having discussed the Custom program with a contractor or trade ally. Only 43% of custom-other participants report the same.
- **More custom-lighting participants find out about the program from a contractor than any other source of information:** 24% of custom-lighting participants report having first heard about the program from a contractor or trade ally, more than any other information source. None of the custom-other participants found out about the program from a contractor.
- **Custom-lighting participants use contractors affiliated with the Smart Ideas for Your Business program:** Almost half (47%) of custom-lighting participants who used a contractor report that the contractor is affiliated with the Smart Ideas for Your Business program; none of the custom-other participants report the same. Notably, participants often do not know if their contractor is affiliated with the program (40% of custom-other participants and 33% of custom-lighting participants).
- **Contractor affiliation with the Smart Ideas for Your Business program is important to custom-lighting participants:** 59% of custom-lighting participants say that affiliation with the Smart Ideas for Your Business program is important (a score of 7 or higher on a scale from 0 to 10); only 29% of custom-other participants think the same. In contrast, 57% of custom-other participants rate the importance a 0 ("not at all important"), compared to only 6% of custom-lighting participants.

In PY1, contractors have clearly played an important role in the implementation of custom-lighting projects. Given the nature of custom-lighting measures, it is not surprising that more than half of the

contractors involved in a custom-lighting project also implemented a project in the Prescriptive Program in PY1. In contrast, only 1 of 11 contractors with a custom-other project also implemented a prescriptive project in PY1. This underscores the fact that these contractors are different from those in the prescriptive program and therefore need to be recruited separately. As some custom-lighting projects move into the Prescriptive Program – certain types of specialty T8 lamps and ballasts that fell under custom-lighting in PY1 were added to the prescriptive measure list for PY2 – recruitment of true custom projects into the program will become more important. The program should therefore make efforts to reach out to contractors that could implement these projects and get them involved in promoting the Custom Program. This issue should also be further explored in the PY2 evaluation.
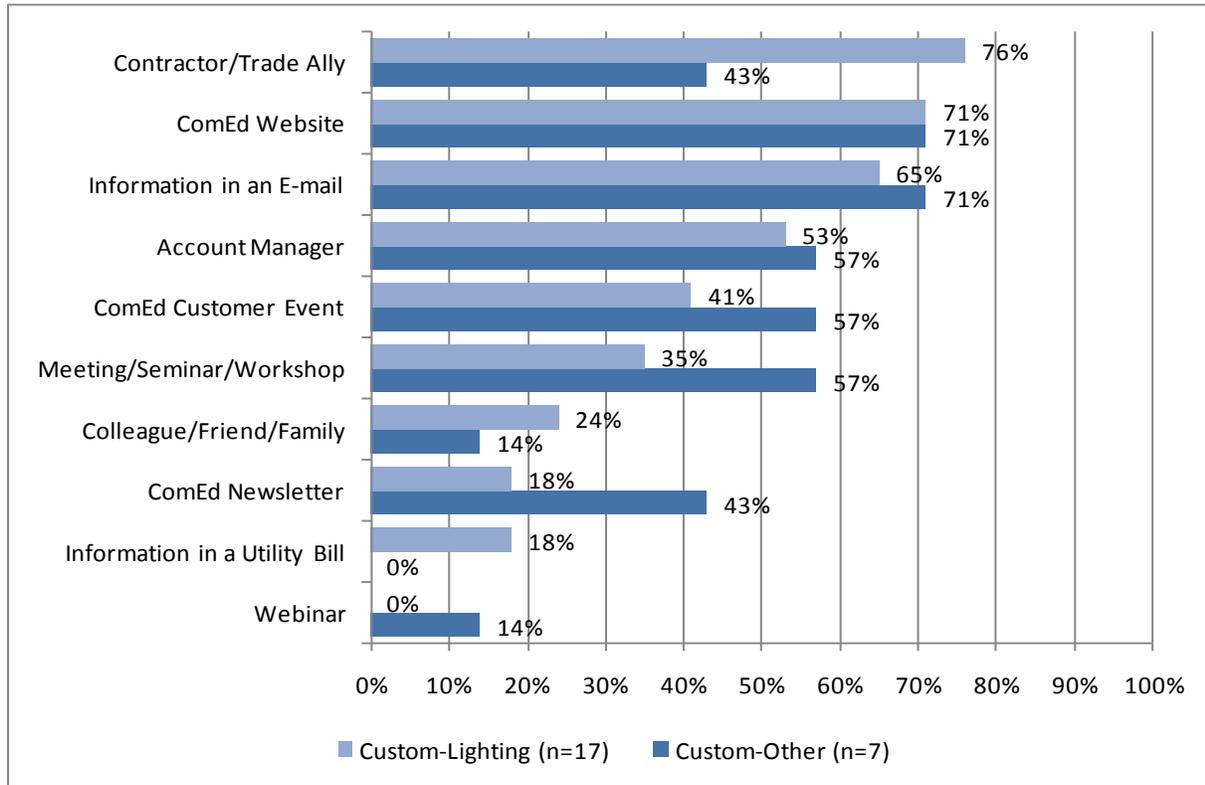
3.2.5 Program Marketing and Outreach

Due to the early oversubscription of the Prescriptive and Custom Programs, very limited marketing activities were conducted in PY1. However, the program did undertake several marketing and outreach efforts including customer and trade ally "kick-off" events, several bill inserts, a trade ally newsletter, and multiple webinars and speaking events. Most of the marketing and outreach efforts were focused on the customer and trade ally "kick-off" events. These events were held just before and after the program launch in May and June 2008 and were used to educate both trade allies and customers on the available programs and participation processes.

Despite the limited marketing efforts, participants recall hearing about the program through a number of different channels:

- The top three sources of program information among **custom-lighting participants** are a contractor or trade ally (76%), the ComEd website (71%), and information provided in an e-mail (65%). Contractors or trade allies were also most often named as the first source of information about the program among custom-lighting participants (24%).
- The top two sources of program information among **custom-other participants** are the ComEd website and information provided in an e-mail (71% each). Custom-other participants also heard about the program through an account manager, a customer event, or a meeting/seminar/workshop (57% each). Account managers were most often named as the first source of information about the program among custom-other participants (43%). Notably, only 43% of custom-other participants discussed the program with their contractor. As discussed above, outreach and recruitment of contractors that can support custom-other projects and promote the program should be a priority in future program years.

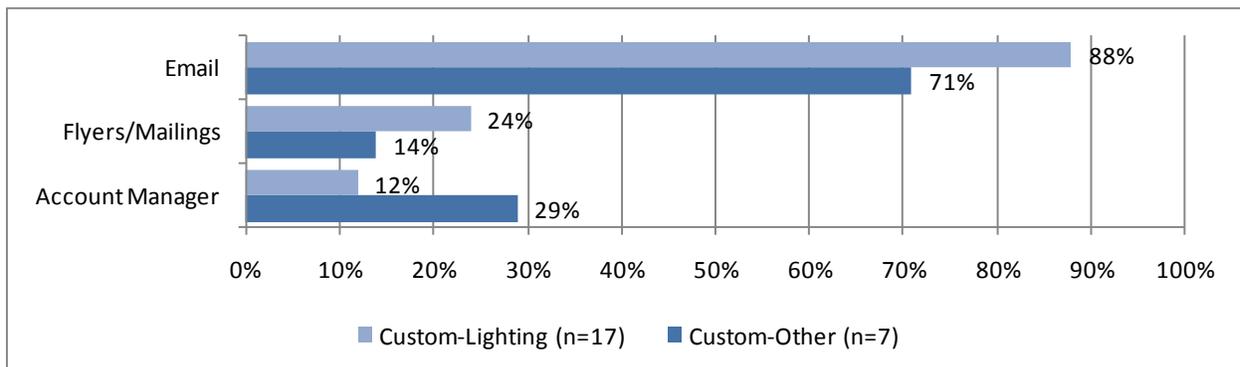Figure 3 summarizes participant responses about program information sources.

Figure 3. Sources of Program Information

(Prompted)

Contractor/Trade Ally	76% / 43%
ComEd Website	71% / 71%
Information in an E-mail	65% / 71%
Account Manager	53% / 57%
ComEd Customer Event	41% / 57%
Meeting/Seminar/Workshop	35% / 57%
Colleague/Friend/Family	24% / 14%
ComEd Newsletter	18% / 43%
Information in a Utility Bill	18% / 0%
Webinar	0% / 14%

Custom-Lighting (n=17)   Custom-Other (n=7)

Source: CATI Participant Survey.

In addition to recalling program marketing materials, most participants (76% of custom-lighting participants and 86% of custom-other participants) found the marketing materials to be useful. Only a few participants noted that the materials could provide more detail or additional sources of program information. Participants also confirmed that ComEd is already using the marketing channels they prefer. As shown in Figure 4, both custom-lighting participants (88%) and custom-other participants (71%) overwhelmingly cite e-mail as the best method of contact, followed by flyers/mailings, and account managers.

Figure 4. Preferred Methods of Contact

(Multiple Response, Unprompted)

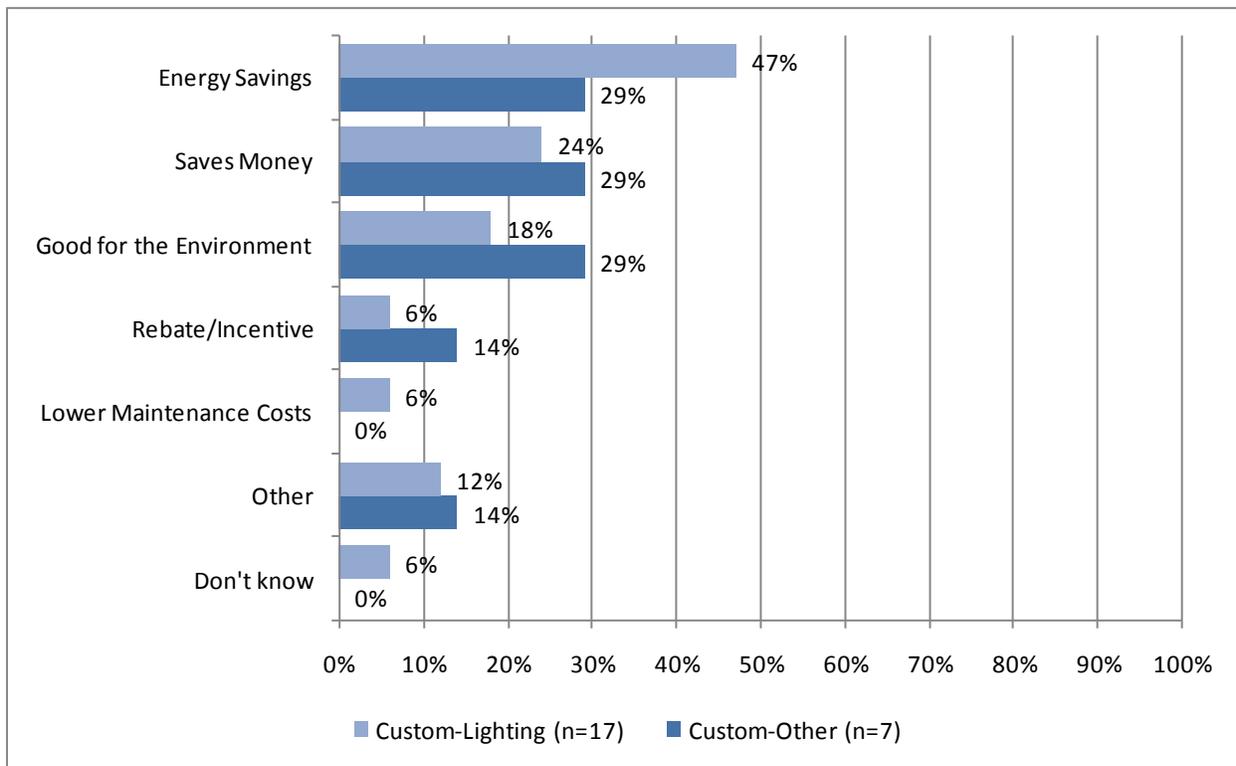|	
Email	88% / 71%
Flyers/Mailings	24% / 14%
Account Manager	12% / 29%

Custom-Lighting (n=17)   Custom-Other (n=7)

Source: CATI Participant Survey.

3.2.6 Barriers to and Benefits of Participation

Barriers to participation – other than the lack of available incentives due to the oversubscription of the Prescriptive Program – could not be assessed in this evaluation since interviews with non-participants and market actors were not conducted. However, in order to get a sense of potential barriers to participation, participants were asked about their views of why other customers might not participate in the program. The responses among custom-lighting participants include program awareness (65%), the difficulty of the application/paperwork (24%), and financial reasons (12%). The responses among custom-other participants include financial reasons (43%) and program awareness (14%).

Participating customers were also asked what they considered to be the main benefits of participating in the Smart Ideas program. Most often, participants cite energy savings as a program benefit. However, custom-other participants consider monetary savings and environmental benefits equally important. Figure 5 summarizes participant responses about the benefits of program participation.

Figure 5. Benefits of Program Participation
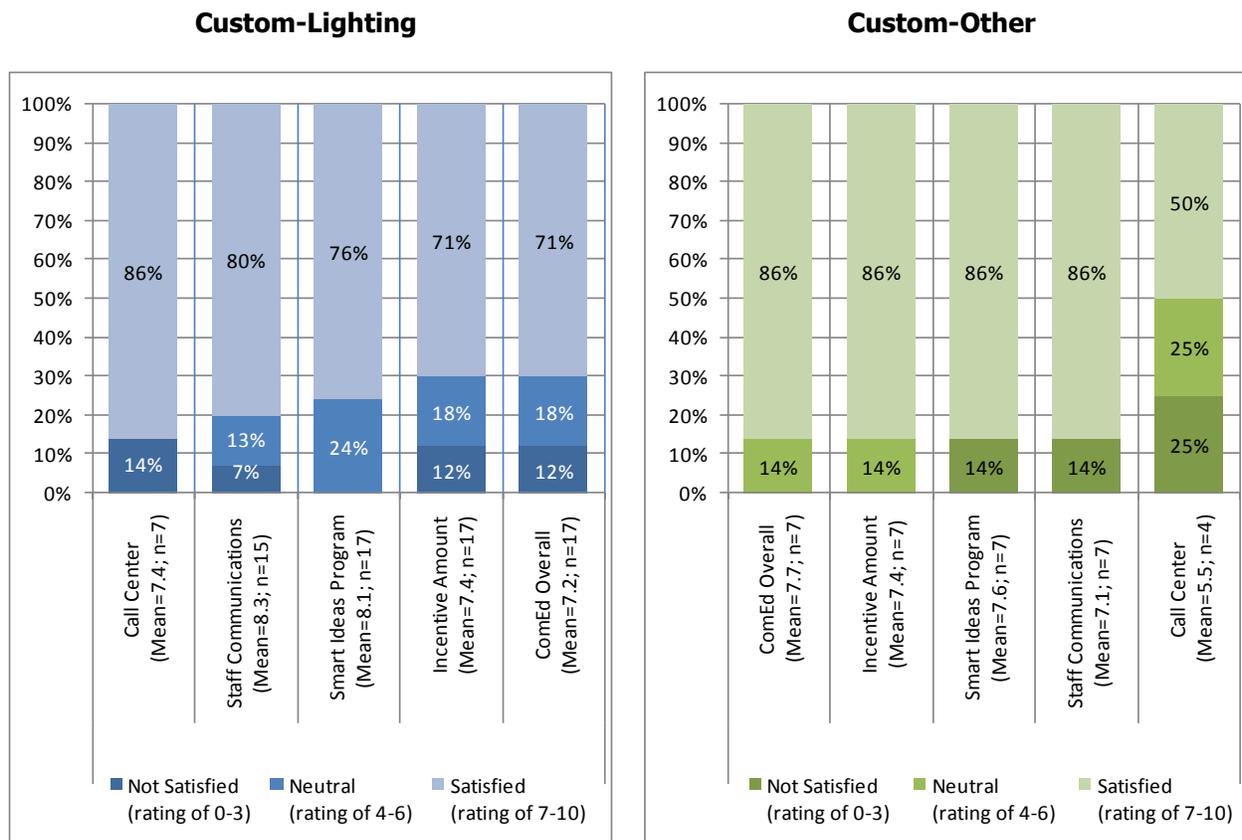**(Multiple Response; Unprompted)**

Source: CATI Participant Survey.

Information on both potential barriers to and benefits of participation should be utilized when planning messaging for future marketing efforts.

3.2.7 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. Among custom-lighting participants, satisfaction is highest with the call center, staff communications, and the Smart Ideas program overall. Custom-other participants report high satisfaction with all aspects they were asked about (ComEd overall, the incentive amount, the Smart Ideas program overall, and staff communications). The only aspect that received lower marks is the call center. However, only four interviewed participants had made used of the call center, so the sample is very small. Figure 6 summarizes participant satisfaction with the various aspects of the program.

Figure 6. Program Satisfaction

Source: CATI Participant Survey.

The high level of customer satisfaction is also evident in the fact that 88% of custom-lighting participants and 86% of custom-other participants are planning to participate in the Smart Ideas program again in the future.

When asked about recommendations to improve the program 53% of custom-lighting participants and 43% of custom-other did not have any suggestions. Participants who did have recommendations mentioned higher incentives, more marketing/publicity, better communication/program information, streamlined participation/application, and quicker processing times.

3.3 Cost Effectiveness

This section addresses the cost effectiveness of the Business Custom program. Cost effectiveness is assessed through the use of the Total Resource Cost (TRC) test. The 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."*[15]

ComEd uses DSMore™ software for the calculation of the TRC test.[16] The DSMore model accepts information on program parameters, such as number of participants, gross savings, free ridership and program costs, and calculates a TRC which 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 MISO 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 on electric prices that comes from extreme weather conditions. Extreme weather creates extreme peaks which create extreme prices. These extreme prices generally occur as price spikes and they create a skewed price distribution. High prices are going to be much higher than the average price while low prices are going to be 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.

Table 26 summarizes the unique inputs used in the DSMore model to assess the TRC ratio for the Business Custom program in PY1. 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.

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[15] Illinois Power Agency Act SB1592, pages 7-8.

[16] Demand Side Management Option Risk Evaluator (DSMore) software is developed by Integral Analytics.

Table 26. Inputs to DSMore Model for Business Custom Program

Item	Value Used
Measure Life	15 years
Participants	64
Annual Gross Energy Savings	6,606 MWh
Gross Coincident Peak Savings	0.4 MW
Net-to-Gross Ratio	72%
Utility Administration and Implementation Costs	$652,050
Utility Incentive Costs	$1,550,258
Participant Contribution to Incremental Measure Costs	$595,790

Based on these inputs, the TRC for this program is 1.29 and the program passes the TRC test.

At this time, additional benefits related to reduction of greenhouse gas emissions have not been quantified in the calculation of the TRC. These additional benefits would increase the given TRC benefit/cost ratio.

4   CONCLUSIONS AND RECOMMENDATIONS

This section highlights the findings and recommendations from the PY1 evaluation of ComEd's Smart Ideas for your Business Custom Program. The primary evaluation objectives includes quantifying the gross and net energy impacts resulting from the rebated measures and assessing program theory, marketing, and delivery. Below are the key conclusions and recommendations.

4.1   Conclusions

In conducting the PY1 Custom program evaluation, the evaluation team has drawn a number of conclusions that are enumerated in this section.

4.1.1 Program Impacts

Lessons to be Learned in the Project-Specific M&V Reports

The EM&V team created site-specific M&V reports for each Custom gross impact sample point. These site-specific draft 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. While it probably is not reasonable to draw generalized conclusions in this section from a PY1 sample size of just five projects, there may be valuable lessons to be learned in those reports, as they relate to submitted impact calculations, the approach applied and parameters input/used. With larger sample sizes in PY2 and PY3 it should be feasible to summarize the cumulative lessons learned.

Tracking System

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 for a first-year program and represent 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. There were some instances of inconsistency regarding field names and data input. Both must be consistent or the data may not be properly analyzed if the evaluation team does not catch the inconsistency.

When pulling datasets into SAS, if the field names change for the same information it takes several steps to correct this. The first step requires contacting the person who created the dataset to make sure it is the same information. The next step is to alter the SAS programming to account for the field name change. Complete documentation that explains the field names and how they are used in tracking data reporting would be useful.

The tracking data is not completely populated for peak demand impact (kW). Missing data for this variable presents a barrier to the ability of evaluators to confidently and accurately represent the program population using a sample of selected projects. Furthermore, it has been communicated that ComEd may bid the program into the PJM power pool. To do so it will be important to more consistently estimate and populate ex ante peak demand savings.

Measure description information is reasonably populated in the tracking system but there is room for improvement in consistently labeling individual measures. 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. With these improvements in place it would be possible to provide measure-based summary statistics and track program accomplishments. Given current measure labeling practices such evaluation efforts were not deemed reasonable to produce.

Gross Impacts

Based on the relatively small sample sizes evaluated in PY1 it appears that ComEd is doing a good job of screening viable Custom energy efficiency projects for incorporation in the program. Some common Custom program issues were <u>not</u> encountered. The project documentation presented a reasonably clear description of how a given project saves energy and the energy efficiency measures included in the program all appear to have a reasonable basis for claiming energy savings. Ex ante savings estimates were reasonably technically accurate, although some equations applied were not well supported or sourced. The baseline condition selected for the impact calculations was generally reasonable. No apparent project fraud or thoroughly unreasonable impact claims were encountered.

With one exception in the M&V sample, involving system controls that were not yet operational (and thereby affecting the energy savings claim), all measures were verified to be installed and operational.

As noted above, the program needs to do a better job of estimating peak demand savings. Not only is peak demand not well populated, but for most measures it appears that accurate estimation of peak demand is given a lower priority than energy savings, due to the fact that incentive levels are tied to energy savings and not peak demand reduction.

Net Impacts

Free-ridership levels measured are better than expected for a Custom program at roughly 30%. Custom-Other is doing especially well – on par with the Custom-Lighting segment of the population. Participants report the program being a strong motivating factor in their decision to upgrade to efficient equipment at the time they elected to do so. Low free-ridership was observed across all project size categories (sampling strata).

Overall, ComEd's quality control and verification procedures for the Custom Program are rigorous and ensure high quality projects and tracking data. In particular, the program is strongest in the area of project screening and access to project documentation in electronic format.

4.1.2 Program Processes

Program Participation

Participation in the Custom Program was outpaced by the Prescriptive Program in PY1. Goals and incentive budgets for the two programs were combined prior to the beginning of the program year, and a majority of the savings goals were met by prescriptive lighting projects. In fact, only 64 customers completed a total of 87 custom projects.

Custom-lighting accounted for a majority (74 or 85%) of the projects but less than half of total ex ante gross energy savings. The more typical custom projects in the custom-other category accounted for a small portion (13 or 15%) of projects but over half of total ex ante gross energy savings. These savings were driven by one very large project that accounted for 19% of total Custom Program ex ante gross savings.

Projects were implemented in the business sectors one would expect – mainly retail/service and offices for custom-lighting and mainly light and heavy industry for custom-other.

Program Oversubscription

The Smart Ideas for Your Business program experienced unexpectedly strong demand for prescriptive measures immediately after launch in June 2008. The program became oversubscribed in September 2008 and had to begin wait-listing projects. Because the budgets and goals for the Prescriptive and Custom Programs had been combined prior to the start of PY1, the strong demand for prescriptive measures presented several challenges to the Custom Program.

1. Most of the program funds were taken up by prescriptive projects, since they are generally quicker to plan and complete, crowding out potential opportunities for custom projects.
2. Some customers had to be waitlisted and others were not able to participate in PY1, and program staff therefore had to manage customer expectations for PY1 while at the same time maintaining customer confidence and interest in the program for future program years.
3. In response to the oversubscription, certain marketing activities that are key for custom programs were de-emphasized, including promotion through Account Managers.

As a result, the Custom program experienced a slower than expected start and fell short of its original, individual goals for PY1. Early results from PY2 show that the program is likely to become oversubscribed again. Assuming that each individual program in the portfolio is striving to meet their program-specific goals, the PY2 evaluation should focus on how program design and/or implementation can be adjusted to avoid the negative consequences of oversubscription on the Custom Program.

Account Managers

Utility Account Managers often play a key role in successful custom programs as they have established relationships with targeted customers. Program participants, particularly ones with custom-other projects, cite their Account Manager as an important information resource and as providing assistance during the participation process. In addition to informing customers of the opportunities available through the Custom Program, Account Managers are also in a unique position to pre-screen potential projects for free-ridership.

During PY1 Account Managers were not fully utilized to market the Custom Program, and program staff noted that Account Managers had not fully bought into the program, partially because they have no goals

associated with their customers' participation. For future program years, steps should be taken to fully engage Account Managers in the program. The program may also wish to consider rewarding Account Managers who bring custom projects with high net savings into the program.

Trade Ally Network

During PY1, trade allies were the main channel of promotion and communication for the Prescriptive program. Approximately 160 market actors joined the trade ally network during PY1. ComEd has put in a place a good process for its trade ally network. Market actors have to complete an application and attend a seminar or webinar that explains the program and program processes before they can become a trade ally. In return, ComEd trade allies are listed in a searchable directory on the ComEd website and can make use of the ComEd call center and technical staff. Additional support for trade allies to help promote the program is planned for future program years.

While ComEd laid a strong foundation for the Trade Ally Network in PY1, staff for the Custom Program noted that the right supplier/trade ally support for more complex custom projects had not yet been reached by the program. This is underscored by responses to the participant survey which show that contractors play an important role in the implementation of custom-lighting projects, but less so in the implementation of custom-other projects.

Marketing and Outreach

Necessarily, the oversubscription also meant that program implementation had to be adjusted. Specifically, some of the anticipated promotional channels (Account Managers, marketing materials) were not utilized as planned since there was no need for additional program promotion overall. However, it is noted that this de-emphasis on marketing, following oversubscription, will not generate a pipeline of Custom projects in the waitlist for PY2 and PY3. The limited marketing that was conducted during PY1 was recalled and well received by program participants. The most successful efforts were promotion via contractors/trade allies and account managers as well as the website, and e-mail.

Customer Satisfaction

Customer satisfaction with various processes and components of the program was high, and few participants reported encountering problems during their participation. Some participants noted not receiving the full incentive amount as an issue, which in some cases resulted from an insufficient pre-review process by the implementer.

When asked to suggest program improvements, participants mentioned higher incentives, more marketing/publicity, better communication/program information, streamlined participation/application, and quicker processing times.

4.2   Recommendations

4.2.1 Impact Recommendations

Lessons to be Learned in the Project-Specific M&V Reports

1. It is recommended that selected ComEd and implementation staff review the content of the site reports to better understand the reasons underlying the ex post realization rate results. Again, making generalizations from a sample of five points is probably not warranted in this section of the report.

Tracking System

1. Consideration should be given to enhancing the ComEd tracking system for Custom measures to ensure measure-level tracking, with use of common measure descriptions and "reporting" across projects. This might include tracking the relevant size, quantity and efficiency of each item-level measure installation, including the appropriate units. (For example, measure = chiller replacement, number of units = 2, total capacity = 600, units of capacity = rated cooling tons, efficiency = 0.60, efficiency units = kW/ton, and detailed measure type = rotary screw water-source chiller replacement.) Currently the tracking system often lists multiple measures under a single line item, and disaggregation for reporting is either very difficult or not feasible. Working towards a tracking system model that is closer to a prescriptive program model would enhance reporting of measure installations, both within the program and within the annual evaluation.

2. Consideration should also be given to expanding prescriptive lighting measure eligibility and thereby reduce the frequency of lighting installations in the Custom program and evaluation. Evaluation resources and planning for the Custom PY1 evaluation did not support an assessment of lighting projects. If the PY2 and PY3 evaluations have similar levels of lighting participation then a new plan will need to be developed to either address those items as part of the Prescriptive program evaluation or to allocate additional resources to the Custom program evaluation or shift evaluation resources from true custom to lighting.

3. As noted earlier, enhanced efforts are needed within the program to enhance the estimation of demand savings and the tracking of those resulting impact estimates.

Application Quality Assurance

1. Consider increases in the level of technical documentation required for the largest, most complex projects. There is a balance between keeping the application process and forms from being overly complex and costly to navigate, while at the same time providing adequate levels of documentation for verification and savings analyses. Application documentation should not be over-simplified given the complexity of measures and range of site-specific characteristics in this program.
2. Better documentation may also be needed regarding pre-installation or pre-retrofit operating conditions. In particular, large complex projects might be required to submit a greater level of site-specific application data than smaller projects, since (a) they contribute disproportionately to total program savings; (b) the large incentive payments increase the temptation for gaming or fraud; (c) measures implemented are often site-specific or industry-specific, and (d) savings may be very sensitive to baseline conditions.
3. Requirements for large project in-program M&V should also be considered.

4. ComEd should also consider an application requirement for reporting baseline system use, to allow a comparison between the estimated impact size and the estimated size of baseline use. This information might facilitate enhanced review of the reasonableness of measure impact claims.

Gross and Net Impacts

1. Free-ridership is an inherent attribute of rebate programs. While it is challenging to screen out free-riders and maintain ease of participation, ComEd should consider the following:
    - Monitor free-ridership among participants and measures to assess the ongoing risk of low NTG ratios.
    - Proactively seek participation from business types, measures, and projects with low free-ridership rates to balance business types and measures that tend to have higher free-ridership.
    - Actively work with customers to identify energy efficiency projects (and thus gain customer perceived credit for those efforts) and conversely be cautious of projects that are far along in conception or implementation when the customer learns about available rebates.

4.2.2 Process Recommendations

Program Participation

1. To maintain a viable Custom Program, ComEd should consider ways to increase the share of Custom-Other projects. While heavy reliance on lighting is common for new programs, a better mix of end uses will make the program more sustainable in the long-term. Account Mangers and contractors/trade allies should play a key role in increasing the number of Custom-Other projects (see also below). Barriers to participation for these types of projects should be further explored in the PY2 evaluation. One recommendation for increasing the share of Custom projects is to retain separate goals and budgets in PY2 and PY3.

Program Oversubscription

1. Assuming that a balanced portfolio of business programs is desirable, the Smart Ideas for Your Business program should consider ways to reduce the negative impact of oversubscription on the Custom Program. For example, placing more emphasis on the individual program goals would motivate program and implementation staff to try and increase participation in the Custom Program. The PY2 evaluation should review how program design and/or implementation can be adjusted to avoid the negative consequences of oversubscription on the Custom Program.

2. Continue to carefully manage the oversubscription of the program. This includes managing customer expectations and communicating the status of waitlisted projects in a timely manner.

Account Managers

1. Once custom budgets are assured, the program should fully utilize ComEd's account manager network in order to market the program to potential custom participants. Account managers are an effective channel for reaching out to these customers. However, having potential incentives be pulled due to oversubscription can adversely affect the relationship between the account manager

and the customer, so the account managers may need some assurance of available funds. The role of Account Managers and their role in the program should be an evaluation focus for PY2.

2. The program may wish to consider rewarding Account Managers who bring customers into the program, ideally based on some measure of net savings achieved.

Trade Ally Network

1. To maintain a viable Custom Program, the program should make efforts to reach out to appropriate market actors/suppliers/trade allies that could implement true custom projects and get them involved in promoting the program. Energy services companies may be an appropriate trade ally for the program to align with for Custom projects. This issue should also be further explored in the PY2 evaluation.

2. Emphasize outreach to market actors/suppliers/trade allies that are most likely to interact with potential Custom-Other participants, e.g., contractors specializing in compressed air, HVAC or motors, or energy services companies (ESCO's). Trade allies are an effective channel of reaching customers. Trade allies were underutilized in the recruitment of Custom-Other projects in PY1. However, to make trade ally promotion viable there should be a definitive allocation of program goals and budget for the Custom program, as project development in true custom projects requires a longer timeline than Prescriptive projects. Any decision to collapse goals again in PY2 or PY3 sends a clear message to the supply-side market actors that they cannot rely on availability of incentive funds and creates competition for program resources (from a project development standpoint) that favors Prescriptive projects, given their shorter timeline.

3. Consider ways to increase the visibility of the "trade ally" designation. Customers currently are not aware of their contractor's status as a trade ally and do not place importance on this. However, status as a trade ally can be a powerful promotional tool for contractors and provides them additional motivation to join the network and promote the program.

4. As the program matures and the Trade Ally Network grows, consider additional ways to reward trade allies that are especially active in the program. This could be done through an identifier in the trade ally directory or through some formal recognition at the end of a program year.

5. Identify registered trade allies in the program tracking database. The database currently lists the contractor who implemented the project but does not indicate whether the contractor is a trade ally. By assigning a unique identification number to each trade ally, ally activity can be more easily monitored. This would be beneficial for both program tracking and for evaluation purposes.

Marketing and Outreach

1. Increase use of Account Mangers and contractors/trade allies to build program awareness and participation among potential Custom participants who are not currently exposed to the program's marketing and outreach efforts (see also discussion above).

Customer Satisfaction

1. KEMA should implement a more thorough pre-review of the technical details of a project in order to avoid customer dissatisfaction about reduced incentive amounts.

5 APPENDICES

5.1 Data Collection Instruments

5.1.1 Interview Guide

ComEd CI
PM-Implementer Guid

5.1.2 Phone Survey

ComEd C&I Custom
Participant Survey 20

5.2 Other Appendices

5.2.1 2008 Program Application Forms

The application forms for the 2008 program are provided in the Operations Manual Appendix B

Operations Manual
2008-12 Appendix B -

5.2.2 Verification and Due Diligence Memo Report

This memo provides the results of Task 3 – Verification and Due Diligence. Under this task, we explored the quality assurance and verification activities currently carried out by program and implementation staff.

ComEd C&I
Prescriptive and Cust