NAVIGANT

Multi-Family Program 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 (Revised)

(The August 14, 2018 revision updated Section 6 of the July 17, 2018 version that was labeled final to clarify text on the sampling approach for custom projects in new versus existing facilities. Verified gross and net savings results in the August 14 version were unchanged from July 17.)

August 14, 2018

Prepared by:

Charles Ampong
Navigant Consulting, Inc.

Mack Shaughnessy
Navigant Consulting, Inc.

Rick Berry
Navigant Consulting, Inc.

Peter Vigilante
Navigant Consulting, Inc.

www.navigant.com

NAVIGANT

Multi-Family Program Impact Evaluation Report

Submitted to:

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

Submitted by:

Navigant Consulting, Inc.
150 North Riverside
Suite 2100
Chicago, IL 60606
Phone 312.583.5700

Contact:

Randy Gunn, Managing Director
312.583.5714
randy.gunn@navigant.com

Kevin Grabner, Associate Director
608.497.2323
kevin.grabner@navigant.com

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

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. INTRODUCTION

This report presents the results of the impact evaluation of the PY6 Peoples Gas (PGL) and North Shore Gas (NSG) Multi-Family (Multi-Family) Program. It presents a summary of the energy impacts for the total program and broken out by relevant measure and program structure details, for each utility. Section 6 (Appendix 1) presents the impact analysis methodology. PY6 covers June 1, 2016 through December 31, 2017.

2. PROGRAM DESCRIPTION

The PGL and NSG Multi-Family Program is designed to provide a "one-stop-shop" to multi-family property owners and managers to achieve comprehensive improvements in energy efficiency that previously would have required accessing multiple programs. The Multi-Family Program delivery approach consists of five paths:

The Direct Install (DI) and Energy Assessment "Jumpstart" path of the program provides free energy efficiency products in residential dwelling units and common areas. The energy assessment identifies additional comprehensive efficiency upgrades that allow participants to implement deeper retrofit measures through other delivery paths.

The Prescriptive Rebate path provides standardized incentives for energy efficient equipment based on the size and efficiency of the equipment installed or on a per unit basis. The Partner Trade Ally (PTA) path also provides standardized incentives for energy efficient equipment based on the size and efficiency of the equipment installed or on a per unit basis while providing higher incentives to a network of trade allies selected, screened and registered with the Multi-Family Program. These Partner TA's in turn offer better rebates to their customers to install energy-efficient products.

The program's Custom path provides technical services and custom rebates for non-standard building improvement upgrades. The program also provides incentive opportunity for new construction energy efficient projects in multi-family buildings. The PY6 program completed one new construction custom project, with PGL. Multi-family property owners and managers may also participate in the PGL and NSG Gas Optimization Study Program that provides gas optimization assessments for multi-family buildings for operation and maintenance issues that, if corrected, deliver energy and cost savings to building owners and managers supported by financial incentives.[1]

The PGL Multi-Family Program had 1,643 participants in PY6 and completed 12,340 projects as shown in the following table.

[1] Five program paths participated in PY6 (custom incentive, new construction, direct install, prescriptive and PTA incentives). No multi-family gas optimization projects were completed in PY6 for PGL or NSG.

Table 2-1. PY6 Volumetric Summary for PGL

Participation	Custom Incentive	New Construction	Jumpstart/ Direct Install	Prescriptive Incentive	PTA Incentive	Total
Participants *	11	1	1,259	249	236	1,643
Installed Projects †	11	1	11,672	333	323	12,340
Total Measures[2]	11	1	29,418	10,123	3,289	42,842

Source: Peoples Gas tracking data and Navigant team analysis.
** Unique Participants. 105 customers had projects in multiple channels.*
† Unique Installed Projects.

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

Table 2-2. PY6 Installed Measure Quantities for PGL

Measure	Quantity Unit	Installed Quantity
Air Sealing	CFM_50 Reduced	8,733
Attic Insulation	Square Feet	981
Bathroom Aerator	Each	10,546
Boiler Reset Controls	MBH	13,019
Boiler Tune Up	MBH	346,467
Custom Project	Project	11
DHW Pipe Insulation	Linear Feet	10,834
DHW Storage Tank Insulation	Square Feet	1,223
High Efficiency Furnace	Each	4
High Efficiency HW Boiler	MBH	32,049
High Efficiency Steam Boiler	MBH	114,123
High Efficiency Water Heater	Each	1,543
HW Pipe Insulation	Linear Feet	5,169
Kitchen Aerator	Each	7,369
Programmable Thermostat	Each	897
Showerhead	Each	10,189
Steam Pipe Averaging Controls	Each	3,639
Steam Pipe Insulation	Linear Feet	222,252
Steam Pipe Insulation Fitting	Each	1,947
Steam Trap Replacement	Each	948
New Construction	Each	1
Other (blend of measures)	Each	5

Source: Peoples Gas tracking data and Navigant team analysis.

The NSG Multi-Family Program had 42 participants in PY6 and completed 877 projects as shown in the following table.

[2] If measure units were reported in the tracking system as linear feet, square feet, or MBH or the measure description was either “prescriptive change” or “custom project,” Navigant treated each row entry of such measure as one measure quantity in this table. For “prescriptive change” and “custom project” measures, the quantity provided in the tracking data did not always reflect the number of measures installed, but rather the total net savings for the project.

Table 2-3. PY6 Volumetric Summary for NSG

Participation	Custom Incentive	New Construction	Jumpstart/ Direct Install	Prescriptive Incentive	PTA Incentive	Total
Participants *	0	0	38	1	6	42
Installed Projects †	0	0	868	1	8	877
Total Measures[3]	0	0	2,890	35	10	2,935

Source: North Shore Gas tracking data and Navigant team analysis.
** Unique Participants. 3 customers had projects in multiple channels.*
† Unique Installed Projects.

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
Bathroom Aerator	Each	928
Boiler Reset Controls	MBH	605
Boiler Tune Up	MBH	8,785
DHW Pipe Insulation	Linear Feet	51
HW Pipe Insulation	Linear Feet	135
Kitchen Aerator	Each	595
Programmable Thermostat	Each	510
Showerhead	Each	845
Steam Pipe Insulation	Linear Feet	127
Steam Pipe Insulation Fitting	Each	33

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

The PGL program participation is dominated by prescriptive and PTA-installed measures, with a significant contribution from boiler measures, steam traps, and steam pipe insulation, as shown in Section 3 and Section 4. The NSG program is dominated by direct install measures. Although the three-year NSG program plan for PY4 through PY6 anticipated installation of several prescriptive / PTA measure types, not many participated, especially in steam system measures. Comparing service territory building stock between PGL and NSG,[4] PGL has many more of the larger multi-family buildings and buildings with steam systems that offer good project opportunities for trade allies and prescriptive rebates.

[3] If measure units were reported in the tracking system as linear feet, square feet, or MBH or the measure description was either "prescriptive change" or "custom project," Navigant treated each row entry of such measure as one measure quantity in this table. For "prescriptive change" and "custom project" measures, the quantity provided in the tracking data did not always reflect the number of measures installed, but rather the total net savings for the project.
[4] Market Analysis/Research in Section 3.1.1 of the *Energy Efficiency Program Plan*, Peoples Gas and North Shore Gas, October 1, 2010. Available at https://www.icc.illinois.gov/docket/files.aspx?no=10-0564&docId=156187.

3. Program Savings Summary

Table 3-1 summarizes the energy savings the PGL Multi-Family Program achieved by path in PY6.

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 Incentive	241,011	103%	248,975	0.78	194,201
Jumpstart/Direct Install	253,161	100%	253,307	0.92	233,042
New Construction Custom	60,007	103%	61,726	0.78	48,146
Prescriptive Incentive	644,285	100%	644,951	0.92	593,355
PTA Incentive	1,355,512	100%	1,355,806	0.92	1,247,342
Total	2,553,976	100%	2,564,765	-	2,316,086

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 Multi-Family Program achieved by path in PY6.

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)
Jumpstart/Direct Install	42,177	100%	42,175	0.92	38,801
Prescriptive Incentive	1,960	100%	1,960	0.92	1,803
PTA Incentive	4,016	101%	4,046	0.92	3,722
Total	48,153	100%	48,181	-	44,326

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 Multi-Family Program includes 22 measure types as shown in the following table. The steam pipe insulation and steam trap replacement measures contributed the most 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)
Air Sealing	759	100%	762	0.92	701
Attic Insulation	981	100%	981	0.92	903
Bathroom Aerator	16,626	100%	16,580	0.92	15,253
Boiler Reset Controls	16,557	100%	16,617	0.92	15,288
Boiler Tune Up	129,185	101%	130,241	0.92	119,822
Custom Project	241,011	103%	248,975	0.78	194,201
DHW Pipe Insulation	38,771	100%	38,792	0.92	35,688
DHW Storage Tank Insulation	6,554	100%	6,548	0.92	6,024
High Efficiency Furnace	532	100%	532	0.92	489
High Efficiency HW Boiler	37,274	100%	37,415	0.92	34,422
High Efficiency Steam Boiler	69,466	100%	69,146	0.92	63,614
High Efficiency Water Heater	67,450	100%	67,449	0.92	62,053
HW Pipe Insulation	21,912	100%	21,903	0.92	20,151
Kitchen Aerator	19,228	100%	19,239	0.92	17,700
New Construction Custom	60,007	103%	61,726	0.78	48,146
Other (blend of measures)	4,603	100%	4,603	0.92	4,235
Programmable Thermostat	38,711	100%	38,867	0.92	35,757
Showerhead	132,483	100%	132,500	0.92	121,900
Steam Pipe Averaging Controls	222,295	100%	222,307	0.92	204,522
Steam Pipe Insulation	532,414	100%	532,427	0.92	489,833
Steam Pipe Insulation Fitting	51,921	100%	51,919	0.92	47,765
Steam Trap Replacement	845,234	100%	845,237	0.92	777,618
Total	2,553,976	100%	2,564,765	-	2,316,086

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.

The NSG Multi-Family Program includes 10 measure types as shown in the following table. The programmable thermostat and showerhead measures contributed the most savings.

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)
Bathroom Aerator	1,463	100%	1,459	0.92	1,342
Boiler Reset Controls	769	100%	772	0.92	710
Boiler Tune Up	3,247	101%	3,274	0.92	3,012
DHW Pipe Insulation	184	100%	184	0.92	169
HW Pipe Insulation	614	100%	614	0.92	565
Kitchen Aerator	1,552	100%	1,553	0.92	1,429
Programmable Thermostat	27,379	100%	27,379	0.92	25,189
Showerhead	10,985	100%	10,986	0.92	10,107
Steam Pipe Insulation	1,446	100%	1,446	0.92	1,330
Steam Pipe Insulation Fitting	514	100%	514	0.92	473
Total	48,153	100%	48,181	-	44,326

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.

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. Section 6 (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)
Air Sealing	CFM_50	0.087	0.087	100%	Illinois TRM, v5.0† (TRM), Section 5.6.1
Bathroom Aerator	Each	CA = 6.1 IU = 1.57	6.1 1.57	100%	TRM Section 4.3.2, 5.4.4
Boiler Reset Controls	MBH	1.272	1.276	100%	TRM Section 4.4.4
Boiler Tune Up	MBH	Space Heating = 0.370 Process = 0.837	0.373 0.838	101%	TRM Section 4.4.3, 4.4.2
Custom Project	Each	Vary	Vary	103%	Program Tracking Data (PTD*), Project File Review, Navigant research ‡
DHW Pipe Insulation	Linear Feet	Vary	Vary	100%	TRM Section 4.4.14
DHW Storage Tank Insulation	Square Feet	5.359	5.354	100%	PTD, TRM Section 4.4.14
High Efficiency Furnace > 95% AFUE (IU)	Each	132.96	132.96	100%	TRM Section 5.3.7
High Efficiency HW Boiler	MBH	1.163	1.167	100%	TRM Section 4.4.10
High Efficiency Steam Boiler	MBH	0.609	0.606	100%	
High Efficiency Water Heater	Each Each	88% TE = 43.728 0.67 EF COM = 35.435	43.723 35.436	100%	TRM Section 4.3.1, 4.3.7
HW Pipe Insulation	Linear Feet	Vary	Vary	100%	TRM Section 4.4.14
Kitchen Aerator	Each	CA = 7.44 IU = 2.61	7.44 2.61	100%	TRM Section 4.3.2, 5.4.4
New Construction Custom	Each	60,007	61,726	103%	Program Tracking Data (PTD*), Project File Review, Navigant research ‡
Other (Blend of Measures)	Each	Vary	Vary	100%	PTD, Navigant research
Programmable Thermostat	Each	CA = 126.07 DI Boiler = 59.93 DI Furnace = 40.5 P Furnace = 22.68	125.91 59.93 40.5 22.68	100%	TRM Section 4.4.18, 5.3.11
Showerhead	Each	CA = 21.728 IU = 13.0	21.732 13.0	100%	TRM Section 4.3.3, 5.4.5
Steam Pipe Averaging Controls	Each	61.09	61.09	100%	TRM Section 4.4.36
Steam Pipe Insulation	Linear Feet	Vary	Vary	100%	TRM Section 4.4.14
Steam Pipe Insulation Fitting	Each	Vary	Vary	100%	
Steam Trap Replacement	Each	Audit = 407.989 No Audit = 110.163	407.992 110.158	100%	TRM Section 4.4.16

** Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas, extract dated January 29, 2018.*
† State of Illinois Technical Reference Manual version 5.0 from http://www.ilsag.info/technical-reference-manual.html. Where different, assumptions indicate Common Areas (CA) and In-Unit (IU) installations.
‡ Project files and monthly billing data provided by Peoples Gas and North Shore Gas. On-site data collected by Navigant.

The "Boiler Tune up" measure has a realization rate of 101% due to the "Boiler Tune Up (COM) – Savings" measure. Navigant found a very slight difference of approximately 0.003 therms between the per-unit ex ante and ex post gross savings estimates for this measure. Navigant attributes this discrepancy to rounding and slight differences on input assumptions.

Recommendation 1. Ensure that the tracking system inputs are the same as values provided in the MMDB.

Navigant conducted engineering file reviews for 11 projects described as "prescriptive change" projects to ensure that projects with savings capped at 20 percent of gas usage were reasonable or did not exceed allowable deemed savings using TRM algorithms. Although Navigant found that the capped savings values were acceptable for each project, the lack of calculation files or custom inputs to savings estimates in the tracking data present a challenge to enable us to quickly verify the claimed savings.

Recommendation 2. Provide calculation files and custom algorithm inputs in "prescriptive change" project files to present how the ex ante savings were calculated. This recommendation is made elsewhere for other programs with similar measure categorization.

5.2 Other Findings and Recommendations

Navigant conducted file reviews on seven of the 11 custom projects that the Multi-Family Program received in PY6. Navigant also conducted a file review on the one new construction project received in PY6. The following findings are related to the custom projects.

Project 1492033 involved the installation of linkageless controls on make-up air units (MAUs). The calculation showed the annual usage of the MAUs to be greater than the estimated space heating usage estimated in the "DATA_UtilityHistory" tab. The calculation assumes that there is increased heating system usage due to reheat during the summer months, when dehumidification is required. This additional usage is justified by a stated assumption that gas usage for hot water "is likely in the 5-10% of gas usage," but does not provide a reference for this range. Online research indicated that this facility has in-unit gas ovens, ranges and fireplaces.

After discussion between the implementation and evaluation teams, an assumption value of 18.5 percent was derived using data from the Residential Energy Consumption Survey (RECS).[5] This value was used to update the calculation. The realization rate for this project is 79 percent.

Project 1572550 involved a boiler burner upgrade. Several portions of the calculation were hard-coded or overridden without explanation or reference. The evaluation team was eventually able to substantiate the values, but not without some difficulty. Projects 982071 and 1588427 involved parking garage demand control ventilation. The square footage, parking spaces, and floors of the parking garage are incorporated into the savings calculation. The implementation contractor did not provide complete referencing for these values.

Recommendation 3. Navigant recommends providing clear references or justifications when assumptions are used in energy savings calculations. The additional documentation will assist

[5] Data available at https://www.eia.gov/consumption/residential/

the evaluation team but should also improve quality control reviews internal to the implementation team.

Project 2367908 involved a boiler replacement. The ex ante calculation was based on reducing only the space heating gas usage of the facility. The trade ally's scope of work indicated that this boiler improvement will also affect the domestic water heating served by the boiler. The calculation was updated to apply the efficiency increase to the facility's water heating gas usage, in addition to the space heating gas usage. This update resulted in a project realization rate of 119 percent.

Recommendation 4. Project documentation should identify the other gas consuming equipment at the facility. Specifically, boiler replacement and boiler upgrade projects should clarify whether domestic water heating loads are served by the improved boilers. More broadly, the additional gas consuming equipment information could help to inform assumptions in the ex ante calculations.

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 TRM[6] 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 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.

The deemed savings verification approach was supplemented by engineering file review of a random sample of 11 prescriptive projects that had savings capped at 20 percent of gas usage (described as "prescriptive change" in the tracking data). Navigant verified the measures installed and the savings reported for these projects as reasonable when compared to the TRM savings.

Engineering Review of Custom and New Construction Project Files

The evaluation team conducted engineering desk file reviews of the one participating new construction project and a sample of seven projects out of the 11 custom projects in existing facilities installed in the PY6 PGL program, to verify project savings that were not based on measures specified in the TRM. Custom projects from existing facilities 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 PGL Custom Projects in Existing Facilities

	Population Summary			Sample Summary		
Program Path	Sampling Strata	Number of Projects (N)*	Ex Ante Gross Savings (Therms)	N*	Ex Ante Gross Savings (Therms)	Sampled % of Population (% Therms)
Custom Projects (Existing Facilities)	1	2	95,066	2	95,066	100%
Custom Projects (Existing Facilities)	2	9	145,945	5	106,837	73%
TOTAL		11	241,011	7	201,903	84%

** The new construction custom results were not included in the gross impact sample for the custom projects shown in this table or the roll up of savings for existing facilities (this table covers only projects in existing facilities). The custom new construction project was analyzed separately.*
Source: PGL and NSG tracking data and Navigant team analysis. NSG did not have a custom project in PY6.

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, engineers estimated ex post gross savings based on their review of documentation and engineering analysis.

To support this review, the implementation contractor provided project documentation in electronic format for each sampled project. Documentation included some or all scanned files of hardcopy application

[6] 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

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.

Results from Engineering Review of Project Files

The table below outlines the summary of adjustments to the existing facility custom project savings and the realization rate estimates at the project level. The overall realization rate for custom projects in existing facilities was 103 percent at a 90 percent confidence level and a 4 percent relative precision.

Table 6-2. PY6 Summary of PGL Existing Facility Custom Sample M&V Results

Project ID	Measure Description	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Summary of Adjustment
982071	Parking Garage DCV	55,822	100%	OK
1588427	Parking Garage DCV	39,244	101%	Adjusted boiler efficiency to reflect project documentation.
2367908	Boiler Replacement	32,874	119%	Adjusted to include DHW loads in the calculation.
1572550	Burner Upgrade	32,201	101%	Adjusted boiler efficiency to reflect project documentation.
1443995	Boiler Replacement	27,808	100%	OK
1289695	Zone Control Valves	9,656	99%	Weather station was updated to closest available.
1492033	Linkageless Controls	4,299	79%	Calculation updated to eliminating overestimation of HVAC usage.
Total*		201,903	103%†	

** New construction results were not included in the gross impact sample or roll up for custom projects in existing facilities shown in this table.*
† This value represents the rolled-up realization rate, not the unweighted sample realization rate.
Source: PGL and NSG tracking data and Navigant team analysis. NSG did not have a custom project in PY6.

Table 6-3. Custom Gross Therm Realization Rates and Relative Precision at 90% Confidence Level

Program Path	Strata	Relative Precision +or-%	Mean RR	Standard Error
Custom (Existing Facilities)	1	0.0%	101%	0.00
	2	6.5%	105%	0.03
Custom (Existing Facilities) Total RR (90/10)		4.1%	103%	0.02

Source: Navigant analysis

The realization rate for Custom New Construction project 908868 was 103 percent. We adjusted boiler efficiency, as well as dishwasher, showerhead and faucet aerator savings according to IL TRM v5.0.

7. APPENDIX 2. IMPACT ANALYSIS SUPPLEMENTAL INFORMATION

In Table 7-1, we show the list of sampled projects described as "prescription change" that the implementer describes as having the ex ante savings capped at 20 percent of the customer annual gas usage. Navigant verified these were steam trap measures and the quantity installed. We verified the savings reported for these projects as reasonable when compared to our estimates using the TRM.

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
1494674	Steam Traps - HVAC Repair/Rep	27	7,685	11,016	
1741082	Steam Traps - HVAC Repair/Rep	16	3,163	6,528	
1696806	Steam Traps - HVAC Repair/Rep	32	6,842	13,056	
1436474	Steam Traps - HVAC Repair/Rep	29	6,756	11,832	
1656999	Steam Traps - HVAC Repair/Rep	25	5,831	10,200	Capped savings acceptable as is
1711815	Steam Traps - HVAC Repair/Rep	29	5,628	11,832	
1436941	Steam Traps - HVAC Repair/Rep	29	5,443	11,832	
1696726	Steam Traps - HVAC Repair/Rep	17	5,364	6,936	
1492069	Steam Traps - HVAC Repair/Rep	102	19,158	41,615	
1837275	Steam Traps - HVAC Repair/Rep	90	16,922	36,719	

Source: PGL and NSG tracking data and Navigant team analysis. NSG did not have a custom project in PY6.

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 Multi-Family 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 Inputs for PGL

Measure	Unit Basis	Quantity	Effective Useful Life (Years)	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Air Sealing	CFM_50 Reduced	8,733	15	759	762	701
Attic Insulation	Square Feet	981	20	981	981	903
Bathroom Aerator	Each	10,546	9	16,626	16,580	15,253
Boiler Reset Controls	MBH	13,019	20	16,557	16,617	15,288
Boiler Tune Up	MBH	346,467	3	129,185	130,241	119,822
Custom Project	Project	11	13	241,011	248,975	194,201
DHW Pipe Insulation	Linear Feet	10,834	15	38,771	38,792	35,688
DHW Storage Tank Insulation	Square Feet	1,223	15	6,554	6,548	6,024
High Efficiency Furnace	Each	4	16.5	532	532	489
High Efficiency HW Boiler	MBH	32,049	20	37,274	37,415	34,422
High Efficiency Steam Boiler	MBH	114,123	20	69,466	69,146	63,614
High Efficiency Water Heater	Each	1,543	20	67,450	67,449	62,053
HW Pipe Insulation	Linear Feet	5,169	15	21,912	21,903	20,151
Kitchen Aerator	Each	7,369	9	19,228	19,239	17,700
New Construction Custom	Each	1	17.4	60,007	61,726	48,146
Other (blend of measures)	Each	5	6	4,603	4,603	4,235
Programmable Thermostat	Each	897	4	38,711	38,867	35,757
Showerhead	Each	10,189	10	132,483	132,500	121,900
Steam Pipe Averaging Controls	Each	3,639	15	222,295	222,307	204,522
Steam Pipe Insulation	Linear Feet	222,252	15	532,414	532,427	489,833
Steam Pipe Insulation Fitting	Each	1,947	15	51,921	51,919	47,765
Steam Trap Replacement	Each	948	6	845,234	845,237	777,618

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

Table 8-2. TRC Inputs for NSG

Measure	Unit Basis	Quantity	Effective Useful Life (Years)	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Bathroom Aerator	Each	928	9	1,463	1,459	1,342
Boiler Reset Controls	MBH	605	20	769	772	710
Boiler Tune Up	MBH	8,785	3	3,247	3,274	3,012
DHW Pipe Insulation	Linear Feet	51	15	184	184	169
HW Pipe Insulation	Linear Feet	135	15	614	614	565
Kitchen Aerator	Each	595	9	1,552	1,553	1,429
Programmable Thermostat	Each	510	4	27,379	27,379	25,189
Showerhead	Each	845	10	10,985	10,986	10,107
Steam Pipe Insulation	Linear Feet	127	15	1,446	1,446	1,330
Steam Pipe Insulation Fitting	Each	33	15	514	514	473

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