



Strategic Energy Management Impact Evaluation Report

**Strategic Energy Management (SEM):
Program Year 2019 (2019)
(1/1/2019-12/31/2019)**

**Presented to
Nicor Gas Company**

Final

July 8, 2020

Prepared by:

**Dustin Bailey
Guidehouse**

**David Bluestein
Guidehouse**

**Jean Rokke
Guidehouse**

**Submitted to:**

Nicor Gas Company
1844 Ferry Road
Naperville, IL 60563

Submitted by:

Guidehouse (which acquired Navigant in 2019)
150 N. Riverside Plaza, Suite 2100
Chicago, IL 60606

Contact:

Randy Gunn
Partner
312.583.5714
randy.gunn@guidehouse.com

Kevin Grabner
Associate Director
608.616.5805
kevin.grabner@guidehouse.com

Laura Agapay-Read
Managing Consultant
312.583.4178
laura.agapay.read@guidehouse.com

Disclaimer: This report was prepared by Guidehouse for Nicor Gas based upon information provided by Nicor Gas and from other sources. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Guidehouse nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.



TABLE OF CONTENTS

1. Introduction 2

2. Program Description 2

3. Program Savings Detail 3

4. Program Savings by Site..... 4

5. Impact Analysis Findings and Recommendations 4

 5.1 Impact Parameter Estimates 4

 5.2 Site-Specific Impact Findings – Nicor Gas Only 4

6. Appendix 1. Impact Analysis Methodology 5

 6.1 Verified Gross Program Savings Analysis Approach 5

7. Appendix 2. Joint Program Findings 6

 7.1 Impact Evaluation Findings and Recommendations 6

 7.2 Market Segment Outreach 7

 7.3 Incentives 8

 7.4 Customer Support 8

 7.4.1 Training 8

 7.4.2 Energy Model 8

8. Appendix 3. Total Resource Cost Detail 9

LIST OF TABLES AND FIGURES

Table 2-1. 2019 Volumetric Findings Detail 2

Table 2-2. 2019 Volumetric Findings Detail 3

Table 3-1. 2019 Total Annual Incremental Gas Savings (therms) 3

Table 4-1. 2019 Energy Savings by Site 4

Table 7-1. Cohort Segments, Utilities and Incentives 7

Table 8-1. Total Resource Cost Savings Summary 9



1. INTRODUCTION

This report presents the results of the impact evaluation of the Nicor Gas 2019 Strategic Energy Management (SEM) Program. It includes a summary of the gas impacts evaluated in 2019. The appendix provides the impact analysis methodology and details of the Total Resource Cost inputs. An appendix section also provides impact and process evaluation findings and recommendations for the joint programs based on interviews with the implementers and utility partners. Program year 2019 covers January 1, 2019 through December 31, 2019.

2. PROGRAM DESCRIPTION

ComEd and Nicor Gas started the SEM Program as a pilot in electric program year (EPY) 7 and gas program year (GPY) 4. In 2019, the program expanded to include Peoples Gas and North Shore Gas (PGL and NSG) and added two new implementation contractors, Cascade and Graphet. Cascade manages participants from the industrial refrigeration and wastewater treatment cohorts, and Graphet manages an industrial cohort. The three utilities manage the program while CLEAResult, Cascade, and Graphet implement and oversee the day-to-day operations of the SEM Program in the region. This report covers the Nicor Gas impact and process evaluation efforts.

The goal of the SEM Program is to apply a process of continuous energy management improvements that result in energy savings and gas use reductions. The program trains participants to identify low-cost and no-cost measures, improve process efficiency, and reduce energy usage and gas consumption through behavioral changes. Nicor Gas provides a \$0.10 per therm saved incentive to all market segments participating in the SEM program.

The program achieves energy savings 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 provides training and implementer support to identify O&M improvements. This training usually lasts for one year and occurs monthly or bi-monthly.

The SEM Program savings are calculated using site-specific models developed by the implementation contractors that have built-in statistical regression analysis. The energy models use two years of utility data prior to program participation. This data is associated with site information such as production and temperature to create baseline models that estimate a site’s baseline usage based on these variables. After program participation begins, the model compares actual energy consumption to modeled energy consumption. The difference between the modeled energy consumption and actual billing data is the savings claimed by the SEM program. Both Table 2-1 and Table 2-2 provide the participation counts for 2019.

Table 2-1. 2019 Volumetric Findings Detail

| Participation | Cascade | CLEAResult | Graphet |
|----------------|---------|------------|---------|
| Participants | 19 | 32 | 14 |
| Total Measures | 19 | 32 | 14 |

Source: Tracking data and Guidehouse team analysis



Table 2-2. 2019 Volumetric Findings Detail

| Participation | ComEd | Peoples Gas North Shore Gas | Nicor Gas |
|----------------|-------|-----------------------------|-----------|
| Participants | 54 | 13 | 29 |
| Total Measures | 54 | 13 | 29 |

Source: Tracking data and Guidehouse team analysis

3. PROGRAM SAVINGS DETAIL

Table 3-1 summarizes the overall gas savings the SEM Program achieved in 2019. Total verified net savings is 2,818,960 therms.

Table 3-1. 2019 Total Annual Incremental Gas Savings (therms)

| Program Path | Ex Ante Gross Savings (Therms) | Verified Gross RR* | Verified Gross Savings (Therms) | NTG† | Verified Net Savings (Therms) |
|---------------------------------------|--------------------------------|--------------------|---------------------------------|-------------|-------------------------------|
| Nicor Gas Strategic Energy Management | 2,981,742 | 95% | 2,818,960 | 1.00 | 2,818,960 |
| Nicor Gas Total | 2,981,742 | 95% | 2,818,960 | 1.00 | 2,818,960 |

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: Nicor Gas_NTG_History_and_2019_Recommendations_Faucet_Aerator_Showerhead_Correction_2019-04-12.xlsx, which is to be found on the Illinois SAG web site: https://www.ilsag.info/ntg_2019/

Source: ComEd and Nicor Gas tracking data and evaluation team analysis



4. PROGRAM SAVINGS BY SITE

The SEM Program tracked and evaluated savings at the site level, rather than at the measure level. Table 4-1 summarizes the site-level incremental gas savings the SEM Program achieved in 2019.

Table 4-1. 2019 Energy Savings by Site

| Site | Utility | Ex Ante Gross Savings (therms) | Verified Gross Therm Realization Rate | Verified Gross Savings (therms) |
|--------------|------------------|--------------------------------|---------------------------------------|---------------------------------|
| Site D | Nicor Gas | 52,806 | 180% | 95,173 |
| Site E | Nicor Gas | 62,102 | 100% | 62,102 |
| Site J | Nicor Gas | 15,670 | 100% | 15,670 |
| Site K | Nicor Gas | 76,761 | 100% | 76,761 |
| Site L | Nicor Gas | 537,655 | 100% | 537,655 |
| Site N | Nicor Gas | 129,066 | 101% | 130,117 |
| Site O | Nicor Gas | 478,080 | 57% | 272,888 |
| Site P | Nicor Gas | 337,335 | 100% | 336,412 |
| Site X | Nicor Gas | 1,268,423 | 100% | 1,268,338 |
| Site Y | Nicor Gas | 23,844 | 100% | 23,844 |
| Total | Nicor Gas | 2,981,742 | 95% | 2,818,960 |

Source: ComEd and Nicor Gas tracking data and Guidehouse team analysis.

5. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

5.1 Impact Parameter Estimates

As a behavioral-based model program, the SEM Program does not have standard impact parameters that are used to determine program savings. The program savings are calculated using billing regression methodologies built into the program models that are customized for each site.

5.2 Site-Specific Impact Findings – Nicor Gas Only

Site D Guidehouse found an operational production change that unnecessarily impacted ex ante SEM savings. The evaluation team created a new statistically significant variable to account for this production change and re-ran the gas model. The resulting RR was 180.23% for therm savings.

Site E No issues.

Site J No issues.

Site K No issues.

Site L No issues.



Site N No issues.

Site O The IC annualized 183 days of post period data and capital project savings by multiplying savings by 365/183. Guidehouse calculated verified savings using only six months of post period data and six months of capital project impacts. Guidehouse did not annualize to 12 months of verified savings since it is unclear how seasonality and implementation of measures over time would affect site savings in the future.

Site P No issues.

Site X No issues.

Site Y No issues.

6. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

6.1 Verified Gross Program Savings Analysis Approach

Verified gross savings from the 2019 SEM Program were calculated using implementer provided statistical models that are grounded in site-specific data. These multi-variable regression models draw upon site data including energy usage, production, weather data and seasonality effects (including holidays or shutdowns). Guidehouse independently evaluated the electric and gas savings using separate energy models.

Guidehouse's review of the models was driven by the following procedure:

- **A site-specific analysis approach** – since 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 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, Guidehouse-calibrated building automation system trend logs and telephone conversations with onsite staff.

For each site, Guidehouse reviewed and updated the statistical models provided by the implementer. Guidehouse staff generally followed the process below for this review:

Step 1: Guidehouse recreated the energy models to ensure they aligned with the provided data.

Step 2: Guidehouse confirmed the model saving calculations accounted for all capital projects. Savings from capital projects were subtracted from total measurement period savings.

Step 3: Guidehouse identified and accounted for any short-term effects that were occurring outside the SEM influence. Telephone interviews with the site staff confirmed these changes.

Step 4: Guidehouse made additional changes to the models as needed. Changes included excluding outlier data points or including additional variables. Outlier points that were above 110% or below



90% of baseline period variables were excluded if the residual was out of line with other residuals in the measurement period.

Guidehouse identified a number of changes that occurred at the site that had short-term or long-term effects on the statistical model. The changes that could affect the model savings include:

- Change in hours of operation
- Change in numbers of employees
- Change in production
- Other capital measures installed at the site that were implemented through other utility energy efficiency and demand response programs or outside of the ComEd or Nicor Gas programs.

7. APPENDIX 2. JOINT PROGRAM FINDINGS

This section provides impact and process evaluation findings for the joint programs that are common across ComEd, Nicor Gas, and Peoples Gas and North Shore Gas, based on impact evaluation and process interviews with the implementers and utility partners.

7.1 Impact Evaluation Findings and Recommendations

Finding 1. SEM models varied across the three implementation contractors operating in 2019.

Supporting Evidence: Guidehouse reviewed a sample of 22 regression models provided by the implementation contractors for the impact evaluation effort and found significant differences in the information provided in the models, model layout, and model structure. For example, the majority of models included the original regression analysis used to calculate savings, but others did not. The latter situation made evaluation more difficult as Guidehouse had to puzzle through how exactly the IC arrived at their savings estimates, instead of focusing on reviewing the actual regression models.

Recommendation 1. Guidehouse recommends that the utilities work with the ICs implementing the SEM program to standardize the approach in modeling and provide similar regression analysis and reporting. Guidehouse found strengths with each ICs approach to SEM which should be incorporated and standardized by the others. For instance, Cascade provided very thorough and detailed opportunity registers with clear documentation on activities leading to SEM savings. CLEAResult provided accurate and detailed models, which included the actual data used in regression analysis, that were easy to follow and evaluate. Graphet clearly documented the post period measurement savings and clearly identified any gaps that impacted SEM savings. Sharing these approaches between ICs will improve the overall SEM program for customers and utilities.

Finding 2. One IC provided limited regression data that was not in the format used to create the original SEM models and calculate ex ante savings.

Supporting Evidence: There were a few models provided that only included raw interval data which was not formatted properly to align with the regression analysis detailed in the site-specific reports. For example, some sites provided raw AMI data with wet or dry bulb temperatures that had to be adjusted to outdoor temperatures, and daily data which had to be averaged to 5- or 7-day work weeks. Guidehouse had to adjust the data prior to regressing it to attempt to replicate the claimed SEM savings, but had difficulty arriving at the same result.

Recommendation 2. Guidehouse recommends all ICs provide robust regression models with clearly documented steps on how the AMI data was adjusted to calculate savings. This will



allow the evaluator to replicate the regression analysis and document changes in savings results.

Finding 3. The ICs varied in the approach for identifying and removing savings from capital projects.

Supporting Evidence: Guidehouse found differences in how savings from capital projects were removed from SEM savings. One IC calculated the overall SEM savings and then removed the capital project savings in one lump sum, while others removed portions of the capital project savings at intervals within the SEM model itself. The latter approach showed inconsistencies as to when a capital project started, at times the project started prior to the post period¹ but still impacted SEM activities, as well as stopped before the end of the post period suggesting the capital project stopped having an impact on SEM results.

Recommendation 3. Guidehouse recommends ICs treat capital savings consistently and remove capital savings as a lump sum after calculating savings for the post period.

Finding 4. Guidehouse found inconsistencies in regression analysis methods used by the ICs.

Supporting Evidence: Guidehouse reviewed the regression models provided by the three ICs and found two specific issues with the underlying modeling methods. Guidehouse’s understanding of regression modeling, as required by SEM programs, is that the CSUM of a proper regression model should zero out at the end of the baseline period and should not include variables with T-stats of less than +/- 2.00. Some of the regression models used by the ICs did not follow these requirements, which led to slight variances in realization rates.

Recommendation 4. Guidehouse recommends the ICs standardize their regression modeling methods to ensure consistencies in SEM savings calculations.

7.2 Market Segment Outreach

Historically, SEM Program participants tended to be large manufacturing sites. In an effort to diversify the SEM program into new innovative segments, the utilities focused on seven different customer groups in 2019. When recruiting new participants for the program, the electric and gas utilities look to the larger users within a segment to maximize the potential energy savings for the program. Other recruiting criteria considers if the customers have the time available to participate in the training and onsite visits and if they have participated in the other programs the utilities have offered. Table 7-1 provides the various cohort segments, their associated utilities and incentives.

Table 7-1. Cohort Segments, Utilities and Incentives

| Cohort | Electric Utility | Gas Utility | Incentive |
|--------------------------|------------------|------------------|--------------------------|
| Alumni | ComEd (Yr 3) | Nicor Gas (Yr 3) | \$0.02/kWh; \$0.10/therm |
| Commercial Real Estate | ComEd | | \$0.02/kWh; |
| Industrial | ComEd | PGL/NSG | \$0.01/kWh; \$0.10/therm |
| Industrial Refrigeration | ComEd | | \$0.01/kWh |
| K-12 | ComEd | Nicor Gas | \$0.02/kWh; \$0.10/therm |
| MEGA ² | | Nicor Gas | \$0.10/therm |
| Wastewater Treatment | ComEd | | \$0.01/kWh |

Source: Guidehouse analysis

¹ Some SEM models had gaps between the end of the baseline period and the start of the post or measurement period. Savings from capital projects often began during this gap timeframe and continued into the post period. Guidehouse was unable to determine why capital project savings was treated this way and how to replicate it in the regression analysis. Again, did we ask the ICs?

² Nicor Gas formed the MEGA cohort to assist large customers who would not be eligible to participate in Nicor Gas efficiency programs in CY2020. Three of these exiting customers chose to participate in the MEGA cohort.



Forming additional cohorts for the commercial real estate, industrial, industrial refrigeration, K-12, MEGA, and wastewater treatment segments in 2019 allowed the ICs to provide specific training and assistance to these targeted customers. Customers in these market segments, such as large industrial facilities, have sensitive processes and equipment so having training tailored to their needs built trust in the SEM program and encouraged participants to implement energy efficiency changes.

As the SEM Program progresses and saturates the larger customer market segments, utilities have begun to recruit participants with lower annual usage including large commercial sites. The migration to commercial customers requires the ICs to focus more on lighting, HVAC, building automation systems (BAS), and control measures for energy efficiency opportunities.

7.3 Incentives

In an effort to meet internal program objectives, ComEd worked with the IC CLEAResult to pilot Milestone incentives in 2019 and closely monitor the participants' energy data, energy charters, and executive sponsorship. Energy data was an incentivized component because the accuracy and timeliness of this customer-inputted data is a critical component to the energy model. The loss of Energy Champions can hinder the progress of the program making it difficult for the participating site to continue in the program. Having the energy charter and energy sponsor as milestone markers provides the customer site the framework to continue in the program should an Energy Champion leave. Given the success of this pilot, ComEd will establish the Milestone Markers for all three ICs in CY2020.

7.4 Customer Support

Two new contractors were added to implement the joint programs in 2019, Cascade and Graphet. Cascade manages participants from the industrial refrigeration and wastewater treatment cohorts, and Graphet manages an industrial cohort.

7.4.1 Training

A key component of the SEM Program is the training provided to customers in the form of onsite workshops and cohort meetings. These trainings have two main categories – cohort encompassing or site specific. The cohort encompassing sessions addressed the main steps of SEM:

- SEM Introduction, what are the drivers and success factors for energy management
- Energy Modeling and Baseline, what is the purpose of an energy model and how is a baseline established
- Project Registers, prioritizing efficiency projects into short-term and long-term projects

The SEM Introduction trains customers on the important steps needed to develop an energy efficient culture at their facility. Changing the participant's culture to be aware of efficiency improvements is a core pillar of SEM. To facilitate this change, the ICs provide engagement workshops on how to empower all employees from the facility directors to the production line workers on how to make sustainable improvements.

7.4.2 Energy Model

The Energy Model is integral to the SEM Program, providing the customer insight on their day-to-day usage and how energy efficiency can help manage costs. The ICs used three different energy models in 2019:

- JMP – for alumni and MEGA industrial customers
- Energy Center – for the commercial customers in the alumni group, K-12 and commercial real estate
- Energy Sensei – for the industrial refrigeration and wastewater treatment cohort

Energy Sensei is a cloud-based customer facing energy management tool. The participant’s energy model is uploaded into Sensei providing a dashboard of the energy model results and a way to visualize energy performance and usage. Providing customers a way to track projects through their implementation stages and a visualization of the impacts supports the customers’ current energy efficiency efforts and encourages future projects.

The three ICs managed the customer energy models differently. One of the ICs entered all of the relevant information while others supported their customers who entered and managed the data. Guidehouse has observed that successful SEM programs encourage customers to have ownership of the energy model and the various inputs such as occupancy and production data, allowing the customer to see the efficiency changes and the impacts they have on usage.

An enhancement to the Energy Model the ICs would like is more timely interval data. Currently, the utilities are receiving this information on a monthly basis making it difficult for customers to see the effects of their efficiency changes in a timely manner. Receiving the interval data on a weekly basis would alleviate this issue.

8. APPENDIX 3. TOTAL RESOURCE COST DETAIL

Table 8-1 below, shows the Total Resource Cost (TRC) table. It includes only the cost-effectiveness analysis inputs available at the time of finalizing this 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 the evaluation team later.

Table 8-1. Total Resource Cost Savings Summary

| Site | Utility | EUL | Ex Ante Gross Savings (therms) | Verified Gross Savings (therms) | NTG | Verified Net Savings (therms) |
|--------------|------------------|------------|--------------------------------|---------------------------------|-------------|-------------------------------|
| Site D | Nicor Gas | 5.0 | 52,806 | 95,173 | 1.00 | 95,173 |
| Site E | Nicor Gas | 5.0 | 62,102 | 62,102 | 1.00 | 62,102 |
| Site J | Nicor Gas | 5.0 | 15,670 | 15,670 | 1.00 | 15,670 |
| Site K | Nicor Gas | 5.0 | 76,761 | 76,761 | 1.00 | 76,761 |
| Site L | Nicor Gas | 5.0 | 537,655 | 537,655 | 1.00 | 537,655 |
| Site N | Nicor Gas | 5.0 | 129,066 | 130,117 | 1.00 | 130,117 |
| Site O | Nicor Gas | 5.0 | 478,080 | 272,888 | 1.00 | 272,888 |
| Site P | Nicor Gas | 5.0 | 337,335 | 336,412 | 1.00 | 336,412 |
| Site X | Nicor Gas | 5.0 | 1,268,423 | 1,268,338 | 1.00 | 1,268,338 |
| Site Y | Nicor Gas | 5.0 | 23,844 | 23,844 | 1.00 | 23,844 |
| Total | Nicor Gas | 5.0 | 2,981,742 | 2,818,960 | 1.00 | 2,818,960 |

Source: ComEd and Nicor Gas tracking data and Guidehouse team analysis.