Strategic Energy Management Impact Evaluation Report

Energy Efficiency Plan: Plan Year 2021 (1/1/2021-12/31/2021)

Prepared for:

Peoples Gas and North Shore Gas

Final

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1. Introduction

This report presents the results of the impact evaluation of the Peoples Gas (PGL) and North Shore Gas (NSG) 2021 Strategic Energy Management Program. It presents a summary of the energy impacts for the total program and broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology. The program year 2021 covers January 1, 2021 through December 31, 2021.

2. Program Description

The goal of the SEM Program is to train staff at participating sites in how to apply a process of continuous energy management improvements that result in natural gas and electric 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 2021, ComEd, Nicor Gas, Peoples Gas, and North Shore Gas continued to manage the SEM Program.

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 1 year and occurs monthly or bimonthly.

SEM Program savings are calculated using site-specific models developed by the implementation contractor that have built-in statistical regression analysis. The energy model uses 2 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, minus energy savings for capital projects claimed through other programs, is the savings claimed by the SEM Program.

PGL had 7 participants in the SEM Program including 6 that claimed savings in 2021, and NSG had 3 participants in the SEM Program including 2 that claimed savings in 2021, as shown in Table 2-1. The program has only one installed measure type, which is the whole building measure.

Table 2-1. 2021 Volumetric Summary for PGL and NSG

Participation	PGL	NSG
Participants *	7	3
Installed Projects †	6	2

* Participants are defined as customers who form the individual energy teams. Each participant may have several models covering saving across several location.
† 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: Peoples Gas and North Shore Gas tracking data and Guidehouse evaluation team analysis.

3. Program Savings Detail

Table 3-1 summarizes the energy savings the PGL SEM Program achieved by path in 2021.

Table 3-1. 2021 Annual Energy Savings Summary for PGL

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
PGL Strategic Energy Management	246,568	114%	280,162	1.00	280,162

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† A deemed value. Available on the SAG web site: https://www.ilsag.info/ntg_2021.
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

Table 3-2 summarizes the energy savings the NSG SEM Program achieved by path in 2021.

Table 3-2. 2021 Annual Energy Savings Summary for NSG

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
NSG Strategic Energy Management	25,791	81%	20,900	1.00	20,900

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† A deemed value. Available on the SAG web site: https://www.ilsag.info/ntg_2021.
Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

4. Program Savings by Measure

The SEM Program tracked and evaluated savings at the site level, rather than at the measure level. SEM site level detail can be found in Table B-1. Appendix C shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report.

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 Findings and Recommendations

Several sites did not annualize savings. These sites removed data points for a variety of reasons but claimed savings only based on the valid data points.

Recommendation 1. There are exceptions where a site may be seasonal or only a very small number of data points are available (less than 6 months), but in most cases, if data points are removed in the post-installation period, savings should be adjusted to represent a typical 12 month year.

Several of the provided models converted monthly gas usage to weekly gas usage before creating the baseline model. This approach introduces an additional variable (number of days per month) that may not be properly accounted for in the provided models.

Recommendation 2. To make the models simpler to review, the implementer should not convert the usage data to a different time scale. If they do convert this data, it should be clear within the provided models how this process of conversion was handled in each step.

The ex ante calculation for one site with two SEM models converted a negative savings result in one model to zero. The final savings was claimed based on the positive savings of the second model. For verified savings, the ex post calculation model included the negative savings in the final savings.

Recommendation 3. For sites that are in their second year and beyond, any savings that is negative should be carefully reviewed. If the site claimed savings in previous years, and the current year's negative savings is a result of negative incremental savings, this savings should be kept as negative savings as it represents the site disengaging from activities completed in earlier years.

5.3 Historical Realization Rates and Net-to-Gross (NTG) Values

Table 5-1 shows the historical gross realization rates and NTG values for the SEM Program.

Table 5-1. Historical Realization Rates and NTG Values

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
2019	99%	102%	1.00	1.00
2020	89%	29%	1.00	1.00
2021	114%	81%	1.00	1.00

Source: Guidehouse evaluation research.

Appendix A. Impact Analysis Methodology

Verified Gross Program Savings Analysis Approach

Verified gross savings from the 2021 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). For participants with coordinated gas and electric activities, Guidehouse independently evaluated the electric savings for ComEd and the natural gas savings for PGL and NSG using separate energy models.

The Guidehouse team'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.

- **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 staff reviewed and updated the statistical models provided by the implementer. Guidehouse staff followed the process below for this review:

Step 1: Recreated the energy models (the ex post model) to ensure they aligned with the provided data.

Step 2: Confirmed the model saving 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.

Guidehouse staff 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.

Due to the small number of projects completed in the programs (8 total), the Guidehouse team reviewed a census of site-specific models for PGL and NSG.

Appendix B. Site Level Impact Analysis Details

Table B-1 summarizes the site-level incremental gas savings the SEM Program achieved in 2021.

Table B-1. 2021 Energy Savings by Site

Site	Project ID	Utility	Ex Ante Gross Savings (therms)	Verified Gross therms Realization Rate	Verified Gross Savings (therms)
Site O	7677425	PGL	14,575	102%	14,898
Site P	7677455	PGL	13,919	100%	13,887
Site Q	7677484	PGL	10,327	100%	10,331
Site R	7677537	PGL	74,435	99%	74,033
Site S	8197241	PGL	9,477	88%	8,378
Site U	8197467	PGL	123,835	128%	158,634
Site T	8197403	NSG	10,427	49%	5,101
Site V	8197479	NSG	15,364	103%	15,798

Source: Peoples Gas and North Shore Gas tracking data and Guidehouse team analysis.

Site O: This calculation used a simplified usage per day method as the model was not statistically significant. It was unclear from the documentation if the final claimed savings was incremental to any savings claimed in previous years. The basis for the verified savings estimate is that savings was not claimed for this site in the past meaning that all of the savings estimated in this year's model was valid.

Site P: The implementer converted monthly gas data to daily before creating the SEM model. This caused issues that resulted in the ex post model being slightly different.

Site Q: The implementer converted monthly gas data to daily before creating the SEM model. This caused issues that resulted in the ex post model being slightly different.

Site R: The implementer converted monthly gas data to daily before creating the SEM model. This caused issues that resulted in the ex post model being slightly different.

Site S: The ex ante savings was annualized to 70 days because 9 days in the measurement period were invalid. Due to the small period of valid data (only 61 days), Guidehouse does not recommend annualizing savings for this project, resulting in a realization rate of 88%.

Site T: The provided ex ante calculations removed the impact of one of the two included models for this site. The excluded model was showing negative savings, but Guidehouse did not see proper justification of why this savings should be considered invalid. The ex post calculation included the negative savings model in the final calculations of the overall site savings.

Site U: The ex ante calculations annualized the final savings for this site based on 49 weeks of valid information. When reviewing this model, Guidehouse found that only 45 weeks of data

were valid in the post condition. The ex post calculation used 45 weeks of data to annualize the final savings resulting in a realization rate above 1.0.

Site V: The ex ante adjustments included in this model did not fully remove the impacts of shutdowns occurring at the site. Guidehouse staff fully removed these data from the post conditions to estimate the final verified savings.

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. 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

Utility	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
PGL	Strategic Energy Management	Sites	6	7.0	246,568	280,162	280,162
NSG	Strategic Energy Management	Sites	2	7.0	25,791	20,900	20,900

Source: Peoples Gas and North Shore Gas tracking data and Guidehouse evaluation team analysis.