



Business Program Evaluation Report

**C&I Prescriptive Rebate Program
C&I Energy Jumpstart Program**

FINAL

**Energy Efficiency Plan:
Gas Plan Year 5
(6/1/2015-5/31/2016)**

**Presented to
Peoples Gas and North Shore Gas**

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E. EXECUTIVE SUMMARY

This report presents a summary of the findings and recommendations from the impact and process evaluation of the GPY5¹ Peoples Gas (PG) and North Shore Gas (NSG) C&I Prescriptive Rebate Program and C&I Energy Jumpstart Program, which are part of the comprehensive Business Program.² This report covers evaluation activities for measures installed and natural gas savings realized through the Standard Incentives path³ and the Direct Install path⁴ which together are referred to as the C&I Prescriptive Program in this report. This report also covers the verification of realized savings from New Construction projects implemented in GPY5.⁵ Franklin Energy Services LLC., (Franklin Energy) is the implementation contractor for the PG and NSG Business program, with trade ally engagement and technical support for program delivery and marketing.

The Standard Incentives path provides standardized incentives for existing customers and new construction projects. Standard incentives are based on approximately 50 percent of incremental costs. These incentives focus on heating systems, water heating systems, pipe insulation, steam traps, various boiler controls, and food service equipment. The direct installation measures are provided at no cost to the customers, including low flow showerheads, kitchen and faucet aerators, and pre-rinse spray valves for appropriate businesses. The Direct Install path and the Engineering Assistance path (no-cost services) provide a high-level assessment of other opportunities that the customer or building owner can implement.

Navigant's evaluation involved verifying the compliance of the program gross savings with the Illinois Technical Reference Manual version 4.0 (TRM v4.0)⁶ and where needed, applying custom adjustment to claimed savings. Navigant calculated GPY5 verified net impact savings using the approved net-to-gross ratio (NTGR) deemed through Illinois Energy Efficiency Stakeholder Advisory Group (SAG) consensus.⁷

E.1 Program Savings

Table E-1 summarizes the natural gas savings from the GPY5 Peoples Gas C&I Prescriptive Program. The verified net savings are 1,219,419 therms, including 1,208,092 therms from the combined direct

¹ The GPY5 program year began June 1, 2015 and ended May 31, 2016.

² The comprehensive Business Program bundles existing programs into paths, and allows all eligible customers to access any of the five paths as a one-stop-shop based on the customer's needs – the paths are: Direct Install, Engineering Assistance, Standard Incentives, Custom Incentives, and Gas Optimization (source: PG & NSG Energy Efficiency Plan for the Second Triennial Plan period of June 1, 2014 – May 31, 2017 —Plan 2).

³ Delivered as the C&I Prescriptive Rebate Program.

⁴ Delivered as the C&I Energy Jumpstart Program.

⁵ Delivered as New Construction Prescriptive Program.

⁶ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 4.0, available at: <http://www.ilsag.info/technical-reference-manual.html>.

⁷ The Net-to-Gross Ratio (NTGR) used for calculating verified net savings is deemed prospectively through a consensus process managed by the Illinois Energy Efficiency Stakeholder Advisory Group (SAG). Deemed NTGRs (as well historical verified gross Realization Rates) are available at:

http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Peoples_Gas_and_North_Shore_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

install and Standard Incentive paths, and 11,327 therms from the New Construction Prescriptive Program. The overall verified gross realization rate for energy savings is 99 percent, after Navigant made adjustments to the ex ante savings for some measures, including: steam traps, pipe insulation, boiler tune-ups and boiler reset controls.

Table E-1. GPY5 Peoples Gas C&I Prescriptive Program Natural Gas Savings

Program/Path	Ex Ante Gross Savings ⁸ (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR ⁹	Verified Gross Savings (Therms)	NTGR ¹⁰	Verified Net Savings ¹¹ (Therms)
Direct Install	570	467	1.00	571	0.82	468
Standard Incentives	1,927,369	1,214,242	0.99	1,916,863	0.63	1,207,624
New Construction Prescriptive	12,312	11,327	1.00	12,312	0.92	11,327
GPY5 Total	1,940,251	1,226,036	0.99	1,929,746	n/a	1,219,419

Source: Evaluation analysis of GPY5 program tracking data (July 19, 2016 data extract) and Illinois Statewide Technical Reference Manuals.¹²

Table E-2 summarizes the natural gas savings from the GPY5 North Shore Gas C&I Prescriptive Program. The verified net savings are 155,503 therms. The verified gross realization rate for energy savings is 100 percent. Navigant applied adjustment to the steam trap ex ante savings.

Table E-2. GPY5 North Shore Gas C&I Prescriptive Program Natural Gas Savings

Program/Path	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Direct Install	-	-	-	-	0.82	-
Standard Incentives	247,591	155,983	1.00	246,830	0.63	155,503
GPY5 Total	247,591	155,983	1.00	246,830	n/a	155,503

Source: Evaluation analysis of GPY5 program tracking data (July 19, 2016 data extract) and Illinois Statewide Technical Reference Manuals.

⁸ The term “Ex Ante” refers to the forecasted savings reported by the Program Administrator that have not been independently verified through evaluation. Savings that have been independently verified by the Evaluation Contractor are referred to as “Verified”.

⁹ Verified Gross Realization Rate (RR) = Verified Gross Savings/Ex Ante Gross Savings.

Verified Gross Savings = RR * Ex Ante Gross Savings

¹⁰ The Net-to-Gross Ratio (NTGR) used for calculating verified net savings is deemed prospectively through a consensus process managed by the Illinois Energy Efficiency Stakeholder Advisory Group (SAG). Deemed NTGRs (as well historical verified gross Realization Rates) are available at:

http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Peoples_Gas_and_North_Shore_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

¹¹ Verified Net Savings = NTGR * Verified Gross Savings

¹² Illinois Statewide Technical Reference Manual for Energy Efficiency (TRM). The effective TRM for GPY5 is Version 4.0, available from the Illinois Energy Efficiency Stakeholder Advisory Group web site: http://www.ilsag.info/il_trm_version_4.html. The list of TRM Version 4.0 errata in effect for GPY5 is provided in TRM Version 5.0, available at: http://www.ilsag.info/il_trm_version_5.html

E.2 Program Savings by Measure

Table E-3 summarizes the natural gas savings from the Peoples Gas C&I Prescriptive Program by measure category. Details of the adjustment between the ex ante gross and verified gross savings are provided in Section 3.

Table E-3. GPY5 Peoples Gas C&I Prescriptive Program Natural Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Water Efficiency Device	570	467	1.00	570	0.82	468
Kitchen Service Equipment	126,891	79,941	1.00	126,891	0.63	79,942
Pipe Insulation	23,272	14,661	1.00	23,376	0.63	14,727
Space, Process Heating & Controls	196,358	123,706	1.00	195,957	0.63	123,453
Steam Trap	1,580,849	995,934	0.99	1,570,639	0.63	989,502
New Construction Prescriptive	12,312	11,327	1.00	12,312	0.92	11,327
GPY5 Total	1,940,251	1,226,036	0.99	1,929,746	n/a	1,219,419

Source: Evaluation analysis of GPY5 program tracking data (July 19, 2016 data extract).
 * RR estimates are rounded to 2 digits. Direct application may produce rounding errors.

Table E-4 summarizes the natural gas savings from the GPY5 North Shore Gas C&I Prescriptive Program by measure category. Details of the adjustment between the ex ante gross and verified gross savings are provided in Section 3.

Table E-4. GPY5 North Shore Gas C&I Prescriptive Program Natural Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Space, Process Heating & Controls	54,290	34,203	1.00	54,205	0.63	34,149
Steam Trap	193,102	121,655	1.00	192,427	0.63	121,229
Water Heater	199	125	1.00	199	0.63	125
GPY5 Total	247,591	155,983	1.00	246,830	0.63	155,503

Source: Evaluation analysis of GPY5 program tracking data (July 19, 2016 data extract).
 * RR estimates are rounded to 2 digits. Direct application may produce rounding errors.

E.3 Impact Estimate Parameters for Future Use

The evaluation team did not conduct any additional research on NTGR components or impact savings parameters for deeming in future versions of the Illinois TRM as part of the GPY5 evaluation.

E.4 Program Volumetric Detail

Table E-5 and Table E-6 below present GPY5 program participation reported by the Program Administrator Franklin Energy for the Peoples Gas and North Shore Gas programs. Detailed volumetric breakdown of the measure type and savings quantity are provided in the program-level analysis in Section 3.

Table E-5. GPY5 Peoples Gas C&I Prescriptive Program Primary Participation

Participation	Direct Install	Standard Incentive	New Construction	Program Total
Participants ¹³	1	56	1	58
Completed Projects	3	89	1	93
Total Measures ¹⁴	81	1,811	2	1,894

Source: Navigant analysis of GPY5 program tracking data (July 19, 2016 data extract).

Table E-6. GPY5 North Shore Gas C&I Prescriptive Program Primary Participation

Participation	Direct Install	Standard Incentive	New Construction	Program Total
Participants	-	9	-	9
Completed Projects	-	11	-	11
Total Measures	-	21	-	21

Source: Navigant analysis of GPY5 program tracking data (July 19, 2016 data extract).

¹³ Participants are defined based on the project site address and number of accounts.

¹⁴ For evaluation reporting purpose, if a measure quantity is reported in the tracking system in linear feet, HP, MBH, or square feet, Navigant treated each row entry of such measure as one measure quantity in this table. Actual quantity of industrial steam traps are not reported in the tracking database. Navigant treated each row entry of such measure as one measure quantity in this table.

E.5 Findings and Recommendations

The following provides insight into key program findings and recommendations.¹⁵

Verified Gross Impacts and Realization Rate

Finding 1. The GPY5 Peoples Gas C&I Prescriptive Program achieved verified gross energy savings of 1,929,746 therms (including savings from direct install, C&I prescriptive and new construction measures). Evaluation adjustments resulted in a gross realization rate of 99 percent. The North Shore Gas C&I Prescriptive Program achieved verified gross energy savings of 246,830 therms, reflecting verified gross realization rate of 100 percent.

Finding 2: Steam traps continue to provide the bulk of program savings, representing 81 percent for the PG program and 78 percent for the NSG program verified gross savings. Space and process heating and controls measures are the next largest program savings contributors, representing 10 percent for PG and about 22 percent for NSG.

Verified Net Impacts

Finding 3. The Peoples Gas GPY5 program achieved 1,219,419 therms verified net savings, including 1,208,092 therms from the combined Direct Install and Standard Incentive paths, and 11,327 therms from the New Construction Prescriptive Program. This represented 156 percent of its net savings goal of 779,863 therms. The North Shore Gas GPY5 program achieved 155,503 therms verified net savings, representing 569 percent of its net savings goal of 27,338 therms.¹⁶

Tracking System Review

Finding 4. Navigant reviewed the program tracking database and found that although the tracking database captured vital program information on impact savings and participation, the database did not directly track the type and unit quantity of industrial steam traps installed in GPY5. The evaluation team referred to the project documentation stored within the tracking system to verify a sample of the actual unit count of industrial steam traps installed in GPY5. We verified that Franklin Energy applied the appropriate TRM deemed inputs to calculate industrial steam trap savings, except that we adjusted the boiler efficiency input value to match the TRM, which resulted in reduction of the ex ante savings with 99 percent gross realization rate for steam traps.

Recommendation 1. As industrial steam traps contribute the majority of program savings, it is recommended that the tracking system provide TRM-based steam system information of the various types of steam traps (sector application, pressure) and unit quantity (audited or not audited) of each type installed. Incorporating this data as tracked fields in the program database will facilitate “real-time” verification (e.g., after the first quarter of a program year) by the evaluation team and mid-year reporting of preliminary findings to the program team. This

¹⁵ The Executive Summary presents the most important of the Section 6 Findings and Recommendations. Findings and Recommendations in the Executive Summary are numbered to match Section 6 for consistent reference to individual findings and recommendations. Therefore, gaps in numbering may occur in the Executive Summary.

¹⁶ Realized savings and goals report generated from the Franklin Energy Efficiency Manager program information management system, September 9, 2016.

data can be tracked separately and provided as a supplemental data to the evaluation team if it cannot be built into the tracking system.

Recommendation 2. Franklin Energy should create a separate field or a supplemental data for tracking projects in which savings are capped at 20 percent of the annual energy usage. This supplemental data should provide detailed information of the projects annual energy usage, including the measures installed and how the savings were determined, if different from using deemed TRM inputs.

Finding 5. Navigant found that the tracking database savings input did not always match Franklin Energy's "Master Measure Database" spreadsheet (MMDB) that documents their approach to compliance with the Illinois TRM. Navigant adjusted the savings for industrial steam traps to use the TRM (v4.0) deemed boiler efficiency value of 80.7 percent from 80 percent. We also updated the default savings for pipe insulation from GPY4 values. Boiler tune ups and boiler reset controls default savings were adjusted to match the MMDB, which was in compliance with the TRM.

Recommendation 3. As noted, Franklin Energy's default MMDB workbook is mostly in compliance with the Illinois TRM. We recommend additional quality control checks when transferring the default inputs calculations to the tracking system. Franklin Energy should consider creating a separate input field for tracking unadjusted program gross ex ante savings that can be directly compared with TRM gross savings values – this would facilitate verification checks.

Program Volumetric Findings

Finding 6. The Peoples Gas GPY5 C&I Prescriptive Program involved 58 participants who implemented 93 projects and 1,894 measures. The North Shore Gas C&I Prescriptive Program reported nine participants in GPY5 who implemented 11 projects and 21 measures. The Peoples Gas GPY5 program implemented a prescriptive new construction project for the first time. The Peoples Gas program installed fewer direct install faucet aerators and showerheads compared with the previous year, with only one participant. Overall the Peoples Gas program implemented fewer measure types compared with the previous year. The North Shore Gas program implemented more steam traps and a mix of other measures than the previous year. Steam traps represented the majority of savings for both utilities.

1. INTRODUCTION

1.1 Program Description

The Second Triennial Plan¹⁷ of the Peoples Gas (PG) and North Shore Gas (NSG) comprehensive Business Program bundles existing programs into five paths and allows all eligible customers to access any of the paths as a one-stop-shop based on the customer's needs. The paths are Direct Install, Engineering Assistance, Standard Incentives, Custom Incentives, and Gas Optimization. Franklin Energy Services LLC (Franklin Energy) implements the comprehensive Business Program with trade ally engagement and technical support for program delivery and marketing. This report covers our evaluation of the Standard Incentives path, delivered as the C&I Prescriptive Rebate Program and the Direct Install path, delivered as the C&I Energy Jumpstart Program, which together are referred in this report as the "C&I Prescriptive Program". The evaluation also covers the verification of realized savings from New Construction Prescriptive Program introduced in GPY5.

The Standard Incentives path provides standardized incentives for existing customers and new construction projects where applicable. These incentives focus on heating systems, water heating systems, pipe insulation, steam traps, various boiler controls, and food service equipment. The direct installation measures are provided at no cost to the customers, including the direct installation of low flow showerheads, kitchen and faucet aerators, and pre-rinse spray valves for appropriate businesses. The Direct Install path and the Engineering Assistance path (no-cost services) provide a high-level assessment of other opportunities that the customer or building owner can implement.

1.2 Evaluation Objectives

The evaluation team identified the following key researchable questions for GPY5

1.2.1 Impact Questions

1. What are the program's verified gross savings? What caused the realization rate (RR) adjustments?
2. What are the program's verified net savings?
3. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

1.2.2 Process Questions

The GPY5 process evaluation activities were limited to interviews with program staff to verify information about the tracking database and data requirements for the evaluation.

¹⁷ Peoples Gas/North Shore Gas Energy Efficiency Plan for the Second Triennial Plan period of June 1, 2014 – May 31, 2017 (known as —Plan 2). The comprehensive business program paths include – Direct Install, Engineering Assistance, Standard Incentives, Custom Incentives, and Gas Optimization.

2. EVALUATION APPROACH

This section provides an overview of the data collection methods, gross and net impact evaluation approaches, and process evaluation approaches that occurred for the GPY5 evaluation. To determine verified gross savings, the evaluation team verified per unit savings for each program measure by (1) reviewing the tracking database, (2) comparing the use of measure algorithms in the tracking database to their use in the Illinois TRM v4.0 to ensure that they are appropriately applied or through secondary research of custom inputs, and (3) cross-checking totals. Navigant multiplied measure quantities reported in the program tracking database by the verified per unit savings values. The verified net savings were calculated using a net-to-gross ratio (NTGR) that was deemed for GPY5. Navigant interviewed program staff to verify information about the tracking database.

2.1 Overview of Data Collection Activities

The core data collection activities included review of the program’s tracking data and verification of direct install measures and prescriptive incentives products quantity and savings against the TRM v4.0. The primary data collection activities are shown in the following table.

Table 2-1. Primary Data Collection Activities

What	Who	Target Completes	Completes Achieved	When
Review program materials, invoices, monthly scorecard	Program Documents, Participants' Completed Projects	All	All	June-September 2016
Tracking System & Desk Review	Participants' Completed Projects	All	All	August- October 2016
In Depth Interviews	Program Management	2	2	April-August 2016

Source: Navigant.

2.2 Verified Savings Parameters

This section presents the approach Navigant employed in conducting verified gross and net program savings.

2.2.1 Verified Gross Program Savings Analysis Approach

Navigant estimated verified per-unit savings for each program measure using impact algorithms and input assumptions defined by the Illinois TRM for deemed measures¹⁸, and evaluation research for non-deemed measures. Table 2-2 below presents the sources for parameters that were used in verified gross savings analysis, indicating which were examined through GPY5 evaluation research and which were deemed.

Table 2-2. GPY5 Verified Gross Savings Parameter Data Sources

Parameter	Data Source	Deemed or Evaluated?
Measure Quantity Installed	Program tracking system	Evaluated
Verified Gross Realization Rate	Program tracking data, TRM, Navigant	Evaluated
Commercial HVAC measure savings assumptions	Illinois TRM, version 4.0, section 4.4‡	Deemed
Commercial hot water measure savings assumptions	Illinois TRM, version 4.0, section 4.3‡	Deemed
Steam traps savings assumptions	Illinois TRM, version 4.0, section 4.4.16‡	Deemed
Commercial food service equipment savings assumptions	Illinois TRM, version 4.0, section 4.2‡	Deemed
Commercial pipe insulation savings assumptions	Illinois TRM, version 4.0, section 4.4.14‡	Deemed
Commercial Kitchen Demand Control Ventilation (DCV)	Illinois TRM, version 4.0, section 4.2.16‡	Deemed
Commercial Water Heaters savings assumptions	Illinois TRM, version 4.0, section 4.3‡	Deemed
New Construction Prescriptive measure assumptions	Illinois TRM, version 4.0, section 4.4.10‡	Deemed

Source: Evaluation analysis of programs data and Illinois TRM documents.

‡ Source: State of Illinois Technical Reference Manuals. PG&NSG MMDB PY5 - 04122016, produced by Franklin Energy Services;

2.2.2 Verified Net Program Savings Analysis Approach

Verified net energy savings were calculated by multiplying the verified gross savings estimates by a deemed net-to-gross ratio (NTGR). In GPY5, the NTGR estimates used to calculate the verified net savings were based on past evaluation research and approved through a consensus process managed through the Illinois Energy Efficiency Stakeholder Advisory Group (SAG)¹⁹. Table 2-3 presents the deemed NTGR by program path.

¹⁸ Because the Illinois TRM provides multiple options for selecting input assumptions, Franklin Energy Services produces a “Master Measure Database” spreadsheet that documents their approach to compliance with the Illinois TRM. The spreadsheet is PG&NSG MMDB PY5 - 04122016, produced by Franklin Energy

¹⁹ Source: Deemed NTGR values are available on the Illinois Energy Efficiency Stakeholder Advisory Group web site. http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Peoples_Gas_and_North_Shore_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

Table 2-3. Net-to-Gross Ratios for Evaluation of the GPY5 C&I Prescriptive Program

Program Path	Utility	GPY5 Deemed NTG Value
Direct Install	PG & NSG	0.82
Prescriptive Rebates	PG & NSG	0.63
New Construction Prescriptive	PG & NSG	0.92

Source: Documents available on the Illinois Energy Efficiency Stakeholder Advisory Group web site.

2.3 Process Evaluation

The GPY5 process evaluation activities were limited to interviews with program staff to verify information about the tracking database and data requirements for the evaluation. We also reviewed program materials to determine if the process recommendations from the GPY4 evaluation were implemented or impacted customer participation.

3. GROSS IMPACT EVALUATION

This section provides detailed analysis and findings from the file reviews and tracking system review of the measures installed and gross savings by program path and delivery channel. Overall, the Peoples Gas GPY5 C&I Prescriptive Program achieved 1,917,434 therms verified gross savings, representing a 99 percent gross realization rate. The North Shore Gas program achieved 246,830 therms verified gross savings, representing a 100 percent gross realization rate. Navigant made adjustments to the savings input assumptions for steam traps, boiler tune ups and controls, and pipe insulation. The sections below provide details of the findings.

3.1 Program Tracking Data Review

Navigant downloaded the final tracking data for the C&I Prescriptive Program evaluation from Franklin Energy Services' Efficiency Manager²⁰ data management platform on July 19, 2016. The evaluation team reviewed the tracking data to verify the completeness and accuracy of the tracking system data to identify any issues that would affect the impact evaluation of the program. We compared the tracking system savings input assumptions to Franklin Energy Services' "Master Measure Database" spreadsheet (MMDB)²¹ that documents their approach to compliance with the Illinois TRM. We verified that the program tracking system was accurately recording measure counts and savings, but we recommend updates for certain measures savings inputs for consistency with the TRM.

Key findings include:

- a. The evaluation team found duplicate savings calculations for the steam pipe insulation in the PY5 MMDB spreadsheet which feeds into the tracking system. Upon further inquiry, Franklin Energy clarified that the tracking system was using both GPY4 and GPY5 default savings estimates which are both existing in the MMDB spreadsheet. We reviewed the savings per unit linear feet for each pipe size and applied the necessary adjustments. The net effect is upward adjustment of savings for certain steam pipe sizes and reduction for others, producing an additional 104 therms verified savings. The pipe insulation savings gross realization rate is 100 percent. Details of the verified per unit savings are provided in Table 3-5.
- b. The tracking system input field for measure quantity did not include tracking of the actual unit quantities of various types of industrial steam traps installed. The evaluation team referred to the project documentation stored within Efficiency Manager to verify a sample of the actual unit count of industrial steam traps installed in GPY5. We also found that the industrial steam trap ex ante savings input assumed a boiler efficiency of 80 percent. This value was updated to 80.7 percent, the applicable TRM (v4.0) value. The adjustment resulted in reduction of the claimed savings by 10,210 therms. The gross realization rate for steam trap savings is 100 percent for HVAC and 99 percent for the industrial steam traps.
- c. The evaluation team identified four PG industrial steam trap projects and two NSG boiler tune up projects in the tracking system which were described as "prescriptive change". Franklin Energy clarified that for these projects, using the TRM assumptions produced significantly more savings but the results were inconsistent with the nature of the projects. Franklin Energy capped the savings at 20 percent of the account's annual gas usage. We reviewed the custom assumptions

²⁰ Franklin Energy has renamed the Bensight information management system to "Efficiency Manager", and evaluation reports will use the name Efficiency Manager going forward.

²¹ PG&NSG MMDB PY5 - 04122016, produced by Franklin Energy

and the savings inputs, and agreed that the savings cap was reasonable. We did not adjust the savings any further and maintained a 100 percent gross realization rate.

- d. We adjusted the unit savings for boiler reset controls and lowered the boiler tune up for space heating, to align with what we found in the Franklin MMDB, which was consistent with the TRM (v4.0). Details of the verified per unit savings are provided in Table 3-5.
- e. Navigant also reviewed the documentation for the new construction project #524265. This project installed two condensing boilers, replacing decommissioned steam boilers. The boiler capacity was 8,000 MBH which produced 12,312 therms verified gross savings, based on the TRM deemed inputs and algorithm.

3.2 Program Volumetric Findings

As shown in Table 3-1 and Table 3-2, the Peoples Gas C&I Prescriptive Program reported 58 participants in GPY5 and implemented 93 projects and 1,894 measures. The North Shore Gas C&I Prescriptive Program reported nine participants in GPY5 and implemented 11 projects and 21 measures.

Table 3-1. GPY5 Peoples Gas C&I Prescriptive Program Primary Participation

Participation	Direct Install	Standard Incentive	New Construction	Program Total
Participants ²²	1	56	1	58
Completed Projects	3	89	1	93
Total Measures ²³	81	1,811	2	1,894

Source: Navigant analysis of GPY5 program tracking data (July 19, 2016 data extract).

Table 3-2. GPY5 North Shore Gas C&I Prescriptive Program Primary Participation

Participation	Direct Install	Standard Incentive	New Construction	Program Total
Participants	-	9	-	9
Completed Projects	-	11	-	11
Total Measures	-	21	-	21

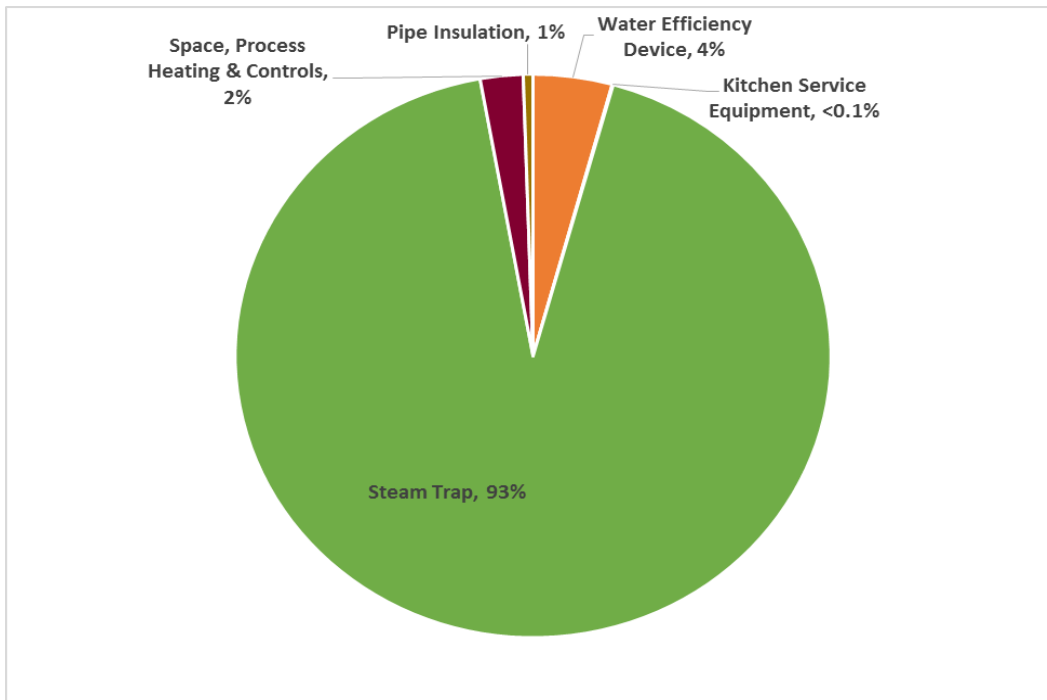
Source: Navigant analysis of GPY5 program tracking data ((July 19, 2016 data extract).

Figure 3-1 and Figure 3-2 disaggregate the total measure quantities provided in Table 3-1 and Table 3-2 by measure type. For Peoples Gas, steam traps contributed 93 percent of the measure quantity in GPY5, while equipment measures (including hot water efficiency measures and kitchen service equipment) contributed four percent, HVAC and process heating and controls were 2 percent, and the remaining were pipe insulation. For North Shore Gas, steam traps account for 97 percent of the measure quantity and HVAC measures and water heaters make up most of the remaining three percent.

²² Participants are defined based on the project site address and number of accounts.

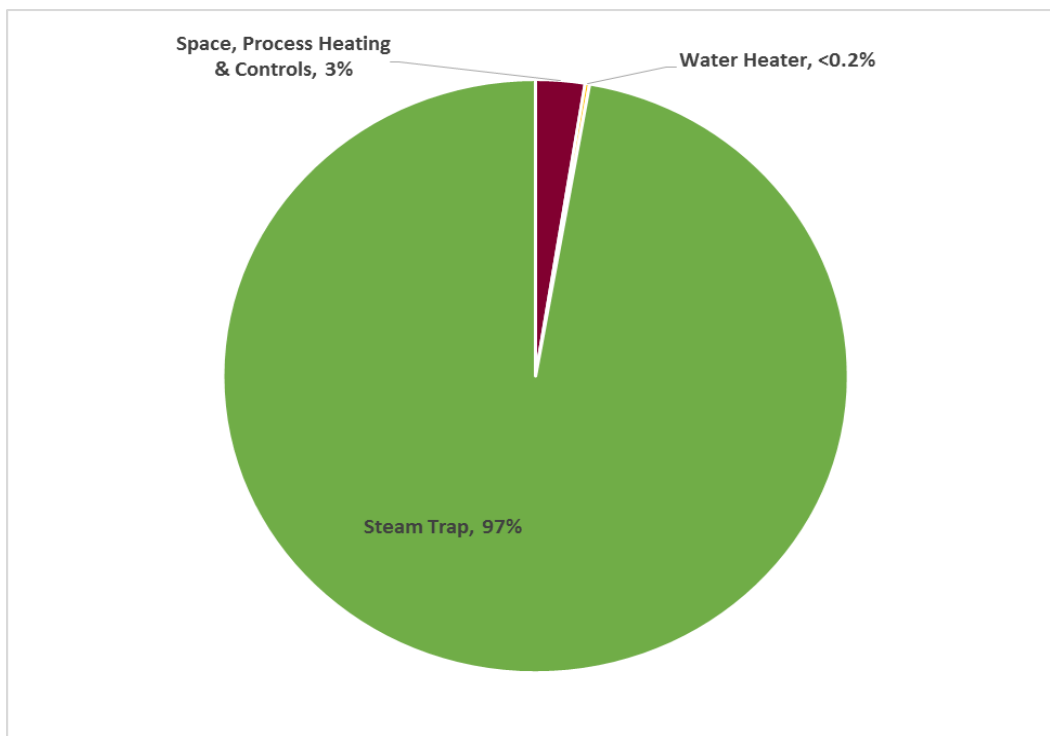
²³ For evaluation reporting purpose, if a measure quantity is reported in the tracking system in linear feet, HP, MBH, or square feet, Navigant treated each row entry of such measure as one measure quantity in this table. Actual quantity of industrial steam traps are not reported in the tracking database. Navigant treated each row entry of such measure as one measure quantity in this table.

Figure 3-1. Peoples Gas: Participation Percentages by Measure Type



Source: Navigant Analysis

Figure 3-2. North Shore Gas: Participation Percentages by Measure Type



Source: Navigant Analysis

Table 3-3 and Table 3-4 below provide additional measure details by count and unit of savings measurement.

Table 3-3. Peoples Gas GPY5 C&I Prescriptive Program Measure Count

Measure	Unit	Install Type	Ex Ante Measure Count	Verified Measure Count
Bathroom Faucet Aerator	Each	DI	68	68
Kitchen Faucet Aerator	Each	DI	12	12
Showerhead	Each	DI	1	1
Boiler Reset Controls	MBH	Standard Incentive	5,040	5,040
Boiler Tune Up - Space Heating	MBH	Standard Incentive	329,610	329,610
Boiler Tune Up - Process	MBH	Standard Incentive	30,226	30,226
DCV - Kitchen	HP	Standard Incentive	114	114
Direct Fired Heaters	MBH	Standard Incentive	11,416	11,416
Double Rack Oven	Each	Standard Incentive	1	1
High Efficiency Boiler >=82% TE	MBH	Standard Incentive	4,119	4,119
Pipe Insulation	Linear Foot	Standard Incentive	3,876	3,876
Steam Traps - HVAC Repair/Rep	Each	Standard Incentive	1,718	1,718
Steam Traps - Industrial Rep	Each	Standard Incentive	Unit counts not tracked	Verified a sample
New Construction Prescriptive Boilers	MBH	Standard Incentive	8,000	8,000

Source: Navigant analysis of program tracking data.

Table 3-4. North Shore Gas GPY5 C&I Prescriptive Program Measure Count

Measure	Unit	Install Type	Ex Ante Measure Count	Verified Measure Count
Boiler Tune Up - Process	MBH	Standard Incentive	22,988	22,988
High Efficiency Boiler >=88% TE	MBH	Standard Incentive	22,700	22,700
Steam Traps - HVAC Repair/Rep	Each	Standard Incentive	418	418
Steam Traps - Industrial Rep.	Each	Standard Incentive	Unit counts not tracked	Verified a sample
Storage Water Heater	MBH	Standard Incentive	199	199

Source: Navigant analysis of program tracking data.

Key findings include:

1. The Peoples Gas program installed fewer direct install faucet aerators and showerheads compared with the previous year. Overall, the Peoples Gas program also implemented fewer measure types compared with the previous year.
2. The North Shore Gas program implemented more steam traps and a mix of other measures than the previous year.
3. The People Gas program implemented one new construction project. This project installed two condensing boiler units, replacing decommissioned steam boilers. Navigant verified the savings using the TRM algorithm and assumptions.

3.3 Gross Program Impact Parameter Estimates

As described in Section 2, Navigant estimated verified per unit savings for each program measure using impact algorithms and input assumptions defined in the Illinois TRM and documentation of TRM compliance provided by Franklin Energy Services. Table 3-5 presents the key parameters and the references used in the verified gross savings calculations.

Navigant made adjustments to the default unit savings for the steam pipe insulation, mostly the fittings and valve insulations. Another adjustment was the steam trap boiler efficiency value, which was updated to be consistent with the TRM (v4.0), and thus reduced the ex ante savings. We adjusted the unit savings for boiler reset controls and the boiler tune up for space heating to match with TRM v4.0.

Table 3-5. GPY5 C&I Prescriptive Program Ex Ante and Verified Gross Savings Parameters

Measure	Ex Ante Gross Savings (Therms/Unit)	Verified Gross Savings (Therms/Unit)	Method	Data Source (TRM v4.0)
Bathroom Faucet Aerator	6.85	6.86	Deemed	
Kitchen Faucet Aerator	6.83	6.86	Deemed	Sections 4.3
Showerhead	21.73	21.73	Deemed	
Boiler Reset Controls	0.94	1.231	Deemed	
Boiler Tune Up - Space Heating	0.365	0.359	Deemed	
Boiler Tune Up - Process	0.841	0.838	Deemed	Sections 4.4
Direct Fired Heaters	2.30	2.31	Deemed	
High Efficiency Boiler >=82% TE	0.587	0.584	Deemed	
High Efficiency Boiler >=88% TE	1.539	1.539	Deemed	
DCV - Kitchen	1,100	1,100	Deemed	Sections 4.2
Double Rack Oven	2,064	2,064	Deemed	
Pipe Insulation - DHW Medium 1.25"-2"	4.25	4.25	Deemed	
Pipe Insulation - DHW Small <=1.25"	2.44	2.44	Deemed	
Pipe Insulation - Steam - Large 5.1" to 8"	24.27	24.26	Deemed	
Pipe Insulation - Steam - Med 2.1" to 5"	13.14	13.15	Deemed	Sections 4.4.14 & 4.4.24
Pipe Insulation - Steam - Small <2"	3.05	3.05	Deemed	
Pipe Insulation - Steam Large Fitting	51.50	45.20	Deemed	
Pipe Insulation - Steam Med Fitting	12.50	12.21	Deemed	
Pipe Insulation - Steam Med Valve	37.40	49.14	Deemed	
HVAC Steam Traps (audited)	327.60	327.61		
HVAC Steam Traps (unaudited)	88.46	88.46	Deemed	Sections 4.4.16
Industrial Steam Trap	Vary	Vary. Adjusted		
Storage Water Heater	1.004	1.004	Deemed	Sections 4.3.1

Source: Navigant analysis of program tracking data and Franklin Energy Services documents. Some minor differences occur due to rounding (e.g., faucet aerators). The effective TRM for GPY5 is Version 4.0, available from the Illinois Energy Efficiency Stakeholder Advisory Group web site: http://www.ilsag.info/il_trm_version_4.html.

3.4 Verified Gross Program Impact Results

As shown in Table 3-6, the GPY5 Peoples Gas C&I Prescriptive Program reported ex ante gross energy savings of 1,940,251 therms (including savings from direct install, C&I prescriptive and new construction measures). Evaluation adjustments resulted in verified gross energy savings of 1,929,746 therms, reflecting the program’s gross realization rate of 99 percent.

Table 3-6. GPY5 Peoples Gas C&I Prescriptive Program Impact Results

Measure Category	Quantity Unit	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Direct Install Measures					
Bathroom Aerator	Each	68	466	1.00	467
Kitchen Aerator	Each	12	82	1.00	82
Showerhead	Each	1	22	1.00	22
<i>Direct Install Subtotal</i>		<i>81</i>	<i>570</i>	<i>1.00</i>	<i>571</i>
Prescriptive Incentive Measures					
Boiler Tune Up - Space Heating	MBH	329,610	120,334	0.98	118,472
Boiler Tune Up - Process	MBH	30,226	42,610	1.00	42,519
Efficient Boiler >=82% TE	MBH	4,119	2,419	1.00	2,407
Boiler Reset Controls	MBH	5,040	4,720	1.31	6,205
Direct Fired Heaters	MBH	11,416	26,275	1.00	26,354
Double Rack Oven	Each	1	2,064	1.00	2,064
DCV-Kitchen	HP	114	124,827	1.00	124,827
HVAC Steam Traps	Each	1,718	402,534	1.00	402,535
Industrial Steam Traps	Unit counts not tracked	Verified a sample	1,178,315	0.99	1,168,104
Pipe Insulation (DHW & Steam/HW Boilers)	Linear Foot	3,876	23,272	1.00	23,376
<i>Prescriptive Incentive Subtotal</i>			<i>1,927,369</i>	<i>0.99</i>	<i>1,916,863</i>
New Construction Prescriptive					
Condensing Boilers	MBH	8,000	12,312	1.00	12,312
PG C&I Prescriptive Total			1,940,251	0.99	1,929,746

Sources: Program tracking data and Navigant analysis

As shown in Table 3-7, the GPY5 North Shore Gas C&I Prescriptive Program reported ex ante gross energy savings of 247,591 therms. Minor evaluation adjustments resulted in verified gross energy savings of 246,830 therms, reflecting the program's gross realization rate that rounded to 100 percent.

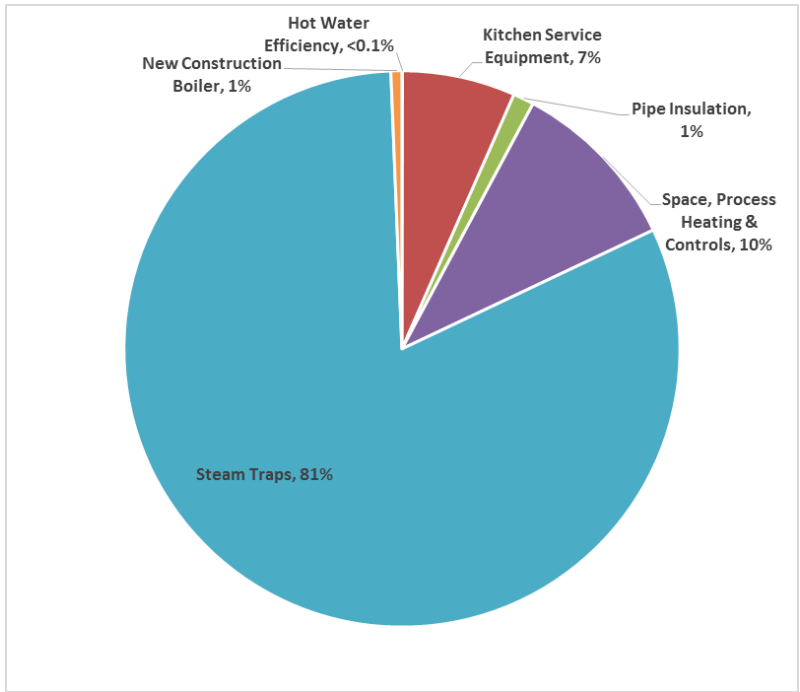
Table 3-7. GPY5 North Shore Gas C&I Prescriptive Program Impact Results

Measure Category	Unit	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Prescriptive Incentive Measures					
Boiler Tune Up - Process	MBH	22,988	19,340	1.00	19,269
High Efficiency Boiler >=88% TE	MBH	22,700	34,950	1.00	34,935
HVAC Steam Traps	Each	418	115,236	1.00	115,236
Industrial Steam Traps	Unit counts not tracked	Verified a sample	77,866	0.99	77,191
Storage Water Heater	MBH	199	199	1.00	199
NSG C&I Prescriptive Total			247,591	1.00	246,830

Source: Program tracking data and Navigant analysis

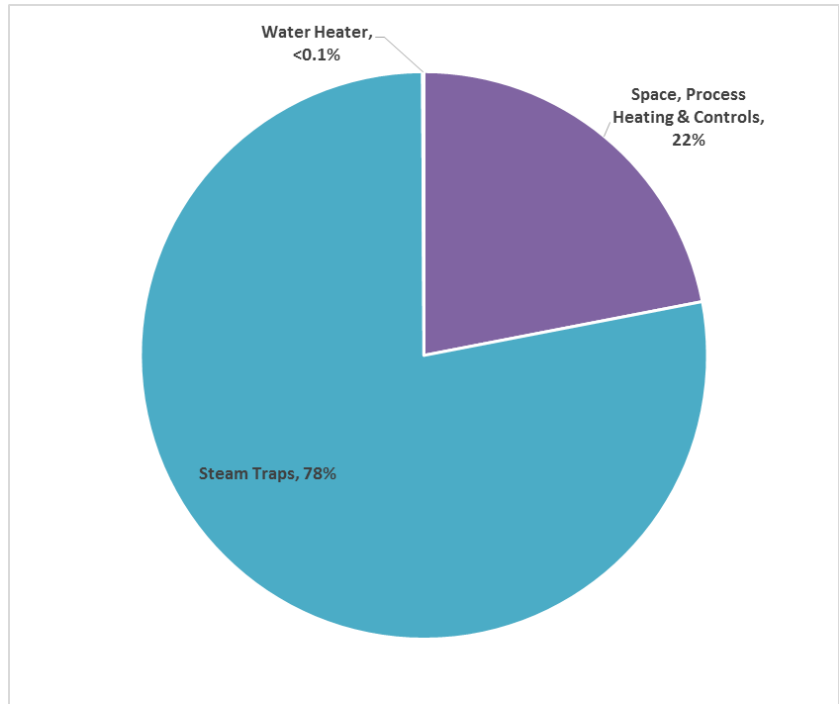
Figure 3-3 and Figure 3-4 disaggregate the total verified savings by measure type. For Peoples Gas, steam traps contributed 81 percent of the verified gross savings followed by HVAC systems and controls with 10 percent, and kitchen service equipment with seven percent. The new construction boiler project accounted for one percent of the Peoples Gas savings. For North Shore Gas, steam traps contributed 78 percent of the verified gross savings, and HVAC systems and water heaters accounted for the remaining 22 percent of the verified gross savings.

Figure 3-3. Peoples Gas: Verified Gross Savings Percentages by Measure



Sources: Navigant analysis

Figure 3-4. North Shore Gas: Verified Gross Savings Percentages by Measure



Sources: Navigant analysis

4. NET IMPACT EVALUATION

Verified net energy savings were calculated by multiplying the verified gross savings estimates by a net-to-gross ratio. As noted in Section 2, the NTGR used to calculate the net verified savings for the GPY5 C&I Prescriptive Program was deemed through a consensus process managed by the Illinois SAG.

When converting ex ante gross to ex ante net savings for tracking and reporting, Franklin Energy Services combines an additional adjustment factor with the net-to-gross ratio. The additional factor accounts for potential gross realization rate adjustments, and is based on a previous year realization rate. This factor must be accounted for when converting ex ante net savings reported in the tracking system to ex ante gross savings. The equations for GPY5 are:

$$\text{GPY5 Ex Ante Net} = \text{Values reported in the GPY5 program tracking data}$$

$$\text{GPY5 Ex Ante Net} = (\text{GPY5 Ex Ante Gross} * \text{GPY4 Verified Gross RR}) * \text{GPY5 Deemed NTGR}$$

$$\text{GPY5 Ex Ante Gross} = \text{GPY5 Ex Ante Net} / (\text{GPY4 Verified Gross RR} * \text{GPY5 Deemed NTGR})$$

Table 4-1 below presents the Realization Rate and NTGRs used to calculate the program-level net savings.

Table 4-1. Peoples Gas and North Shore Gas GPY5 Program RR and NTGR Values

Program/Path	Embedded GPY4 RR Adjustment Factors	GPY4 RR Source	GPY5 Deemed NTGR	NTGR Source
Direct Install	1.00	Navigant GPY4 Evaluation†	0.82	SAG‡
Prescriptive Rebates	1.00	Navigant GPY4 Evaluation†	0.63	SAG‡
New Construction Prescriptive	n/a	n/a	0.92	SAG‡

Source: †Navigant evaluation report for the GPY4 C&I Prescriptive Program is available at <http://www.ilsag.info/evaluation-documents.html>.

‡ Deemed Net-to-Gross Ratios are available from:

http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Peoples_Gas_and_North_Shore_Gas_NTG_Summary_GPY_1-5_2015-03-01_Final.pdf

Table 4-2 summarizes the natural gas savings from the GPY5 Peoples Gas C&I Prescriptive Program by end-use categories. The Peoples Gas GPY5 program achieved 156 percent of its net savings goal of 779,863 therms.²⁴

²⁴ Realized savings and goals report generated from the Franklin Energy Efficiency Manager program information management system, September 9, 2016.

Table 4-2. GPY5 Peoples Gas C&I Prescriptive Program Natural Gas Savings

Program/Path	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Direct Install	570	467	1.00	571	0.82	468
Standard Incentives	1,927,369	1,214,242	0.99	1,916,863	0.63	1,207,624
New Construction Prescriptive	12,312	11,327	1.00	12,312	0.92	11,327
GPY5 Total	1,940,251	1,226,036	0.99	1,929,746	n/a	1,219,419

Source: Evaluation analysis of GPY5 program tracking data (July 19, 2016 data extract) and Illinois Statewide Technical Reference Manuals.

Table 4-3 summarizes the natural gas savings from the GPY5 North Shore Gas C&I Prescriptive Program by end-use categories. The North Shore Gas GPY5 program achieved 569 percent of its net savings goal of 27,338 therms.

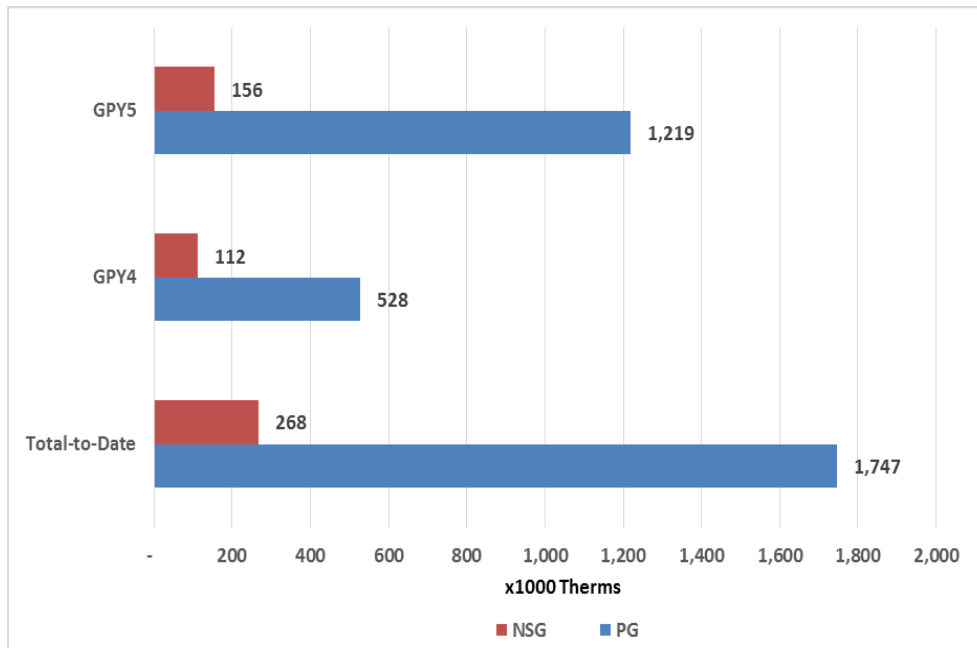
Table 4-3. GPY5 North Shore Gas C&I Prescriptive Program Natural Gas Savings

Program/Path	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Direct Install	-	-	-	-	0.82	-
Standard Incentives	247,591	155,983	1.00	246,830	0.63	155,503
GPY5 Total	247,591	155,983	1.00	246,830	n/a	155,503

Source: Evaluation analysis of GPY5 program tracking data (July 19, 2016 data extract) and Illinois Statewide Technical Reference Manuals.

Figure 4-1 provides a comparison of the year-over-year performance of the Peoples Gas and North Shore Gas C&I Prescriptive Program. Peoples Gas GPY5 net therms savings is 231 percent year-over-year compared with GPY4. North Shore Gas GPY5 net therms savings is 138 percent year-over-year compared with GPY4.

Figure 4-1. GPY4-GPY5 Yearly Comparison



Sources: Navigant analysis

5. PROCESS EVALUATION

Process research in GPY5 was limited to interviews with program staff and a review of program materials to verify information about program measures and the program tracking system. Navigant conducted interviews with the program staff in May 2016. We also had periodic conversations with program staff over the program year to discuss program forecasts and strategies for future program cycles. There are no process findings to report for GPY5.

6. FINDINGS AND RECOMMENDATIONS

The following provides insight into key program findings and recommendations.

Verified Gross Impacts and Realization Rate

Finding 1. The GPY5 Peoples Gas C&I Prescriptive Program achieved verified gross energy savings of 1,929,746 therms (including savings from direct install, C&I prescriptive and new construction measures). Evaluation adjustments resulted in a gross realization rate of 99 percent. The North Shore Gas C&I Prescriptive Program achieved verified gross energy savings of 246,830 therms, reflecting verified gross realization rate of 100 percent.

Finding 2: Steam traps continue to provide the bulk of program savings, representing 81 percent for the PG program and 78 percent for the NSG program verified gross savings. Space and process heating and controls measures are the next largest program savings contributors, representing 10 percent for PG and about 22 percent for NSG.

Verified Net Impacts

Finding 3. The Peoples Gas GPY5 program achieved 1,219,419 therms verified net savings, including 1,208,092 therms from the combined Direct Install and Standard Incentive paths, and 11,327 therms from the New Construction Prescriptive Program. This represented 156 percent of its net savings goal of 779,863 therms. The North Shore Gas GPY5 program achieved 155,503 therms verified net savings, representing 569 percent of its net savings goal of 27,338 therms.²⁵

Tracking System Review

Finding 4. Navigant reviewed the program tracking database and found that although the tracking database captured vital program information on impact savings and participation, the database did not directly track the type and unit quantity of industrial steam traps installed in GPY5. The evaluation team referred to the project documentation stored within the tracking system to verify a sample of the actual unit count of industrial steam traps installed in GPY5. The evaluation team referred to the project documentation in the tracking system to verify a sample of the actual unit count of industrial steam traps installed in GPY5. We verified that Franklin Energy applied the appropriate TRM deemed inputs to calculate industrial steam trap savings, except that we adjusted the boiler efficiency input value to match the TRM, which resulted in reduction of the ex ante savings with 99 percent gross realization rate for steam traps.

Recommendation 1. As industrial steam traps contribute the majority of program savings, it is recommended that the tracking system provide TRM-based steam system information of the various types of steam traps (sector application, pressure) and unit quantity (audited or not audited) of each type installed. Incorporating this data as tracked fields in the program database will facilitate “real-time” verification (e.g., after the first quarter of a program year) by the evaluation team and mid-year reporting of preliminary findings to the program team. This

²⁵ Realized savings and goals report generated from the Franklin Energy Efficiency Manager program information management system, September 9, 2016.

data can be tracked separately and provided as a supplemental data to the evaluation team if it cannot be built into the tracking system.

Recommendation 2. Franklin Energy should create a separate field or a supplemental data for tracking projects in which savings are capped at 20 percent of the annual energy usage. This supplemental data should provide detailed information of the projects annual energy usage, including the measures installed and how the savings were determined, if different from using deemed TRM inputs.

Finding 5. Navigant found that the tracking database savings input did not always match Franklin Energy's "Master Measure Database" spreadsheet (MMDB) that documents their approach to compliance with the Illinois TRM. Navigant adjusted the savings for industrial steam traps to use the TRM (v4.0) deemed boiler efficiency value of 80.7 percent from 80 percent. We also updated the default savings for pipe insulation from GPY4 values. Boiler tune ups and boiler reset controls default savings were adjusted to match the MMDB, which was in compliance with the TRM.

Recommendation 3. As noted, Franklin Energy's default MMDB workbook is mostly in compliance with the Illinois TRM. We recommend additional quality control checks when transferring the default inputs calculations to the tracking system. Franklin Energy should consider creating a separate input field for tracking unadjusted program gross ex ante savings that can be directly compared with TRM gross savings values – this would facilitate verification checks.

Program Volumetric Findings

Finding 6. The Peoples Gas GPY5 C&I Prescriptive Program involved 58 participants who implemented 93 projects and 1,894 measures. The North Shore Gas C&I Prescriptive Program reported nine participants in GPY5 who implemented 11 projects and 21 measures. The Peoples Gas GPY5 program implemented a prescriptive new construction project for the first time. The Peoples Gas program installed fewer direct install faucet aerators and showerheads compared with the previous year, with only one participant. Overall the Peoples Gas program implemented fewer measure types compared with the previous year. The North Shore Gas program implemented more steam traps and a mix of other measures than the previous year. Steam traps represented the majority of savings for both utilities.