Guidehouse
Outwit Complexity

Strategic Energy Management Program Impact Evaluation Report

Energy Efficiency Plan: Program Year 2022 (1/1/2022-12/31/2022)

Prepared for:

Nicor Gas Company

FINAL

June 22, 2023

Prepared by:

Dustin Bailey
Guidehouse

David Bluestein
Guidehouse

Submitted to:

Nicor Gas Company
1844 Ferry Road
Naperville, IL 60563

Submitted by:

Guidehouse
150 N. Riverside Plaza, Suite 2100
Chicago, IL 60606

Contact:

Ed Balbis
Partner
561.644.9407
ebalbis@guidehouse.com

Stu Slote
Director
802.526.5113
stu.slote@guidehouse.com

Laura Agapay-Read
Associate Director
312.583.4178
laura.agapay.read@guidehouse.com

Charles Ampong
Associate Director
608.446.3172
charles.ampong@guidehouse.com

Table of Contents

1. Introduction 1
2. Program Description 1
3. Program Savings Detail 3
4. Program Savings by Measure 3
5. Impact Analysis Findings and Recommendations 4
5.1 Impact Parameter Estimates 4
5.2 Findings and Recommendations 4
Appendix A. Impact Analysis Methodology A-1
A.1 Engineering Review of Project Files A-1
A.2 Verified Gross Program Savings Analysis Approach A-1
Appendix B. Impact Analysis Supplemental Information B-1
Appendix C. Program Specific Inputs for the Illinois TRC C-1

List of Tables, Figures, and Equations

Table 2-1. 2022 Volumetric Findings Detail 2
Table 2-2. 2022 Installed Measure Quantities 2
Table 3-1. 2022 Annual Energy Savings Summary 3
Table 4-1. 2022 Annual Energy Savings by Measure 3
Table 5-1. Verified Gross Savings Parameters 4

Table A-1. Profile of Gross Impact Sample for Custom Projects A-1
Table B-1. 2022 Energy Savings by Site B-1
Table C-1. Verified Cost Effectiveness Inputs C-1

1. Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2022 Strategic Energy Management (SEM) Program and a summary of the energy impacts for the total program and is broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology and cost-effectiveness input summary. Program year 2022 covers January 1, 2022 through December 31, 2022.

2. Program Description

The goal of the SEM Program is to train personnel at participating commercial and industrial customer sites to apply a process of continuous energy management improvements that result in energy savings and electricity demand reductions. The program trains participants to identify low-cost and no-cost measures, improve process efficiency, and reduce energy usage and demand through behavioral changes. In 2022, ComEd, Nicor Gas, Peoples Gas, and North Shore Gas continued to administer the SEM Program for their customers.

The program achieves energy savings through operational and maintenance (O&M) improvements, incremental increases in capital energy efficiency projects, and the identification of additional capital projects that would not otherwise have been considered (e.g., process changes, consideration of energy efficiency in all capital efforts). The program provides training and implementer support to identify O&M improvements. This training usually lasts for one year and occurs monthly or bimonthly.

SEM Program savings are calculated using site-specific models developed by the implementation contractors that have built-in statistical regression analysis. The energy model uses at least one year of utility data prior to program participation. This data is associated with site information, such as production and temperatures, 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, minus energy savings for capital projects claimed through other programs, is the savings claimed by the SEM Program.

Nicor Gas had 13 gas participants in the SEM Program across the Private and Public sectors that claimed savings in 2022, as shown in Table 2-1. The program savings are characterized as a single installed measure type, which is the whole building measure.

Table 2-1. 2022 Volumetric Findings Detail

Participation	Total
Private Sector	
Participants *	9
Installed Projects †	9
Public Sector	
Participants *	4
Installed Projects †	4
Program 2022 Total	
Participants *	13
Installed Projects †	13

* Participants are defined as customers who formed the individual energy teams. Each participant may have several models covering saving across several locations.
† Installed Projects are defined as the total impact of all SEM activities completed at the site. This include several behavioral and low-cost measures and is custom to each site.
Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.

Table 2-2 summarizes the installed measure quantities that are the basis for verified energy savings.

Table 2-2. 2022 Installed Measure Quantities

Program Category	Program Path	Measure	Quantity Unit	Installed Quantity
Private	Alumni - Private Sector	SEM – whole building	9	9
Public	Alumni - Public Sector	SEM – whole building	4	4

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

3. Program Savings Detail

Table 3-1 summarizes the energy savings the SEM Program achieved by path in 2022.

Table 3-1. 2022 Annual Energy Savings Summary

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Alumni - Private Sector	415,846	100%	416,716	0.97	404,214
Alumni - Public Sector	73,121	100%	72,942	0.97	70,754
Total or Weighted Average	**488,967**	**100%**	**489,658**	**0.97**	**474,968**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross: A deemed value. Available on the Illinois Energy Efficiency Stakeholder Advisory Group (SAG) web site: https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/.
Source: Guidehouse evaluation team analysis.

4. Program Savings by Measure

The program includes 13 projects or sites as shown in Table 4-1.

Table 4-1. 2022 Annual Energy Savings by Measure

Savings Category	Site Identifier	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
SEM Whole Building	Site A	22,430	99%	22,251	0.97	21,583
	Site B	16,425	100%	16,425	0.97	15,932
	Site C	55,062	100%	55,002	0.97	53,352
	Site D	157,395	100%	157,827	0.97	153,092
	Site E	28,094	103%	28,836	0.97	27,971
	Site F	25,896	100%	25,958	0.97	25,179
	Site G	5,464	100%	5,449	0.97	5,286
	Site H	19,855	100%	19,882	0.97	19,286
	Site I	102,291	100%	102,291	0.97	99,222
	Site J	30,112	100%	30,112	0.97	29,209
	Site K	18,505	100%	18,505	0.97	17,950
	Site L	2,074	100%	2,074	0.97	2,012
	Site M	5,364	94%	5,045	0.97	4,894
Total or Weighted Average		**488,967**	**100%**	**489,658**	**0.97**	**474,968**

† Net-to-Gross: A deemed value. Available on the SAG web site: : https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/.
Source: Nicor Gas tracking data and Guidehouse evaluation 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. Appendix C shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Table 5-1 shows the singular SEM measure and realization rate (RR) findings from the evaluation review.

Table 5-1. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (Therms/unit)	Verified Gross (Therms/unit)	Realization Rate	Data Source(s)
SEM-Whole Building	Site	Vary	Vary	100%	Project File Review, Nicor Gas Tracking Data ‡

‡ Project files and monthly billing data provided by Nicor Gas. Where conducted, on-site or telephone interview data collected by Guidehouse.

5.2 Findings and Recommendations

Finding 1. College Sites J and K did not annualize savings across summer months and therefore did not claim program savings for three months in the 2022 program year. The SEM model for this site only included nine months of savings period data that were available for evaluation review in 2022. After further discussion with Nicor Gas and the program implementer, the evaluation team determined to only calculate savings for the 9-month period that occurred in the program year.

> **Recommendation 1.** Going forward, savings should be annualized to a 12-month period unless there is clear justification as to why this is not occurring.

Appendix A. Impact Analysis Methodology

A.1 Engineering Review of Project Files

The evaluation team conducted a census of sites participating in the Nicor Gas SEM Program in 2022 and reviewed project files and SEM models for 13 projects (Table A-1).

Table A-1. Profile of Gross Impact Sample for Custom Projects

Population Summary				Sample Summary		
Program	Sampling Strata	Number of Projects (N)	Ex Ante Gross Savings (Therms)	n	Ex Ante Gross Savings (Therms)	Sampled % of Population (% Therms)
SEM-Whole Building	Small	3	12,902	3	12,902	23%
	Medium	7	161,317	7	161,317	54%
	Large	3	314,748	3	314,748	23%
Total		**13**	**488,967**	**13**	**488,967**	**100%**

Source: Guidehouse evaluation team analysis.

A.2 Verified Gross Program Savings Analysis Approach

Verified gross savings from the 2022 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 and shutdowns. For participants with coordinated gas and electric activities, the evaluation team independently evaluated the electric savings for ComEd and the gas savings for Nicor Gas using separate energy models.

The evaluation 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 Whole Facility billing/metered data regression was the main approach to evaluate savings.
- **Data collection focused on verifying and updating the assumptions that feed into the implementer's energy model for each site** – including program tracking data and supporting documentation (project specifications, invoices, etc.), utility billing and interval data, the evaluation team calibrated building automation system trend logs, and telephone conversations with onsite staff.

For each site, the evaluation team reviewed and updated the statistical models provided by the implementer. The evaluation generally followed these processes for this review:

Step 1: Recreated the energy models to ensure these aligned with the provided data.

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

Step 3: 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: 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.

The evaluation team identified several changes that occurred at the sites that had short-term or long-term effects on the statistical model. The changes that could affect the model savings include:

- Facility shutdowns
- 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 Nicor Gas programs

.

Appendix B. Impact Analysis Supplemental Information

Table B-1 summarizes the site-level incremental gas savings the SEM Program achieved in 2022, with differences between ex ante savings and verified savings explained in the following text.

Table B-1. 2022 Energy Savings by Site

Site Identifier	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Gross Realization Rate
Site A	22,430	22,251	99.2%
Site B	16,425	16,425	100.0%
Site C	55,062	55,002	99.9%
Site D	157,395	157,827	100.3%
Site E	28,094	28,836	102.6%
Site F	25,896	25,958	100.2%
Site G	5,464	5,449	99.7%
Site H	19,855	19,882	100.1%
Site I	102,291	102,291	100.0%
Site J	30,112	30,112	100.0%
Site K	18,505	18,505	100.0%
Site L	2,074	2,074	100.0%
Site M	5,364	5,045	94.1%

Source: Nicor Gas tracking data and Guidehouse team analysis.

Site A: The evaluation team removed gas savings from capital projects as identified in the energy model documentation, and only removed from Year 1 savings as shown by the re-baselined model and documented in the report.

Site B: The evaluation team did not identify any issues with the bottom-up calculation methods and documentation and gave the project a realization rate of 100%. However, Guidehouse requested and received the source of the hard-coded "Average Annual Therms" value in cell N6 of the calculation workbook.

Site C: Slight variation in regression model.

Site D: The evaluation team annualized to 365 days.

Site E: The evaluation team annualized to 365 days.

Site F: The evaluation team annualized to 365 days.

Site G: The evaluation team annualized to 365 days.

Site H: The evaluation team annualized to 365 days.

Site I: No issues.

Site J: The evaluation team calculated savings for nine months of provided data. The evaluation team recommends using 12 months of savings period data for all future models. Since savings from the SEM program is incremental to previous years, any savings not captured in 2022 will be incorporated in the 2023 results.

Site K: The evaluation team calculated savings for nine months of provided data. The evaluation team recommends using 12 months of savings period data for all future models. Since savings from the SEM program is incremental to previous years, any savings not captured in 2022 will be incorporated in the 2023 results.

Site L: The evaluation team did not identify any issues with the bottoms-up calculation methods and documentation and gave the project a realization rate of 100%.

Site M: Variation in regression model due to daily model layout.

Appendix C. Program Specific Inputs for the Illinois TRC

Table C-1 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Currently, 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. Guidehouse will include annual and lifetime water savings and greenhouse gas reductions in the end of year summary report.

Table C-1. Verified Cost Effectiveness Inputs

Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Alumni - Private Sector	SEM- whole building	Project	9	7	415,846	416,716	404,214
Alumni - Public Sector	SEM- whole building	Project	4	7	73,121	72,942	70,754
Total or Weighted Average			**13**	**7**	**488,967**	**489,658**	**474,968**

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