Smart Ideas for Your Business
Data Centers Efficiency Program
PY6 Evaluation Report

Final

Energy Efficiency / Demand Response Plan:
Plan Year 6
(6/1/2013-5/31/2014)

Presented to
Commonwealth Edison Company

March 25, 2015

Prepared by:

Kumar Chittory
Itron, Inc.

Sara Rosenbrock
Itron, Inc.

www.navigant.com

Submitted to:

ComEd
Three Lincoln Centre
Oakbrook Terrace, IL 60181

Submitted by:

Navigant Consulting, Inc.
30 S. Wacker Drive, Suite 3100
Chicago, IL 60606

Contact:

Randy Gunn, Managing Director
312.583.5714
Randy.Gunn@Navigant.com

Jeff Erickson, Director
608.497.2322
Jeff.Erickson@Navigant.com

NAVIGANT

Table of Contents

E. Executive Summary 3

E.1. Program Savings 3
E.2. Results Summary 4
E.3. Key Findings and Recommendations 4

1 Introduction 6

1.1 Program Description 6
1.2 Evaluation Objectives 6
1.2.1 Impact Objectives 6
1.2.2 Process Objectives 6

2 Evaluation Approach 7

2.1 Overview of Data Collection Activities 7
2.2 Verified Savings Parameters 7
2.2.1 Verified Gross Program Savings Analysis Approach 8
2.2.2 Verified Net Program Savings Analysis Approach 9
2.3 Process Evaluation 10
2.4 Sampling 10
2.4.1 Profile of Population 10
2.4.2 Gross Impact (M&V) Sample 10
2.4.3 Telephone Survey Sample 11

3 Gross Impact Evaluation 12

3.1 Tracking System Review 12
3.2 Gross Program Impact Parameter Estimates 12
3.3 Verified Gross Program Impact Results 13

4 Net Impact Evaluation 19

4.2 Spillover 25
4.3 Evaluation Verified Net Impact Results 26

5 Process Evaluation 28

5.1 Program Strengths 28
5.2 Program Weaknesses 28

6 Findings and Recommendations 31

7 Appendix 34

7.1 Net-to-Gross Scoring Algorithm 34
7.2 Survey Instruments 36
7.2.1 Technical Service Providers 36
7.2.2 Vendor NTG Survey Instrument 41

NAVIGANT

List of Figures and Tables

Figures:

Figure 3-1. Energy and Demand Realization Rates 15
Figure 4-1. NTG Component Scores 21
Figure 4-2. Average Ratings of Program Components Elements 22
Figure 4-3. Average Unweighted NTGR by Colocation Flag 23
Figure 5-1. Participant Perspectives on Program Strengths 28
Figure 5-2. Participant Perspectives of the Program Concerns or Suggestions 29

Tables:

Table E-1. PY6 Total Program Electric Savings 3
Table E-2. PY6 Results Summary 4
Table 2-1. Primary Data Collection Activities 7
Table 2-2. Verified Savings Parameter Data Sources 8
Table 2-3. PY6 Program Participation by Sampling Strata 10
Table 2-4. PY6 Gross Impact Sample by Strata 11
Table 2-5. PY6 Telephone Survey Sample by Strata 11
Table 3-1. Verified Gross Savings Parameters 12
Table 3-2. Gross Parameters and Savings Estimates 13
Table 3-3. Gross Impact Realization Rate Results for the Selected Data Center Sample 17
Table 3-4. Gross kWh Realization Rates and Relative Precision at 90% Confidence Level 18
Table 3-5. Gross kW Realization Rates and Relative Precision at 90% Confidence Level 18
Table 4-1. PY6 NTGR Results for the Data Centers Sample 19
Table 4-2. kWh NTGR and Relative Precision at 90% Confidence Level 20
Table 4-3. kW NTGR and Relative Precision at 90% Confidence Level 20
Table 4-4. Evidence of Spillover in PY6 25
Table 4-5. PY6 Verified Net Impact Savings Estimates 26
Table 4-6. Program-Level Evaluation Verified Net kWh Impacts 27
Table 4-7. Program-Level Evaluation Verified Net kW Impacts 27
Table 7-1. Basic Net-to-Gross Scoring Algorithm for the PY6 Data Centers Program 34

E. Executive Summary

This report presents a summary of the findings and results from the Impact and Process Evaluation of Commonwealth Edison Company's (ComEd) program year (PY6) [1] Data Centers Efficiency program. ComEd's Smart Ideas for Your Business suite of energy efficiency programs includes a Data Centers Efficiency program which provides incentives to both new and existing data centers for implementing program-eligible energy efficiency measures. The program pays an incentive of $0.07/kWh saved for eligible projects, up to a maximum of 100% of the total project cost and 100% of the incremental project cost. The primary objectives of this evaluation are to quantify gross and net impacts, determine process-related program strengths and weaknesses and identify ways in which the program can be improved.

E.1. Program Savings

Table E-1 summarizes the electricity savings from the Data Centers Efficiency Program.

Table E-1. PY6 Total Program Electric Savings

Savings Category †	Energy Savings (MWh)	Peak Demand Savings (MW)
Ex Ante Gross Savings	21,905	1.996
Verified Gross Savings	21,333	1.842
Verified Net Savings	12,939	1.069

Source: ComEd tracking data and Evaluation Team analysis.

Based on the gross impact sample of 10 projects in PY6, the evaluation results yielded an energy gross realization rate of 0.97 and a peak demand gross realization rate of 0.92. The relative precision for the gross impact results at one-tailed 90% confidence level is ± 2% for the energy realization rate and ±3% for the peak demand realization rate. The evaluation verified net-to-gross ratio (NTGR) of 0.61 for energy savings is based on a NTG analysis of a census of the 16 projects completed by the program during PY6.

Overall, the program team did an excellent job of ensuring all the implemented measures were installed and operating as planned. The program team continues to collect site specific pre- and post-metered data for all projects which paid off in terms of enabling them to accurately estimate ex-ante savings. In general, the program team did a very good job of collecting site specific pre- and post-M&V data. Since the evaluators did not collect M&V data for desk review projects, the program-collected M&V data was very valuable in calculating evaluation-based savings for the sampled projects.

[1] The PY6 program year began June 1, 2013 and ended May 31, 2014.

E.2. Results Summary

The following table summarizes the key metrics from PY6.

Table E-2. PY6 Results Summary

Participation	Units	PY6
Net Savings	MWh	12,939
Net Demand Reduction	MW	1.07
Gross Savings	MWh	21,333
Gross Demand Reduction	MW	1.84
Program Realization Rate	MWh	0.97
Program Demand Realization Rate	MW	0.92
Program NTG Ratio	MWh	0.61
Program Demand NTG Ratio	MW	0.58
Projects Completed	#	16

Source: ComEd tracking data and Evaluation team analysis.

E.3. Key Findings and Recommendations

The PY6 Data Centers program gross energy impact realization rate of 0.97 and demand realization rate of 0.92 is above average for a program that involves custom calculation methods based on site specific M&V, and analysis of complex and/or emerging technologies. These PY6 evaluation results reflect a program that is well run and technically competent in addressing an array of impact estimation and program design challenges. Based on these findings, it appears that the program is off to a very good start and is well-positioned to use solid M&V practices in the future as the project and measure mix becomes more complex.

The following provides insight into key program findings and recommendations.[2]

Measurement and Estimation of Power Factor

Finding 1. For several projects, the program M&V activities did not accurately determine power factor values. The program-reported power factor was found to be significantly higher than the typical values for data center cooling equipment (e.g., CRACs, fans and pumps). The program generally calculates cooling equipment power usage using power factor which results in overestimation of savings. The evaluation team performed independent measurements and adjusted site specific savings calculations which resulted in reductions of savings (e.g., Projects #20611, #21708, #21084, #19212, #22053 and #19775).

Recommendation 1. The program should ensure that measurements taken are within the typical range for the cooling equipment. For power factor measurements that exceed the

[2] Numbered findings and recommendations in this section are the same as those found in the Findings and Recommendations section of the evaluation report for ease of reference between each section.

typical or nameplate value, multiple spot measurements should be taken to confirm the accuracy of the measurements. As a reliable comparison, a typical value of 0.79 for cooling equipment and 0.98 for VFD controlled cooling equipment can be used.

Normalizing Savings to account for IT load changes.

Finding 2. The program normalized savings to account for changes in IT load without verifying if the changes in energy usage of the cooling equipment are technically feasible (i.e., consistent with the equipment operating strategies, usage profiles and characteristics). In several cases, a simple ratio of pre to post IT loads was applied to adjust the savings (e.g., Projects 15879, 17146, 19212, 20611, 21084, and 21708).

Recommendation 2. The program should examine if the changes to energy usage of the cooling equipment due to changes in IT load are technically feasible (i.e., consistent with equipment operations). The equipment affected by the installed measure should be analyzed based on observed or typical operating conditions.

Sample size selection for metering

Finding 4. The program did not follow a sampling plan to select the measure equipment for metering (e.g., Project #21084).

Recommendation 4. When sampling is used to select measure equipment for metering, the sample size should be calculated to meet 80/20 confidence/precision and 0.5 coefficient of variation (CV) criteria. For projects with several units of equipment operating at variable loads, sampling is critical for estimating average load for the equipment.

Net-to-Gross Ratio Research

Finding 6. The Evaluation Research Findings NTG ratio is 0.61 for kWh and 0.58 for kW. Although improved from the values in PY5, these values still indicate significant free ridership, particularly among the small and medium-sized stratum 2 and 3 projects.

Recommendation 6. ComEd should consider adopting procedures to limit or exclude known free riders by conducting screening for high free ridership on a project-by-project basis. In addition, each of these strategies is designed to reduce free ridership in the program.

1 Introduction

1.1 Program Description

The ComEd Smart Ideas for Your Business program provides incentives for business customers who upgrade their facilities with energy efficient equipment. This incentive program is available to all eligible, nonpublic, commercial and industrial customers in ComEd's service territory. ComEd's Smart Ideas for Your Business suite of energy efficiency programs includes a Data Centers Efficiency program. This program provides incentives to both new and existing data centers for implementing qualified energy efficiency measures.

The Data Centers Efficiency program pays an incentive of $0.07/kWh saved for eligible projects. The program also provides an early commitment incentive option to the customers. The early commitment option provides incentive funding certainty once an application is approved. To qualify for this option, projects must reduce energy consumption by a minimum of 500,000 kWh. For qualifying early commitment projects, the program pays an incentive of $0.06/kWh saved. Incentives are paid after successful completion of the project has been verified and are not subject to change based on actual verified kWh savings. Incentives cannot exceed 100% of the total project cost and 100% of the incremental project cost.

1.2 Evaluation Objectives

The Evaluation Team identified the following key objectives for PY6.

1.2.1 Impact Objectives

1. Estimate the gross impacts from the program.
2. Identify opportunities for improvement to program impact calculations and estimates.
3. Estimate the net impacts from the program.
4. Provide up-front evaluation input for large or complex projects before each application is finalized and paid by the program.

1.2.2 Process Objectives

1. Describe program strengths and weaknesses.
2. Identify ways that the program can be improved.

2 Evaluation Approach

Program Year 6 (PY6) represents the third full-scale year of implementation for the Data Centers Efficiency program. For the PY6 impact evaluation, gross program impact results were developed based on the on-site M&V analysis for three projects and thorough engineering desk reviews supported with telephone interviews for seven projects. Net-to-gross ratio (NTGR) results were based on self-reported data from surveys of a census of PY6 projects. The verified gross savings estimates were then multiplied by the NTGR to determine the verified net energy and peak demand savings. The PY6 process evaluation was restricted to feedback from the PY6 participants on the program's strengths and weaknesses.

2.1 *Overview of Data Collection Activities*

The core data collection activities included on-site audits and detailed M&V analysis in support of gross impact analysis, and telephone surveys in support of NTG and Process analysis. The full set of data collection activities is shown in Table 2-1.

Table 2-1. Primary Data Collection Activities

What	Who	Target Completes	Completes Achieved	When	Comments
Onsite M&V Audit	Participants	3	3	May – November 2014	Sampled projects from Stratum 1 and 2
Desk Reviews	Participants	7	7	August – November 2014	Sampled projects from Stratum 2 and 3. Reviews include engineer conducted telephone interviews
Telephone Survey	Participants	Census (16 participants)	Census (16 participants)	September – November 2014	Data collection supporting NTG research and process analysis.
Telephone Survey	Technical Service Providers	Census (3 participants)	Census (3 participants)	September – November 2014	Data collection supporting NTG research.
Telephone Survey	Vendors	2	1	October – November 2014	Data collection supporting NTG research.

2.2 *Verified Savings Parameters*

The following table, Table 2-2, presents the parameters that were used in the verified gross and net savings calculations and indicates which were examined through evaluation activities and which were deemed.

Table 2-2. Verified Savings Parameter Data Sources

Input Parameters	Data Source	Deemed or Evaluated?
Gross Energy Savings Realization Rate	PY6 Analysis	Evaluated
Gross Peak Demand Savings Realization Rate	PY6 Analysis	Evaluated
NTG Ratio	PY6 Analysis	Evaluated
Net Energy Savings	PY6 Analysis	Evaluated
Net Peak Demand Savings	PY6 Analysis	Evaluated

2.2.1 Verified Gross Program Savings Analysis Approach

The objective of the gross program savings evaluation is to verify the veracity and accuracy of the PY6 ex ante gross savings estimates in the Data Centers Efficiency program tracking system. The PY6 evaluation activities included on-site M&V analysis for three projects and desk reviews for seven projects. The savings reported for the completed PY6 projects were evaluated using the methods outlined directly below.

On-site audits were performed for the sampled stratum 1 and stratum 2 projects (total of three projects). On-site data collection included verification of measure installation, functioning system and planned system operation, and specific details of any variation between the ex ante and ex post verifications. On-site audits also entailed collection of customer-stored data to support downstream M&V calculations. Measurement data obtained from the sites, including spot measurements, run-time hour data logging, and post-installation interval metering, were used to calibrate the site-specific analyses. Customer-supplied data from energy management systems (EMS) or supervisory control and data acquisition (SCADA) systems were also obtained when available.

For the smaller projects (stratum 2 and 3), engineering desk reviews were performed to calculate the ex post impacts. Each of the desk reviews involved a review of project documentation provided by the program, an engineering review of the algorithms and an audit of ex ante calculation models used by the program to estimate energy and peak demand savings. The engineering audit of program calculations determined if the inputs for the program calculations were reasonable and acceptable or if they needed any revisions based on evaluation findings. In addition to the desk reviews, the evaluation team completed telephone interviews with the site contacts for each site and the information collected during these interviews was used to verify the savings estimates. Also, the site contacts were requested to provide post-installation operating data electronically. The information collected was used to inform evaluation savings calculations.

Engineering calculations were performed to derive evaluated gross kWh and kW savings based on data collected during the on-site visit or the desk review process. The engineering reviews also included a preliminary judgment to identify those assumptions with higher uncertainty or potential to influence the program savings estimates. Data obtained from the sampled sites served to verify measure installation, determine installed measure characteristics, assess operating hours and relevant modes of operation, identify the characteristics of the replaced equipment, support the selection of baseline conditions and perform ex post savings calculations. The peak kW savings calculation

methodology was consistent with PJM requirements[3] for each project. The final step involved discussion of project-level results with the implementation teams and ComEd's program staff to ensure that both the evaluation team and the implementation team are in agreement about their understanding of the project scope and details.

A verified gross realization rate was then estimated for the sampled sites, weighted by sampling stratum and applied to the entire population of projects. The result is a verified gross savings estimate for the Data Centers Efficiency Program. Additional details on the sampling approaches are described in Section 2.4 below.

2.2.2 Verified Net Program Savings Analysis Approach

The primary objective of the net savings analysis 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 NTGR 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 telephone surveys, was used to estimate the NTGR for this evaluation.

Verified net energy and coincident peak demand savings were calculated by multiplying the verified gross savings estimates by the calculated NTGR. In PY6, the NTGR values used to calculate the verified net savings were based on the NTG research conducted for a census of the 16 projects completed by the program during PY6. This NTGR method was approved at the Illinois Stakeholders Advisory Group (SAG) and documented.[4]

NTG research methods in PY6 consisted of participant and technical service provider survey data collection and analysis. Research for both groups used a self-report survey-based method in which participants and technical service providers were asked a series of questions designed to assess the influence of program and non-program factors on their decisions to implement and offer energy efficient data center measures, respectively. The participant survey instrument researched the participants' awareness of the installed measures prior to their participation in the program, and their previous use of those measures outside the program.

For PY6, the net program impacts were quantified solely on the estimated level of free-ridership. Information regarding participant spillover was also collected, but ultimately did not support a finding of any spillover.

The determination of free ridership requires estimating what would have happened in the absence of the program. Responses from the survey 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.

[3] PJM defines the coincident summer peak period as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, during the months of June through August.

[4] Source: ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html

The calculation then averages those three scores to come up with a project- or measure-level net-to-gross ratio.

Further details on the scoring approach used to calculate free-ridership from data collected through participant phone surveys are provided in the Appendix, in Table 7-1.

Once free-ridership has been estimated, the project or measure level Net-to-Gross Ratio (NTGR) is calculated as 1 – Free-ridership Rate.

2.3 Process Evaluation

Telephone surveys with a census of participating customers were conducted in support of the PY6 process evaluation activities. This component of the evaluation was narrowly defined to report on perceptions regarding program strengths and weaknesses, based on survey findings.

2.4 Sampling

2.4.1 Profile of Population

The table below presents the three sampling strata used in the evaluation of the Data Centers Efficiency program, which were based on a total of 16 tracking records for 16 unique Data Center projects. The number of records is presented by stratum, along with the claimed ex ante gross kWh and kW in Table 2-3 below.

Table 2-3. PY6 Program Participation by Sampling Strata

Sampling Stratum	Ex Ante kWh Impact Claimed	Ex Ante kW Impact Claimed	Tracking Records
1	14,004,573	1,207	2
2	4,100,856	468	3
3	3,799,599	321	11
TOTAL	21,905,028	1,996	16

Source: Evaluation Team analysis

2.4.2 Gross Impact (M&V) Sample

Consistent with the evaluation plan, a stratified random sampling approach was used to select the gross impact sample of 10 projects. Projects were sorted and placed in three strata based upon the level of ex ante kWh savings.

Table 2-4 provides a profile of the gross impact M&V sample for the Data Centers Efficiency program in comparison with the program population. Shown below is the resulting sample that was drawn that consists of 10 projects. These projects make up 19.8 million kWh of the ex ante impact claim which represents 90% of the ex ante impact claim for the program population. Also shown are the ex

ante based kWh sample weights for each of the three stratum. Note that stratum 1 projects account for approximately 70% of total sample kWh.

Table 2-4. PY6 Gross Impact Sample by Strata

Population Summary			Impact Sample			
Sampling Stratum	Number of Tracking Records (N)	Ex Ante kWh Impact Claimed	kWh Weights	Number of Tracking Records (n)	Ex Ante kWh	Sampled % of Population kWh
1	2	14,004,573	0.64	2	14,004,573	100%
2	3	4,100,856	0.19	3	4,100,856	100%
3	11	3,799,599	0.17	5	1,712,421	45%
TOTAL	16	21,905,028	-	10	19,817,850	90%

Source: Evaluation Team analysis

2.4.3 Telephone Survey Sample

Per the evaluation plan, the target for the participant surveys was a census attempt of all participants in the Data Center Efficiency program in PY6. Data from these surveys were in support of the Net-to-Gross component of the evaluation and the Process evaluation component.

Participating Customer Survey Sample

Table 2-5 summarizes the participating customer telephone interviews completed in support of the PY6 NTG research and process evaluation efforts. The completed interviews represent 21.9 million kWh or 100% of the ex ante impact claim for the total program population.

Table 2-5. PY6 Telephone Survey Sample by Strata

Population Summary			Completed Interviews			
Sampling Strata	Number of Tracking Records (N)	Ex Ante kWh Impact Claimed	kWh Weights	Number of Tracking Records (n)	Ex Ante kWh	Sampled % of Population kWh
1	2	14,004,573	0.64	2	14,004,573	100%
2	3	4,100,856	0.19	3	4,100,856	100%
3	11	3,799,599	0.17	11	3,799,599	100%
TOTAL	16	21,905,028	-	16	21,905,028	100%

Source: Evaluation Team analysis

3 Gross Impact Evaluation

The evaluation team reviewed ComEd's tracking data extract to determine reported PY6 ex ante gross savings. The verified gross program impacts for the evaluation for the Data Centers Efficiency program were developed based on the on-site M&V analysis for three sites and engineering desk reviews for seven projects.

3.1 Tracking System Review

ComEd provided the evaluation team with direct access to their on-line tracking system and data for evaluation purposes. The on-line system was easy to work with and provided viewing access to the project tracking data plus downloading rights to project documentation in electronic format for each project. This documentation was complete and greatly facilitated the evaluation efforts.

Key findings include:

1. In addition to projects belonging to the Data Centers Efficiency program, the tracking database extract included projects from other programs. In many cases it was not immediately apparent how a given project/record was aligned with a specific program.
2. ComEd should ensure the measure field (Measure Number) within the tracking database identifies the program name for all projects so that the evaluation team and the program staff can clearly identify the projects from the Data Centers Efficiency program vs. projects from other programs.

3.2 Gross Program Impact Parameter Estimates

Gross program impacts for this evaluation of the Data Centers Program were developed based on the on-site visits including detailed M&V analysis for three projects and thorough engineering desk reviews supported with telephone interviews for seven projects. The EM&V team conducted research to validate the parameters that were not specified in the TRM. The verified gross impact results for PY6 are shown in Table 3-1 below.

Table 3-1. Verified Gross Savings Parameters

Input Parameters	Value	Deemed or Evaluated?
Energy Savings Realization Rate	0.97	Evaluated
Peak Demand Savings Realization Rate	0.92	Evaluated

Source: Evaluation Team analysis.

There are two basic statistical methods for combining individual gross 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.[5] 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 gross realization rates by stratum.

The evaluation team used the separate ratio estimation technique to estimate verified gross impacts for the Data Centers Efficiency program. The separate ratio estimation technique follows the steps outlined in the California Evaluation Framework[6] which identified best practices in program evaluation. These steps are matched to the stratified random sampling method that was used to create the sample for the program. The standard error was used to estimate the error bound around the estimate of verified gross impacts.

3.3 Verified Gross Program Impact Results

Based on the gross impact sample size of 10 projects in PY6, the evaluation results yielded energy gross realization rate of 0.97 and demand gross realization rate of 0.92, as indicated in Table 3-1. The resulting total program verified gross savings is 21,333,382 kWh and 1,842 kW as shown in Table 3-2.

Overall, the program team did an excellent job of ensuring all the implemented measures were installed and operating as planned. The program team continues to collect site specific pre- and post-metered data for all projects which paid off in terms of their being able to accurately estimate ex-ante savings. In general, the program team did a very good job of collecting site specific pre- and post-M&V data. Since the evaluators did not collect M&V data for desk review projects, the program-collected M&V data was very valuable in calculating evaluation-based savings for the sampled projects.

Table 3-2. Gross Parameters and Savings Estimates

Sampling Strata	Ex Ante kWh	Evaluation Verified kWh	kWh RR	Ex Ante kW	Evaluation Verified kW	kW RR
1	14,004,573	13,814,054	0.99	1,207	1,213	1.01
2	4,100,856	3,374,364	0.82	468	386	0.82
3	3,799,599	4,144,964	1.09	321	243	0.76
TOTAL	21,905,028	21,333,382	0.97	1,996	1,842	0.92

Source: Evaluation Team analysis

The PY6 energy gross realization rate of 0.97 and the demand realization rate of 0.92 is a very good result for a Data Centers program that typically involves custom calculations methods based on site specific M&V activities and analysis of complex and/or emerging technologies. The achieved PY6

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

[6] Tec Market Works, "The California Evaluation Framework," Prepared for the California Energy Commission, June 2004. Available at http://www.calmac.org

results are very impressive since these challenging program aspects were addressed proficiently. This shows that the program is off to a very good start and should continue using solid M&V practices for upcoming program years where the project mix and measures are expected to be more complex.

The PY6 gross energy realization rate of 0.97 is slightly lower than the PY5 level of 1.01. Note that the evaluated sample size for PY6 was 10 projects compared to the PY5 sample size of 4 projects. The evaluation team believes that due to the significant difference in the sample size, the results cannot be compared to draw any conclusions and that the PY6 sample size provides more accurate and in-depth insight into the program performance due to the larger sample.

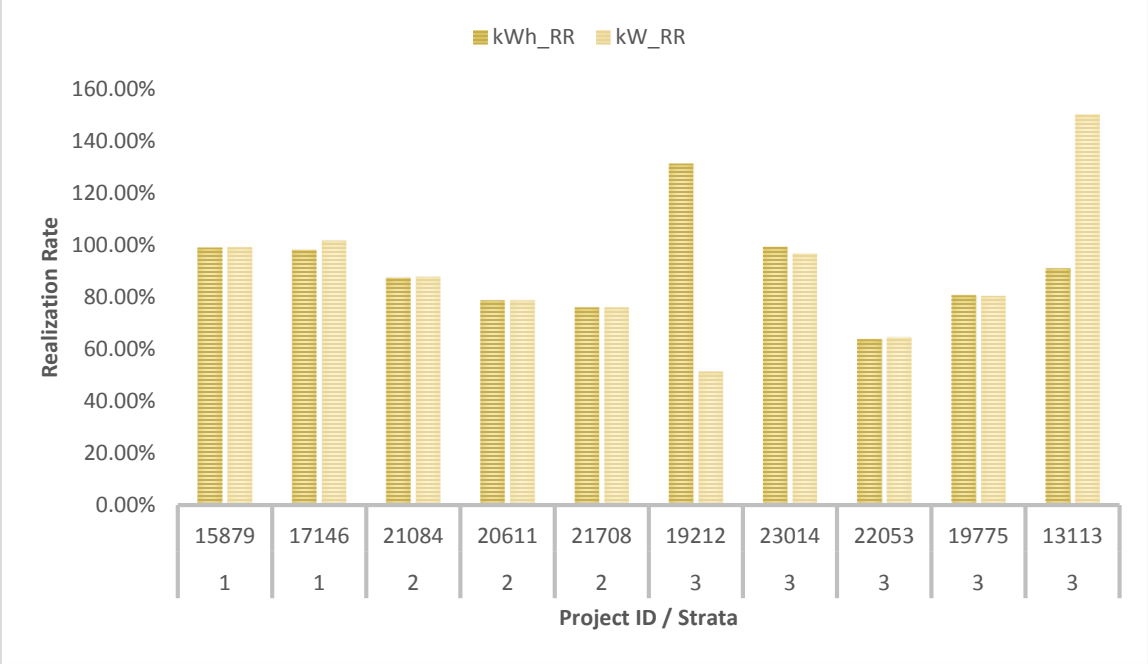
PY6 gross realization rate results indicate that stratum 2 (medium sized data center projects) had a gross realization rate of 0.82 and realized a lower proportion of the ex ante claims than stratum 1 (largest sized data center projects) and stratum 3 (smallest sized data center projects), which had realization rates of 0.99 and 1.09 respectively. Additionally, stratum 1 included two large projects that account for 70% of the sampled savings. The stratum 1 large projects realization rate of 0.99 also demonstrates that the program M&V efforts were thorough and solid which is commendable since the large projects typically require complex custom calculations and extensive data collection activities. The results of these stratum 1 projects were a significant driver for the high program realization rate.

The lower realization rate for stratum 2 projects is due to the program M&V activities not accurately representing power factor values. The evaluation team performed independent measurements of power factors as part of the ex post M&V and adjusted site specific savings calculations which resulted in reduction of savings. The evaluation team determined that that the program M&V activities are not performing measurements accurately (i.e., collecting measurements directly from the equipment power panels).

The PY6 demand realization rate of 0.92 is much higher than the PY5 value of 0.69. This improvement is mainly because the peak demand savings for PY6 projects were calculated for the PJM peak period instead of the average demand savings reported in PY5. Note that the stratum 3 demand realization rate was lower than those for stratum 1 and stratum 2, mainly due to the significant reduction in realized savings for projects #19212 and #22053. For project #19212, the demand savings estimate errors were due to a spreadsheet error that led to the program calculations using the incorrect number of hours to determine peak demand periods

Figure 3-1 below shows a comparison of the energy and demand realization rates for every site, broken down by strata. The PY6 energy savings realization rate results ranged from 0.64 to 1.31 which shows a large variation in realization rates across projects. For four out of the ten projects, the gross energy realization rate was greater than program mean realization rate (0.97) and for the remaining six projects the gross energy RR was less than program mean realization rate. For two large stratum 1 projects that accounted for the majority (64%) of program claimed savings, the gross energy RR was higher than program mean realization rate.

Figure 3-1. Energy and Demand Realization Rates



Source: Evaluation Team analysis

The results of each project are summarized in Table 3-3. Some key observations from the site specific evaluation results include the following:

- For project #20611, the combination of both power factor discrepancies, as well as IT normalization made up the majority of the differences in *ex ante* vs *ex post* savings. The measured power factor readings were in the range of 0.94-0.99 for CRAC fans and for the entire CRAC unit, which are much higher than expected values.
- For project #21708, the rated power factor for the motors was 80%, yet program measured readings gave values of over 10% higher, which is unreasonably high, and a measured load factor of over 100% compared with the calculated value of 86%. Normalization and changes in other inputs made up a very small portion of the savings discrepancies.
- For project #19212, the difference in *ex ante* vs *ex post* power factors made up the majority of the difference in savings. The remainder of the realization rate was made up of a change in normalization methods resulted in a reduction in savings.
- Additionally for project #19212, the demand savings are much lower than expected due to a spreadsheet error. The program calculations used the incorrect hours to determine peak demand periods. The periods included hours outside of the actual summer peak hours. For instance, hours were included for winter operation during which the compressors and condensers would not be running.
- For project #22053, the difference in *ex ante* vs *ex post* power factors that has been discussed in other projects was the first modification to savings. The second modification is related to the *ex ante* M&V data that was provided, which did not take into account the total power of all three units over the entire metering period. The *ex post* analysis only looked at a portion of the metered data which took into account the power of all three RTUs.

- For project #19775, the power factor was changed in the *ex post* analysis. Additionally, a vendor-reported EER was used as opposed to the calculated value used in the *ex ante* analysis.
- For project #13113, several changes were made to this site, including using trended power data to calculate savings and changes in unit efficiency and calculation inputs.

Table 3-3. Gross Impact Realization Rate Results for the Selected Data Center Sample

Sampled Application ID	Sample-Based Ex Ante kWh Impact Claimed	Sample-Based Ex Ante kW Impact Claimed	Sampling Strata	Ex Ante-Based kWh Gross Impact Weights by Strata	Sample-Based Evaluation Verified Gross kWh Impact	Sample-Based Evaluation Verified Gross kW Impact	Application - Specific Evaluation Verified Gross kWh Realization Rate	Application - Specific Evaluation Verified Gross kW Realization Rate	Sample-Based Evaluation Verified Gross kWh Realization Rate	Sample-Based Evaluation Verified Gross kW Realization Rate
15879	7,398,405	552	1	0.53	7,326,320	547.00	0.99	0.99	0.99	1.01
17146	6,606,168	655	1	0.47	6,487,734	665.90	0.98	1.02		
21084	1,954,490	223	2	0.48	1,710,709	196.00	0.88	0.88	0.82	0.82
20611	1,172,994	134	2	0.29	923,778	105.50	0.79	0.79		
21708	973,372	111	2	0.24	739,877	84.50	0.76	0.76		
19212	831,884	49	3	0.49	1,092,138	25.20	1.31	0.51	1.09	0.76
13113	631,799	13	3	0.37	575,414	19.82	0.91	1.50		
19775	107,702	12	3	0.06	86,952	9.90	0.81	0.80		
22053	74,776	9	3	0.04	47,780	5.50	0.64	0.65		
23014	66,260	11	3	0.04	65,788	10.54	0.99	0.97		
TOTAL	19,817,850	1,769	-	NA	19,056,490	1,670	NA	NA	0.97	0.92

Source: Evaluation Team analysis

The relative precision for the gross impact results at one-tailed 90% confidence level is ± 2% for the kWh realization rate and ± 3% for the kW realization rate. The evaluation kWh realization rate of precision of ± 2% achieved in this evaluation is better than the evaluation targeted kWh realization rate precision of ± 10% at one-tailed 90% confidence level which set forth in the PY6 Data Center Program Evaluation Plan.

Table 3-4. Gross kWh Realization Rates and Relative Precision at 90% Confidence Level

Stratum	Relative Precision ± %	Low	Mean	High
Stratum 1	0%	0.99	0.99	0.99
Stratum 2	0%	0.82	0.82	0.82
Stratum 3	13%	0.95	1.09	1.23
PY6 kWh RR	2%	0.95	0.97	1.00

Source: Evaluation Team analysis

Table 3-5. Gross kW Realization Rates and Relative Precision at 90% Confidence Level

Stratum	Relative Precision ± %	Low	Mean	High
Stratum 1	0%	1.01	1.01	1.01
Stratum 2	0%	0.82	0.82	0.82
Stratum 3	23%	0.58	0.76	0.93
PY6 kW RR	3%	0.89	0.92	0.95

Source: Evaluation Team analysis

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

4 Net Impact Evaluation

The SAG has determined that the NTGR for this program should be based on primary research during the current program year and applied retrospectively to determine verified net savings.[7]

As described in Section 2.2.2, free-ridership was estimated using a self-report method that relies on data obtained from participating customer and participating technical service provider surveys. A project and/or measure-specific Net-to-Gross ratio (NTGR) was calculated for each site. The PY6 project-specific and stratum level NTGRs are shown in Table 4-1.

Table 4-1. PY6 NTGR Results for the Data Centers Sample

Project ID*	Sampling stratum	Project Specific NTGR	Sample-Based Verified kWh NTGR	Sample-Based Verified kW NTGR
PY6 – 01**	1	0.70	0.71	0.71
PY6 – 02**	1	0.72		
PY6 – 03**	2	0.25	0.30	0.30
PY6 – 04**	2	0.63		
PY6 – 05**	2	0.00		
PY6 – 06**	3	0.81	0.57	0.51
PY6 – 07	3	0.37		
PY6 – 08**	3	0.73		
PY6 – 09	3	0.77		
PY6 – 10	3	0.28		
PY6 – 11	3	0.30		
PY6 – 12**	3	0.03		
PY6 – 13	3	0.56		
PY6 – 14**	3	0.63		
PY6 – 15**	3	0.00		
PY6 – 16	3	0.15		
TOTAL	NA	NA	0.61	0.58

Source: Evaluation Team analysis
* Actual Project IDs are not provided to protect customer confidentiality
**Overlaps with gross impact sample

A ratio estimation technique was used to estimate the program-level NTGR, based on the steps outlined in the California Evaluation Framework. The standard error was used to estimate the error bound around the estimate of the verified evaluation NTGR. The program level kWh and kW NTGR, along with confidence intervals and precision estimates, are shown in Table 4-2 (kWh impacts) and in Table 4-3 (kW impacts).

[7] Source: ComEd PY5-PY6 Proposal Comparisons with SAG.xls, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html

Spillover was also researched in this evaluation and the magnitude was found to be quite small as discussed below in the spillover section. *Therefore, a quantification of spillover was not included in the calculation of NTGR for PY6.*

Table 4-2. kWh NTGR and Relative Precision at 90% Confidence Level

Sampling Strata	Relative Precision ± %	Low NTGR	Mean NTGR	High NTGR
1	0%	0.71	0.71	0.71
2	0%	0.30	0.30	0.30
3	0%	0.57	0.57	0.57
TOTAL	0%	0.61	0.61	0.61

Source: Evaluation Team analysis

Table 4-3. kW NTGR and Relative Precision at 90% Confidence Level

Sampling Strata	Relative Precision ± %	Low NTGR	Mean NTGR	High NTGR
1	0%	0.71	0.71	0.71
2	0%	0.30	0.30	0.30
3	0%	0.51	0.51	0.51
TOTAL	0%	0.58	0.58	0.58

Source: Evaluation Team analysis

Observations regarding PY6 NTGR findings. Overall, the program influence has improved in PY6 based on the Evaluation Research Findings kWh NTGR of 0.61, compared to the PY5 kWh NTGR of 0.48. However, results varied significantly by strata. The NTGR values for the three sampling strata are 0.71 for stratum 1 (large sized projects), 0.30 for stratum 2 (medium sized projects), and 0.58 for stratum 3 (small sized projects).

Significant free-ridership (above 40%) was found in nine out of 16 evaluated projects, of which seven projects had a resulting NTGR at or below 0.30. All seven projects with substantial free-ridership had low Program Influence[8] and low No-Program[9] scores.

PY6 projects with the lowest No-Program scores tended to have lower NTG ratios, while those with higher No-Program scores had NTG ratios that were among the highest. As noted in Footnote 9, a No-Program score includes participants that would have taken action even if the program did not exist. That means certain participants would have implemented energy efficiency measures even without the

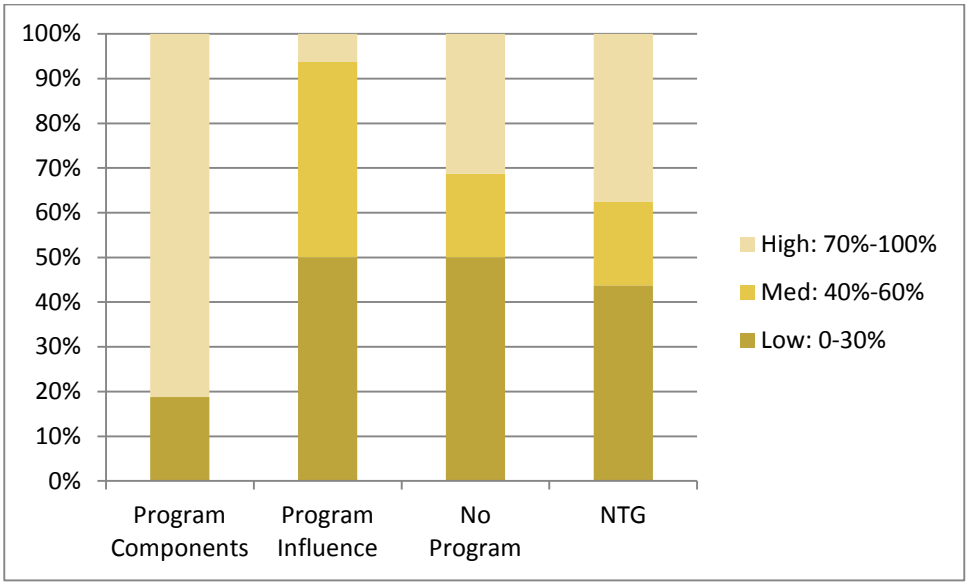
[8] A Program Influence score reflects the degree of influence the program had on the customer's decision to install the specified measures.

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

program. This drives lower NTG values. For example, all projects with No-Program scores of three or lower had NTG ratios that were at or below 0.37. The average NTGR across all of these projects was 0.17. In contrast, the projects with higher NTGRs, those having a mean NTGR of 0.75 across the group, had No-Program scores of eight or greater.

As shown in Figure 4-1, the correlation between the Program Influence and Program Components scores and resulting NTGR was not as significant as was the correlation with the No-Program score and the resulting NTGR.

Figure 4-1. NTG Component Scores



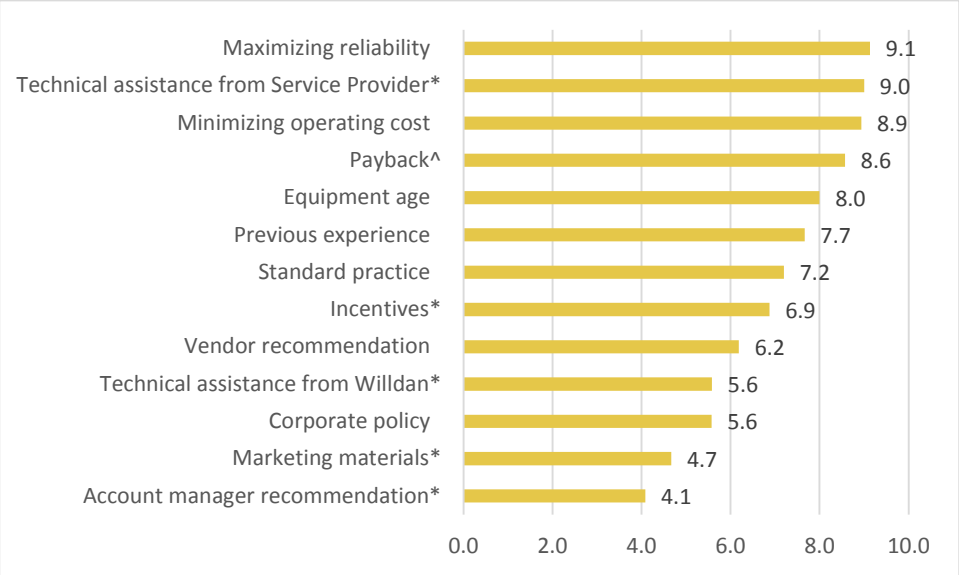
Source: Evaluation Team analysis

Figure 4-1 provides a breakdown of each of the three scores used to calculate the NTGR based on the distribution of values reported for each project. In cases with program influence, a number of different reasons existed. In nearly half of the projects (7 of 16 projects), the customer reported that they would have installed the same equipment at the same time in the absence of the program, resulting in a low No-Program score. Further, when PY6 participants were asked to divide 10 points between the importance of the Program versus the most important of the non-program factors in their decision to implement the measure, 9 out of 16 participants rated the non-program factors higher than the program factors, resulting in a low Program Influence score. Finally, the program elements in the Program Components score were rated lower on average (5.9) than non-program elements (7.5) in their importance in decision making.

Further, Figure 4-2 presents the average scores for each Program Components score component in the telephone survey. The objective of maximizing facility reliability (five 9s) was rated highest on average (9.1), followed closely by technical assistance from the firm that conducted the ComEd sponsored study (9.0) and minimizing operating cost (8.9). In contrast, many of the other program elements were rated

much lower, including a recommendation from the ComEd account manager (4.1) and information from the Data Center Program or ComEd marketing materials (4.7).

Figure 4-2. Average Ratings of Program Components Elements

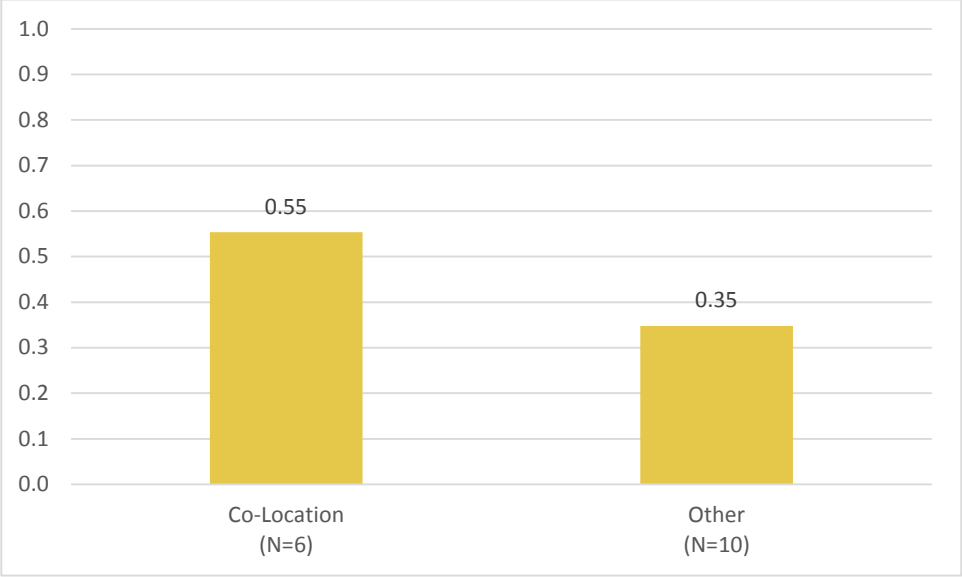


Source: Evaluation Team analysis
* Program related elements
^ Payback can be a program or a non-program related element depending on whether the incentive helped the participant meet their payback requirements or not.

Thirty-eight percent of PY6 participants were colocation[10] data centers. As shown in Figure 4-3 below these colocation data centers had higher NTGR than non-colocation data centers. On average, colocation data centers had higher Program Components scores than non-colocation data centers, 9.2 and 7.2 respectively. Moreover, colocation data centers had higher average No-Program scores than non-colocation data centers, 5.9 and 2.5 respectively. However, the average Program Influence scores were similar for both colocation and non-colocation data centers, 3.2 and 3.6 respectively.

[10] Colocation data centers are multi-tenant facilities which host the physical space for multiple customer's data center needs. In addition to the space, these facilities generally supply the cooling, power, bandwidth, and physical security for a business's data center needs. The renter will typically provide the servers and networking equipment needed.

Figure 4-3. Average Unweighted NTGR by Colocation Flag



Source: Evaluation Team analysis

4.1.1.1 Procedures to Reduce Free Ridership

Without a doubt, the high technology nonresidential market is extremely challenging to address and to influence behavior. Customers in this sector are generally more knowledgeable, sophisticated and motivated to adopt best practices in all areas, including energy using behaviors compared to other non-residential sectors. As a result, a certain amount of free ridership is to be expected in this market. Despite these challenges, there are a number of different strategies available to ComEd to adjust program design elements and implementation procedures in order to reduce free ridership. These recommendations are as follows:

Recommendation: Adopt procedures to limit or exclude known free riders.

The best way to accomplish this is to conduct screening for high free ridership on a project-by-project basis. In cases where it is found, the program implementer should encourage such customers to move to a higher level of efficiency or undertake a bundled retrofit to ensure deeper savings. Any of these options will result in funding a project that would not have been implemented absent the program. Another path is for the program to set the standard for incentive eligibility higher across-the-board so that all such projects will need to meet a higher standard to qualify. Note that **none** of these options equates to rejecting a customer for energy efficiency funding. Instead, the concept is to "upsell" the customer to an energy efficiency project that they weren't already planning to do on their own.

One way to assess the rate of free ridership likely on a given project is to critically examine the key reasons behind the project **before** the incentive is approved. For example:

- Has the project already been included in the capital or operating budget? Has the equipment already been ordered or installed?

- Is the measure one that the company or other comparable companies in the same industry/segment routinely installs as a standard practice? Is the measure installed in other locations, without co-funding by incentives? Is the measure potentially incentivized?
- Is the project being done, in part, to comply with regulatory mandates (such as environmental regulations)?
- Are the project economics already compelling without incentives? Is the rebate large enough to make a difference in whether or not the project is implemented?
- Is the company in a market segment that is ahead of the curve on energy efficiency technology installations? Is it part of a national chain that already has a corporate policy to install the proposed technology?
- Does the proposed measure have substantial non-energy benefits? Is it largely being considered for non-energy reasons (such as improved quality or increased production)?

By conducting a brief interview regarding these issues before the incentive is approved, the implementer can better assess the likely degree of free ridership and may be able to then decide if the project should be excluded or substantially re-scoped to a higher efficiency level.

Recommendation: Make changes to the incentive design

Tier incentives by technology class, such as end-use, to enhance promotion of technologies that are less well accepted versus those that are already established. Under this approach, the incentive level for less widely adopted and emerging technologies would be higher, while the incentive level for more widely-adopted measures would be lower.

Consider Incorporating a Payback Floor, Excluding Projects for Which the Payback Time is Less Than, Approximately, One Year. Project-specific investigation of free ridership for custom programs also indicates that projects with extremely short payback periods are more likely to be free riders, all else being equal. Although it is certainly true that many customers do not adopt attractive efficiency projects with very low paybacks[11], a payback floor can still be helpful, particularly if it is not set too high and if the administrator is allowed some flexibility in its application. Several program administrators in other parts of the country have used payback floors effectively, although such criteria present project cost verification challenges. A one year floor guideline makes sense because projects with a one-year payback or less can usually be funded out of the current year's energy budget. The use of a payback floor (a minimum payback level based on energy savings alone) can help to reduce free ridership by eliminating projects that have extremely quick paybacks and thus little need for ratepayer-funded incentives. *Offer bonuses to incent desirable behavior*, such as installation of multiple measures or installation by a first-time participant.

[11] For example, industrial end users sometimes do not invest in compressed air projects with paybacks as low as one year or even less.

4.2 Spillover

Spillover effects were also investigated in the PY6 evaluation based on responses to a battery of spillover questions in the telephone survey. The evidence of spillover for the program is presented in Table 4-4 below. These results ultimately did not support any quantification of spillover savings.

Table 4-4. Evidence of Spillover in PY6

Spillover Question	Evidence of Spillover
Since your participation in the ComEd program, did you implement any additional energy efficiency measures at this facility that did NOT receive incentives through any utility or government program?	Of the 16 surveyed customers that responded to this question, 3 said "Yes" (19%). These 3 respondents implemented a total of 3 energy efficiency measures.
What type of energy efficiency measure was installed without an incentive?	(1) Compressor (1) Sealed air leaks (1) Raised floor system with directional air flow tiles
On a scale of 0 to 10, where 0 means "not at all significant" and 10 means "extremely significant," how significant was your experience in the ComEd program in your decision to implement this energy efficiency measures?	For the 3 implemented measures: (1) Rating between 0 and 3 (0) Rating between 4 and 6 (1) Rating between 7 and 10 (1) Don't know
If you had not participated in the ComEd program, how likely is it that your organization would still have implemented this measure? Use a 0 to 10, scale where 0 means you definitely would NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	For the 3 implemented measures: (1) Rating between 0 and 3 (0) Rating between 4 and 6 (1) Rating between 7 and 10 (1) Don't know
Why did you purchase this energy efficiency measure without the financial assistance available through the ComEd's program?	For the 3 implemented measures: (1) Rebate program was too complicated/Wasn't worth the time (1) Too small (1) ComEd didn't offer a rebate because it was too hard to measure the savings

Source: Evaluation Team analysis

These findings suggest that there are no spillover effects for PY6. While participating customers are installing other energy efficiency improvements outside of the program, they attributed either no influence to the program in their decision to install these additional measures or reported that the measure was too small to warrant a rebate. Other reasons given for not pursuing rebates through the

ComEd program were that it wasn't worth the effort, or they did try, but it was too hard for ComEd to measure savings. The evaluation team will collect spillover data in this same manner in the PY7 evaluation. The decision to conduct additional evaluation activities to quantify spillover in PY7 will be examined as part of the evaluation planning effort.

4.3 Evaluation Verified Net Impact Results

Net program impacts were derived by multiplying the evaluation research findings gross program savings by the evaluation research findings NTGR. The evaluation calculated verified net savings is shown in Table 4-5 below.

Table 4-5. PY6 Verified Net Impact Savings Estimates

Savings Source	Sample Size	Energy Savings (MWh)	Significance 90/10	Coincident Peak Demand Savings (MW)	Significance 90/10
Ex Ante PY6 Gross Savings	10	21,905	Yes	2.00	Yes
Realization Rate	10	0.97	Yes	0.92	Yes
Verified Gross Savings	10	21,333	Yes	1.84	Yes
Free Ridership	16	0.39	Yes	0.42	Yes
Spillover	16	0.00	Yes	0.00	Yes
NTG	16	0.61	Yes	0.58	Yes
Verified Net Savings	16	12,939	Yes	1.07	Yes

Source: Evaluation Team analysis

Table 4-6 and Table 4-7 provide the strata-level evaluation verified net impact results for the PY6 program. Strata-level NTG ratios are weighted by ex-ante savings to calculate program-level NTG ratios for kWh and kW. This weighting scheme is consistent with the sampling method used. Evaluation verified net (kWh) strata detail is not shown since the sampled populations between gross and net do not add up to the total verified net savings. Since the NTGR results are weighted by ex-ante savings, the strata level net kWh results are different from the total program net kWh results. The strata-level net kWh will only add up to the total if they are weighted by ex-post gross; however, as noted, this would be inconsistent with the applied sampling method.

Table 4-6. Program-Level Evaluation Verified Net kWh Impacts

Sampling Strata	Ex Ante Gross kWh	Evaluation Verified Gross kWh	Evaluation Verified kWh RR	Evaluation Verified Net kWh	Evaluation Verified NTGR
1	14,004,573	13,814,054	0.99	-*	0.71
2	4,100,856	3,374,364	0.82	-*	0.30
3	3,799,599	4,144,964	1.09	-*	0.57
TOTAL	21,905,028	21,333,382	0.97	12,939,385	0.61

Source: Evaluation Team analysis

* The stratum level Ex Post Net kWh results are not applicable due to different sampled populations between gross and net.

Table 4-7. Program-Level Evaluation Verified Net kW Impacts

Sampling Strata	Ex Ante Gross kW	Verified Findings Gross kW	Verified Findings kW RR	Verified Findings Net kW	Verified Findings NTGR
1	1,207	1,213	1.01	-*	0.71
2	468	386	0.82	-*	0.30
3	321	243	0.76	-*	0.51
TOTAL	1,996	1,842	0.92	1,069	0.58

Source: Evaluation Team analysis

* The stratum level Ex Post Net kWh results are not applicable due to different sampled populations between gross and net.

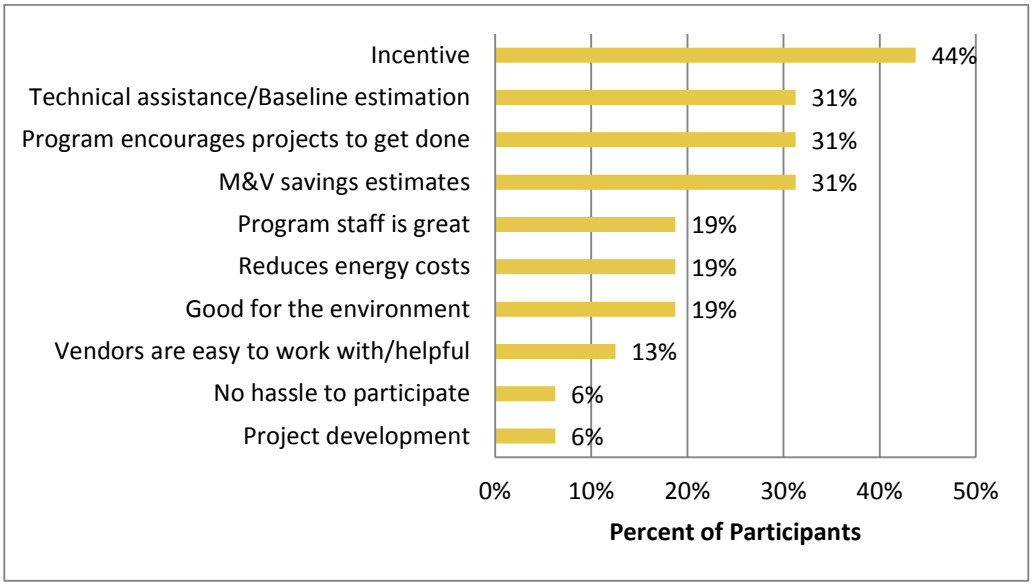
5 Process Evaluation

The participating customer surveys previously discussed were also the primary data source for this Process evaluation component. Findings are based on feedback on the strengths and weaknesses of the program. This scope was narrowly defined, since more expansive Process feedback is already provided via the overarching Process evaluation study for Business programs.

5.1 Program Strengths

With respect to the program's strengths, participants most commonly reported appreciation for the program incentives (44%), the technical assistance provided (31%), the motivation it gave them for pursuing a greater level of energy efficiency in their facility (31%), and an independent source and validation of savings estimates (31%), as shown in Figure 5-1.

Figure 5-1. Participant Perspectives on Program Strengths



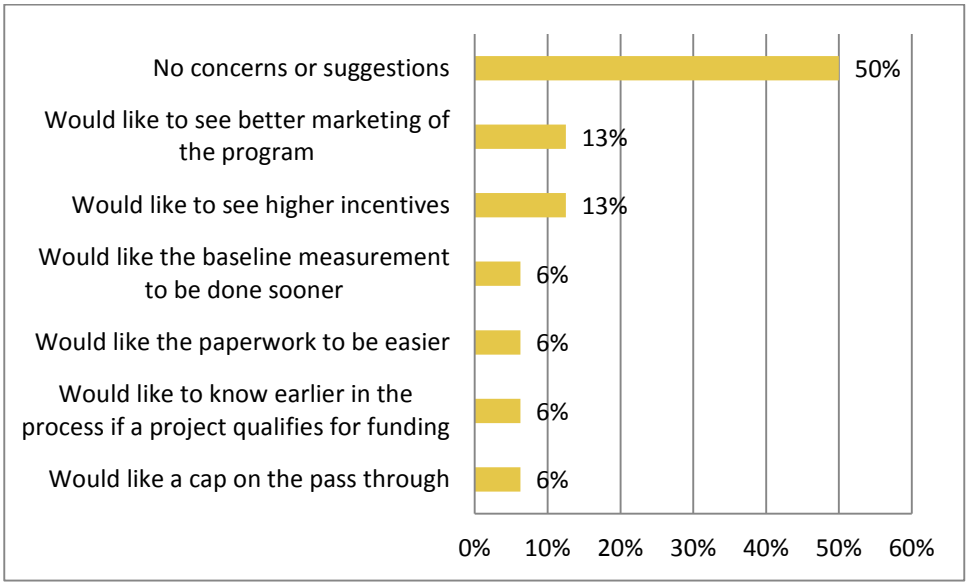
Source: Evaluation Team analysis

Other strengths were also mentioned. Two participants noted that as a result of participating in the data center program they now have formalized corporate policy or guidelines to help them make decisions regarding energy efficiency equipment.

5.2 Program Weaknesses

Participating customers were also asked to provide feedback on the program's weaknesses and potential areas of improvement. Participants most commonly reported that they had no concerns or suggestions (50%), as shown in Figure 5-2.

Figure 5-2. Participant Perspectives of the Program Concerns or Suggestions



Source: Evaluation Team analysis

Two respondents mentioned that they would like to see better marketing of the program:

> *"I wouldn't have known about the program if not for the contractor. We would like to know more about the other ComEd offerings."*

> *"We had installed a server and I didn't realize the rebate program could have helped. We saved significant energy from this, and it would be great to access rebate funds."*

Increased incentives were also mentioned by two respondents, who, noted that other states offered higher incentives:

> *"Incentive very low in this case relative to what we saw in NY. Maybe 1/3 of what we got per kWh in NY. Consider increasing incentive amount per kWh."*

> *"Our biggest concern is the level of the rebate $0.07/kWh is not enough. A lot more projects would be done with higher rebates. Other places are paying $0.09/kWh, one is paying $0.23/kWh."*

One participant mentioned accelerating the timeline for the baseline measurement:

> *"Set it up so that as soon as an application is approved, the process of measuring baseline energy use can begin, rather than waiting until there is a green light on the project itself. This wastes valuable time and holds back the project."*

One participant mentioned the paperwork was difficult to understand:

> *"The paperwork is burdensome. It could be easier for the layperson to understand the eligibility of the program and the application process."*

And finally, one participant was unaware of the "Early Commitment" incentive requirement:

> *"I've done a few projects through Smart Ideas. Funding availability is sometimes uncertain. Need to know firmly and up front. Provide certainty earlier re availability of funding. Once you start talking with someone, just be able to accelerate the process. On the corporate/customer side it will always be a slow process of finding the money. It's inherently painful, and gets more so when there are question marks on the ComEd end, in terms of hanging in the balance on whether a project will get incentive funding."*

6 Findings and Recommendations

The PY6 Data Centers program gross energy impact realization rate of 0.97 and demand realization rate of 0.92 is above average for a program that involves custom calculation methods based on site specific M&V, and analysis of complex and/or emerging technologies. These PY6 evaluation results reflect a program that is well run and technically competent in addressing an array of impact estimation and program design challenges. Based on these findings, it appears that the program is off to a very good start and is well-positioned to use solid M&V practices in the future, as the project and measure mix becomes more complex.

Key evaluation findings and recommendations include the following:

Measurement and Estimation of Power Factor

Finding 1. For several projects, the program M&V activities did not accurately determine power factor values. The program-reported power factor was found to be significantly higher than the typical values for data center cooling equipment (e.g., CRACs, fans and pumps). The program generally calculates cooling equipment power usage using power factor which results in overestimation of savings. The evaluation team performed independent measurements and adjusted site specific savings calculations which resulted in reductions of savings (e.g., Projects #20611, #21708, #21084, #19212, #22053 and #19775).

Recommendation 1. The program should ensure that measurements taken are within the typical range for the cooling equipment. For power factor measurements that exceed the typical or nameplate value, multiple spot measurements should be taken to confirm the accuracy of the measurements. As a reliable comparison, a typical value of 0.79 for cooling equipment and 0.98 for VFD controlled cooling equipment can be used.

- Take measurements at the panel or leads associated with the cooling equipment instead of taking readings from display screens.
- When metering multiple pieces of same equipment type, the program should consider using a kW logger that is capable of measuring voltage and power factor for a portion of the measurements. The data collected using kW loggers can be used to estimate power factor for similar equipment usage profiles captured using amperage loggers.

Normalizing Savings to account for IT load changes.

Finding 2. The program normalized savings to account for changes in IT load without verifying if the changes in energy usage of the cooling equipment are technically feasible i.e., consistent with the equipment operating strategies, usage profiles and characteristics. In several cases, a simple ratio of pre to post IT loads was applied to adjust the savings (e.g., Projects 15879, 17146, 19212, 20611, 21084, and 21708).

Recommendation 2. The program should examine if the changes to energy usage of the cooling equipment due to changes in IT load are technically feasible i.e., consistent with equipment operations. The equipment affected by the installed measure should be analyzed based on observed or typical operating conditions.

- For example, if the measure involves a fan or a pump that was operating at a constant speed in the baseline condition, the operation of that equipment would not change along with IT loads. Under these circumstances, normalizing savings for IT load changes is not a valid approach.

Finding 3. For IT load changes, the program claimed savings for auxiliary cooling equipment (e.g., fans, pumps) in addition to the main cooling equipment (chiller/CRAC). However, the program did not provide any supporting data to establish savings for auxiliary cooling equipment (e.g., Project #15879).

Recommendation 3. The program should use the efficiency of the main cooling equipment (chiller/CRAC efficiency) for estimating the effect on system operation and energy use due to change in IT load. Auxiliary equipment savings (e.g., fans, pumps) should be verified. The auxiliary equipment changes should be analyzed based on equipment operating conditions (e.g., variable or constant flow) since these savings can have a high degree of uncertainty, especially when changes in IT load are minor.

- For example, for pumps and fans the flows and pressures, including the changes, should be verified to determine the savings validity. The operation of the pumps should be logged or trended as possible to determine the changes in flow.

Sample size selection for metering

Finding 4. The program did not follow a sampling plan to select measure equipment for metering (e.g., Project #21084).

Recommendation 4. When sampling is used to select program equipment for metering, the sample size should be calculated to meet 80/20 confidence/precision and 0.5 variance criteria. For projects with several units of equipment operating at variable loads, sampling is critical for estimating average load for the equipment.

Calibrating logged or trended data

Finding 5. The program used logged and trended amperage data without calibration. There were many sets of logged data for which the average logged amperage was significantly different than the spot measurements.

Recommendation 5. The program should ensure that logged and trended data is accurate. A calibrated meter should be used to take spot measurements at the time of logger deployment. If the spot measurement indicates that the logged or trended data is inaccurate, the data should be adjusted accordingly. For example, if the spot measurement is higher than the concurrent logged data point by 10%, the logged data readings should be adjusted by 10%.

Net-to-Gross Ratio Research

Finding 6. The Evaluation Research Findings NTG ratio is 0.61 for kWh and 0.58 for kW. Although improved from the values in PY5, these values still indicate significant free ridership, particularly among the small and medium-sized stratum 2 and 3 projects.

Recommendation 6. ComEd should consider adopting procedures to limit or exclude known free riders by conducting screening for high free ridership on a project-by-project basis. In addition, each of these strategies is designed to reduce free ridership in the program.

Better marketing of the Early Commitment Option

Finding 7. One customer was unaware of the Early Commitment Option and made the suggestion to provide earlier certainty about funding.

Recommendation 7. The program should consider informing customers and/or Trade Allies about the Early Commitment option. Currently, the evaluation team understands, there are not many projects signing up for this offer, however, better marketing strategy (e.g., emails) can be considered if this option were to be continued for future program years.

More clarity within the tracking database

Finding 8. In addition to projects belonging to the Data Centers Efficiency program, the tracking database extract included projects from other programs. In many cases it was not immediately apparent how a given project/record was aligned with a specific program.

Recommendation 8. ComEd should ensure the measure field (Measure Number) within the tracking database identifies the program name for all projects so that the evaluation team and the program staff can clearly identify the projects from the Data Centers Efficiency program vs. projects from other programs

7 Appendix

7.1 Net-to-Gross Scoring Algorithm

Table 7-1. Basic Net-to-Gross Scoring Algorithm for the PY6 Data Centers Program

Scoring Element	Calculation
Program Components score. The maximum score (on a scale of 0 to 10 where 0 equals not at all influential and 10 equals very influential) among the self-reported influence level the program had for: A. Availability of the program incentive B. Technical assistance from utility or program staff C. Recommendation from utility or program staff D. Information from utility or program marketing materials E. Endorsement or recommendation by a utility account rep F. Recommendation from vendor or Technical Service Provider[12].	Maximum of A, B, C, D, E, and F
Program Influence score. "If you were given a TOTAL of 10 points that reflect the importance in your decision to implement the <ENDUSE>, and you had to divide those 10 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 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[13]
PY6 Project level Net-to-Gross Ratio (ranges from 0.00 to 1.00)	1 – Project level Free-ridership
Apply score to other end-uses within the same project?	If yes, assign score to other end-uses of the same project
Apply score to other projects of the same end-use?	If yes, assign score to same end-use of the additional projects

[12] Only applicable for sites that indicated a vendor influence score greater than maximum of the other program element scores or those sites that had a study performed by a Technical Service Provider.

[13] There are exceptions to the general framework, notably: (1) when the decision-maker indicates absolute certainty of installing the same project in the program's absence by assigning a probability a 10 out of a possible 10 points. In such cases, the Program Components Score is eliminated from the calculation. (2) when the decision-maker provides inconsistent responses to certain critical questions, and they decline to resolve the inconsistency during the interview, the inconsistent responses and associated scores are thrown out; (3) when survey responses overall are inconsistent with the "story" behind the project, the evaluation team reserves the right to throw out that specific sample point.

7.2 Survey Instruments

7.2.1 Technical Service Providers

Technical Services Provider NTG Survey Instrument – for ComEd Custom Programs – Data Center version – PY6

Introduction

AA1 Hello, this is _____ from Itron calling on behalf of ComEd. THIS IS NOT A SALES CALL. I am calling about your firm's recent involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY_DATE>._____Our records indicate that ...<%CONTACT>... would be the person most knowledgeable about this. Is he/she available?

1 Yes AA5
2 No AA2
88 RefusedThank and Terminate
99 Don't know Thank and Terminate

AA2 Who would be the person most knowledgeable about your firm's involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY_DATE>?

1 Record name AA3
88 RefusedThank and Terminate
99 Don't know Thank and Terminate

AA3 May I speak with him/her?

1 Yes AA4
2 No (not available right now) SCHEDULE APPOINTMENT

AA4 Hello, this is _____ from Itron calling on behalf of ComEd...THIS IS NOT A SALES CALL. I was told that you are the person most knowledgeable about your firm's involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY_DATE>. __Is this correct?

1 Yes A2
2 No, there is someone else (RECORD NAME AND ASK TO BE TRANSFERRED) AA5
3 No and I don't know who to refer you to Thank and Terminate
88 RefusedThank and Terminate
99 Don't know Thank and Terminate

AA5 Am I speaking with ..<%BETTER_CONTACT> ...the representative of your company that worked with ...<%CUSTOMER>... during the time that your firm conducted a technical assessment study sponsored by ComEd? This study was conducted on approximately... <%STUDY_DATE>.

1 Yes A2

2 Yes, but we need to make an appointment. Reschedule appt.
3 No but I will give you to the correct person. AA4
88 RefusedThank and Terminate
99 Don't know Thank and Terminate

Before we start, I would like to inform you that for quality control purposes, this call may be monitored by my supervisor. For the sake of expediency, we will be recording this interview.

A1 <%CUSTOMER>... has indicated that your firm conducted a technical assessment study sponsored by ComEd in which you recommended that they install <MEASURE>. ___Is this correct?…

1 Yes A2
2 No Thank and Terminate
88 RefusedThank and Terminate
99 Don't know Thank and Terminate

[READ] For the sake of expediency, during the balance of the interview, we will be referring to the <%PROGRAM> as the PROGRAM and we will be referring to the installation of ... <%MEASURE> as the MEASURE. I will repeat this from time to time during the interview as your organization may have installed more than one measure through more than one program.

I am going to ask you to rate the importance of the ComEd Smart Ideas for Your Business in influencing your decision to recommend this <%MEASURE> to ...<%CUSTOMER>.. Think of the degree of importance as being shown on a scale with equally spaced units from 0 to 10, where 0 means not at all important and 10 means very important, so that an importance rating of 8 shows twice as much influence as a rating of 4.

V3 Using this 0 to 10 likelihood scale where 0 is NOT AT ALL LIKELY and 10 is EXTREMELY LIKELY, if the ComEd Smart Ideas for Your Business PROGRAM, including incentives as well as program services and information, had not been available, what is the likelihood that you would have recommended this specific <%MEASURE> to ...<%CUSTOMER>?
Record 0 to 10 score (_____) V4
88 RefusedV4
99 Don't know V4

V4 Approximately, in what percent of sales situations did you recommend this <%MEASURE> before you became involved with the ComEd Smart Ideas for Your Business PROGRAM?
% Record PERCENTAGE V5
88 Don't know V5
99 RefusedV5

V5 And approximately in what percent of sales situations do you recommend this <%MEASURE> now that you have worked with the ComEd Smart Ideas for Your Business PROGRAM?
% Record PERCENTAGE V6a

88 Don't know V6a
99 RefusedV6a

V6a In what other ways has the ComEd Smart Ideas for Your Business PROGRAM influenced your recommendation that a customer install this <%MEASURE>?
1 Record FIRST mention V6aa
2 Record SECOND mention V6aa
3 Record THIRD mention V6aa
4 No other way V7a
88 Refusedv7a
99 Don't know V7a

IF V6a not '.' THEN ASK, ELSE V6ab
V6aa Using a 0 to 10 scale, how important was <%FIRST_MENTION> in your recommendation that a customer install this <%MEASURE>?
Record 0 to 10 score (_____) V6b
88 Don't know V6b
99 RefusedV6b

IF V6a not '.' THEN ASK, ELSE V6ac
V6ab Using a 0 to 10 scale, how important was <% SECOND _MENTION> in your recommendation that a customer install this <%MEASURE>?
Record 0 to 10 score (_____) V6b
88 Don't know V6b
99 RefusedV6b

IF V6a not '.', THEN ASK, ELSE V7a
V6ac Using a 0 to 10 scale, how important was <% THIRD _MENTION> in your recommendation that a customer install this <%MEASURE>?
Record 0 to 10 score (_____) V6b
88 Don't know V6b
99 RefusedV6b

V7b And how important was the information provided by the ComEd website in your recommendation that a customer install this MEASURE?
Record 0 to 10 score (_____) V7c
88 Don't know V7c
99 RefusedV7c

V7c And how important was your firm's past participation in a rebate or audit program sponsored by ComEd in your recommendation that a customer install this MEASURE?
Record 0 to 10 score (_____) V8
88 Don't know V8
99 RefusedV8

IF VENDOR ALSO STOCKS AND SELLS PROGRAM QUALIFYING <%MEASURE> THEN ASK. ELSE SKIP TO V9.

V8 Approximately, what percentage of your sales over the last 12 months of this...<%MEASURE > installed in ComEd 's service territory are energy efficient models…that qualify for incentives from the program?

%	Record PERCENTAGE	V9
88	Don't know	V9
99	Refused	V9

V9 In what percent of sales situations do you encourage your customers in ComEd 's service territory to purchase this program qualifying ...<%MEASURE >...?

%	Record PERCENTAGE	V9a
88	Don't know	V10
99	Refused	V10

IF V9 < 100% THEN ASK. ELSE V10.

V9a In what situations do you NOT encourage your customers to purchase this program qualifying ...<%MEASURE >...? And why is that?

77	RECORD VERBATIM	V10
88	Refused	V10
99	Don't know	V10

V10 Of those installations of ...<%MEASURE >... in ComEd 's service territory that qualify for incentives, approximately what percentage do not receive the incentive?

%	Record PERCENTAGE	V11
88	Don't know	V12
99	Refused	V12

IF V10 >> 0;

V11 Why do you think they do not receive the incentive?

77	RECORD VERBATIM	V12
88	Refused	V12
99	Don't know	V12

V12 Do you also sell ...<%MEASURE> in areas where customers do not have access to incentives for energy efficient models?

1	Yes	V13
2	No	V14
88	Refused	V14
99	Don't know	V14

IF VENDOR ALSO STOCKS AND SELLS PROGRAM QUALIFYING <%MEASURE> THEN ASK. ELSE SKIP TO V15.

V13 About what percent of your sales of program-qualifying...<%MEASURE > ... are represented by these areas where incentives are not offered?
% Record PERCENTAGE V14
88 Don't know V14
99 RefusedV14

V14 Have you changed your stocking practices for <%MEASURE> as a result of ComEd 's Program? [IF NEEDED: BY STOCKING PRACTICES, I MEAN THE TYPES OF EQUIPMENT YOU SUPPLY AND SELL IN ComEd 's SERVICE TERRITORY.]
1 Yes V15
2 No V15
88 RefusedV15
99 Don't know V15

IF V12=1
V15 Do you promote energy efficient equipment, such as <%MEASURE>, equally in areas with and without incentives??
1 Yes V16
2 No V16
88 RefusedV16
99 Don't know V16

V16 Do you know of any other vendors that worked with ...<%CUSTOMER>... during their implementation and/or installation of ...<%MEASURE>, for example engineers or designers?
1 Yes V16a
2 No V17
88 RefusedV17
99 Don't know V17

V16a Do you have their business name?
77 RECORD Business name and contact's name and phone number(s) V17
88 RefusedV17
99 Don't know V17

V17 [IF NEEDED] And finally, for verification purposes only, may I please have your first name?

77 RECORD VERBATIM END

END Those are all the questions I have for you today. Thank you very much for your time.

END OF SURVEY

7.2.2 Vendor NTG Survey Instrument

Vendor NTG Survey Instrument – for ComEd Custom Programs – Data Center version – PY6

Introduction

AA1 Hello, this is _____ from Itron calling on behalf of ComEd. THIS IS NOT A SALES CALL. I am calling about your firm's recent involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY_DATE>._____Our records indicate that ...<%CONTACT>... would be the person most knowledgeable about this. Is he/she available?

1	Yes	AA5
2	No	AA2
88	Refused	Thank and Terminate
99	Don't know	Thank and Terminate

AA2 Who would be the person most knowledgeable about your firm's involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY_DATE>?

1	Record name	AA3
88	Refused	Thank and Terminate
99	Don't know	Thank and Terminate

AA3 May I speak with him/her?

1	Yes	AA4
2	No (not available right now) SCHEDULE APPOINTMENT	

AA4 Hello, this is _____ from Itron calling on behalf of ComEd...THIS IS NOT A SALES CALL. I was told that you are the person most knowledgeable about your firm's involvement conducting a technical assessment study sponsored by ComEd for ...<%CUSTOMER>'s... through ... the ComEd Smart Ideas for Your Business PROGRAM ... on approximately...<%STUDY_DATE>. __Is this correct?

1	Yes	A1
2	No, there is someone else (RECORD NAME AND ASK TO BE TRANSFERRED)	AA5
3	No and I don't know who to refer you to	Thank and Terminate
88	Refused	Thank and Terminate
99	Don't know	Thank and Terminate

AA5 Am I speaking with <%BETTER_CONTACT> ...the representative of your company that worked with ...<%CUSTOMER>... during the time that your firm conducted a technical assessment study

sponsored by ComEd? This study was conducted on approximately... <%STUDY_DATE>.

1	Yes	A1
2	Yes, but we need to make an appointment.	Reschedule appt.
3	No but I will give you to the correct person.	AA4
88	Refused	Thank and Terminate
99	Don't know	Thank and Terminate

Before we start, I would like to inform you that for quality control purposes, this call may be monitored by my supervisor. For the sake of expediency, we will be recording this interview.

A1 Our records indicate that your firm conducted a technical assessment study sponsored by ComEd in which you recommended that <%CUSTOMER> install <%MEASURE1 - %MEASURE3>. ___Is this correct?…

1	Yes	A2
2	No	Thank and Terminate
88	Refused	Thank and Terminate
99	Don't know	Thank and Terminate

[DO NOT READ: The following question will determine if we ask about influences on their recommendations. Please be sure to be thorough with this question. If they truly only installed this equipment, then a "No" is fine]

LOOP/ASK FOR EACH MEASURE (1-3)

A2 As <%CUSTOMER>'s vendor, did you recommend the installation of this <%MEASUREx>?

1	Yes	A3
2	No	A3
88	Refused	A3
99	Don't know	A3

A3 Can you please explain what was your firm's involvement with ...<%CUSTOMER>'s ... implementation of <%MEASUREx>? [IF NEEDED: were they just an order taker, were they just equipment suppliers, or were they instrumental in what equipment was selected?.....if they were instrumental, then you need to go back and correct the answer to the previous question.]

77	RECORD VERBATIM	A3a
88	Refused	Thank and Terminate
99	Don't know	Thank and Terminate

A3a Does your company currently stock and sell <%MEASUREx>s?

1	Yes	V2
2	No	V2
88	Refused	V2
99	Don't know	V2

[READ] For the sake of expediency, during the balance of the interview, we will be referring to the <%PROGRAM> as the PROGRAM and we will be referring to the installation of ... <%MEASURE> as the MEASURE. I will repeat this from time to time during the interview as your organization may have installed more than one measure through more than one program.

I am going to ask you to rate the importance of the ComEd Smart Ideas for Your Business in influencing your decision to recommend this <%MEASUREx> to ...<%CUSTOMER>.. Think of the degree of importance as being shown on a scale with equally spaced units from 0 to 10, where 0 means not at all important and 10 means very important, so that an importance rating of 8 shows twice as much influence as a rating of 4.

V2 Using this 0 to 10 scale where 0 is NOT AT ALL IMPORTANT and 10 is EXTREMELY IMPORTANT, how important was the ComEd Smart Ideas for Your Business PROGRAM, including incentives as well as program services and information, in influencing your decision to recommend that ...<%CUSTOMER>... install the energy efficiency <%MEASUREx> at this time?

\# Record 0 to 10 score (_____) V3
88 RefusedV3
99 Don't know V3

V3 And using a 0 to 10 likelihood scale where 0 is NOT AT ALL LIKELY and 10 is EXTREMELY LIKELY, if the ComEd Smart Ideas for Your Business PROGRAM, including incentives as well as program services and information, had not been available, what is the likelihood that you would have recommended this specific <%MEASUREx> to ...<%CUSTOMER>?

\# Record 0 to 10 score (_____) V4
88 RefusedV4
99 Don't know V4

V4 Approximately, in what percent of technical assessment studies did you recommend this <%MEASUREx> before you learned about the ComEd Smart Ideas for Your Business PROGRAM?

% Record PERCENTAGE V5
88 Don't know V5
99 RefusedV5

V5 And approximately in what percent of technical assessment studies do you recommend this <%MEASUREx> now that you have worked with the ComEd Smart Ideas for Your Business PROGRAM?

% Record PERCENTAGE V6a
88 Don't know V6a
99 RefusedV6a

V6a In what other ways has the ComEd Smart Ideas for Your Business PROGRAM influenced your recommendation that a customer install this <%MEASUREx>?

1 Record FIRST mention V6aa
2 Record SECOND mention V6aa

3	Record THIRD mention		V6aa
4	No other way		V7b
88	Refused	v7b	
99	Don't know		V7b

IF V6a=1 THEN ASK, ELSE V6ab

V6aa Using a 0 to 10 scale, how important was <%FIRST_MENTION_IN_V6A> in your recommendation that a customer install this <%MEASUREx>?

#	Record 0 to 10 score (_____)	V6ab
88	Don't know	V6ab
99	Refused	V6ab

IF V6a=2 THEN ASK, ELSE V6ac

V6ab Using a 0 to 10 scale, how important was <%SECOND _MENTION_IN_V6A > in your recommendation that a customer install this <%MEASUREx>?

#	Record 0 to 10 score (_____)	V6ac
88	Don't know	V6ac
99	Refused	V6ac

IF V6a=3 THEN ASK, ELSE V7a

V6ac Using a 0 to 10 scale, how important was <%THIRD _MENTION_IN_V6A > in your recommendation that a customer install this <%MEASUREx>?

#	Record 0 to 10 score (_____)	V7b
88	Don't know	V7b
99	Refused	V7b

V7b And how important was the information provided by the ComEd website in your recommendation that a customer install this MEASURE?

#	Record 0 to 10 score (_____)	V7c
88	Don't know	V7c
99	Refused	V7c

V7c And how important was your firm's past participation in a rebate or audit program sponsored by ComEd in your recommendation that a customer install this MEASURE?

#	Record 0 to 10 score (_____)	V8
88	Don't know	V8
99	Refused	V8

IF VENDOR ALSO STOCKS AND SELLS PROGRAM QUALIFYING <%MEASURE> (if A3a=1) THEN ASK V8. ELSE SKIP TO V15.

V8 Approximately, what percentage of your sales over the last 12 months of this...<%MEASUREx >, installed in ComEd 's service territory, are energy efficient models…that qualify for incentives from the program?

%	Record PERCENTAGE	V9
88	Don't know	V9

99	Refused	V9

V9 In what percent of sales situations do you encourage your customers in ComEd 's service territory to purchase this program qualifying ...<%MEASUREx >...?

%	Record PERCENTAGE	V9a
88	Don't know	V10
99	Refused	V10

IF V9 < 100% THEN ASK. ELSE V10.

V9a In what sale situations do you NOT encourage your customers to purchase this program qualifying ...<%MEASUREx >...? And why is that?

77	RECORD VERBATIM	V10
88	Refused	V10
99	Don't know	V10

V10 Of those installations of ...<%MEASUREx>... in ComEd 's service territory that qualify for incentives, approximately what percentage do not receive the incentive? (Note: Wildan stated that vendor may not know this)

%	Record PERCENTAGE	V11
88	Don't know	V12
99	Refused	V12

IF V10 >> 0;

V11 Why do you think they do not receive the incentive?

77	RECORD VERBATIM	V12
88	Refused	V12
99	Don't know	V12

V12 Do you also sell ...<%MEASUREx> in areas where customers do not have access to incentives for energy efficient models?

1	Yes	V13
2	No	V14
88	Refused	V14
99	Don't know	V14

V13 About what percent of your sales of program-qualifying...<%MEASUREx> ... are represented by these areas where incentives are not offered?

%	Record PERCENTAGE	V14
88	Don't know	V14
99	Refused	V14

V14 Have you changed your stocking practices for <%MEASUREx> as a result of ComEd 's Program? [IF NEEDED: BY STOCKING PRACTICES, I MEAN THE TYPES OF EQUIPMENT YOU SUPPLY AND SELL IN ComEd 's SERVICE TERRITORY.]

1	Yes	V15

2 No V15
88 RefusedV15
99 Don't know V15

IF V12=1

V15 Do you promote energy efficient equipment, such as <%MEASUREx>, equally in areas with and without incentives??

1 Yes V16
2 No V16
88 RefusedV16
99 Don't know V16

V16 Do you know of any other vendors that worked with ...<%CUSTOMER>... during their implementation and/or installation of ...<%MEASUREx>, for example engineers or designers?

1 Yes V16a
2 No V17
88 RefusedV17
99 Don't know V17

V16a Do you have their business name?
77 RECORD Business name and contact's name and phone number(s) V17
88 RefusedV17
99 Don't know V17

LOOP ABOVE QUESTIONS FOR MEASURE1-3

PROCESS MODULE

V17 And finally, for verification purposes only, may I please have your first name?
77 RECORD VERBATIM END

END Those are all the questions I have for you today. Thank you very much for your time.

END OF SURVEY