DCEO
Energy Efficiency/Demand Response Plan
Plan Year 1 (6/1/2008-5/31/2009)
Evaluation Report:
Public Sector Electric Efficiency Standard Incentives Program
Ameren Service Territory

Submitted To:

The Illinois Department of Commerce and Economic Opportunity

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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 Public Sector Electric Efficiency (PSEE) Standard Incentives program.[1] The primary objectives of this evaluation are to quantify gross and net savings impacts and to determine key process-related program strengths and weaknesses and identify ways in which the program can be improved.

The Illinois Department of Commerce and Economic Opportunity (DCEO) Public Sector Electric Efficiency Program provides incentives for public sector customers of ComEd and Ameren Illinois Utilities who upgrade their facilities with energy efficient equipment. There were two specific program elements that were available to customers during program year 1: a Custom Incentives program and a Standard Incentives 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 Standard Incentives program provides an expedited application approach for public sector 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.

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

E.2 Evaluation Methods

The methods used for impact evaluation were to review default energy savings assumptions for measures eligible for the program and to quantify gross savings impacts from an engineering review of the program reporting data and project documentation. The net impacts adjusted for free-ridership were evaluated through a self-report survey with program participants. Participant spillover was examined qualitatively through a self-report survey in PY1 and is not factored into the net impacts. Participant spillover will be examined quantitatively in PY2 and PY3.

The methods used for the process evaluation for PY1 included an in-depth interview with the program manager and a participant phone survey. A review and evaluation of program materials and the tracking database was also conducted.

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

The data collection and analyses for impact and process evaluation was conducted at the state-level. Energy impacts for the program are reported separately for the ComEd and Ameren Illinois Utilities. The process results report statewide data.

The data collected for evaluation of the PY1 Standard Incentives program was gathered during a number of activities including tracking data analysis, an in-depth phone interview with the program manager, a participant phone survey, and project file engineering review. The evaluation team also reviewed program materials developed by DCEO, including the Guidelines and Application document, public presentations, a portfolio fact sheet, program planning documents, and the program web site (www.illinoisenergy.org).

Table 1 below provides a summary of these data collection activities including the targeted population, the sample frame, and timing in which the data collection occurred.

Table 1. Data Collection Activities for PY1

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	Standard Incentives program projects	DCEO Tracking Database	-	All	Ongoing
In-depth Phone Interviews	DCEO Standard Program Staff	Contact from DCEO	Standard Incentives Program Manager	1	June 2009
Phone Survey	Standard Incentives Program Participants	Tracking Database and Project Files	Stratified Random Sample of Standard Incentives Program Participants	50	October 2009
Project File Engineering Review	Projects with incentives paid on measures	Tracking Database and Project Files	Stratified random sample by Standard project-level kWh (3 strata)	34	September – October 2009

E.3 Key Findings

Table 2 below provides a summary of reported ex ante savings from the DCEO tracking system, and evaluation-adjusted gross and net savings impacts for the Statewide PY1 Standard Incentives program. As shown in Table 2, the PY1 evaluation found that verified gross impacts were significantly higher than savings in DCEO's tracking system, as indicated by the realization rate (realization rate = ex post gross / tracking system gross).

The relative precision at a 90% confidence level for the program kWh Realization Rate is ± 10%. The relative precision at a 90% confidence level for the program NTG ratio is ± 3%. Although the NTG ratios for federal facilities and community colleges were substantially lower than the mean (0.50 and 0.51 versus 0.62) the results are not significant due to the low response rates in those two public sector types.

Table 2. Statewide Program-Level Evaluation-Adjusted Net kWh Impacts for PY1

Public Sector	Tracking System Savings Ex Ante Gross kWh	Evaluation Adjusted Savings Ex Post Gross kWh	Realization Rate	Net kWh	NTGR (net kWh / ex post gross kWh)
K-12 School	4,249,610	5,492,737	1.29	3,605,794	0.66
Community college	1,135,202	1,157,834	1.02	594,662	0.51
University	2,888,512	3,277,450	1.13	2,082,939	0.64
Municipal	5,746,076	6,403,426	1.11	4,050,481	0.63
Federal	889,676	1,137,623	1.28	565,720	0.50
Statewide	14,909,076	17,469,070	1.17	10,899,596	0.62

Realization rates for demand savings were not calculated because DCEO did not produce an ex ante estimate of demand savings. As part of the evaluation process, the evaluation team estimated gross non-coincident and peak kW reductions and applied the mean NTG ratio from the phone survey to arrive at an estimate of net peak kW reduction for the PY1 Standard Incentives program.

Table 3. Program-Level Evaluation Estimate of Net kW Impacts for PY1

Public Sector	Ex Ante Gross kW	Ex Post Gross kW	Realization Rate	Net kW	NTGR (Sample Mean)
Statewide	Not reported	2,875	NA	1,765	0.614

Impacts for public sector customers in Ameren delivery service territory are provided in Table 4.

Table 4. Utility-Specific Evaluation-Adjusted Net kWh and Estimated kW Impacts for PY1

Utility	Ex Ante Gross kWh	Ex Post Gross kWh	Realization Rate	Net kWh	NTGR (ex post gross)	Net kW
Ameren	3,023,432	4,204,312	1.39	2,640,635	0.63	358

Key Impact Findings

- In developing default savings for measures, DCEO relied upon ComEd's and Ameren's documentation because of the matching measure lists. An evaluation team review of the utilities' assumptions found most of them to be conservative and reasonable, but both ComEd and Ameren had default measure savings values that we judged to be inaccurate. Some DCEO measure default savings did not match the utility defaults, and the DCEO discrepancies were both higher and lower than the utility-derived assumptions we judged to be reasonable. As a result, DCEO is

introducing inaccuracies into their program tracking savings. DCEO should collaborate with ComEd, Ameren, and other parties in Illinois to develop a consistent set of default savings values and provide a brief description of how their default savings derive from the statewide values. It is recommended DCEO should then update their tracking system.

- The evaluation team found the DCEO tracking system to have limited functionality and lacking important detail data. We found it difficult to verify the data, and it appears that it would be difficult and time consuming for DCEO to maintain. We found several instances of wrong values or wrong links that affected tracking savings. The design of the tracking system limits our ability to construct samples, conduct surveys, and analyze impacts that isolate specific end-uses, measures, and building types. We believe a more complete tracking system with better functionality would be a significant benefit to the program manager and staff, as well as improve our ability to evaluate the program.
- We found the hard copy project documentation files to be well maintained by DCEO staff.
- The PY1 evaluation found that verified gross impacts were higher than the savings recorded in DCEO's tracking system. The PY1 Standard Incentives program had a realization rate on tracked energy savings of 1.17. While the realization rate for PY1 is greater than 1, some of this higher than expected savings was due to errors in default assumptions and the tracking system that under-estimated the tracking savings. Documentation on some large projects did not allow us to confirm all installed quantities or that all equipment met the qualifying criteria without follow-up verification from the site or site contact, resulting in some reductions to tracked savings. Site follow-up verification was not included in the PY1 evaluation due to budget and schedule constraints. Limited site verification is included in the PY2 evaluation, and the PY2 schedule will allow DCEO an opportunity to provide additional documentation after initial evaluation review. Section 3.1.1 – Verification and Due Diligence provides recommendations for DCEO to reduce evaluation adjustments.
- The PY1 Standard Incentives program had an evaluated Net-to-Verified Gross ratio of 0.62 for energy savings at a relative precision of ± 3% with at the 90% confidence level. The lower NTG ratio can be traced mainly to two issues: 1) respondents who learned about the program after they decided to implement the measure, and 2) respondents who claimed they would have installed exactly the same equipment at the same time (or within 6 months) in the absence of the program.
- DCEO's NTG score was raised by the strong influence of various program components (rebates, recommendations, and program materials) on customer decisions, where 72% of respondents gave a score that translates to 0.8 to 1.0 for that component of the NTG score (weighted one-third of overall score).
- The phone survey data identified 13 of 50 respondents (26%) who reported learning about the program AFTER they had decided to implement the measure, reducing their NTG ratio. This result is consistent with a concern that public sector entities can have planning horizons that extend well beyond one year, and that some public sector participants would submit projects from facility improvement plans that were in place prior to the start of the program. In general, these respondents had high free-ridership scores in all categories, but the projects tended to be smaller so the kWh-weighted impact on program NTG ratio is lessened. HVAC projects were more likely than lighting to have previously approved implementation plans, especially chiller projects. DCEO should seek involvement in the planning processes for public sector entities and document involvement and influence (dates, contacts, documents delivered, and discussions) for possible submission to evaluators (survey participants are not always aware of all past contacts that may have occurred in their organization). This additional documentation could provide the basis for adjustments to scores based solely on survey data.
- The PY1 evaluation found strong evidence of spillover in 8% of phone survey respondents (4 of 50). Among the 4 strongest spillover candidates, the potential spillover measures identified were T8 lamps (2 projects), VFD on HVAC motors, chiller, and outdoor air optimizing controls.

- Program participation and net impacts were highly concentrated in large projects, in certain public sectors (K-12 Schools and Municipal), and in lighting measures. The 15 largest projects provided 53% of the net program savings, while 47% of net savings was captured by the remaining 140 smaller projects. Municipal projects and K-12 schools provided 70% of net energy savings by building type. Lighting was a measure in 91% of projects.

Key Process Findings

The Public Sector Electric Efficiency Standard Incentive program was well received in PY1. Over 100 public sector customers conducted more than 150 projects. While the program did not meet its savings goals for PY1, the program built a good foundation for future program years, especially given its limited resources. Examination of barriers to participation will be an evaluation priority for the next evaluation cycle.

Customer satisfaction with various processes and components of the program was high, and few participants reported encountering problems during their participation. Participants provided the highest ratings for the PSEE program, staff communications, and DCEO overall.

Participants were less satisfied with the incentive amounts than with other program components. Some customers noted issues with the length of the participation process and the availability of program information. When asked to suggest program improvements, participants most often cite higher incentives and better program information.

The program design included a $100,000 incentive cap per location in PY1 (this was raised to $200,000 for PY2). During PY1, the program exercised a certain amount of flexibility in enforcing the incentive cap allowing incentives greater than $100,000 if the entity had multiple projects. While this is appropriate for a new program that did not exhaust its incentive funds in its first year, concentrating too much incentive money in a single project or a single customer carries risk for program savings (if the customer is found to be a free-rider) and for the on-going success of the program.

The application process allows multiple projects to be incorporated into a single grant, resulting in some participants including multiple sites or locations in a single application. This results in inconsistencies within the program tracking database, particularly when diverse measures are bundled within a single project, and presents difficulties for program evaluation and tracking.

The payment process for incentives of $10,000 or more must meet several accounting and legal requirements before payment can be made to the customer. These requirements can cause the process to take several months from the time a completed final application is received to the time that the incentive is paid to the customer. Because pre-approval applications are not required for most standard incentive projects, the program could end up having to process multiple applications for $10,000 or more that they were previously unaware of. This occurred at the end of PY1 and created a back-log in incentive processing.

The assigned program staff targeted their efforts at core activities related to processing applications, participant implementation assistance, inspections, and marketing. While the program has achieved significant savings in PY1, it did not meet its goals. Future growth of the program and attainment of program goals will require additional resources (staff and dollars) to expand the depth and breadth of program activities undertaken.

Implementation of the Standard Incentive program relied heavily on existing delivery channels such as the Smart Energy Design Assistance Center (SEDAC) and outreach activities by the ComEd and Ameren

C&I Incentive programs. This approach is both cost-effective and practical. However, relying on ComEd's and Ameren's outreach activities also means limited control over the content, timing, and frequency of messages being sent. This became a problem for the program in PY1, when the ComEd program became oversubscribed. ComEd ended much of its program promotion, and market actors mistakenly thought that incentive money had also run out for public sector projects as well, negatively affecting the PSEE program.

During PY1, the program made effective use of the existing SEDAC network to promote the program. This included making use of SEDAC's monthly newsletter that is sent to more than 3,000 market actors and end users. In addition, SEDAC experts often recommend participation in the PSEE programs for public entities. The PY2 evaluation will consider SEDAC's role in generating spillover savings for the program.

The PSEE programs leveraged the ComEd and Ameren trade ally networks in PY1. However, coordination of outreach activities with the utilities waned over the course of PY1. Since contractors play an important role in promoting the Standard Incentives program, successful use of the ComEd and Ameren trade ally networks is key to the growth of the PSEE programs.

DCEO recognizes that utility account managers often play a key role in successful incentive programs as they have established relationships with targeted customers. PSEE program participants cite their Account Manager as an information resource and as providing assistance during the participation process. Early in PY1 DCEO conducted a webinar for Account Managers and presented on the public sector as part of the utility's roll out to Account Managers on all program efforts. DCEO fields calls from Account Managers.

In PY1 DCEO assigned one full time staff person to focus on marketing for all PSEE programs. In addition to this full time staff member, other program staff participated in marketing activities as part of their normal job duties. Overall, the program heavily leveraged marketing activities by SEDAC, ComEd, and Ameren, with DCEO-specific activities somewhat limited by staff and resource availability. The marketing that was conducted was recalled and well received by program participants. The most successful efforts were promotion via market actors and the DCEO website.

Participants overwhelmingly prefer to be informed about opportunities such as the PSEE incentive programs by e-mail. DCEO currently uses e-mail when distributing its monthly SEDAC newsletters.

1 INTRODUCTION TO PROGRAM

This evaluation report covers the Standard Incentives program element of the Public Sector Electric Efficiency incentive program.

1.1 Program Description

The Illinois Department of Commerce and Economic Opportunity (DCEO) Public Sector Electric Efficiency program provides incentives for public sector customers of ComEd and Ameren Illinois Utilities who upgrade their facilities with energy efficient equipment. There were two specific program elements that were available to customers during program year 1: a Custom Incentives program and a Standard Incentives 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 Standard Incentives program provides an expedited application approach for public sector entities 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.

DCEO uses internal staff to manage, implement, and administer the program. Technical assistance is provided as needed with the assistance of the Smart Energy Design Assistance Center (SEDAC). The PY1 program application form listing measures, eligibility criteria and incentive levels is provided in Appendix 5.2.1. The measure list and incentives matched those offered by ComEd, except that DCEO offered incentives for LED traffic signals. The Standard and Custom programs continued into program year 2 with minor increases to prescriptive incentive levels and changes to rebate options.

The net MWH savings goals for the PY1 Standard incentive program are shown in Table 5.

Table 5. Public Sector Electric Efficiency Standard Incentives program PY1 Planned Savings Goals

Utility	Plan Target Net MWH	Plan Target Net MW
ComEd Service Territory	30,009	8.6
Ameren Service Territory	11,050	3.2
Total	**41,059**	**11.7**

Source: Direct Testimony of Jonathan Feipel, DCEO, Docket No. 07-0541, Exhibit 1.2, November 15, 2007.

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

2.1 Analytical Methods

2.1.1 Gross Program Savings

The objective of this element of the impact evaluation is to verify the original gross savings estimates in the Standard Incentives program tracking system. The savings reported in DCEO's tracking system were adjusted through a multistep process:

1. Engineering review of the algorithms used by the program to calculate default energy savings for all measures and the assumptions that feed those algorithms. Default savings values were either judged acceptable as documented or adjusted by the evaluation team. Preliminary findings were sent to DCEO on June 26, 2009.
2. Review of DCEO's tracking database to identify potential adjustments to reported tracking savings resulting from missing values, outliers, or changes to default values in the database.
3. The results of the first two steps were communicated to the engineering team responsible for project file review to inform potential adjustments.
4. Engineering review at the measure-level for a stratified sample of 34 projects selected from the population of 155 projects, with the following subcomponents:
    a. Engineering review and analysis of energy and demand impacts for 121 measures based on project documentation and tracking data.
    b. Review and application (if appropriate) of participant phone survey impact data (reported hours of use, reported baseline equipment) to projects in the engineering review sample.
    c. Calculation of a verified gross savings value (kWh and kW) for each measure within sample.

A verified gross realization rate (which is the verified gross savings / reported tracking savings) was estimated from the sample for each stratum and applied to the remaining non-reviewed projects in the strata. The result is a new estimate of verified gross savings for the Standard Incentives program.

Default Savings Review

Measures with assigned default savings values were assessed for reasonableness of the underlying algorithms, technology assumptions, and calculated savings values. In developing default savings for measures, DCEO relied mainly upon ComEd's documentation because of the matching measure lists. Members of the evaluation team conducted a technical review of ComEd's and Ameren's default savings assumptions as tasks under those evaluations, and relied upon those reviews to assess DCEO's measures. Our findings regarding individual assumptions and algorithms may be categorized as follows:

1) ACCEPTABLE AS IS: assumption or algorithm is reasonable and appropriate

2) REVISE OVER TIME: the assumption or algorithm is acceptable for the near term but should be improved over time through the evaluation process, market research, or program experience.

3) ERROR OR DISAGREEMENT: We believe the assumption or algorithm contains an error or we disagree on the value or approach.

The preferred data sources for assumptions are recent local primary research, EM&V, and program experience. Since those sources were generally not available in Illinois when DCEO, ComEd, and Ameren assembled documentation and developed default savings values, we understand that some assumptions must be drawn from data sources that involve a compromise between age, rigor, or location. When assumptions are described as "needing revision", we may propose an existing alternative data source or suggest using the evaluation process, market research, or program experience to revise the assumption through a collaborative review process.

Several points in this default savings review discuss issues that EM&V *could* illuminate. This should not be construed as saying that EM&V work as defined in the current evaluation plans *will* address the issue. The current evaluation budget could not support detailed research on the full range of issues identified as potential targets for EM&V work. The EM&V deliverables within our current plans will be one of several sources of information to draw upon as default values are updated.

Following are the types of issues we considered in our reviews:

Measure definition – Provides a description of the efficient technology, the required technology performance specifications, and the applications where the technology is eligible. Potential issues include:

- Are the performance specifications complete to ensure the default savings will be achieved?
- Are the performance specifications independently rated or certified?

Measure Savings Engineering Analysis – provides the algorithms used to calculate non-coincident demand reduction, coincident demand reduction, and annual energy savings:

- Are the algorithms correct for the measure?
- Do the algorithms provide reasonable estimates for the range of applications and operating conditions of participants in the program?
- Are factors missing from the equation?

Measure Savings Assumptions – documents the wattages, efficiency ratings and operating assumptions for baseline and efficient equipment to calculate non-coincident demand reduction, coincident demand reduction, and annual energy savings. Potential issues include:

- Is the baseline equipment type and performance appropriate for the measure description?
- Are the efficiency ratings and wattages appropriate for the range of operating conditions expected of participants?
- Do the operating assumptions provide a reasonable representation for program participation?
- Are the coincident factors reasonable?
- Are the assumptions documented and are the data sources appropriate for Illinois?

Measure Savings Results – Presents the default values that are derived from the algorithms and assumptions. Potential issues include:

- Has the calculation been correctly performed to generate the default values (any math errors)?
- Is the weighting or averaging of data to derive a single default value reasonable?
- Do individual default values cover too broad of a range?
- Are the units for the savings correct and clearly presented?

Tracking System Savings Review

The tracking data for this evaluation consisted of two Excel spreadsheet files that DCEO staff maintained. The review is based on versions sent by DCEO dated July 28, 2009 and September 8, 2009. Under this task, we conducted a review of Standard Incentives program data in the DCEO tracking system to identify issues that could affect reported savings. During this review, we looked at project data for outliers and missing information, and checked for incorrect default values in lookup tables used by the tracking system to report savings. We also assessed basic functionality of the tracking system for use in recording, tracking, and reporting impact data.

Engineering Review of Project Files

Michaels Engineering conducted a measure-level engineering review on a sample of 34 projects from PY1 to verify documentation, tracking system entries, installed measure characteristics, hours of operation, and characteristics of replaced equipment. For each project in the sample, Michaels engineers reproduced the ex ante savings reported in the tracking system (kWh and kW), and then calculated an adjusted gross savings based on their review of documentation and engineering analysis. A gross savings realization rate was calculated for the sample, and then applied to the population.

To support this review, DCEO provided access at their office to project documentation in hard copy format for each sampled project. The evaluation team then scanned the documents into Adobe PDF files to distribute to team members along with the tracking system files. Documentation included some or all of scanned files of hardcopy application forms and supporting documentation from the applicant (invoices, measure specification sheets, vendor proposals), inspection reports (when conducted), calculation spreadsheets, and important email and memoranda. Where projects covered by the participant phone survey overlapped with the engineering review sample, relevant impact data from the phone survey (reported hours of use) was applied to projects.

On-Site Verification

On-site verification was not conducted for the Standard Incentives program in PY1. Michaels Engineering conducted site visits for a sample of PY1 Custom projects and the findings are reported in the Custom Incentives program evaluation.

2.1.2 Net Program Savings

Net Program Savings

The primary objective of the net savings analysis for the Standard Incentives 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. A more extensive effort will be undertaken to quantify spillover in PY2, commensurate with the evidence of spillover found in PY1.

Once free-ridership (and spillover beginning PY2) have been estimated the Net-to-Gross (NTG) ratio is calculated as follows:

NTG Ratio = 1 – Free-ridership Rate + Spillover Rate (beginning PY2)

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 influence of the most important of various program and program-related elements in the customer's decision to select specific program measures at this time.
- 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 DCEO Custom Incentives program, the ComEd Business Custom and Business Prescriptive programs, and Ameren Illinois Custom, Standard Revised, and Standard Business programs with the exact same questions.

The calculation of free-ridership for the Standard Incentives program is a multi-step process. After confirming the customer's ability to answer questions regarding the measures installed for one end-use (lighting, HVAC, refrigeration, or motors) at the site address that defines the project, the survey covers a battery of questions used to assess net-to-gross ratio for the specific end-use and site. If a project includes multiple end-uses, the questions are asked about the end-use providing the largest contribution to ex ante project savings. Customers are then asked if the responses also apply to the end-use with second highest contribution to project savings.

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 for measures of that end-use.

This scoring approach is summarized in Table 6.

Table 6. Net-to-Gross Scoring Algorithm for the PY1 Standard Incentives 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 rebate B. Recommendation from program staff C. Information from utility or program marketing materials D. Endorsement or recommendation by a utility account rep	Maximum of A, B, C, and D
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
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-uses of the additional projects

Spillover

For the PY1 Standard Incentives program evaluation, a battery of questions to assess spillover qualitatively was asked regarding the end use addressed in the survey (the end use with the greatest contribution to ex ante savings for the project). Below is a paraphrased version of the spillover questions for lighting:

1. Since participation in the DCEO program, has your organization implemented any additional energy efficiency measures WITHOUT an incentives through a utility or government program?
2. What was the first measure you implemented? The second? The third? Describe the measure(s).
3. On a scale of 0 to 10, where 0 means "not significant" and 10 means "extremely significant" how significant was your experience with the DCEO program in your decision to implement this measure?
4. If you had not participated in the DCEO program, how likely is it that your organization would still have implemented this measure (1 to 10 scale)?

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 with the participants.

2.2 Data Sources

The data collected for evaluation of the PY1 Standard Incentives program was gathered during a number of activities including tracking data analysis, an in-depth phone interview with the program manager, a participant phone survey, and project file engineering review. The evaluation team also reviewed program materials developed by DCEO, including the Guidelines and Application document, public presentations, a portfolio fact sheet, program planning documents, and the program web site (www.illinoisenergy.org).

Table 7 below provides a summary of these data collection activities including the targeted population, the sample frame, and timing in which the data collection occurred.

Table 7. Data Collection Activities for PY1

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	Standard Incentives program projects	DCEO Tracking Database	-	All	Ongoing
In-depth Phone Interviews	DCEO Standard Program Staff	Contact from DCEO	Standard Incentives program Manager	1	June 2009
Phone Survey	Standard Incentives program Participants	Tracking Database and Project Files	Stratified Random Sample of Standard Incentive Program Participants	50	October 2009
Project File Engineering Review	Projects with incentives paid on measures	Tracking Database and Project Files	Stratified random sample by Standard project-level kWh (3 strata)	34	September – October 2009

Tracking Data

The tracking data for this evaluation consisted of two Excel spreadsheet files that DCEO delivered on a periodic basis. Program samples were drawn from the versions sent by DCEO dated July 28, 2009 and September 8, 2009. The files were:

- **PSEE Project KWH Savings 2009-07-28.xlsx:** This file (the "PSEE projects" file) contained project level details including a tab identifying measures, incentives, and savings for each participating project plus summary totals.
- **EEPS Incentive Applicants 2009-09-08.xlsx:** This file (the "EEPS applicants" file) contained program-level information including one tab for tracking data for applicants (including project name, milestone dates, savings and incentives) plus tabs for summary and status information at the program level.

Program Staff Interview

The Standard Incentive program does not have an implementation contractor. Therefore, only one depth interview, with the Program Manager Andrea Reiff, was conducted as part of this evaluation. The interview was completed over the phone in June of 2009. The interview 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 guide used for the interview is included in Appendix 5.1.1.

Phone Survey

A telephone survey was conducted with 50 Standard Incentives program participants. This survey focused on questions to estimate the gross and net program impacts and to support the process evaluation. All surveys were completed by Opinion Dynamics Corporation (ODC) in October 2009.

The survey was directed toward unique customer contact names from the tracking system for PY1 paid Standard projects. The survey assessed all of the parameters necessary to calculate PY1 free-ridership, and supported gross savings analysis by collecting self reported data for end-use hours of operation. Additional data was collected to support a qualitative assessment of spillover as well as the process evaluation. The survey instrument used for this evaluation is included in Appendix 5.1.2.

Participant Project Documentation

To support this review, DCEO provided access at their office to project documentation in hard copy format for each sampled project. The evaluation team then scanned the documents into Adobe PDF files to distribute to team members along with the tracking system files. Documentation included some or all of scanned files of hardcopy application forms and supporting documentation from the applicant (invoices, measure specification sheets, vendor proposals), inspection reports (when conducted), calculation spreadsheets, and important email and memoranda.

On-Site Verification

On-site verification was not conducted for the Standard Incentives program in PY1.

2.3 Sampling

The tracking data delivered for this evaluation was provided as two Excel spreadsheet files by DCEO on July 28, 2009 and September 8, 2009.

Profile of Population

The evaluation team analyzed program participation data from DCEO's PSEE projects tracking data and the EEPS applicants files. The format of the database (two Excel spreadsheet files) presented some challenges for analyzing the data. Although the DCEO project-level spreadsheet contains quantities and savings for each measure within each application, DCEO did not establish all the links to a tab that summarizes the program results by end-use and measure, and the evaluation team did not fix the links to access this measure level savings information (173 project tabs to link for each measure).

Another challenge presented by DCEO's data tracking approach is the definition of a "project." In some instances, a project is one site address, in other cases it is multiple sites bundled into one "project." Bundled projects are given one contact name when possibly multiple facility managers could have been named. This bundling reduces the population size and created a challenge for completing the phone surveys. Compounding this problem is the fact that some of the contact names in the database were high ranking public officials, who are often hard to contact, hard to schedule for an extensive interview, and, possibly not as familiar with the details of the projects as others would be.

We were able to examine the data by project size, public sector classification (K-12, university, community college, municipal, state, and federal), utility (Ameren, ComEd), and whether the project involved Custom-only, Standard-only, or both programs. DCEO did have a field in the EEPS applicants file that identified generically the type measure installed ("Retrofit Lights," "Chiller, VSD," "Chillers, VSD, LED Exits, Occ Sensors," etc.).

Tables 8, 9, 10, and 11 below provide a profile of PY1 Standard Incentives program participation.

Participation is highly concentrated in the largest projects, with 15 of 155 projects accounting for two-thirds of the program energy savings – although several of the largest projects had multiple sites bundled into one project. Most of the projects (91%, 141 out of 155) identified lighting as a component of the project. Among public sector classes, municipal and K-12 schools provide 68% of savings. University projects provided 19% of savings, but project sizes were considerably larger.

Table 8. PY1 Standard Incentives program Participation by Project Size

Size Category	Size Range, Ex Ante kWh	Project Count		Ex Ante kWh	
Largest	845,413 to 2,303,990	4	3%	4,925,558	33%
Middle	242,633 to 717,744	11	7%	4,825,047	32%
Smallest	303 to 236,640	140	90%	5,158,472	35%
TOTAL	303 to 2,303,990	155	100%	14,909,076	100%

Source: Evaluation analysis of tracking savings.

Table 9. PY1 Standard Incentives program Participation by Public Sector

Public Sector	Project Count		Savings for all PY1 Projects, Ex Ante kWh		Average Size, Ex Ante kWh
K-12 School	58	37%	4,249,610	29%	73,269
Community college	9	6%	1,135,202	8%	126,134
University	9	6%	2,888,512	19%	320,946
Municipal	60	39%	5,746,076	39%	95,768
Federal	19	12%	889,676	6%	46,825
Program	155	100%	14,909,076	100%	96,188

Source: Evaluation analysis of tracking savings.

Table 10. PY1 Standard Incentives program Participation by Measure or End-Use

Measure or End-use	Number of Projects Identified (N=155)	
Lighting	141	91%
Chiller or HVAC	7	5%
VSD or Motors	17	11%

Source: Evaluation analysis of tracking savings. Some projects contain multiple end-uses so the totals are greater than 155.

Table 11. PY1 Standard Incentives program Participation by Utility

Utility	Project Count		Ex Ante kWh	
ComEd	94	61%	11,885,644	80%
Ameren	61	39%	3,023,432	20%
TOTAL	155	100%	14,909,076	100%

Source: Evaluation analysis of tracking savings.

The distribution of population ex ante kWh by utility and strata is provided in Table 12. This table shows that approximately two-thirds of Ameren projects are in the small projects strata, with no projects in the largest projects group. ComEd savings are distributed more equally.

Table 12. PY1 Standard Incentives program Distribution of Savings by Utility and Strata

Strata	ComEd	Ameren	Total
Largest	33%	0%	33%
Middle	25%	7%	32%
Smallest	22%	13%	35%
Total	80%	20%	100%

Source: Program tracking savings. Total savings for the table is 14,909,076 kWh.

2.3.1 Engineering Review Sample

The sample for the engineering review of PY1 paid Standard Incentives program projects was selected from data in the tracking system. Data review was undertaken before the sample was pulled to check for outliers and missing values. Some projects contain both Custom and Standard measures (combined projects). The Custom and Standard Incentives programs were evaluated through different approaches by

necessity, so the evaluation team included all custom measures within the Custom evaluation, and all standard measures within the Standard evaluation. The phone survey was coordinated by assigning combined projects to one evaluation or the other to avoid multiple contacts. As a result, 18 projects required special coordination between the two evaluations.

The program-level Standard savings data was analyzed by public sector type and project size to inform sample design. After analysis, the sample design selected for the Standard evaluation was stratification by project size, where project size is defined as the sum of all ex ante kWh for Standard measures installed within a project (as defined by unique project IDs assigned by DCEO). For DCEO, a project can involve either a single site address or multiple site addresses, and may include multiple measures including traffic signals. As discussed in the section above, the evaluation process could yield results with better differentiation and precision if the tracking system was structured to improve access to project detail. Projects were sorted from largest to smallest Standard kWh, and placed into one of three strata that each contained approximately one-third of the program total kWh. Thus, the 4 largest projects comprising one-third of program savings were assigned to "strata 1," the 11 next largest were assigned to "strata 2," and the smallest 140 projects were assigned to "strata 3."

The Standard Incentives program evaluation plan called for a target sample of 50 projects to be selected for engineering review. This sample was reduced to 34 due to the concentration of savings in the largest projects that allowed a high percentage of program savings to be captured through a smaller sample. The sample was drawn as follows: all 4 projects in strata 1 were selected, all 11 projects in strata 2 were selected, and 19 of 140 projects in strata 3 were randomly selected.

Profile of Engineering Review Sample

Tables 13, 14, 15, and 16 below provide a profile of the Engineering Review Sample for the Standard Incentives program in comparison with the program population.

Table 13. Profile of the Engineering Review Sample by Strata

Strata	N	Population Ex Ante kWh	Population Weights	Target Sample, n
1 "Largest Projects"	4	4,925,558	33%	4
2 "Middle"	11	4,825,047	32%	11
3 "Smallest Projects"	140	5,158,472	35%	19
Total	155	14,909,076	100%	34

Table 14. Profile of the Engineering Review Sample by Public Sector

Public Sector Type	Project Count							
	Strata 1		Strata 2		Strata 3		Total	
	Pop	Sample	Pop	Sample	Pop	Sample	Pop	Sample
K-12 School	1	1	4	4	53	7	58	12
Community college	0	0	2	2	7	0	9	2
University	1	1	3	3	5	1	9	5
Municipal	2	2	1	1	57	10	60	13
Federal	0	0	1	1	18	1	19	2
Totals	4	4	11	11	140	19	155	34

Table 15. Profile of the Engineering Review Sample by Public Sector Type

Public Sector Type	Population kWh		Sample kWh		Sampled %
K-12 School	4,249,610	29%	2,892,075	28%	68%
Community college	1,135,202	8%	842,349	8%	74%
University	2,888,512	19%	2,437,147	23%	84%
Municipal	5,746,076	39%	3,890,022	37%	68%
Federal	889,676	6%	412,934	4%	46%
Totals	14,909,076	100%	10,474,527	100%	70%

Table 16 provides the sample by utility, and shows that because Ameren had only 3 of 15 projects in strata 1 and 2, the savings kWh in the sample is slightly under-represented. However, the engineering review included 48% of Ameren project savings.

Table 16. PY1 Standard Incentives program Participation by Utility

Utility	Population kWh		Sample kWh		Sampled %
ComEd	11,885,644	80%	9,032,087	86%	76%
Ameren	3,023,432	20%	1,442,439	14%	48%
TOTAL	14,909,076	100%	10,474,527	100%	70%

Source: Evaluation analysis of tracking savings.

2.3.2 Phone Survey

A telephone survey was conducted with 50 Standard Incentives program participants. The survey was directed toward 105 unique customer contact names from the tracking system for PY1 paid Standard Incentives projects. We attempted to call 101 of these customers (four of the 105 contacts also had a Custom Incentives project and were included in the participant survey for the Custom Incentives program).

The survey assessed all of the parameters necessary to calculate PY1 free-ridership and supported gross savings analysis by collecting self reported data for end-use hours of operation. Additional data was collected to support the process evaluation (such as program design and implementation, program marketing and awareness, customer satisfaction), a qualitative assessment of spillover, and business demographics. The survey instrument used for this evaluation is included in Appendix 5.1.2.

Sampling

The phone survey drew a sample from the Standard Incentives program population to achieve a minimum of 50 completed phone interviews. An important difference between the phone survey and engineering review is that the phone survey must target unique contact names to avoid overburdening any one respondent by discussing multiple projects. Many participants submitted projects for multiple locations (e.g., school districts) and listed a single contact person for all projects. These multiple-location participants had to be handled together in the sample.

Starting with the population of all projects with Standard Incentive measures, a single project was selected for contact with multiple projects, as were customer contacts without phone numbers, and contacts for combined Custom and Standard projects that were being targeted by the Custom phone survey. Given the smaller population of Custom projects, the Custom Incentives program was given priority for calling combined project contacts.

The stratified approach from the engineering review sample was retained. The evaluation team concluded that an un-weighted analysis provided the best representation for process results.

Survey Disposition

Table 17 below shows the final dispositions of the 105 unique participants in the Standard Incentive Program. As this table shows, contact with 101 of the 105 contacts was attempted, resulting in 50 completed surveys. The survey center was unable to make contact with 13% of contacts for a variety of reasons including: no one answered the phone, an answering machine picked up, or the phone line was busy. We attempted to reach each of these customers at least three to four times. The phone numbers provided for 7% of the sample had problems such as being disconnected, blocked, or an incorrect number.

Overall, the response rate for this survey was 61%, computed as the number of completed surveys divided by the number of eligible respondents.[2]

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

Table 17. Sample Disposition

Sample Disposition	Customers	%
Population of Unique Contacts	105	100%
Not Called (Moved to Custom Sample)	4	4%
Completed Survey	50	48%
Unable to Reach	14	13%
Non-Specific Callback/Appointment Scheduled	13	12%
Knowledgeable Person No Longer There/Not Available	8	8%
Phone Number Issue	7	7%
Refusal	4	5%
Could Not Confirm Participation	2	2%
Project Not Complete	2	2%

Source: ODC CATI Center

Profile of Survey Respondents

Over 85% of survey respondents represent one of two sectors: local government (58%) or K-12 schools (30%). This distribution is similar to that of all 105 entities that participated in the Standard Incentives program in PY1. Table 18 presents the comparison of sectors for survey respondents and the population of participants.

Table 18. Business Sector of Survey Respondents

Sector	Survey Respondents (n=50)	Population (N=105)
Local Government	58%	52%
K-12 Schools	30%	35%
Federal Government	8%	5%
Community Colleges	2%	4%
Universities	2%	4%

Source: DCEO Tracking Database

A majority of survey respondents are classified as small entities (82%) with the remaining 18% classified as large. This distribution is almost identical to that of all 105 public sector entities that participated in the program in PY1 (see Table 19).

Table 19. Size of Public Sector Entity

Size of Entity	Survey Respondents (n=50)	Population (n=105)
Small	82%	81%
Medium	0%	0%
Large	18%	19%

Source: DCEO Tracking Database.

3 PROGRAM LEVEL RESULTS

This section presents results of the impact and process evaluations of the Standard Incentives program.

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, we explored the quality assurance and verification activities currently carried out by program staff. We compared these activities to industry best practices[3] for similar non-residential 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 staff and documentation of current program processes as outlined in the program Guidelines and Application.

The complete draft 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 DCEO's Public Sector Energy Efficiency (PSEE) Custom and Standard Incentives 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 program. The final summary and recommendations section of the report is provided below.

Summary and Recommendations

Overall, DCEO's quality control and verification procedures for the Standard Incentive program were acceptable for PY1 but need further development to ensure high quality projects and tracking data as program participation expands. It is critical to acknowledge that DCEO programs face staff resource constraints and, within this operating environment, make a dedicated effort to institute sound procedures related to quality control and verification.

In particular, the program is strongest in the area of administrative review. Suggested improvements focus on developing documentation and applying formal pre- and post-inspection protocols, maintaining an up-to-date tracking system through the various stages of project completion, and potentially adding a second

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

check of large and complex projects based on resource availability. These enhancements will help to ensure quality and consistency as staff verification resources are added to meet higher program participation levels.

Table 20 summarizes the quality assurance and verification activities currently carried out by the Standard Incentives program. It also features recommended changes to current procedures, as well as suggestions regarding additional activities that DCEO could implement to enhance quality assurance and verification.

Table20. Summary of QA Activities in Place and Recommendations

QA Activities in Place	Recommended Changes
Pre-Approval • Customer eligibility and application completeness checks • Measure eligibility review • Pre-inspections using a standardized form	**Pre-Approval** • Document and apply a procedure for entry of pre-approval information into the tracking system to minimize time lag in data entry. • In addition to routine checking measure eligibility and quantities of each application, conduct a second check on large and complex projects. • Document and apply formal criteria for selecting projects for pre-inspection, as well as targets for the number of pre-inspections. • Document measure-specific procedures in detail for conducting pre-inspections, including what information is collected, where it is recorded, and where inspection forms are stored as part of project tracking.
Final Approval • Customer eligibility and application completeness checks • Measure eligibility review • Post-inspections using a standardized form • Targeted number of post-inspections based on project size.	**Final Approval** • In addition to routine checking measure eligibility, invoices, and quantities of each application, conduct a second check on large and complex projects. • Document formal criteria for selecting projects for post-inspection and targets for the number of post-inspections. • Document measure-specific procedures in detail for conducting post-inspections, including what information is collected (equipment description and specs, operational data, guidelines for census counts versus sampling), where it is recorded, and where inspection forms are stored as part of project tracking.

3.1.2 Tracking System Review

Under this task, we conducted a review of Standard Incentives program data in the DCEO tracking system to identify issues that could affect reported savings. During this review, we looked at project data for outliers and missing information, and checked for incorrect default values in lookup tables used by the

tracking system to report savings. We also assessed basic functionality of the tracking system for use in recording, tracking, and reporting impact data.

The tracking data for this evaluation consisted of two Excel spreadsheet files that DCEO updated and delivered on a periodic basis. The review is based on versions sent by DCEO dated July 28, 2009 and September 8, 2009. The files were:

- **PSEE Project KWH Savings 2009-07-28.xlsx:** This file (the "PSEE projects" file) contained project level details including a tab identifying measures, incentives, and savings for each participating project plus summary totals.
- **EEPS Incentive Applicants 2009-09-08.xlsx:** This file (the "EEPS applicants" file) contained program-level information including one tab for tracking data for applicants (including project name, milestone dates, savings and incentives) plus tabs for summary and status information at the program level.

DCEO uses these two spreadsheets as the tracking system for the Standard Incentives program. The spreadsheets are used to estimate savings and incentives for each project, and track basic implementation milestones. Participant data and project details from the application package are retained in hard copy files at DCEO offices. This tracking approach has limited functionality for evaluation tasks such as analyzing data and drawing samples. It has much less functionality than either the ComEd or Ameren tracking systems.

One of the challenges to the DCEO tracking system design is the number of Excel links that must be maintained to extract summary information from each measure and project. In the PY1 tracking system, the project numbering reached 283, and each project has its own tab in the PSEE projects file. Some of the 283 projects were cancelled, but the Standard Incentives program had 155 active paid projects in PY1. DCEO extracted summaries from this project data in a process that requires linking hundreds of cells. At some point during the program year many of the links for summary data became broken. It is difficult to verify a cell's contents as it may have a formula linking to hundreds of other cells on separate tabs.

There were a number of challenges and data anomalies that the evaluation team encountered in the task of analyzing data and drawing samples. Some of these are listed below:

- HVAC projects require an extra data input step to choose one of 14 measure codes. During the engineering review, we found this code was missing on project 199, and as a result, a chiller project that saved 123,580 kWh (ex ante) was not picked up in the summaries. The incentive was picked up by the system.
- Project 20 had a $700 Standard refrigeration incentive and savings that was put into Custom.
- The evaluation team found a wrong cell reference in a summary table that altered ex ante savings.

One particular challenge is that in some cases, multiple building sites were included in one project, while other times each site had a separate project ID. To improve our ability to evaluate the program, we recommend that each site address be assigned a unique identification number. This could be a unique "Project ID", or potentially a single Project ID could have multiple unique entries for each "Site ID" included in the project. Lacking this identification code limits our ability to construct samples, conduct surveys, and analyze impacts that isolate specific end-uses and measures.

For example, municipal projects may have measures as diverse as occupancy sensors and traffic signals bundled into one project ID. Some school districts are handled as one project per school, while other times multiple schools will be bundled into one project. Participant phone surveys must focus the

respondent's attention to one end-use, measure and decision process because answers to questions on net-to-gross, spillover, and hours of use are likely to be quite different for different measures.

The tracking data contains contact names for each project however some of the contact names were high ranking public officials, who are often hard to contact, hard to schedule for an extensive interview, and, possibly not as familiar with the details of the projects as others would be. Adding more contact names to the database, particularly those who are likely to have detailed knowledge of the project, would help the EM&V team address questions to the appropriate individuals.

The DCEO tracking system has limited functionality and lacks important detail data. We found it difficult to verify the data. DCEO should investigate improving or replacing the system. Ameren and ComEd have tracking systems that are much more functional, and could provide a starting point for DCEO to reference.

3.1.3 Default Savings Review

In developing default savings for measures, DCEO relied mainly upon ComEd's documentation because of the matching measure lists. Members of the evaluation team conducted a technical review of ComEd's and Ameren's default savings assumptions as tasks under those evaluations, and then relied upon that review to assess DCEO's measures with assigned default savings values to assess the reasonableness of underlying algorithms, technology assumptions, and calculated savings values.

DCEO Default Savings Assumptions

DCEO default savings assumptions are built into the PSEE projects spreadsheet as a tab that contains a lookup table for kWh savings per unit assumptions by measure and building type. DCEO default savings are differentiated by four building types from the ComEd assumptions: College/University, Medical, Office, and K-12 School. To generate savings for tracking, DCEO must select one of these four building types to represent the project.

For most measures, DCEO kWh per unit savings assumptions match ComEd's exactly. Some measures have significant differences. It appears in some cases DCEO used an early version of ComEd's savings default assumptions that contained errors:

- First Version with errors: ComEd *Smart Ideas for Your Business, KEMA Operations Manual, Final Draft November 26, 2008, Appendix A* (file provided: "Operations Manual 2008-12 Appendix A – Prescriptive Measures.PDF").
- Updated Version: ComEd *Smart Ideas for Your Business, KEMA Operations Manual, Final Draft November 26, 2008, Appendix A* (file provided: "JAN VERSION Operations Manual Appendix A – Prescriptive Measures.PDF").

In another case, ComEd's documentation was wrong but they fixed the error in their tracking system – so it is understandable that DCEO would not be aware of this change. There are some measures where DCEO's assumptions differ significantly from ComEd without documentation.

On some measures, including icemakers and possibly premium motors, DCEO appears to have used default assumptions from Ameren. Our review of the Ameren default savings assumptions for icemakers and premium motors concluded the Ameren assumptions needed correction, and that the motor savings were significantly too high.

Table 21 below identifies the measures where there is a discrepancy between DCEO and ComEd.

Table 21. Default Savings Discrepancies between DCEO and ComEd

Measure	Applies to	Discrepancy, DCEO Savings are:
Hardwired CFLs	Offices	6% lower than ComEd
Delamp 8' with or without reflector	All buildings	42% higher than ComEd
High Performance T8 with ballast	All buildings	3% lower than ComEd
Reduced Wattage T8 lamp and ballast	All buildings	3% lower than ComEd
Reduced Wattage T8 Lamp only	All buildings	21% lower than ComEd
Metal Halides (Pulse start or Ceramic) 100W or less	All buildings	3% lower than ComEd
Metal Halides (Pulse start or Ceramic) 101W -200W	All buildings	100% higher than ComEd
Metal Halides (Pulse start or Ceramic) 201W-350W	All buildings	100% higher than ComEd
Cold Cathode	Offices	7% higher than ComEd
HVAC VSDs	All buildings	15% lower than ComEd
Strip Curtains on Walk-Ins	All buildings	36% higher than ComEd
Anti-Sweat Heater Control	All buildings	17% lower than ComEd
EC Motor for Walk-in	All buildings	16% higher than ComEd
EC Motor for Reach-in	All buildings	7% higher than ComEd
Icemakers	All buildings	
101-200		2.5 times higher than ComEd
201-300		47% higher than ComEd
301-400		10% lower than ComEd
401-500		23% higher than ComEd
501-1000		5% lower than ComEd
1001-1500		18% lower than ComEd
>1500		22% lower than ComEd
Premium Motors	All buildings	2 to 3 times higher than ComEd

Review of ComEd's Default Savings Assumptions

With only a few exceptions, ComEd's default savings values, both kW and kWh, are well documented, reasonable, and conservative in the savings they claim. It was necessary for ComEd to rely heavily on secondary data for PY1, much of it from California, so we believe that research and evaluation in Illinois targeting key assumptions would improve the default savings values for use in ComEd service territory.

One exception worth noting is the full load cooling hours assumed for HVAC measures. We believe they overstate the energy savings from cooling efficiency improvements in ComEd service territory and should be revised. Default savings for permanent lamp removal (delamping), although well documented and not necessarily overstating or understating the savings, has in our opinion too much uncertainty and should be revisited during PY2 after reviewing PY1 results.

Finally, we have identified several instances where we believe a math error or typo occurs in the documentation that should be corrected – in some cases the error carries over into the tracking system lookup tables, in other instances the tracking system contains the corrected values. When we encountered

a ComEd default value in the engineering file review process that we concluded contained an error, the savings for the measure were adjusted.

Our preliminary review of default savings values as documented in Appendix A of the ComEd program operations manual was sent to ComEd on June 17, 2009, and shared with DCEO on June 26, 2009. An updated version of that review is provided in Appendix 5.2.3. Below is a summary of key observations, issues and recommendations from the default review:

Crosscutting issues, relevant to DCEO

- Early participants targeted by trade allies were likely to have higher lighting hours of use than the averages ComEd has borrowed from California.
- The use of DEER as a starting data source for coincidence factors is reasonable, and we support case-by-case revisions for specific buildings types when a solid case can be made for an alternate source, or as Illinois data becomes available.
- We recommend a set of HVAC interaction factors that are specific to Illinois be developed.
- ComEd often uses un-weighted averaging when combining multiple assumptions into a single default value. A weighted average approach based on program participation profile and characteristics for ComEd customers would be a better method of combining data values. A simple average is acceptable for calculating initial default values entirely from secondary data, but should be revisited in future years as local data becomes available.

Lighting

- There are several sources of significant uncertainties in the default savings values for the "permanent lamp removal" measure (delamping). We recommend updating this default value in PY2 based on evaluation findings and program experience from PY1.
- Lighting default values make assumptions about the base fixture types and wattages that are reasonable for PY1 but need to be confirmed through market research, program results, and evaluation M&V.
- There are math errors in the savings table entries for reduced wattage eight foot T8 lamps and metal halide fixtures.
- ComEd should consider using separate demand and energy savings fractions for occupancy sensors, and revisit occupancy off rates after EM&V results.

Cooling

- Throughout the cooling section, the cooling equipment run time and kWh usage are based on a percentage of lighting hours of operation. There are no technical references provided for using that approach, and the percentages of lighting hours have no supporting documentation. We would recommend that ComEd seek out literature on estimated run time hours for cooling instead of basing it on lighting hours, or use a bin analysis. As one alternative, the 2007 ASHRAE Handbook lists equivalent full load cooling hours for Chicago, based on a 2000 study by CDH Energy (Chapter 32).
- We believe there is math error (wrong value) in the calculation of impacts for unitary HVAC that overstates impacts for units over 5 tons by about 14%.
- Compared with default values in other states, ComEd has used conservative (low) coincidence factors and redundancy factors (redundancy accounts for unit oversizing and installing excess cooling capacity that will not operate at full load; many default savings databases do not account for this but we recommend including it).

- We believe the installation of a variable speed drive on an existing chiller should be a custom measure.
- The assumption of 19% energy savings for HVAC VSDs and the resulting average energy savings of 371 kWh per HP are conservative (low) values. The savings are built up from undocumented assumptions and should be revisited in PY2.

Refrigeration

- The application of DEER weather sensitive data from even northern California to Illinois is problematic. Wet bulb temperature is much higher in Illinois than in Northern California most of the time. Midwest sources should be explored for default savings values.
- The default savings values, assumptions and algorithms are acceptable for the near term but should be improved over time using information that may be available from EM&V results, market research, and program experience.

Motors

- Instead of using motor horsepower to determine operating hours, the operating hours could be determined by gathering basic information through the application form. A better default value for load factor and coincident demand might also be obtainable through this method if the participant is asked to identify the motor application.

3.1.4 Gross Program Impact Parameter Estimates

Michaels Engineering conducted an engineering review of all 121 measures within the 34 projects that were selected in the gross savings review sample for PY1.

For each measure in the sample, Michaels' engineers attempted to reproduce the ex ante kWh savings reported in the tracking system, drawing upon the default savings assumptions incorporated into the tracking spreadsheet. Michaels engineers then calculated an adjusted gross savings for each measure (kWh and kW) drawing upon multiple sources of data. A gross savings realization rate for each of the three strata was calculated from the sampled projects, and then applied to the remainder of the non-reviewed projects within strata.

The following data sources were used in making gross impact adjustments to reported measure tracking savings:

a. Awareness of issues with the potential to affect impacts identified through the default savings and tracking system reviews (e.g., wrong defaults, cooling load full load hours, etc.).
b. Review and application (if appropriate) of impact data from the participant phone survey (reported hours of use) to projects that were also in the engineering review sample.
c. Engineering review and analysis of measure savings based on project documentation and tracking system data, supported by standard engineering methods and sources (e.g., ASHRAE data and algorithms).

Michaels Engineering created an Access database to record their adjustments for each of the 121 measures reviewed. The database includes project and measure data pulled from DCEO's tracking system, and adds fields including commentary on the ex ante savings calculation, a description of the ex post adjustments, phone survey reported hours of use (if a respondent), checkboxes to record common reasons for adjustment, and ex ante and ex post kW and kWh.

The checkboxes for adjustment include inappropriate assumption, tracking error (including difference in unit counts), calculation error, and operating difference (including hours of use adjustments). These reasons are recorded for file review and on-site ex post adjustments, and are summarized in Table 22 below.

Table 22. Reasons for Engineering Adjustments to Tracking Savings

Reason Cited for Adjustment	Adjustments to Ex Ante Savings, File Review (N=34 projects reviewed)
Inappropriate Assumption	11 (32%)
Tracking Error	6 (18%)
Calculation Error	2 (6%)
Operating Difference	8 (24%)

It is worth noting that the reasons for adjustment in Table 22 apply when savings are overstated or understated, such as when an assumption is conservative and the adjustment increases savings.

Within each project reviewed, individual measures may have savings adjusted up, down, or kept the same. The individual measure savings in each project were summed to provide an evaluation adjusted project-level savings. Table 23 below provides a count of the number of projects that had project-level savings adjusted upward, downward, or kept the same.

Table 23. Evaluation Adjustments to Tracking Savings from File Review

Type of Evaluation Adjustment to Project-Level Tracking Savings	Number of Projects with Adjustments to Tracking Savings File Review Process (N=34 projects reviewed)
Adjusted downward	11 (32%)
No change	4 (12%)
Adjusted upwards	19 (56%)

Hours of Use Impact Adjustments

As noted in the default savings review, hours of use adjustment was anticipated in the evaluation. Through use of data from the phone survey and engineering review of project files, lighting and HVAC measures received hours of use adjustment relative to default assumptions. The phone survey provided data to inform evaluation adjustments on 11 projects, primarily for increasing lighting hours of use relative to default values. For example, three phone survey respondents provided data on municipal public safety buildings that operate continuously.

Realization Rates for the Engineering Review Sample

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.[4] 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.

As described in Section 2, our sample design consisted of 3 strata, each representing approximately one-third of the total tracking system savings for the program.[5] We selected all 4 projects in stratum 1 (largest projects) and all 11 projects in stratum 2 (medium project size group) for review, completing a census of projects covering two-thirds of program savings.

We randomly selected 19 projects from the 140 projects in stratum 3 for engineering review. We concluded that separate ratio estimation for stratum 3 would provide the best estimate of savings for that population of projects, following the steps outlined in the California Evaluation Framework. A gross savings realization rate for stratum 3 was calculated from the 19 sampled projects, and then applied to the remainder of the non-reviewed projects within stratum 3.

The realization rates for kWh for each stratum are summarized in Table 24 below.

Table 24. Realization Rates (RR) for the Engineering Review Sample

Stratum	Population kWh, Ex Ante	Sample kWh, Ex Ante	Sample kWh, Ex Post	Sample RR
Stratum 1	4,925,558	4,925,558	4,221,428	0.86
Stratum 2	4,825,047	4,825,047	5,318,776	1.10
Stratum 3	5,158,472	723,922	1,112,709	1.54

Several factors account for the large difference between realization rates for strata 1, 2, and 3. Strata 3 is relatively higher because of significant savings adjustment increases that came through the tracking system review, engineering review, and phone survey results. One of the largest projects in strata 3 was completely missed by the tracking system: it was 0 tracking system savings but 123,580 kWh ex post (11% of ex post kWh for strata 3). Strata 3 had more respondents to the phone survey (strata 1 had none), and several of those respondents provided hours of use information that increased the estimate of gross

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

[5] As described in Section 2.3.1, the engineering review sample was stratified by project size, where project size is defined as the sum of all ex ante kWh for Standard measures installed within a project (as defined by unique project IDs assigned by DCEO). Projects were sorted from largest to smallest Standard kWh, and placed into one of three strata that each contained one-third of the program total kWh. Thus, the 4 largest projects comprising one-third of program savings were assigned to "stratum 1," the 11 next largest were assigned to "stratum 2," and 19 of the smallest 140 projects were randomly selected and assigned to "stratum 3."

savings. As noted in the default savings review, some of DCEO's default values under-estimated savings, and several strata 3 projects had savings increased through the review process for that reason. On the other end, strata 1 projects did not receive savings increases through the phone survey hours of use adjustment. Several measures in Strata 1 projects had savings reduced because documentation did not confirm installed quantities or qualifying criteria.

The standard error was used to estimate the error bound around the estimate of verified gross kWh. The results are summarized in Tables 25 below.

Table 25. kWh Realization Rates and Relative Precision at 90% Confidence Level

Stratum	Relative Precision ± %	Low	Mean	High
Stratum 1	-	0.86	0.86	0.86
Stratum 2	-	1.10	1.10	1.10
Stratum 3	29%	1.09	1.54	1.99
Total kWh RR	10%	1.02	1.17	1.33

The mean realization rate for gross energy savings in the Standard Incentives program is 1.17 with a relative precision ± 10% at a 90% confidence level.

Peak Demand Savings Estimate

Realization rates for demand savings were not calculated because DCEO did not produce an ex ante estimate of demand savings. As part of the engineering review process, the evaluation team estimated non-coincident kW reductions for each measure, and then applied building and end-use coincidence factors and demand interactive effect adjustments assumed by ComEd (default values discussed in Section 3.1.3) to arrive at a peak kW reduction for the measures in the engineering sample. To estimate the peak kW reduction for the projects that were not included in the engineering review, the ratio of the ex-post peak kW to the ex-ante kWh of the sample was determined, and then applied to the non-reviewed tracking energy savings. This calculation procedure is outlined in Table 26 below.

Table 26. Program Peak Demand Estimated from Engineering File Review

Peak kW Calculation Parameter	Calculated Result
Sample ex post non-coincident kW (from the 34 reviewed projects)	3,069 kW
Sample ex post coincident kW (from the 34 reviewed projects and ComEd default assumptions by end-use and building type)	2,020 peak kW
Sample ex ante kWh (from the 34 reviewed projects prior to review)	10,474,527kWh
Ratio from sample, ex post peak kW / ex ante kWh (2,020 kW / 10,474,527kWh)	0.0001928 peak kW/kWh
Non-reviewed ex ante kWh (from the 121 projects not included in review)	4,434,550 kWh
Estimated peak kW for non-reviewed projects (4,434,550 kWh * 0.0001928 peak kW/kWh)	855 peak kW
Estimated ex post gross peak kW (855 + 2,020)	2,875 peak kW

The peak demand estimate was not carried out for each stratum.

3.1.5 Gross Program Impact Results

Based on the gross impact parameter estimates described in the previous section we estimated the verified gross program impacts resulting from the overall PY1 Standard Incentives program. The results are provided in Tables 27.

Table 27. Gross Impact Parameter and Program Savings Estimates

Stratum	Gross kWh, Ex Ante	Gross kWh, Ex Post	kWh RR	kW, Ex Ante	Gross kW, Ex Post
Stratum 1	4,925,558	4,221,428	0.86	NA	NA
Stratum 2	4,825,047	5,318,776	1.10	NA	NA
Stratum 3	5,158,472	7,928,866	1.54	NA	NA
Total	14,909,076	17,469,070	1.17	NA	2,875

3.1.6 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 Standard Incentives program was estimated using a customer self-report approach. This approach relied on responses provided by program participants during the phone survey to determine the fraction of

measure installations that would have occurred by participants in the absence of the program (free-ridership). Once this parameter has been estimated, the PY1 NTG ratio is calculated as:

NTG Ratio = 1 – Free-ridership

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

Free-ridership

The customer self-report method uses participant phone survey data and the algorithm outlined in Section 2.1.2 to calculate the following three scores for each respondent (on a scale of 0 to 10 where 0 equals a full free-rider and 10 equals a non free-rider):

- A **Program Components** score that reflects the influence of the most important of various program and program-related elements in the customer's decision to select specific program measures at this time.
- 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. Free-ridership diminishes as the timing of the installation without the program moves further into the future.

The customer-level free-ridership is equal to:

$$\text{Customer-level Free-Ridership} = 1 - \frac{(\text{Program Components} + \text{Program Influence} + \text{No-Program})}{30}$$

The Net-to-Gross ratio is equal to:

NTG Ratio = 1 – Free-ridership

Or,

$$\text{NTG Ratio} = \frac{\text{Average of Scores (Program Components, Program Influence, No-Program)}}{10}$$

Although attempts were made to reach every contact in the sample, no surveys were completed with the Standard Incentive Program contacts in strata 1. The contacts in strata 1 were also the contacts for the largest strata in the sample for the Custom Incentives NTG survey. Efforts will continue to get data from those sites to support an adjusted estimate of free ridership.

Table 28. Standard Incentive Program Survey Responses by Strata

Strata	Sample	Responses
1	3	0
2	9	4
3	89	46
Total	101	50

We calculated the three free-ridership scores and a NTG ratio for each of the 50 completed phone surveys. The distribution of project-level scores is shown in Figure 1. A few observations:

- The Program Components score was between 8 and 10 for 72% of the respondents (n=36). This indicates one or more program components (availability of the program rebate, recommendation from DCEO program staff, information from DCEO or program marketing materials, or endorsement or recommendation by a utility account rep) had a strong influence on the participant, increasing the NTG ratio.

- The No-Program score had the highest percentage of respondents that tended toward full free-ridership – 11of the 50 respondents had a score between 0 and 2 (22%). This result can be paraphrased as customers who report they would be very likely to have installed exactly the same equipment at exactly the same time (or within 6 months) in the absence of the program.

- The Program Influence score had 57% of respondents with a score of 6 or less (28 respondents). The response data identified 13 respondents (26%) who reported learning about the program AFTER they had decided to implement the measure, causing their reported program influence score to be cut in half. This result is consistent with a concern that some public sector participants had previously approved facility improvement plans prior to the start of the program. Some characteristics of this group of 13 respondents with "previously approved plans" are given in Table 29. In general, these respondents had low scores in all categories, but the projects tended to be smaller so the kWh-weighted impact on program NTG ratio is lessened. HVAC projects were more likely than lighting to have previously approved implementation plans, especially chiller projects.

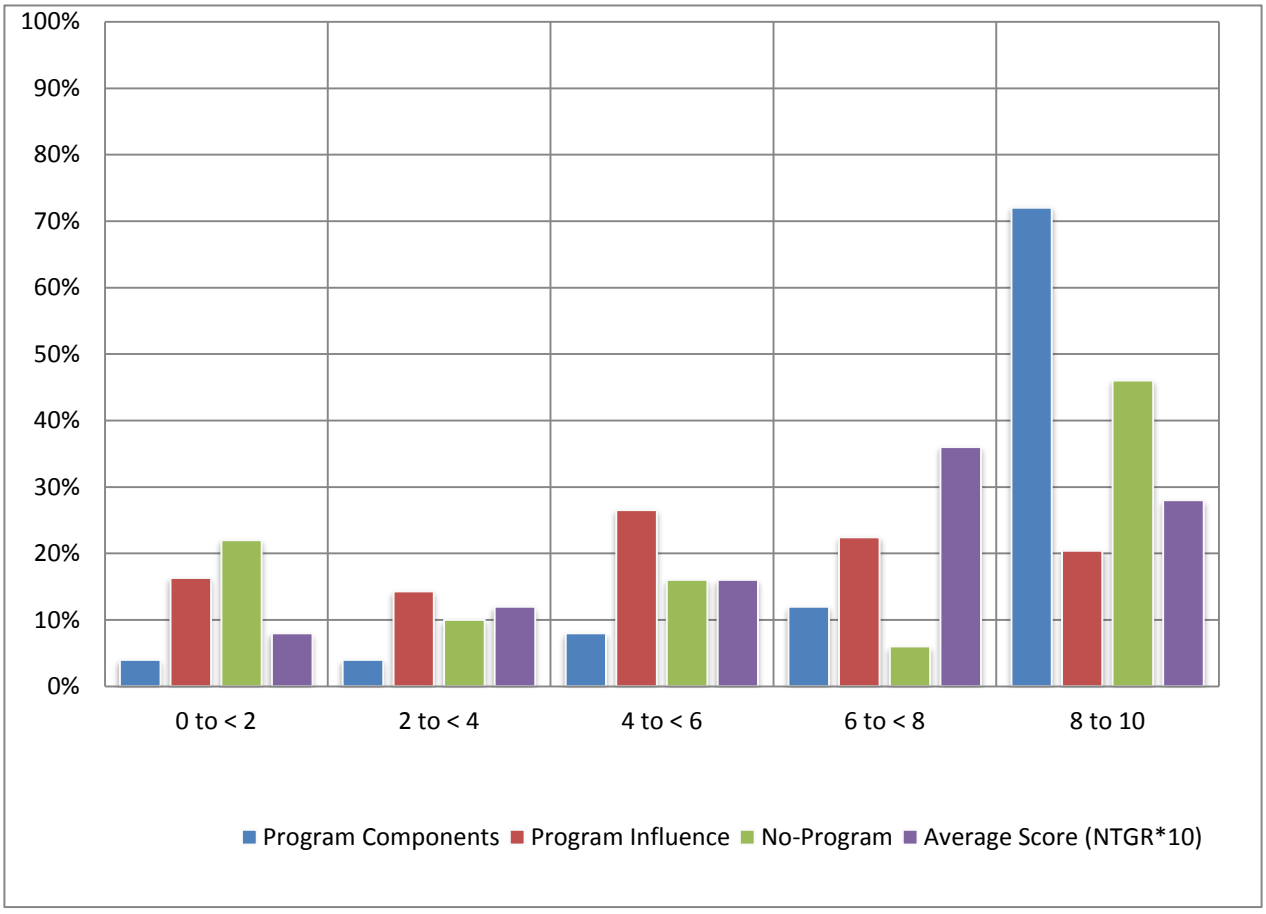
Table 29. Characteristics of Projects making Implementation Decisions Prior to Learning about the Program

Characteristic	Data for the Group
NTG ratio	Simple average =0.43
Program Components Score	Simple average =0.67
Program Influence Score	Simple average =0.25
No Program Score	Simple average =0.36
Utility Service Territory	12 in ComEd, 1 in Ameren
Strata	12 in strata 3, 1 in strata 2
Total Ex Ante kWh	819,539 kWh (5.5% of total program savings)
When were they planning to implement the project?	9 at the same time, and 1 each for 9, 18, 30, and 48 months later
Customer Type	1 K-12 school, 1 College, 2 Federal, 9 Municipal
End-Use	6 HVAC projects (including 4 chillers), 2 LED traffic signals, 5 high efficiency lighting
HVAC	6 of 9 of the survey respondents with HVAC projects 4 of 5 chiller projects responding to the survey

- The average of the three free-ridership scores is equal to 10 times the NTG ratio. The average score for 14 of 50 respondents (28%) was in the range of 8 to 10 (a NTG ratio of 0.8 to 1.0). Another 18 respondents (36%) had a score between 6 and 8, so that 64% had average scores of 6 or greater (NTG ratio of 0.6 or greater).

- Of the roughly one-third of projects with an average score below 6 (NTG ratio less than 0.6), low No Program and Program Influence scores are the primary reason. As described above, low scores in these two categories can be traced to two issues:
  - Respondents, especially those implementing HVAC projects, who learned about the program after they decided to implement the measure, and
  - Respondents who claimed they would have installed exactly the same equipment at the same time or within 6 months in the absence of the program.

Figure 1. Distribution of Project Level Free-Ridership Scores



Contacts with duplicate projects were asked if other projects within the same end use used the same decision process as the project they had just responded to in the net-to-gross questions. A total of 4 respondents representing 10 additional projects indicated the additional projects used the same decision process. The NTG scores calculated for the sampled project were applied to the additional projects, which all fell into strata 3. Four respondents had measures in multiple end-uses within the project. All four responded that the other end-use followed the same design process, so the entire savings of that project was included in the weighting analysis. Six respondents to the Custom survey representing 7 Standard projects (including one in strata 1) used the same decision process on their Standard projects. The single Custom/Standard project to respond in strata 1 represented 47% of the Standard savings for strata 1.

Table 30 below shows the distribution of the survey participants and represented projects across the three strata.

Table 30. Respondents and Represented Projects by Strata

Strata	Standard Survey Respondents	Projects included in Population Analysis
Strata 1	0	1
Strata 2	4	5
Strata 3	46	61
Total	50	67

The population analysis used a combined ratio estimator, where the mean NTG ratio for the sample was calculated directly without first calculating separate realization rates by stratum. The scores for individual projects in the sample were combined by weighting according to their energy savings, rather than as a simple average. Weighting was done with project-level ex ante kWh savings. As a result, projects with greater kWh savings carry more weight in the estimate of the mean NTG ratio for the sample. Table 31 provides a summary of the scoring for the sample.

Table 31. NTG Ratio Scoring for the Sample, Ex Ante kWh Weighted

Program Components Score	Program Influence Score	No-Program Score	NTG Ratio Score for Sample
0.86	0.42	0.47	0.61

The relative precision at a 90% confidence level is provided in Table 32.

Table 32. Net-to-Gross Ratio and Relative Precision at 90% Confidence Level

Relative Precision ± %	Low	Mean	High
3%	0.59	0.61	0.64

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 to support a decision about whether it is appropriate to attempt to quantify spillover in future evaluations. The evidence of spillover is summarized in Table 33 below.

Table 33. Evidence for Spillover for Lighting in PY1

Spillover Question	Evidence of Spillover
Since your participation in the DCEO program, has your organization implemented any ADDITIONAL energy efficiency measures that did NOT receive incentives through a utility or government program?	Of 50 participants that responded to this question, 17 said "Yes" (34%)
How significant was your experience in the DCEO 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?	Of the 17 respondents who answered "Yes," 7 reported a program influence score of 7 or higher, including 4 scores of 10. This is 14% of the 50 total respondents (7/50). 8 of the 17 gave a score of 0 – Not at all significant
If you had not participated in the DCEO 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? (A lower score is an indicator of spillover)	Of the 7 expressing high program influence, 4 gave a score or 5 or 6. These four project contacts are potential spillover candidates. The other 3 gave a score of 10 – they definitely would have implemented the measure even if they hadn't participated in the DCEO program.
What type of equipment was installed without an incentive?	Among the 4 strongest spillover candidates, the potential spillover measures identified were T8 lamps (2 projects), VFD on HVAC motors, chiller, and outdoor air optimizing controls

The PY2 evaluation plan includes an effort to quantify spillover. Options that will be considered include more detailed surveys and on-site visits.

3.1.7 Net Program Impact Results

The program level net savings were calculated by first assigning a NTG ratio to each project in the program – either the actual value calculated from the phone survey data for respondents or the mean value for the sample (0.61) for the non-respondents. For example, a NTG ratio of 0.61 was assigned to each of the 7 projects of strata 2 that did not provide a response to the phone survey, while the four respondents in strata 2 were assigned their calculated values that ranged from 0.27 to 0.75. Net program impacts were derived by multiplying verified gross savings by the estimated NTG ratio for each project in the program, and summing the net savings.

Table 34 provides the program-level evaluation-adjusted net impact results for the PY1 Standard Incentives program. The chained realization rate (gross RR * NTG Ratio) is 0.73 for kWh.

Table 34. Program-Level Evaluation-Adjusted Net kWh Impacts for PY1

By Strata	Ex Ante Gross kWh	Ex Post Gross kWh	Realization Rate	Net kWh	NTGR (ex post gross)	Chained Realization Rate
Strata 1	4,925,558	4,221,428	0.86	2,627,499	0.62	0.53
Strata 2	4,825,047	5,318,776	1.10	3,201,371	0.60	0.66
Strata 3	5,158,472	7,928,866	1.54	5,070,726	0.64	0.98
Program	14,909,076	17,469,070	1.17	10,899,596	0.62	0.73

Table 35. Program-Level Evaluation-Adjusted Net kW Impacts for PY1

By Strata	Ex Ante Gross kW	Ex Post Gross kW	Realization Rate	Net kW	NTGR Sample Mean
Program	Not reported	2,875	NA	1,765	0.614

Table 36. Program-Level Evaluation-Adjusted Net kWh Impacts for PY1

Public Sector	Ex Ante Gross kWh	Ex Post Gross kWh	Realization Rate	Net kWh	NTGR (ex post gross)
K-12 School	4,249,610	5,492,737	1.29	3,605,794	0.66
Community college	1,135,202	1,157,834	1.02	594,662	0.51
University	2,888,512	3,277,450	1.13	2,082,939	0.64
Municipal	5,746,076	6,403,426	1.11	4,050,481	0.63
Federal	889,676	1,137,623	1.28	565,720	0.50
Program	14,909,076	17,469,070	1.17	10,899,596	0.62

Table 37. Utility-Specific Evaluation-Adjusted Net kWh and Estimated kW Impacts for PY1

Utility	Ex Ante Gross kWh	Ex Post Gross kWh	Realization Rate	Net kWh	NTGR (ex post gross)	Net kW
Ameren	3,023,432	4,204,312	1.39	2,640,635	0.63	358

3.2 Process

The process component of the Standard Incentives program evaluation focused on program implementation, program design and processes, marketing and outreach, and participant satisfaction. Data sources for the process component include a review of program materials, an in-depth interview with the program manager, and a telephone survey with 50 program participants. Of the survey respondents, 35 are in ComEd's service territory and 15 are in Ameren's service territory.

3.2.1 Program Theory and Logic Model

This section contains the program theory, logic model, and performance indicators of the Standard Incentives 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.

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 and 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.

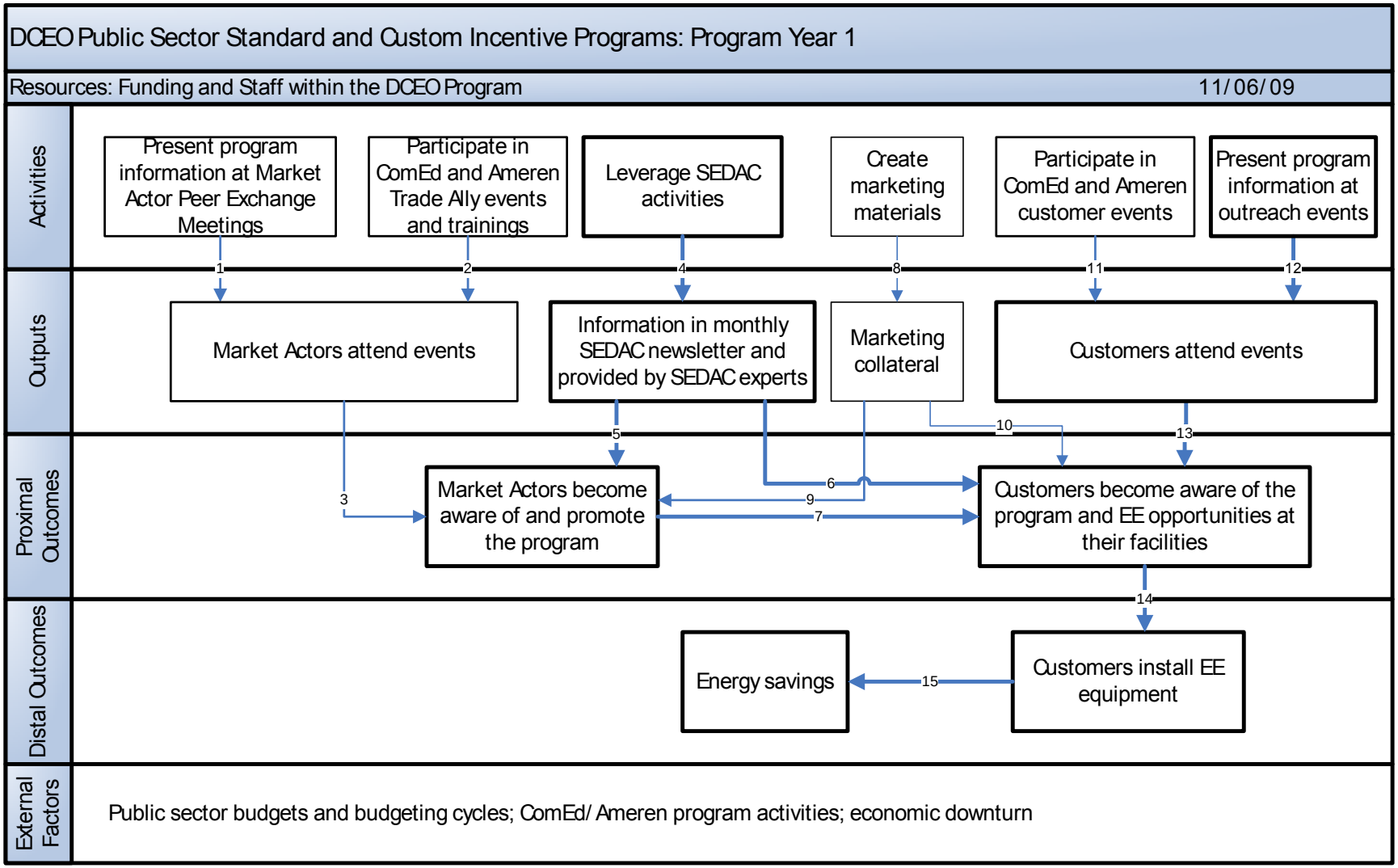
When thinking about how to write each of the performance indicators, we asked ourselves "What might we look at to judge whether the link description actions are occurring" and wrote the answer as the performance indicator.

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 that 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 2. Preliminary Logic Model



Notes: Thicker lines indicate a greater emphasis of activity in program implementation.

Table 38. Performance Indicators Table

Link	Description of Link	Potential Performance Indicator	Potential Success Criteria for Performance Indicator	Evaluator Data Collection Activities Associated with Link
1	DCEO hosts bi-annual "Peer Exchange" meetings for Market Actors. These events provide a venue for program staff to inform Market Actors about the PSEE program.	1. Number of Peer Exchange meetings where program are discussed	1. 2 Peer Exchange meetings per year.	1. Program documentation
2	DCEO participates in ComEd and Ameren's trade ally events and trainings. These events provide a venue for program staff to inform Market Actors about the PSEE program.	1. Percent of ComEd/Ameren events and trainings attended	1. DCEO staff attends 75% of ComEd and Ameren events and trainings	1. Program documentation
3	Market Actors are not aware of the program or the EE opportunities it offers. The information provided in the events increases Market Actor awareness and knowledge of the program and allows them to promote them more effectively to their customers.	1. Percent of Market Actors who attended Peer Exchange meetings who found information about the program useful 2. Percent of Market Actors who think information helps them to promote the program 3. Percent of Market Actors who attended ComEd/Ameren event who found information about the program useful 4. Percent of Market Actors who think information helps them to promote the program	1/3. 75% of Market Actors who attended an event found it informative 2/4. 75% of Market Actors who attended an event say it helped them promote the program	1. Survey of Market Actors who attended an event - not conducted for PY1
4	Through the Smart Energy Design Assistance Center (SEDAC), the PSEE program have access to an established network of market actors. DCEO leverages this network to inform market actors of program offerings. By using this existing network, DCEO has a captive audience that can be informed of program offerings.	1. Number of SEDAC newsletters with a focus on EE technologies and/or program offerings 2. Percent of SEDAC staff knowledgeable about the program	1. 6 newsletters with PSEE program content 2. 100% of SEDAC staff is knowledgeable about the program	1. Review of SEDAC newsletters 2. Interview with SEDAC staff - not conducted for PY1
5	Market Actors are not aware of the program or the EE opportunities it offers. The information provided through SEDAC increases Market Actor awareness and knowledge of the program and allows them to promote them more effectively to their customers.	1. Percent of Market Actors who are part of the SEDAC network who heard about the program through SEDAC 2. Percent of Market Actors who heard about program through SEDAC who think information helps them to promote the program	1. 75% of Market Actors who are part of the SEDAC network recall hearing about the program through SEDAC 2. 75% of Market Actors who heard about program through SEDAC say information helped them promote the program	1. Survey of Market Actors - not conducted for PY1
6	Customers are not aware of the program or the EE opportunities it offers. The information provided through SEDAC increases customer awareness and knowledge of the program and of energy efficiency opportunities at their facilities.	1. Percent of customers who have used SEDAC services who were informed of the program	1. 75% of customers who used SEDAC services recall hearing about the program through SEDAC	1. Participant & Non-participant surveys (NP survey was not conducted for PY1)
7	Customers are not aware of the program or the EE opportunities it offers. They learn about the program and the available	1. Percent of Market Actors who promote the program to their customers 2. Percent of customers who were informed	1. 50% of Market Actors who are aware of the program promote them to their customers 2. 25% of customers report having heard	1. Survey of Market Actors - not conducted for PY1 2. Participant & Non-participant surveys (NP

Link	Description of Link	Potential Performance Indicator	Potential Success Criteria for Performance Indicator	Evaluator Data Collection Activities Associated with Link
	incentives from their Market Actor.	of the program by a Market Actor	about the program from a Market Actor	survey was not conducted for PY1)
8	DCEO creates and distributes marketing materials (including a website and program brochures) that provide information on EE technologies and program offerings.	1. Marketing materials are effective 2. Number of website hits	1. Marketing materials provide information and contain messages that will induce customers to participate 2. 25% increase in website hits year to year	1. Review of marketing materials 2. Program documentation
9	Market Actors 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 Market Actors who have seen marketing material 2. Percent of Market Actors who found marketing material useful	1. 10% of market actors report having seen marketing materials 2. 75% of market actors who have seen marketing materials found it useful	1/2. Market actor interviews - not conducted for PY1
10	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)
11	DCEO participates in ComEd and Ameren's customer events. These events provide a venue for program staff to inform customers about the PSEE program.	1. Percent of ComEd/Ameren events attended	1. DCEO staff attends 75% of ComEd and Ameren events	1. Program documentation
12	DCEO participates in outreach events including presentations at public sector associations. These events provide a venue for customers to find out about program opportunities.	1. Number of events attended	1. 8-12 events attended by a representative of DCEO	1. Program documentation
13	Customers are not aware of the program or the EE opportunities it offers. They attend the outreach events and learn about the program and the available incentives.	1. Percent of customers who attended a ComEd/Ameren event who found information about the program useful 2. Percent of customers who attended an outreach event who found information about the program useful	1/2. 75% of customers who have attended an event found the information useful	1/2. Survey of customers who attended an event - not conducted for PY1
14	Public sector 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. Products offered through the program are desired by public sector customers 2. Incentive offered will induce customers to install promoted products 3. Number of projects	1. 75% of public sector customers desire products offered 2. 75% of customers believe incentives are "good deal" 3. 20% increase in participants year to year	1/2. Participant & Non-participant surveys (NP survey was not conducted for PY1) 3. Program documentation
15	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 PY1 over 100 customers conducted more than 150 projects that accounted for 14.9 GWh of ex-ante gross savings.[6] Municipal governments and K-12 schools account for the majority of participants (88%), projects (76%), and ex ante gross energy savings (67%). Universities account for 19% of energy savings but only for 6% of projects. Projects in this sector tend to be larger (on average 321 MWh) than in the other sectors (on average 96 MWh). In the Federal government, one participant implemented 14 small lighting projects.

Table 39 summarizes the distribution of PY1 participants, projects, and energy savings by sector.

Table 39. Distribution of Participants, Projects, and Savings by Sector

	Participants		Projects			Ex Ante Savings		kWh/ Project
	#	%	#	%	Projects/ Participant	kWh	%	
Municipal Government	55	52%	60	39%	1.1	5,746,076	39%	95,768
K-12 Schools	37	35%	58	37%	1.6	4,249,610	29%	73,269
Federal Government	5	5%	19	12%	3.8	889,676	6%	46,825
Universities	4	4%	9	6%	2.3	2,888,512	19%	320,946
Community Colleges	4	4%	9	6%	2.3	1,135,202	8%	126,134
TOTAL	**105**		**155**		**1.5**	**14,909,076**		**96,188**

Source: DCEO Tracking Database.

In PY1, 91% of all projects included one or more lighting measures, while 5% of projects included a chiller or HVAC measure and 11% included a VSD or motor.[7]

3.2.3 Program Design and Processes

DCEO's Standard Incentive program includes new lighting, cooling, refrigeration, and motor equipment upgrades for Illinois' public sector customers. Many aspects of the program, including the type of measures and incentive levels, were based on the ComEd Business Prescriptive Program. Choosing a similar program design was intended to reduce potential confusion among market actors involved in implementing program projects and also made program roll-out easier for DCEO staff.

Overall, participants appear to be satisfied with the program and the processes in which they are involved. Participants provide high ratings for a variety of program components (see also Section 3.2.7), and only 6% (or three interviewed participants) reported that they experienced problems during the participation process. Issues included the process taking too long and difficulty in obtaining program information.

[6] 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.

[7] Some projects included multiple end-uses; as a result, the percentages sum to more than 100%.

Application Process

The application process includes both a pre-approval and final approval application. While a pre-approval application is only required for permanent lamp removal and T8/T5-fixture lighting retrofit projects, it is generally completed for all standard projects. Program guidelines stipulate that projects must be completed within 90 days of pre-approval. However, this deadline is sometimes extended because pubic projects tend to take longer than 90 days to complete. . Program participants must submit the final approval application within 60 days of project completion.

A majority of participants (76%) fill out the initial program paperwork themselves. Of these customers, nearly all feel that the pre-approval application clearly explains the program requirements and participation process (95%) and rate the application process as easy (63%).[8] Those that rate the process as difficult most often note that they received inconsistent information regarding participation status and that the participation process generally takes too long. Only 14% think the paperwork is too burdensome.

Similarly, 86% of participating customers report filling out the final application themselves, and most of these customers (86%) rate the final application process as easy.

The application process allows multiple projects to be incorporated into a single grant. This results in inconsistencies within the program tracking database, particularly when diverse measures are bundled within a single project, and presents difficulties for program evaluation and tracking. (See also Section 3.1.2 Tracking System Review.) Going forward, the program may wish to consider clarifying the definition of a project in application materials and requesting that applicants fill out a separate application for each unique site.

The payment process for incentives of $10,000 or more must meet several accounting and legal requirements before payment can be made to the customer. These requirements can cause the process to take several months from the time a completed final application is received to the time that the incentive is paid to the customer. Because pre-approval applications are not required for most standard incentive projects, the program could end up having to process multiple applications for $10,000 or more that they were unaware of. This occurred at the end of PY1 and created a back-log in incentive processing. The program should consider requiring pre-approval applications for all projects with an incentive of $10,000 or more in order to allow program staff to prepare for the extra time needed to process these payments. This includes any projects that are bundled into a single grant or rebate incentive payment.

Incentive Cap

During PY1, participants were subject to an incentive cap of $100,000 per location. For PY2, this cap has been raised to $200,000. The incentive cap is in place to reduce the possibility of one entity receiving an undue share of the incentive pool.

The program exercised a certain amount of flexibility in enforcing the incentive cap during PY1, allowed incentives greater than $100,000 if the entity had multiple projects. This is appropriate for a new program that did not exhaust its incentive funds in its first year. However, concentrating too much incentive money in a single project or a single customer carries risk for program savings (if the customer is found to be a free-rider) and for the on-going success of the program.

[8] 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."

Customer Service

The Standard Incentive program manager fields any program-related questions from participants. Fifty-four percent of participants report calling DCEO program staff during the participation process. All of the participants who called DCEO were satisfied with the answers they received to their questions.

3.2.4 Program Implementation

The PSEE Incentive programs do not have an implementation contractor. Instead, the program manager is responsible for most aspects of implementation, with limited additional support from other DCEO staff for activities such as project inspections and outreach. Given the limited funding and staffing, implementation of the Standard Incentive program relies heavily on existing delivery channels such as the Smart Energy Design Assistance Center (SEDAC) and outreach activities by the ComEd and Ameren C&I Incentive programs. This approach is both cost-effective (given the limited program resources) and practical (given the overlap in market actors between the PSEE and the utility programs). However, relying on ComEd's and Ameren's outreach activities also means limited control over the content, timing, and frequency of messages being sent. This became a problem for the program in PY1, when the ComEd program became oversubscribed. ComEd ended much of its program promotion, and market actors mistakenly thought that incentive money had also run out for public sector projects, negatively affecting the PSEE program.

Going forward, the program should continue to leverage existing delivery channels currently used to promote the program. However, the program should also consider ways to differentiate itself from the utility programs and to more independently reach out to key parties such as trade allies and account managers.

SEDAC Network

SEDAC provides technical services to private and public facilities in Illinois in order to help them increase their economic viability through the efficient use of energy resources. In support of this mission, SEDAC maintains a network of energy service providers and sends out a monthly electronic newsletter to more than 3,000 market actors and potential customers. SEDAC is sponsored by DCEO in partnership with ComEd and Ameren Illinois Utilities.

The Standard Incentives program is making good use of SEDAC's existing network of experts and communication channels. For example, the program holds outreach events at SEDAC and includes program information in the monthly newsletters, and SEDAC experts include the PSEE programs in their recommendations as part of the technical services they provide to customers. The ability to leverage SEDAC to promote PSEE programs is facilitated by the fact that the manager of the Standard Incentive Program also manages the Smart Energy Design Assistance Program, with which SEDAC is affiliated.

The importance of SEDAC, its outreach activities, and its network of experts to participation in the Standard Incentive Program could not be fully explored in our evaluation efforts for PY1. However, interviews with program participants showed that 24% of participants had heard about the program through the SEDAC newsletter (53% of participants in Ameren's service territory and 12% of participants in ComEd's service territory). Participants generally do not know whether their contractor was affiliated with SEDAC (53%) and do not place high importance on affiliation with an electric utility program (only 28% provide an importance rating of 7 or higher on a scale from 0 to 7).

The program should continue its use of SEDAC in promoting the Standard Incentives program. Future evaluation efforts should more fully explore additional opportunities of leveraging SEDAC to increase program participation.

ComEd and Ameren Trade Ally Networks

The C&I incentive programs implemented by ComEd and Ameren rely heavily on trade allies to promote the programs to their customers. The PSEE programs leveraged this relationship in PY1 by participating in outreach and training events for ComEd and Ameren trade allies. According to the PSEE program manager, coordination of outreach activities with the utilities waned over the course of PY1. In addition, the oversubscription of the ComEd program indirectly hurt the PSEE program as ComEd curtailed its promotion and market actors mistakenly thought that incentive money had also run out for public sector projects.

In PY1, contractors played an important role in promoting the Standard Incentive program: 50% of participants report having discussed the Standard Incentives program with a contractor or trade ally, and 20% name a contractor or trade ally as the first source of information about the program. As a result, successful coordination of promotional messages to ComEd and Ameren trade allies is key to the growth of the PSEE programs. Program staff should try and make this a priority in future program years. This is particularly important if the utility programs become oversubscribed again in PY2.

In addition to closer coordination, the program should also try to differentiate itself from the utility programs and more independently reach out to trade allies. This could be done through independent communication with contractors registered with Ameren and ComEd and would allow the program to provide its own messaging at times when the utility programs might no longer need to advertise their programs.

Account Managers

DCEO recognizes that utility account managers can be a valuable resource for promoting incentive programs as they have established relationships with targeted customers. In the case of the PSEE programs, both Ameren and ComEd's account managers could be more fully utilized to market program opportunities to customers in the public sector. Early in PY1 DCEO conducted a webinar for account managers and presented on the public sector as part of the utility's roll out to account managers on all program efforts. DCEO fields calls from account managers.

Despite the absence of any formal marketing through utility Account Managers, program participants report involvement of Account Managers during PY1:

- 44% of program participants report having a utility account manager, and an additional 8% are not sure;
- Of participants with a utility account manager, 55% report receiving assistance with implementing the project from their account manager;
- Of participants with an Account Manager, 50% have discussed the program with an Account Manager; and
- Of participants with an Account Manager, 14% first heard about the program from an Account Manager.

As with trade allies, the program should make an effort to more closely coordinate Account Manager activities with the utilities and try to ensure that correct information about the status of the PSEE programs is provided to customers, even if the utility programs become oversubscribed.

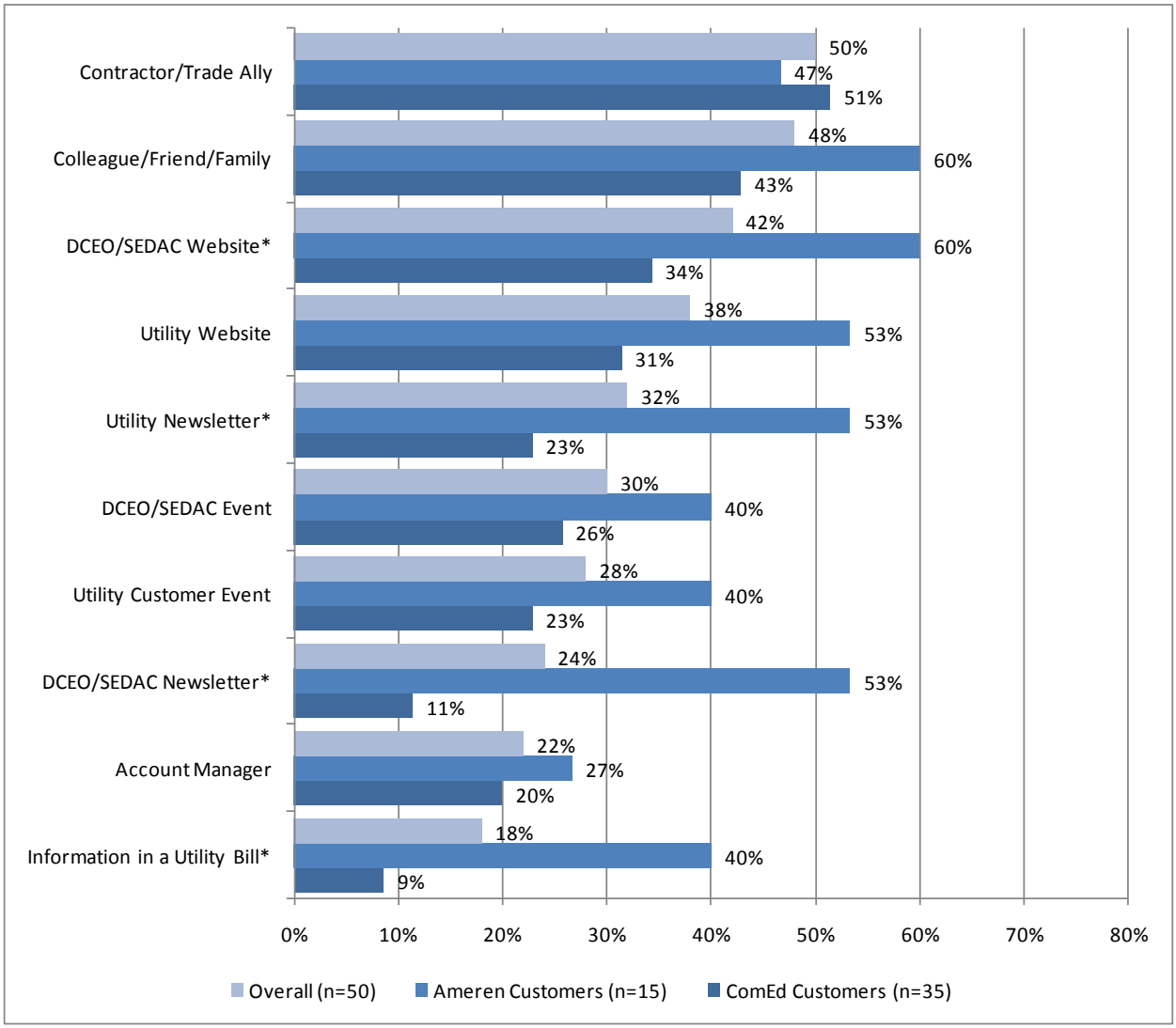
3.2.5 Program Marketing & Outreach

In PY1 DCEO assigned one full time staff person to focus on marketing for all PSEE programs. In addition to this full time staff member, other program staff participated in marketing activities as part of their normal job duties. As discussed in Section 3.2.4, the program leveraged the SEDAC network both by making use of the SEDAC electronic newsletter to inform market actors and potential participants of program opportunities and by including program opportunities in SEDAC's recommendations. In addition, DCEO held two "peer exchange" meetings where program opportunities were presented to market actors, and DCEO staff also attended many of ComEd and Ameren's market actor and customer events. It is important to note that public sector customers would also have been exposed to any utility-sponsored marketing of ComEd's Smart Ideas for Your Business and Ameren's Act On Energy programs. In addition, any public sector customer who inquired about participation in the utility programs should have been referred to DCEO's Public Sector Efficiency programs.

Participants recall hearing about the program through a number of different channels. The top three sources of program information are a contractor or trade ally (50%), a colleague, friend or family member (48%), and the DCEO/SEDAC website (42%). In addition, market actors were most often named as the *first* source of information about the program (26% of participants named a supplier, distributor or vendor, and 20% named a contractor or trade ally).

Figure 3 summarizes participant responses about program information sources (questions were prompted). Notably, customers in Ameren's service territory are more likely than customers in ComEd's service territory to have heard about the program through electronic and direct mail efforts such as the DCEO or SEDAC website, a utility or SEDAC newsletter, or a bill insert.

Figure 3. Sources of Information about the Public Sector Electric Efficiency Program

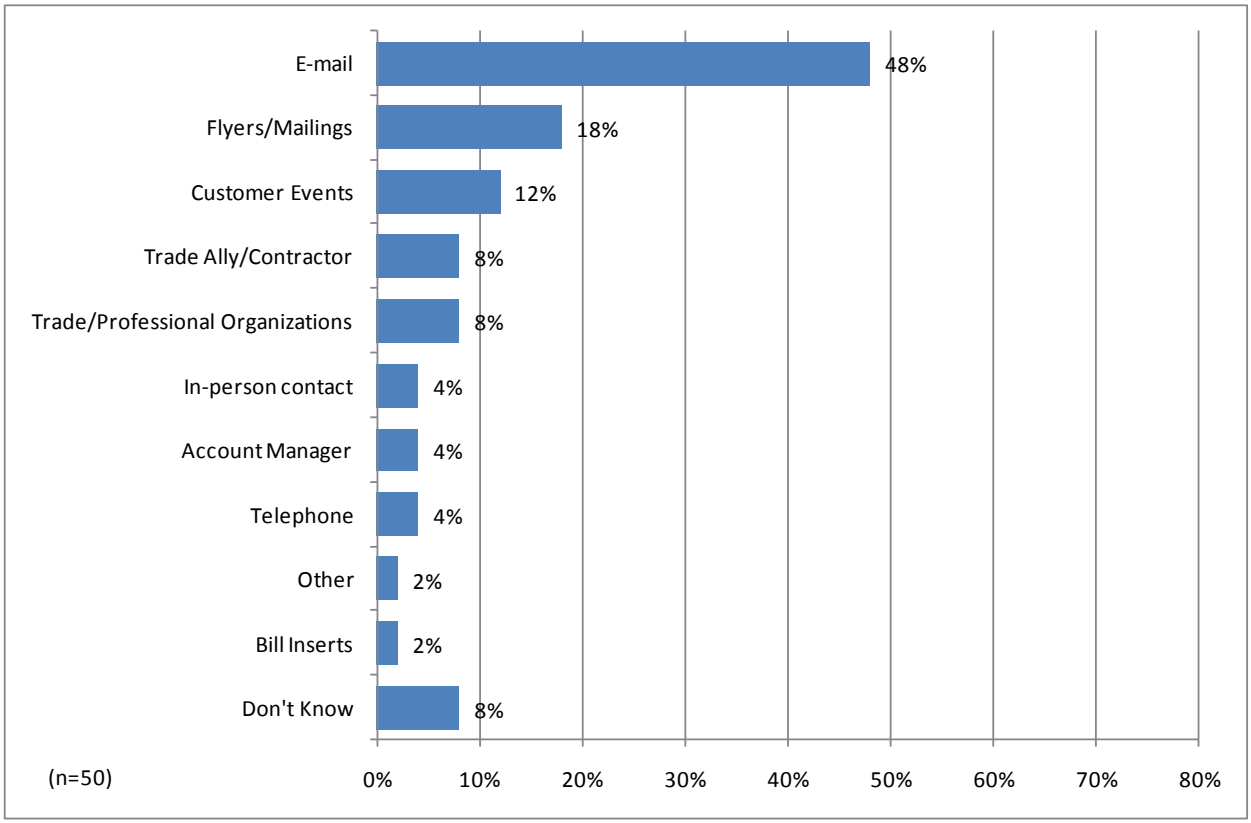


** Participants from Ameren's service territory were more likely than participants from ComEd's service territory to have heard of the program via this information source.*
Source: Participant Survey.

In addition to recalling program marketing materials, all but one interviewed participant also found the materials to be useful.

Participants overwhelmingly prefer to be informed about opportunities such as the PSEE incentive programs by e-mail (48%), followed by flyers/mailing (18%) (see also Figure 4). DCEO currently uses e-mail when distributing its monthly SEDAC newsletters. The program may wish to consider expanding its use of e-mail for recruiting new participants into the program. If e-mail addresses are not already available, they could be compiled from public entities' websites. While this requires labor to complete, it is a task that could be delegated to a lower level staff member or an intern. Alternatively, this effort could be limited by focusing on only one or two sectors that have been hard to reach through other channels.

Figure 4. Preferred Methods of Contact
(Multiple Response)



Source: Participant Survey.

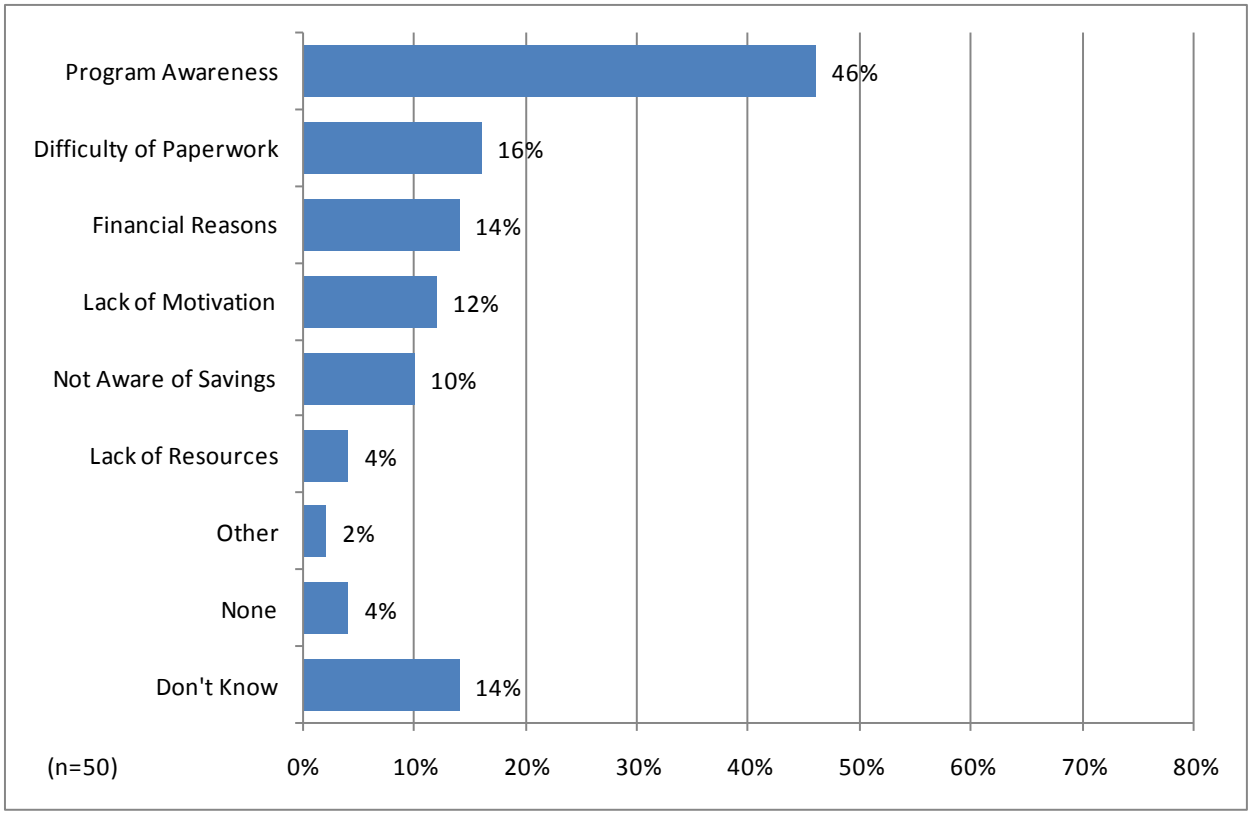
As noted above, public sector customers are also exposed to any utility-sponsored marketing of ComEd's Smart Ideas for Your Business program and Ameren's Act on Energy program. While this additional marketing is helpful, given the limited staff and budget of the DCEO program, it can be problematic if the message delivered by ComEd and Ameren is in conflict with the message of the DCEO program. This occurred during PY1 when both ComEd and Ameren's standard incentive programs were oversubscribed while the PSEE program still had funds available causing some confusion among contractors and potential PSEE participants regarding the availability of program funds. As recommended above, closer coordination with the promotional messages from the utilities should be a priority of the program.

3.2.6 Barriers to and Benefits of Participation

Public sector entities face unique barriers to participation in programs like the Standard Incentive Program. One major barrier, noted by the program manager, is the length of the budget planning process for many public sector entities. In many cases, public sector budgets are written and approved months and even years in advance. According to the program manager, this might have presented a barrier to participation for schools in PY1, as they often implement capital projects during the summer months but had their budgets set several months before the program launched. In future program years, this barrier should decrease as public sector customers are aware of the program and can therefore factor participation into their budgeting process. However, long budget planning cycles also require certainty that the program will be there and funds will be available.

A full assessment of barriers to participation was not possible for this evaluation as interviews with non-participants and market actors were not conducted. However, in order to get a sense of potential barriers, participants were asked about their views of why other customers might not participate in the program. The main reason given was program awareness (46%) (see Figure 5). Given that the program fell short of its PY1 program goals, examination of barriers to participation should be an evaluation priority for the next evaluation cycle.

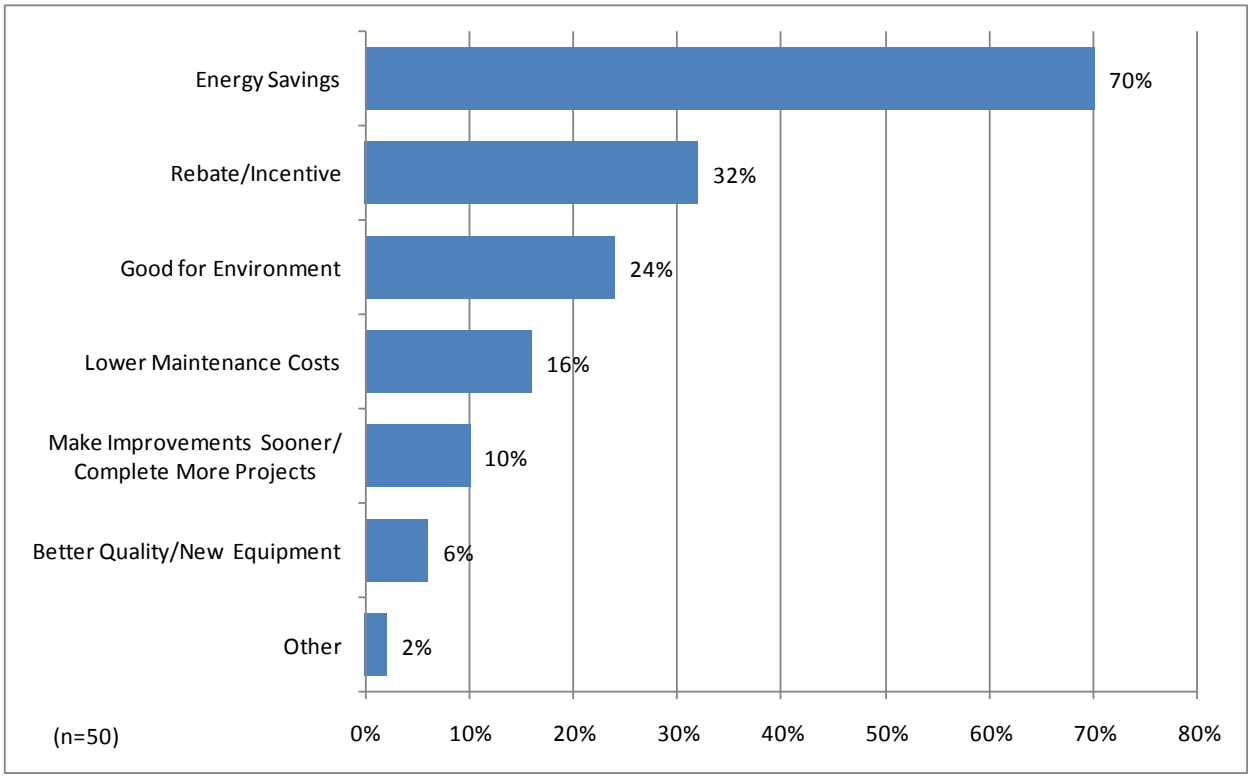
Figure 5. Barriers to Participation
(Multiple Response)



Source: Participant Survey.

Finally, participants were asked what they considered to be the main benefits of participating in the program. Overwhelmingly, participants cite energy savings as a program benefit (70%). All other benefits are mentioned by less than a third of participants (see Figure 6).

Figure 6. Benefits of Program Participation
(Multiple Response)



Source: Participant Survey.

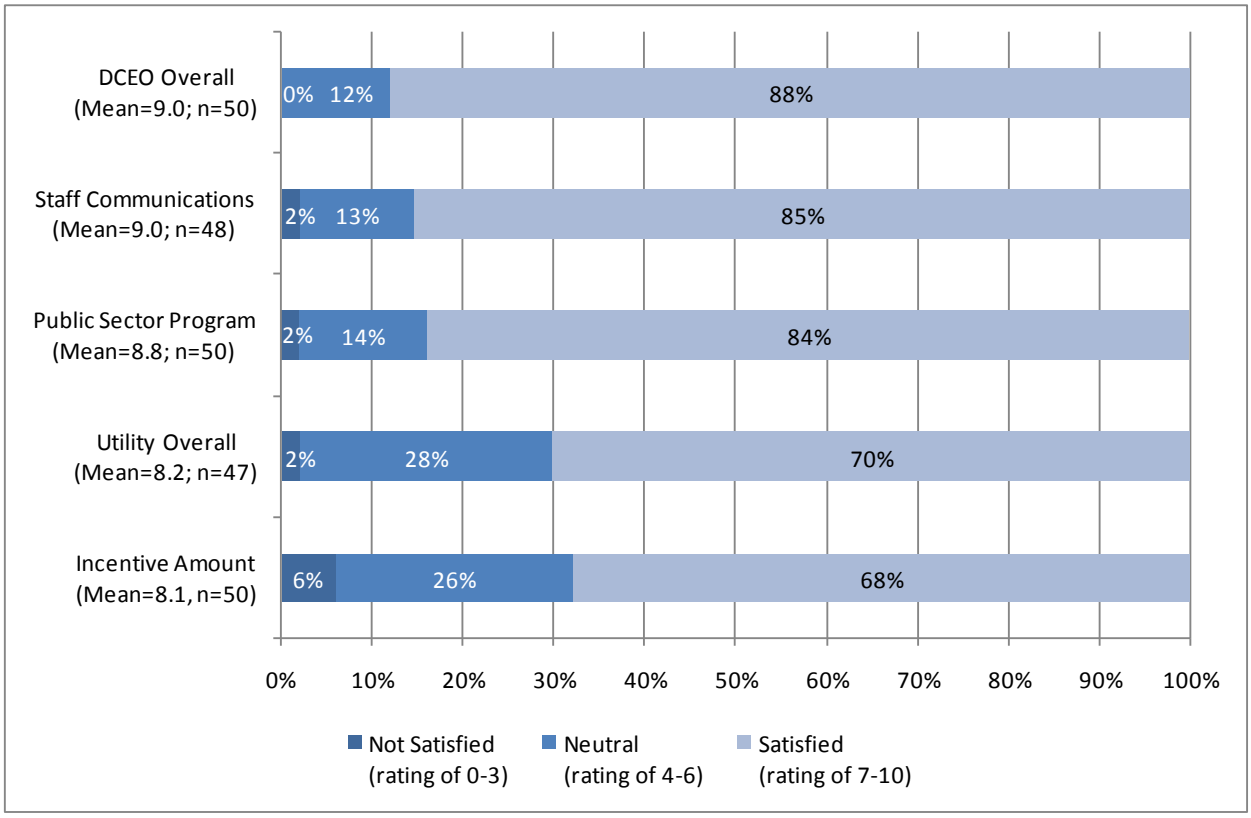
Information on both potential barriers to and benefits of participation should be utilized when planning messaging for future marketing efforts.

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. Satisfaction is highest with DCEO overall, staff communications, and the Public Sector program overall. The lowest satisfaction is reported for the incentive amount, but 68% were still satisfied with the amount. Figure 7 summarizes participant satisfaction with the various aspects of the program. Given the limited budget and staff associated with the PSEE program, these satisfaction scores are impressive and the program staff should be commended for maintaining high customer satisfaction with the program.

Importantly, the high level of customer satisfaction is also evident in the fact that 80% of participants are planning to participate in the Standard Incentive program again in the future.

Figure 7. Program Satisfaction



Source: Participant Survey.

When asked about recommendations to improve the program, 18% of participant did not have any suggestions. Recommendations most often mentioned higher incentives (36%) and better program information (22%).

3.3 Cost Effectiveness

This section addresses the cost effectiveness of the Public Sector Standard 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."[9]

For the DCEO Ameren programs, assessment of cost-effectiveness begins with a valuation of each conservation program's net "total resource" benefits, as measured by the electric avoided costs, total incremental costs of measures installed, and administrative costs associated with the program. A program is deemed cost-effective if its net "total resource" benefits are positive, i.e.,:

$$\frac{Total\ Resource\ Benefits}{Total\ Resource\ Costs} \geq 1$$

where,

$$Total\ Resource\ Benefits = \text{PV}\left(\sum_{year=1}^{measurelife}\left(\sum_{i}^{i=8760}(impact_i \times avoidedcost_i)\right)\right)$$

and,

Total Resource Cost = PV (Incremental Measure Costs + Utility Costs).

Benefits used in the TRC test calculation include the full value of time and seasonally differentiated generation, transmission and distribution, and capacity costs and also take into account avoided line losses. For each energy-efficiency measure included in a program, hourly (8,760) system-avoided costs were adjusted by the hourly load shape of the end use affected by the measure to capture the full value of time and seasonally-differentiated impacts of the measure. Evaluated impacts were provided to AIU for the DCEO program. End-use load shapes were also employed in calculating peak load impacts for energy-efficiency measures in AIU programs. To calculate the peak load impacts from energy-efficiency measures, end-use load shapes were used to identify the average reduction in demand over AIU's top hours defined as summer weekdays from 3 p.m. until 7 p.m. Non-energy benefits such as water savings were not factored into the calculation. Additionally, consistent with The State of Illinois Commerce Commission Order 07-0539 ("the Order") Section 12-103(f)(5), gas benefits were not accounted for under the program.

Future benefits for the TRC are discounted by 9% based on Ameren's weighted average cost of capital (WACC). Benefits are also adjusted for line losses. Annual avoided costs were adjusted to an hourly stream of costs using hourly system load data to capture seasonality and pricing differences. Consistent with the Order, avoided costs include estimates for financial costs associated with legislation and regulation related to greenhouse gas emissions. The carbon costs are introduced in the 2014 (Program Year 6) costs, valued at $15 per ton.

The cost component of the analysis considered incremental measure costs and direct utility costs. Incremental measure costs are the incremental expenses associated with installation of energy-efficiency measures and ongoing operation and maintenance costs, where applicable. These costs include the incentive as well as the customer contribution. Utility costs include any customer payments and the

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

expenses associated with program development, marketing, delivery, operation, and evaluation, or monitoring and verification (EM&V).

Table 40 summarizes the unique inputs used to assess the TRC ratio for the Public Sector Standard program in PY1. Most of the unique inputs come directly from the evaluation results presented previously in this report. DCEO administration, implementation and other costs come from the budgets filed as part of the 2008 DCEO Energy Efficiency Plan.[10] Incentive costs come from the DCEO program tracking data. Avoided costs for both demand and energy match what was used by AIU for assessing the TRC ratio of their own energy efficiency projects. Avoided costs include estimates for financial costs associated with legislation and regulation related to greenhouse gas emissions. The carbon costs are introduced in the 2014 (Program Year 6) costs, valued at $15 per ton.

Table 40. Inputs to TRC Assessment for Public Sector Standard Program

Item	Value
Measure Life (years)	15
Participants	1
Annual Gross Energy Savings (MWh)	4,204
Gross Coincident Peak Savings (MW)	.568
Net-to-Gross Ratio	63%
DCEO Incentive Costs	$473,834
Participants Contribution to Incremental Measure Costs	$141,108
DCEO Administration Costs	$51,892

Based on these inputs, the TRC for this program is 2.56 and the program passes the TRC test.

[10] Exhibits 1.2 through 1.10 in DCEO testimony filed in Docket Nos. 07-0539 and 07-0540.

4 CONCLUSIONS AND RECOMMENDATIONS

This section highlights the findings and recommendations from the PY1 evaluation of DCEO's Public Sector Electric Efficiency Standard Incentives program. The primary objectives of this evaluation were to quantify the gross and net energy impacts resulting from the rebated measures and to assess program theory, marketing, and delivery. Below are the key conclusions and recommendations.

4.1 Conclusions

The data collected for evaluation of the PY1 Standard Incentives program was gathered during a number of activities including tracking data analysis, an in-depth phone interview with the program manager, a participant phone survey, and engineering review of default savings assumptions and project files. Following are the key conclusions drawn from those activities.

4.1.1 Program Impacts

Default Savings Review

In developing default savings for measures, DCEO relied mainly upon ComEd's documentation because of the matching measure lists, although some measures use default assumptions developed by Ameren. With only a few exceptions, ComEd's default savings values, both kW and kWh, are well documented, reasonable, and conservative in the savings they claim. For most measures, DCEO kWh per unit savings assumptions match ComEd's exactly for the four building types that DCEO uses to differentiate savings assumptions.

Some measures have significant differences from the ComEd defaults. DCEO appears to have used an early version of ComEd assumptions that contained errors. Assumptions for icemakers and motor savings appear to have been taken from Ameren, and our review of those values identified a need for corrections. The DCEO discrepancies are both higher and lower than the ComEd assumptions we judged to be reasonable. As a result, DCEO is introducing inaccuracies into their program tracking savings.

DCEO default savings are differentiated by four building types from the ComEd assumptions: College/University, Medical, Office, and K-12 School. To generate savings for tracking, DCEO must select one of these four building types to represent the project. These four options do not capture the diversity of operations we encountered in the engineering review process. For example, many public sector buildings are occupied continuously all year. Early K-12 grades typically have lower operating hours than high schools. When we encountered a DCEO default value in the engineering file review process that we concluded should be revised, the savings for the measure were adjusted either higher or lower.

It was necessary for ComEd and Ameren to rely heavily on secondary data when they developed PY1 default values. Much of the secondary data is from California, where program efforts are mature and the climate is substantially different. We found reason to revise energy savings relative to default values for many of the installed measures reviewed during the engineering review process for the PY1 gross impact evaluation.

Tracking System and Project Documentation

To support the impact evaluation, the evaluation team was given access to DCEO's spreadsheet based tracking system. The evaluation team found the DCEO tracking system had limited functionality and lacked important detail data. We found it difficult to verify the data

There were a number of challenges and data anomalies that the evaluation team encountered in the task of analyzing data and drawing samples. We found several instances of wrong values or wrong links that affected tracking savings. One particular challenge is that in some cases, multiple building sites were included in one project, while other times each site had a separate project ID. Lacking site identification limits our ability to construct samples, conduct surveys, and analyze impacts that isolate specific end-uses, measures, and building types.

Project documentation files (application forms, measure documentation, invoices, inspection reports, etc.) are maintained in hard copy at DCEO offices. To conduct our engineering reviews, it was necessary to go on-site at DCEO and scan paper files into PDFs. We found the hard copy files were well maintained by DCEO staff.

Gross Impacts

The PY1 evaluation found that verified gross impacts were higher than the savings recorded in DCEO's tracking system. The PY1 Standard Incentives program had a realization rate on tracked energy savings of 1.17. The relative precision at a 90% confidence level for the program kWh Realization Rate was ± 10%.

As noted in the default savings review, ComEd's default savings assumptions were generally conservative in their savings claims. In addition, several of DCEO's default savings apparently used an early version of draft ComEd assumptions that underestimated energy savings for key T8 measures and HVAC VSDs. Through use of data from the phone survey and engineering review, several of the lighting measures received hours of use increases relative to default assumptions that increased the energy realization rate, although some hours of use were also lowered.

While the realization rate for the PY1 program is greater than 1, some of this "higher than expected savings" was due to errors in default assumptions and the tracking system that underestimated the tracking savings. Documentation on some large projects did not allow us to confirm all installed quantities or that all equipment met the qualifying criteria without follow-up verification from the site or site contact, resulting in some reductions to tracked savings. These areas require attention to improve the estimation and tracking of energy savings.

Smaller projects (those in strata 3) tended to have much higher realization rates than larger projects. The smaller projects received increases for hours of operation and included measures that DCEO's defaults had underestimated. Tracking errors that added savings showed up in the smaller projects group as well.

Net Impacts

The PY1 Standard Incentives program had an evaluated Net-to-Verified Gross ratio of 0.62 for energy savings at a relative precision of ± 3% with at the 90% confidence level.

The lower NTG ratio can be traced mainly to two issues: 1) respondents who learned about the program after they decided to implement the measure, and 2) respondents who claimed they would have installed exactly the same equipment at the same time (or within 6 months) in the absence of the program. DCEO's NTG score was raised by the strong influence of various program components (rebates,

recommendations, and program materials) on customer decisions, where 72% of respondents gave a score that translates to 0.8 to 1.0 for that component of the NTG score (weighted one-third of overall score).

The phone survey data identified 13 of 50 respondents (26%) who reported learning about the program AFTER they had decided to implement the measure, reducing their NTG ratio. This result is consistent with a concern that some public sector participants had previously approved facility improvement plans prior to the start of the program. In general, these respondents had high free-ridership scores in all categories, but the projects tended to be smaller so the kWh-weighted impact on program NTG ratio is lessened. HVAC projects were more likely than lighting to have pre-approved implementation plans, especially chiller projects. This may be expected given the lead time required to replace a chiller, the advance warning often given by increasing maintenance costs, and the importance of avoiding emergency failure.

Although the NTG ratios for federal facilities and community colleges were substantially lower than the mean (0.50 and 0.51 versus 0.62) the results are not significant due to the low response rates in those two public sector types.

The PY1 evaluation found strong evidence of spillover in 8% of phone survey respondents (4 of 50). Among the 4 strongest spillover candidates, the potential spillover measures identified were T8 lamps (2 projects), VFD on HVAC motors, chiller, and outdoor air optimizing controls

Program participation and net impacts were highly concentrated in large projects, in certain public sectors (K-12 Schools and Municipal), and in lighting measures. The 15 larger projects of strata 1 and strata 2 provided 53% of the net program savings, while 47% of net savings was captured by the 140 smaller projects. Municipal projects and K-12 schools provided 70% of net energy savings by building type. Lighting was a measure in 91% of projects.

As goals increase it may be necessary to expand efforts in additional measures, end-uses, and public sector types. That they have not shown up in the first year is an indication that these other markets could be more challenging to bring into the program. This suggests proactive efforts need to begin in advance of the time that savings are needed to meet goals.

4.1.2 Program Processes

Program Participation

The Public Sector Electric Efficiency Standard Incentive program was well received in PY1. Over 100 public sector customers conducted more than 150 projects that accounted for 14.9 GWh of ex-ante gross savings. Lighting measures accounted for a majority of projects and savings – a typical observation for a new standard incentive program. Municipal governments and K-12 schools account for the majority of participants, projects, and ex ante gross energy savings in PY1, with less participation from federal government and community colleges and universities.

While the program did not meet its savings goals for PY1, the program built a good foundation for future program years, especially given its limited resources. Examination of barriers to participation will be an evaluation priority for the next evaluation cycle.

Customer Satisfaction

Customer satisfaction with various processes and components of the program was high, and few participants reported encountering problems during their participation. Participants provided the highest ratings for the PSEE program, staff communications, and DCEO overall. Participants were less satisfied with the incentive amounts than with other program components. Some customers noted issues with the length of the participation process and the availability of program information. When asked to suggest program improvements, participants most often cite higher incentives and better program information.

Incentive Cap

The program design included a $100,000 incentive cap per location in PY1 (this was raised to $200,000 for PY2). During PY1, the program exercised a certain amount of flexibility in imposing the incentive cap, allowing incentives greater than $100,000. While this is appropriate for a new program that did not exhaust its incentive funds in its first year, concentrating too much incentive money in a single project or a single customer carries risk for program savings (if the customer is found to be a free-rider) and for the on-going success of the program.

Application Process

The application process does not appear to clearly define what constitutes a "project," resulting in some participants including multiple sites or locations in a single application. This results in inconsistencies within the program tracking database, particularly when diverse measures are bundled within a single project, and presents difficulties for program evaluation and tracking.

The payment process for incentives of $10,000 or more must meet several accounting and legal requirements before payment can be made to the customer. These requirements can cause the process to take several months from the time a completed final application is received to the time that the incentive is paid to the customer. Because pre-approval applications are not required for most standard incentive projects, the program could end up having to process multiple applications for $10,000 or more that they were previously unaware of. This occurred at the end of PY1 and created a back-log in incentive processing.

Implementation

The assigned program staff targeted their efforts at core activities related to processing applications, participant implementation assistance, inspections, and marketing. While the program has achieved significant savings in PY1, it did not meet its goals. Future growth of the program and attainment of program goals will require additional resources (staff and dollars) to expand the depth and breadth of program activities undertaken.

Implementation of the Standard Incentive program relied heavily on existing delivery channels such as SEDAC and outreach activities by the ComEd and Ameren C&I Incentive programs. This approach is both cost-effective and practical. However, relying on ComEd's and Ameren's outreach activities also means limited control over the content, timing, and frequency of messages being sent. This became a problem for the program in PY1, when the ComEd program became oversubscribed. ComEd ended much of its program promotion, and market actors mistakenly thought that incentive money had also run out for public sector projects as well, negatively affecting the PSEE program.

SEDAC Network

During PY1, the program made effective use of the existing SEDAC network to promote the program. This included making use of SEDAC's monthly newsletter that is sent to more than 3,000 market actors and end users. In addition, SEDAC experts often recommend participation in the PSEE programs for public entities. The PY2 evaluation will consider SEDAC's role in generating spillover savings for the program.

ComEd and Ameren Trade Ally Networks

The PSEE programs leveraged the ComEd and Ameren trade ally networks in PY1. However, coordination of outreach activities with the utilities waned over the course of PY1. Since contractors play an important role in promoting the Standard Incentive program, successful use of the ComEd and Ameren trade ally networks is key to the growth of the PSEE programs.

Account Managers

DCEO recognizes that utility account managers often play a key role in successful incentive programs as they have established relationships with targeted customers. PSEE program participants cite their Account Manager as an information resource and as providing assistance during the participation process. Early in PY1 DCEO conducted a webinar for Account Managers and presented on the public sector as part of the utility's roll out to Account Managers on all program efforts. DCEO fields calls from Account Managers.

Marketing and Outreach

In PY1, DCEO assigned one full time staff person to focus on marketing. In addition to this full time staff member, other program staff participated in marketing activities as part of their normal job duties. The program heavily leveraged marketing activities by SEDAC, ComEd, and Ameren. The marketing that was conducted was recalled and well received by program participants. The most successful efforts were promotion via market actors and the DCEO website.

Participants overwhelmingly prefer to be informed about opportunities such as the PSEE incentive programs by e-mail. DCEO currently uses e-mail when distributing its monthly SEDAC newsletters.

4.2 Recommendations

4.2.1 Impact Recommendations

Default Savings Review

1. DCEO needs to update its table of default assumptions in the tracking system. There were numerous discrepancies with ComEd, including wrong values ComEd found and corrected.

2. DCEO should consider expanding the four building types used to differentiate default assumptions. Candidates to consider include adding a continuous operation facility type and separating out high schools.

3. We believe that research and evaluation M&V in Illinois targeting key assumptions would improve the default savings values. Priorities for improved, local knowledge are:
    - Lighting hours of use

- Occupancy sensor applications
- Coincidence factors for lighting measures
- Coincidence and redundancy factors for cooling measures (redundancy accounts for reduced per unit savings due to unit oversizing and installing excess cooling capacity)
- HVAC interaction factors for lighting measures
- Cooling full load hours
- HVAC Variable Speed Drive applications

4. DCEO should collaborate with ComEd, Ameren, and other parties in Illinois to develop a consistent set of default savings values and provide a brief description of how their default savings derive from the statewide values. The technical reference for default savings is a key input in the engineering review for impact evaluation.

Tracking System

1. The DCEO tracking system has limited functionality and lacks important detail data. DCEO should investigate improving or replacing the system. Ameren and ComEd have tracking systems that are much more functional and complete, and could provide a starting point for DCEO to reference. We believe a more complete tracking system with better functionality would be a significant benefit to the program manager and staff, as well as improve our ability to evaluate the program.

2. To improve our ability to evaluate the program, we recommend that each site address be assigned a unique identification number. This could be a unique "Project ID", or potentially a single Project ID could have multiple unique entries for each "Site ID" included in the project.

Gross and Net Impacts

1. Gross and net savings are highly concentrated by end-use and public sector type. To achieve goals in future years, DCEO should identify the next tier of participation targets by end-use, public sector type, and measure, and develop plans to gain their participation.

2. Free-ridership is an inherent attribute of a trade ally driven rebate offered to the public sector. While it is challenging to screen out free-riders and maintain ease of participation, DCEO should consider the following:
    - Consider a more proactive, earlier program role in chiller replacements.
    - Monitor free-ridership among participants and measures to assess the ongoing risk of low NTG ratios.
    - Proactively seek participation from public sectors with low free-ridership rates to balance those that tend to have higher free-ridership.
    - The initial evaluation plan for PY2 included research to estimate spillover. The results of the phone survey confirm that the effort to quantify spillover be retained.
    - DCEO should seek involvement in the planning processes for public sector entities and document involvement and influence (dates, contacts, documents delivered, and discussions) for possible submission to evaluators (survey participants are not always aware of all past contacts that may have occurred in their organization). This additional documentation could provide the basis for adjustments to scores based solely on survey data.

3. Suggested improvements in the QA/QC process focus on developing documentation and applying formal pre- and post-inspection protocols, maintaining an up-to-date tracking system through the various stages of project completion, and potentially adding a second check of large and complex projects based on resource availability. These enhancements will help to ensure quality and consistency as staff verification resources are added to meet higher program participation levels.

4.2.2 Process Recommendations

Program Participation

1. Consider ways to increase participation by sectors currently less active in the program, such as colleges and universities.

2. Take steps to reduce barriers to participation presented by the public sector budgeting process by creating confidence among public sector customers that the program will be active in future years. This is especially true as demand for the incentives increases and the program becomes more fully subscribed.

Incentive Cap

1. If the program becomes fully subscribed it might be necessary to limit exceptions for projects or customers that exceed the cap.

Application Process

1. Consider issuing grants or rebates to a single location as opposed to multiple locations and requesting that applicants fill out a separate application for each unique site.

2. If program participation approaches a level of being fully subscribed, consider requiring pre-approval applications for all projects with an incentive of $10,000 or more in order to allow program staff to prepare for the extra time needed to process these payments. This includes any projects that are "bundled" into a single grant or rebate incentive payment.

Implementation

1. If possible, add more staff to the program to allow for additional activities to be conducted.

2. Continue to leverage existing delivery channels currently used to promote the program. However, also consider ways to differentiate the program from the utility programs and to more independently reach out to key parties such as trade allies and account managers.

SEDAC Network

1. Continue to leverage the SEDAC network. The newsletter and network of energy service providers are effective channels of reaching customers.

ComEd and Ameren Trade Ally Networks

1. Try to increase involvement in promotional messages to ComEd and Ameren trade allies. Also try to more independently reach out to trade allies.

Account Managers

1. Continue to use Ameren and ComEd's account managers to market the program to potential public sector participants. Survey responses indicated account managers were an effective channel for reaching out to potential participants.

Marketing and Outreach

1. Continue leveraging outreach activities by SEDAC, ComEd, and Ameren.

2. As the program matures, be prepared to make greater use of certain program delivery channels, including direct marketing and utility account managers, to build program awareness and participation among customers who may not be easily reached by market actors.

3. Monitor the possibility of confusion regarding the availability of program funds if ComEd and/or Ameren's programs become oversubscribed in Program Year 2. If confusion does result, consider independent messaging that will clarify the availability of funding from the PSEE programs. This could include links to the DCEO program from the ComEd and Ameren program websites.

4. Consider expanding the use of e-mail for recruiting new participants into the program.

5 APPENDICES

5.1 Data Collection Instruments

5.1.1 Interview Guide

DCEO
Custom-Standard Dep

5.1.2 Phone Survey

DCEO Public Sector
Electric Efficiency Pro

5.2 Other Appendices

5.2.1 2008 Program Application Forms

The application forms for the 2008 program are provided in the Guidelines and Application document.

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5.2.2 Verification and Due Diligence Memo Report

This memo provides draft 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.

DCEO PSEE Standard
and Custom QAQC 20

5.2.3 Review of ComEd's Default Savings Values

ComEd C&I
Prescriptive Default S