



# ComEd Standard Combined Evaluation Report

**Energy Efficiency / Demand Response Plan:  
Plan Year 9 (PY9)**

**Presented to  
ComEd**

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## 1. INTRODUCTION

This report combines the key deliverables from the evaluation of the Standard Program for PY9. Each of these deliverables were drafted, reviewed and finalized during the course of the PY9 evaluation.

**APPENDIX A. COMED STANDARD – EVALUATION RESPONSE TO CONCERNS ON  
M&V APPROACH\_2018-01-16**

**To:** Erin Daughton, Martin Montes, Ashley Harrington, ComEd;  
Andrey Gribovich, DNV-GL,  
**CC:** Rob Neumann, Jeff Erickson, Randy Gunn, Navigant; Jennifer Morris, ICC Staff  
**From:** Charles Ampong, Rick Berry, Navigant; Ryan Kroll, John Flotterud, Michaels Energy  
**Date:** January 16, 2018  
**Re:** Standard Program - Evaluation Response to Concerns on M&V Approach

## Introduction

The Standard evaluation team have discussed with ComEd and the ICF/DNV-GL team, the preliminary results from the M&V of a sample of PY9 Standard projects. The discussion generated three questions that required further evaluation consideration.

1. Clarification of what triggers code baselines and how they are applied.
2. The possibility of claiming savings associated with projects that do not meet program criteria.
3. Clarification of evaluation approach to Energy Management Systems (EMS) savings verification.

This memo provides the evaluation team's response to the above questions, while taking into account ComEd and the implementer's perspective on addressing these topics going forward.

## Energy Code Baseline

### Code Triggers and Application

Code baselines are triggered when a facility adds a new system or completely changes the system types of equipment that is defined by code. Frequently, this equates to instances where equipment is not being retrofitted. Chapter 5 of the 2015 International Energy Conservation Code (IECC 2015)<sup>1</sup> provides definitions on code compliance for additions and alterations. Regarding VSDs, code requires that building additions<sup>2</sup> and alterations<sup>3</sup> comply with the applicable code sections. The evaluation team has historically interpreted these code texts to require VSDs on any new or replaced motor on an HVAC system. Upon further review of the code and multiple organizations interpretation of the code, the evaluation team determined that this position is an overly strict interpretation of the code.

### Resolution

The evaluation team has reviewed the PY9 sample projects and credited savings for projects that were previously disqualified for this reason. This includes projects 30976 and 32315.

## Non-Qualified Equipment Savings

This discussion topic involves projects which upon evaluation, do not meet program criteria but may still result in energy savings. Table 1 shows two sampled projects of what this memo refers to as non-qualified equipment (NQE).

<sup>1</sup> Chapter 5 Existing Buildings, Section C501, 2015 International Energy Conservation Code, <https://codes.iccsafe.org/public/document/IECC2015/chapter-5-ce-existing-buildings>

<sup>2</sup> C502.2.3 Building mechanical systems. "New mechanical systems and equipment that are part of the *addition* and serve the building heating, cooling and ventilation needs shall comply with Section C403."

<sup>3</sup> C503.4 Heating and cooling systems. "New heating, cooling and duct systems that are part of the *alteration* shall comply with C403."

**Table 1. Wave 1 Projects with Non-Qualified Equipment**

Project ID	Description of Issue	Ex Ante Savings (kWh)
33622	<p>Project claimed savings for a program qualified hybrid injection molding machine but evaluation found equipment to be a standard (baseline) hydraulic unit which does not meet program requirement. Although the machine was equipped with a variable-speed drive (VSD) to control the hydraulic pumps, which would result in about 20% savings when compared to non-VSD hydraulic pumps.</p> <p><b>Evaluation:</b> The evaluation team has determined a verified savings of zero for this project, on the basis that the installed equipment must meet the prescriptive program criteria and/or TRM requirements to result in eligible savings. The evaluation did not find a justification for counting the VSD savings after reviewing the technical requirements in the ComEd HVAC VSD Workpaper. The workpaper was not intended for industrial process application. Details of our conclusion is provided in the Evaluation Perspective section of this document.</p>	218,922
31925	<p>Upon evaluation, the VSDs on HVAC supply and cooling tower fans were found to be controlling evaporator and condenser fans in a refrigerated warehouse. This project resulted in energy savings, though neither the IL TRM nor the ComEd Standard PY9 Workpapers<sup>4</sup> provide guidance on calculating savings for this application (process refrigeration).</p> <p><b>Evaluation:</b> The evaluation team has determined a verified and research savings of zero based on the conclusions of the Evaluation Perspective section below.</p>	374,397

Source: ComEd Standard PY9 Wave 1 data

## Implementation Perspective

The program implementer (contended that the savings from projects 33622 and 31925 should be acceptable based on two reasons.

1. The customer received an incentive for the project and participated in the same process as a typical ComEd Standard Program participant. The program influenced these customers under the same mechanisms as most program participants.
2. The project is generating energy savings. Depending on the project, the savings may be more or less than the ex ante estimate.

## Evaluation Perspective

The evaluation team referred to the guidance provided by Policy Document for the Illinois Statewide Technical Reference Manual<sup>5</sup> and the eligibility criteria as provided in the HVAC VSD Workpaper to determine that the savings from these projects should not be included.

**“Savings Verification:** An evaluation process that independently verifies program savings achieved through prescriptive measures. This process verifies that the TRM was applied correctly and consistently by the program being investigated, that the measure level inputs to the algorithm were correct, and that the quantity of measures claimed through the program are correct and in place and operating. The results of savings verification may be expressed as a program savings realization rate (verified ex post savings / ex ante savings). Savings verification may also result in recommendations for further evaluation research and/or field (metering) studies to increase the accuracy of the TRM savings estimate going forward.”

<sup>4</sup> Despite being on the VSD Incentive Worksheet, application to process fans is explicitly forbidden in the ComEd Workpapers: “application on compressed air, process motors and data centers are not applicable.” ComEd Standard Program Year 9 Workpapers, p. 102.

<sup>5</sup> Policy Document for the Illinois Statewide Technical Reference Manual for Energy Efficiency, Final. October 25, 2012. [http://ilsagfiles.org/SAG\\_files/Technical\\_Reference\\_Manual/Policy%20Document%20for%20IL%20TRM%2010-25-12.pdf](http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Policy%20Document%20for%20IL%20TRM%2010-25-12.pdf)

**“Prescriptive:** The TRM is intended to define all prescriptive measures. Prescriptive measures refer to measures offered through a standard offering within programs. The TRM establishes energy savings algorithm and inputs that are defined within the TRM and may not be changed by the Program Administrator, except as indicated within the TRM.”

The evaluation team interprets these passages to require that installed equipment meet TRM and program criteria to result in eligible savings. Specifically, this text advises that the evaluation process is intended to “[verify] that the TRM was applied correctly and consistently by the program being investigated.” Claiming savings on NQE projects does not qualify as consistent treatment. By design, these projects should be screened out during the application process and referred to the Custom program.

The Policy Document also appears to limit the type of adjustments made to TRM algorithms and input values: “[the] TRM establishes energy savings algorithm and inputs that are defined within the TRM and may not be changed by the Program Administrator, except as indicated within the TRM.” The evaluation team interprets this to mean that deviations, such as creating new algorithms or input values for equipment or applications outside of the scope of the TRM measure or program workpaper, are prohibited.

Additionally, there are significant ramifications to deciding in favor of including NQE savings.

1. There is a conflict of interest for program implementers to screen out NQE projects if savings can be claimed.
2. The decision would likely be used by other Illinois utilities (Nicor Gas, Peoples Gas, North Shore Gas, and Ameren) to justify claiming savings from NQE.
3. The arguments used to justify this decision could also be used to defend claiming savings in cases where customers thought they were going to get an incentive but did not, due to equipment specifications (savings would still need to be actually occurring).

### **Comments on HVAC VSD Workpaper**

Regarding projects 33622 and 31925 in Table 1, Navigant reconsidered the verified savings using an alternative approach. Both projects involved VSDs on industrial process fans or pumps, a measure which was found on the PY9 VSD Incentive Worksheet. While both projects meet the incentive worksheet’s criteria for “VSD on Industrial Process Fan or Pump  $\leq$  200 HP,” the savings methodology within the ComEd PY9 Workpapers<sup>6</sup> is not suitable to apply to industrial process motors. The justification for this position is summarized in the two points below.

1. The workpaper was not intended for industrial process application. The measure description states that “application on compressed air, process motors and data centers are not applicable.” The words “industrial” or “process” are not mentioned (other than to exclude it) in the workpaper, only “motors that do not fall into any of the mapped categories” which Navigant interprets to act as a catch-all to account for miscellaneous HVAC fan or pump motors.
2. The documentation for this measure is inadequate. Due to the wide variety of applications and additional considerations that are required of industrial process projects, this measure is recommended to be processed exclusively as a custom measure. If this is to be a prescriptive measure, the variety of applications and complexity warrant a dedicated workpaper. Within the PY9 workpaper, the “Other” motor type savings is based on the verified results of a sample of 14 past VSD projects, from as recent as PY3.<sup>7</sup> The details of this sample are unclear, including

<sup>6</sup> ComEd Standard Program Year 9 Measures Workpapers, Version 2.0, Effective June 1, 2016.

<sup>7</sup> From ComEd PY9 workpaper: “Savings are based on verified results for VSD applications from ComEd program from inception to the end of October 2010. The VSD size in the sample of 14 projects reviewed varies from 5 to 200 hp.”



whether the sampled projects involved non-HVAC motors, HVAC motors or some combination of the two.

## Resolution

Navigant will not consider NQE savings when estimating verified savings because it found the guidance provided in the IL TRM Policy Document to override the arguments from the implementation perspective. For this reason, and the reason identified in the “Comments on HVAC VSD Workpaper”, projects 33622 and 31925 did not result in verified savings.

Additional considerations are required of industrial process projects or measures, and evaluation recommends projects like 33622 and 31925 are processed exclusively as a custom measure. If they are to be a prescriptive measure, the variety of applications and complexity warrant a dedicated workpaper.

## EMS Evaluation Approach

### Evaluation Methodology

The evaluation approach attempts to follow the protocol detailed in Chapter 19 of the Uniform Methods Project (UMP)<sup>8</sup> for both the analysis methodologies and the testing of model validity. The billing analysis begins with a review of the project files for background information and key dates such as project start and completion. This review will also attempt to identify secondary factors that affect energy usage such as additional projects, occupancy or production changes, major renovations and space type changes. This information is used to help develop the initial billing analysis model.

Specific parameters incorporated in the billing analysis are dependent upon the project. Some projects can be characterized adequately using only outside air temperature or heating and cooling degree-days; while others may require separating weekdays and weekends or seasonal variations such as a summer school schedule. The base temperature for heating and cooling degree-days is set independently. This ensures that the balance points and deadband for the model can be set based on site-specific conditions. A review of the initial model is performed which may lead to specific questions, typically associated with abnormalities at specific times in the utility data.

From this review, several actions can be taken to account for deficiencies in the model. The resulting information is used to make necessary changes to the billing analysis.

1. An additional data request may be made if missing data is suspect or if insufficient time is included in the pre or post periods.
2. The evaluation team may attempt to contact the customer and interview them regarding the installation of the EMS, the building operation both pre and post-retrofit, additional projects completed at the site that would affect energy usage, tenant and space usage changes, or other factors that would affect site energy usage characteristics.
3. Reviews of large projects may involve a survey of meters to identify the meters associated with HVAC energy usage. This can increase the ratio of savings to total usage as well as remove additional variables that affect energy usage.
4. If abnormal energy usage or changes were found in the initial billing analysis, review questions will focus on identifying the causes and deciding how affected data should be handled.

The utility data used in the billing analysis is typically Advance Metering Infrastructure (AMI) data at 30-minute intervals, otherwise monthly customer billing data is used. AMI data allows projects to be

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<sup>8</sup> Romberger, Jeff. (2017). *Chapter 19: HVAC Controls (DDC/EMS/BAS) Evaluation Protocol, The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures*. Golden, CO; National Renewable Energy Laboratory. NREL/SR-7A40-68575. <http://www.nrel.gov/docs/fy17osti/68575.pdf>

evaluated on hourly, daily, and monthly levels. Verified savings are typically reported using a monthly analysis, which results in fewer data points but less variation and higher  $R^2$  values. However, if a project cannot be evaluated at the monthly level, largely due to an insufficient temperature range captured in the post-retrofit data, a daily analysis is then used.

The evaluation team completes a daily analysis for each project with AMI data. While it may not be used to determine the project savings, this analysis provides insight into facility operation such as weekday or weekend schedules, holidays, shutdowns, abnormal operation and seasonal changes. These aspects can be masked in a monthly analysis. The daily analysis can also help design questions to ask the customer about their building operation.

The evaluation team adjusts the billing analysis model to achieve the best possible validity metrics. Frequently, the model results are better than the suggested acceptable values for these metrics, however it is not always possible.

## Key Concerns

Occasionally, the evaluation team is unable to alleviate all concerns and compounding factors from the analysis. If this occurs, the evaluation team is limited to passing the savings through, setting them to zero, or using the billing analysis results even though the validity criteria are outside of the ideal ranges. Three common issues and their resolutions are outlined below.

### Noise

Consideration is given when the ratio of savings to total usage is small. Currently, there is no explicit threshold for this ratio at this time. Professional judgement is relied on to determine the validity of the model on a project-level basis.

- If the ex ante savings and billing analysis results are a small portion of the facilities' energy usage and within the noise of the data, the ex ante savings is passed through.
- If the ex ante savings is not a small portion of total usage, but the billing analysis results are within the noise of the data, the billing analysis is used.

### Model Validity Criteria

Historically, the evaluation team has focused on the coefficient of determination ( $R^2$ ) and root-mean-square error (RMSE) as indicators of the validity of a billing analysis model. The targets for  $R^2$  ( $> 0.85$ ) and RMSE ( $< 20\%$ ) have been considered guidelines and not explicit thresholds, though the evaluation team will consider changing this for the following program year. The UMP<sup>8</sup> does specify additional metrics which the evaluation team will investigate to incorporate into future models. If a billing analysis model does not meet the validity criteria, engineering judgement is used to determine if it should be used to justify verified savings.

### Abnormal or Anomalous Results

Some models may appear to produce abnormal or anomalous results such as extreme realization rates (e.g., 440%, -80%) or large savings-to-usage ratios (e.g.,  $> 50\%$  of total usage). In these cases, the actions enumerated above will be utilized in an attempt to explain the results of the model. Detailed findings are provided in the site-specific measurement and verification reports. If no explanation can be supported, the model may be disregarded and ex ante savings is used.

## Resolution

In Table 2, the evaluation team provides a further review of five EMS projects from Wave 1 sample, to address ComEd and ICF/DNV-GL comments on these projects.

Additionally, the evaluation team will consider research in CY2018 to fortify the statistical analysis of the EMS measure. The goal of this effort will be to develop more transparent and explicit protocols for EMS analysis. However, the EMS analysis will remain a custom analysis of a prescriptive measure which is likely to maintain its limitations. The pre-installation details will continue to be a source of uncertainty which will manifest itself in the model validity criteria. This must be considered when establishing thresholds for model validity and acceptable uncertainty.

**Table 2. Wave 1 EMS Projects with Comments**

Project ID	Description of Issue	Ex Ante Savings (kWh)
32714	<p><b>Implementer:</b> Model has poor R<sup>2</sup> and CV (RMSE) values that fall outside the targets set forth by evaluation team (targets are generally accepted in industry). Model results cannot be considered reliable.</p> <p><b>Evaluation:</b> Ex ante savings are 7.6% of total and evaluated savings are 13% of total usage. The model will be re-evaluated with additional metered data to improve the model criteria. The model validity criteria are within limits for the hourly billing analysis but above the monthly limits according to the UMP. This project completed a daily analysis. R<sup>2</sup> values were not developed and reported for this project. Based on savings percentages this model is valid.</p>	38,753
32367	<p><b>Implementer:</b> Model meets target criteria except savings target. Even in "good" models when dipping under 10% of annual energy savings when performing bill level analysis, the shown energy usage change can be attributed to white noise. This is more pronounced here than in project 31813 as the energy savings change is &lt;1% of annual energy use. Although model is "good," it is unreliable for this level of comparison.</p> <p><b>Evaluation:</b> Ex ante savings are 2.5% and evaluated savings are 2%. This model is being disregarded since the savings are a relatively small percentage of annual energy use. Ex ante savings will be used.</p>	228,831
33535	<p><b>Implementer:</b> Model has poor R<sup>2</sup> values that fall outside the targets set forth by evaluation team (targets are generally accepted in industry). Savings are below 10% total threshold and variations can be a result of noise in limited data. Model results cannot be considered reliable.</p> <p><b>Evaluation:</b> Ex ante savings are 1.7% of total usage while evaluated savings are 5%. We can further review this model but this project could be potentially passed through at 100% for the verified savings.</p>	553,133
32868	<p><b>Implementer:</b> Model has poor R<sup>2</sup>, percent savings and CV (RMSE) values fall outside the targets set forth by evaluation team (targets are generally accepted in industry). Model results cannot be considered reliable.</p> <p><b>Evaluation:</b> Ex ante savings were 14.2% of total usage and evaluated savings are 0% of the bill. Based on the claimed savings the regression model should be viable. A lack of identifiable savings is evidence that the savings are not being achieved. This project will remain at 0%; however additional metered data will be requested and the model will be reviewed again.</p>	584,044
33001	<p><b>Implementer:</b> 24.5% facility energy reduction seems unreasonable for a project that does not affect entire facility. This shows flaws in the evaluator's approach for EMS wherein they ignore/fail to collect information on facility operating changes between pre/post cases and only rely on billing analysis.</p> <p><b>Evaluation:</b> In addition to upgrading one third of the floors, this project also upgraded the central plant which affects the entire building. The energy usage for this project is only the HVAC energy usage. The watts/ft<sup>2</sup> for this building's HVAC system was close to expected for an entire building, so the building was in poor existing condition. No additional updates are needed. Details of the evaluation resolution is provided in the project M&amp;V report already submitted to ComEd.</p>	674,588

**APPENDIX B. ComEd PY9 STANDARD IMPACT EVALUATION REPORT 2018-04-24 FINAL**



# ComEd Standard Program Impact Evaluation Report

**Energy Efficiency / Demand Response Plan:  
Plan Year 9 (PY9)**

**Presented to  
Commonwealth Edison Company**

**FINAL**

*April 24, 2018*

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## 1. INTRODUCTION

This report presents the results of the impact evaluation of ComEd's Program Year 9 (PY9) Standard Program. It presents a summary of the energy and demand impacts for the total program and broken out by relevant measure and program structure details. Section 6 (Appendix 1) presents the impact analysis methodology. PY9 covers June 1, 2016 through December 31, 2017.

## 2. PROGRAM DESCRIPTION

The Standard Program offers prescriptive financial incentives and a streamlined application to facilitate the implementation of cost-effective energy efficiency improvements for non-residential (commercial and industrial) customers and market segments, with a program network of trade allies and service providers. Eligible measures include energy-efficient indoor and outdoor lighting, HVAC equipment, refrigeration, Energy Management Systems (EMS), commercial kitchen equipment, variable speed drives (VSDs), compressed air equipment and other qualifying products. The program implementation contractor transitioned from DNV-GL to ICF International, Inc, starting June 1, 2017. ICF continues to collaborate with DNV-GL for the program day-to-day operations.

ComEd made some key changes in the Standard Program in PY9. Notable program changes made from PY8 to PY9 include:

- Addition of LED screw-based HID replacements, and additional new measure incentives for new compressed air systems, industrial systems, and new refrigeration measures.
- Decrease of incentives for the LED and T8/T5 reduced watts measures, fluorescent lighting retrofits, induction fixtures, and occupancy and vacancy sensors.
- Removal of metal halide measures, bi-level stairwell, hallway or garage fixtures, sensor-controlled wall pack fixtures, and parking garage bi-level fixtures.
- Established the Energy Management Assistance Offer to provide extra incentive rates for completing one or more projects in six month increments up to two years (incentives starting from 26% with 2% decrement).
- Established the Comprehensive Energy Savings Offer to provide extra incentive rates from 20% with 5% increments, for a completion of comprehensive packages; Tier 1 (three project options) up to Tier 3 (five project options) of eligible selected improvements.
- Established the Office Space Offering, which provides financial incentives to property managers or owners to reduce their tenants' electricity use by improving the efficiency of their equipment in building areas primarily used as office. Qualified PY9 measures and customers were eligible for the incentives, starting June 1 through December 31, 2017.
- Established the Made in Illinois Bonus offer, which provides financial incentives to promote installation of new energy-efficient products that are manufactured or assembled in Illinois. Qualified PY9 measures and customers were eligible for the bonus, starting June 1 through December 31, 2017.
- Beginning June 1, 2017, customers that had a peak demand of or over 10 MW for 30 minutes in ComEd's territory were exempted from participating in the ComEd Energy Efficiency Program. This made a list of Standard customers ineligible part way through PY9, and then a new list being ineligible for the next program year.



The program had 4,677 participants in PY9 and implemented 4,839 projects, involving installation of 7,671 measures as shown in the following table and graph. Lighting projects comprised of 81 percent of the measure mix and 83 percent of the participants in PY9. Non-lighting projects comprised of 19 percent of the measure mix and 17 percent of the participants in PY9.

**Table 2-1. PY9 Volumetric Findings Detail**

Participation	Lighting End Use	Non-Lighting End Use	Total
Participants*	4,013	810	4,677
Total Measures†	6,237	1,434	7,671
Installed Projects	4,160	679	4,839

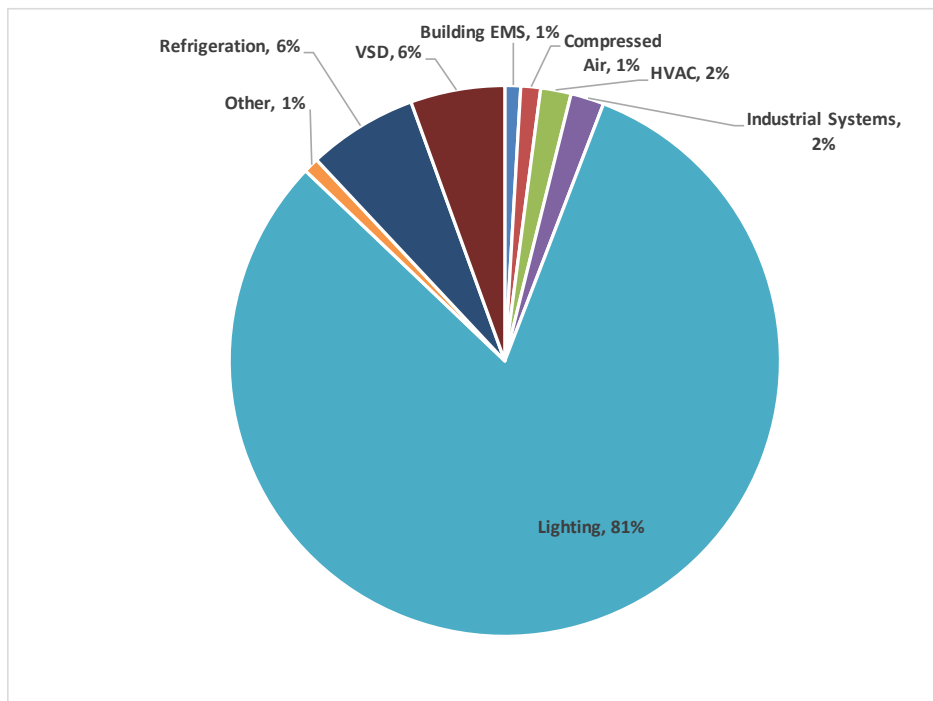
\* Based on project name and site address. The 4,677 excludes 146 participants who installed both lighting and non-lighting measures.

† This is a project-level measure count based on type of measure, not quantities installed.

Source: ComEd tracking data and Navigant team analysis.

Figure 2-1 shows the approximate distribution of measures installed in the PY9 Standard Program.

**Figure 2-1. Number of Measures Installed by End Use**



Source: Evaluation Analysis

### 3. PROGRAM SAVINGS

Table 3-1 summarizes the incremental energy and demand savings the ComEd Standard Program achieved in PY9.

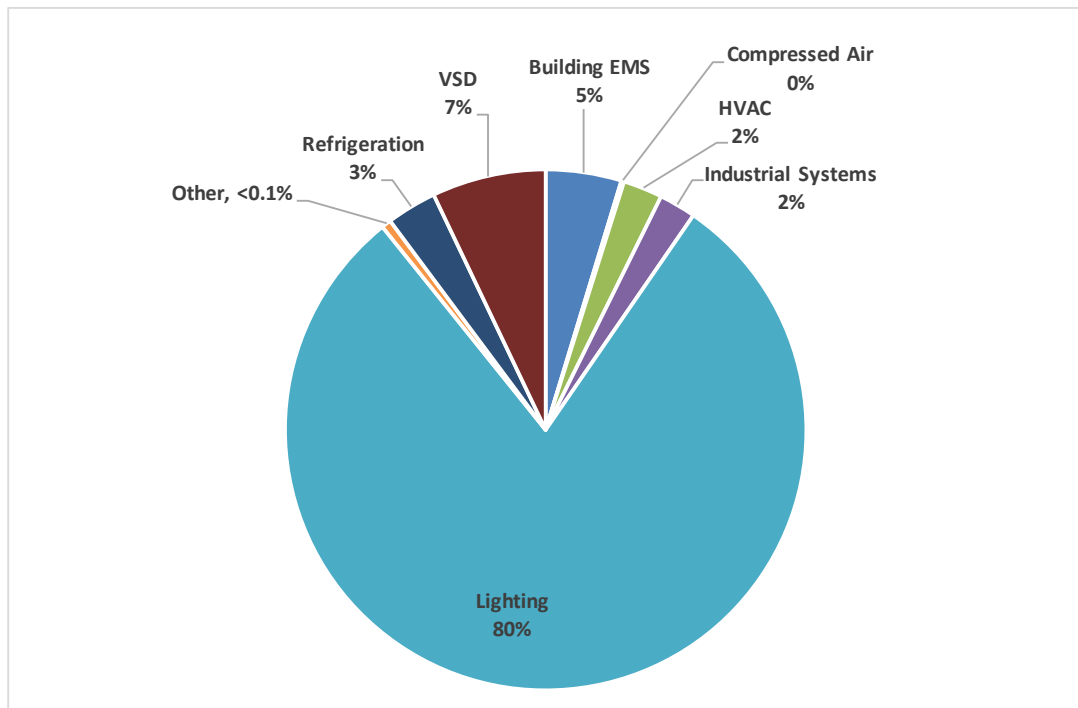
**Table 3-1. PY9 Total Annual Incremental Savings**

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Peak Demand Savings (kW)
Ex Ante Gross Savings	400,168,648	NA	55,676
Program Gross Realization Rate	95%	NA	79%
Verified Gross Savings	380,839,229	84,539	44,005
Program Net-to-Gross Ratio (NTGR)	Varies	Varies	Varies
Verified Net Savings	265,810,377	58,951	30,737

Source: ComEd tracking data and Navigant team analysis.

Figure 3-1 shows the distribution of verified net energy savings by end use.

**Figure 3-1. Program Net Energy Savings by End Use**



Source: Evaluation Analysis

#### 4. PROGRAM SAVINGS BY MEASURE

The following tables show program electric and demand savings by measure end use based on the monitoring and verification (M&V) sample grouping of lighting and non-lighting end uses. The lighting measures contributed the most savings, with 80 percent of the verified gross and net kWh savings. The non-lighting measures contributed 20 percent, of which seven percent were realized from VSDs, five percent from EMS measures, and the remaining eight percent from other end uses.

**Table 4-1. PY9 Energy Savings by Measure**

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate*	Verified Gross Savings (kWh)	NTGR†	Verified Net Savings (kWh)	Technical Measure Persistence Life	Effective Useful Life (EUL)‡
Lighting	Lighting	290,050,189	105%	303,130,925	0.70	212,191,647	NA	11.1
	Building EMS							
	Compressed Air							
	HVAC							
Non-Lighting	Industrial Systems	110,118,459	71%	77,708,304	0.69	53,618,730	NA	14.6
	Other							
	Refrigeration							
	VSD							
	<b>Total</b>	<b>400,168,648</b>	<b>95%</b>	<b>380,839,229</b>	<b>Varies</b>	<b>265,810,377</b>		

\* Based on evaluation research.

† A deemed value. Source: ComEd\_NTG\_History\_and\_PY9\_Recommendations\_2016-02-26\_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

‡ EUL is a combination of technical measure life and persistence. Values shown are a weighted average by gross energy savings. More granular average EUL estimates at the measure level are provided in the TRC table in the appendix.

Source: ComEd tracking data and Navigant team analysis.

**Table 4-2. PY9 Demand Savings by Measure**

End Use Type	Research Category	Ex Ante Gross Demand Reduction (kW)*	Verified Gross Realization Rate	Verified Gross Demand Reduction (kW)	NTGR†	Verified Net Demand Reduction (kW)
Lighting	Lighting	NA	NA	61,921	0.70	43,345
	Building EMS					
	Compressed Air					
	HVAC					
Non-Lighting	Industrial Systems	NA	NA	22,618	0.69	15,606
	Other					
	Refrigeration					
	VSD					
	<b>Total</b>	<b>NA</b>	<b>NA</b>	<b>84,539</b>	<b>NA</b>	<b>58,951</b>

\*The implementation contractor did not report demand reduction in the tracking data.

† A deemed value. Source: ComEd\_NTG\_History\_and\_PY9\_Recommendations\_2016-02-26\_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

Source: ComEd tracking data and Navigant team analysis.

**Table 4-3. PY9 Peak Demand Savings by Measure**

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate*	Verified Gross Peak Demand Reduction (kW)	NTGR†	Verified Peak Net Demand Reduction (kW)
Lighting	Lighting	36,494	102%	37,400	0.70	26,180
Non-Lighting	Building EMS	19,183	34%	6,604	0.69	4,557
	Compressed Air					
	HVAC					
	Industrial Systems					
	Other Refrigeration VSD					
Total		55,676	79%	44,005	NA	30,737

\* Based on evaluation research findings.

† A deemed value. Source: ComEd\_NTG\_History\_and\_PY9\_Recommendations\_2016-02-26\_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

Source: ComEd tracking data and Navigant team analysis.

## 5. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

### 5.1 Impact Parameter Estimates

Verified gross and net savings (energy and coincident peak demand) resulting from the PY9 Standard Program were calculated using algorithms as defined by the Illinois TRM version v5.0 or ComEd PY9 Workpapers.<sup>1</sup> Table 5-1 presents the key parameters and the references used in the verified gross and net savings calculations, and indicate which were examined through PY9 evaluation research and which were deemed.

<sup>1</sup> ComEd Standard Program Year 9 Measures Workpapers, Version 2.0, Effective June1, 2016.

**Table 5-1. Verified Gross Savings Parameters**

Gross Savings Input Parameters	Data Source	Deemed* or Evaluated?
Installed Quantities	Program tracking data analysis; PY9 evaluation on-site M&V	Evaluated
Deemed Lighting Measure Savings Parameters: Hours of Use (HOU), Peak Load Coincidence Factor, Energy and Demand Interactive Effects	Illinois TRM v5.0	Deemed
Lighting Measure Delta Watts (where deemed by the Illinois TRM)	Illinois TRM v5.0	Deemed
Lighting Measure Delta Watts not deemed by the Illinois TRM	Program documentation and PY9 M&V	Evaluated
Deemed HVAC, Food Service/Other, and Refrigeration Measures, principally: Electric Chillers, PTAC/PTHP, HVAC VSDs, Air Compressor with Integrated VSD, EC Motors, Anti-Sweat Heater Controls	Illinois TRM v5.0	Deemed
Non-deemed Non-Lighting Measures, principally: Industrial VSD, EMS Control Systems, Refrigeration Display Case/Doors; Refrigerated Cycling Dryers, Demand Control Ventilation, Laboratory measures	Program documentation and PY9 M&V	Evaluated
Gross Realization Rates	PY9 evaluation M&V and Program tracking data analysis	Evaluated
Lighting and Non-Lighting NTG Ratios	Illinois Stakeholder Advisory Group process	Deemed†

\* State of Illinois Technical Reference Manual version 2.0 from <http://www.ilsag.info/technical-reference-manual.html>.

† Source: ComEd\_NTG\_History\_and\_PY8\_Recommendation\_2014-02-28\_Final\_EMV\_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

## 5.2 Other Impact Findings and Recommendations

### Verified Gross Impacts and Realization Rate

**Finding 1.** The Standard Program evaluation sampled lighting and non-lighting projects separately. The lighting end uses achieved an energy savings realization rate of 105 percent. This is primarily a result of several large advanced lighting control projects having increases in verified energy savings based on the trend data from the lighting management system.

**Recommendation 1.** Navigant recommends that the analysis files used to quantify the Advanced Lighting Control (M&V) ex ante savings be included in the project documentation. Additional information regarding the lighting control system such as baseline information should be captured by the program. In some projects, the baseline wattage in the trend data is the

inefficient fixture wattage (pre-installation) while in others it appears to be the new LED fixture wattage.

**Finding 2.** The non-lighting end use achieved an overall energy savings realization rate of 71 percent. This result is due to adjustments of verified savings of building energy management systems (EMS) and variable speed drives (VSDs) projects. The details of these reductions are covered in subsequent findings.

**Finding 3.** The non-lighting end use achieved an overall demand savings realization rate of 34 percent. This result is primarily due to adjustments in demand savings for chiller replacements and variable speed drives (VSDs) projects. The details of these reductions are covered in Findings 6 and 7.

**Finding 4.** The sampled EMS projects received an energy savings realization rate of 57 percent with project-level realization rates ranging from 0% to 444% (see Table 7-2 for details). The verified savings estimates are based on billing analyses using daily billing or 30-minute interval data, depending on the project. The reasons for the adjustments to verified energy savings estimates has been outlined and discussed in the monthly meetings with the program implementation contractor and ComEd and in a separate memo<sup>2</sup>.

**Recommendation 2.** Historically, the EMS projects have a realization rate below 100 percent since EMS became a prescriptive measure in PY5. The evaluation team recommends making changes to the EMS deemed savings approach to move the average realization rate for EMS closer to 100 percent. This could include:

Reducing the deemed savings percentage for the EMS measure.

Disaggregating the deemed savings percentages by influencing factors such as building type, building size, HVAC system and implemented control strategies.

Gathering more information on the baseline conditions which factor heavily into the performance of this measure.

Consider establishing a savings threshold above which projects are processed as custom projects.

**Finding 5.** The sampled HVAC VSD projects achieved an energy savings realization rate of 49 percent, with project-level realization rates ranging from 0 to 122 percent (see Table 7-5 for details). The verified energy savings adjustments were commonly based on the following:

VSDs were found to be operating at a fixed speed.

VSDs were found to not be modulating based on feedback controls.

VSDs were installed in process applications instead of on HVAC pump or fan motors.

Resulting from on-site verification, the baseline control types for some projects were determined to be different from those listed in the tracking data.

Updating the assumed hours of operation to actual hours, based on site verifications or application information.

**Recommendation 3.** Navigant recommends updating the program post-inspection protocols to include verification of feedback controls and their operation.

**Finding 6.** The PY9 ComEd workpapers for VSD pumps do not include the 65 percent load factor used to calculate the brake horsepower (BHP) of the pump. This error results in demand realization rate of 65 percent. This finding is present in many of the VSD pump measures, significantly impacting the demand savings realization rate of the non-lighting sample.

**Recommendation 4.** Navigant recommends updating the ComEd workpapers to include the load factor.

**Finding 7.** The deemed savings for HVAC chillers have three issues that require updating. First, the PY9 ComEd workpapers use a baseline of IECC 2012 code, while the IL TRM v5.0 requires IECC 2015 as the baseline. For this reason, the sampled chiller measures achieved an energy realization rate less than 100 percent. Secondly, the workpapers appear to use heating equivalent full-load hours (EFLHs) instead of cooling EFLHs. Thirdly, the ex ante demand savings are calculated with integrated part-load value (IPLV) efficiency instead of full-load efficiency, as specified in the IL TRM v5.0.

**Recommendation 5.** Navigant recommends updating the chiller savings estimates used by the program to reflect the applicable IL TRM algorithms.

**Finding 8.** Two sampled projects that involve VSDs installed evaporator and condenser fans in refrigerated warehouses - those installed VSDs applications do not meet program requirements for HVAC VSDs and result in no claimed savings. Refrigerated warehouses are highly energy-intensive facilities and the VSD projects should result in significantly more energy savings than in typical HVAC applications.

**Recommendation 6.** Navigant recommends creating a separate measure for this application or processing this as a custom project under the Custom Program.

**Finding 9.** The “VSD on Industrial Process Fan or Pump ≤ 200 HP” savings methodology within the ComEd PY9workpapers<sup>3</sup> is not suitable to apply to industrial process motors. The workpapers’ measure description states that “application on compressed air, process motors and data centers are not applicable.” The words “industrial” or “process” are not mentioned (other than to exclude it) in the workpaper, only “motors that do not fall into any of the mapped categories” which Navigant interprets to act as a catch-all to account for miscellaneous HVAC fan or pump motors.

**Recommendation 7.** The evaluation team recommends that this measure be processed as a custom measure due to the wide variety of applications and additional considerations that are required of industrial process projects. If this is to be a prescriptive measure, the workpaper should be rewritten to better represent the VSDs in industrial applications.

**Finding 10.** The Closed Refrigerated Case Lighting workpapers use an interactive factor 1.22 for both freezers and coolers, while the IL TRM v5.0 uses 1.29 for coolers and 1.50 for freezers.<sup>4</sup>

**Recommendation 8.** The evaluation team recommends that this workpaper be updated to reflect the interactive factors in the lighting input table in the IL TRM v5.0.

**Finding 11.** The Open Refrigerated Case Lighting workpapers use an interactive factor 1.15 for both freezers and coolers, while the IL TRM v5.0 uses 1.29 for coolers and 1.50 for freezers.<sup>4</sup>

**Recommendation 9.** The evaluation team recommends that this workpaper be updated to reflect the interactive factors in the lighting input table in the IL TRM v5.0.

**Finding 12.** The Refrigerated Air Dryers in the IL TRM v5.0 contain an error in the algorithm. The TRM uses the CFM value at 50 percent of the rated dryer capacity, but the 50 percent load assumption is also accounted for in the energy consumption ratios (EC50). Correcting this increases the verified energy savings.

**Recommendation 10.** The evaluation team recommends correcting this TRM error in the ComEd workpapers. The evaluation team will bring this error to the attention of the TRM Technical Advisory Committee (TAC).

**Finding 13.** Project 35626 contained a VSD air compressor that was an oil-free unit. Oil-free compressors do not require the blowdown cycle that oil-cooled compressors utilize to prevent

<sup>3</sup> ComEd Standard Program Year 9 Measures Workpapers, Version 2.0, Effective June 1, 2016.

<sup>4</sup> Illinois Statewide Technical Reference Manual v5.0, p. 340-341.

the aeration of the oil. Oil-free compressors can cycle on and off as needed and have efficient and responsive load or no-load controls. Oil-free compressors do not utilize inlet modulation controls and should have more efficient baseline control assumptions.

**Recommendation 11.** The evaluation team recommends that projects involving oil-free compressors be processed as a custom or a separate measure.

### Tracking System Review

**Finding 14.** Eight projects involved installing multiple VSD air compressors. Since multiple VSD air compressors installed on the same compressed air system are not likely to achieve the deemed energy savings, this scenario is not incented. The incentive worksheet criteria state that “Air compressors purchased or installed for backup or redundant systems do not qualify.”

**Recommendation 12.** Navigant recommends that additional program verification be conducted to ensure that the VSD air compressors are installed on separate systems when applications involve multiple air compressors.

### Participation

**Finding 15.** The program had 4,677 participants in PY9 and incented 7,671 measures through implementation of 4,839 projects. Of the 4,839 projects, lighting projects comprised 81 percent of the measure mix and 83 percent of the participants in PY9. Non-lighting projects comprised 19 percent of the measure mix and 17 percent of the participants in PY9. The program made strides to implement 11 comprehensive projects under the Energy Management Assistance Offer and the Comprehensive Energy Savings Offer, but no project was realized under the Office Space Offering or the Made in Illinois Bonus offering in PY9.

**Recommendation 13.** Navigant recognizes ComEd is implementing changes to the additional program offering and incentives for other existing program measures. Navigant conducted process survey with customers who participated in the comprehensive offering. We will provide our findings from the process survey in a separate memo to improve these offerings.

**Finding 16.** The program exceeded its adjusted gross planning energy target of 391 GWh due to the 7 additional months of program extension. The reported gross energy savings was 400 GWh (102 percent), although this got adjusted to 97 percent after evaluation adjustment of gross savings).

## 6. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

### 6.1 Verified Gross Program Savings Analysis Approach

The evaluation estimates of gross savings and stratified measure level realization rates are presented in this section of the report. The savings verification process sought to verify eligibility, quantity, and compliance with claimed deemed per unit savings values defined in the Illinois TRM (v5.0). This process verified that the TRM was applied correctly and consistently by the program, that the measure level inputs to the algorithm were correct, and that the quantity of measures claimed through the program are correct, in place and operational. Gross impact evaluation of non-deemed measures involved retrospective evaluation adjustments to gross savings on custom variables. For measures with custom variables, ComEd provided work paper documentation of savings, but verified savings were based on engineering review, billing or interval data review, and on-site M&V (including metering) of sampled measures to determine eligibility and savings.

Other evaluation activities to verify gross energy savings and produce a research realization rate estimate for the Standard Program involved the following steps:



Implemented a stratified random sampling design of lighting and non-lighting measures to select 125 projects (consisting of 60 lighting and 65 non-lighting projects) from the population of 4,389 Standard project applications and 4,382 Standard measures. Sampling was done in three waves with three strata based on kWh size. Sample sizes were designed to provide a 90/10 confidence and precision level for program-level savings separately for lighting and non-lighting gross savings verification. Table 6-1 summarizes the sample selection for the M&V activities. Additional details of the sampling approach and disposition are provided in Table 6-2 and Table 6-3.

Conducted on-site visits and measurement and verification (M&V) activities on a sample of 37 Standard projects (16 lighting and 21 non-lighting) selected from the 125 projects to support deemed and non-deemed measure savings verification and measure-level research. On-site measurement and verification included participant interviews, baseline assessment, installed equipment verification, and performance measurement. Measurement may include spot measurements, run-time hour data logging, review of participant energy management system trend data, and post-installation interval metering. Our approach to selecting M&V strategies follows the International Performance Measurement and Verification Protocol (IPMVP); Option A or Option B are typically selected.

Performed an engineering review of project files and energy savings estimates on the remaining 88 projects (44 lighting and 44 non-lighting) to support deemed and non-deemed measure savings verification and program-level research.

Conducted a quality control review of the research findings impact estimates and the associated draft site reports and implement any necessary revisions.

Produced an estimate of verified gross savings (kWh and kW) using the TRM or research for savings verification.

Produced a gross realization rate for the stratified sample and extrapolated to the program population using a ratio estimation method to yield ex post evaluation-adjusted gross energy savings. Gross realization rates were developed for energy and demand savings.

### **6.1.1 Sampling Design for Savings Verification**

The sample draw for PY9 gross impact evaluation was designed to provide a 90/10 level confidence and relative precision for gross impact realization rate results for lighting measures, non-lighting measures, and the overall program. Strata were defined by project size (separately for lighting and non-lighting projects) based on ex ante gross energy savings boundaries that placed about one-third of program-level savings into each stratum (large, medium, and small).

Sampling was done in three waves. The first wave of sampling projects was conducted on 74 projects with a status of paid in a May 30, 2017 database extract when the program had completed about half of the PY9 participation target. The second wave of 45 sample projects was drawn from October 25, 2017 tracking system extract of projects paid after the May 30, 2017 extract. The final third wave of six projects was drawn from the final PY9 tracking data.

Table 6-1 below provides the sample selection by end use category and stratification. Overall the sample represented 17 percent (67,963,256 kWh) of the population ex ante savings of 400,168,648 kWh. A total of 60 lighting projects were selected, including 42 projects in wave 1 and 18 projects in wave 2. Sixty-five (65) non-lighting end use projects were selected including 32 projects in wave 1, 27 projects in wave 2, and six projects in wave 3.

**Table 6-1. Profile of the PY9 Population and Gross Savings Verification Sample by End Use Strata**

Population Group	Sampling Strata	Population			Sample		
		Number of Projects (N)	Ex Ante Claimed Gross Savings, kWh	kWh Weights	Number of Projects (n)	Ex Ante kWh	Sampled % of Population
Lighting	1	103	90,403,891	0.312	20	20,826,454	23%
	2	374	97,730,025	0.337	20	4,279,732	4%
	3	3683	101,916,273	0.351	20	1,363,082	1%
<b>Lighting Subtotal</b>		<b>4,160</b>	<b>290,050,189</b>	<b>1.000</b>	<b>60</b>	<b>26,469,268</b>	<b>9%</b>
Non-Lighting	1	27	45,232,401	0.411	20	31,364,738	69%
	2	88	31,659,724	0.288	23	8,006,489	25%
	3	564	33,226,334	0.302	22	2,122,761	6%
<b>Non-Lighting Subtotal</b>		<b>679</b>	<b>110,118,459</b>	<b>1.000</b>	<b>65</b>	<b>41,493,988</b>	<b>38%</b>
<b>Program Total</b>		<b>4,839</b>	<b>400,168,648</b>	<b>1.000</b>	<b>125</b>	<b>67,963,256</b>	<b>17%</b>

Source: ComEd tracking data and Navigant team analysis.

Table 6-2 below provides a comparison of the population profile to the sample, analyzed by measure technology types for sampled projects that align with end uses. The project count of the sample provides an indication of the end use distribution of sampled projects due to the ex ante kWh weighting approach of sampled projects to develop the population mean for the realization rate.

**Table 6-2. Profile of the PY9 Population and Gross Savings Verification Sample by End Use Type**

Population Group	Population Summary			Sample			
	Number of Project (N)	Ex Ante Claimed Gross Savings, kWh	kWh Weights	Number of Project (n)	Ex Ante kWh	Sample kWh Weights	Sampled kWh % of Population
Lighting	4,160	290,050,189	0.72	60	26,469,268	0.39	9%
Building.EMS	61	24,459,913	0.06	12	11,263,173	0.17	46%
HVAC.VSD	123	38,253,938	0.10	17	18,042,266	0.27	47%
HVAC	92	14,649,924	0.04	13	7,254,966	0.11	50%
Industrial.Systems	133	12,670,594	0.03	10	1,135,425	0.02	9%
Other	39	3,233,382	0.01	3	403,947	0.01	13%
Refrigeration	213	16,264,897	0.04	10	3,394,211	0.05	21%
Compressed.Air	16	496,428	0.00	0	0	-	0%
ROOFTOP	2	89,382	0.00	0	0	-	0%
<b>TOTAL</b>	<b>4,839</b>	<b>400,168,648</b>	<b>1.00</b>	<b>125</b>	<b>67,963,256</b>	<b>1.00</b>	<b>17%</b>

Source: Utility tracking data and Navigant analysis.

Navigant compared the sample building type distribution to the program population to check if the sample reasonably represents the population distribution. Navigant used an iterative approach to draw a sample until we could capture a reasonable representation of building type distribution after wave 3. This approach did not support 90/10 gross impact realization rate results at the business type level, but nonetheless provided useful information for the most prominent building types. Details are shown in Table 6-3.

**Table 6-3. Profile of the PY9 Population and Gross Savings Sample by Business Type**

Population Group	Gross kWh, Population	Population kWh Weights	Project Count, Sample	Number of Project (n)	Gross kWh, Sample	Sample kWh Weights
College	3,185,887	1%	1	1%	239,394	0%
Heavy Industry	27,525,534	7%	11	9%	5,308,798	8%
Warehouse	54,631,959	14%	14	11%	7,807,746	11%
Retail - Strip Mall	101,033,769	25%	20	16%	9,766,975	14%
Healthcare Clinic	9,543,206	2%	6	5%	4,224,103	6%
Office - Mid Rise	63,209,223	16%	23	18%	25,056,641	37%
Hotel/Motel - Common	12,808,306	3%	6	5%	4,678,316	7%
Convenience Store	15,937,762	4%	11	9%	2,318,808	3%
Restaurant	5,029,836	1%	3	2%	234,463	0%
Light Industry	35,018,360	9%	15	12%	4,624,868	7%
Elementary School	2,314,739	1%	2	2%	415,854	1%
Unknown	69,930,067	17%	13	10%	3,287,289	5%
Total	400,168,648	100%	125	100%	67,963,256	100%

Source: Utility tracking data and Navigant analysis.

### 6.1.2 Engineering Review of Project Files

For each selected project, the M&V team performed an in-depth application review to assess the engineering methods, parameters and assumptions used to generate all ex-ante impact estimates. For each measure in the sampled project, engineers estimated ex post gross savings based on their review of documentation and engineering analysis.

To support this review, ComEd provided project documentation in electronic format for each sampled project. Documentation included some or all scanned files of hardcopy application forms and supporting documentation from the applicant (invoices, measure specification sheets, and vendor proposals), pre-inspection reports and photos (when required), post inspection reports and photos (when conducted), calculation spreadsheets, a project summary report, and important email and memoranda.

### 6.1.3 On-Site Data Collection

The Monitoring and Verification (M&V) team completed on-site surveys for a subset of 37 of the 125 customer applications sampled, including 16 lighting and 21 non-lighting projects. For most projects, on-site sources include interviews that are completed at the time of the on-site, visual inspection of the systems and equipment, EMS data downloads, spot measurements, and short-term monitoring (e.g., less than four weeks).

The M&V team developed an analysis plan for each project selected for on-site data collection. Each plan explains the general gross impact approach used (including monitoring plans), provides an analysis of the current inputs (based on the application and other available sources at that time), and identifies sources that will be used to verify data or obtain newly identified inputs for the ex post gross impact approach.

The engineer assigned to each project first calls to set up an appointment with the customer. During the on-site audit, the engineer collects data identified in the analysis plan, including monitoring records (such as instantaneous spot watt measurements for relevant equipment, measured temperatures, data from equipment logs and EMS/SCADA system downloads), equipment nameplate data, system operation sequences and operating schedules, and a careful description of site conditions that might contribute to baseline selection.

#### 6.1.4 Site-Specific Impact Estimates

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

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

For this study, summer peak hours are defined as non-holiday weekdays between 1:00 P.M. and 5:00 P.M. Central Prevailing Time (CPT) from June 1 to August 31. Winter peak hours are defined as non-holiday weekdays between 6:00 A.M. and 8:00 A.M. CPT, and between 5:00 P.M. and 7:00 P.M. CPT, from January 1 to February 28. This is in accordance with the PJM manual 18, *PJM Capacity Market*, effective October 16, 2015.<sup>5</sup>

Peak demand savings for both baseline and post retrofit conditions are the average demand kW savings for the 1:00 P.M. to 5:00 P.M. CPT weekday time period for summer, and 6:00 A.M. to 8:00 A.M. CPT and 5:00 P.M. to 7:00 P.M. CPT weekday time period for winter.<sup>6</sup> If this energy savings measure is determined to have weather dependency, then the summer peak kW savings are based on the zonal weighted temperature humidity index (WTHI) standard, and the winter peak kW savings are based on the zonal wind speed-adjusted temperature (WWP) standards posted by PJM (there is also PJM Zonal Winter Weather Standards similar to summer WTHI). The zonal WTHI and WWP are the mean of the zonal WTHI values or WWP values on the days in which PJM peak load occurred in the past sixteen years (1998-2014). This mean ComEd WTHI value is 81.6 kW<sup>7</sup> demand savings for summer and is the difference in kW between the baseline and post retrofit conditions. Similarly, the ComEd WWP value is 14.5 kW<sup>7</sup> demand savings for winter and is the difference in kW between the baseline and post retrofit conditions.

After completion of the engineering analysis, the M&V team prepares a site-specific draft impact evaluation report that summarizes the M&V plan, the data collected at the site, and all the calculations and parameters used to estimate savings. Each draft site report underwent engineering review and comment, providing feedback to each assigned engineer for revisions or other improvements. Each assigned engineer then revised the draft reports as necessary to produce the final site reports.

The results of the on-site M&V and engineering file reviews determined the measure-level verified gross savings for the sampled projects.

#### 6.1.5 Research Findings Realization Rates for the PY9 Standard Program

The M&V team used a stratified ratio estimation technique to estimate evaluation research findings gross energy savings for the Standard Program. The research findings use all available data collected through M&V to make a gross savings estimate, without being constrained by algorithms or assumptions defined in the Illinois TRM. The stratified ratio estimation technique follows the steps outlined in the California Evaluation Framework<sup>7</sup>. These steps are matched to the stratified random sampling method that was

<sup>5</sup> Manual 18b, page 65-67: (<https://www.pjm.com/~media/documents/manuals/m18.ashx>)

<sup>6</sup> The Winter Weather Standard is the dry bulb temperature adjusted (by 0.5 °F) for wind speed above 10 mph. The measurements were for Hour Ending 19:00 on RTO peak days.”

<sup>7</sup> TecMarket Works, et al., *The California Evaluation Framework*, Chapter 13, Sampling. June 2004

used to create the sample for the program savings verification effort. A standard error was used to estimate the error bound around the estimate of evaluation research findings gross energy savings realization rate. The research findings gross realization rates and relative precision at 90 percent confidence interval for lighting and non-lighting end uses are summarized in Table 6-4 below.

**Table 6-4. Research Gross kWh Realization Rates and Relative Precision at 90% Confidence Level**

Population Group	Sampling Strata	Mean kWh RR	Relative Precision at 90% Level of Confidence ± %, kWh	Mean KW RR	Relative Precision at 90% Level of Confidence ± %, KW
Lighting	1	1.03	4%	1.00	3%
	2	1.07	8%	1.10	14%
	3	1.04	10%	0.98	12%
<i>Lighting Overall</i>		1.05	4%	1.02	7%
Non-Lighting	1	0.52	21%	0.25	23%
	2	0.70	20%	0.31	24%
	3	0.96	12%	0.42	57%
<i>Non-Lighting Overall</i>		0.71	9%	0.34	38%
PY9 Program Overall		0.95	6%	0.79	8%

Source: Utility tracking data and Navigant analysis.

## 6.2 Verified Net Program Savings Analysis Approach

Navigant calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a net-to-gross ratio (NTGR). In PY9, the NTGR estimates used to calculate the net verified savings were based on past evaluation research and defined by a consensus process through SAG, as documented in a spreadsheet.<sup>8</sup> The deemed NTGR for lighting end use is 0.70, and 0.69 for non-lighting end use.

## 7. APPENDIX 2. IMPACT ANALYSIS DETAIL

The resulting total program verified gross savings are 380,839,229 kWh and 44,005 kW as shown in the following table. The table presents savings at the measure group level including groups where the estimate is not statistically significant at the 90/10 level. The verified net savings are 265,810,377 kWh and 30,737 kW.

<sup>8</sup> Source ComEd\_NTG\_History\_and\_PY9\_Recommendations\_2016-02-26\_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

**Table 7-1. PY9 Verified Gross and Net Impact Savings Estimates by Program Channel**

Program Group	Sample Size	Gross Energy Savings (kWh)	90/10 Significance	Gross Peak Demand Savings (kW)	90/10 Significance
<b>Lighting Measures</b>					
Ex Ante Gross Savings		290,050,189		36,494	
Verified Gross Realization Rate	60	105%*	Yes	102%*	Yes
Verified Gross Savings		303,130,925		37,400	
NTGR†		0.7		0.7	
Verified Net Savings		212,191,648		26,180	
<b>Non-Lighting Measures</b>					
Ex Ante Gross Savings		110,118,459		19,183	
Verified Gross Realization Rate	65	71%*	Yes	34%*	No
Verified Gross Savings		77,708,304		6,604	
NTGR†		0.69		0.69	
Verified Net Savings		53,618,730		4,557	
<b>PY9 Program Total</b>					
Ex Ante Gross Savings		400,168,648		55,676	
Verified Gross Realization Rate	125	95%*	Yes	79%*	Yes
Verified Gross Savings		380,839,229		44,005	
NTGR†		Varies		Varies	
Verified Net Savings		265,810,377		30,737	

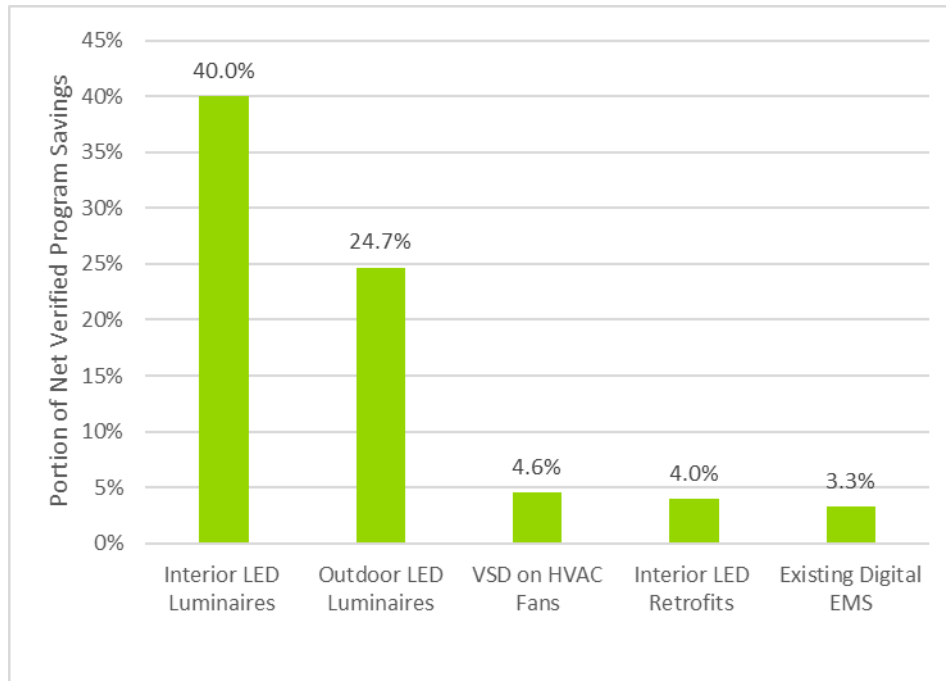
\* Based on evaluation research findings.

† A deemed value. Source: ComEd\_NTG\_History\_and\_PY9\_Recommendations\_2016-02-26\_Final.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

Source: Evaluation Team analysis.

Table 7-2 illustrates the contribution to the net kWh savings by the top five measures in the program. LED lighting measures contributed approximately 69 percent of the total net savings (overall lighting contributed 80 percent). Variable speed drives (VSDs) on HVAC fans was second with approximately five percent of the net savings (overall VSDs contributed 7 percent), and followed by existing digital EMS.

**Table 7-2. Top 5 Measures by Net Verified Energy Savings**



Source: Evaluation Team analysis.

Table 7-3 below presents the verified gross energy savings realization rate, the percent of sample energy savings, and any notes or recommendations Navigant had to address discrepancies by measure. Navigant has also assigned a priority (high, medium or low) based on evaluation risk and percent of program savings. Note that these percentages were weighted to calculate the overall program level gross realization rates presented in the body of the report.

**Table 7-3. Summary of Evaluation Findings by End Use Results**

End Use Type	% of Sample Ex Ante Savings	Unweighted kWh Realization Rate*	Comments	Recommendation	Priority
Building EMS	17.49%	50%	Building EMS projects were typically adjusted based on billing analysis results. Projects whose billing analysis resulted in negative savings, were considered to have a verified savings of zero (projects #32868, #35081, and #32714 had their verified savings set to zero).	<p>Consider reducing the deemed savings percentage.</p> <p>Consider revising the savings methodology to account for influencing factors such as building size (ft<sup>2</sup>), HVAC type and implemented control strategies.</p> <p>Consider updating EMS approach to gather additional information on the pre-installation condition, which is influential to the RR estimate.</p>	High

End Use Type	% of Sample Ex Ante Savings	Unweighted kWh Realization Rate*	Comments	Recommendation	Priority
Compressed Air	0.04%	135%	The sampled compressed air measures (part of industrial system projects) consisted of refrigerated dryers and no-loss condensate drains. The IL TRM v5.0 contains an algorithm error that underestimates the savings.	The refrigerated compressed air dryer workpaper should be updated to correct the error found in the IL TRM.	High
HVAC	9.70%	51%	The sampled HVAC measures were primarily chiller projects, which received significant adjustments. 1. The baseline was updated to IECC 2015. 2. The demand savings algorithm was updated to use full-load efficiency values. 3. The EFLH have been updated to reflect the IL TRM v5.0 values for cooling. 4. The installed efficiency values were updated to reflect project documentation. Project #33017 had the verified savings set to zero.	The HVAC chiller workpaper requires updating to address points 1-3.  The installed efficiency value should use the information provided by manufacturer.	High
Industrial Systems	1.63%	94%	The sampled industrial systems measures were all VSD air compressors, with one injection molding machine. The VSD air compressors were typically updated with actual operating hours.  The hybrid injection molding machine did not meet program requirements and resulted in no verified savings. Projects #33622 and #35745 had the verified savings set to zero	The program review process should be updated to better screen projects based on product criteria.	Medium
Lighting	38.92%	103%	Several advanced lighting control projects resulted in increased verified savings. This is due to updating with lighting control system trend data and changing hours and interactive factors to reflect actual building type.  Project 35832 had a significant change in installed wattage which resulted in an additional 200,000	The advanced lighting control project documentation should include the M&V savings calculation based on trend data.	Medium



End Use Type	% of Sample Ex Ante Savings	Unweighted kWh Realization Rate*	Comments	Recommendation	Priority
			kWh. The update was based on using correct fixture spec sheets.		
Other	0.63%	69%	The guest room energy management (GREM) system measure is tracked per controller but the energy savings is calculated per ton controlled.	The GREM measure should include tonnage information in the tracking data.	Low
Refrigeration	4.98%	101%	Minor adjustments were made to account for actual LED case lighting wattages and actual product specifications.	The New Cooler and Freezer Display Cases with Doors workpaper should be updated to reflect new construction applications.	Low
VSD	26.60%	72%	VSD measures commonly required adjustments for the following reasons: 1. Units did not qualify for program due to operating at fixed speed, not having feedback controls or non-HVAC application (projects #31925 had the verified savings set to zero). 2. The baseline control types were updated to actual. 3. The operation hours were updated to actual. 4. The demand savings algorithm was updated to reflect the IL TRM. The "BHP" and "PLR <sub>FF,Peak</sub> " terms were not applied correctly in the PY9 ComEd workpapers.	The program post-inspection protocol should be updated to verify VSD modulation based on feedback, in addition to installation and motor size.  The VSD workpapers should be updated to reflect the IL TRM.	High

Source: Evaluation analysis.

\* This is an unweighted end use level realization rate and is meant to illustrate the M&V findings at the measure or end use level. For instance, the lighting realization rate in this table (103 percent) does not match the weighted realization rate (105 percent) found in Table 4-1.

In the following tables Navigant highlights the variation in the realization rates for the high priority HVAC, VSD, and EMS sample projects.

**Table 7-4. EMS Sample Realization Rates**

Project ID	Ex Ante Gross Energy Savings (kWh)	Verified Gross Energy Savings (kWh)	Realization Rate
30976	3,016,097	473,371	16%
35081	2,604,000	0	0%
31175	1,671,549	379,537	23%
31293	1,114,033	1,107,899	99%
33001	674,588	2,993,765	444%
32868	584,044	0	0%
33535	553,133	553,133	100%
32909	309,876	397,953	128%
32120	239,394	69,540	29%
31813	228,874	228,874	100%
32367	228,831	228,831	100%
32714	38,753	0	0%
Total	11,263,173	6,432,879	57%

Source: Evaluation analysis.

**Table 7-5. HVAC VSD Sample Realization Rates**

Project ID	Ex Ante Gross Energy Savings (kWh)	Verified Gross Energy Savings (kWh)	Realization Rate
31305	4,784,487	1,214,677	25%
33406	3,076,141	442,279	14%
30977	2,368,653	2,385,964	101%
35305	2,099,827	557,421	27%
33790	1,144,380	600,210	52%
30350	1,001,662	831,095	83%
35817	582,048	692,770	119%
32911	525,395	391,754	75%
35342	412,303	257,563	62%
32853	377,101	245,592	65%
31925	374,397	0	0%
34726	343,635	237,243	69%
32315	302,160	309,995	103%
35545	225,309	274,930	122%
35649	195,616	195,617	100%
34729	168,855	109,644	65%
32002	60,298	60,298	100%
Total	18,042,266	8,807,052	49%

Source: Evaluation analysis.

**Table 7-6. HVAC Sample Realization Rates**

Project ID	Ex Ante Gross Energy Savings (kWh)	Verified Gross Energy Savings (kWh)	Energy Realization Rate
37139	1,843,681	892,523	48%
37259	1,168,220	672,615	58%
35358	920,148	302,397	33%
34082	695,191	533,209	77%
33701	692,672	421,821	61%
33017	490,981	0	0%
36071	482,379	441,853	92%
34929	357,135	257,102	72%
35279	254,656	188,817	74%
32120	239,394	69,540	29%
31802	236,717	139,608	59%
32174	100,346	69,771	70%
35432	11,403	3,410	30%
33142	1,436	2,305	160%
Total	7,494,361	3,994,971	53%

Source: Evaluation analysis.

## 8. APPENDIX 3. TOTAL RESOURCE COST DETAIL

Table 8-1, the Total Resource Cost (TRC) variable table, only includes cost-effectiveness analysis inputs available at the time of finalizing this PY9 impact evaluation report. Additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in this table and will be provided to evaluation at a later date. Details on EULs in this table are subject to change and are not final.

**Table 8-1. Total Resource Cost Savings Summary**

End Use Type	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (kWh)	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)
Building EMS	Building EMS	Varies	71	15	25,667,028	-	18,162,142	-
Compressed Air	Compressed Air	Varies	89	11	954,958	311	673,894	219
HVAC	HVAC	Varies	137	20	13,352,167	5,474	9,425,209	3,876
Industrial Systems	Industrial Systems	Varies	150	12	12,507,550	1,931	8,826,318	1,363
Lighting	Lighting	Varies	6,237	11	288,748,150	36,356	301,689,784	37,976
Other	Other	Varies	69	15	3,264,100	2,193	2,307,663	1,548
Refrigeration	Refrigeration	Varies	494	12	16,992,148	3,604	12,434,033	2,593
VSD	VSD	Varies	424	15	38,682,546	5,807	27,320,187	4,100

**APPENDIX C. COMED STANDARD PY9 NTG RESEARCH MEMO 2018-08-24**

To: Erin Daughton, ComEd  
 From: Charles Ampong, Sharon Mullen, Laura Agapay-Read, Mack Shaughnessy, Navigant  
 CC: Jennifer Morris, ICC; Randy Gunn, Jeff Erickson, Rob Neumann  
 Date: August 24, 2018  
 Re: Net-to-Gross Research Results from PY9 for the ComEd Standard Program

## INTRODUCTION

This memo presents results from Navigant’s free ridership and spillover research for the ComEd Standard Program, based on program year nine (PY9) participants. The research was conducted in November 2017 and January 2018 through data collection and computer assisted telephone surveys (CATI) completed with PY9 participants and using the Illinois TRM version 6.0 net-to-gross methodologies (IL-NTG Methods).<sup>1</sup> The IL-NTG Methods non-residential protocol combines three scores that test different ways of approaching free ridership: the Program Components Score, the Program Influence Score, and the No Program Score. Navigant combined these scores to calculate the final NTG value based on a designated algorithm that includes inputs with alternative specifications—the No-Program Score input has two alternative specifications. The results are two calculations of free ridership. In Table 1, Navigant presents the two estimates of free ridership using a ratio estimation method based on the kilowatts-hour weight of the project-level free ridership and rolled up to the population of the end-use categories. The participant free ridership and spillover analysis involved 104 survey completions by a sample of PY9 program participants (66 lighting and 38 non-lighting).

**Table 1. ComEd Standard Program NTGR Sensitivity Analysis Findings**

NTG Algorithm	End-use	Participant Free Ridership, (weighted)	Participant Spillover	Trade Ally Participant Spillover*	NTGR	Relative Precision on Free Ridership Results @ 90% CI
Algorithm 1	Lighting	0.19	0	0.02	0.83	4%
	Non-lighting	0.24	0	0.02	0.78	8%
	Population Roll-up	0.20	0	0.02	0.82	5%
Algorithm 2	Lighting	0.25	0	0.02	0.77	4%
	Non-lighting	0.27	0	0.02	0.75	9%
	Population Roll-up	0.26	0	0.02	0.76	7%

\* Navigant analysis of PY8 trade ally and contractor self-reports approved by the SAG (see appendix).

Source: Navigant analysis of 104 participants survey responses from 1,879 unique population of PY9 participants.

Navigant recommends using a free ridership rate of 0.19 for lighting and 0.24 for non-lighting end-uses for CY2019, which come from Algorithm 1. These values were respectively estimated at 4 percent and 8 percent relative precision at 90 percent confidence interval.

<sup>1</sup> Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 6.0, Volume 4: Cross-Cutting Measures and Attachments, effective January 1<sup>st</sup>, 2018.

## FREE RIDERSHIP COMPARISON

For comparison, the free ridership and spillover results in effect for PY9 and CY2018 program participants are presented below. These values are based on evaluation research conducted in PY7 and PY8.

**Table 2. PY9 and CY2018 Deemed Free Ridership and NTGR**

Program Path	Free Ridership *	Participant Spillover †	Trade Ally Participant Spillover †	NTGR
Lighting	0.31	0	0.02	0.71
Non-Lighting	0.32	0	0.02	0.70

\* Navigant analysis of data from PY7 participant and trade ally self-reports, approved by the SAG (see appendix).

† Navigant analysis of PY8 trade ally and contractor self-reports approved by the SAG (see appendix).

FR = Participant Free Ridership; PSO = Participant Spillover; TPSO = Trade Ally Participant Spillover; NTGR = Net-to-Gross Ratio  
 NTGR = 1 – FR + PSO + TPSO

The PY9 research results presented in Table 1 show lower free ridership than the previous SAG-approved results in Table 2.

**Spillover.** The PY9 participant spillover results (0.09% or 0.0009) is very low. Thus, we determined participant spillover was zero from this sample in PY9. However, we believe the results from PY8 Standard Program participating trade ally spillover study remains valid and will include that estimate (0.02) in our draft recommendation for future NTG values.

## FREE-RIDERSHIP SURVEY AND SAMPLE DISPOSITION

The PY9 free ridership and spillover research was conducted following a customer self-report approach through a telephone survey with 122 program participants who responded to questions about free-ridership and participant spillover. The randomized sample frame included 2,335 projects completed by 1,879 unique program participants. Projects were classified by end-use (lighting or non-lighting) and energy savings (large, medium, and small), using ex-ante energy impacts reported in the tracking database. Each project was placed into one of six end-use and impact size strata. A total of 73 lighting project participants and 49 non-lighting project participants were interviewed. Table 3 shows the details of the free-ridership and spillover sample disposition.

Each respondent was asked questions to assess free ridership and spillover on a project-by-project basis, hence the survey did not apply the same score to other projects if a customer had projects at other sites covering the same end-use. Customers with multiple projects were interviewed once on a specific project.

**Table 3. Free Ridership and Spillover Research Decision Maker Survey Disposition**

Free Ridership Stratum	Impact Size Stratum	Population Contacts (N)	Number of Completes	Dropped from the Analysis	Analyzed Completes*
L1	Large	55	15	1	14
L2	Medium	234	33	3	30
L3	Small	1,237	25	3	22
NL1	Large	20	4	0	4
NL2	Medium	63	8	2	6
NL3	Small	270	37	9	28
TOTAL		1,879	122	18	104

\* Analyzed Completes provides the interview count used to develop the free ridership and spillover estimates. Analyzed Completes excludes responses that failed consistency checks or lacked required data. Navigant removed 18 records, reducing the sample from 122 to 104 before calculating rolled-up free ridership results (discussed further below).

Source: Navigant analysis of PY9 participants survey responses.

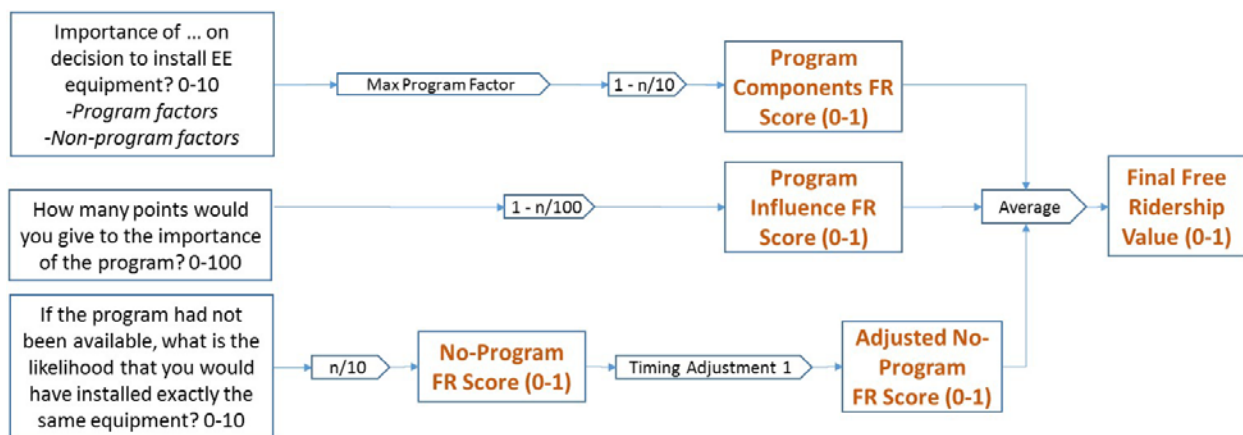
Number of Usable Contacts	Target Completes	Measure Installations Covered by Completed Interviews*	Dropped from the Analysis	Analyzed Completes†
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## FREE RIDERSHIP ESTIMATES USING ALGORITHMS IN THE TRM VERSION 6.0

The following diagrams describe the TRM free ridership algorithms for core non-residential programs.

**Figure 1. Core Free Ridership Algorithm 1**

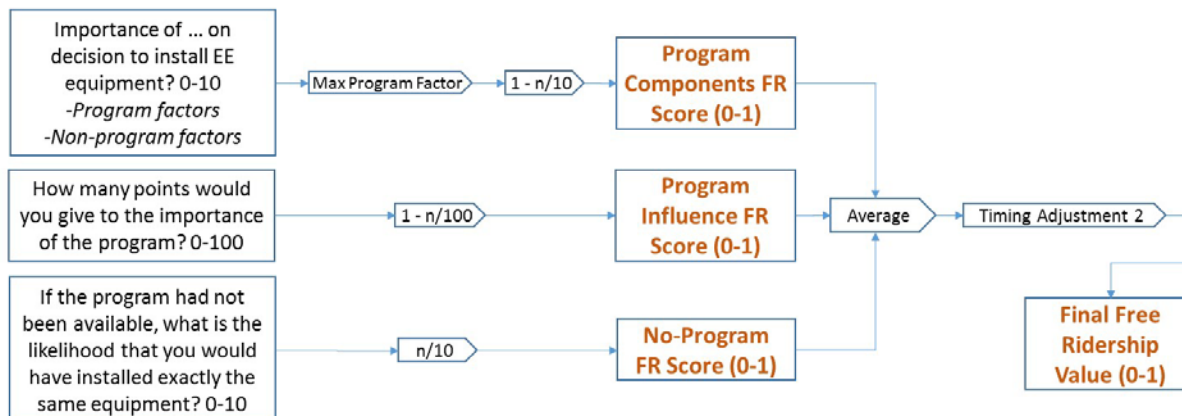
$$\text{Final Free Ridership Value (0-1)} = \frac{\text{Program Components FR Score (0-1)} + \text{Program Influence FR Score (0-1)} + (\text{No-Program FR Score (0-1)} * \text{Timing Adjustment 1})}{3}$$



Source: Illinois TRM Version 6, Volume 4. Cross-Cutting Measures and Attachments, final February 8, 2017, effective January 1st, 2018.

### Figure 2. Core Free Ridership Algorithm 2

$((\text{Program Components FR Score} + \text{Program Influence FR Score} + \text{No-Program FR Score}) / 3) * \text{Timing Adjustment 2}$



Source: Illinois TRM Version 6, Volume 4. Cross-Cutting Measures and Attachments, final February 8, 2017, effective January 1st, 2018.

Navigant applied both algorithms indicated by the TRM version 6.0 flow diagrams to the data we collected from 122 PY9 Standard Program participants. Using the TRM defined consistency checks<sup>22</sup>, we found 53 inconsistent records out of the 122 respondents. Navigant removed 18 records before calculating rolled-up results because they offered inconsistent responses and no responses to open-ended questions that could clarify their intentions. The other 35 inconsistent records were reviewed closely.

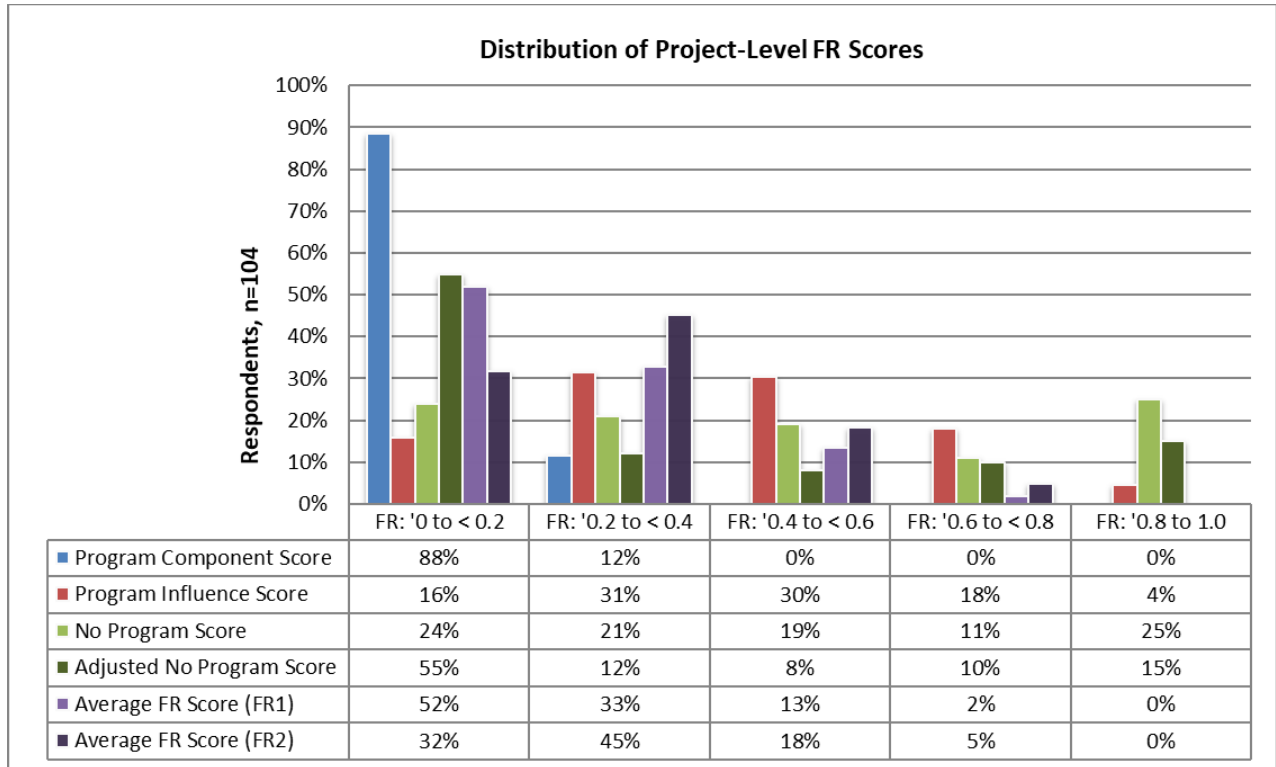
For those 35 respondents, we analyzed their responses to the consistency check follow-up questions, which included an open-ended question. Their open-ended responses were consistent with the complex nature of their free ridership component responses. A common pattern was a high influence of the incentive as well as a high likelihood of implementing the efficiency improvement if the program did not exist, together with an open-ended response that the incentive helped with an improvement they needed to do anyway. This suggests that while these records failed numeric consistency checks, their numeric responses were consistent with their open-ended responses. Subsequently, we saw no reason to adjust the 35 responses. However, we propose reviewing the TRM consistency check criteria with the Illinois NTG Working Group, given the relatively high incidence of the pattern of false positives.

In Figure 3, we present the percentage distribution of the scoring (0 to 1 scale) for the final 104 respondents in the free ridership estimations, using each possible combination of designated input specifications. The majority of respondents had low free ridership as represented by the Program Component Score and Adjusted No Program Score.

<sup>22</sup> Pages 31-32 in IL TRM v6 volume 4 section 3.1.1.1.5



**Figure 3. Distribution of Project-Level Free Ridership Scores**



Source: Navigant analysis of PY9 participants survey responses.

In context, the results for the program component score show that 88 percent of respondents scored between 0 to 0.2 free ridership and that 100 percent respondents scored less than 0.4 free ridership. This indicates a higher importance of the program components in the customers' decision to implement the energy efficient equipment that they installed.

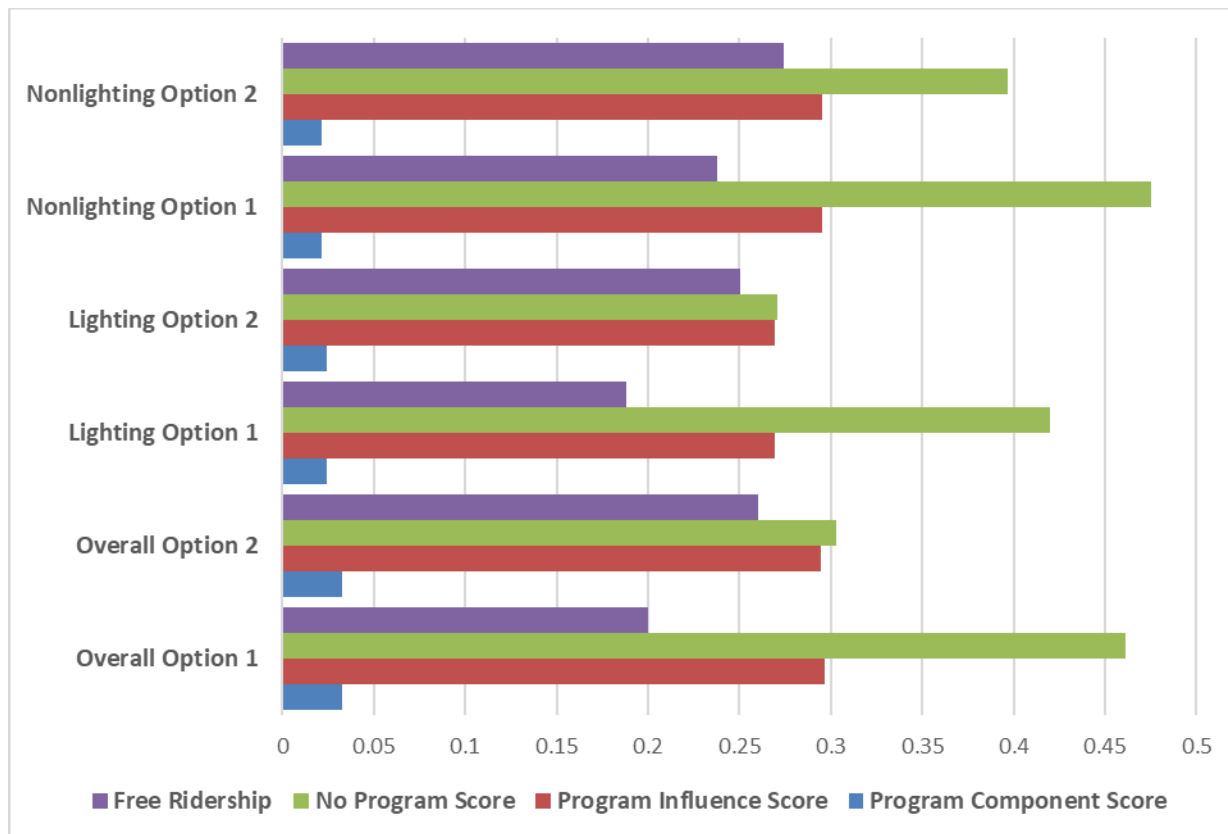
Table 4 and Figure 4 illustrate the details of the final free ridership components scoring for the end-use categories.

**Table 4. Details of Free-Ridership Scores**

NTG Algorithms	End-use	Program Components Score	Program Influence Score	No-Program Score	Free Ridership	Cronbach's Alpha Estimate
Algorithm 1	Lighting	0.02	0.27	0.42	0.19	0.15
	Non-lighting	0.02	0.30	0.48	0.24	0.29
	Overall	0.03	0.30	0.46	0.20	0.23
Algorithm 2	Lighting	0.02	0.27	0.27	0.25	0.29
	Non-lighting	0.02	0.30	0.40	0.27	0.38
	Overall	0.03	0.29	0.30	0.26	0.34

Source: Navigant analysis of PY9 participants survey responses.

Figure 4. Details of Free-Ridership Scores



Source: Navigant analysis of PY9 participants survey responses.

The evaluation team recommends the results from Algorithm 1. The rationale for selecting Algorithm 1 over Algorithm 2 is that Algorithm 1 provides for equal weighting of each of the three component free ridership scores, which represent different ways of determining program influence. In Algorithm 1, the timing adjustment modifies only one of the three components of free ridership. In contrast, in Algorithm 2, the timing adjustment modifies all three components of free ridership, which we believe gives it too much weight. Such a high weighting essentially discounts the effect of the other factors influencing program influence, which in our view is inappropriate.

## PARTICIPANT SPILLOVER ESTIMATION

The respondents were asked if they installed additional electricity savings measures to reduce the energy consumption at their property since participating in the Standard Program. Navigant included questions to identify spillover candidates and measures, paraphrased below:

1. Since participating in the Standard program, have you purchased and installed any additional energy efficiency measures that you did not receive any rebate for?
2. Did participating in the Standard program influence you in any way to make these additional purchases?
3. On a zero to ten scale, where zero is not at all important and ten is extremely important, how important was your participation in the Standard program on your decision to purchase these additional energy efficiency services or equipment? [Measure Attribution Score 1.]
4. If you had not participated in the Standard program, how likely is it that you would have purchased the additional energy efficiency services or equipment? Please use a zero to ten

scale, where zero means that you definitely would not have purchased them and ten means that you definitely would have purchased them? [Measure Attribution Score 2.]

Following the TRM, Spillover would be attributed to the Standard Program if the following condition was met: the average of Measure Attribution Score 1 and (10 minus Measure Attribution Score 2) must exceed 5.0.

The Spillover rate is calculated at the project level or at the program level using the following formula:

$$\text{Spillover Rate} = (\text{ISO} + \text{OSO}) / (\text{Ex Post Gross Impacts})$$

Where:

Net ISO = Inside Participant Spillover (additional program-induced EE measures at a program project site)

Net OSO = Outside Participant Spillover (program-induced EE measures at sites within ComEd's service territory at which program project measures were not implemented).

The evaluation identified 38 respondents from the 122 survey respondents who installed additional energy efficient equipment, but only eight indicated that participating in the Standard Program influenced them to make these additional purchases. Navigant determined that two of the eight potential spillover candidates had averaged spillover attribution scores greater than 5.0 and installed equipment (LED lamps and processing equipment) with quantifiable electricity savings.

Navigant was able to use the savings from the above-mentioned LED lamps to calculate spillover, though the information from the respondent with process equipment was insufficient to be quantified.<sup>3</sup> The sample spillover rate was 0.0009 from the LED lamps when rolled up to the population. This spillover rate does not make a significant impact and therefore the participant spillover attributed to the program should be reported as zero. However, we believe the spillover estimate from our previous trade ally spillover study (using a different method) remains valid and will include that estimate (0.02) in our draft recommendation for SAG approval.

## ESTIMATING CRONBACH ALPHA FOR SURVEY RELIABILITY

Cronbach's Alpha is a measure of internal consistency or reliability. It is used to assess how closely related a set of items are as a group. In this memo, Cronbach's Alpha is used to assess how closely related the items going into the NTG score are to each other. In general, the higher the measured Cronbach's Alpha value, the more consistent and reliable are the results. However, given the small number of items (i.e., the 3 scores) being considered in this application of Cronbach's Alpha, a high alpha value is not expected. Realistically, Alpha values ranging from 0.4 to 0.6 are considered an acceptable measure of reliability for this analysis given the small number of items being analyzed.

We used the Standardized Cronbach's Alpha calculation as specified below:

$$\alpha_{\text{standardized}} = \frac{K \cdot \bar{r}}{1 + (K - 1) \cdot \bar{r}}$$

Where K is the number of variables or items of the scale or questionnaire, and r-bar is the average correlation among all pairs of variables. The simplified algorithm we used is below.

$$\text{Alpha} = (K) / (K-1) * (1 - (\text{Sum of Item Variances} / (\text{Standard Dev. of Responses or Scores})^2))$$

<sup>3</sup> Customer did not provide a response to Question SP3a "How did you experience with the Program influence your decision to install this high efficiency equipment on your own? Or SP3b "How many <SP3a RESPONSE> did you install without receiving an incentive?". Customer did not provide a response to Question SP3a "How did you experience with the Program influence your decision to install this high efficiency equipment on your own? Or SP3b "How many <SP3a RESPONSE> did you install without receiving an incentive?". The customer also provided a "Don't Know" response to question SP3e "Why did you purchase the <SP2a RESPONSE> without an incentive from <UTILITY>?"

Navigant determined alpha coefficient for the free ridership results using a combination of components that determined the Program Influence Score, Non-Program Score, and Program Component Score, for lighting and non-lighting end-use for each algorithm, and the overall Alpha value for the combined free ridership results in that option. We estimated 0.29 as the overall Cronbach’s Alpha value for the survey based on the standardized variable of the relatively heterogeneous variances in the mixture of dichotomous and multi-point scales in the survey.

## NTG RESULTS

The NTG research results for the Standard Program PY9 participants are summarized in Table 5. In conclusion, Navigant recommends to the SAG to consider approval of the PY9 NTG values from Algorithm One for future use, based on reasons discussed above (see page 6).

**Table 5. ComEd Standard Proposed NTGR Values**

NTG Algorithm	End-use	Participant Free Ridership, (weighted)	Participant Spillover	Trade Ally Participant Spillover*	Mean NTGR	Relative Precision @ 90% CI
Algorithm 1	Lighting	0.19	0	0.02	0.83	4%
	Non-lighting	0.24	0	0.02	0.78	8%
	Overall	0.20	0	0.02	0.82	5%
Algorithm 2	Lighting	0.25	0	0.02	0.77	4%
	Non-lighting	0.27	0	0.02	0.75	9%
	Overall	0.26	0	0.02	0.76	7%

NTGR =1-FR+PSO+TPSO

\* Navigant analysis of PY8 trade ally and contractor self-reports approved by the SAG (see appendix).

Source: Navigant analysis of PY9 participants survey responses.

## APPENDIX: STANDARD PROGRAM NTG HISTORY

	<b>Business Standard Incentive</b>
PY1	<p><b>NTG 0.67</b>  <b>Free-Ridership 33%</b>  <b>Participant Spillover 0%</b> (qualitative evidence observed, not quantified)  <b>Method:</b> Customer self-report. 95 interviews completed covering 101 projects from a population of 455 projects.</p>
PY2	<p><b>NTG 0.74</b>  <b>Free-Ridership 27%</b>  <b>Participant Spillover 1%</b>  <b>Method:</b> Customer self-report. 90 interviews completed covering 114 projects from a population of 1,739 projects.                      Enhanced method. Ten trade allies called for 11 participants and their responses factored in to the customer free ridership calculation.</p>
PY3	<p><b>NTG 0.72</b>  <b>Free-Ridership 28%</b>  <b>Participant Spillover 0%</b> (qualitative evidence observed, not quantified)  <b>Method:</b> Customer self-report. 108 interviews completed covering 292 projects from a population of 3,794 projects.</p>

	<b>Business Standard Incentive</b>
	Enhanced method. Two trade allies and three account managers were called for five participants and their responses factored in to the customer free ridership calculation.
PY4	<p><b>Deemed using PY2 values.</b>  <b>PY4 Research NTG 0.70</b>  <b>Free-Ridership 31%</b>  <b>Participant Spillover 1%</b>  <b>Method:</b> Customer self-report. 110 interviews completed covering 166 projects from a population of 4,603 projects.  Enhanced method. Two trade allies called for two participants and their responses factored in to the customer free ridership calculation.  NTGR (Free-Ridership only): All lighting =0.70 (90/±5%); Lighting, no T12s reported in base case 0.66 (90/±9%); Lighting, T12s reported in base case 0.80 (90/±14%) Non-Lighting = 0.63 (90/±16%).</p>
PY5	<p>SAG Consensus:</p> <ul style="list-style-type: none"> <li>• Lighting: 0.74</li> <li>• Non-Lighting: 0.62</li> </ul>
PY6	<p>SAG Consensus:</p> <ul style="list-style-type: none"> <li>• Lighting: 0.70</li> <li>• Non-Lighting: 0.63</li> </ul>
PY7	<p><b>Lighting</b>  <b>NTG: 0.81</b></p> <p>Free Ridership: Measured and equal to 0.26  Justification: EPY5 ComEd Standard Program research, 63 participants</p> <p>Total Recommended Spillover = 0.07</p> <p>Participant and Non-Participant Spillover Identified by Participating Standard Program Trade Allies: Measured and equal to 0.05  Justification: EPY5 ComEd Standard Program research, participating trade ally sample 55</p> <p>Participant and Non-Participant Spillover Identified by Non-Participating Standard Program Trade Allies: Not measured for ComEd; a value of 0.02 is recommended  Justification: Based on GPY2 results from Nicor Gas (0.02), and Peoples Gas and North Shore Gas (0.02).</p> <p><b>Non-Lighting</b>  <b>NTG: 0.77</b></p> <p>Free Ridership: Measured and equal to 0.31  Justification: EPY5 ComEd Standard Program research, 64 participants</p> <p>Total Recommended Spillover = 0.08</p> <p>Participant and Non-Participant Spillover Identified by Participating Standard Program Trade Allies: Measured and equal to 0.06  Justification: EPY5 ComEd Standard Program research, participating trade ally sample 10.</p> <p>Participant and Non-Participant Spillover Identified by Non-Participating Standard Program Trade Allies: Not measured for ComEd; a value of 0.02 is recommended</p>

	<b>Business Standard Incentive</b>
	Justification: Based on GPY2 results from Nicor Gas (0.02), and Peoples Gas and North Shore Gas (0.02).
PY8	<p><b>Recommendation (based upon PY6 research):</b>  <b>NTG Lighting: 0.74</b>  <b>NTG Non-Lighting: 0.63</b>  <b>Free-Ridership, Lighting: 0.27</b>  <b>Free-Ridership, Non-Lighting: 0.38</b>  <b>SO: 0.01</b></p> <p>Free Ridership was estimated in PY6 as 0.27 for lighting  Free Ridership = 0.38 for non-lighting  Both based on customer self-report data collected through phone interviews (n=59).</p> <p>In PY6, trade allies and business customers were interviewed in a separate study to estimate spillover broadly across the C&amp;I market.</p> <p>The results of the cross-cutting C&amp;I spillover study will be reported separately.</p>
PY9	<p><b>Recommendation (based upon PY7 research):</b>  <b>NTG Lighting: 0.70</b>  <b>NTG Non-Lighting: 0.69</b>  <b>Free-Ridership, Lighting: 0.31</b>  <b>Free-Ridership, Non-Lighting: 0.32</b>  <b>Spillover, Lighting: 0.01</b>  <b>Spillover, Non-Lighting: 0.01</b></p> <p>NTG Research Source:  FR = PY7 Participant Customers and Trade Allies  SO = PY6 C&amp;I NTG study</p>
CY2018	<p><b>Recommendation (based upon PY7 and PY8 research):</b>  <b>NTG Lighting: 0.71</b>  <b>NTG Non-Lighting: 0.70</b>  <b>Free-Ridership, Lighting: 0.31</b>  <b>Free-Ridership, Non-Lighting: 0.32</b>  <b>Spillover, Lighting: 0.02</b>  <b>Spillover, Non-Lighting: 0.02</b></p> <p>NTG Research Source:  FR = PY7 Participant Customers and Trade Allies  SO = PY8 TA and Contractor Self-Report</p>

Source: [http://ilsagfiles.org/SAG\\_files/NTG/2017\\_NTG\\_Meetings/Final/ComEd\\_NTG\\_History\\_and\\_PY10\\_Recommendations\\_2017-03-01.pdf](http://ilsagfiles.org/SAG_files/NTG/2017_NTG_Meetings/Final/ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.pdf)

**APPENDIX D. COMED STANDARD PY9 EVALUATION PROCESS REPORT 2018-10-15 FINAL**



# ComEd Standard Program Process Evaluation Report

Energy Efficiency / Demand Response Plan:  
Plan Year 9 (PY9)

Presented to  
Commonwealth Edison Company

**FINAL**

October 15, 2018

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## 1. INTRODUCTION

The Navigant team conducted a limited process evaluation for the PY9 ComEd Standard Program (Standard Program or program) in conjunction with its net-to-gross research, reported separately. We surveyed participating customers in late 2017 and early 2018 to inform our research.

The research addressed participants' experience with the program as well as barriers to and participation in Comprehensive Energy Savings Offer (CES), and interest in and key elements of the Energy Management Assistance Offer (EMA). Although the program has moved on from these new offerings, there are lessons learned from each one that are applicable to the program.

## 2. EVALUATION APPROACH

In PY9, the Navigant team conducted a limited process evaluation for the ComEd Standard Program (Standard Program or program) in conjunction with its net-to-gross research, which was reported separately. We surveyed 122 participating customers in November 2017 and January 2018 using a computer assisted telephone interviewing (CATI) survey to inform our research (Appendix 5.1).

The initial survey sample frame included 3,335 projects, completed by 1,879 unique program participants (sampling units). Projects were classified by end-use (lighting or non-lighting) and energy savings (large, medium, and small), using ex ante energy impacts reported in the tracking database. Participants who completed both a Standard project and a Custom project were removed from the Standard Program survey sample. For remaining participants that completed multiple projects, we designated one project as the interview project. The final sample frame for the CATI survey consisted of 1,693 participants.

**Table 2-1. Sample Disposition for Participant Survey**

Sample Disposition	Value
Completed Interviews (I)	122
Eligible incomplete interview (N)*	15
Survey-ineligible organization (X1)	6
Not an eligible organization (X2)†	53
Organization with undetermined survey eligibility (U1)‡	411
Undetermined if eligible organization (U2)	19
Estimated proportion of cases of unknown survey eligibility that are eligible (e1)	96%
Estimated proportion of cases of unknown business eligibility that are eligible (e2)	91%
Total Phone Numbers Used	626
Total Sample Frame	1693
Response Rate§	22%

\* Partial interview: callback to complete or mid-interview terminate.

† Reasons: disconnected phone, business/residential phone, computer tone, or customer said wrong number.

‡ Reasons: answering machine, not available, respondent scheduled appointment, non-specific callback/secretary/NTG, initial refusal, hard refusal, gatekeeper refusal, or left voicemail.

The following formulas were used to calculate the AAPOR<sup>1</sup> Response Rate 3 (RR3):

$$RR_{(2-level)} = \frac{I}{I + N + e1(U1 + e2 * U2)}$$

where:

$$e1 = \frac{I + N}{I + N + X1}$$

$$e2 = \frac{I + N + X1 + U1}{I + N + X1 + U1 + X2}$$

### 3. DETAILED FINDINGS

The PY9 process research addressed the following topics related to the Standard Program and two offerings launched in the summer of 2017:

- Participant experience and satisfaction with the program delivery and operations
- Awareness of, and barriers to, participation in the Comprehensive Energy Savings Offer (CES)
- Awareness of, and interest in, the key elements of the Energy Management Assistance Offer (EMA)

Both new offerings featured additional bonuses on top of the usual incentive for completing multiple projects within a two-year window, intending to drive broader energy savings and higher customer engagement through multiple, comprehensive projects.

CES was designed to capitalize on customers' interest in comprehensive savings by offering an additional 20-30 percent bonus incentive for participants that reserve program funding for multiple projects at one time and complete the projects within a two-year window.

EMA was targeted at small-to-midsized customers (with demand of 100-150 kW) without a dedicated energy manager on staff or under contract, with the goal of providing the resources to encourage more comprehensive projects. EMA provided an additional 20-26 percent bonus incentive for participants to create a custom energy management plan and help participants implement the identified projects within the two-year window.

Although the program has moved on from these new offerings, there are lessons learned from each one that are applicable to the program, which are reported below.

## 3.1 Program Process and Satisfaction

### 3.1.1 Participant Satisfaction

Standard Program participants reported high levels of satisfaction with the overall program, with an average satisfaction rating of 8.7 on a scale of 0 to 10, where 0 means very dissatisfied and 10 means very satisfied. A majority (58 percent) of the respondents rated their overall program satisfaction at a 9 or 10 (Figure 3-1). Participants were most satisfied with the equipment that was eligible for incentives and their implementation contractor.

<sup>1</sup> [www.aapor.org/AAPOR\\_Main/media/publications/Standard-efinitions2015\\_8theditionwithchanges\\_April2015\\_logo.pdf](http://www.aapor.org/AAPOR_Main/media/publications/Standard-efinitions2015_8theditionwithchanges_April2015_logo.pdf)

Figure 3-1. Satisfaction with Components of the PY9 Standard Program



Source: PY9 Participant Survey

A little over a third (35 percent) of Standard participants used ComEd's resources to help them find a contractor. Survey responses suggest that this aspect of the program could be improved: it received the lowest average rating out of all components, with 18 percent of respondents highly dissatisfied, rating it a 0 or 1. Respondents also expressed less satisfaction with program communications. While additional research may be required to ferret out the drivers of satisfaction surrounding resources to find a contractor, ComEd could enhance the multiplicity of communications platforms, ease of navigation and improve the consistency with which they provide customer-centric quality communications.

The main program benefits are financial in nature. When asked about benefits of participating, respondents most frequently cited benefits like saving energy and money (80 percent), reducing maintenance costs (41 percent), and receiving the program incentives (32 percent). A quarter (25 percent) found benefit in projects that are good for the environment. Twenty percent mentioned the ability to install and use better quality or newer equipment as a main benefit. Other, less frequently mentioned benefits include the ability to make improvements sooner than otherwise possible (8 percent).

Respondents who have an on-site energy manager in their organization are significantly more likely to cite environmental benefits than those who do not (48 percent compared to 16 percent). However, company policy was not very influential (6.6 mean, 41% high rating, 17% low rating) in the decision to engage in the program. We recommend additional research to determine the role that company policy and dedicated energy managers play in program participation and free ridership.

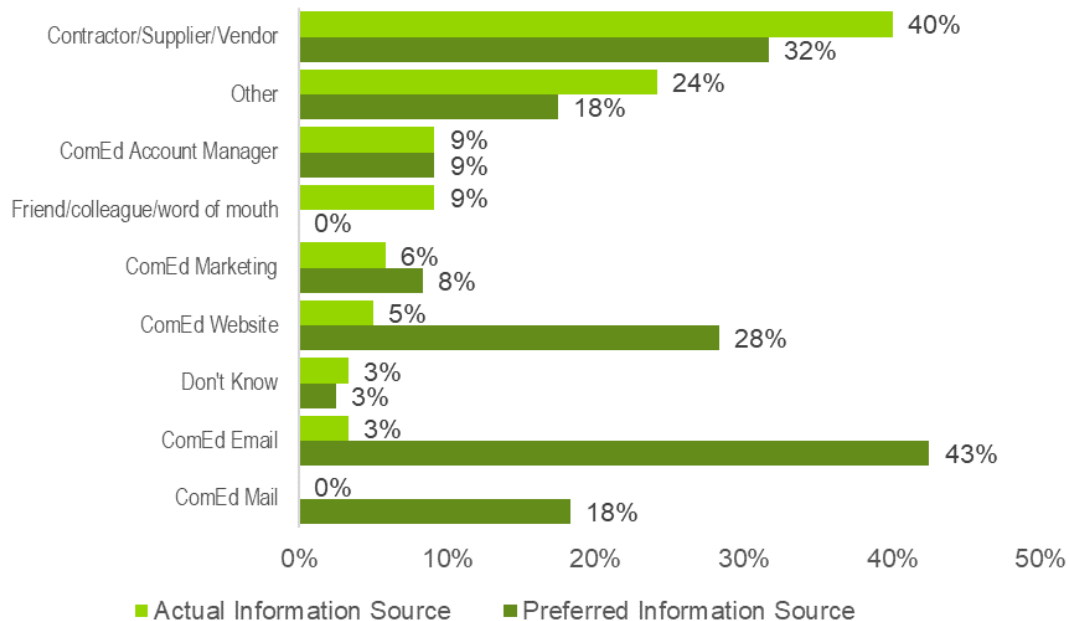
Engaging in a second project within two years constitutes a comprehensive project with additional bonus incentives. Yet few (3 percent lighting, 8 percent non-lighting) have completed a comprehensive project

(See Section 3.2.1 below). This suggests that future research should focus on the informational barrier(s) separating re-participation interest from comprehensive project completion.

**3.1.2 Marketing and Outreach**

ComEd continues to market the program using a multi-touch strategy across platforms and outreach to trade allies that enables the TAs to promote the program. PY9 participants most frequently first learned about the program through a contractor, supplier, or vendor (40 percent), and 32 percent also indicated that this was one of the best ways for ComEd to disseminate information about energy efficiency opportunities to their company (Figure 3-2). ComEd Account Managers (9 percent) and word of mouth (9 percent) reached more than marketing (6 percent), the ComEd website (5 percent), and emails (3 percent) combined.

**Figure 3-2. PY9 Standard Program Actual Information Source versus Preferred Outreach Channels**



Note: Multiple choices allowed, total will exceed 100 percent.  
 Source: PY9 Participant Survey n=120.

Email was the most preferred method of outreach but is underutilized or unsuccessful in attracting customers' attention. While 43 percent of respondents indicated it was one of the best ways of reaching their company, only 3 percent of respondents said they first learned about the program through email. This indicates an opportunity for ComEd to develop a more robust, content-rich targeted email campaign strategy, testing subject lines and monitoring open rates. The ComEd website and promotional mail were also underrecognized channels that customers prefer, suggesting that more mailers and an easily navigable, informative website offering distinct calls to action in the customer's language could drive participation.

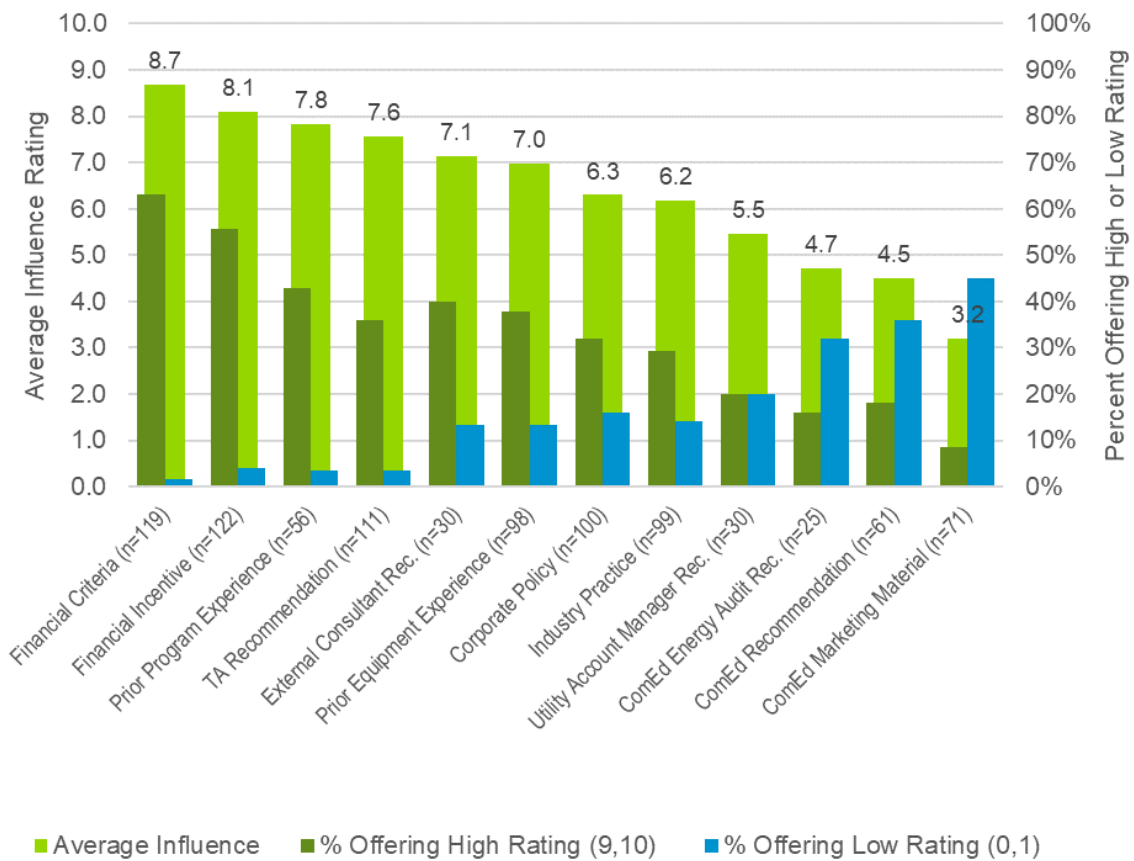
Standard Program participation is heavily driven by project financial metrics and prior program success rather than program deliverables (Figure 3-3). As such, customer needs should be a marketing focus rather than program deliverables. Focusing on the perception of value to the customer (the influences driving their decision to participate) conceivably would increase willingness and ability to participate in the

program. The most influential driver to refocus marketing efforts, according to participants, are financial criteria.

**3.1.3 Decision Making Criteria**

Standard Program participants rated project finances (financial criteria and financial incentives) as the most influential factor in their determination to participate in the program, followed by prior program experience (Figure 3-3). The four lowest rated influencers were associated with utility- and program-related recommendations and marketing. ComEd’s influence on participants could be strengthened with marketing materials that provide information on financial resources for project ROI or Payback, more targeted recommendations by industry segment, and testimonials or stories about past projects.

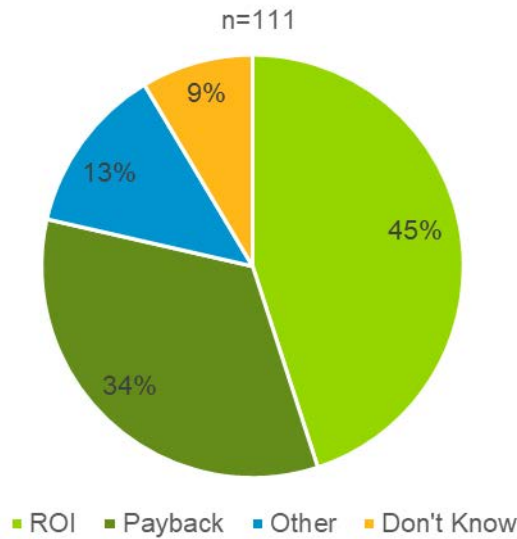
**Figure 3-3. Influences that Drive the Decision to Participate in the Standard Program**



Source: PY9 Participant Survey - n=120.

Participants reported a greater use of the Return on Investment (ROI) metric than Payback (Figure 3-4) but were less familiar with the required ROI than they were with Payback.

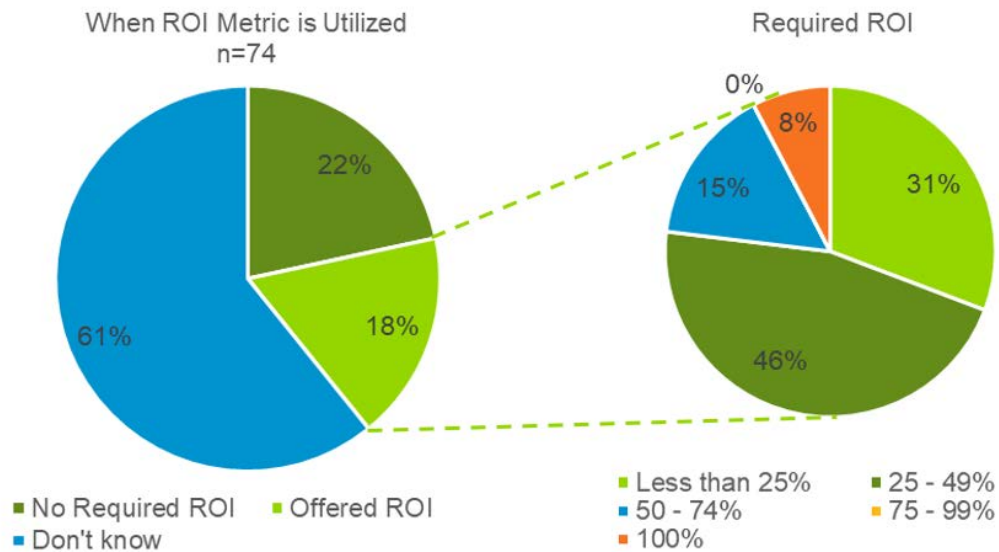
Figure 3-4. Type of Financial Metrics Required



Source: Analysis of PY9 Participant Survey

While more respondents specified the ROI metric, the required ROI suggests a possible lack of familiarity with the concept, with 69 percent reporting that their firm required a ROI greater than 25 percent, and almost a quarter requiring an ROI over 50 percent (Figure 3-5).

Figure 3-5. Requirement for Return on Investment

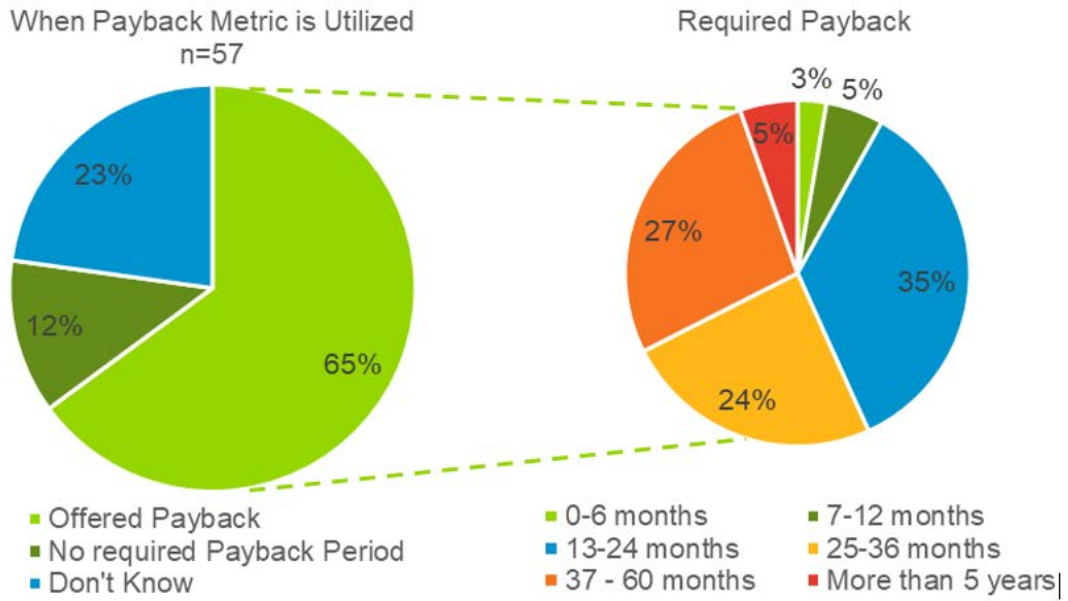


Source: PY9 Participant Survey

Respondents showed a greater familiarity with the payback concept, demonstrating better recall of the required metric for their projects that were more typical for energy efficiency investments. (Figure 3-6).



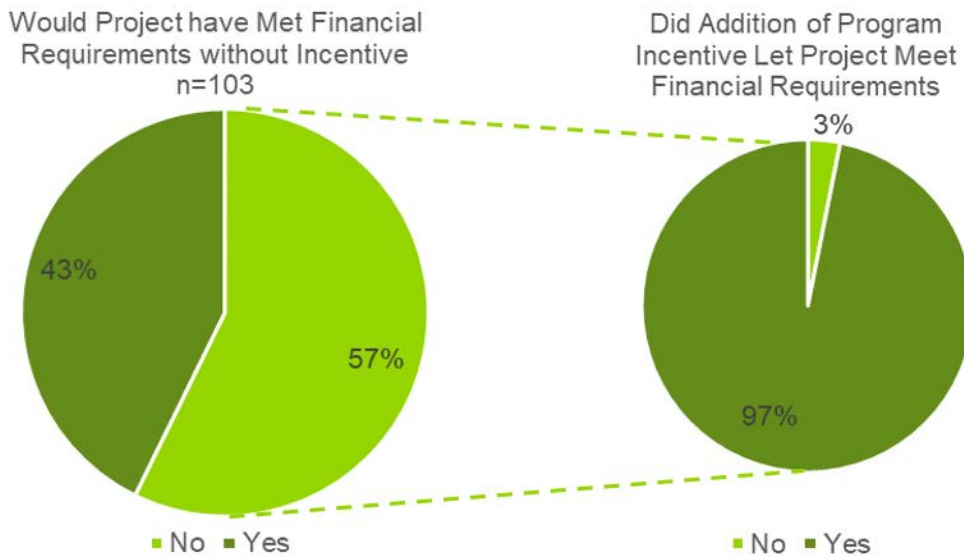
Figure 3-6. Requirement for Payback



Source: PY9 Participant Survey

Participants reported that the financial incentives offered through the program were necessary to meet the required financial criteria for a project to move forward at their company over half the time (Figure 3-7). Of those who reported requiring the program incentive, almost all reported that adding the incentive cleared the financial criteria.

Figure 3-7. Role of Program Incentives in Meeting Financial Criteria

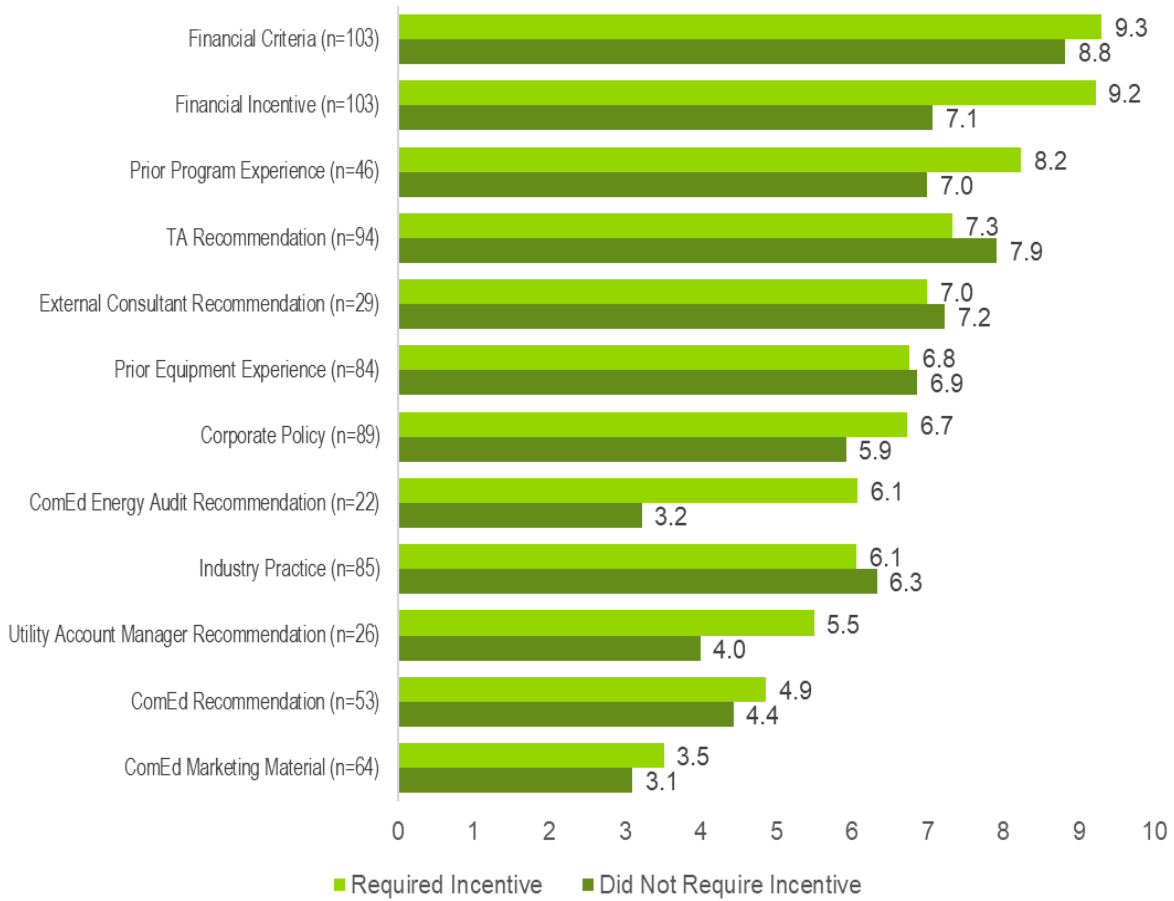


Source: PY9 Participant Survey

Accordingly, program factors were more important to those participants who required the financial incentive to qualify their project, influencing the level of free ridership. (Figure 3-8). Our research found a

disparity in the influence of prior program experience, recommendations from the ComEd energy audit and account managers on those requiring the incentive for their project to qualify.

**Figure 3-8. Importance of Program Factors Relative to Need for Financial Incentive**



Source: PY9 Participant Survey.

### 3.2 New Offers

#### 3.2.1 Comprehensive Savings Offer (CES)

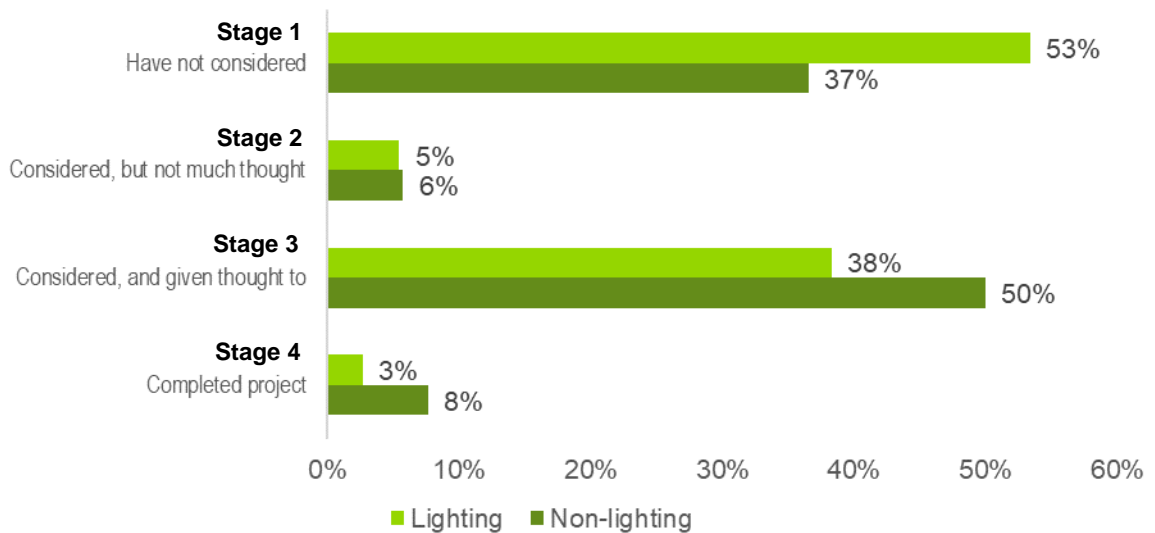
Our research addressed the new CES offer, including awareness, consideration of additional projects and future engagement in the program. Although we understand this offering may no longer be available, the research delivered findings important to future program development and the encouragement of participants to engage in multiple projects.

Six customers participated in CES in PY9. As noted above, roughly three quarters of participants reported the intent to submit additional projects through the program, and about half of those plan to do so within the coming year. Although well-promoted, few participants in the Standard Program are aware of CES (13 percent). Program participants who were aware of CES were more likely to actively seek out program information than other program participants, suggesting that actively engaged customers are searching for energy efficiency project assistance. For example:

- Participants were significantly more likely to learn about CES through the website (44 percent) than they were to learn about the other Standard Program offerings through the website (7 percent)
- Participants without an on-site energy manager are significantly more likely to learn about the offer through the ComEd website (53 percent) than those with an on-site manager (13 percent)
- CES participants most often recalled learning about the offer from the ComEd website (44 percent), their contractor (20 percent), and ComEd Account Managers (17 percent).

Respondents exhibit four stages of progress when considering comprehensive projects, ranging from never having considered it to completing a project (Figure 3-9). Although most customers are interested in doing multiple upgrades through the Standard Program (see re-participation findings, above), only a few can claim a track record of packaging multiple upgrades together in a comprehensive fashion.

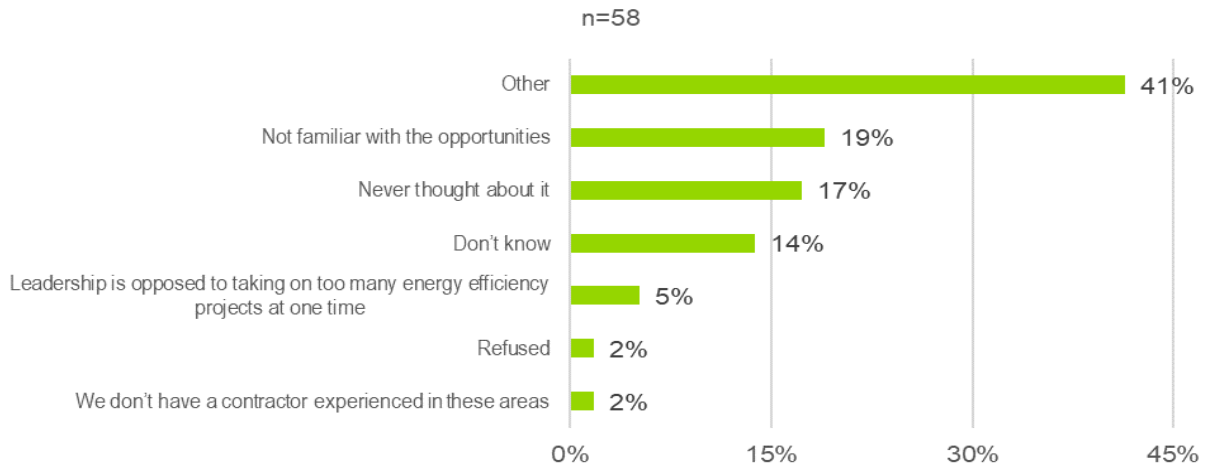
Figure 3-9. Previous Consideration for Comprehensive Projects Among CES Non-Participants



Source: PY9 Participant Survey

**Stage 1: Have not considered comprehensive projects:** Overall, 46 percent of respondents have simply never considered doing a comprehensive energy efficiency project. Lighting participants were more likely to have not considered a CES project (53 percent) than non-lighting participants (37 percent). Barriers to considering additional projects vary, with 19 percent reporting a lack of familiarity with the opportunities (Figure 3-10).

Figure 3-10. Barriers Among Participants Who Have Not Considered a Comprehensive Project

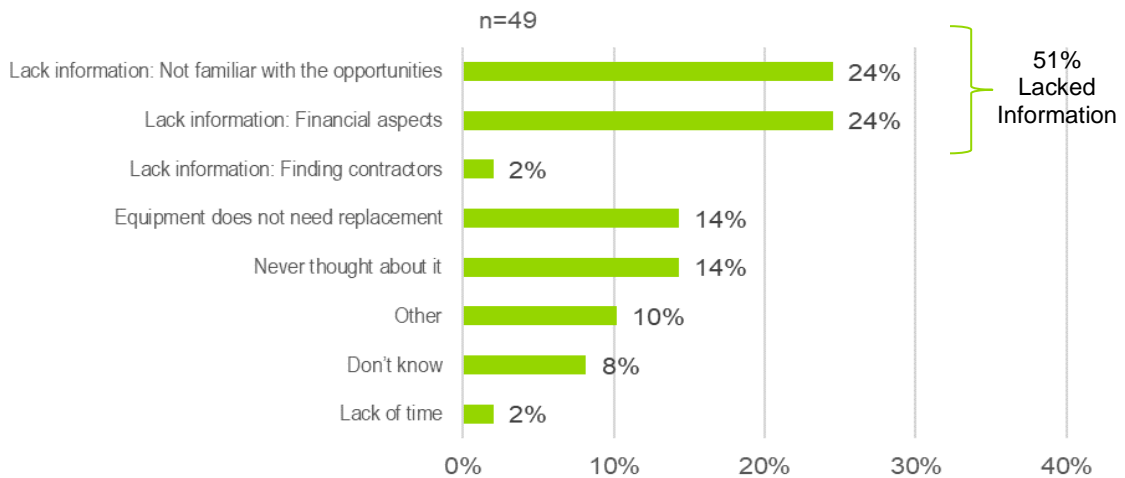


Source: PY9 Participant Survey

**Stage 2: Considered but have not given much thought:** Another 6 percent of participants claimed to have considered comprehensive projects but did not give them much thought. These participants did not provide further comment on why they did not give the project much thought and there was no difference between lighting and non-lighting customers.

**Stage 3: Considered and have given thought to comprehensive projects:** Just under half (45 percent) of participants have considered a project of this type and given it further thought. They suggested that a key barrier to forward movement is getting “stuck” in the planning process due to lack of information (Figure 3-11). More than half (51 percent) of customers in this stage said that they did not move their projects forward because they lacked information on which energy efficiency opportunities to undertake (24 percent), financial aspects of the project (24 percent), and how to find contractors (2 percent).

Figure 3-11. Barriers Among Participants Who Have Considered and Given Thought to Projects



Source: PY9 Participant Survey

**Stage 4: Completed project:** A few Standard Program participants who have not participated in the CES have already completed projects that addressed multiple systems at one time. Non-lighting customers more commonly completed these types of projects (8 percent of all participants) than lighting customers (3 percent of all participants).

Most of all customers lacked appreciation of what a comprehensive project would provide them or what it would entail. Customers who have considered comprehensive upgrades are challenged by how to operationalize their plans and determine benefits of a more complex project.

To help interested customers advance from planning to execution, ComEd may want to consider incorporating more education as part of its program delivery, helping to resolve customers' operational barriers by explaining how to coordinate a comprehensive project (or noting that trade allies can help with this) and highlighting how a coordinated effort can provide customer value beyond the bonus incentive.

### **3.2.2 Energy Management Assistance Offer (EMA)**

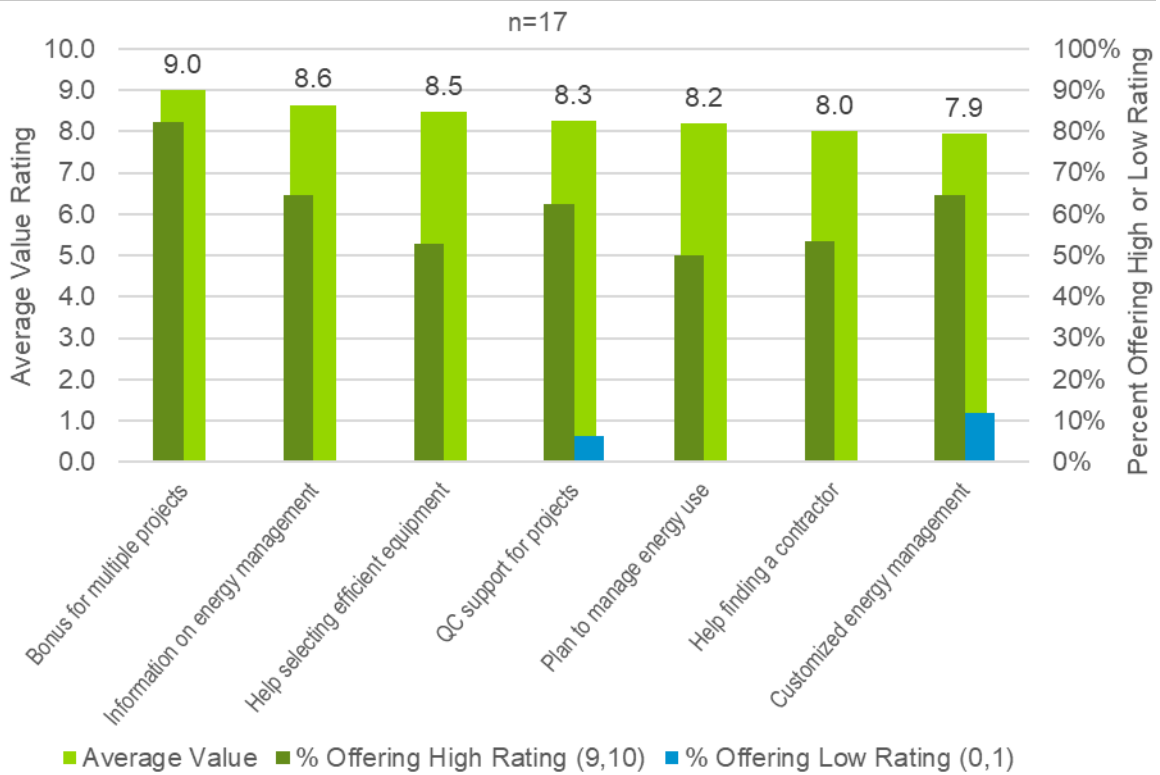
Our research addressed the new EMA offering, including awareness, perception, interest, benefits and barriers. While no projects were completed through this offer in PY9, there were a few projects in the pipeline. Although we understand this offering may no longer be available, the research delivered findings important to future program development and the encouragement of participants to engage in projects.

Most survey respondents (70 percent) reported not having an on-site energy manager. Of those respondents without an on-site energy manager, 17 percent had previously heard of ComEd's EMA.

After hearing about the EMA through the survey, 36 percent of participants reported either very high or very low interest in participating in the program within the next year. Those with a strong interest in the program (18 percent) found high value in energy management services provided by the program, while those with a low interest (18 percent) found little value in the services.

Of respondents with a high interest in EMA participation, each energy management service was individually valued highly by at least half of these respondents (Figure 3-12). About 82 percent valued the reserved bonus incentive the highest while 12 percent placed a very low value on a customized energy management plan. Conversely, participants that exhibited a low interest in participating in the program within the next year placed minimal high values on energy services, and each energy management service was individually valued very low by more than 60 percent.

**Figure 3-12. Perceived Value of Services for Potential Participants**



Source: PY9 Participant Survey

## 4. FINDINGS AND RECOMMENDATIONS

The following provides insight into key program findings and recommendations.

**Finding 1.** Participants tend to be satisfied with their overall program experience and note several benefits of participating. Strong areas of the Standard Program are the types of measures offered and incentive amounts. The primary drawbacks are the enrollment and approval timelines. While half the participants who used ComEd to help find a contractor were satisfied with these resources, many others felt neutral and a few felt dissatisfied. Overall, most participants plan to participate again in the future.

**Recommendation 1.** The high portion of neutral and dissatisfied attitudes towards ComEd’s resources to help find a contractor suggest that these resources could be improved. Because contractors and ComEd-approved trade allies play a key role in marketing and delivering the program, ComEd may want to consider doing additional research about how to improve this component.

**Finding 2.** Participants most commonly learn about the Standard Program through contractors, suppliers and vendors (44 percent) and/or through one or more of ComEd’s marketing channels (31 percent). Participants report a variety of preferred communications channels, the top three of which are email, program partners and the ComEd website. However, the website is not simple or obvious for customers unfamiliar with the offerings to navigate, challenging new customers to initiate projects on their own.

**Recommendation 2.** Because customers have a range of preferred channels of learning about ComEd’s offerings, ComEd should continue its multi-channel outreach strategy.

**Recommendation 3.** Because customers prefer to access program information on their own schedule via email, website and mailers, supporting materials should be offered from the customers' perspective, easy to navigate and offer distinct calls to action. Email links for additional information offered at easier (higher) navigation levels (not primarily on the PDFs deep in the site) would allow the customer to be tracked in a CRM system as a potential participant.

**Finding 3.** Most participants in the Standard Program have not given much thought to carrying out a project that could address multiple systems at one time and commonly lack information that would help them plan for this type of project.

**Recommendation 4.** ComEd should consider developing materials that deliver stronger focus on educating customers about the benefits and value of comprehensive projects. Customers without on-site energy managers, particularly the small and mid-sized businesses, would benefit from an assessment that includes a plan of action, reducing barriers such as indecision, confusion, and the need for additional research.

**Finding 4.** Customers without an on-site energy manager are significantly more likely to learn about the Comprehensive Energy Savings Offer (CES) through the ComEd website (53 percent) than those with an on-site manager (13 percent).

**Recommendation 5.** The segment of customers lacking on-site energy managers who are actively seeking information and resources to improve their efficiency is self-selecting and not obvious to the program or TAs. To convert these customers to participants, the program should offer distinct calls to action on the website, including an email link for more information on the navigation pages that will avoid frustration of making choices the customer may not understand.

**Finding 5.** Lighting project respondents tend to lack a familiarity with other energy efficiency upgrade opportunities.

**Recommendation 6.** Lighting TAs should be encouraged to promote comprehensive projects and additional measure types through training and provided with literature to leave behind. Program material should bolster non-lighting end uses and the concept of comprehensive projects.

## 5. APPENDIX

### Survey Instrument

The ComEd PY9 Standard Participant Survey instrument is provided below.

#### ComEd Energy Efficiency Program Participating Customer Survey – Standard Projects December 2017

The purpose of this survey is to gather information that can be used to develop net-to-gross ratios, including free-ridership and participant spillover for the ComEd Standard Program. In addition, the PY9 survey contains focused questions to collect data on the following process questions:

1. What are awareness, perceptions and interest among non-participants, and satisfaction among participants, in the Comprehensive Energy Savings Offer and Energy Management Assistance Offer?
2. What are participants' perspectives and overall satisfaction with the program?
3. How can the program be improved?

### Sample Variables

#### Introduction

[READ IF CONTACT=1]

Hello, this is \_\_\_\_\_ from Opinion Dynamics calling on behalf of ComEd. This is not a sales call. May I please speak with \_\_\_\_\_ ?



Our records show that \_\_\_\_\_ recently installed \_\_\_\_\_ that received an incentive from ComEd. Is this correct? [IF NOT, ASK TO BE TRANSFERRED TO MOST KNOWLEDGEABLE PERSON OR RECORD NAME & NUMBER.]

This survey will take about 10 minutes. Is now a good time? [If no, schedule call-back]

[READ IF CONTACT=0]

Hello, this is \_\_\_\_\_ from Opinion Dynamics calling on behalf of ComEd. I would like to speak with the person most knowledgeable about recent changes in cooling, lighting or other energy-related equipment for your firm at this location.

[IF NEEDED] Our records show that \_\_\_\_\_ recently installed \_\_\_\_\_ that received an incentive from ComEd. When signing the application form, you also agreed to support evaluation efforts of the ComEd Energy Efficiency Program which includes participating in surveys like this one. I was told you're the person most knowledgeable about this project. Is that correct? [IF NOT, ASK TO BE TRANSFERRED TO MOST KNOWLEDGEABLE PERSON OR RECORD NAME & NUMBER.]

This survey will take about 20 minutes. Is now a good time? [If no, schedule call-back]

(IF NEEDED: This is not a sales call.)

**Screening Questions**

[READ IF ENDUSE\_STRATUM=L1, L2, NL1, NL2] It is important that we hear from all types of companies, and you are one of only a few customers we are calling about <ENDUSE> projects. By sharing your feedback, you can help us be sure that we represent the views of companies like yours.

- A1 Just to confirm, did \_\_\_\_\_ participate in ComEd’s Energy Efficiency Program at \_\_\_\_\_ around \_\_\_\_\_ ?  
 (IF NEEDED: This is a program where your business received an incentive from \_\_\_\_\_ for installing one or more pieces of energy efficient equipment at your facility.)
- 01 (Yes, participated as described)
  - 02 (Yes, participated but at another location)
  - 03 (NO, did NOT participate in program)
  - 00 (Other, specify)
  - 98 (Don’t know)
  - 99 (Refused)

[SKIP A2 IF A1=1]

- A2 Is it possible that someone else dealt with the energy-efficient product installation?
- 01 (Yes, someone else dealt with it)
  - 02 (No)
  - 00 (Other, specify)
  - 98 (Don’t know)
  - 99 (Refused)

[IF A2=1, ask to be transferred to that person. If available, go back to A1. If not available, THANK AND TERMINATE.]

[IF A1<>1 THANK AND TERMINATE (Record dispo as “Could not confirm participation”.)]

- A3 I'd like to confirm some information in \_\_\_\_\_'s database. Our records show that you completed an \_\_\_\_\_ project through the program. Is this correct?
- 1 (Yes)
  - 2 (No, did not install)
  - 8 (Don't know)
  - 9 (Refused)

[IF A3<>1 THANK AND TERMINATE (Record dispo as "Could not confirm measures")]

TFR Before we begin, I want to emphasize that this survey will only be about the \_\_\_\_\_ project you completed with an incentive from \_\_\_\_\_ at \_\_\_\_\_. For the remainder of this survey, I will refer to the \_\_\_\_\_ as "the program" and to the \_\_\_\_\_ project as "the project".

**Free-Ridership**

- NP1 Did you work directly with any of the following in selecting the efficiency level of this project? Did you work with ... [1=Yes, 2=No, 8=Don't know, 9=Refused]
- a A contractor or vendor?
  - b An external planning or design professional? (IF NEEDED: A professional from outside your company, OTHER THAN A CONTRACTOR, who helped you plan or design the project.)
  - c A ComEd Account Manager

[ASK IF NP1a=1]

NP1aa. Who was the contractor or vendor that you worked with? [OPEN END]

- NP2 Who was the most influential in specifying the efficiency level of this project?
- 01 (Me/respondent)
  - 02 (Contractor)
  - 03 (Engineer)
  - 04 (Architect)
  - 05 (Manufacturer)
  - 06 (Distributor)
  - 07 (Company Owner)
  - 08 (Upgrade Project manager)
  - 09 ( \_\_\_\_\_ Representative/Program Staff)
  - 10 (Co-worker/peer)
  - 11 (Management at my company)
  - 00 (Other, specify)
  - 98 (Don't know)
  - 99 (Refused)

- NP3 And who informed you about the availability of an incentive through the program?
- 01 (Me/respondent)
  - 02 (Contractor)
  - 03 (Engineer)
  - 04 (Architect)
  - 05 (Manufacturer)
  - 06 (Distributor)
  - 07 (Company Owner)
  - 08 (Upgrade Project manager)

- 09 ( Representative/Program Staff)
- 10 (Co-worker/peer)
- 11 (Management at my company)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

NP4 Prior to this project, had \_\_\_\_\_ previously participated in the \_\_\_\_\_ ?  
 (IF NEEDED: Have you received an incentive for a project completed through the program in the past?)

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

NP5 To the best of your knowledge, has the facility located at \_\_\_\_\_ received a \_\_\_\_\_ - sponsored energy audit within the past 3 years? (IF NEEDED: An audit involves a visit by a field technician who looks at your facility and provides recommendations for ways to reduce your facility's energy usage.)

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

## Influencing Factors

TN1 I'd now like to ask a few questions about the \_\_\_\_\_ equipment you installed through the program.

N1 Did this new energy efficiency equipment that you installed through the program... replace existing equipment, was it added to control or work directly with existing equipment, or was it additional stand-alone equipment?

- 1 (Replaced existing equipment)
- 2 (Added to control or work directly with existing equipment)
- 3 (Additional stand-alone equipment)
- 00 Other (record VERBATIM)
- 98 (Don't know)
- 99 (Refused)

[ASK IF N1=1]

N2 Which of the following statements best describes the performance and operating condition of the equipment you replaced through the program?

- 1 Existing equipment was functioning without significant problems
- 2 Existing equipment was functioning, but it was outdated
- 3 Existing equipment was functioning, but with significant problems
- 4 Existing equipment had failed or did not function
- 00 Other (RECORD VERBATIM)
- 96 (Not applicable, ancillary equipment (VSD, EMS, controls, etc.) or additional stand-alone equipment)
- 98 (Don't know)
- 99 (Refused)

N3 In deciding to do a project of this type, there are usually a number of reasons why it may be undertaken. What were the main reasons you decided to install this equipment? (Probe for other reasons.)

[MULTIPLE RESPONSE]

[INTERVIEWER: If respondent says "Energy Savings", PROBE: What is your motivation behind wanting to achieve energy savings? Is it to reduce cost/use, for environmental reasons, or something else?]

- 01 (To replace old or outdated equipment)
- 02 (As part of a planned remodeling, build-out, or expansion)
- 03 (To improve equipment performance/product quality)
- 04 (To comply with codes set by regulatory agencies)
- 05 (To comply with company policies, goals, or mandates)
- 06 (To reduce energy costs/use)
- 07 (For environmental reasons/green image)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

[SKIP IF NP4=1]

N4 Did you learn about the program BEFORE or AFTER the decision was made to select the equipment?

(INTERVIEWER NOTE: If they say "at the same time," e.g., while talking with a contractor about equipment options, ask them to clarify if they picked the exact equipment before or after they found out about the available incentive.)

- 1 (Before)
- 2 (After)
- 8 (Don't know)
- 9 (Refused)

TN5 Next, I'm going to ask you to rate the importance of the \_\_\_\_\_ as well as other factors that might have influenced your decision to complete this project with the exact equipment chosen. I will read you a list of factors. For each factor, please rate its importance on a scale from 0 to 10, where 0 means "not at all important" and 10 means "extremely important". If something does not apply, please let me know.

[FOR EACH N5A-N5L RECORD 0 to 10; 96=Not Applicable; 98=Don't Know; 99=Refused]

(Interviewer Note: Prompt for a numeric rating if not given, for example "So what rating would that be, on a 0 to 10 scale?"... If respondent says "We would not have done it", prompt with "So would you rate that as extremely important, or a 10 on a 0 to 10 scale?")

N5a (IF NEEDED: How important in your DECISION to implement the project was...)  
Availability of the program's financial incentive?

[ASK IF N5A=0,1,2,8,9,10]

N5aa Could you briefly discuss why you gave that rating to the availability of the program incentive? [OPEN END; 98=Don't know; 99=Refused]

[ASK IF NP1-a=1]

N5b (IF NEEDED: How important in your DECISION to implement the project was...)  
A recommendation from an equipment vendor or contractor that helped you with the choice of the equipment?

[ASK IF NP1-b=1]

N5c (IF NEEDED: How important in your DECISION to implement the project was...)

(IF NEEDED: A professional from outside your company)  
 A recommendation from an external project planning or design consultant?

[ASK IF NP1-c=1]

N5d (IF NEEDED: How important in your DECISION to implement the project was...)  
 An endorsement or recommendation by your account manager?

[ASK IF N5d=0,1,2,8,9,10]

N5dd Could you briefly discuss why you gave that rating to your account manager? [OPEN  
 END; 98=Don't know; 99=Refused]

N5e (IF NEEDED: How important in your DECISION to implement the project was...)  
 A recommendation from a ComEd program staff person?  
 (IF NEEDED: This would be someone from that is affiliated specifically with  
 the program and not someone from the utility that might ordinarily contact you about your  
 account.)

[ASK IF N5e=0,1,2,8,9,10]

N5ee Could you briefly discuss why you gave that rating to the ComEd program staff person?  
 [OPEN END; 98=Don't know; 99=Refused]

[ASK IF NP5=1]

N5f (IF NEEDED: How important in your DECISION to implement the project was...)  
 Information provided through a -sponsored energy audit?

[ASK IF N5f=0,1,2,8,9,10]

N5ff Could you briefly discuss why you gave that rating to the energy audit? [OPEN END;  
 98=Don't know; 99=Refused]

N5g (IF NEEDED: How important in your DECISION to implement the project was...)  
 Information from marketing materials?

[ASK IF N5g=0,1,2,8,9,10]

N5gg Could you briefly discuss why you gave that rating to the marketing materials? [OPEN  
 END; 98=Don't know; 99=Refused]

[ASK IF NP4=1]

N5h (IF NEEDED: How important in your DECISION to implement the project was...)  
 Previous experience with the program?

N5i (IF NEEDED: How important in your DECISION to implement the project was...)  
 Previous experience with this type of equipment?

N5j (IF NEEDED: How important in your DECISION to implement the project was...)  
 Your company's corporate policy or guidelines?

N5k (IF NEEDED: How important in your DECISION to implement the project was...)  
 Standard practice in your business or industry?

N5l (IF NEEDED: How important in your DECISION to implement the project were...)  
 Financial criteria, such as payback or return on the investment

N5m Were there any other factors we haven't discussed that were influential in your decision to choose  
 the energy efficient equipment?

- 00 [Record verbatim]
- 96 (Nothing else influential)
- 98 (Don't Know)
- 99 (Refused)

[ASK IF N5m=00]

N5mm Using the same zero to 10 scale, how would you rate the influence of this factor?  
 [RECORD 0 to 10; 98=Don't Know; 99=Refused]

[ASK IF N5i>7 AND NP4=1]

- N5ii You indicated that previous experience with this type of equipment was important in your decision to complete the project that qualified for the \_\_\_\_\_ incentive. Was your experience from a time when you... installed the equipment using an earlier \_\_\_\_\_ incentive, ... or was it from a time when you installed that equipment on your own?
- 1 (With \_\_\_\_\_ incentive)
  - 2 (On my own/No \_\_\_\_\_ incentive)
  - 3 (Both)
  - 8 (Don't know)
  - 9 (Refused)

[ASK IF N5L>5 ELSE SKIP TO TN7]

**Financial Criteria**

TN6 I'd like to find out more about the financial criteria your company uses for its capital investments and expenditures.

N6 What financial criteria does your company use for \_\_\_\_\_ projects like the one you completed through the \_\_\_\_\_ program? Do you use... (Prompt, if needed) [MULTIPLE RESPONSE, UP TO 3]

- 01 Payback period
- 02 Return-on-investment
- 00 Something else (specify)
- 98 (Don't know)
- 99 (Refused)

[ASK IF N6=02]

N6a What is the return-on-investment threshold that your company uses, as a percentage? [OPEN END, RECORD AS PERCENTAGE BETWEEN 0% AND 100%; 996 - My company doesn't have a set percentage; 998-DK; 999-Ref]

[ASK IF N6=01]

N6b What is the payback cut-off point <COMPANY> uses, in months, before deciding to proceed with an investment? Would you say... (IF NEEDED: The payback period is the amount of time it takes for the energy savings created by a project to pay for the project cost.)

- 1 0 to 6 months
- 2 7 months to 1 year
- 3 more than 1 year up to 2 years
- 4 more than 2 years up to 3 years
- 5 more than 3 years up to 5 years
- 6 Over 5 years
- 7 (Don't have a cut-off point)
- 8 (Don't know)

N7 Without the program's incentive, would this project have met your company's financial criteria?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

[SKIP IF N7=1]

N7a And with the program's incentive, did this project meet your company's financial criteria?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

## Program vs. Other Factors

TN7 Thinking about this differently, I would like you to compare the importance of the PROGRAM with the importance of OTHER factors you may have considered in implementing the project.

[GENERATE OTHER\_IMP=1 IF (N5C, N5K, OR N5J=8,9,10) OR (N5B=8,9,10 AND <TA>=0) OR (N5L=8,9,10 AND (N7=1 OR N7a=2,8,9)) OR (N5i=8,9,10 AND (NP4<>1 OR N5ii=2))]

[READ IF OTHER\_IMP=1]

TN7o You mentioned that the following OTHER factors were important:

[READ IF N5B=8,9,10 & <TA>=0] Recommendation from an equipment vendor or contractor

[READ IF N5i=8,9,10 & (NP4<>1 OR N5ii=2)] Previous experience with this type of equipment

[READ IF N5C=8,9,10] Recommendation from an external project planning or design consultant

[READ IF N5K=8,9,10] Standard practice in your business/industry

[READ IF N5J=8,9,10] Corporate policy or guidelines

[READ IF N5L=8,9,10 & (N7=1 OR N7a=2,8,9)] Financial criteria, such as payback or return on the investment

N7o If you were given a TOTAL of 100 points that reflect the importance in your decision to implement the project, and you had to divide those 100 points between 1) the program and 2) any OTHER factors, how many points would you give to the importance of the PROGRAM?

[RECORD 0 to 100; 998=Don't Know; 999=Refused]

[CALCULATE VARIABLE "OTHER\_PTS" AS: 100 MINUS N7o RESPONSE; IF N7o=998,999, SET OTHER\_PTS=BLANK]

N7p And how many points would you give to other factors?

[RECORD 0 to 100; 998=Don't Know; 999=Refused]

[ASK IF N7p<>OTHER\_PTS & N7o<>998,999 & N7p<>998,999]

N7INC The last question asked you to divide a TOTAL of 100 points between the program and other factors. You just noted that you would give <N5p RESPONSE> points to the program. Does that mean you would give <OTHER\_PTS> points to other factors?

- 1 Yes
- 2 No

- 8 (Don't know)
- 9 (Refused)

[ASK IF N7INC=2]

- N7INC2 Would you like for me to change either the points given to the program or change the points given to other factors? Or we can change both if you wish.
- 1 (Change points given to program)
  - 2 (Change points given to other factors)
  - 3 (Change both)
  - 4 (No, don't change)
  - 8 (Don't know)
  - 9 (Refused)

[IF N7INC2=1,3, RETURN TO N7o]

[IF N7INC2=2, RETURN TO N7p]

### Counterfactual Scenarios

TN8 Now I would like you to think about the action you would have taken with regard to the completion of this project if the program had not been available. For the next two questions, please use a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely."

N8 Without the program, what is the likelihood that you would have installed EXACTLY the same ENERGY EFFICIENT equipment, either at the same time or at a later time?  
 [RECORD 0 to 10; 98=Don't know; 99=Refused]

[SKIP IF N8=0]

N9 And what is the likelihood that you would have installed exactly the same energy efficient equipment WITHIN 12 MONTHS OF WHEN YOU COMPLETED your project? (If needed: Please use the same likelihood scale, where 0 is "Not at all likely" and 10 is "Extremely likely.")  
 [RECORD 0 to 10; 98=Don't know; 99=Refused]

[SKIP IF N8=0]

N9a When do you think you would have installed the efficient equipment had the program not been available? (IF NEEDED: Please answer relative to the date that you ACTUALLY installed the equipment)

- 0 [MASK IF N9=0] At the same time
- 1 [MASK IF N9=0] Within 6 months
- 2 [MASK IF N9=0] More than 6 months up to 1 year later
- 3 More than 1 year up to 2 years later
- 4 More than 2 years up to 3 years later
- 5 More than 3 years up to 4 years later
- 6 More than 4 years later
- 8 (Don't know)
- 9 (Refused)

[ASK IF N9a=6]

N9b Why do you think it would have been over 4 years later?

- 00 [Record VERBATIM]
- 98 (Don't know)
- 99 (Refused)



## Consistency Checks

GENERATE PROGRAM INFLUENCE VARIABLES AS FOLLOWS]

Program Influence Variable	Check Description	Value	Condition
CC_PC	Importance of program components	1 = High	Any of N5a, N5e, N5H, N5g, OR N5D=8,9,10
		2 = Low	At least one of N5a, N5e, N5H, N5g, OR N5D=0,1,2 AND None of N5a, N5e, N5H, N5g, OR N5D=3-10
		0 = Neither	Any other responses
CC_PI	Program influence score	1 = High	N7o = 71-100
		2 = Low	N7o = 0-29
		0 = Neither	Any other responses
CC_NP	No-program likelihood score	1 = High	N8=0,1,2
		2 = Low	N8=8,9,10
		0 = Neither	Any other responses
CC_ID	Installation decision timeframe	2 = After	N4=2
		1 = Before	N4=1
		0 = Neither	Any other responses

[GENERATE TRIGGER VARIABLE AS FOLLOWS]

TRIGGER	TRIGGER_2	CC_PC	CC_PI	CC_NP	CC_ID
1	1	1	2	ANY	ANY
		2	1	ANY	ANY
		1	ANY	2	ANY
		2	ANY	1	ANY
		ANY	1	2	ANY
		ANY	2	1	ANY
	2	1	ANY	ANY	2
		ANY	1	ANY	2
		ANY	ANY	1	2
0	0	All other combinations			

[IF TRIGGER=0, SKIP TO SPILLOVER SECTION]

[ASK IF TRIGGER = 1, ELSE SKIP TO SPILLOVER SECTION]

TCC1 I have a few follow-up questions on your earlier responses. Some of your answers suggested that the program WAS pretty important in your decision to complete the project but others suggested that it WASN'T very important. Just to make sure I have understood your responses, I have a couple of follow-up questions to ask you.

The following responses suggest that the program was important:

- [READ IF CC\_PC=1] You gave a rating of 8 or higher to the following program components:
  - [READ IF N5a=8,9,10] the program incentive
  - [READ IF N5H=8,9,10] previous experience with the program
  - [READ IF N5E=8,9,10] a recommendation from a program staff person
  - [READ IF N5g=8,9,10] information from marketing materials
  - [READ IF N5D=8,9,10] an endorsement or recommendation by your key account executive
- [READ IF CC\_PI=1] You gave out of 100 points to the program.
- [READ IF CC\_NP=1] You gave a rating of for the likelihood that you would have completed the same project without the program.

But you also...

- [READ IF CC\_ID=2] said that you learned about the program AFTER you already decided to install energy efficient
- [READ IF CC\_PC=2] rated all program components 2 or less in terms of their importance in your decision to implement the project,
  - [READ IF CC\_PI=2] gave <N7o RESPONSE> out of 100 points to the program,
  - [READ IF CC\_NP=2] gave a rating of <N8 RESPONSE> for the likelihood that you would have completed the same project without the program,

... which suggests that the program was not important.

- CC1 Overall, would you say that the program was important, or not important, in your selection of the energy efficient equipment?
- 1 Important
  - 2 Not important
  - 3 (Neither important nor unimportant)
  - 8 (Don't know)
  - 9 (Refused)

- CC2 Can you describe the role the program played in your decision to install this efficient equipment?  
[OPEN END – RECORD VERBATIM; 98=DON'T KNOW; 99=REFUSED]

[ASK IF CC\_ID=2 AND N5b=7,8,9,10]

- CC3 Could you briefly describe the role of your vendor on your decision to implement the project?  
[OPEN END – RECORD VERBATIM; 98=DON'T KNOW; 99=REFUSED]

[ASK IF (CC\_ID=2 AND CC1=1)]

- CC4 Could you please clarify whether you learned about the program before, or after, you made your final decision to install your specific energy-efficient equipment?
- 01 (Learned about Program Before)
  - 02 (Learned about program After)
  - 00 (Other, specify)
  - 98 (Don't know)
  - 99 (Refused)

[SKIP RESPONDENTS WHO ONLY TRIGGERED TIMING CHECK TO SPILLOVER SECTION: SKIP IF (CC\_PC=1 AND CC\_P1=2 AND CC\_NP=1 AND CC\_ID=2) OR (CC\_PC=2 AND CC\_PI=1 AND CC\_NP=2 AND CC\_ID=2) OR (CC\_PC=1 AND CC\_PI=1 AND CC\_NP=1 AND CC\_ID=2)]

[ASK IF CC1=1,2, ELSE SKIP TO SPILLOVER SECTION]

- CC5 Would you like for me to change your responses that suggested that the program was [READ IF CC1=1: not] important? We can change: [MULTIPLE RESPONSE, UP TO 2]
- 1 [READ IF (CC\_PC=1 AND CC1=2) OR (CC\_PC=2 AND CC1=1)] the ratings you gave to program factors
  - 2 [READ IF (CC\_PI=1 AND CC1=2) OR (CC\_PI=2 AND CC1=1)] the points you allocated to the program
  - 3 [READ IF (CC\_NP=1 AND CC1=2) OR (CC\_NP=2 AND CC1=1)] the likelihood to install the same equipment without the program
  - 4 (No, don't change)
  - 8 (Don't know)
  - 9 (Refused)

[ASK IF CC5=1]

- CC6 Please tell me what new rating you would like to give to each of the following...  
[FOR EACH N11a-N11I RECORD 0 to 10; 98=Don't Know; 99=Refused]

How important in your DECISION to implement the project was...

- a [ASK IF (CC\_PC=1 AND N5a=8,9,10) OR (CC\_PC=2 AND N5a=0,1,2)] the importance of the program's financial incentive?  
(IF NEEDED: Your prior rating was a \_\_\_\_\_ out of 10)
- h [ASK IF (CC\_PC=1 AND N5H=8,9,10) OR (CC\_PC=2 AND N5H=0,1,2)] the importance of previous participation in the program?  
(IF NEEDED: Your prior rating was a \_\_\_\_\_ out of 10)
- e [ASK IF (CC\_PC=1 AND N5E=8,9,10) OR (CC\_PC=2 AND N5E=0,1,2)] the importance of a recommendation from a program staff person?  
(IF NEEDED: Your prior rating was a \_\_\_\_\_ out of 10)
- g [ASK IF (CC\_PC=1 AND N5G=8,9,10) OR (CC\_PC=2 AND N5G=0,1,2)] the importance of information from \_\_\_\_\_ marketing materials?  
(IF NEEDED: Your prior rating was a \_\_\_\_\_ out of 10)
- d [ASK IF (CC\_PC=1 AND N5D=8,9,10) OR (CC\_PC=2 AND N5D=0,1,2)] the importance of an endorsement or recommendation by your \_\_\_\_\_ account manager?  
(IF NEEDED: Your prior rating was a \_\_\_\_\_ out of 10)

[ASK IF CC5=2]

- CC7 Out of a total of 100 points, how many points would you give to the program and how many would you give to other influences? [RECORD 0 to 100; 998=Don't Know; 999=Refused]
- a the program?
  - b other factors?
- (IF NEEDED: You previously allocated \_\_\_\_\_ out of 100 points to the program)

[ASK IF CC5=3]

- CC8 If the program had not been available, what is the likelihood that you would have installed exactly the same equipment?  
(IF NEEDED: Using a scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely")  
(IF NEEDED: Your prior rating was a \_\_\_\_\_ > out of 10)  
[RECORD 0 to 10; 98=Don't know, 99=Refused]

**Spillover**

Thank you for discussing the \_\_\_\_\_ project that you completed through the \_\_\_\_\_ .  
 Next, I would like to discuss any energy efficient equipment you might have installed without receiving an incentive from \_\_\_\_\_ .

- SP1 Since receiving the incentive for the project we just discussed, have you installed any ADDITIONAL energy efficiency measures at this facility or at your other facilities within \_\_\_\_\_ 's service territory that did NOT receive an incentive from \_\_\_\_\_ ?
- 1 Yes
  - 2 No
  - 8 (Don't know)
  - 9 (Refused)

[ASK IF SP1=1, ELSE SKIP TO PROCESS MODULE]

- SP1a Have you applied, or do you still plan to apply, for a \_\_\_\_\_ incentive for these energy efficiency measure(s)?
- 1 Yes
  - 2 No
  - 8 (Don't know)
  - 9 (Refused)

[ASK IF SP1a=1]

- SP1b What \_\_\_\_\_ program(s) do you plan to apply to for incentives for these energy efficiency measure(s)? [INTERVIEWER NOTE: Customers interviewed for this survey just completed a Standard/Prescriptive project]
- 1 (Standard/Prescriptive Program)
  - 2 (Custom Program)
  - 00 (Other, specify)
  - 98 (Don't know)
  - 99 (Refused)

[ASK IF SP1a=1]

- SP1c When do you plan to apply for incentives through these program(s)?
- 00 [RECORD VERBATIM]

**First Spillover Measure**

[ASK IF SP1a=2, ELSE SKIP TO PROCESS MODULE]

- SP2a What was the first energy efficient measure that you implemented without a <UTILITY> incentive? (If response is general, e.g., "lighting equipment", probe for specific measure. Probe from list, if necessary.)
- 01 (Lighting: LED lamps)
  - 02 (Lighting: T8 lamps) (Note that this is a type of linear fluorescent lamps)
  - 03 (Lighting: T5 lamps) (Note that this is a type of linear fluorescent lamps)
  - 04 (Lighting: Highbay Fixtures)
  - 05 (Lighting: CFLs)
  - 06 (Lighting: Controls or Occupancy sensors)
  - 07 (Cooling: Chiller)
  - 08 (Cooling: Unitary/Split Air Conditioning System)
  - 09 (Room A/C)
  - 10 (Strip curtains)
  - 11 (Motors: Variable Frequency Drives (VFD/VSD))

- 12 (Motors: Efficient motors)
- 13 (Food service products: Anti-sweat controls)
- 14 (Food service products: EC motor for WALK-IN cooler/freezer)
- 15 (Food service products: EC motor for REACH-IN cooler/freezer)
- 16 (Process equipment)
- 17 (Information technology)
- 00 (Other, specify)
- 96 (Didn't install any measures)
- 98 (Don't know)
- 99 (Refused)

[SKIP TO PROCESS MODULE IF SP2a=96, 98, 99]

SP2b On a scale of 0-10, where 0 means "no influence" and 10 means "greatly influenced," how much did your experience with the \_\_\_\_\_ influence your decision to install this particular high efficiency equipment on your own?  
 [SCALE 0-10; 98=Don't know, 99=Refused]

SP2c If you had NOT participated in the \_\_\_\_\_, how likely is it that \_\_\_\_\_ would still have installed this additional energy efficient equipment? Please use a 0 to 10 scale, where 0 means you "definitely WOULD NOT have implemented this equipment" and 10 means you "definitely WOULD have implemented this equipment".  
 [SCALE 0-10; 98=Don't know, 99=Refused]

[CALCULATE SP\_SCORE:

- IF SP2b<>98,99 AND SP2c<>98,99, THEN SP\_SCORE = (SP2b+(10-SP2c))/2
- IF SP2b<>98,99 AND SP2c=98,99, THEN SP\_SCORE = SP2b
- IF SP2b=98,99 AND SP2c<>98,99, THEN SP\_SCORE = 10-SP2c]

[ASK IF SP\_SCORE>5, ELSE SKIP TO PROCESS MODULE]

SP3a How did your experience with the <PROGRAM\_NAME> influence your decision to install this high efficiency equipment on your own?  
 [OPEN END; 98=Don't Know, 99=Refused]

[ASK IF SP2a=1-6, ELSE SKIP TO SP3e]

SP3b How many <SP3a RESPONSE> did you install without receiving an incentive (IF NEEDED: Probe for best estimate) [NUMERIC OPEN END; 0-995; Don't know=998, Refused=999]

SP3c Generally, what type of light bulbs did the <SP2a RESPONSE> [READ IF SP2a=1-5: replace; READ IF SP2a=6: control]?

- 1. (Incandescent lamps)
- 2. (CFLs)
- 3. (LEDs)
- 4. (Halogen lamps)
- 5. (Linear fluorescent T12s)
- 6. (Linear fluorescent T8s)
- 00. (Other – specify)

- 98. (Don't know)
- 99. (Refused)

SP3d Were the majority of <SP2a RESPONSE> installed in areas that use space cooling and heating?

- 1. (Cooling Only)
- 2. (Heating Only)
- 3. (Cooling and Heating)
- 4. (Neither Cooling nor Heating)
- 8. (Don't know)
- 9. (Refused)

SP3e Why did you purchase the <SP2a RESPONSE> without an incentive from <UTILITY>? [MULTIPLE RESPONSE, UP TO 3]

- 01 (Takes too long to get approval)
- 02 (No time to participate, needed equipment immediately)
- 03 (The equipment did not qualify)
- 04 (The amount of the incentive wasn't large enough)
- 05 (Did not know the program was available)
- 06 (There was no program available)
- 07 (Had reached the maximum incentive amount)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

[ASK IF SP3e=3]

SP3ee Why didn't the equipment qualify? [OPEN END; 98=Don't Know, 99=Refused]

## Second Spillover Measure

SP4 Did you implement any other energy efficient measures without a <UTILITY> incentive?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

[ASK IF SP4=1, ELSE SKIP PROCESS MODULE]

SP5a What was the second energy efficient measure that you implemented without a <UTILITY> incentive? (If response is general, e.g., "lighting equipment", probe for specific measure. Probe from list, if necessary.)

- 01 (Lighting: LED lamps)
- 02 (Lighting: T8 lamps) (Note that this is a type of linear fluorescent lamps)
- 03 (Lighting: T5 lamps) (Note that this is a type of linear fluorescent lamps)
- 04 (Lighting: Highbay Fixtures)
- 05 (Lighting: CFLs)
- 06 (Lighting: Controls or Occupancy sensors)
- 07 (Cooling: Chiller)
- 08 (Cooling: Unitary/Split Air Conditioning System)
- 09 (Room A/C)
- 10 (Strip curtains)
- 11 (Motors: Variable Frequency Drives (VFD/VSD))
- 12 (Motors: Efficient motors)
- 13 (Food service products: Anti-sweat controls)

- 14 (Food service products: EC motor for WALK-IN cooler/freezer)
- 15 (Food service products: EC motor for REACH-IN cooler/freezer)
- 16 (Process equipment)
- 17 (Information technology)
- 00 (Other, specify)
- 96 (Didn't install any measures)
- 98 (Don't know)
- 99 (Refused)

[SKIP TO PROCESS MODULE IF SP5a=96, 98, 99]

SP5b On a scale of 0-10, where 0 means "no influence" and 10 means "greatly influenced," how much did your experience with the \_\_\_\_\_ influence your decision to install this particular high efficiency equipment on your own?  
[SCALE 0-10; 98=Don't know, 99=Refused]

SP5c If you had NOT participated in the \_\_\_\_\_, how likely is it that \_\_\_\_\_ would still have installed this additional energy efficient equipment? Please use a 0 to 10 scale, where 0 means you "definitely WOULD NOT have implemented this equipment" and 10 means you "definitely WOULD have implemented this equipment".  
[SCALE 0-10; 98=Don't know, 99=Refused]

[CALCULATE SP\_SCORE:

- IF SP5b<>98,99 AND SP5c<>98,99, THEN SP\_SCORE = (SP5b+(10-SP5c))/2
- IF SP5b<>98,99 AND SP5c=98,99, THEN SP\_SCORE = SP5b
- IF SP5b=98,99 AND SP5c<>98,99, THEN SP\_SCORE = 10-SP5c]

[ASK IF SP\_SCORE>5, ELSE SKIP TO PROCESS MODULE]

SP6a How did your experience with the <PROGRAM\_NAME> influence your decision to install this high efficiency equipment on your own?  
[OPEN END; 98=Don't Know, 99=Refused]

[ASK IF SP5a=1-6, ELSE SKIP TO SP6e]

SP6b How many <SP5a RESPONSE> did you install without receiving an incentive (IF NEEDED: Probe for best estimate) [NUMERIC OPEN END; 0-995; Don't know=998, Refused=999]

SP6c Generally, what type of light bulbs did the <SP5a RESPONSE> [READ IF SP5a=1-5: replace; READ IF SP5a=6: control]?

1. (Incandescent lamps)
2. (CFLs)
3. (LEDs)
4. (Halogen lamps)
5. (Linear fluorescent T12s)
6. (Linear fluorescent T8s)
00. (Other – specify)

- 98. (Don't know)
- 99. (Refused)

SP6d Were the majority of <SP5a RESPONSE> installed in areas that use space cooling and heating?

- 1. (Cooling Only)
- 2. (Heating Only)
- 3. (Cooling and Heating)
- 4. (Neither Cooling nor Heating)
- 8. (Don't know)
- 9. (Refused)

SP6e Why did you purchase the <SP5a RESPONSE> without an incentive from <UTILITY>? [MULTIPLE RESPONSE, UP TO 3]

- 01 (Takes too long to get approval)
- 02 (No time to participate, needed equipment immediately)
- 03 (The equipment did not qualify)
- 04 (The amount of the incentive wasn't large enough)
- 05 (Did not know the program was available)
- 06 (There was no program available)
- 07 (Had reached the maximum incentive amount)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

[ASK IF SP6e=3]

SP6ee Why didn't the equipment qualify? [OPEN END; 98=Don't Know, 99=Refused]

### Third Spillover Measure

SP7 Did you implement any other energy efficient measures without a <UTILITY> incentive?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

[ASK IF SP7=1, ELSE SKIP TO PROCESS MODULE]

SP8a What was the third energy efficient measure that you implemented without a <UTILITY> incentive? (If response is general, e.g., "lighting equipment", probe for specific measure. Probe from list, if necessary.)

- 01 (Lighting: LED lamps)
- 02 (Lighting: T8 lamps) (Note that this is a type of linear fluorescent lamps)
- 03 (Lighting: T5 lamps) (Note that this is a type of linear fluorescent lamps)
- 04 (Lighting: Highbay Fixtures)
- 05 (Lighting: CFLs)
- 06 (Lighting: Controls or Occupancy sensors)
- 07 (Cooling: Chiller)
- 08 (Cooling: Unitary/Split Air Conditioning System)
- 09 (Room A/C)
- 10 (Strip curtains)
- 11 (Motors: Variable Frequency Drives (VFD/VSD))
- 12 (Motors: Efficient motors)
- 13 (Food service products: Anti-sweat controls)



- 14 (Food service products: EC motor for WALK-IN cooler/freezer)
- 15 (Food service products: EC motor for REACH-IN cooler/freezer)
- 16 (Process equipment)
- 17 (Information technology)
- 00 (Other, specify)
- 96 (Didn't install any measures)
- 98 (Don't know)
- 99 (Refused)

[SKIP TO PROCESS MODULE IF SP8a=96, 98, 99]

SP8b On a scale of 0-10, where 0 means “no influence” and 10 means “greatly influenced,” how much did your experience with the \_\_\_\_\_ influence your decision to install this particular high efficiency equipment on your own?  
[SCALE 0-10; 98=Don't know, 99=Refused]

SP8c If you had NOT participated in the \_\_\_\_\_, how likely is it that \_\_\_\_\_ would still have installed this additional energy efficient equipment? Please use a 0 to 10 scale, where 0 means you “definitely WOULD NOT have implemented this equipment” and 10 means you “definitely WOULD have implemented this equipment”.  
[SCALE 0-10; 98=Don't know, 99=Refused]

[CALCULATE SP\_SCORE:

- IF SP8b<>98,99 AND SP8c<>98,99, THEN SP\_SCORE = (SP8b+(10-SP8c))/2
- IF SP8b<>98,99 AND SP8c=98,99, THEN SP\_SCORE = SP8b
- IF SP8b=98,99 AND SP8c<>98,99, THEN SP\_SCORE = 10-SP8c]

[ASK IF SP\_SCORE>5, ELSE SKIP TO PROCESS MODULE]

SP9a How did your experience with the <PROGRAM\_NAME> influence your decision to install this high efficiency equipment on your own?  
[OPEN END; 98=Don't Know, 99=Refused]

[ASK IF SP8a=1-6, ELSE SKIP TO SP9e]

SP9b How many <SP8a RESPONSE> did you install without receiving an incentive (IF NEEDED: Probe for best estimate) [NUMERIC OPEN END; 0-995; Don't know=998, Refused=999]

SP9c Generally, what type of light bulbs did the <SP8a RESPONSE> [READ IF SP8a=1-5: replace; READ IF SP8a=6: control]?

1. (Incandescent lamps)
2. (CFLs)
3. (LEDs)
4. (Halogen lamps)
5. (Linear fluorescent T12s)
6. (Linear fluorescent T8s)
00. (Other – specify)

- 98. (Don't know)
- 99. (Refused)

SP9d Were the majority of <SP8a RESPONSE> installed in areas that use space cooling and heating?

- 1. (Cooling Only)
- 2. (Heating Only)
- 3. (Cooling and Heating)
- 4. (Neither Cooling nor Heating)
- 8. (Don't know)
- 9. (Refused)

SP9e Why did you purchase the <SP8a RESPONSE> without an incentive from <UTILITY>?

[MULTIPLE RESPONSE, UP TO 3]

- 01 (Takes too long to get approval)
- 02 (No time to participate, needed equipment immediately)
- 03 (The equipment did not qualify)
- 04 (The amount of the incentive wasn't large enough)
- 05 (Did not know the program was available)
- 06 (There was no program available)
- 07 (Had reached the maximum incentive amount)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

[ASK IF SP9e=3]

SP9ee Why didn't the equipment qualify? [OPEN END; 98=Don't Know, 99=Refused]

**Process Module**
**Program Processes and Satisfaction**

I'd now like to ask you a few general questions about your participation in the ComEd Energy Efficiency Program as well as some other services ComEd offers to their business customers.

- PR1 How did you first hear about the ComEd Energy Efficiency program?
- 1 (ComEd Account Manager)
  - 2 (ComEd Website)
  - 3 (Email from ComEd)
  - 4 (Other ComEd marketing)
  - 5 (Contractor)
  - 6 (Supplier/Vendor)
  - 7 (Friend/colleague/word of mouth)
  - 00 (Other, specify)
  - 98 (Don't know)
  - 99 (Refused)
- PR2 In general, what is the best way of reaching companies like yours to provide information about energy efficiency opportunities like the ComEd Energy Efficiency program? **[MULTIPLE RESPONSE, UP TO 3]**
- 1 (ComEd Account Manager)
  - 2 (ComEd Website)
  - 3 (Email from ComEd)
  - 4 (Other ComEd marketing)
  - 7 (Mail from ComEd)
  - 5 (Contractor)
  - 6 (Supplier/Vendor)
  - 00 (Other, specify)
  - 98 (Don't know)
  - 99 (Refused)
- PR3 What do you see as the main benefits to participating in the ComEd Energy Efficiency program? **[MULTIPLE RESPONSE, UP TO 3]**
- 1 (Energy Savings/Saving money)
  - 2 (Good for the Environment)
  - 3 (Lower Maintenance Costs)
  - 4 (Better Quality/New Equipment)
  - 5 (Rebate/Incentive)
  - 6 (Able to make improvements sooner)
  - 00 (Other, Specify)
  - 98 (Don't know)
  - 99 (Refused)
- PR4 What do you see as the drawbacks to participating in the program? **[MULTIPLE RESPONSE, UP TO 3]**
- 1 (Paperwork too burdensome)
  - 2 (Incentives not high enough/not worth the effort)
  - 3 (Program is too complicated)
  - 4 (Project approval takes too much time)
  - 5 (Cost of equipment)
  - 0 (Other, specify)

- 6 (No drawbacks)
- 8 (Don't know)
- 9 (Refused)

- PR5 On a scale of 0 to 10, where 0 is very dissatisfied and 10 is very satisfied, how would you rate your satisfaction with... [96=not applicable, 98=Don't know, 99=Refused]
- a the incentive amount (If needed: Please give an overall rating for the incentive.)
  - b the communication you had with the ComEd Energy Efficiency program staff
  - c the equipment that is eligible for an incentive under the program
  - d ComEd resources to help you find a contractor to install energy efficient upgrades
  - e [ASK IF NP1a=1] the contractor you worked with to implement the <ENDUSE> project
  - f the total amount of time it took to complete the project through the program
  - g the ComEd Energy Efficiency program overall [ANCHOR]
  - h ComEd overall [ANCHOR]

- PR6 Do you plan to participate in the program again in the future?
- 1 Yes
  - 2 No
  - 3 (Maybe)
  - 8 (Don't know)
  - 9 (Refused)

[ASK IF PR6=1]

- PR7 When do you plan to participate in the program? Would you say...
- 1 Within the next 6 months,
  - 2 7 months to 1 year from now,
  - 3 Between 1 and 2 years from now, or
  - 4 More than 2 years from now
  - 8 (Don't know)
  - 9 (Refused)

## New Offers: Screeners

Thanks for your responses! I now have a couple of questions about your company.

- NO1 Which of the following best describes the ownership of your facility at <ADDR>?
- 1 My company owns and occupies this facility
  - 2 My company owns this facility, but it is rented to someone else
  - 3 My company rents this facility, from someone else
  - 8 (Don't know)
  - 9 (Refused)
- NO2 Does your company have an on-site energy manager at this facility, including yourself, or any other employee or contractor?
- 1 Yes
  - 2 No
  - 8 (Don't know)
  - 9 (Refused)

[ASK IF NO2=1]

- NO3 Is the on-site energy manager...?
- 01 a company employee,

- 02 a contractor
- 00 (Some other type of employee, specify; OPEN END)
- 98 (Don't know)
- 99 (Refused)

[ASK IF NO2=1]

NO4 What percent of the on-site energy manager's time is devoted to energy-related activities at this location? [IF NEEDED: Your best estimate is fine.] [NUMERIC OPEN-END, WHOLE NUMBERS 0 TO 100, 998=DON'T KNOW, 999=REFUSED]

## Comprehensive Savings Offers: "Tiered" Standard Offer

**Tx1.** [SHOW Intro for those who do NOT have Energy Managers; NO2<>1] My next questions are about new incentives that are available for projects completed through the ComEd Energy Efficiency Program. The first offer is called the Comprehensive Energy Savings Offer. The offer provides a bonus incentive for companies that reserve program funding for multiple projects at one time, and then complete all projects within a two-year window. Bonuses range from an additional twenty to thirty percent of the standard rebate.

**Tx2.** [SHOW THIS intro for those who DO have Energy Managers; NO2=1] My last questions are about a new incentive for projects completed through the ComEd Energy Efficiency Program called the Comprehensive Energy Savings Offer. The offer provides a bonus incentive for companies that reserve program funding for multiple projects at one time, and then complete all projects within a two-year window. Bonuses range from an additional twenty to thirty percent of the standard rebate.

C1 Were you aware ComEd offered this Comprehensive Energy Savings Offer?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refuse)

[ASK IF C1=1]

C1A How did you learn about the program?

- 01 (ComEd Account Manager)
- 02 (ComEd Website)
- 03 (Email from ComEd)
- 04 (Other ComEd marketing)
- 05 (Contractor)
- 06 (Supplier/Vendor)
- 07 (Friend/colleague/word of mouth)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

[ASK C2 IF COMP\_PART=0, ELSE SKIP TO CP0]

C2 Have you ever considered doing comprehensive energy efficiency projects like this before, where you could address multiple systems at one time, like lighting, the HVAC system, or compressed air, for example?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refuse)

[ASK IF C2=1]

- C3 What has prevented you from addressing multiple other systems? [MULTIPLE RESPONSE]
- 01 (Need more information about energy efficiency opportunities)
  - 02 (Need more information about the financial return/payback/ROI for these projects)
  - 03 (Need more information about contractors who offer these services)
  - 04 (Leadership is opposed to taking on too many energy efficiency projects at one time)
  - 05 (Not familiar with the opportunities)
  - 06 (Our contractor doesn't work in other areas)
  - 07 (Never thought about it)
  - 00 (Other, specify)
  - 98 (Don't know)
  - 99 (Refused)

[ASK IF C2=2]

- C4 Why is your company not interested in addressing multiple other systems? [MULTIPLE RESPONSE]
- 01 (Haven't seen strong results from what we've done so far)
  - 02 (Leadership is opposed to taking on too many energy efficiency projects at one time)
  - 03 (Not familiar with the opportunities)
  - 04 (Never thought about it)
  - 05 (We don't have a contractor experienced in these areas)
  - 00 (Other, Specify)
  - 98 (Don't know)
  - 99 (Refuse)

C5\_new Is there anything else that would help your company engage in these other projects in the future?

- 01 (No - Don't need to do any other efficiency projects)
- 02 (No -Can't plan that far ahead)
- 03 (No -Additional incentive not big enough)
- 04 (no – other reason)
- 05 (No - too busy)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

[ASK IF COMP\_PART=1]

- CP0. Our records show that your company is enrolled in a Comprehensive Savings Offer project at this time. Is that correct?
- 1 Yes
  - 2 No
  - 8 (Don't know)
  - 9 (Refused)

**[ASK IF CP0=1; ELSE SKIP TO ENERGY MANAGEMENT ASSISTANCE SECTION]**

CP1. How many projects did you agree to complete as part of the program? [NUMERIC OPEN END; 0-5, 98=DON'T KNOW, 99=REFUSED]

[Ask if CP1 <5]

CP1A. Customers can complete up to 5 projects in this offering, and you said that you completed fewer than this. Why did you select that number of measures rather than the maximum possible?

- 01. (Lack of funding)
- 02. (Not enough time to complete more projects)
- 03. (Did not know what else would qualify)
- 04. (Didn't know I could complete that many)
- 00. (Other, specify)

- 98. (Don't Know)
- 99. (Refused)

CP2. How many of these projects would you have completed without the additional incentives through the Comprehensive Tier Track offering? Would you say...

- 1. The same amount
- 2. More projects, or
- 3. Fewer projects?
- 8. (Don't Know)
- 9. (Refused)

[ASK IF CP2=2]

CP2A. How many more of these projects would you have completed without the additional incentives through the Comprehensive Tier Track offering? [NUMERIC OPEN END; 0-10, 98=DON'T KNOW, 99=REFUSED]

[ASK IF CP2=3]

CP2B. How many fewer of these projects would you have completed without the additional incentives through the Comprehensive Tier Track offering? [NUMERIC OPEN END; 0-10, 98=DON'T KNOW, 99=REFUSED]

CP3. What do you see as the main benefits of this Comprehensive Tier Track offering?

- 00. [Open End]
- 98. (Don't Know)
- 99. (Refused)

CP4. What, if any, barriers do you see to participating in this Offer?

- 01. (Requirement to complete multiple projects within two years)
- 02. (Lack of funding)
- 03. (Not enough time to complete more projects)
- 04. (Did not know what else would qualify)
- 00. (Other, specify)
- 98. (Don't Know)
- 99. (Refused)

CP5. What suggestions do you have to improve the Comprehensive Tier Track offering?

[OPEN END; 98=Don't Know, 99=Refused]

## Comprehensive Savings Offers: Energy Management Assistance

[ASK SECTION IF NO2<>1 ELSE GO TO END]

The next NEW incentive offer is called the Energy Management Assistance Offer. The Energy Management Assistance Offer provides a bonus incentive for companies that make a plan for facility energy management and complete projects on their plan. To help guide companies through the plan and projects, this Offer provides free support from a ComEd energy manager. The quicker customers implement the projects identified in their plan, the larger the bonus. Bonuses range from an extra twenty to twenty-six percent of the standard incentive, for projects completed within a two-year window.

M1 Prior to this survey, had you heard of this ComEd Energy Management Assistance Offer?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

**[ASK IF M1=1]**

M2 How did you hear about the Energy Management Assistance Offer? **[MULTIPLE RESPONSE]**

- 1 (ComEd Account Manager)
- 2 (ComEd Website)
- 3 (Email from ComEd)
- 4 (Other ComEd marketing)
- 5 (Contractor)
- 6 (Supplier/Vendor)
- 7 (Friend/colleague/word of mouth)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

**[ASK IF MANAGE\_PART=0; ELSE SKIP TO MP1]**

M3 On a scale of 0 to 10, where 0 is not at all valuable and 10 is extremely valuable, how would you rate the value of the following energy management services to your company? **[96=not applicable, 98=Don't know, 99=Refused][ROTATE]**

- a Information about the basics of facility energy management
- b Help developing a custom plan for managing your facility's energy use
- c Help selecting specific energy efficient equipment
- d Help finding a contractor to install energy efficient equipment
- e Support to ensure projects are performed properly at your facility
- f A reserved bonus incentive for completing multiple projects within 2 years
- g Turn-key energy management help that is customized to your needs

M4 Overall, based on what I have told you about the Energy Management Assistance Offer, how would you rate your level of interest in participating in it, within the next year? Please use the same 0-10 scale, where 0 means not at all interested and 10 means extremely interested.

- [0-10]
- 98 (Don't know)
- 99 (Refused)

**[ASK IF MANAGE\_PART=1]**

MP1. Our records show that your company is enrolled in the Energy Management Assistance Offer at this time. Is that correct?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

**[ASK IF mp1=1; ELSE SKIP TO end]**

MP2. On a scale of 0 to 10, where 0 is not at all valuable and 10 is extremely valuable, how would you rate the value of the following energy management services to your company? **[96=not applicable, 98=Don't know, 99=Refused][ROTATE]**

- a Information about the basics of facility energy management
- b Help developing a custom plan for managing your facility's energy use
- c Help selecting specific energy efficient equipment
- d Help finding a contractor to install energy efficient equipment
- e Support to ensure projects are performed properly at your facility
- f A reserved bonus incentive for completing multiple projects within 2 years
- g Turn-key energy management help that is customized to your needs

MP3. What do you see as the main benefits of this Energy Management Assistance offering?

- 00. [Open End]
- 98. (Don't Know)



- 99. (Refused)
- MP4. What, if any, barriers do you see to participating in this Offer?
  - 01. (Requirement to complete multiple projects within two years)
  - 02. (Lack of funding)
  - 03. (Not enough time to complete more projects)
  - 04. (Did not know what else would qualify)
  - 00. (Other, specify)
  - 98. (Don't Know)
  - 99. (Refused)
- MP5. What suggestions do you have to improve the Energy Management Assistance offering?
  - 00. Open End
  - 98. (Don't Know)
  - 99. (Refused)

*Those are all of the questions I have. Thank you for your participation in this study.*