Gas Optimization Program Impact Evaluation Report

Energy Efficiency Plan: Program Year 2023 (1/1/2023-12/31/2023)

Prepared for:

Peoples Gas and North Shore Gas

FINAL

June 13, 2024

Prepared by:

Hang Zhang	Deborah Swarts	Roger Hill
Guidehouse	InCA	InCA

Submitted to:

Peoples Gas
North Shore Gas
200 East Randolph Street
Chicago, IL 60601

Submitted by:

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

Contact:

Ed Balbis	Stu Slote	Laura Agapay-Read
Partner	Director	Associate Director
561.644.9407	802.526.5113	312.583.4178
ebalbis@guidehouse.com	**stu.slote@guidehouse.com**	**laura.agapay.read@guidehouse.com**

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

Table of Contents

List of Tables, Figures, and Equations

1. Introduction

This report presents the results of the impact evaluation of the Peoples Gas (PGL) and North Shore Gas (NSG) 2023 Gas Optimization programs and a summary of the energy impacts for the total program, as well as relevant measure and program structure details. The appendix presents the impact analysis methodology. Program year 2023 covers January 1, 2023 through December 31, 2023.

2. Program Description

The Gas Optimization program provides a technical assessment service where energy advisors and contracted engineering firms review commercial, industrial, and public sector facilities for operation and maintenance issues that, if corrected, often provide short payback projects. In addition to identifying low-cost and no-cost measures that can be implemented by the customer, Gas Optimization studies also identify capital improvement projects. Incentives to complete recommended improvements include reimbursement for the cost of the technical assessment, rebates, and program implementation support. Projects identified through the Gas Optimization Program include steam pipe insulation, HVAC space conditioning control optimization, and other energy saving measures.

The PGL Gas Optimization program had ten participants in 2023 and completed twelve projects, as shown in Table 2-1. Nine participants were in the private sector, and one participant was in the public sector.

Table 2-1. 2023 Program Volumetric Summary for PGL

Participation	Private	Public	Total
Participants *	9	1	**10**
Installed Projects †	11	1	**12**

* Participants are defined as unique work order IDs.
† Installed Projects are defined as unique retrofits or measures for each participant.
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

The NSG Gas Optimization program had no participants in 2023.

3. Program Savings Detail

Table 3-1 summarizes the energy savings the PGL Gas Optimization Program achieved by path in 2023. The private sector savings contributed to 93% of the program savings and the public sector savings contributed to 7% of the program savings.

Table 3-1. 2023 Annual Energy Savings Summary for PGL

Program Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms	NTG†	Verified Net Savings (Therms)
Private	386,780	91%	352,336	0.94	331,196
Public	27,861	100%	27,793	0.94	26,125
Total or Weighted Average	**414,640**	**92%**	**380,129**	**0.94**	**357,321**

Note: Totals may not sum due to rounding.
* 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 website: **https://www.ilsag.info/evaluator-ntg-recommendations-for-2023/.** The PGL Gas Optimization program had no participants in the disadvantaged communities (DAC).
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

4. Program Savings by Measure

The PGL Gas Optimization program does not offer prescribed measures. Four custom measures are included in Table 4-1, three of which are in the private sector and one in the public sector. The Process – Insulation measure contributed the most savings.

Table 4-1. 2023 Annual Energy Savings by Measure for PGL

Program Category	Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
Private	Process - Insulation	278,883	88%	245,322	0.94	230,602
	Custom Project	93,860	100%	93,560	0.94	87,946
	HVAC - Space Conditioning Controls	14,037	96%	13,455	0.94	12,648
Public	HVAC - Space Conditioning Controls	27,861	100%	27,793	0.94	26,125
Total or Weighted Average		**414,640**	**92%**	**380,129**	**0.94**	**357,321**

Note: Totals may not sum due to rounding.
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

Realization rate findings for individual sampled projects are provided in Appendix B.

5. Impact Analysis Findings and Recommendations

5.1 Impact Parameter Estimates

Table 5-1 shows the realization rate findings and data sources from the evaluation review. The realization rate is the ratio of the verified gross savings to the ex ante gross savings. Following Table 5-1 are findings and recommendations which address measures with realization rates of more or less than 100 percent. Appendix A provides further details of the impact analysis methodology.

Table 5-1. 2023 Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
PGL Gas Optimization Custom Measures	Project	Vary	Vary	92%	Project File Review, History Billing Data Review, Verification of Site Specific Data through Customer Communication*; IL-TRM v11.0†

* Project files and monthly billing data provided by Peoples Gas. Site specific data collected by Guidehouse through telephone interviews with customer.
† State of Illinois Technical Reference Manual version 11.0 from **http://www.ilsag.info/technical-reference-manual.html**.

5.2 Findings and Recommendations

The evaluation team found the largest deviation from ex ante savings were in one Process – Insulation project and one HVAC – Space Conditioning Controls project; other sampled projects were verified within in 5% range of the ex ante savings. The detailed realization rates and evaluation findings for individual sampled projects are provided in Appendix B. General findings and recommendations follow.

Finding 1. Ex ante savings for one Process – Insulation project (WO-4298135) was above 10%[1] of building consumption, so the evaluation team conducted a billing data analysis. The billing analysis results did not support the ex ante savings, so the evaluation team used the regression results as the ex post savings. During communication with the customer, the evaluation team and implementation contractor identified and accounted for a steam trap project in the ex post calculation. The baseline data period included 2022 and 2019 and excluded 2021 and 2020 for COVID impact. These updates resulted in a 72% realization rate.

> **Recommendation 1a.** When the expected project savings exceeds 10% of the building consumption, conduct a building utility data regression analysis to confirm the savings and collect information on whether there are other energy efficiency projects at the same site during the Gas Optimization project baseline, implementation, and post implementation time periods.

---

[1] IPMVP Core Concepts, Efficiency Valuation Organization, Section 5.5.1 Option C: Whole Facility – General, page 25. Discuss the necessity for conducting regression analysis when a 10% building usage consumption is exceeded.

Recommendation 1b. For large and complex projects, continue to work with the evaluation team during the pre-application phase to complete parallel path reviews.

Finding 2. For HVAC – Space Conditioning Controls project WO-4297222, the ex ante calculation for reset savings was based on an annual regression model. The evaluation team updated the analysis to include only the winter season data, excluding data from June, July, August, and September, to better align with the active hours of the reset strategy. The evaluator also updated the calculator to use 30-year average weather data to normalize the savings.

> **Recommendation 2a.** If a measure only impacts certain seasons in a year, when conducting the data analysis, consider using only the data from the applicable seasons during which the measure is active, to limit the impact from other equipment onsite during other seasons. For example, if a boiler measure applied only in winter and swing seasons, when conducting the data analysis, consider using only the winter and swing season data.

> **Recommendation 2b.** In PY2023, weather normalization of savings should be conducted using 30-year average weather data to be consistent with IL TRM version 11. Moving forward in PY2024, weather normalization of savings should be conducted using 15-year average weather data to be consistent with IL TRM version 12.

Finding 3. For Custom project WO-4297211, the program analyzed the baseline and post installation data using different methodologies. The evaluation team updated the baseline and post installation hours per day to be the same due to no changes in the project scope that affected operating hours. We updated the baseline and post installation data analysis methodology to be consistent. The updates resulted in minor change in RR to 101%.

> **Recommendation 3.** Apply the same data analysis methodology for the baseline and post installation cases of one project to ensure the consistency of the approach. If in the baseline analysis, minimal values (e.g. <0.1) are excluded from the data analysis and the daily operating hours are adjusted accordingly, the same approach should be applied when analyzing the post installation data.

Finding 4. For Custom Project WO-4301502, the ex ante calculation did not account for fan heat when quantifying the heating energy consumption. The evaluation team added 2F for supply fan heat to the preheat and discharge air temperature difference in the ex post calculations, and this update resulted in an increase of the gross RR to 104%.

> **Recommendation 4.** Fan heat should be considered when quantifying HVAC system heating energy consumption for savings result accuracy.

Appendix A. Impact Analysis Methodology

The evaluation team conducted site-specific research to verify project savings that were not based on measures specified in the TRM. Projects were randomly selected through a stratified sample design at the tracking record level using the population gross therm savings determined from program tracking data.

Table A-1 shows a profile of the sample selection. Four strata were defined by project size based on gross energy savings boundaries that placed about one-third of program-level savings into each stratum. The lowest savings projects, which add up to 2% of the total program savings were excluded from the sampling process.

Table A-1. 2023 Profile of Gross Impact Sample for Gas Optimization Projects

Program	Sampling Strata	Number of Projects (N)	Ex Ante Gross Savings (Therms)	n	Ex Ante Gross Savings (Therms)	Sampled % of Population (% Therms)
		Population Summary			**Sample Summary**	
Gas Optimization	1	1	159,548	1	159,548	100%
	2	1	119,334	1	119,334	100%
	3	4	128,085	4	128,085	100%
	4	4	7,672	0	-	0%
Total or Weighted Average		**10**	**414,640**	**6**	**406,968**	**98%**

Note: Totals may not sum due to rounding.
Source: Guidehouse evaluation team analysis.

Table A-2 provides the PGL Gas Optimization program sample precision analysis and roll up realization rate to the population. The verified gross realization rate for PGL was 78% at a 0% relative precision at a 90% confidence interval.

Table A-2. 2023 Relative Precision at 90% Confidence Level for PGL

Program	Strata	Relative Precision + or -%	Mean RR	Standard Error
PGL Gas Optimization	1	0%	100%	0.00
	2	0%	72%	0.00
	3	0%	100%	0.00
	4*	NA	92%	NA
Weighted Average RR (90/10)		**0%**	**92%**	**0.00**

*Stratum 4 projects add up to less than 2% of the program savings and are excluded from the sampling process.
Source: Guidehouse evaluation team analysis.

Engineering Review of Project Files

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

To support this review, the implementation contractor provided project documentation in electronic format for each sampled project. Documentation included some or all scanned files of hardcopy application forms and supporting documentation from the applicant (invoices, measure specification sheets, and vendor proposals), pre-inspection reports and photos, post inspection reports and photos, and calculation spreadsheets.

Site-Specific Data Collection

Site-specific data collection was completed through communications with customer by phone calls and emails for two of the six sampled projects. There were no site visits conducted in the 2023 evaluation. Utility billing data was provided by PGL and analyzed for one of the six sampled projects.

Appendix B. Impact Analysis Supplemental Information

Table B-1 provides a summary of verification results and adjustments for the PGL Gas Optimization program sampled projects. As previously indicated, the roll up of the sample results to the population produced 100% gross realization rate for PGL.

Table B-1. 2023 PGL Summary of Sample M&V Results

Project ID	Measure	RR	Comments
WO-4297082	Process - Insulation 100-212 F - PG C&I Custom Opt; Process - Insulation >212 F - PG C&I Custom Opt	100%	No adjustment to ex ante savings.
WO-4298135	Process - Insulation 100-212 F - PG C&I Custom Opt; Process - Insulation >212 F - PG C&I Custom Opt	72%	Conducted utility billing data analysis; identified additional steam trap project on site and addressed in the savings calculations; baseline period included 2022 and 2019, excluded 2021 and 2020 for COVID impact.
WO-4297211	Custom Project - PG C&I Custom Opt	101%	Adjusted the baseline hours to match the post installation hours; updated to include production and gas usage data from January to May 2019, and included data in analysis only when values are above 0.1.
WO-4297222	HVAC - Space Conditioning Controls - PG Public Custom Opt	93%	Updated the reset savings using a winter season data regression instead of an annual data regression. Used 30 year average weather data in the calculation.
WO-4301502	Custom Project - PG C&I Custom Opt	104%	Included 2F fan heat between preheating and discharge air for both baseline and post installation calcualtions.
WO-4298130	HVAC - Space Conditioning Controls - PG C&I Custom Opt	100%	Updated "NaN" values in the weather data dewpoint column using O'Hare weather data.

Source: Evaluation analysis of program data.

Appendix C. Program Specific Inputs for the Illinois TRC

Table C-1 show 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 Table C-1 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. 2023 Verified Cost Effectiveness Inputs – PGL

Program Category	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Private	Process - Insulation	Project	2	15	278,883	245,322	230,602
	Custom Project	Project	3	15	93,860	93,560	87,946
	HVAC - Space Conditioning Controls	Project	4	15	14,037	13,455	12,648
Public	HVAC - Space Conditioning Controls	Project	1	15	27,861	27,793	26,125
Total or Weighted Average			**10**	**15**	**414,640**	**380,129**	**357,321**

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