



C&I and Public Sector Custom Program Impact Evaluation Report

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

Presented to

Peoples Gas and North Shore Gas

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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 Custom 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 and Appendix B present the impact analysis methodology. Program year 2020 covers January 1, 2020 through December 31, 2020.

2. Program Description

The Custom Rebate path provides private sector commercial and industrial (C&I) and public sector (PS) customers with rebates on a custom basis; these are applications that include measures not covered under the Prescriptive Rebate path. For example, burner replacement measures may fall into the Custom Rebate category. New construction projects not participating through the coordinated Non-Residential New Construction program may be treated through the Custom Program¹.

Custom rebates are based on a dollar per therm basis, subject to limits for payback and project cost. PGL and NSG may revise eligible measures and incentives as driven by current market conditions, changes to codes and standards, technology, evaluation results, and program management knowledge. Typical market sectors for this program include larger customers in light and heavy manufacturing, steel and metal working, plastics compounding and processing, hospitals, food processing, hotels, public sector facilities, commercial laundry and other process heating intensive businesses.

The PGL Custom Program had 13 participants in 2020 and completed 23 projects, as shown in Table 2-1.

Table 2-1. 2020 Volumetric Summary for PGL

Participation	Private	Public	Total
Participants *	11	2	13
Installed Projects †	18	5	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 Custom Program had three participants in 2020 and completed three projects, as shown in Table 2-2.

¹ The net savings for Non-Residential New Construction projects coordinated with ComEd are tracked and reported separately, not in this Custom Program evaluation report.

Table 2-2. 2020 Volumetric Summary for NSG

Participation	Private	Public	Total
Participants *	2	2	4
Installed Projects †	2	2	4

* Participants are defined as unique account numbers

† Installed Projects are defined as unique project IDs. One project was a staffing grant that claimed zero therms in 2020.

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

3. Savings Summary

Table 3-1 summarizes the energy savings the PGL Custom 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	377,068	0.99	371,607	0.74	274,989
Public	50,896	0.99	50,159	0.74	37,118
Total or Weighted Average	427,964	0.99	421,766	0.74	312,107

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings for a sample of Custom Program projects.

† 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 Custom 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	5,072	0.71	3,598	0.74	2,663
Public	19,865	1.00	19,865	0.74	14,700
Total or Weighted Average	24,938	0.94	23,463	0.74	17,363

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings for a sample of Custom Program projects.

† 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

The Custom Program does not offer prescribed measures. The measures included in Table 4-1 and Table 4-2 have been manually characterized by the evaluation team. These characterizations were based on the primary energy saving measure in a given project. The realization rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings for a sample of Custom Program projects. Realization rate findings for individual sampled projects are provided in Appendix B.

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

Program Path	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private	Pipe Insulation	84,031	0.99	82,814	0.74	61,283
Private	Wireless Pneumatic Thermostats	80,041	0.99	78,882	0.74	58,373
Private	Condensate Management	65,174	0.99	64,230	0.74	47,530
Private	Valve Replacement	61,420	0.99	60,530	0.74	44,792
Private	Building Automation System (BAS)	50,145	0.99	49,418	0.74	36,570
Private	Heat Exchangers	16,607	0.99	16,367	0.74	12,111
Private	Low Flow Aerators	9,851	0.99	9,709	0.74	7,184
Private	Linkageless Burner	9,799	0.99	9,657	0.74	7,146
Public	Valve Replacement	27,726	0.99	27,325	0.74	20,220
Public	Condensate Management	20,735	0.99	20,434	0.74	15,122
Public	AC Covers and Gap Sealers	2,435	0.99	2,400	0.74	1,776
Total or Weighted Average		427,964	0.99	421,766	0.74	312,107

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings for a sample of Custom Program projects.

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

Program Path	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private	Building Automation System (BAS)	5,072	0.71	3,598	0.74	2,663
Public	Pipe Insulation	19,865	1.00	19,865	0.74	14,700
Total or Weighted Average		24,938	0.94	23,463	0.74	17,363

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings for a sample of Custom Program projects.

† 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.

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 Table 5-1, we provide findings and recommendations, including discussion of measures with realization rates above or below 100%. Appendix A provides a description of the impact analysis methodology. Realization rate findings for individual sampled projects are provided in Appendix B. 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)
Custom	Vary	Vary	Vary	99% (PGL) 94% (NSG)	Project File Review, Monthly Billing Data, On-Site or Telephone Verification of Site Specific Data*

* 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.

5.2 Findings and Recommendations

Guidehouse found that several projects had quality control issues in them that resulted in adjustments to verified savings. These issues were defined as objectively preventable (i.e., not the result of subjective analysis).

Table 5-2. Projects with Quality Control Issues

Project	Realization Rate	Description
5329604	63.8%	Overall, the result was a lower realization rate, based on two issues: (77) line items in pipe insulation calculation were incorrectly populated with a quantity of one. The savings calculation divides by boiler efficiency twice.
5972470	306.7%	(80) line items in pipe insulation calculation were incorrectly populated with a quantity of one.
4420521	70.9%	The manual temperature adjustment in the calculation did not reflect the description of the project. The ex ante savings was based on increased temperature setback during periods of low insolation, rather than during periods of high insolation.
4570767	104.6%	The density units of saturated vapor was inverted in the calculation (ft ³ /lb instead of lb/ft ³).
	100.1%*	The calculation did not divide by boiler efficiency to reflect input therms.
5972475	100.0%	The post-inspection photos included in the Payment Application file were from another project. †

* This realization rate reflects additional evaluation adjustment that are not characterized as quality control issues.

† This did not result in an evaluation adjustment but does reflect a quality control issue.

Recommendation 1. The implementer’s quality control processes for custom projects be reviewed and fortified to eliminate preventable issues.

Project 4050448 involved the installation of insulated steam trap jackets. Four of the 23 steam traps were located outdoors. Guidehouse updated the 3E Plus input parameters for the exterior steam traps to reflect outdoor conditions ($T_{avg} = 48.6^{\circ}\text{F}$ and wind speed = 5 mph). The realization rate increased by 3% as a result of this adjustment. Another minor adjustment reduced the project’s realization rate to 102%.

Recommendation 2. Apply outdoor ambient conditions to the 3E Plus calculations for steam traps, fittings, and pipe insulation that are location outdoors.

Project 4200938 involved the replacement of a pressure reducing valve (PRV). Four of the 12 PRVs were valved off during the summer, so leaks would only exist during the heating season. The hours of leaking were updated to reflect operation only during the heating season (ex ante = 8,282; verified = 4,029).

Recommendation 3. Ensure calculation inputs that have default values are reviewed and updated if needed to reflect the project documentation.

5.3 Historical Realization Rates and NTG Values

Table 5-3 shows the historical gross realization rates and NTG values for the Custom Program.

Table 5-3. Historical Realization Rates and NTG Values

Program Year*	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
GPY1 (2011-12)	102%	102%	0.68	0.68
GPY2 (2012-13)	81%	81%	0.78	0.78
GPY3 (2013-14)	96%	96%	0.78	0.78
GPY4 (2014-15)	100%	102%	0.68	0.68
GPY5 (2015-16)	100%	96%	0.78	0.78
GPY6 (2016-17)	97%	108%	0.69	0.69
2018	104%	109%	0.69	0.69
2019	99%	63%	0.69	0.69
2020	99%	94%	0.74	0.74

* Program years GPY1 through GPY5 began June 1 and ended May 31. GPY6 began June 1, 2016 and ended December 31, 2017. Beginning January 1, 2018, program year (PY) coincides with calendar year (CY).

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 TRM. The PGL projects were initially planned to be reviewed as a census, however, the last portion of the year saw increased participation and we relied upon a sample. The sampled projects represent 85% of the PGL Custom Program population. Due to a smaller population size of only three projects, the NSG projects were reviewed as a separate, census sample.

Table A-1 shows a profile of the PGL sample selection, and Table A-2 provides the sample precision.

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)
PGL Custom	1	23	427,964	20	365,533	85%
TOTAL		23	427,964	20	365,533	85%

Source: Guidehouse evaluation team analysis.

Table A-2. PGL Gross Realization Rates and Relative Precision at 90% Confidence Level

Program	Strata	Relative Precision + or - %	Mean RR	Standard Error
PGL Custom	1	1.3%	99%	0.01
Customer Total RR (90/10)		1.3%	99%	0.01

Source: Guidehouse evaluation team analysis.

Engineering Review of Project Files

For each selected project, an in-depth application review is 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 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
5329604	Pipe Insulation	64%	Corrected the double-counting of boiler efficiency, and removed the calculation line items that were not supported by project documentation.
5962095	Valve Replacement	82%	Updated the efficiency values to be consistent with Project 5763304, and updated the calculation inputs to reflect the pre-inspection documentation.
4200938	Valve Replacement	83%	Updated the hours of operation to reflect heating season only, and converted pressure from psia to psig.
4452523	Valve Replacement	95%	Small adjustments to the pressure values, reflecting project documentation.
6298286	Valve Replacement	100%	Ok
5829074	Pipe Insulation	100%	Ok
4977862	Linkageless Burner	100%	Ok
4330929	Condensate Management	100%	Ok
3682440	Valve Replacement	100%	Ok
3896774	Wireless Pneumatic Thermostats	100%	Ok
5703906	Heat Exchangers	100%	Ok
5763304	Valve Replacement	100%	Ok
5972475	Pipe Insulation	100%	Ok
4679296	Condensate Management	100%	Ok
4042324	Pipe Insulation	100%	Ok
4072673	Pipe Insulation	100%	Ok
5637505	Pipe Insulation	100%	Ok
4050448	Pipe Insulation	102%	Updated the ambient conditions for the steam traps that were located outdoors, updated the boiler efficiency to reflect the project description, and updated the hours per year to 8,766.
4570767	Condensate Management	105%	Corrected a unit conversion error and corrected a calculation error.
5972470	Pipe Insulation	307%	Corrected the quantity values to reflect project documentation.

Source: Evaluation analysis of program data.

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

Table B-2. 2020 NSG Summary of Sample M&V Results

Project ID	Measure Description	Gross Realization Rate	Summary of Adjustment
4420521	BAS	71%	The temperature adjustments were changed to reflect the intended relationship between solar irradiance and temperature setpoints.
5970124	Pipe Insulation	100%	Ok
5974473	Pipe Insulation	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	Pipe Insulation	Project	8	15.0	84,031	82,814	61,283
	Wireless Pneumatic Thermostats	Project	1	15.0	80,041	78,882	58,373
	Condensate Management	Project	2	20.0	65,174	64,230	47,530
	Valve Replacement	Project	3	13.0	61,420	60,530	44,792
	BAS	Project	1	15.0	50,145	49,418	36,570
	Heat Exchangers	Project	1	24.0	16,607	16,367	12,111
	Low Flow Aerators	Project	1	10.0	9,851	9,709	7,184
	Linkageless Burner	Project	1	16.0	9,799	9,657	7,146
Public	Valve Replacement	Project	3	13.0	27,726	27,325	20,220
	Condensate Management	Project	1	16.0	20,735	20,434	15,122
	AC Covers and Gap Sealers	Project	1	5.0	2,435	2,400	1,776
Total or Weighted Average			23	15.6	427,964	421,766	312,107

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	Pipe Insulation	Project	2	15.0	19,865	19,865	14,700
Public	BAS	Project	1	15.0	5,072	3,598	2,663
Total or Weighted Average			3	15.0	24,938	23,463	17,363

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