Guidehouse

Small Business Impact Evaluation Report

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

Presented to
Peoples Gas and North Shore Gas

Final

June 15, 2020

Prepared by:

Rick Berry
Guidehouse

Charles Ampong
Guidehouse

Dan Peppler
Kojo Quaye
Guidehouse

www.guidehouse.com

Small Business Impact Evaluation Report

Submitted to:

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

Submitted by:

Guidehouse (which acquired Navigant in 2019)
150 N. Riverside Plaza, Suite 2100
Chicago, IL 60606

Contact:

Randy Gunn, Partner
312.583.5714
randy.gunn@guidehouse.com

Kevin Grabner, Associate Director
608.616.5805
kevin.grabner@guidehouse.com

Robert Neumann, Associate Director
312.583.2176
rob.neumann@guidehouse.com

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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 Small Business 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. Program year 2019 covers January 1, 2019 through December 31, 2019.

2. Program Description

The 2019 Small Business Program is implemented by Peoples Gas and North Shore Gas (PGL and NSG) with Franklin Energy Services (Franklin Energy) operating as implementer of the program. The Small Business Program seeks to secure energy savings through direct installation of low-cost efficiency measures, financial incentives for the installation of prescriptive rebate retrofit measures, and custom measures for non-standard upgrades.

The PGL program had 293 participants in 2019 and completed 354 projects as shown in the following table.

Table 2-1. 2019 Volumetric Summary for PGL

Participation	Direct Install	Prescriptive	Custom & Optimization	Total*
Participants †	67	213	13	293
Installed Projects ‡	69	272	14	355

* Total may not equal the sum of the row as participants may install both DI and prescriptive measures
†Participants are defined as
‡ Installed Projects are defined as
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.

Table 2-2. 2019 Installed Measure Quantities for PGL

Program Path	Measure	Quantity Unit	Installed Quantity
Direct Install	Faucet Aerator - Bathroom	Each	102
	Kit (Bathroom Aerator & Pre-Rinse Sprayer)	Each	59
	Pre-Rinse Sprayer	Each	4
	Showerhead	Each	47
Custom & Optimization	Custom Optimization	Project	2
	Demand Control Ventilation (DCV)	Project	5
	RO/UV System	Project	1
	Pipe Insulation	Project	3
	Condensate Pump	Project	1
	Waste Heat Recovery	Project	1
	High Turndown Burner	Project	1
Prescriptive	Boiler Tune Up - Process	MBH	205,316
	Boiler Tune Up - Space Heating	MBH	744,554
	Condensate Tank Insulation	Square Feet	144
	DCV - Gas Heating	Square Feet	42,192
	Direct Fired Heaters	MBH	1,850
	Dock Door Seals	Each	2
	Fryer	Each	2
	High Efficiency Boiler	MBH	43,592
	High Efficiency Furnace	Each	11
	High Speed Washer	lbs-capacity	2,000
	Infrared Salamander Broiler	Each	1
	Large Gas Water Heater	MBH	324
	Linkageless Controls	MBH	25,138
	Modulating Dryers	Each	2
	Pipe Insulation	Linear Feet	3,466
	Prescriptive Change (steam trap, Thermostat, other)	Projects	14
	Programmable Thermostat	Each	23
	Smart Thermostat	Each	16
	Steam Traps - Dry Cleaner	Each	337
	Steam Traps - HVAC Repair/Rep	Each	973
	Steam Traps - Industrial Rep	Each	78
	Water Heater	MBH	3,998

Source: People Gas tracking data and Guidehouse team analysis.

The NSG program had 85 participants in 2019 and completed 98 projects as shown in the following table.

Table 2-3. 2019 Volumetric Summary for NSG

Participation	Direct Install	Prescriptive	Custom	Total
Participants *	24	60	1	85
Installed Projects †	25	69	4	98

* Participants are defined as
† Installed Projects are defined as
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

Program Path	Measure	Quantity Unit	Installed Quantity
DI	Faucet Aerator - Bathroom	Each	26
	Kit (Bathroom Aerator & Pre-Rinse Sprayer)	Each	24
	Pre-Rinse Sprayer	Each	2
Custom	Pipe Insulation	Project	4
Prescriptive	Boiler Tune Up - Process	MBH	43,820
	Boiler Tune Up - Space Heating	MBH	8,600
	DCV - Kitchen	HP	15
	High Efficiency Boiler	MBH	2,277
	High Efficiency Furnace	Each	2
	Steam Traps - Dry Cleaner	Each	186
	Steam Traps - HVAC Repair/Rep	Each	69
	Water Heater	MBH	399

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

3. Savings Summary

Table 3-1 summarizes the energy savings the PGL Small Business Program achieved by path in 2019. Most of the PGL program savings came from the Prescriptive path.

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)
Direct Install	8,528	100%	8,528	0.95	8,101
Prescriptive	1,313,003	99%	1,304,518	0.92	1,200,156
Custom	116,205	107%	124,426	0.92	114,472
Custom Optimization	10,589	81%	8,606	0.92	7,918
Total	**1,448,325**	**100%**	**1,446,078**	**NA**	**1,330,647**

* 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 Small Business Program achieved by path in 2019. Similarly, most of the NSG savings came from the Prescriptive path.

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)
Direct Install	3,024	100%	3,024	0.95	2,873
Prescriptive	172,396	100%	172,449	0.92	158,653
Custom	21,568	101%	21,887	0.92	20,136
Total	**196,988**	**100%**	**197,360**	**NA**	**181,662**

NA = Not applicable
* 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.

4. Program Savings by Measure

The PGL Program includes 27 measures as shown in the following table. The steam traps repair and replacement and the space heating boiler tune up measures contributed the most savings.

Table 4-1. 2019 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)
Direct Install	Faucet Aerator - Bathroom	623	100%	623	0.95	592
	Showerhead	1,021	100%	1,021	0.95	970
	Pre-Rinse Sprayer	699	100%	699	0.95	664
	Kit (Bathroom Aerator & Pre-Rinse Sprayer)	6,185	100%	6,185	0.95	5,876
Prescriptive	Boiler Tune Up - Process	172,108	100%	172,103	0.92	158,335
	Boiler Tune Up - Space Heating	283,882	94%	267,616	0.92	246,206
	Condensate Tank Insulation	890	100%	890	0.92	819
	DCV - Gas Heating	2,869	100%	2,869	0.92	2,640
	Direct Fired Heaters	4,271	100%	4,271	0.92	3,929
	Dock Door Seals	470	100%	470	0.92	432
	Fryer	1,016	100%	1,016	0.92	935
	High Efficiency Boiler	28,330	100%	28,330	0.92	26,063
	High Efficiency Furnace	2,493	100%	2,493	0.92	2,293
	High Speed Washer	11,011	100%	11,012	0.92	10,131
	Infrared Salamander Broiler	240	100%	240	0.92	221
	Large Gas Water Heater	1,043	100%	1,043	0.92	960
	Linkageless Controls	14,566	100%	14,567	0.92	13,402
	Modulating Dryers	460	100%	460	0.92	423
	Pipe Insulation	19,187	138%	26,499	0.92	24,379
	Prescriptive Change	96,825	100%	96,825	0.92	89,079
	Programmable Thermostat	2,895	100%	2,896	0.92	2,664
	Smart Thermostat	1,420	100%	1,415	0.92	1,302
	Steam Traps - Dry Cleaner	172,126	100%	172,144	0.92	158,372
	Steam Traps - HVAC Repair/Rep	300,588	100%	300,586	0.92	276,539
	Steam Traps - Industrial Rep	192,926	100%	192,931	0.92	177,497
	Water Heater	3,386	113%	3,842	0.92	3,535
Custom	Custom	116,205	107%	124,426	0.92	114,472
Custom Optimization	Gas Optimization	10,589	81%	8,606	0.92	7,918
	Total	**1,448,325**	**100%**	**1,446,078**	**NA**	**1,330,647**

NA = Not applicable
* 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.

The NSG Program includes 12 measures as shown in the following table. The dry cleaner steam traps and process boiler tune up measures contributed the most savings.

Table 4-2. 2019 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)
Direct Install	Faucet Aerator - Bathroom	159	100%	159	0.95	151
	Kit (Bathroom Aerator & Pre-Rinse Sprayer)	2,516	100%	2,516	0.95	2,390
	Pre-Rinse Sprayer	349	100%	349	0.95	332
Prescriptive	Boiler Tune Up - Process	36,732	100%	36,731	0.92	33,793
	Boiler Tune Up - Space Heating	3,091	100%	3,091	0.92	2,844
	DCV - Kitchen	11,610	100%	11,610	0.92	10,681
	High Efficiency Boiler	2,564	100%	2,564	0.92	2,359
	High Efficiency Furnace	453	100%	453	0.92	417
	Steam Traps - Dry Cleaner	95,002	100%	95,011	0.92	87,410
	Steam Traps - HVAC Repair/Rep	22,605	100%	22,605	0.92	20,797
	Water Heater	338	113%	383	0.92	353
Custom	Custom	21,568	101%	21,887	0.92	20,136
	Total	**196,988**	**100%**	**197,360**	**NA**	**181,662**

NA = Not applicable
* 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)	Realization Rate	Data Source(s)*
Boiler Tune Up - Process	MBH	0.84	0.84	100%	IL TRM v7.0, Section 4.4.3
Boiler Tune Up - Space Heating	MBH	0.38	0.36	94%	IL TRM v7.0, Section 4.4.2
Condensate Tank Insulation	Square Feet	6.18	6.18	100%	SBES Tracking Data
Custom Measures	Project	Vary	Vary	107%	Project File Review, Monthly Billing Data ‡
DCV - Gas Heating	Square Feet	0.07	0.07	100%	IL TRM v7.0, Section 4.4.19
DCV - Kitchen	HP	774.02	774.00	100%	IL TRM v7.0, Section 4.2.16
Direct Fired Heaters	MBH	2.31	2.31	100%	IL TRM v7.0, Section 4.4.39
Dock Door Seals	Each	235.00	234.95	100%	FES
Faucet Aerator - Bathroom	Each	6.11	6.10	100%	IL TRM v7.0, Section 4.3.2
Fryer	Each	507.93	507.90	100%	IL TRM v7.0, Section 4.2.7
High Efficiency Boiler	MBH	0.67	0.67	100%	IL TRM v7.0, Section 4.4.10
High Efficiency Furnace	Each	226.63	226.62	100%	IL TRM v7.0, Section 4.4.11
High Speed Washer	lbs-capacity	5.51	5.51	100%	Il TRM v7.0, Section 4.8.5
Infrared Salamander Broiler	Each	240.00	240.00	100%	IL TRM v7.0, Section 4.2.14
Kit	Each	104.84	104.83	100%	SBES Tracking Data
Large Gas Water Heater	MBH	3.22	3.22	100%	IL TRM v7.0, Section 4.3.1
Linkageless Controls	MBH	0.58	0.58	100%	IL TRM v7.0, Section 4.4.21
Modulating Dryers	Each	230.11	230.13	100%	IL TRM v7.0, Section 4.8.4
Pipe Insulation	Linear Feet	5.54	7.65	138%	IL TRM v7.0, Section 4.4.14
Pre-Rinse Sprayer	Each	174.67	174.65	100%	IL TRM v7.0, Section 4.2.11
Prescriptive Change	Each	1.09	1.09	100%	SBES Tracking Data
Programmable Thermostat	Each	125.87	125.91	100%	IL TRM v7.0, Section 4.4.18
Showerhead	Each	21.73	21.73	100%	IL TRM v7.0, Section 4.3.3
Smart Thermostat	Each	88.74	88.44	100%	IL TRM v7.0, Section 4.4.42
Steam Traps - Dry Cleaner	Each	510.76	510.81	100%	IL TRM v7.0, Section 4.4.16
Steam Traps - HVAC Repair/Rep	Each	310.17	310.16	100%	IL TRM v7.0, Section 4.4.16
Steam Traps - Industrial Rep	Each	2473.41	2473.48	100%	IL TRM v7.0, Section 4.4.17
Water Heater	MBH	0.85	0.96	113%	IL TRM v7.0, Section 4.3.1

* 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.
‡ Project files and monthly billing data provided by Peoples Gas and North Shore Gas. Site-specific data collected by Guidehouse as needed.

5.1.1 Restaurant Kits

Guidehouse found that projects 4251536 and 4251629 were tracked as part of North Shore Gas projects but the Restaurant Kits they installed were described as “PG”, indicating Peoples Gas measures. The projects’ application forms also did not specify the natural gas utility. Upon further review of the installation addresses we assigned the projects and savings to North Shore Gas.

Recommendation 1. Guidehouse recommends ensuring that the measure description for a project ID corresponds with the program path in which it is tracked or reported.

Guidehouse reviewed the savings inputs for the Restaurant Kit measures which included Bathroom Aerator & Pre-Rinse Sprayer (comprised of 1 pre-rinse sprayer and 4 bath aerators). We agree with the total gross savings estimate of 104.83 therms per kit. We found however, that the ex ante net savings in the tracking data used a net-to-gross (NTG) of 0.92. Since the Kit is a direct install measure, Guidehouse used the 0.92 NTG to convert tracking ex ante net to gross savings but used 0.95 NTG to calculate the verified net savings. The measure has a 100% verified gross realization rate but the verified net savings is higher than the tracking savings.

Recommendation 2. Guidehouse recommends changing the ex ante net savings in the tracking data to use the direct install NTG of 0.95 for the Restaurant Kits.

5.1.2 Boiler Tune-up

The program had 125 installations of the boiler tune up – space heating measure and all but seven resulted in a 100% realization rate. These seven installations came from projects 4718528, 4718931, and 5090801. The gross therms per unit savings for these projects is 0.838 while the per unit value for the rest of the installations, and the value from the Franklin Energy MMDB[1] is 0.359. The 0.838 value is the per unit savings for the boiler tune up – process measure. Guidehouse used the 0.359 therms per MBH for these projects, which were verified to be space heating boiler tune-ups.

Recommendation 3. Verify that the correct savings are applied for each measure and that each installation has the correct measure name.

5.1.3 Pipe Insulation

The pipe insulation measure has seven different combinations of types and diameters of piping. The savings are based on modeling heat loss per foot for various systems (e.g., steam, hot water, and condensate return). These different systems result in different savings values.

Table 5-2. Per Unit Savings for Pipe Insulation Types

Measure Name	Ex Ante Gross Therms Per Unit	Verified Gross Therms Per Unit	Realization Rate
Pipe Insulation - DHW Medium 1.26-2"	4.25	4.25	1.00
Pipe Insulation - DHW Small <=1.25"	2.44	2.44	1.00
Pipe Insulation - HW Small 1" to 2"	2.66	2.66	1.00
Pipe Insulation - Steam Large 5.1" to 8"	25.00	25.00	1.00
Pipe Insulation - Steam Med 2.1" to 5"	9.78	12.81	1.31
Pipe Insulation - Steam Med Fitting	12.34	15.44	1.25
Pipe Insulation - Steam Small 1" to 2"	3.19	5.64	1.77

Source: PGL and NSG tracking data and Guidehouse team analysis.

[1] Excel file: *PG NSG MMDB PY8 - C&I, SB.xlsx*, January 24, 2019.

The medium steam, medium steam fitting, and small steam pipe insulation formulas reference incorrect values in the Franklin Energy MMDB workbook. Where they should reference commercial steam values, they instead reference commercial condensate return values.

Recommendation 4. Correct the pipe insulation formulas in the MMDB workbook for the small, medium, and medium fitting steam measures. Guidehouse acknowledges that Franklin Energy is addressing this issue for 2020 program, and we will assess the merit of the changes during 2020 evaluations.

5.1.4 Water Heater

The water heater savings algorithm is based on the IL TRM v7.0, section 4.3.1.[2] The savings depend on hot water use and the usage value depends on the building type. The detailed water heater measure name in the tracking data is "Water Heater 88% TE – Central Plant (Lodging)". There is a specific water usage value for the "lodging" building type in the IL TRM, but the MMDB workbook and ex ante savings do not use the IL TRM value.

Recommendation 5. Update the savings workbook to use the "lodging" hot water usage value for the lodging water heater measure.

5.1.5 Custom Projects

Table 5-3 summarizes the results of evaluation M&V on sampled custom projects from 2019. Evaluation project reviews were conducted for two sampling waves during 2019, and in one final sample drawn from end of year final data. Key findings and recommendations follow the table.

[2] Ilsag.info/il_trm_version_7

Table 5-3. Summary of Custom Project M&V Results

Project ID	Utility	Measure Description	Gross Realization Rate	Evaluation Wave	Summary of Adjustments
3674182	PGL	Demand Control Ventilation	83%	1	Updated building type and savings factor
3674880	PGL	Demand Control Ventilation	83%	1	Updated building type and savings factor
3675131	PGL	Demand Control Ventilation	83%	1	Updated building type and savings factor
3676441	PGL	Demand Control Ventilation	83%	1	Updated building type and savings factor
3678736	PGL	Demand Control Ventilation	83%	1	Updated building type and savings factor
3674307	NSG	Pipe Insulation	102%	1	Updated operating hours based on IL TRM and heat loss values based on thermal properties
3700717	NSG	Pipe Insulation	102%	1	Updated operating hours based on IL TRM and heat loss values based on thermal properties
3455302	PGL	Pipe Insulation	100%	1	Updated operating hours
4031819	PGL	Pipe Insulation	100%	2	Updated operating hours
3402757	PGL	Waste Heat Recovery	100%	2	Ok
4232001	PGL	High Turndown Burners	108%	Final Data	Savings factor updated to reflect IL TRM v7.0
4404690	PGL	RO/UV System for Tunnel Washer	92%	Final Data	Updated temperature rise and recalculated the water heating energy value
3968600	PGL	Pipe Insulation	150%	Final Data	Updated operating hours from 5,840 to 8,766 based on pre-inspection
4729347	PGL	Condensate Pump	100%	Final Data	Updated energy content from steam tables to go to two decimal places
4408102	PGL	HVAC - Space Conditioning Controls	91%	Final Data	Heat gain values updated based on unoccupied periods
4408056	PGL	HVAC - Space Conditioning Controls	80%	Final Data	Heat gain values updated based on unoccupied periods
4246987	NSG	Pipe Insulation	100%	Final Data	Updated operating hours based on IL TRM v7.0
4996804	NSG	Pipe Insulation	101%	Final Data	Updated operating hours based on IL TRM v7.0 and heat loss values using 3ePlus

Source: PGL and NSG tracking data and Guidehouse team analysis.

Projects 3674182, 3674880, 3675131, 3676441, and 3678736 are all demand control ventilation (DCV) measures and calculate savings with the same algorithm. The algorithm is based on the IL TRM v7.0, section 4.4.19. The ex ante calculation used the "Retail – Dept. Store" building type but the IL TRM glossary states a building must be greater than 30,000 square feet to be considered a department store. However, it also states that "drug stores" are considered department stores. Due to this ambiguity, Guidehouse used an average of the two retail building types. All other DCV projects were from the same customer so savings were updated accordingly with an 81% gross realization rate.

Recommendation 6. Use an average of the IL TRM "Retail – Department Store" and "Retail – Strip Mall" input values for drug stores.

Projects 3674307 and 3700717 installed new pipe insulation. The ex ante energy savings are calculated by modeling the heat loss per foot using the 3E Plus software. Guidehouse updated the calculations to use the actual thermal properties of the installed insulation instead of using a comparable material in the

software. Guidehouse also updated the yearly hour value to 8,766 from 8,760, consistent with the IL TRM. Project 3968600 is also a pipe insulation project. Guidehouse found that it is also a year-round operation and updated the annual hours from 5,840 to 8,766. Guidehouse found that projects 4246987 and 4996804 used 8,760 hours for year-round operation. This was updated to 8,766 per the IL TRM.

Recommendation 7. Use the listed thermal properties of installed insulation instead of using a similar material listed in the 3Eplus software and use 8,766 hours for 24/7 operation.

Project 4232001 uses the algorithm from IL TRM v7.0 section 4.4.20, High Turndown Burner of Space Heating Boilers. The ex ante savings used a value of 1.3% for the savings factor with no explanation. The IL TRM accepts custom inputs, but since there was no justification for the value, Guidehouse applied the IL TRM default value of 1.4%.

Recommendation 8. Use IL TRM default values or document justification for custom inputs.

For project 4404690 Guidehouse updated the temperature rise used in the savings calculation based on a photograph from the post-inspection documentation. Guidehouse also recalculated the water heating energy value. The original calculation used hot and cold water usage for the “hot water usage factor” and the “water utilization factor” reflected the process load of linen per year.

Recommendation 9. In a custom project (like 4404690), the savings calculations should reflect the post-installation conditions and documentation and should be clearly and correctly labeled.

Project 4408102 is an optimization project with “HVAC - Space Conditioning Controls” that establishes setback temperatures and scheduled shut-down for unoccupied times. The savings calculation accounts for internal heat, but the ex ante savings did not consider the new unoccupied hours of 2am to 6am. Project 4408056 is a similar project with unoccupied hours from 10pm to 6am but does not consider internal heat gain for new occupied hours.

Recommendation 10. When modeling an air handling unit shutdown in the HVAC calculation template, the heat gains should reflect the unoccupied conditions.

5.1.6 Tracking Data

The Small Business Program expanded to medium-sized businesses in 2019. The program implementer noted that the data to identify medium-sized business participation is tracked internally, and will be incorporated into the data that is provided for the 2020 evaluation.

5.2 Historical Realization Rates and NTG Values

Table 5-4 below shows the historical gross realization rates and NTG values for the Small Business Program.

Table 5-4. Historical Realization Rates and NTG Values

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
GPY1	99%	99%	0.99	0.99
GPY2	102%	102%	0.99	0.99
GPY3	100%	102%	0.99	0.99
GPY4	106%	102%	0.94	0.99
GPY5	98%	100%	0.93	0.93
GPY6	112%	153%	0.93	0.93
2018	101%	100%	0.82	0.92
2019	100%	100%	0.92	0.93

Source: Guidehouse evaluation research.

6. Appendix 1. Impact Analysis Methodology

Guidehouse determined verified gross savings for each program measure by:

1. Reviewing the savings algorithm inputs in the measure workbook for agreement with the TRM[3] or evaluation research for non-deemed measures.
2. Validating that the savings algorithm was applied correctly.
3. Cross-checking per-unit savings values in the tracking data with the verified values in the measure workbook or in Guidehouse's calculations if the workbook did not agree with the TRM.
4. Multiplying the verified per-unit savings value by the quantity reported in the tracking data.
5. Conducting engineering file review of a sample of custom projects.

Engineering Review of Custom Project Files

For each selected custom 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, engineers estimated verified 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.

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

Table 7-1 and Table 7-2 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of drafting 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.

[3] Because the Illinois TRM provides multiple options for selecting input assumptions, Franklin Energy produces a "Master Measure Database" spreadsheet that documents their approach to compliance with the Illinois TRM.

Table 7-1. TRC Inputs – PGL

Program Path	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Direct Install	Faucet Aerator - Bathroom	Each	338	10	2,822	2,822	2,681
	Pre-Rinse Sprayer	Each	63	5	4,684	4,684	4,449
	Showerhead	Each	47	10	1,021	1,021	970
Custom & Gas Optimization	HVAC - Space Conditioning Controls	Project	2	10	10,589	8,606	7,918
	DCV	Project	12	10	7,051	5,877	5,407
	RO/UV System	Project	1	13	28,441	26,241	24,142
	Pipe Insulation	Project	3	15	63,870	75,309	69,284
	Condensate Pump	Project	1	15	4,440	4,438	4,083
	Waste Heat Recovery	Project	1	20	10,343	10,344	9,516
	High Turndown Burners	Project	1	21	2,060	2,218	2,041
Prescriptive	Boiler Tune Up - Process	MBH	205,316	3	172,108	172,103	158,335
	Boiler Tune Up - Space Heating	MBH	744,554	3	283,882	267,616	246,206
	Condensate Tank Insulation	Square Feet	144	15	890	890	819
	DCV - Gas Heating	Sq. Feet	42,192	10	2,869	2,869	2,640
	Direct Fired Heaters	MBH	1,850	15	4,271	4,271	3,929
	Dock Door Seals	Each	2	20	470	470	432
	Fryer	Each	2	15	1,016	1,016	935
	High Efficiency Boiler	MBH	43,592	20	28,330	28,330	26,063
	High Efficiency Furnace	Each	11	17	2,493	2,493	2,293
	High Speed Washer	lbs-capacity	2,000	7	11,011	11,012	10,131
	Infrared Salamander Broiler	Each	1	12	240	240	221
	Large Gas Water Heater	MBH	324	15	1,043	1,043	960
	Linkageless Controls	MBH	25,138	16	14,566	14,567	13,402
	Modulating Dryers	Each	2	14	460	460	423
	Pipe Insulation	Linear Feet	3,466	15	19,187	26,499	24,379
	Prescriptive Change	Projects	14	6	96,825	96,825	89,079
	Programmable Thermostat	Each	23	4	2,895	2,896	2,664
	Smart Thermostat	Each	16	11	1,420	1,415	1,302
	Steam Traps - Dry Cleaner	Each	337	6	172,126	172,144	158,372
	Steam Traps - HVAC Repair/Rep	Each	973	6	300,588	300,586	276,539
	Steam Traps - Industrial Rep	Each	78	6	192,926	192,931	177,497
	Water Heater	MBH	3,998	15	3,386	3,842	3,535
Total					**1,448,325**	**1,446,078**	**1,330,647**

Source: PGL and NSG tracking data and Guidehouse team analysis.

Table 7-2. TRC Inputs - NSG

Program Path	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Direct Install	Faucet Aerator - Bathroom	Each	122	10	1,053	1,053	1,001
	Pre-Rinse Sprayer	Each	26	5	1,970	1,970	1,872
Custom	Pipe Insulation	Project	4	15	21,568	21,887	20,136
Prescriptive	Boiler Tune Up - Process	MBH	43,820	3	36,732	36,731	33,793
	Boiler Tune Up - Space Heating	MBH	8,600	3	3,091	3,091	2,844
	DCV - Kitchen	HP	15	15	11,610	11,610	10,681
	High Efficiency Boiler	MBH	2,277	20	2,564	2,564	2,359
	High Efficiency Furnace	Each	2	16.5	453	453	417
	Steam Traps - Dry Cleaner	Each	186	6	95,002	95,011	87,410
	Steam Traps - HVAC Repair/Rep	Each	69	6	22,605	22,605	20,797
	Water Heater	MBH	399	15	338	383	353
Total					**196,988**	**197,360**	**181,662**

Source: PGL and NSG tracking data and Guidehouse team analysis.