Gas Optimization Impact Evaluation Report

Energy Efficiency Plan Year 2020 (1/1/2020-12/31/2020)

Prepared for:

Peoples Gas and North Shore Gas

Final

June 25, 2021

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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) 2020 Gas Optimization Programs. It presents a summary of the energy impacts for the total program and broken out by relevant measure and program structure details. Appendix A presents the impact analysis methodology. Program year 2020 covers January 1, 2020 through December 31, 2020.

2. Program Description

The Gas Optimization Program provides a technical assessment service where energy advisors and contracted engineering firms review commercial, industrial, or 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 control optimization, heat recovery repair, process improvements, and other energy saving measures.

The PGL program had three participants in 2020 and completed 23 projects, as shown in Table 2-1. All participants were private sector participants.

Table 2-1. 2020 Volumetric Summary for PGL

Participation	Gas Optimization
Participants *	3
Installed Projects †	23

* Participants are defined as unique account numbers
† Installed Projects are defined as unique project IDs
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

The NSG program had two participants in 2020 and completed six projects, as shown in Table 2-2. All participants were private sector participants.

Table 2-2. 2020 Volumetric Summary for NSG

Participation	Gas Optimization
Participants *	2
Installed Projects †	6

* Participants are defined as unique account numbers
† Installed Projects are defined as unique project IDs
Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

3. Program Savings Detail

Table 3-1 summarizes the energy savings the PGL Gas Optimization Program achieved by path in 2020.

Table 3-1. 2020 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)
Private	723,675	1.00	724,032	0.91	658,869
Total	**723,675**	**1.00**	**724,032**	**0.91**	**658,869**

* 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_2020.
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

Table 3-2 summarizes the energy savings the NSG Gas Optimization Program achieved by path in 2020.

Table 3-2. 2020 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)
Private	144,929	1.00	145,039	0.91	131,986
Total	**144,929**	**1.00**	**145,039**	**0.91**	**131,986**

* 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_2020.
Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

4. Program Savings by Measure

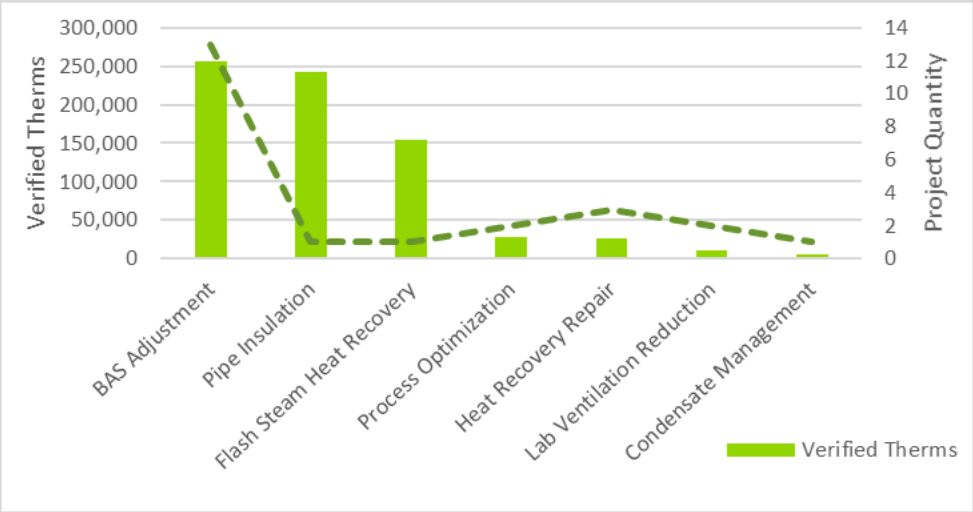
Savings for the PGL program were verified through a sample design with two strata as shown in Table 4-1. There were three large projects in Strata 1, and 20 smaller projects in Strata 2. Savings by measure type are provided in Figure 4-1, showing that building automation system (BAS) adjustments, pipe insulation, and flash steam heat recovery accounted for most of the savings.

Table 4-1. 2020 Annual Energy Savings by Strata for PGL

Program Management	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private	Strata 1	555,197	1.00	555,197	0.91	505,229
Private	Strata 2	168,478	1.00	168,835	0.91	153,640
Total or Weighted Average		**723,675**	**1.00**	**724,032**	**0.91**	**658,869**

* 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_2020.
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

Figure 4-1. 2020 Annual Energy Savings by Measure Category for PGL



* Dashed green line indicates installed project quantity defined as unique project IDs.
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

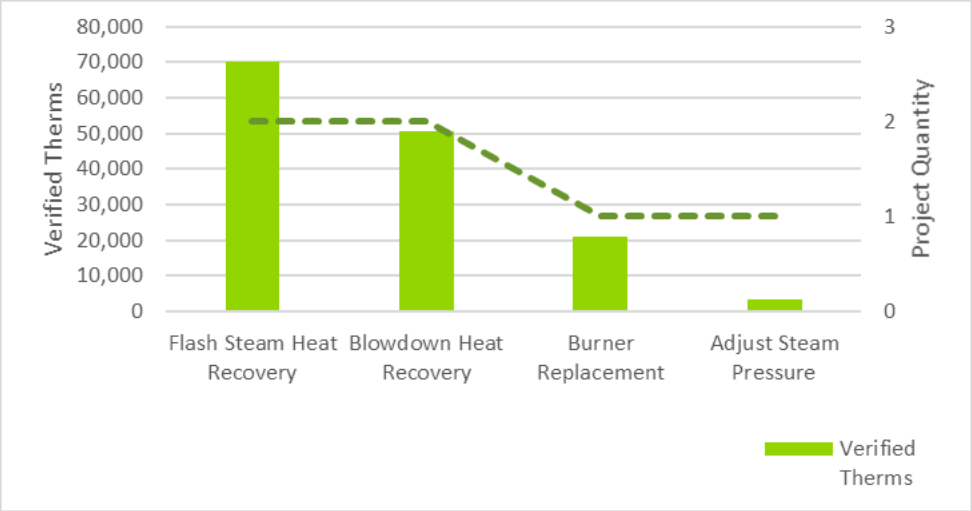
The savings for the NSG program shown in Table 4-2 were not stratified for sampling and all projects (census sample) were evaluated. Savings by measure type are provided in Figure 4-2, showing that flash steam heat recovery and blowdown heat recovery accounted for most of the savings.

Table 4-2. 2020 Annual Energy Savings by Measure for NSG

Program Category	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private	Census	144,929	1.00	145,039	0.91	131,986
Total or Weighted Average		**144,929**	**1.00**	**145,039**	**0.91**	**131,986**

* 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_2020.
Source: North Shore Gas tracking data and Guidehouse team analysis.

Figure 4-2. 2020 Annual Energy Savings by Measure Category for NSG



* Dashed green line indicates installed project quantity defined as unique project IDs.
Source: North Shore Gas tracking data and Guidehouse team analysis.

5. Impact Analysis Findings and Recommendations

5.1 Impact Parameter Estimates

Table 5-1 shows the unit therm savings and realization rate findings by measure from our review. The realization rate is the ratio of the verified savings to the ex ante savings. Following the table, we provide findings and recommendations, including discussion of all measures with realization rates above or below 100 percent. Appendix A provides a description of the impact analysis methodology and sampling approach, and Appendix B provides the verification findings for each sampled project. Appendix C provides the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report.

Table 5-1. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Gas Optimization	Vary	Vary	Vary	100% (PGL) 100% (NSG)	Project File Review*, TRM v8†

* Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas, extract dated February 1, 2021. Project files and monthly billing data provided by Peoples Gas and North Shore Gas. Site-specific data collected by Guidehouse.
† State of Illinois Technical Reference Manual version 8.0 from http://www.ilsag.info/technical-reference-manual.html.

5.2 Findings and Recommendations

In projects 3806447 and 5978557, values in the ex ante calculation were not supported by any information in the project documentation. In both cases, Guidehouse updated those values using the available project documentation. The impact of these adjustment was minor in both projects.

Recommendation 1. Provide explanations and support for inputs and assumptions within the calculation file, which will help make both internal quality control and evaluation more effective.

Project 3998278 involves a burner replacement. The calculation template for this type of project includes a stoichiometric calculation that helps calculate the combustion efficiency values. Specifically:

- The IF function that selects the correct Nitrogen (N_2) specific heat values does not use the correct temperature bins for Nitrogen. This occurs in rows 92 and 106 of the Stoichiometry tab.
- The IF functions that select the correct Nitrogen and Oxygen (O_2) specific heat values contains an absolute reference (cell C81) to the first exhaust temperature bin. This Excel formula should reference the exhaust temperature for each bin (cell C$81). This occurs in rows 88, 92, 102, and 106 of the Stoichiometry tab.

Recommendation 2. Correct the errors in the burner calculation template and all pipeline projects that use this template.

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

Table 5-2 shows the historical gross realization rates and NTG values for the Gas Optimization Program.

Table 5-2. Historical Realization Rates and NTG Values

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
GPY4 (2014-2015)	98%	109%	1.02	1.02
GPY5 (2015-2016)	91%	NA	1.02	1.02
GPY6 (2016-2017)	100%	102%	1.02	1.02
2018	95%	NA	1.02	1.02
2019	102%	100%	0.91	0.91
2020	100%	100%	0.91	0.91

NA-not applicable, no completed projects.
Source: Guidehouse evaluation research.

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 Illinois Technical Reference Manual (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. Strata were defined by project size, based on gross energy savings boundaries that placed about three-quarters of the savings in a large project stratum and the remaining savings in a small project stratum. Table A-1 shows a profile of the sample selection.

Table A-1. Profile of Gross Impact Sample for Gas Optimization 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)
Gas Optimization	1	3	555,197	3	555,197	100%
	2	20	168,478	10	123,744	73%
Total or Weighted Average		**23**	**723,675**	**13**	**678,941**	**94%**

Source: Guidehouse evaluation team analysis.

Figure A-1. PGL Relative Precision at 90% Confidence Level

Program	Strata	Relative Precision +or-%	Mean RR	Standard Error
Gas Optimization	1	0.00%	100%	0.00
	2	0.17%	100%	0.00
Customer Total RR (90/10)		0.05%	100%	0.00

Source: Guidehouse evaluation team analysis.

Engineering Review of Project Files

For each selected project, an in-depth application 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, engineers estimated ex post gross savings based on their 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. There were no site visits in the 2020 evaluation.

Appendix B. Impact Analysis Supplemental Information

Table B-1 provides a summary of verification results and adjustments for the PGL sampled projects.

Table B-1. 2020 PGL Summary of Sample M&V Results

Project ID	Measure Description	Gross Realization Rate	Summary of Adjustment
3239284	Pipe Insulation	100%	Ok
5985114	BAS Adjustment	100%	Ok
3815222	Flash Steam Heat Recovery	100%	Ok
5978557	BAS Adjustment	101%	Updated the steam loading rate to reflect project documentation
5985259	BAS Adjustment	100%	Ok
3806460	Heat Recovery Repair	100%	Ok
6030885	Process Optimization	100%	Ok
6030855	Process Optimization	100%	Ok
3806431	BAS Adjustment	100%	Ok
3806437	BAS Adjustment	100%	Ok
5985162	Lab Ventilation Reduction	100%	Ok
3806467	BAS Adjustment	100%	Ok
3806447	BAS Adjustment	102%	Updated the delivery loss value to reflect the project documentation

Source: Evaluation analysis of program data.

Table B-2 provides a summary of verification results and adjustments for the NSG sampled projects.

Table B-2. NSG Summary of Sample M&V Results

Project ID	Measure Description	Gross Realization Rate	Summary of Adjustment
4007755	Flash Steam Heat Recovery	100%	Ok
4009637	Blowdown Heat Recovery	100%	Ok
3998278	Burner Replacement	101%	Corrected formula errors in the Stoichiometry tab
3990096	Flash Steam Heat Recovery	100%	Ok
4009714	Blowdown Heat Recovery	100%	Ok
4016800	Adjust Steam Pressure	100%	Ok

Source: Evaluation analysis of program data.

Appendix C. Program Specific Inputs for the Illinois TRC

Table C-1 and Table C-2 show 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 – PGL

Program Path	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Private	BAS Adjustment	Project	13	8.8	256,844	257,051	233,917
Private	Pipe Insulation	Project	1	15	242,394	242,394	220,579
Private	Flash Steam Heat Recovery	Project	1	24	153,582	153,582	139,760
Private	Process Optimization	Project	2	5	27,532	27,590	25,107
Private	Heat Recovery Repair	Project	3	8.8	26,704	26,761	24,352
Private	Lab Ventilation Reduction	Project	2	5	10,972	10,995	10,006
Private	Condensate Management	Project	1	20	5,646	5,658	5,149
Total or Weighted Average			**23**	**14.0**	**723,675**	**724,032**	**658,869**

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

Table C-2. Verified Cost Effectiveness Inputs – NSG

Program Path	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Private	Flash Steam Heat Recovery	Project	2	24.0	70,012	70,012	63,711
Private	Blowdown Heat Recovery	Project	2	24.0	50,532	50,532	45,984
Private	Burner Replacement	Project	1	18.3	20,836	20,947	19,062
Private	Adjust Steam Pressure	Project	1	5.0	3,548	3,548	3,229
Total or Weighted Average			**6**	**22.7**	**144,929**	**145,039**	**131,986**

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