Guidehouse

C&I and Public Sector Prescriptive Program Impact Evaluation Report

Energy Efficiency Plan:
Plan Year 2019
(1/1/2019-12/31/2019)

Presented to
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) 2019 Prescriptive Program for public sector and commercial and industrial (C&I) customers. 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. Program year 2019 covers January 1, 2019 through December 31, 2019.

2. Program Description

The PGL and NSG comprehensive non-residential programs bundle offerings into program paths and allow all eligible C&I and public sector customers to access any of the paths[1] based on the customer's needs. This report covers evaluation activities for measures installed and natural gas savings realized through the Prescriptive Rebate and Energy Jumpstart paths, referred to as the Prescriptive Program in this report. The Prescriptive Rebate path provides standardized incentives that cover a portion of incremental measure costs for existing commercial and industrial customers and public sector facilities. These incentives focus on heating systems, water heating systems, pipe insulation, steam traps, various boiler controls, food service equipment, and other public sector energy efficiency measures. The Energy Jumpstart path provides assessments and direct installation of low-cost measures such as aerators and pre-rinse sprayers. Franklin Energy Services LLC., (Franklin Energy) is the implementation contractor for the PGL and NSG program, with trade ally engagement and technical support for program delivery and marketing.

The PGL program had 38 participants in 2019 and completed 70 projects as shown in the following table.

Table 2-1. 2019 Volumetric Summary for PGL

Participation	C&I	Public	Total
Participants *	34	4	38
Installed Projects †	45	25	70
Measure Types Installed	13	5	13

* Participants are defined as number of unique gas account numbers. Public sector participants include school districts that installed projects in multiple buildings.
† Installed Projects are defined as number of unique project IDs
Source: Peoples Gas tracking data and Guidehouse team analysis.

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

[1] The comprehensive non-residential sector program paths include – Energy Jumpstart (direct installation of free energy saving products), Engineering Studies and staffing assistance, Prescriptive Rebates, Custom Rebates, and Gas Optimization. Only measures that received prescriptive rebates were implemented in 2019; the 2019 program did not realize savings from the Energy Jumpstart path. The custom and gas optimization projects are evaluated and reported separately.

Table 2-2. 2019 Installed Measure Quantities for PGL

Measure	Quantity Unit	Installed Quantity
C&I		
Boiler Tune Up – Process	MBH	128,980
Boiler Tune Up – Space Heating	MBH	151,992
High Efficiency Boiler	MBH	6,500
Prescriptive Change Other*	Projects	5
Prescriptive Change Pipe Wrap	Project	1
Prescriptive Change Steam Trap	Projects	12
Steam Traps – HVAC Repair / Replacement	Each	506
Steam Traps – Industrial Replacement	Projects	59
Public		
Boiler Tune Up – Process	MBH	63,214
Boiler Tune Up – Space Heating	MBH	173,315
Steam Traps – HVAC Repair / Replacement	Each	219
Steam Traps – Industrial Replacement	Projects	2

* Projects characterized as "Prescription Change" are those that the implementer describes as having the ex ante savings capped based on site considerations.
Source: Peoples Gas tracking data and Guidehouse team analysis.

The NSG program had 13 participants in 2019 and completed 14 projects as shown in the following table.

Table 2-3. 2019 Volumetric Summary for NSG

Participation	C&I	Public	Total
Participants *	6	7	13
Installed Projects †	6	8	14
Measure Types Installed	11	7	17

* Participants are defined as number of unique gas account numbers. Public sector participants include school districts that installed projects in multiple buildings.
† Installed Projects are defined as number of unique project IDs
Source: North Shore Gas tracking data and Guidehouse team analysis.

Table 2-4 summarizes the installed measure quantities that are the basis for verified energy savings.

Table 2-4. 2019 Installed Measure Quantities for NSG

Measure	Quantity Unit	Installed Quantity
C&I		
Boiler Tune Up – Process	MBH	20,000
Boiler Tune Up – Space Heating	MBH	14,645
Linkageless Boiler Controls for Space Heating	MBH	8,857
Prescriptive Change Steam Trap*	Projects	1
Steam Traps – HVAC Repair/Replacement	Each	490
Steam Traps – Industrial Replacement	Projects	9
Public		
Boiler Tune Up – Space Heating	MBH	3,610
Demand Controlled Ventilation	Sq. Ft.	65,888
Double Rack Oven	Each	3
High Efficiency Boiler	MBH	10,000
Pipe Insulation	Ln. Ft.	457
Storage Water Heater (Large)	MBH	199

* Projects characterized as "Prescription Change" are those that the implementer describes as having the ex ante savings capped based on site considerations.
Source: North Shore Gas tracking data and Guidehouse team analysis.

3. SAVINGS SUMMARY

Table 3-1 summarizes the energy savings the PGL Prescriptive program achieved by path in 2019.

Table 3-1. 2019 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)
C&I	1,164,881	100%	1,164,841	0.79	920,223
Public	189,893	100%	189,900	0.79	150,021
PGL Total 2019	**1,354,774**	**100%**	**1,354,741**	**0.79**	**1,070,244**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-01_Final Faucet Aerator and Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: http://ilsag.info/net-to-gross-framework.html.
Source: Peoples Gas tracking data and Guidehouse team analysis.

Table 3-2 summarizes the energy savings the NSG Prescriptive program achieved by path in 2019.

Table 3-2. 2019 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)
C&I	653,218	100%	653,224	0.79	516,047
Public	26,067	101%	26,399	0.79	20,855
NSG Total 2019	**679,285**	**100%**	**679,623**	**0.79**	**536,902**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-01_Final Faucet Aerator and Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: http://ilsag.info/net-to-gross-framework.html.
Source: Peoples Gas tracking data and Guidehouse team analysis.

4. Program Savings by Measure

The PGL program includes eight measures as shown in the following table. The Steam Trap and Boiler Tune Up measures contributed the most savings.

Table 4-1. 2019 Annual Energy Savings by Measure for PGL

Measure Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
C&I					
Boiler Tune Up – Process	108,118	100%	108,116	0.79	85,411
Boiler Tune Up – Space Heating	54,629	100%	54,631	0.79	43,158
High Efficiency Boiler	7,319	100%	7,320	0.79	5,783
Prescriptive Change Other	96,898	100%	96,898	0.79	76,549
Prescriptive Change Pipe Wrap	1,991	100%	1,991	0.79	1,573
Prescriptive Change Steam Trap	44,051	100%	44,051	0.79	34,800
Steam Traps – HVAC Repair / Replacement	165,755	100%	165,769	0.79	130,958
Steam Traps – Industrial Replacement	686,120	100%	686,065	0.79	541,991
C&I Subtotal	**1,164,881**	**100%**	**1,164,841**	**0.79**	**920,223**
Public					
Boiler Tune Up – Process	52,990	100%	52,998	0.79	41,861
Boiler Tune Up – Space Heating	62,292	100%	62,295	0.79	49,213
Steam Traps – HVAC Repair / Replacement	71,740	100%	71,746	0.79	56,679
Steam Traps – Industrial Replacement	2,871	100%	2,871	0.79	2,268
Public Subtotal	**189,893**	**100%**	**189,900**	**0.79**	**150,021**
PGL TOTAL 2019	**1,354,774**	**100%**	**1,354,741**	**0.79**	**1,070,244**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-01_Final Faucet Aerator and Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: http://ilsag.info/net-to-gross-framework.html.
Source: North Shore Gas tracking data and Guidehouse team analysis.

The NSG program includes 11 measures as shown in the following table. The Steam Trap and Boiler Tune Up measures contributed the most savings.

Table 4-2. 2019 Annual Energy Savings by Measure for NSG

Measure Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
C&I					
Boiler Tune Up – Process	16,765	100%	16,765	0.79	13,244
Boiler Tune Up – Space Heating	5,264	100%	5,264	0.79	4,158
Linkageless Boiler Controls for Space Heating	5,132	101%	5,180	0.79	4,092
Prescriptive Change Steam Trap	42,997	100%	42,997	0.79	33,968
Steam Traps – HVAC Repair/Replacement	160,514	100%	160,527	0.79	126,817
Steam Traps – Industrial Replacement	422,546	100%	422,491	0.79	333,768
C&I Subtotal	**653,218**	**100%**	**653,224**	**0.79**	**516,047**
Public					
Boiler Tune Up – Space Heating	1,297	100%	1,298	0.79	1,025
Demand Controlled Ventilation	4,480	107%	4,810	0.79	3,800
Double Rack Oven	5,788	100%	5,790	0.79	4,574
High Efficiency Boiler	11,261	100%	11,261	0.79	8,896
Pipe Insulation	2,599	100%	2,600	0.79	2,054
Storage Water Heater (Large)	641	100%	641	0.79	506
Public Subtotal	**26,067**	**101%**	**26,399**	**0.79**	**20,855**
NSG TOTAL 2019	**679,285**	**100%**	**679,623**	**0.79**	**536,902**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-01_Final Faucet Aerator and Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: http://ilsag.info/net-to-gross-framework.html.
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 1 provides a description of the impact analysis methodology.

Table 5-1. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (Therms/unit)	Verified Gross (Therms/unit)	RR	Data Source(s)
Boiler Tune Up - Process	MBH	0.838	0.838	100%	PGL/NSG Program Tracking Data (PTD*), IL TRM v7.0†, Section 4.4.3
Boiler Tune Up - Space Heating	MBH	0.359	0.359	100%	IL TRM v7.0, Section 4.4.2 and PTD, and MMDB§
High Efficiency Boiler	MBH	1.126	1.126	100%	IL TRM v7.0, Section 4.4.10 and PTD, and MMDB§
Linkageless Boiler Controls for Space Heating	MBH	0.579	0.585	101%	IL TRM v7.0, Section 4.4.21 and PTD, and MMDB§
Prescriptive Change Other	Each	1.00	1.00	100%	IL TRM v7.0, Section 4.4.16 and PTD, and MMDB§
Prescriptive Change Pipe Wrap	Each	1.00	1.00	100%	IL TRM v7.0, Section 4.4.16 and PTD, and MMDB§
Prescriptive Change Steam Trap	Projects	1.00	1.00	100%	IL TRM v7.0, Section 4.4.16 and PTD, and MMDB§
Steam Traps - HVAC Repair / Replacement	Each	327.58	327.61	100%	IL TRM v7.0, Section 4.4.16 and PTD, and MMDB§
Steam Traps - Industrial Replacement	Projects	Vary	Verified	100%	IL TRM v7.0, Section 4.4.16 and PTD, and MMDB§
Boiler Tune Up - Process	MBH	0.838	0.838	100%	IL TRM v7.0, Section 4.4.3 and PTD, and MMDB§
Boiler Tune Up – Space Heating	MBH	0.359	0.359	100%	IL TRM v7.0, Section 4.4.2 and PTD, and MMDB§
Demand Controlled Ventilation	Sq. Ft.	0.068	0.073	107%	IL TRM v7.0, Section 4.4.19 and PTD
Double Rack Oven	HP	1929.4	1930	100%	IL TRM v7.0, Section 4.2.18 and PTD, and MMDB§
High Efficiency Boiler	MBH	1.126	1.126	100%	IL TRM v7.0, Section 4.4.10 and PTD, and MMDB§
Pipe Insulation‡	Ln Ft.	Vary	Verified. Adjusted	100%	IL TRM v7.0, Section 4.4.14, PTD, and MMDB§
Steam Traps – HVAC Repair / Replacement	Each	327.58	327.61	100%	IL TRM v7.0, Section 4.4.16 and PTD, and MMDB§
Steam Traps – Industrial Replacement‡	Projects	35.43	35.436	100%	IL TRM v7.0, Section 4.4.16 and PTD, and MMDB§
Storage Water Heater Large	MBH	3.22	3.22	100%	IL TRM v7.0, Section 4.3.1, PTD, and MMDB§

* Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas, extract dated January 30, 2020.
† State of Illinois Technical Reference Manual version 7.0 from http://www.ilsag.info/technical-reference-manual.html.
‡ There are multiple subsets of industrial steam trap types and pipe insulation (i.e. different psig ranges, different diameter ranges). All types had a realization rate of 100%.
§ Franklin Energy's Master Measure Database spreadsheet, Commercial PG NSG MMDB (PY8).
Source: Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas, extract dated January 30, 2020 and Guidehouse Team Analysis.

5.1.1 Demand Controlled Ventilation

The ex ante savings calculations for demand controlled ventilation use a therm savings of 68 therms per 1,000 square feet, the unit savings for a project installed in a "default" building type (TRM v7.0 4.4.19). Guidehouse found that, of the two projects, one project was installed at an elementary school and one was installed at a middle school. Guidehouse used a therm savings of 73 therms per 1,000 square feet, the unit savings value for "Elementary School", for both projects (TRM v7.0 4.4.19 has values for only elementary and high school).

Recommendation 1. To improve the accuracy of the ex ante savings calculations, Guidehouse recommends that PGL and NSG use building type specific unit savings for demand controlled ventilation, as specified by TRM v7.0 4.4.19. The default building type provides a reasonable estimate for ex ante savings, however.

5.1.2 Linkageless Boiler Controls for Space Heating

The ex ante savings calculation used an EFLH value of 1,525, which is the average of all EFLH values provided for all building types in TRM v7.0 4.4. The verified savings used an EFLH value of 1,539, which is the EFLH for an "Unknown" building type. The EFLH for an "Unknown" building type in TRM v8.0 is 1,678 hours.

Recommendation 2. Guidehouse recommends that PGL and NSG use an EFLH of 1,678 hours in 2020 for linkageless boiler controls for space heating when the building type is unknown.

5.2 Historical Realization Rates and NTG Values

Table 5-2 below shows the historical gross realization rates and NTG values for the C&I Prescriptive Program. Table 5-3 below shows the historical gross realization rates and NTG values for the Public Sector Prescriptive Program, beginning with GPY6 when PGL and NSG assumed administration of the program.

Table 5-2. Historical Realization Rates and NTG Values – C&I

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
GPY1	100%	100%	0.43	0.43
GPY2	100%	100%	0.63	0.63
GPY3	100%	100%	0.63	0.63
GPY4	100%	100%	0.58	0.58
GPY5	99%	100%	0.63	0.63
GPY6	100%	100%	0.79	0.79
2018	100%	100%	0.79	0.79
2019	100%	100%	0.79	0.79

Source: Guidehouse evaluation research.

Table 5-3. Historical Realization Rates and NTG Values – Public Sector

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
GPY6 – Prescriptive	100%	100%	0.46	0.46
GPY6 – STEP	98%	98%	0.90	0.90
2018	100%	107%	0.79	0.79
2019	100%	101%	0.79	0.79

Source: Guidehouse evaluation research.

6. Appendix 1. Impact Analysis Methodology

Guidehouse compared the savings calculation method in the 2019 tracking data to Franklin Energy's "Master Measure Database" file (MMDB)[2], which feeds into calculating the tracking data savings, and to IL TRM-based savings values. Guidehouse verified that the IL TRM algorithms were correctly applied in the MMDB. Guidehouse checked that measure inputs matched deemed IL TRM inputs and validated custom inputs. To be eligible, an IL TRM measure must meet the physical, operational, and baseline characteristics as defined in the applicable version of the IL TRM.[3]

The deemed savings verification approach was supplemented by engineering review of projects that were described as "prescriptive change" in the tracking data. Projects characterized as "prescriptive change" are those that the implementer describes as having the ex ante savings capped at a percentage of site billing usage based on site-specific considerations. We determined that the savings reported for these projects are reasonable and therefore estimated 100 percent gross realization rate for these projects.

Guidehouse reviewed the program tracking data drawn from a January 30, 2020 extract to substantiate the type and quantity of measures installed. Verified gross realization rates are calculated by dividing the verified gross savings by the ex ante gross savings.

[2] File name: PG NSG MMDB PY8 – C&I, SB, produced by Franklin Energy.
[3] Illinois Statewide Technical Reference Manual for Energy Efficiency Version 7.0 from http://www.ilsag.info/technical-reference-manual.html

7. Appendix 2. Program-Specific Inputs for the Illinois TRC

Table 7-1 and Table 7-2, the Total Resource Cost (TRC) variable tables, only include cost-effectiveness analysis inputs available at the time of this draft Prescriptive Program impact evaluation report. Additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in the tables and will be provided to the evaluation team later.

Table 7-1. TRC Test Inputs for PGL

Measure	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Boiler Tune Up – Process	MBH	240,970	3.0	161,108	161,104	127,272
Boiler Tune Up – Space Heating	MBH	1,173,781	3.0	116,921	116,925	92,371
High Efficiency Boiler	MBH	2	20.0	7,391	7,320	5,783
Prescriptive Change Other	Projects	5	13.0	96,898	96,898	76,549
Prescriptive Change Pipe Wrap	Project	1	15.0	1,991	1,991	1,573
Prescriptive Change Steam Trap	Projects	12	6.0	44,051	44,051	34,800
Steam Traps – HVAC Repair / Replacement	Each	806	6.0	237,495	237,515	187,637
Steam Traps – Industrial Replacement	Projects	519	6.0	688,891	688,935	544,259
PGL Total 2019			**6.0**	**1,354,774**	**1,354,741**	**1,070,244**

Source: Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas, extract dated January 30, 2020 and Guidehouse team analysis.

Table 7-2. TRC Test Inputs for NSG

Measure	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Boiler Tune Up – Process	MBH	20,000	3.0	16,765	16,765	13,244
Boiler Tune Up – Space Heating	MBH	18,255	3.0	6,561	6,561	5,184
Demand Controlled Ventilation	Sq. Ft	65,888	10.0	4,480	4,810	3,800
Double Rack Oven	Each	3	12.0	5,788	5,790	4,574
High Efficiency Boiler	MBH	10,000	20.0	11,261	11,261	8,896
Linkageless Boiler Controls for Space Heating	MBH	8,857	16.0	5,132	5,180	4,092
Pipe Insulation	Ln Ft.	457	15.0	2,599	2,600	2,054
Prescriptive Change Steam Trap	Project	1	6.0	42,997	42,997	33,968
Steam Traps – HVAC Repair / Replacement	Each	490	6.0	160,514	160,527	126,817
Steam Traps – Industrial Replacement	Projects	158	6.0	422,546	422,491	333,768
Storage Water Heater (Large)	MBH	199	15.0	641	641	506
NSG TOTAL 2019			**6.3**	**679,285**	**679,623**	**536,902**

Source: Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas, extract dated January 30, 2020 and Guidehouse team analysis.