



Small Business Impact Evaluation Report

**Energy Efficiency Plan: Plan Year 6 (PY6)
(6/1/2016-12/31/2017)**

**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) PY6 Small Business (SB) programs. It presents a summary of the energy impacts for the total program as well as by relevant measure and program structure detail, for each utility. The appendix presents the impact analysis methodology. PY6 covers June 1, 2016 through December 31, 2017. Franklin Energy Services LLC, (Franklin Energy) is the implementation contractor for the PGL and NSG Small Business programs, with trade ally engagement and technical support for program delivery and marketing.

2. PROGRAM DESCRIPTION

The SB programs assist qualified PGL and NSG non-residential customers¹ to achieve natural gas energy savings by presenting and providing financial incentives on energy efficiency (EE) opportunities through three SB program delivery paths:

- The Energy Assessment and Direct Install path provides installation of no-cost direct-install (DI) measures² to small businesses through on-site assessments conducted by Energy Advisors employed by the program implementation contractor
- The Prescriptive Rebate path provides small business customers with direct financial incentives for installation of retrofit measures recommended through the Energy Assessment path or a trade ally. New construction projects are eligible
- The Custom path provides technical services and custom rebates for non-prescriptive or non-standard building improvement upgrades, including New Construction projects

The PGL program had 316 participants in PY6 and completed 447 projects, as shown in Table 2-1.

Table 2-1. PY6 Volumetric Summary for PGL

Participation	Assessment/ Direct Install	Prescriptive Rebate	Custom	New Construction	Total
Participants	92	229	10	1	316*
Installed Projects	119	304	13	1	447
Installed Measure Types	5	17	8	1	28†

Source: Peoples Gas tracking data and Navigant team analysis.

* Participants are defined as unique account names.

† Measure types indicate the count of different measures installed by the program path. Custom measures were not provided in the tracking database extract provided to Navigant, and instead were verified from Franklin's Efficiency Manager tracking system.

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

¹ To qualify, participants must be a PGL or NSG commercial or industrial customer that uses less than 60,000 therms per year.

² No-cost direct-install measures include low-flow showerheads and faucet aerators, pre-rinse spray valves, programmable/ reprogram thermostats, and domestic hot water (DHW) pipe insulation.

Table 2-2. PY6 Installed Measure Quantities for PGL

Measure	Quantity Unit	Installed Quantity
Boiler Reset Controls	MBH	6,810
Boiler Tune Up – Process	MBH	1,703
Boiler Tune Up – Space Heating	MBH	336,621
Custom Projects	Each	13
DHW Storage Tank Insulation	Square Feet	70
Faucet Aerator – Bathroom	Each	1,033
Energy Star Fryer*	Each	15
High Efficiency Steam and HW Boilers	MBH	50,492
High Efficiency Furnace	Each	11
High Speed Washer	Lbs-Capacity	555
Infrared Salamander Broiler	Each	2
Small Business Kit†	Each	9
Large Gas Water Heater	MBH	506
Pipe Insulation	Linear Feet	10,669
Programmable Thermostat	Each	22
Showerhead	Each	180
Steam Traps – Dry Cleaner	Each	422
Steam Traps – HVAC Repair/Rep	Each	396
Steam Traps – Industrial Rep	Each	2,020
Laundromat Water Heater	MBH	5,487
High Efficiency Steam and HW Boilers	MBH	50,492
Other (prescriptive change)	Project	59

Source: Peoples Gas tracking data and Navigant team analysis.

* Energy Star Fryers include one installation in a new construction project.

† Kits include pre-rinse spray valve and bathroom faucet aerator.

The NSG program had 76 participants in PY6 and completed 93 projects as shown in Table 2-3.

Table 2-3. PY6 Volumetric Summary for NSG

Participation	Assessment/ Direct Install	Prescriptive Rebate	Custom	New Construction	Total
Participants	10	65	4	0	76*
Installed Projects	13	76	4	0	93†
Installed Measure Types	5	9	4	0	18‡

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

* Participants are defined as unique account names.

† Unique Installed Projects.

‡ Measure types indicate the count of different measures installed by the program path. Custom measures were not provided in the tracking database extract provided to Navigant, and instead were verified from Franklin’s Efficiency Manager tracking system.

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

Table 2-4. PY6 Installed Measure Quantities for NSG

Measure	Quantity Unit	Installed Quantity
Custom Projects	Each	4
Faucet Aerator – Bathroom	Each	154
Faucet Aerator – Kitchen	Each	4
Fryer	Each	6
High Efficiency Steam and HW Boilers	MBH	7,185
High Efficiency Furnace	Each	5
High Speed Washer	Lbs-Capacity	60
Infrared Heater	MBH	350
Large Gas Water Heater	MBH	996
Pipe Insulation	Linear Feet	1,290
Pre Rinse Sprayer	Each	8
Programmable Thermostat	Each	12
Showerhead	Each	26
Steam Traps – Dry Cleaner	Each	171
Other (prescriptive change)	Project	10

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

3. PROGRAM SAVINGS SUMMARY

Table 3-1 summarizes the energy savings the PGL SB program achieved in PY6 by delivery path.

Table 3-1. PY6 Annual Energy Savings Summary for PGL

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTGR†	Verified Net Savings (Therms)
Custom Subtotal	111,340	89%	98,767	0.93	91,853
Direct Install Subtotal	19,417	100%	19,414	0.93	18,055
Prescriptive Rebate Subtotal	690,155	116%	798,064	0.93	742,200
Prescriptive New Construction	505	100%	505	0.93	470
Total	821,417	112%	916,750	0.93	852,578

Source: Peoples Gas tracking data and Navigant team analysis.

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† Net-to-Gross Ratio (NTGR) is the ratio of verified net savings to verified gross savings. The NTGR is a deemed value. Source: PG-NSG_GPY6_NTG_Values_2016-02-29_Final.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

Table 3-2 summarizes the energy savings the NSG SB program achieved in PY6 by delivery path.

Table 3-2. PY6 Annual Energy Savings Summary for NSG

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTGR†	Verified Net Savings (Therms)
Custom Subtotal	12,393	89%	10,994	0.93	10,224
Direct Install Subtotal	3,058	100%	3,058	0.93	2,844
Prescriptive Rebate Subtotal	63,884	168%	107,030	0.93	99,536
Total	79,335	153%	121,082	0.93	112,604

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

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† Net-to-Gross Ratio (NTGR) is the ratio of verified net savings to verified gross savings. The NTGR is a deemed value. Source: PG-NSG_GPY6_NTG_Values_2016-02-29_Final.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

4. PROGRAM SAVINGS BY MEASURE

The PGL SB program included 21³ measure types as shown in the following table. The steam trap and boiler tune up measures comprised most of the savings.

Table 4-1. PY6 Annual Energy Savings by Measure for PGL

Measure Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTGR†	Verified Net Savings (Therms)
Boiler Reset Controls	8,421	100%	8,384	0.93	7,797
Boiler Tune Up – Process	1,428	100%	1,428	0.93	1,328
Boiler Tune Up – Space Heating	119,446	101%	120,992	0.93	112,523
Custom Project Savings	111,340	89%	98,767	0.93	91,853
DHW Storage Tank Insulation	375	100%	375	0.93	349
Faucet Aerator – Bathroom	6,309	100%	6,306	0.93	5,865
Faucet Aerator – Kitchen	37	100%	37	0.93	34
Fryer	7,070	100%	7,072	0.93	6,577
High Efficiency Steam and HW Boilers	37,098	100%	37,194	0.93	34,590
High Efficiency Furnace	3,014	83%	2,493	0.93	2,318
High Speed Washer	3,103	83%	2,580	0.93	2,399
Infrared Salamander Broiler	478	100%	478	0.93	445
Small Business Kit	943	100%	943	0.93	877
Large Gas Water Heater	267	136%	267	0.93	248
Pipe Insulation	47,394	100%	47,541	0.93	44,213
Programmable Thermostat	2,774	100%	2,770	0.93	2,576
Showerhead	3912	100%	3912	0.93	3638
Steam Traps – Dry Cleaner	107,782	199%	214,999	0.93	199,949
Steam Traps – HVAC Repair/Rep	125,187	100%	125,189	0.93	116,426
Steam Traps – Industrial Rep	2,020	100%	2,020	0.93	1,879
Water Heater	9,777	100%	9,761	0.93	9,078
New Construction	505	100%	505	0.93	470
Other (prescriptive change) ‡	213,830	100%	213,830	0.93	198,862
Total§	821,417	112%	916,750	0.93	852,578

Source: Peoples Gas tracking data and Navigant team analysis.

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† Net-to-Gross Ratio (NTGR) is the ratio of verified net savings to verified gross savings. The NTGR is a deemed value. Source: PG-NSG_GPY6_NTG_Values_2016-02-29_Final.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

‡ A blend of HVAC measures with savings capped at 20 percent of gas usage. More detail is provided in the appendix.

§ Totals may not add up due to rounding.

The NSG program included 13⁴ measure types as shown in Table 4-2. The steam trap measure contributed most of the savings.

³ Excluding “Prescriptive Change” and “Custom Project” measures, which represent multiple measures installed.

⁴ Excluding “Prescriptive Change” and “Custom Project” measures, which represent multiple measures installed.

Table 4-2. PY6 Annual Energy Savings by Measure for NSG

Measure Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTGR†	Verified Net Savings (Therms)
Custom Project Savings	12,393	89%	10,994	0.93	10,224
Faucet Aerator – Bathroom	940	100%	940	0.93	874
Faucet Aerator – Kitchen	30	100%	30	0.93	28
Fryer	3,030	100%	3,031	0.93	2,819
High Efficiency Steam and HW Boilers	7,433	100%	7,427	0.93	6,907
High Efficiency Furnace	1,370	83%	1,133	0.93	1,054
High Speed Washer	335	83%	279	0.93	259
Infrared Heater	1,052	100%	1,052	0.93	978
Large Gas Water Heater	525	100%	525	0.93	488
Pipe Insulation	3,427	100%	3,427	0.93	3,187
Pre Rinse Sprayer	1,397	100%	1,397	0.93	1,299
Programmable Thermostat	1,387	100%	1,385	0.93	1,288
Showerhead	565	100%	565	0.93	525
Steam Traps – Dry Cleaner	43,675	199%	87,120	0.93	81,022
Other (prescriptive change) ‡	1,651	100%	1,651	0.93	1,535
Total§	79,335	153%	121,082	0.93	112,604

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

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† Net-to-Gross Ratio (NTGR) is the ratio of verified net savings to verified gross savings. The NTGR is a deemed value. Source: PG-NSG_GPY6_NTG_Values_2016-02-29_Final.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

‡ A blend of HVAC measures with savings capped at 20 percent of gas usage. More detail is provided in the appendix.

§ Totals may not add up due to rounding.

5. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

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*
Aerator – Bathroom	Each	6.108	6.105	100%	TRM, Section 4.3.2
Aerator – Bathroom	Each	7.441	7.443	100%	TRM, Section 4.3.2
Boiler – HW	MBH	1.128	1.126	100%	TRM, Section 4.4.10
Boiler – Steam >=300MBH, >=82% TE	MBH	0.581	0.584	101%	
Boiler Reset Controls	MBH	1.237	1.231	100%	TRM, Section 4.4.4
Boiler Tune Up	MBH	Process = 0.839	0.838	100%	TRM, Section 4.4.3
		HVAC = 0.355	0.359	101%	TRM, Section 4.4.2
DHW Storage Tank Insulation	Square Feet	5.355	5.354	100%	Program Tracking Data (PTD)†, TRM, Section 4.4.14
Small Business Kit	Each	104.828	104.832	100%	TRM, Section 4.2.11, 4.3.2
ENERGY STAR Fryer	Each	505	505	100%	TRM, Section 4.2.7
Furnace > 95% AFUE (COM)	Each	273.972	226.618	83%	TRM, Section 4.4.11
High Speed Washer – Laundromat	Lbs-Capacity	5.59	4.65	83%	TRM, Section 4.8.5‡
Infrared Heater	MBH	3.004	3.007	100%	TRM, Section 4.4.12
Infrared Salamander Boiler	Each	239	239	100%	TRM, Section 4.2.14
Large Gas Water Heater	MBH	0.527	0.527	100%	TRM, Section 4.3.5
Pipe Insulation	Linear Feet	Vary	Vary	100%	TRM, Section 4.4.14
Pre Rinse Sprayer	Each	174.65	174.65	100%	TRM, Section 4.2.11
Programmable Thermostat	Each	126.07	125.91	100%	TRM, Section 4.4.18
Steam Traps – Dry Cleaner Repair (Audited)	Each	255.41	509.48	199%	TRM, Section 4.4.16
Steam Traps – HVAC Repair/Replace	Each	Audit = 327.602 No Audit = 88.452	327.607 88.454	100%	
Water Heater 88% TE – Laundromat	MBH	1.054	1.057	100%	TRM, Section 4.3.5
Water Heater 95% TE – Laundromat	MBH	1.839	1.835	100%	
Prescriptive Change (combination of measures)	Vary	Vary	Vary	100%	PTD
Custom Measures	Vary	Vary	Vary	89%	

* Except where noted, Data Source for TRM references is State of Illinois Technical Reference Manual version 5.0 from <http://www.ilsag.info/technical-reference-manual.html>.

† Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas, extract dated January 29, 2018.

‡ State of Illinois Technical Reference Manual Version 6.0 from <http://www.ilsag.info/technical-reference-manual.html>.

The “Furnace >95% AFUE (COM)” measure has a per-unit realization rate of 83 percent due to an assumption used in the ex ante calculation that 14 percent of installed furnaces are early replacement upgrades and 86 percent are time of sale. This assumption is based on research cited in the TRM for residential programs, which is not applicable to commercial programs. For the C&I Small Business program, Navigant determined that using the time of sale program is reasonable when calculating savings for this measure.

Recommendation 1. Consider estimating furnace savings separately for early replacement and time of sale baselines and apply the assumptions based on the data provided by the customer application. If unknown, assume a time of sale baseline. Navigant presented this finding and recommendation in an early impact memo during PY6.⁵ Franklin Energy⁶ indicated that changes would be made to the default measure assumptions in the Master Measure Database document (MMDB)⁷, and the suggested changes to the time of sale assumption would be considered going forward.

The “High Speed Washer – Laundromat” measure has a per-unit realization rate of 83 percent due to an adjustment to the custom calculations used in the ex ante savings estimate. The custom algorithm used to estimate equivalent full load hours (EFLH), the actual clothes washer rated capacity (lbs/cycle), and the load factor of the machines installed were not justified with site-specific data. Navigant determined that using the algorithm deemed in IL TRM v6.0 section 4.8.5 was reasonable to use for this measure.

Recommendation 2. Consider estimating high speed washer savings using the algorithm deemed in IL TRM v6.0 section 4.8.5 instead of a custom calculation. Franklin Energy indicated they would use the TRM savings assumption for the measure going forward.

The “Large Gas Water Heater” measure per unit savings assumes a “Hot Water Use Gallons” input value of 139,500 MBH, which was estimated from an average tank size of 150 gallons per year⁸ multiplied by an estimate of consumption per usable capacity of the hot water storage tank. This produces 0.53 therms/MBH Input. Navigant agrees with the average tank size estimate and the claimed savings.

The “Steam Trap – Dry Cleaner Repair (Audit)” measure has a per-unit realization rate of 199 percent due to an incorrect ex ante calculation in the measure database. The “Adjustment Factor (A)” algorithm input should only be used once but the measure database incorrectly applied it twice. This resulted in per-unit savings of 255.41 therms compared to 509.48 therms when calculated correctly.

Recommendation 3. Correct the algorithm in the measure database for the “Steam Trap – Dry Cleaner Repair (Audit)” measure so that the “Adjustment Factor (A)” algorithm input is only factored once. Franklin Energy indicated they would make changes to the MMDB savings assumption for the measure going forward.

Navigant found that the tracking ex ante gross therm savings for efficient boilers, boiler reset controls and boiler tune ups are slightly different than the values in Franklin Energy’s MMDB. The differences are mostly due to rounding of values in the tracking system. The verified savings were mostly matching the MMDB values.

Recommendation 4. Ensure that the tracking system savings inputs for boilers and tune up measures are consistent with the default values in the MMDB file.

Navigant conducted engineering file reviews on ten projects described as “prescriptive change” to ensure that custom-calculated project savings did not exceed allowable deemed savings using TRM algorithms. Navigant found that the claimed savings did not exceed TRM-derived values for each project, and were

⁵ Early impact memo from Charles Ampong, Sagar Deo, and Paul Higgins, Navigant (“PGL-NSG GPY6 SBES Tracking Database Review Interim Findings Memo”), emailed on October 6, 2017 by Kevin Grabner.

⁶ Personal communication from Adam Roche, Franklin Energy, on October 24, 2017.

⁷ File name: PGNSG MMDB PY6-Navigant013017, produced by Franklin Energy.

⁸ The 150 gallon tank size is Franklin Energy’s estimate of average tank size for gas water heaters that are greater than 75 MBH Input and less than 400 MBH Input.

acceptable. The tracking system data did not provide calculation files, custom inputs, or customer gas usage information that was the implementer’s claimed basis for capping ex ante savings at 20 percent of usage. Navigant also verified that the capping was applied mostly to HVAC equipment other than thermostats. Thermostat savings were not capped, and were estimated at the building type level, which was a different approach from similar measures in the program where the implementer applied an average therms savings for all building types. Details of these findings are presented in Table 7-1 in the appendix.

Recommendation 5: Provide calculation files and custom inputs in “prescriptive savings” project files to present how the ex ante savings were calculated.

Recommendation 6: Ensure consistency in the approach of categorizing measures under the “prescriptive change” savings capping. In the case for thermostats where savings are mainly based on the TRM, clarify reasons for the categorization as “prescriptive change”.

Other Findings and Recommendations

Navigant conducted file reviews on 14 of the 17 custom projects implemented through the Small Business program in GPY6. The following findings are related to the custom projects. Table 5-2 summarizes the adjustments to the custom project savings and the realization rate estimates at the project level.

Table 5-2. PY6 Summary of Custom Sample M&V Results

Project ID	Measure Description	Gross Realization Rate	Summary of Adjustment
1398827	Clothes Dryer Controls	100%	OK
1300297	Clothes Washer Replacement	100%	OK
1217278	Clothes Washer Replacement	104%	Updated laundry cycles values using site starts reports.
1300296	Clothes Washer Replacement	100%	OK
1442697	OA Setback & Boiler Piping Modifications	100%	OK
1391105	Pneumatic to DDC Controls	110%	Updated occupancy values and weather data
807102	Parking Garage DCV	100%	OK
1635964	BAS	0%	Billing analysis shows increased usage post-installation. Project installed prior to PY6 period
944835	Stack Economizers	0%	Economizers found to have been removed from service due to faulty design by the manufacturer
1318933	Boiler Controls	66%	Updated setback temperature and hours
1567510	Boiler Controls	100%	OK
1742120	Air Compressor Heat Recovery	105%	Updated weather data
1221157	Clothes Washer Replacement	100%	OK
1958561	Steam Pipe Insulation	100%	OK

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

Project 944835 involved the installation of stack economizers on the process boilers at a brewery which increased the efficiency of the boiler system by recovering heat from the boiler exhaust and applying it to the boiler make-up water. The ex ante savings calculation assumed that brewer’s production would double in the next year, resulting in a doubling of the savings. Production information was not captured in the project documentation, making this assumption difficult to verify. Based on the utility history, Navigant found this assumption to be incorrect. After following up with the implementer, they discovered from the customer that the economizers were removed from service due to poor installation and operation.

Navigant determined that this project did not achieve verified savings, so the savings realization rate was zero percent.

Recommendation 7. If a savings calculation involves production data, either in the assumptions or in terms of gas usage per unit output, the project documentation should include information on production data.

Project 1318933 involved installing setback controls on an HVAC system and reducing the temperatures during unoccupied periods. The ex ante savings calculation assumes a setback of 12°F, but the post-inspection documents showed a setback of 8°F. This project achieved a realization rate of 66 percent, primarily due to adjusting the setback to match the post-inspection documentation.

Recommendation 8. Navigant recommends that for projects of this nature, the pre- and post-inspection observations should be used to inform the input values and assumptions in the savings calculations. If the pre- or post-inspection findings are not considered valid or representative, an explanation should be provided.

Project 1635964 involved the installation of a building automation system (BAS) at a church. This project was installed in June 2015, but moved from PY5 to PY6 during last year's evaluation due to inconclusive billing analysis results. The BAS should save energy by allowing the facility to modulate the outside air dampers and temperature setpoint based on occupancy. Navigant reviewed this project using a billing analysis approach with 24 months of pre-installation data and 24 months of post-installation data. Analysis of usage data showed an increase in usage per heating degree-day, though the verified savings was set to zero instead of a negative value. This project achieved a realization rate of zero percent, due to billing analysis showing no savings.

The absence of savings could be due to efficient baseline conditions (e.g., programmable thermostats), increased ventilation levels due to code requirement, poor commissioning, or overriding of programming. More information is needed to determine the cause of this discrepancy.

Recommendation 9. Navigant recommends that the pre-inspections of BAS projects gather more detailed information such as thermostat setpoints and scheduling, and outside air damper settings and operation. The post-inspection documents should confirm the operation of the implemented control strategies.

Project 1217278 involved the replacement of clothes washers at a laundromat. To calculate savings for the different sizes of washers at the facility, "starts reports" (documentation from the facility counting how many times the washers were started) were used to calculate how often the washers would run in a typical year. Initially, only the starts reports from January 2017 were used in the savings calculation. Navigant updated the savings calculation using all available starts reports data (January 1, 2017 – February 23, 2017), resulting in a realization rate of 104 percent.

Recommendation 10. Navigant recommends the implementer use data from the largest representative portion of the year when calculating a normalized savings factor.

Projects 1742120 and 1391105 both involve temperature bin analysis to calculate gas savings. Project 1742120 involves air compressor heat recovery at a manufacturing plant and project 1391105 involves installation of a new direct digital control (DDC) system with demand control ventilation in a church. Both calculations originally used weather bin data from Chicago's O'Hare Airport. However, both projects were significantly closer geographically to Waukegan Airport, which has a separate weather bin data to use for

calculation. For both projects, the weather bin data was updated from Chicago O'Hare Airport bin data to Waukegan Airport bin data. Realization rates for both projects were slightly greater than 100 percent.

Recommendation 11. Navigant recommends that the implementer apply weather bin data from the closest source to the project's location for all gas savings projects which involve calculations using local weather bin data.

6. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

Navigant determined verified gross savings for each program measure by:

1. Reviewing the savings algorithm inputs in the measure workbook for agreement with the TRM⁹ or evaluation research for non-TRM 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 Navigant’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 desk file review of a subset of custom projects

Engineering Review of Project Files

The deemed savings verification approach was supplemented by an engineering file review of a random sample of 10 prescriptive projects that were described as “prescriptive change” in the tracking data. Navigant verified the savings reported for these projects did not exceed allowable deemed savings using TRM algorithms.

Additionally, the evaluation team conducted engineering desk file reviews of a sample of 14 out of the 17 custom projects installed in PY6 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. Strata were defined by project size based on gross energy savings boundaries that placed about one-half of program-level savings into each stratum. Table 6-1 shows a profile of the sample selection.

Table 6-1. Profile of Gross Impact Sample for Custom Projects

Population Summary				Sample Summary		
Program	Sampling Strata	Number of Projects (N)	Ex Ante Gross Savings (Therms)	Sample (n)	Ex Ante Gross Savings (Therms)	Sampled % of Population (% Therms)
Small Business	1	4	58,892	3	47,678	81%
	2	13	64,841	11	57,571	89%
TOTAL		17	123,733	14	105,248	85%

Source: Navigant analysis

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

To support Navigant’s 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 (when required), post-inspection reports and photos (when conducted), and calculation spreadsheets.

⁹ 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. The spreadsheet is “PGNSG MMDB PY6 update for PS” produced by Franklin Energy.

Results from Engineering Review of Project Files

Table 6-2 shows the estimated average realization rate for the custom projects was 89 percent at a 90 percent confidence level.

Table 6-2. Gross Therms Realization Rates and Relative Precision at 90% Confidence Level

Program	Strata	Relative Precision +/- %	Mean RR	Standard Error
Small Business	1	1.5%	101%	0.01
	2	11.8%	79%	0.05
Custom Total RR (90/10)		5.3%	89%	0.03

Source: Peoples Gas and North Shore Gas tracking data and Navigant team analysis.

7. APPENDIX 2. IMPACT ANALYSIS SUPPLEMENTAL INFORMATION

Table 7-1 shows a list of sample projects described as “prescription change”, which reportedly had the savings capped at 20 percent of the customer annual gas usage. Navigant verified that the capping was applied mostly to the HVAC equipment other than thermostats. Thermostat savings were based on building type, which was different from similar measures in the program where the implementer applied an average therms savings for all building types.

Table 7-1. Projects with Capped Percentage Savings (“Prescriptive Change”)

Project ID	Type of Measure	QTY Installed (From Project Files)	Ex Ante Gross Therms (capped savings)	Verified TRM Gross Therms	Comments
1304486	Steam Traps – HVAC Repair/Rep	21	6,230	6,880	
1311964	Steam Traps – HVAC Repair/Rep	55	8,431	18,018	
1986789	Furnace > 95% AFUE (COM)	1	129	274	Capped savings acceptable as is
2720604	Steam Traps – HVAC Repair/Rep	24	3,878	7,863	
2720610	Steam Traps – HVAC Repair/Rep	11	1,817	3,604	
1464852	Programmable Thermostat	1	38	OK	No capped savings. The TRM savings specific to building type were used for these projects. No roll-up adjustment applied.
1881896	Smart Thermostat	1	164	OK	
2270874	Smart Thermostat	1	164	OK	
2294984	Smart Thermostat	1	110	OK	
2748832	Smart Thermostat	1	103	OK	

Source: Peoples Gas and North Shore Gas tracking data and Navigant team analysis.

8. APPENDIX 3. PROGRAM-SPECIFIC INPUTS FOR THE ILLINOIS TRC

Table 8-1 and Table 8-2, the Total Resource Cost (TRC) variable tables, only include cost-effectiveness analysis inputs available at the time of finalizing the PY6 Small Business 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 evaluation later. Detail in the TRC tables (e.g., EULs), other than final PY6 savings and program data, are subject to change and are not final.

Table 8-1. TRC Detail - PGL

Measure	Unit Basis	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Boiler Reset Controls	MBH	6,810	20	8,421	8,384	7,798
Boiler Tune Up - Process	MBH	1,703	3	1,428	1,428	1,328
Boiler Tune Up - Space Heating	MBH	336,621	3	119,446	120,992	112,522
Custom Project Savings	Each	111,340	13	111,340	98,767	91,853
DHW Storage Tank Insulation	Square Feet	70	15	375	375	349
Faucet Aerator - Bathroom	Each	1,033	9	6,309	6,306	5,865
Faucet Aerator - Kitchen	Each	5	9	37	37	35
Fryer	Each	15	15	7,575	7,577	7,047
High Efficiency Steam and HW Boilers	MBH	50,492	20	37,098	37,194	34,590
High Efficiency Furnace	Each	11	16.5	3,014	2,493	2,318
High Speed Washer	lbs-capacity	555	7	3,103	2,580	2,399
Infrared Salamander Broiler	Each	2	12	478	478	445
Small Business Kit	Each	9	7	943	943	877
Large Gas Water Heater	MBH	506	20	267	267	248
Pipe Insulation	Linear Feet	10,669	15	47,394	47,541	44,213
Pre Rinse Sprayer	Each	51	5	8,907	8,907	8,284
Prescriptive Change	Each	213,830	6	213,830	213,830	198,862
Programmable Thermostat	Each	22	4	2,774	2,770	2,576
Showerhead	Each	180	10	3,912	3,912	3,638
Steam Traps - Dry Cleaner	Each	422	6	107,782	214,999	199,949
Steam Traps - HVAC Repair/Rep	Each	396	6	125,187	125,189	116,425
Steam Traps - Industrial Rep	Other	2,020	6	2,020	2,020	1,879
Water Heater	MBH	5,487	20	9,777	9,761	9,078
Total			8	821,417	916,750	852,578

Source: Peoples Gas tracking data and Navigant team analysis

Table 8-2. TRC Detail - NSG

Measure	Unit Basis	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Custom Project Savings	Each	12,393	11	12,393	10,994	10,224
Faucet Aerator - Bathroom	Each	154	9	940	940	874
Faucet Aerator - Kitchen	Each	4	9	30	30	28
Fryer	Each	6	15	3,030	3,031	2,819
High Efficiency Steam and HW Boilers	MBH	7,185	20	7,433	7,427	6,908
High Efficiency Furnace	Each	5	16.5	1,370	1,133	1,054
High Speed Washer	lbs-capacity	60	7	335	279	259
Infrared Heater	MBH	350	12	1,052	1,052	979
Large Gas Water Heater	MBH	996	20	525	525	488
Pipe Insulation	Linear Feet	1,290	15	3,427	3,427	3,187
Pre Rinse Sprayer	Each	8	5	1,397	1,397	1,299
Prescriptive Change	Each	1,651	6	1,651	1,651	1,535
Programmable Thermostat	Each	12	4	1,513	1,511	1,405
Showerhead	Each	26	10	565	565	525
Steam Traps - Dry Cleaner	Each	171	6	43,675	87,120	81,022
Total			8	79,335	121,082	112,604

Source: North Shore Gas tracking data and Navigant team analysis