

ComEd and Nicor Gas Strategic Energy Management (SEM) Evaluation Report

FINAL

Energy Efficiency / Demand Response Plan:
Electric Plan Year 8 (EPY8) / Gas Plan Year 5 (GPY5)
(6/1/2015-5/31/2016)

Presented to

Commonwealth Edison Company

Nicor Gas

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E. EXECUTIVE SUMMARY

The Strategic Energy Management (SEM) program began as a pilot in EPY8/GPY5 and is jointly managed by ComEd and Nicor Gas. There were 10 participants in the pilot year and eight of the 10 will continue their involvement through EPY9/GPY6. Although jointly managed, the day-to-day operation of the program is conducted by CLEARresult.

The goal of the SEM program is to implement a process of continuous energy management improvements that result in energy savings and reductions in energy intensity through low cost/no cost opportunities. Energy savings are expected to be achieved through operational and maintenance (O&M) improvements, incremental increases in capital energy efficiency projects, additional capital projects that would not otherwise have been considered (e.g., process changes, consideration of energy efficiency in all capital efforts), and improved persistence for O&M and capital projects. The program seeks to educate participants in the identification of low cost and no cost measures, improve process efficiency, and reduce energy usage through behavioral changes. The evaluation of the SEM program will characterize and quantify:

- Energy savings achieved through continuous energy management improvements and behavior change beyond capital projects (prescriptive and custom).
- The influence of the SEM program on increasing the number of prescriptive and custom program projects and their associated savings.
- Customer satisfaction and feedback on the SEM program to determine which program elements were most successful while soliciting opportunities for future program improvements.

This report presents a summary of the findings and results from the impact and process evaluation of the Strategic Energy Management (SEM) program for EPY8/GPY5.

E.1. Program Savings

The savings goal for the pilot year was a combined energy savings of 5 percent of total site usage for both gas and electric. The summary of the electricity and gas savings from the Strategic Energy Management (SEM) program is shown in Table E-1. The verified gross savings reported includes interactive effects. With very few exceptions, the program design and calculation approach for the SEM program does not allow us to quantify and remove the interactive effects due to the installation of multiple measures within the same timeframe. Although the program achieved significant savings in year one, it was unable to achieve the combined five percent goal as shown in Table E-4 below.

The ComEd SEM program was not included in the deliberations in SAG that led to the deemed NTG values for most programs. In preparing the evaluation plan, the evaluation team determined that it is appropriate to recommend that the free ridership value (and not the spillover value) from the Retrocommissioning program be used for the SEM program. Thus the NTG value used in the net savings analysis is 0.95 for electricity and 0.91 for gas.

Table E-1. EPY8/GPY5 Total Program Electric and Gas Savings

Savings Category	Energy Savings (GWh)	Energy Savings Gas (Therms)
Ex Ante Gross Savings	6.35	410,087
Verified Gross Savings	7.16	532,713
Verified Net Savings	6.80	484,769

Source: CLEARResult reports and calculations and Navigant analysis

In addition to SEM program savings, eight of the 10 sites claimed that SEM had a large influence on their installation of capital project (seven out of 10 or greater). Although the total electric savings related to these projects are small in year one, Navigant expects that the influence of the SEM program may affect capital projects in the future. The gas capital projects influenced by SEM saved an additional 497,221 Therms above the claimed SEM savings. These projects were rebated outside of the SEM program and will not affect SEM savings.

Table E-2. EPY8/GPY5 Claimed Capital Savings Influenced by SEM

Savings Category	Energy Savings (GWh)	Energy Savings Gas (Therms)
Capital Project Savings	0.35	497,221
Capital Savings as % of SEM Savings	5.6%	103%

Source: CLEARResult reports and calculations and Navigant analysis

E.2. Site Level Savings

Table E-3 summarizes the site by site realization rates for electric and gas savings from the Strategic Energy Management (SEM) program. Specific details for each site can be found in Section 3.1.

Table E-3 EPY8/GPY5 Realization Rate by Site

Site #	Ex Ante Gross Savings (KWh)	Ex-Post Gross Savings (KWh)	Verified Gross Realization Rate	Ex Ante Gross Savings (Therms)	Ex-Post Gross Savings (Therms)	Verified Gross Realization Rate
Site 1	1,976,198	1,976,199	100%	0	0	-
Site 2	183,299	183,299	100%	20,089	43,590	217%
Site 3	3,234,798	3,234,798	100%	74,647	74,647	100%
Site 4	677,776	677,776	100%	115,961	115,960	100%
Site 5	278,103	278,103	100%	19,986	19,986	100%
Site 6	0	583,304	-	0	0	-
Site 7†	0	0	-	0	0	-
Site 8	0	0	-	66,150	66,150	100%
Site 9	0	229,585	-	33,103	132,229	399%
Site 10	0	0	-	80,151	80,151	100%
Total	6,350,175	7,163,065	113%	410,087	532,713	130%

Source: CLEARResult reports and calculations and Navigant analysis

†Zero savings are discussed in Section 3.1

E.3. Program Participation Detail

The program had 10 participants in EPY8/GPY5. In addition to capital measures, these sites installed a large number of SEM process-focused measures including proper shutdown or startup procedures, air compressor or boiler maintenance, equipment controls and lighting controls. The program did not claim measure level savings, but, rather, calculated savings as a percentage of site usage. Ex ante savings were based upon the savings reported in each site report. The table below provides a summary of the overall ex post site level savings (kWh and Therms).

Table E-4. Program Participant Findings Detail

Participation	EPY8/GPY5 SEM Program
Participants	10
Average Ex post kWh Savings (% of site usage)	1.55%
Average Ex post Therm Savings (% of site usage)	1.12%

Source: Navigant analysis.

E.4. Results Summary

The following table summarizes the key metrics from EPY8/GPY5.

Table E-5. EPY8/GPY5 Results Summary

Participation	Units	EPY8/GPY5
Electric Summary		
Ex Ante Gross Savings	GWh	6.35
Verified Gross Savings	GWh	7.16
Verified Net Savings	GWh	6.80
Program Realization Rate	%	113%
Program NTG Ratio †	#	0.95
Gas Summary		
Ex Ante Gross Savings	Therms	410,087
Verified Gross Savings	Therms	532,713
Verified Net Savings	Therms	484,769
Program Realization Rate	%	130%
Program NTG Ratio †	#	0.91
Customers Participants	#	10

Source: CLEAR result reports and calculations and Navigant analysis

† This NTG value reflects the free ridership rate (and not spillover) from the Retro commissioning program. The SEM program was evaluation determined it is appropriate to recommend that the free ridership value (and not the spillover value) from the ComEd RCx program be used here for the SEM program and that free ridership not be measured in the first two years of the SEM program. A deemed value. 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> and Nicor_Gas_Final_GPY5_Consensus_NTG_Values_2015-03-01.pdf, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

E.5. Findings and Recommendations

The following provides insight into key program findings and recommendations.¹

Verified and Evaluation Gross Impacts and Realization Rate

Ex ante savings were calculated using detailed energy model that were custom created for each site. Overall, the program revealed a strong realization rate, but individual sites had a number of issues that became evident through the energy model. Ex post results were calculated by making adjustments to these models based on the issues identified below.

During the review of the SEM energy model several issues were noted including:

Finding 1. The models did not always properly account for short-term changes, new equipment or other issues that are occurring at the site. Site 2, 8 and 9 had major short-term issues that affected the final energy model.

Recommendation 1. The energy use from these changes should be measured and their impact removed from the final SEM model.

Finding 2. Navigant found that Site 4 had a major capital project that was claimed as SEM saving but conversations with the site revealed that this measure was installed independently of SEM activities. Although incentives outside of the SEM program were not claimed for this project, the site contact made it clear that this project was planned to be installed long before the SEM program began. This site would have received a zero percent NTG but a deemed net to gross was used for this program year.

Recommendation 2. The Implementer should carefully identify what large capital projects were included in the SEM program and which were not. If a project occurred outside of the influence of the SEM program, the savings should be accounted for and removed.

Finding 3. Several sites showed savings on a per production basis, but not in the model.

Recommendation 3. The model should be carefully reviewed to understand what is negatively affecting the results when the site is showing savings on a simple Key Performance Indicator (KPI) basis.

Process Evaluation

Navigant completed phone surveys with all 10 participating sites, the implementer and the program managers for this program. Through these surveys, Navigant identified a number of process evaluation issues.

Finding 6. The SEM program had a strong influence on participants identifying capital project opportunities. These capital projects were included in their planning for the year. However, when these sites applied for rebates for these projects, they were surprised that the incentives for these projects were not available due to the timing and were placed on a waitlist. While Navigant is aware that the training addresses this waitlist issue one site specifically mentioned this issue during the survey.

Finding 7. The time commitment for the SEM program can be burdensome for customers with limited staffing resources.

Recommendation 6. While group training can be beneficial for team building, an option for those companies that cannot attend every meeting would be to record the meetings for them to review another time.

¹ Numbered findings and recommendations in this section are the same as those found in the Findings and Recommendations section of the evaluation report for ease of reference between each section.

Recommendation 7. To help the sites with limited staff address the findings of the onsite energy scan, the utility or implementer could provide a dedicated onsite resource to ease the workload of the participant. This resource would be knowledgeable of the rebates and services each utility provides. In addition, this resource could provide help to develop project proposals of measures identified during the energy scan including the cost-benefit analysis. This resource could then follow through with rebate applications and supporting paperwork. This resource should be made available - or if already available - should be clearly communicated to the sites.

1. INTRODUCTION

1.1 Program Description

The Strategic Energy Management (SEM) program, managed by both ComEd and Nicor Gas, began as a pilot in EPY8/GPY5. There were 10 participants in the Pilot year and eight of the 10 will continue their involvement through EPY9/GPY6. Although jointly managed, the day-to-day operation of the program is conducted by CLEARResult.

The goal of the SEM program is to implement a process of continuous energy management improvements that result in energy savings and reductions in energy intensity. Energy savings are expected to be achieved through operational and maintenance (O&M) improvements, incremental increases in capital energy efficiency projects, additional capital projects that would not otherwise have been considered (e.g., process changes, consideration of energy efficiency in all capital efforts), and improved persistence for O&M and capital projects. The program seeks to educate participants in the identification of low cost and no cost measures, improve process efficiency, and reduce energy usage through behavioral changes.

1.2 Evaluation Objectives

The evaluation of the SEM program will characterize and quantify:

- Energy savings achieved through continuous energy management improvements and behavior change beyond capital projects (prescriptive and custom).
- The influence of the SEM program on increasing the number of prescriptive and custom program projects and their associated savings.
- Customer satisfaction and feedback on the SEM program to determine which program elements were most successful while soliciting opportunities for future program improvements.

This report presents a summary of the findings and results from the impact and process evaluation of the EPY8/GPY5 Strategic Energy Management (SEM) program.

The evaluation will seek to answer the following key researchable questions:

1.2.1 Impact Evaluation

- What are the evaluation-verified energy behavior savings in this program?
- What were the realization rates of the projects? [Defined as evaluation-verified (*ex post*) savings divided by program-reported (*ex ante*) savings].
- Are there any major changes occurring during or after program implementation (production, size, hours etc.) which may have affected the results?

1.2.2 Process Evaluation and Other Research Topics

- What is the satisfaction of the participants?
- How can the program structure be improved?

- What were the major results of the SEM training? What actions did participants take? What recommended actions did they not take, and why?
- What were the motivating factors for a facility to choose to participate?

2. EVALUATION APPROACH

Gross savings were calculated through a combination of model reviews and participant surveys. Navigant recommended deemed net to gross values for the SEM program that were informed by research from the ComEd Retrocommissioning program. If the program grows substantially in EPY9/GPY6, then we expect that it will be important to measure NTG in the future. The evaluation will perform a process evaluation in the first year and will revisit the need for future process evaluations after this initial program year.

2.1 Overview of Data Collection Activities

The core data collection activities included engineering reviews of provided calculations methodologies, and telephone surveys of participants, implementer and program staff. The full set of data collection activities is shown in the following tables.

Table 2-1. Primary Data Collection Activities

What	Who	Target Completes	Completes Achieved	When	Comments
Engineering Review	Participating Customers	10	10	July 2016	
Telephone Survey	Participating Customers-10 Implementer-1 Program Staff-2	13	13	July-August 2016	Engineering review to provide guidance to surveys
Second Engineering Review	Participating Customers	10	10	August 2016	A second review based on survey results

Source: Navigant analysis.

2.2 Verified Savings Parameters

2.2.1 Verified Gross Program Savings Analysis Approach

Verified gross savings from the EPY8/GPY5 SEM program were calculated using provided engineering models that are grounded in site-specific data. These multi-regression models draw upon site data including energy usage, production, weather data and seasonality effects (including holidays or shutdowns). Electric and gas were independently evaluated using separate energy models. The verified gross savings reported include interactive effects. With very few exceptions, the program design and calculation approach for the SEM program does not allow us to quantify and remove the interactive effects due to the installation of multiple measures within the same timeframe. These methods closely follow the guidance of the NREL UMP protocol for SEM.

Navigant staff carefully reviewed the models using the following procedure:

- A site-specific analysis approach was implemented. Because this program contains primarily behavioral-based changes, the International Performance Measurement and Verification Protocol (IPMVP) option C – billing/metered data regression, was the main approach to impact evaluation.
- The data collection focused on verifying and/or updating the assumptions that feed into the implementer’s energy model for each site. This data included: program tracking data and supporting documentation (project specifications, invoices, etc.), utility billing and interval data,

Navigant-calibrated building automation system (BAS) trend logs and telephone conversations with onsite staff.

This data was used with other information collected from the site to identify operating characteristics of the site both pre and post. If major changes occurred at the site during or after the SEM activities, Navigant adjusted the energy model to account for these changes. The changes that could affect the model savings include:

- Change in hours of operation
- Change in employees
- Change in production
- Other measures installed at the site that were implemented through other Utility EE/DR programs or outside of the ComEd/Nicor programs.

2.2.2 Verified Net Program Savings Analysis Approach

Navigant calculated the verified net energy and demand savings by multiplying the verified gross savings estimates by a deemed net-to-gross ratio (NTGR). The ComEd SEM program was not included in the deliberations in SAG that led to the deemed NTG values for most programs. In preparing the evaluation plan, the evaluation team determined that it is appropriate to recommend that the free ridership value (and not the spillover value) from the Retrocommissioning program be used for the SEM program electric NTG. In the SAG document, Nicor provided a deemed NTG for the SEM program specifically. Thus the NTG value used in the net savings analysis is 0.95 for electricity and 0.91 for gas.²

Table 2-2. Deemed NTG Values for EPY8/GPY5

Program Channel	EPY8/GPY5 Deemed NTG Value
Comprehensive	0.95
Monitoring-Based	0.95
All Natural Gas	0.91

Source: ComEd_NTG_History_and_PY8_Recommendation_2014-02-28_Final_EMV_Recommendations.xlsx and Nicor_Gas_Final_GPY5_Consensus_NTG_Values_2015-03-01.pdf. Available on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

2.3 Process Evaluation

The process evaluation research included in-depth interviews with the program managers, implementer and customers. The process evaluation covered the program structure, participation details, and customer satisfaction. The process research questions are listed in Section 1.2.

² Source: ComEd_NTG_History_and_PY8_Recommendation_2014-02-28_Final_EMV_Recommendations.xlsx and Nicor_Gas_Final_GPY5_Consensus_NTG_Values_2015-03-01.pdf , which are to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

3. GROSS IMPACT EVALUATION

Table 3-1 summarizes the electricity and gas savings from the Strategic Energy Management (SEM) program.

Table 3-1. EPY8/GPY5 Total Program Electric and Gas Savings

Savings Category	Energy Savings (GWh)	Energy Savings Gas (Therms)
Ex Ante Gross Savings	6.35	410,087
Verified Gross Savings	7.16	532,713
Program Realization Rate	113%	130%
Verified Net Savings	6.80	484,769

Source: CLEAResult reports and calculations and Navigant analysis

Navigant completed a detailed review of the provided engineering calculation and site reports for each project in the SEM program. Adjustments were made to these models to account for short term changes unrelated to SEM activities project savings that was realized outside of SEM influence and process changes that effected energy use at the site. The overall SEM portfolio had a realization rate above one for electric and above one for gas but individual sites had large variations in their realization rate as shown below in Section 3.1.

3.1 Savings by Site

Table 3-2. EPY8/GPY5 Program Results by Site³

Site #	Ex Ante Gross Savings (KWh)	Ex-Post Gross Savings (KWh)	Verified Gross Realization Rate	Ex Ante Gross Savings (Therms)	Ex-Post Gross Savings (Therms)	Verified Gross Realization Rate
Site 1	1,976,198	1,976,199	100%	0	0	-
Site 2	183,299	183,299	100%	20,089	43,590	217%
Site 3	3,234,798	3,234,798	100%	74,647	74,647	100%
Site 4	677,776	677,776	100%	115,961	115,960	100%
Site 5	278,103	278,103	100%	19,986	19,986	100%
Site 6	0	583,304	-	0	0	-
Site 7	0	0	-	0	0	-
Site 8	0	0	-	66,150	66,150	100%
Site 9	0	229,585	-	33,103	132,229	399%
Site 10	0	0	-	80,151	80,151	100%
Total	6,350,175	7,163,065	113%	410,087	532,713	130%

Source: CLEAResult reports and calculations and Navigant analysis
 Site specific detail is discussed below.

For each site, Navigant reviewed and updated the provided engineering models. Navigant staff generally followed the process below for this review:

³ Specific site detail is shown directly below.

Step 1- Navigant recreated the provided energy models to ensure they aligned with the provided data.

Step 2- Navigant confirmed that the model saving calculations accounted for all capital projects.

Step 3- Navigant identified and accounted for any short term effects that were occurring outside of the SEM influence. The telephone interviews with the site staff confirmed these changes.

Step 4- Navigant made additional changes to the model as needed. Changes may include excluding certain data points or including additional variables.

Several sites reported no electric or gas savings ex ante. Although activities were completed at these sites the energy model was unable to detect energy savings occurring at these site for a variety of reasons. For these sites, Navigant checked to see if the energy intensity per production changed at these sites. If the sites showed improvement in this way, Navigant calculated an ex post savings for these sites using this method.

Site 1

Navigant was able to recreate the energy models from the provided data. No major issues regarding short-term projects or excluded data points were identified as a part of this project. Based on this review, no changes to the models were required resulting in a realization rate near 100 percent.

Site 2

During the review of the site report, Navigant noted that a ventilation fan was left running unintentionally causing an increase in gas usage. Navigant confirmed this fact during the interview with site staff. Since the site corrected the short-term effect, Navigant removed the impact of this fan from the final gas savings, which caused the realization rate to be 217 percent. This fan had little to no impact on the electric model.

Site 3

This site was unique in having daily production data both pre and post program implementation. For this reason this was one of the most statically sound models of the entire group. Navigant's review of these models did not identify any unaccounted for short-term changes but a small number of data points were excluded without a clear explanation. Navigant discussed this issue during the survey and felt confident in the exclusion of the data. Based on this information Navigant recreated the energy model that resulted in a realization rate of 100 percent for both electricity and gas.

Site 4

The electric savings for this site were from the installation of new capital equipment. Due to meter issues, the savings were calculated using simple engineering calculations and not based on an energy model.

Site 5

The weekly model included for this site accounted for any short-term changes and explained all excluded data points. Navigant was able to recreate the model and found no major reason to make any additional changes to the results.

Site 6

The SEM model was unable to show electric savings for this site resulting in an ex ante savings of 0 kWh. However, Navigant noted that the electric power per production had dropped significantly from the baseline condition. For this reason, Navigant calculated an ex post energy savings based on this drop in energy use.

The SEM model showed a significant negative gas savings for this site. Navigant noted that a large gas capital project seemed to be influencing site gas usage. It is unclear if this project's ex ante savings is accurate and due to its large influence Navigant chose to show zero therm savings for this site which align with ex ante claims. The negative savings could be due to a change in process, impact of the noted capital measure or some unaccounted for equipment change.

Site 7

The SEM model was unable to show gas or electric savings for this site resulting in no claimed ex ante savings. Navigant noted that the therm per production and kWh per production has increased at this site as compared to the baseline period. The implementer report stated "It is suspected that recent product mix and processing changes during the measurement period are responsible for the increase in energy intensity and no savings showing in the models." Navigant was unable to get further details around these changes and is therefore showing no kWh or therm savings ex post.

Site 8

Navigant noted two issues in the electric SEM model for this site. First, the site had to add additional refrigeration load in the post period that was not included in the baseline. After discussing this issue with the site, Navigant identified this issue as a short-term effect and removed the impact of this change from the claimed electrical savings.

Second, the electric model did not include a variable for production. Navigant noted that the production dropped over 20 percent from the baseline period to the post period. Navigant, therefore, chose to include production in the electric savings model. The production variable had a low level of statistical significance but still fell within standard values of acceptance. Including this variable reduced the savings claimed ex post for this model resulting in zero ex post savings. Due to the significant drop in production at this site, this reduction in savings is expected.

Site 9

This site had several changes occurring in the post period that were affecting the energy model. Four months into the post period the site installed additional equipment that increased the energy usage at the site. In addition, the site began using natural gas refrigeration in the summer to reduce peak load. Both of these activates were completed outside of the SEM influence and needed to be careful considered in the model.

The model did not show energy savings for gas or electric ex ante but the site did show a reduction in energy usage per production in the post period. For this reason, Navigant calculated electric and gas savings ex post based on this drop in the usage per production.

Site 10

Navigant noted that some of the gas measures may be causing an increase in electric usage but since this is considered an interactive effect Navigant accepted the claimed zero kWh savings for this site.

3.2 SEM Influence on Capital Projects

During the interview process with the participants, Navigant inquired about the influence of the SEM program on sites installing capital projects. Two of the sites were already planning to install capital measures before the SEM program and claimed little or no influence. The other eight sites claimed that SEM had a large influence on their decisions to install capital projects. On average, these sites rated the SEM influence an 8.5 out of 10. Although the total savings related to these projects were small in year one, Navigant expects that the influence of the SEM program may affect capital projects in the future. The gas capital projects influenced by SEM saved an addition 497,221 Therms above the claimed SEM savings. These projects received rebates outside of the SEM program and will not affect SEM savings.

Table 3-3. EPY8/GPY5 Claimed Capital Savings Influenced by SEM

Savings Category	Energy Savings (GWh)	Energy Savings Gas (Therm)
Capital Project Savings	0.35	497,221
Savings as % of SEM Savings	5.6%	103%

Source: CLEAResult reports and calculations and Navigant analysis

3.3 Verified Gross Program Impact Results

The resulting total program verified gross savings is 7.16 GWh and 532,713 Therms as shown in the following table. Due to the small number of participants, Navigant was able to calculate gross savings based on a detailed review of all sites.

Table 3-4. EPY8/GPY5 Results Summary

Participation	Units	EPY8/GPY5
Electric Summary		
Ex Ante Gross Savings	GWh	6.35
Verified Gross Savings	GWh	7.16
Verified Net Savings	GWh	6.80
Program Realization Rate	%	113%
Program NTG Ratio †	#	0.95
Gas Summary		
Ex Ante Gross Savings	Therms	410,087
Verified Gross Savings	Therms	532,713
Verified Net Savings	Therms	484,769
Program Realization Rate	%	130%
Program NTG Ratio †	#	0.91
Customers Participants	#	10

Source: CLEAResult reports and calculations and Navigant analysis.

† A deemed value. Source: ComEd_NTG_History_and_PY8_Recommendation_2014-02-28_Final_EMV_Recommendations.xlsx and Nicor_Gas_Final_GPY5_Consensus_NTG_Values_2015-03-01.pdf, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

4. NET IMPACT EVALUATION

The ComEd SEM program was not included in the deliberations in SAG that led to the deemed NTG values for most programs. In preparing the evaluation plan, the evaluation team determined that it is appropriate to recommend that the free ridership value (and not the spillover value) from the Retrocommissioning program be used for the SEM program. Thus the NTG value used in the net savings analysis is 0.95 for electricity and 0.91 for gas.⁴ The table below shows the deemed NTG values.

Table 4-1. Deemed NTG Values for EPY8/GPY5

Program Channel	EPY8/GPY5 Deemed NTG Value
Comprehensive	0.95
Monitoring-Based	0.95
All Natural Gas	0.91

*Source: ComEd_NTG_History_and_PY8_Recommendation_2014-02-28_Final_EMV_Recommendations.xlsx and Nicor_Gas_Final_GPY5_Consensus_NTG_Values_2015-03-01.pdf
Available on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>*

⁴ Source: ComEd_NTG_History_and_PY8_Recommendation_2014-02-28_Final_EMV_Recommendations.xlsx, and Nicor_Gas_GPY6_NTG_Values_2016-02-29_Final.xlsx, which are to be found on the IL SAG web site here: <http://www.ilsag.info/net-to-gross-framework.html>

5. PROCESS EVALUATION

The pilot year for Strategic Energy Management program provided strong results with opportunities for growth. The program delivery was through 12 training workshops, seven of which were group workshops and five were individual onsite training workshops. The purpose of these workshops was to help the participant identify low-cost and no cost energy reductions that could be implemented in their facilities. Overall, the participants were very satisfied (8.5 out of 10) with the program's training, onsite support and energy reduction recommendations. They felt that the program provided them with a better understanding of energy costs and energy usage from the different types of equipment and the inter-relationship of the various end uses to each other.

The program managers and implementers also felt that the first year pilot went well. They thought the training programs met the customers' needs while resulting in energy reduction.

The large customers appreciated the program's training, but it was a challenge for the minimally staffed sites to implement. The facilities with just one engineer, who is often responsible for many aspects of a facilities operation, felt overwhelmed by the level of paperwork and measure details required. In order for the SEM program to be successful with these smaller sites, the requirements of the program may need to be relaxed, or additional resources from either the utility or implementer provided to help them be more successful.

Of the original 100 potential customers identified, thirty-seven were interested in the program but only 10 decided to be participants. The sites interviewed identified the commitment of time and the potential impact on production as reasons that may prevent a customer from participating. However, while interviewing the participants it was found that the SEM program had the advantage of:

- Providing one-to-one support
- Being offered at minimal cost
- Providing incentives for implementation of measures

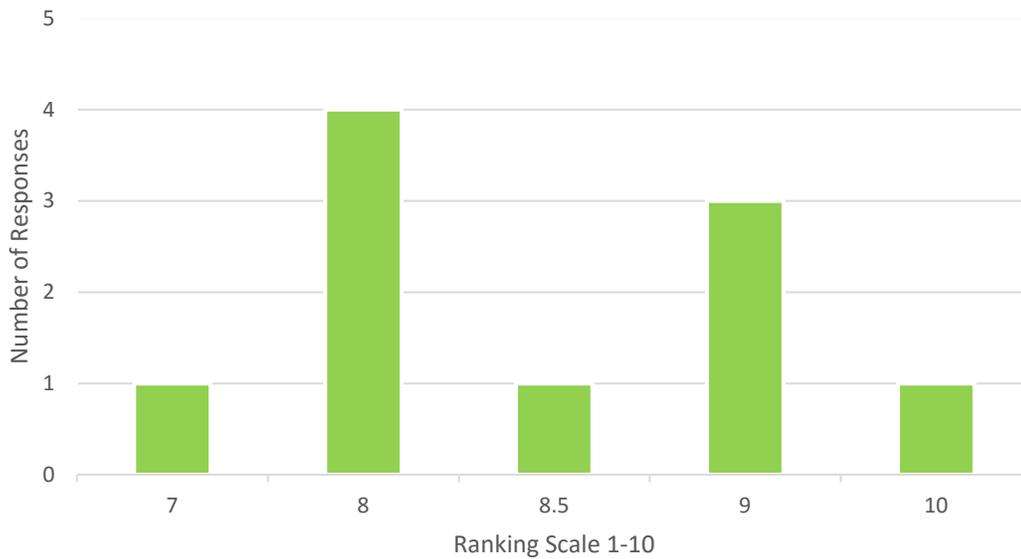
As Nicor Gas and ComEd develop their marketing message for future cohorts, highlighting these benefits to their customers may increase the participation percentage. Future research should consider also interviewing those that chose not to participate in the program.

5.1 Customer Satisfaction

Overall, the participating sites showed significant gas and electric savings and were pleased with the program. The participants found the workshops engaging, providing them a greater awareness of the potential for energy savings and helping them develop an energy model for their facilities.

A small number of these sites did not show electric or gas savings, but reported high satisfaction with the program. Facilities that showed minimal savings are hopeful that they will see savings in the second year. They attributed the minimal first year savings to the volatile timeframe of implementing multiple projects in a tight timeframe. Although savings were not identified by the energy model, Navigant found that several of these sites did show savings at the energy per production level. The implementer should investigate why these models did not show saving even though the energy usage per production was dropping.

As seen in Figure 5-1, nine of the 10 participants ranked their satisfaction with the program an eight or higher.

Figure 5-1. Customer Satisfaction


Source: Navigant survey

This overall satisfaction was consistent with the satisfaction of the individual training components:

- Training Workshops – over 90 percent satisfaction.
- Frequency of the Workshops, 80 percent satisfaction.
- Content of the Workshops, 80 percent satisfaction.

The training helped participants understand how to manage their energy better. Participants reported a variety of benefits that they received from the training:

- How to structure an energy efficiency internal program.
- How to develop and use a detailed energy model to calculate the energy usage of the facility. The energy model provided the participants with a deeper understanding of site energy usage at the equipment level.
- How to engage employees throughout the facility. The participants reported that their staff are actively monitoring energy use, observing energy saving opportunities and implementing them as a part of the daily routine.

Outside of the group training sessions, the implementer also provided one-on-one support to the various facilities. They provided guidance on the financial viability of projects, and provided engineering analysis on projects requiring a tight payback timeframe. They also helped with the rebate paperwork – which participants felt was sometimes confusing.

5.2 Program Structure

While the program satisfaction was high, the program design frustrated the smaller customers.

Half of the participants were from medium-sized facilities with an average usage below 20 GWhs per year. These facilities did not have the same staffing resources available to them as did the larger sites.

The energy champions at these facilities had multiple duties and responsibilities beyond energy management. These participants had difficulty attending all training, completing the required paperwork for both utilities, and providing detailed justification for the measures installed at the sites. Navigant identified the following recommendations to address these issues:

- In order to address the training attendance issue in the future, the workshops could be recorded and viewed by the participants at a later date.
- In addition, the utilities or implementer should assign a dedicated resource to help develop project proposals of measures identified during the energy scan including the cost-benefit analysis could help the participant achieve their goals while minimizing their time commitment. This resource should be made available - or if already available - should be clearly communicated to the sites.

Additional program improvements and comments provided by the respondents include:

- Real-time metering – Customers want to optimize their energy usage by understanding how much energy is consumed during each step of the production process. Provide the means for the facilities to do real-time metering of their individual processes.
- The SEM program had a strong influence on participants identifying capital project opportunities. Such capital projects were included in their planning for the year. However, when these sites applied for rebates for these projects, they were surprised that the incentives were not available due to the timing and were placed on a waitlist. While Navigant is aware that this waitlist issue is discussed during training, one site specifically mentioned this issue during the survey.
- While Portfolio management of each program is not an SEM specific issue, customers mentioned that Nicor representatives provided higher detailed information such as rebate information, program changes, cost-benefits and due dates for rebates. The participants would appreciate ComEd representatives providing similar information throughout the year on their rebates.
- While the participants appreciated the recommendations from the energy scan, they did request more specific end use training applicable to specific sites should be provided. For example, facilities that use steam often use it for multiple applications from cooking to water sanitization to condensation recovery. The program may want to bring in outside subject matter experts to identify and analyze end use specific opportunities.
- The participants need billing data in a more timely fashion. Customers mentioned that it was difficult to monitor the changes and see the impact when the usage documentation was 15-30 days behind.

5.3 Behavior Changes

During the interview process, it became apparent that many participants felt overwhelmed by the program and needed additional support. While the design of the program required participation of all levels of management through roles such as executive sponsor, energy champion, and energy team; not all members at a facility contributed equally. As the program transitions from pilot stage to a portfolio offering, Navigant feels it is important for the sites to develop a “corporate culture” of energy efficiency. This corporate culture is key to realizing the maximum potential savings for this program and ensuring savings persistence in the future. ComEd and Nicor Gas could witness improved participant acceptance, which may lead to larger savings, if they recommend a more integrated approach to their future cohorts by including all levels.

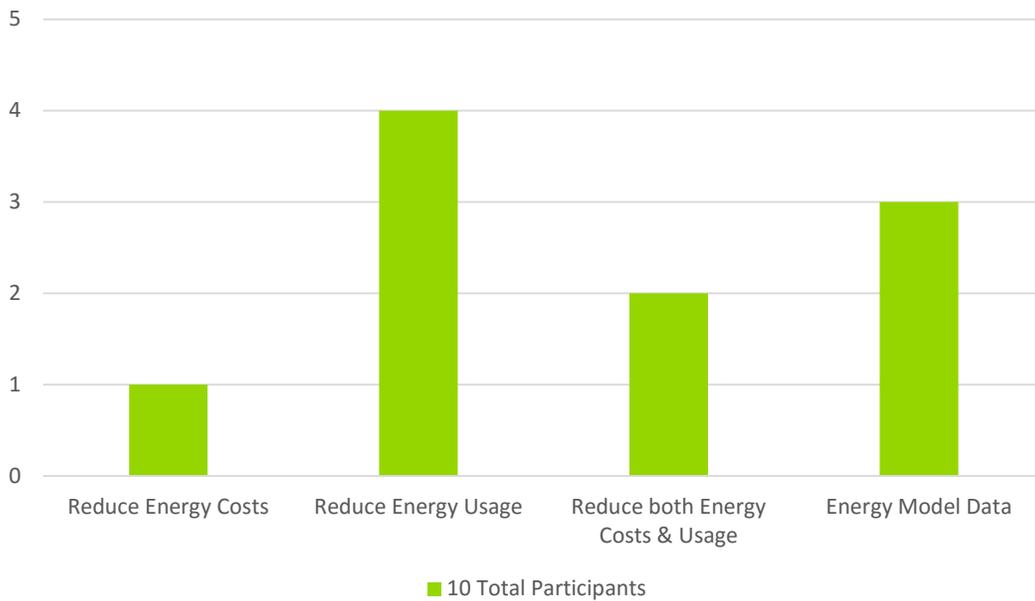
The participants did identify positive behavior changes in the facilities' attitudes towards energy usage in their facilities and their employees were taking action to reduce the usage throughout the day by:

- Turning off equipment when not in use.
- Installing motion sensors
- Conducting all-plant meetings to discuss the SEM program
- Utilizing corporate communications such as newsletters, posters and other publicity to address energy usage and ways to reduce.
- Graphing energy usage and timelines to determine causes of higher loads.
- Considering energy efficiency when purchasing or rebuilding equipment.

5.4 Goals of Participation

The participants were consistent in their reasons for participating in the program. Seven of the 10 participants wanted to reduce their energy costs, energy usage or both. A third group was interested in learning more about their equipment's energy usages via the energy model; Figure 5-2 reflects the various participant's purpose for being part of the program.

Figure 5-2. Goals of Participation



Source: Navigant survey

The participants realized similar results in regards to their energy savings with eight of the 10 facilities showing reductions in their electric and gas energy use. It is interesting to note that the savings by energy source were lop-sided with facilities showing greater savings in either gas or electricity. One facility explained this phenomenon was because they only had so much bandwidth in both time and finances to devote to the SEM program; therefore, they focused on the identified recommendations that had the largest estimated reductions.

For two of the 10 facilities the implementer could not develop an energy model that realistically reflected the usage and energy reductions of the facility. For this reason, the ex-ante saving was calculated using

measure by measure analysis. During the interviews with the participants and implementer, it was inconclusive as to the reason why the models were not fully developed; both groups acknowledged that there were some issues regarding metering.

6. FINDINGS AND RECOMMENDATIONS

The following provides insight into key program findings and recommendations.⁵

Verified and Evaluation Gross Impacts and Realization Rate

Ex ante savings were calculated using detailed energy model that were custom created for each site. Overall, the program revealed a strong realization rate, but individual sites had a number of issues that became evident through the energy model. Ex post results were calculated by making adjustments to these models based on the issues identified below.

During the review of the SEM energy model several issues were noted including that:

Finding 1. The models did not always properly account for short-term changes, new equipment or other issues that are occurring at the site. Site 2, 8 and 9 had major short-term issues the affected the final energy model.

Recommendation 1. The energy use from these changes should be measured and their impact removed from the final SEM model.

Finding 2. Navigant found that Site 4 had a major capital project that was claimed as SEM saving but conversations with the site revealed that this measure was installed independently of SEM activities. Although incentives outside of the SEM program were not claimed for this project, the site contact made it clear that this project was planned to be installed long before the SEM program began. This site would have received a zero percent NTG but a deemed net to gross was used for this program year.

Finding 3. Several sites showed savings on a per production basis, but not in the model.

Recommendation 3. The model should carefully be reviewed to understand what is negatively affecting the results when the site is showing savings on a simple Key Performance Indicator (KPI) basis.

Finding 4. Site 6 had a large capital project that seemed to be influencing claimed SEM savings. Navigant suspects that the savings for this project was incorrectly estimated negatively impacting SEM savings.

Recommendation 4. The SEM program should coordinate with implementers as much as is feasible on projects (such as capital projects) at sites so that those program's projects are accurately estimated and do not improperly affect SEM savings.

Finding 5. Site 8 did not include production as a part of the energy model. Production dropped more than 20% from the baseline to EE period and Navigant suspects that this had an impact on the energy model.

Recommendation 5. All SEM models should consider the energy usage of the production cycle if possible as it is often the most important factor for site energy usage.

Process Evaluation

Navigant completed phone surveys with all 10 participating sites, the implementer and the program managers for this program. Through these surveys, Navigant identified a number of process evaluation issues.

Finding 6. The SEM program had a strong influence on participants identifying capital project opportunities. These capital projects were included in their planning for the year. However, when these sites applied for rebates for these projects, they were surprised that the

⁵ Numbered findings and recommendations in this section are the same as those found in the Findings and Recommendations section of the evaluation report for ease of reference between each section.

incentives for these projects were not available due to the timing and were placed on a waitlist. While Navigant is aware that this waitlist issue is discussed during training, one site specifically mentioned this issue during the survey.

Finding 7. The time commitment for the SEM program can be burdensome for customers with limited staffing resources.

Recommendation 6. While group training can be beneficial for team building, an option for those companies that cannot attend every meeting would be to record the meetings for them to review another time.

Recommendation 7. To help the sites with limited staff address the findings of the onsite energy scan, the utility or implementer could provide a dedicated onsite resource to ease the workload of the participant. This resource would be knowledgeable of the rebates and services each utility provides. In addition, this resource could provide help to develop project proposals of measures identified during the energy scan including the cost-benefit analysis. This resource could then follow through with rebate applications and supporting paperwork. This resource should be made available - or if already available - should be clearly communicated to the sites.

Finding 8. Of the original 100 potential customers identified, thirty-seven were interested in the program but only 10 decided to be participants. The sites interviewed identified the commitment of time and the potential impact on production as reasons that may prevent a customer from participating.

However, while interviewing the participants, Navigant found that SEM had the advantage of:

- Providing one-to-one support
- Being offered at minimal cost
- Providing incentives for implementation of measures

Recommendation 8. As Nicor Gas and ComEd develop their marketing message for future cohorts, highlighting these benefits to their customers may increase the participation percentage.

7. APPENDICES

7.1 Participant Survey Instrument

ComEd & Nicor Strategic Energy Management Program: Participant Facility Manager Interview

Participant Name:

Company:

Phone Number:

Email:

Date & Time of Interview:

Interview conducted by:

Interview

Section A: Introduction

Hello, this is _____ from Navigant Consulting calling on behalf of ComEd regarding your company's participation in the Strategic Energy Management program. May I please speak with [CONTACTNAME]?

Our records show that [COMPANY] participated in the Strategic Energy Management pilot project and we are calling to conduct a follow-up study about your firm's participation in this program. Our records indicate that you're the person most knowledgeable and the most involved with the decision to participate in the program. Is this correct? [IF NOT, ASK TO BE TRANSFERRED TO THE DECISION MAKER OR SOMEONE FAMILIAR WITH THE BASIS FOR THE DECISION TO PARTICIPATE OR RECORD NAME & NUMBER.]

[IF NEITHER DECISION MAKER OR SOMEONE FAMILIAR WITH THE BASIS FOR THE DECISION TO PARTICIPATE, IS AVAILABLE TERMINATE AND CALL REFERRAL]
 (IF NEEDED: Is it possible that someone else dealt with the project?)

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

1. Before we begin, I have a couple general questions. Can you take a moment and explain your job title or role?

Section B: Program structure

1. How were the "energy champion", "energy team" and "Executive sponsor" chosen for your facility?
 - a. Who was your "energy coach"?

2. What are the main goals that your facility originally chose to participate in the SEM program?
(guide if need to fit in bins below)

1	Rebate/ Incentive	
2	Lower Utility Bill	
3	Help to justify Investment	
4	Able to Make improvements Sooner	
5	Energy Savings	
6	Training for you Staff	
7	ID Opportunities	
8	Other	

2a. How did you perform against your goals in the first year?

3. Can you think of any reason a company such as yours would choose NOT to participate?

4. In regard to your interaction with CLEAResult:
 - a. Besides the monthly training, how did CLEAResult provide support to your facility?

 - b. On a scale of 1-10, where 1 is not at all helpful and 10 is very helpful, how helpful were these activities in helping your facility to achieve your primary goal?

 - c. What do you think CLEAResult could do to be more helpful?

Section C: Facility’s Goals/Program Status

1. Before participating in the SEM program, had you sought any similar training or energy audit programs elsewhere?

Section D: Changes to Program Processes

1. What behavioral changes has your facility undertaken because of the SEM Program?

2. What capital measures have you installed at your facility during your participation in the SEM program?
 - a. In what ways did the SEM program influence your facility’s decision to install these measures? (1-10)

- b. Did you explore other ComEd (and/or) Nicor business energy efficiency programs when installing these measures?
 - c. Did you receive a rebate for this/these measures?
 - d. Did you install more capital projects over the past year than in the past?

If so, how many?
3. Since you began participating in this program, has your facility had any significant change in hours of operation?
- a. Did the SEM program influence these changes in operating hours?
4. Since you began participating in this program, has your facility had any significant change in the number of employees?
- a. Did the SEM program influence these changes in production?
5. Since you began participating in this program, has your facility had any significant change in production?
- a. Did the SEM program influence these changes in production?

Section E: Training Workshops

1. How frequently did you attend the SEM Program training workshops?
2. On a scale of 1-10, where 1 is not at all satisfied and 10 is very satisfied, how satisfied are you with the frequency of these workshops?

- a. [If <6] What are the reasons that you are less than satisfied with the frequency of these workshops?
3. How many people from your organization regularly attend the SEM Program training workshops?
4. On a scale of 1-10, where 1 is not at all satisfied and 10 is very satisfied, how satisfied are you with the content of these workshops?
 - a. [If <6] What are the reasons that you are less than satisfied with the content of these workshops?
5. In particular, what major benefits have you gotten from the workshops?

Section F: Site Specific Questions

This will be determined by the initial impact evaluation of a specific customer.

Section G: Participant Satisfaction

1. On a scale of 1-10, where 1 is not at all satisfied and 10 is very satisfied, how satisfied are you with the program, overall?
2. Is there anything ComEd (and/or) Nicor could do to increase your satisfaction with the program, overall?

Section H: Closing

1. Do you have any other comments, concerns or suggestions about the program that we did not discuss that you would like to make sure I know about?

Thank you very much for taking the time in assisting us with this evaluation. If I come up with any additional questions that come from this interview, do you mind if I send you an email or give you a quick call?

7.2 Program Manager Survey Instrument

ComEd & Nicor Strategic Energy Management: Program Manager Interview Guide

Participant Name:

Company:

Phone Number:

Email:

Date & Time of Interview:

Interview conducted by:

Interview

Section A: Introduction

We are interested in asking you some questions about the program so that we can understand the Strategic Energy Management (SEM) program elements and get a sense of program successes and challenges, from your perspective.

1. Before we get started, can you take a moment and explain your role and scope of responsibilities with respect to ComEd (and/or) Nicor's SEM Program? How long have you held this position?

Section B: Program Goals/Status

1. What are the program goals for program year 2016? (i.e., goals from the 2015-2016 Plan)?
2. How is the program doing in terms of meeting these goals?
 - A. Are there goals that program staff use that are different from those outlined by the Plan?

- B. Are there any other quantitative goals that ComEd (and/or) Nicor keeps track of, including non-energy goals (e.g., recycling)?
3. Is participation sufficient to meet current and future program goals?
4. Tell me about the best project in your program this past year.
5. Tell me about the most difficult project in your program this past year.

Section C: Marketing and Outreach Activities

1. Is ComEd (and/or) Nicor involved in how sites are chosen for your program?
 - A. What are the criteria for recruiting?
 - B. How are sites chosen and targeted? (What messages about the program are customer most responsive to in your recruiting?)
 - C. Who is excluded or included (for the first cohort)?
 - D. Is the majority of the participation from internal recruiting or outside interest?
2. Of the customers that were recruited:
 - A. Did any of the sites not have the proper data available to participate?
 - B. Did any of the sites not have the proper technical expertise to participate?
 - C. Why did they not seek this kind of training elsewhere? Were they unaware of the benefits of this kind of training?

3. Are other industrial sites (of your participants) performing SEM-type programs?
4. How are you planning to recruit moving forward?
5. What are the barriers that your Industrial customers usually encounter, and how did SEM address those concerns?

Section D: Program Tracking and Reporting

1. How does the implementer communicate savings to you?
2. How does the implementer report changes to the model to you?
 - a. Are you getting the data you need in a useable and timely format?
3. Is there anything you would like to see change about the data transfer process between you and the SEM implementer? If so, what?
4. How were the written reports delivered to you?
 - a. Did you have any issues with these reports including timing, ability to review, or the information that was provided to both you and the customer?

Section E: Program Strengths and Areas for Improvement

1. What unexpected things happened that impacted the program's operation or reaching goals?

2. What are things that you would like to change about this program moving forward?
 - a. What impediments are there to you making changes?
 - b. What could the implementer change?
3. In regard to the cohort meetings/training:
 - a. Did you attend these meetings? (how many per month)
 - b. Did customer account representatives attend?
 - c. How satisfied are you with the frequency of these workshops?
 - d. How satisfied are you with the content of these workshops?
 - e. In your opinion, what can ComEd (and/or) Nicor do to improve these workshops?

Section F: Closing

1. Do you have any other comments, concerns or suggestions about the program that we didn't discuss that you would like to make sure I know about?

Thank you very much for taking the time in assisting us with this evaluation. If I come up with any additional questions that come from this interview, do you mind if I send you an email or call you back?

7.3 Implementer Survey Instrument

ComEd & Nicor Strategic Energy Management: Implementation Staff Interview Guide

Participant Name:

Company:

Phone Number:

Email:

Date & Time of Interview:

Interview conducted by:

Interview

Section A: Introduction

[If needed] I would like to give you some background about who we are and why we want to talk with you today.

We are interested in asking you some questions about this program so that we can understand the Strategic Energy Management (SEM) program elements and get a sense of program successes and challenges, from your perspective.

1. Before we begin, can you take a moment and explain your role and scope of responsibilities with respect to ComEd (and/or) Nicor's SEM Program?

Section B: Program Design

Next, I would like to discuss a little more about how the program is currently structured.

1. Besides the monthly training, how did you provide support to your facilities?
2. Beside the energy coach, what staff do you provide to support these sites? What support do they provide?

3. What are the key activities that affect the energy savings of the participant sites? (What would cause a site to incur savings or lose savings? (Goal setting, CEO by-in, Energy teams etc.)
4. Why did **site XX** show more energy savings than the other participating sites?
5. Why do you think **sites A, B and C** did not show energy savings?
6. What do you feel could be changed to the program design, either by you or ComEd (and/or) Nicor?
7. In regard to the cohort meetings/training:
 - a. Did you attend these meetings? (how many per month)
 - b. How satisfied are you with the frequency of these workshops?
 - c. How satisfied are you with the content of these workshops? Do you feel that you were limited by what you could present and do you plan to make changes moving forward?
8. How does the energy model adjust to major changes (production, operating hours and employee count for example)?
 - a. Are these changes logged and are old versions available?
 - b. Is the model checked for accuracy and reasonability throughout the process, and by whom?
 - c. How are the (savings in) the completed large capital projects at the site during this measure period accounted for?
 - d. How are the equipment or operational changes at the site accounted for?
 - e. What difficulties did you run into while developing this model? Did you have reasons that this model took a while to develop or did you lack data you needed to develop it?

9. How are the clients using the energy Model?
 - a. Can the client use it internally to help cost justify projects?
 - b. What level of accuracy can they rely on?
 - c. Are there any constraints within the model that would limit how long the clients can use the model?

10. How did you report the results to the client and ComEd (and/or) Nicor?
 - a. Did you have any issues with these reports including timing, or the information that you had to provide to both ComEd (and/or) Nicor and the customer?

Section D: Marketing and Outreach Activities

1. Are you involved in how sites are chosen for the program?
 - E. What are the criteria for recruiting?
 - F. How are they chosen and targeted? **[If needed]:** What's the relationship between you and ComEd (and/or) Nicor in recruiting and choosing sites?
 - G. Who is excluded or included?
 - H. Is the majority of the participation from internal recruiting or outside interest?

2. Of the customers that were recruited:
 - D. Did any of the sites not have the proper data available to participate?

 - E. Did any of the sites not have the proper technical expertise to participate?

3. Are you aware of other SEM-type programs in the ComEd (and/or) Nicor area?
4. Did you identify any barriers that prevented a company from participating in the program?
 - a. Were there any barriers that prevented a customer from implementing a recommended measure?

Section E: Improvement on Training Workshops

1. Do you feel that the training workshops could be improved and how?
2. Do you feel that the number of workshops conducted is sufficient, would you like to increase or decrease the number of workshops?
3. Do you think doing a follow up/check in training would be valuable?
 - a. How should a follow up process work?
 - b. What goals or metrics should be included?
 - a. How often would you do this kind of checkup after the first year?

Section E: Closing

1. Do you have any other comments, concerns or suggestions about the program that we didn't discuss that you would like to make sure I know about?

Thank you very much for taking the time in assisting us with this evaluation. If I come up with any additional questions that come from this interview, do you mind if I send you an email or give you a quick call?