



GPY3 Evaluation Report For TRM-Based Programs

**Home Energy Rebate
Home Energy Jumpstart
Multi-Family Comprehensive Energy Efficiency Program
C&I Prescriptive Rebate Program
Small Business Energy Savings**

Final

**Energy Efficiency Plan:
Gas Plan Year 3
(June 1, 2013, through May 31, 2014)**

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

January 2, 2015

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Acknowledgements

This report has benefited strongly from the editing contributions of Rachel Dickenson, Stuart Smoller, and Mary Thony in addition to those individuals listed above.

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Executive Summary

Peoples Gas and North Shore Gas implemented Program Year 3 of their portfolio of energy efficiency programs beginning June 1, 2013, and continuing through May 31, 2014 (GPY3). The GPY3 portfolio of programs for evaluation included three residential programs, one Multi-family program, and four programs targeted at business customers. A key approach of the GPY3 program evaluations was to commit resources towards evaluating the impacts of programs and comparably less resources to process and net-to-gross research that were the focus of GPY1 and GPY2 evaluations.

This report covers the following five programs: Home Energy Rebate (HER), Home Energy Jumpstart (HEJ), Multi-family Comprehensive Energy Efficiency Program (MCEEP or Multi-Family), Small Business Energy Services (SBES), and Commercial and Industrial (C&I) Prescriptive Rebate (aka, Prescriptive). As a compendium report it is designed to present the evaluation findings for all of the GPY3 portfolio programs where Navigant Consulting, Inc. (Navigant) conducted impact-only evaluations of the programs with Technical Resource Manual (TRM) measures or custom type measures with prescriptive incentives. The purpose of this compendium reporting approach is to reduce redundancy in reporting methodology and measure-level findings. Separate evaluation reports are provided for other portfolio programs that required billing analysis or additional on-site measurement and verification, which include the C&I Custom, Gas Optimization, Opower Home Energy Reports (Opower-HER), and C&I Retro-Commissioning programs. Franklin Energy Services, LLC (Franklin Energy), is the primary implementation contractor (IC) for the portfolio programs.

E.1 Program Savings and Results Summary

Table E-1 summarizes the natural gas savings from the GPY3 Peoples Gas programs. The residential programs Home Energy Rebate achieved a verified net savings of 830,615 therms, the Home Energy Jumpstart achieved a verified net savings of 317,376 therms, and the Multi-family program achieved 5,173,566 verified net therms. For the Peoples Gas commercial and industrial programs, the C&I Prescriptive Rebate achieved 852,017 therms verified net savings, and the Small Business Energy Savings program achieved 921,647 therms verified net savings.

For each program except Home Energy Jumpstart, the verified net savings was within one percent of ex ante net savings. Verified net savings for Home Energy Jumpstart were seven percent greater than ex ante net savings because the implementer had embedded a conservative realization rate of 0.93 into tracked savings, based on results from the previous year. As shown, the Peoples Gas programs achieved 100% verified gross realization rates, except the Home Energy Jumpstart program that received a 99% verified gross realization rate.

Table E-1. GPY3 Peoples Gas Programs Natural Gas Savings

Programs	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)*	Verified Gross RR ¹ †	Verified Gross Savings (Therms)	NTGR†	Verified Net Savings (Therms)
Residential Programs						
Home Energy Rebate	1,015,839	841,318	1.00	1,012,945	0.82	830,615
Home Energy Jumpstart	333,915	298,119	0.99	330,600	0.96	317,376
Multi-family	5,749,844	5,211,081	1.00	5,748,408	0.90	5,173,566
Business Programs						
C&I Prescriptive Rebate	1,351,330	853,831	1.00	1,352,409	0.63	852,017
Small Business Energy Savings	927,591	928,604	1.00	930,957	0.99	921,647

‡ Based on evaluation review of the programs tracking database and measure savings using the Illinois TRM (v2.0 & v3.0)².

† Deemed values. Source: Approved by the Stakeholder Advisory Group (SAG) ([http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/Peoples%20Gas%20and%20North%20Shore%20Gas%20GPY1-GPY3%20and%20Phase%20II%20Plan.xls)).

* When converting ex ante gross to ex ante net savings for tracking and reporting, Franklin Energy 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 the previous year realization rate. The equation for GPY3 is:

$$\text{GPY3 Ex Ante Net} = \text{GPY3 Ex Ante Gross} * \text{GPY2 Verified Gross RR} * \text{GPY3 NTG}.$$

Source: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract) and statewide TRMs.

Table E-2 summarizes the natural gas savings from the GPY3 North Shore Gas programs. The residential programs Home Energy Rebate achieved a verified net savings of 576,055 therms, the Home Energy Jumpstart achieved a verified net savings of 47,781, and the Multi-family program achieved 90,301 therms verified net savings. For the Peoples Gas commercial and industrial programs, the C&I Prescriptive Rebate achieved 88,623 therms verified net savings, and the Small Business Energy Savings program achieved 349,446 therms net savings.

For each program except Home Energy Jumpstart, the verified net savings was within two percent of ex ante net savings. Verified net savings for Home Energy Jumpstart were 12 percent greater than ex ante net savings because the implementer had embedded a conservative realization rate of 0.89 into tracked savings, based on results from the previous year. As shown, the North Shore Gas programs achieved 100% verified gross realization rates, with minor adjustments to verified gross savings,

¹ Verified Gross Realization Rate (RR) = Verified Gross Savings/Ex Ante Gross Savings.

² Reference Manuals: Illinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean.pdf; Illinois_Statewide_TRM_Effective_060114_Version_3.0_021414_Final_Clean.pdf (for measure errata corrections).

except for Small Business Energy Savings which had a 102% verified gross realization rate and the Home Energy Jumpstart program that received a 98% verified gross realization rate.

Table E-2. GPY3 North Shore Gas Programs Natural Gas Savings

Programs	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)*	Verified Gross RR‡	Verified Gross Savings (Therms)	NTGR†	Verified Net Savings (Therms)
Residential Programs						
Home Energy Rebate	721,771	588,966	1.00	720,068	0.80	576,055
Home Energy Jumpstart	50,937	43,521	0.98	49,772	0.96	47,781
Multi-family	100,500	92,168	1.00	100,335	0.90	90,301
Business Programs						
C&I Prescriptive Rebate	140,315	88,609	1.00	140,671	0.63	88,623
Small Business Energy Savings	347,444	350,065	1.02	352,976	0.99	349,446

‡ Based on evaluation review of the programs tracking database and measure savings using the Illinois TRM (v2.0 & v3.0);

† Deemed values. Source: Approved by the SAG (http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls).

* When converting ex ante gross to ex ante net savings for tracking and reporting, Franklin Energy combines an additional adjustment factor with the deemed net-to-gross ratio. The additional factor accounts for potential gross realization rate adjustments, and is based on the previous year realization rate. The equation for GPY3 is:

$$\text{GPY3 Ex Ante Net} = \text{GPY3 Ex Ante Gross} * \text{GPY2 Verified Gross RR} * \text{GPY3 NTG}.$$

Source: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract) and statewide TRMs.

E.2 Impact Estimate Parameters

In the course of estimating verified gross and net savings, the evaluation team used a variety of parameters in its calculations. Most of the measure savings parameters were deemed for this program year and others were adjusted based on evaluation research. The key parameters used in the analysis are shown in Table E-3.

Table E-3. Verified Gross and Net Savings Parameter Data Sources

Parameter	Data Source	Deemed or Evaluated?
Measure Quantity Installed	Program tracking system	Evaluated
Net-to-Gross Ratio (NTGR)	Illinois SAG Process †	Deemed
Verified Gross Realization Rate	Program tracking data, TRM, Navigant	Evaluated
Residential HVAC measure savings assumptions	Illinois TRM, version 2.0, section 5.3‡	Deemed
Commercial HVAC measure savings assumptions	Illinois TRM, version 2.0, section 4.4‡ <i>Used TRM (v3.0) for errata correction</i>	Deemed
Residential hot water measure savings assumptions	Illinois TRM, version 2.0, section 5.4‡	Deemed
Commercial hot water measure savings assumptions	Illinois TRM, version 2.0, section 4.3‡ <i>Used TRM (v3.0) for errata correction</i>	Deemed
Steam traps savings assumptions	Illinois TRM, version 2.0, section 4.4.15‡	Deemed
Residential appliance measure savings assumptions	Illinois TRM, version 2.0, section 4.2‡	Deemed
Commercial food service equipment savings assumptions	Illinois TRM, version 2.0, section 5.1‡	Deemed
Residential pipe insulation savings assumptions	Illinois TRM, version 2.0, sections 5.3 and 5.4‡	Deemed
Commercial pipe insulation savings assumptions	Illinois TRM, version 2.0, section 4.4‡	Deemed
Programmable thermostat savings assumptions	Illinois TRM, version 2.0, section 5.3‡	Deemed
Custom Analysis and Measures	Project File Review and On-site M&V	Evaluated

† Deemed values. Source: Approved by the SAG ([http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/Peoples%20Gas%20and%20North%20Shore%20Gas%20GPY1-GPY3%20and%20Phase%20II%20Plan.xls)).

‡ Source: Integrys_Master_Measure_Document 8282014 produced by Franklin Energy; State of Illinois Technical Reference Manuals: Illinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean.pdf
Illinois_Statewide_TRM_Effective_060114_Version_3.0_021414_Final_Clean.pdf (for measure errata corrections).

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

E.3 Participation Information

Table E-4 and Table E-5 below display the GPY3 program participation and installed measures 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 3.4.

Table E-4. GPY3 Peoples Gas Programs Primary Participation Detail

	Installed Measures ³	Implemented Projects	Participants
Residential Programs			
Home Energy Rebate	6,894	5,733	4,774
Home Energy Jumpstart	25,293	6,356	5,935
Multi-family	65,353	16,573	2,947
Business Programs			
C&I Prescriptive Rebate	3,763	103	82
Small Business (SBES)	936	445	384

Source: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract).

Table E-5. GPY3 North Shore Gas Programs Primary Participation Detail

	Installed Measures ⁴	Implemented Projects	Participants
Residential Programs			
Home Energy Rebate	5,050	3,841	3,386
Home Energy Jumpstart	4,472	932	784
Multi-family	5,608	1,874	388
Business Programs			
C&I Prescriptive Rebate	304	19	19
Small Business (SBES)	672	346	333

Source: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract).

³ For evaluation reporting purpose, if a measure quantity is reported in the tracking system in linear feet, MBH or in square feet, Navigant treated each row entry of such measure as one measure quantity in this table. The actual linear feet, MBH or square feet are reported in Section 3.4 at the program-level analysis. As an example, for PGL Multi-family program there were 341,182 linear feet of pipe insulation, but Navigant treated each row entry of pipe insulation in the tracking system as one measure, and this summed up to 2,299 measures.

⁴ *Ibid.* As an example, NSG Multi-family had DWH boiler tune-up with 3,290 MBH total input capacities. Navigant treated each row entry of DWH boiler tune-up as one measure, and this summed up to 12 measures.

E.4 Findings and Recommendations

The following provides insight into key findings and recommendations.

Savings Verification Process

Finding 1. Franklin Energy produces a spreadsheet to document their methodology, assumptions, and algorithms for setting per unit savings values for each program measure. The values documented in the spreadsheet are programmed into the tracking system. Franklin Energy provides Navigant with the measure documentation spreadsheet on request and direct real-time access to the program tracking system to review project specific documents, quantities, and invoices to verify savings. This approach is effective for facilitating evaluation savings verification.

Recommendation 1. Franklin Energy should consider establishing with the evaluation team an early review process of per unit measure savings, to occur as early as practical before or soon after the start of a program year. The early review could consist of a walk-through of the savings approach by measure, and an initial review by evaluation to identify potential adjustments, and resolution of differences. Later revisions by Franklin Energy could be sent to Navigant when they occur. This may reduce end-of-year evaluation adjustments.

Verified Gross Realization Rates

Finding 2. Franklin Energy has developed a process for accurately tracking program savings. For nearly all measures, we found Franklin Energy had correctly applied the TRM, used reasonable approaches for custom inputs and measures, and accurately transferred measure savings documentation to programmed values in the tracking system. Navigant has previously verified accurate tracking of quantities and data quality control practices, and did not observe errors in tracking quantities in GPY3. Relatively minor adjustments were made to per unit measure savings for 12 measures across the five programs evaluated in this report. All programs had a verified gross realization rate of 100% (100% is a rounded value, actual values were very slightly different) except the North Shore Gas Small Business Program that had 102%. The majority of final adjustments may have been identified through the structured savings verification early review process recommended above.

Recommendation 2. If Franklin Energy chooses to embed GPY3 realization rates into tracked net savings for GPY4, we recommend a value of 1.00 for each of the five programs evaluated in this report.

Net Savings

Finding 3. For the programs that were delivered through multiple paths in GPY3 – Multi-family, C&I Prescriptive, and Small Business – Franklin Energy tracked ex ante net savings by applying a different NTGR for each path in the program. The alternative would have been to use a single NTGR value for the entire program, specifically the values allowed for deeming by SAG consensus. Navigant reviewed both methods and concluded application of NTGR by path would more accurately represent the program.



Navigant has reviewed the GPY3 NTGR values Franklin Energy used for the paths and found them to be reasonable.

Recommendation 3. Navigant recommends applying a single NTGR per program for GPY3 as approved by SAG consensus and has used those NTGR values for reporting verified net savings in GPY3. However, Navigant recommends applying NTGR values by program path for GPY4. As shown by the results in Table 4-2 and Table 4-3, both methods provide very similar results.

1 Introduction

1.1 Portfolio Description and Programs Evaluated

Peoples Gas and North Shore Gas implemented Program Year 3 of their portfolio of energy efficiency programs beginning June 1, 2013, and continuing through May 31, 2014 (GPY3). The GPY3 portfolio of programs for evaluation included three residential programs, one Multi-family program, and four programs targeted at business customers. A key approach of the GPY3 program evaluations was to commit resources towards evaluating the impacts of programs and comparably less resources to process and net-to-gross research that were the focus of GPY1 and GPY2 evaluations. The following programs were evaluated and were active during GPY3:

- » Residential Programs
 - Home Energy Rebate (HER)
 - Home Energy Jumpstart (HEJ)
 - Multi-Family Comprehensive Energy Efficiency Program (Multi-family)
 - In-unit direct installation
 - Common area prescriptive incentives, trade ally participant installations (TAPI), and custom projects
 - Opower Home Energy Report (HER-Opower)
- » Business Programs
 - C&I Custom Rebate Program with Gas Optimization
 - C&I Prescriptive Rebate
 - Retro-Commissioning
 - Small Business Energy Savings (SBES)

This report is designed to present the evaluation findings for all of the GPY3 portfolio programs where Navigant Consulting, Inc. (Navigant) conducted impact-only evaluations of the programs with Technical Resource Manual (TRM) measures or custom type measures with prescriptive incentives. This report is considered a compendium report for those programs. The purpose of this compendium reporting approach is to reduce redundancy in reporting methodology and measure-level findings. This report covers the following five programs: Home Energy Rebate (HER), Home Energy Jumpstart (HEJ), Multi-family Comprehensive Energy Efficiency Program (MCEEP or Multi-Family), Small Business Energy Services (SBES), and Commercial and Industrial (C&I) Prescriptive Rebate (aka, Prescriptive). Separate evaluation reports are provided for other portfolio programs that required billing analysis or additional on-site measurement and verification, which include the C&I Custom, Gas Optimization, Opower Home Energy Reports (Opower-HER), and C&I Retro-Commissioning programs. Franklin Energy Services, LLC (Franklin Energy), is the primary implementation contractor (IC) for the portfolio programs.

Changes in the programs delivery approach in GPY3 occurred in the Multi-family, SBES, C&I Prescriptive and C&I Custom programs with the introduction of paths. Each path of a program can

serve as a stand-alone activity or as part of a complete “one-stop-shop” approach to achieve comprehensive improvements to energy efficiency. In essence, paths allow participants to work within one program to complete comprehensive improvements that would previously require accessing multiple programs. For example, in addition to the Multi-family offering direct installation of energy efficiency products components, the program concurrently developed marketing and outreach materials to commercial contractors and Multi-family decision-makers about “comprehensive” program measures designed to achieve energy savings in whole buildings and grounds. Improvements may include upgrades to central plant heating and controls, and building shell improvements, among others. Some Multi-family comprehensive measures were previously offered through different programs, such as the C&I Prescriptive Rebate and Custom Rebate programs. Similarly, SBES offered C&I Prescriptive and C&I Custom measures through paths. The C&I Prescriptive Program added a direct installation path. Finally, a non-joint retro-commissioning program was added called the Gas Optimization Program. Gas Optimization is reported within the GPY3 C&I Custom program although it has a separate identity.

1.2 Evaluation Objectives

The objectives of the GPY3 evaluation of the five TRM-based programs were to:

1. Provide a reliable calculation of the net therm savings produced by each Technical Reference Manual (TRM)-based program in the portfolio
2. As feasible given needs and available budget, assess the effectiveness of the administration and implementation of the programs.
3. Review calculation of portfolio and program cost-effectiveness for PGL and NSG (reported separately).

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 in GPY3.

2.1 Primary Data Collection

2.1.1 Overview of Data Collection Activities

Navigant’s planned process and impact evaluation activities for GPY3 TRM-based programs are summarized by program in Table 2-1.

Table 2-1. Summary of Peoples Gas and North Shore Gas GPY3 Evaluation Activities

Program	Process Evaluation	NTGR Research	Tracking Data Review	Project File Reviews	On-Site M&V	Billing Analysis	Other
Home Energy Rebate	PM/IC Int.	None	Yes	No	No	No	TRM Verification
Home Energy Jumpstart	PM/IC Int.	None	Yes	No	No	No	TRM Verification
Multi-family	PM/IC Int.	None	Yes	Yes	No	No	TRM Verification
C&I Prescriptive Rebate	PM/IC Int.	None	Yes	Yes	No	No	TRM Verification
Small Business Energy Savings	PM/IC Int.	None	Yes	No	No	No	TRM Verification

Source: Navigant.

2.1.2 Verified Savings Parameters

Navigant estimated verified per-unit savings for each program measure using impact algorithm sources found in the Illinois TRM for deemed measures, 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 GPY3 evaluation research and which were deemed.

Table 2-2. Verified Gross and Net Savings Parameter Data Sources

Parameter	Data Source	Deemed or Evaluated?
Measure Quantity Installed	Program tracking system	Evaluated
NTGR	SAG Agreement†	Deemed
Verified Gross Realization Rate	Program tracking data, TRM, Navigant	Evaluated
Direct install/common area measures in-service rate	Illinois TRM, version 2.0	Deemed
Residential HVAC measure savings assumptions	Illinois TRM, version 2.0, section 5.3‡	Deemed
Commercial HVAC measure savings assumptions	Illinois TRM, version 2.0, section 4.4‡ <i>Used TRM (v3.0) for errata correction</i>	Deemed
Residential hot water measure savings assumptions	Illinois TRM, version 2.0, section 5.4‡	Deemed
Commercial hot water measure savings assumptions	Illinois TRM, version 2.0, section 4.3‡ <i>Used TRM (v3.0) for errata correction</i>	Deemed
Steam traps savings assumptions	Illinois TRM, version 2.0, section 4.4.15‡	Deemed
Residential appliance measure savings assumptions	Illinois TRM, version 2.0, section 4.2‡	Deemed
Commercial food service equipment savings assumptions	Illinois TRM, version 2.0, section 5.1‡	Deemed
Residential pipe insulation savings assumptions	Illinois TRM, version 2.0, sections 5.3 and 5.4‡	Deemed
Commercial pipe insulation savings assumptions	Illinois TRM, version 2.0, section 4.4‡	Deemed
Programmable Thermostat savings assumptions	Illinois TRM, version 2.0, section 5.3‡	Deemed
Custom measure (non TRM measures)	Projects Documentation File Reviews	Evaluated

† Deemed values. Source: Approved by the SAG ([http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/Peoples%20Gas%20and%20North%20Shore%20Gas%20GPY1-GPY3%20and%20Phase%20II%20Plan.xls)).

‡ Source: Integrys_Master_Measure_Document 8282014 produced by Franklin Energy; State of Illinois Technical Reference Manuals: Illinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean.pdf
Illinois_Statewide_TRM_Effective_060114_Version_3.0_021414_Final_Clean.pdf (for measure errata corrections).

Source: Navigant analysis of programs tracking data and Illinois TRM documents.

2.1.3 Verified Gross Program Savings Analysis Approach

Methods for gross savings verification of TRM measures employed in GPY3 are tracking data review and engineering review of measure savings for compliance with the Illinois TRM. Version 2.0 was used for GPY3 evaluation except for measures with errata correction where the Version 3.0 was

used.⁵ Estimating the evaluation researched verified gross savings of non-deemed “custom” measures involved tracking data review and engineering review of project files.

2.1.4 Verified Net Program Savings Analysis Approach

Verified net energy savings were calculated by multiplying the verified gross savings estimates by a net-to-gross ratio (NTGR). Table 2-3 presents the GPY3 NTGR evaluation approach. The NTGR values used to calculate the net verified savings for GPY3 were deemed through a consensus process by the Illinois Stakeholder Advisory Group (SAG),⁶ and no further evaluation research was conducted for GPY3.

Table 2-3. Net-to-Gross Ratios for Evaluation of GPY3 Programs

PGL and NSG Program	GPY3 NTGR Source	GPY3 NTGR Research	GPY3 NTGR Used for Evaluation
Residential Programs			
Home Energy Rebate	Deemed	None	0.82 (PGL)
			0.80 (NSG)
Home Energy Jumpstart	Deemed	None	0.96
Multi-family	Deemed	None	0.90
C&I Programs			
C&I Prescriptive Rebate	Deemed	None	0.63
C&I Custom	Deemed	None	0.78
Retro-Commissioning	Deemed	None	1.02
Small Business Energy Savings	Deemed	None	0.99

Source: Approved by the SAG for GPY3 evaluation (http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls).

2.1.5 Process Evaluation

The GPY3 process evaluation activities for the programs were limited to interviews with program staff and the implementation contractor staff to verify information about marketing and outreach strategies made in GPY3 that impacted customer and trade ally participation and satisfaction.

⁵ Consensus from the Illinois TRM Technical Advisory Committee and the SAG indicated that changes should be made effective June 1, 2013. “Specifically, when a measure error was identified (in V2 TRM) and the TAC process resulted in a consensus, the measure is identified (in V3 TRM) as an ‘Errata’. In these instances the measure code indicates that a new version of the measure has been published, and that the effective date of the measure dates back to June 1st, 2013” (page 10 of V3 TRM).

⁶ Approved by the SAG for GPY3 Evaluation (http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls).

3 Gross Impact Evaluation

The gross impact analysis involved tracking system review and verification of measure savings. The verified savings were calculated by multiplying the quantity of measures installed by the verified measure unit savings. The programs verified gross realization rate were determined by the ratio of the verified savings and the tracking ex ante gross savings.

3.1 Tracking System Review

Over the course of the GPY3 program year, Navigant and the program implementation contractor (Franklin Energy) maintained close contact regarding the programs tracking system (Bensight Data Management platform) updates and follow-up from previous program evaluation recommendations. Franklin Energy provided updated links from the previous year to enable Navigant to download the programs tracking database for GPY3 impact evaluation.⁷ Navigant used the data extracts from the program's tracking system to verify the GPY3 program ex ante inputs including measure counts and ex ante savings. In addition to the tracking database, Franklin Energy updated and provided to Navigant a spreadsheet of measure savings (*Integrlys_Master_Measure_Document*)⁸ derived from the Illinois TRM (Ver. 2.0) for the deemed measures or from other engineering estimates. Listed below are additional findings from the program's tracking system review and some recommendations to improve the tracking system.

1. For C&I measures and Multi-family common area measures, the tracking system used TRM C&I input assumptions and algorithms to estimate the programs' ex ante savings. Navigant verified that in most cases the implementation contractor complied with the consensus from the SAG and the Illinois TRM Technical Advisory Committee, and applied corrections to TRM (v2.0) errata measures using the TRM (v3.0) effective June 1, 2013.⁹ The GPY3 tracking measures affected by this directive included bathroom and kitchen aerators, high efficiency furnace and boilers, boiler tune-up and boiler reset control measures. The evaluation team adjusted the savings for these measures, where applicable. Details of any adjustments are discussed in the program level analysis in Section 3.
2. Where the evaluation team identified a project in the tracking database that used custom input assumptions, the evaluation team accessed the Bensight database system and downloaded the project files for engineering review. In almost all cases, Navigant found the custom measure assumptions and tracking savings calculations as reasonable for acceptance.
3. Where the evaluation team found inconsistency in the tracking default unit savings compared to the TRM or the *Integrlys_Master_Measure_Document* (e.g. input capacity for high efficiency furnace installed through the C&I Prescriptive and Multi-family programs), the

⁷ Dates for the final data extracts were HER - 8/12/2012, HEJ - 10/09/2014, MCEEP - 8/28/2014, C&I Prescriptive - 8/20/2014, and SBES - 8/12/2014.

⁸ *Integrlys_Master_Measure_Document* 8282014, produced by Franklin Energy.

⁹ *Illinois_Statewide_TRM_Effective_060114_Version_3_0_021414_Final_Clean.pdf* (see pages starting from 10).

evaluation team reviewed the project invoices and measure specifications to verify the appropriate input parameters.

4. The evaluation team found several instances in the Home Energy Rebate tracking system where Peoples Gas measures were found in the North Shore Gas program and vice versa. This had no impact on savings, but could be potentially confusing when consolidating data. Navigant recommends that in the future, only Peoples Gas measures be included in the Peoples Gas program and only North Shore Gas measures be included in the North Shore Gas program.

3.2 Programs Volumetric Findings

The key GPY3 volumetric findings are summarized in Table 3-1 for Peoples Gas programs, and in Table 3-2 for North Shore Gas programs. Additional findings are outlined below.

Table 3-1. GPY3 Peoples Gas Volumetric Findings Details

	Installed Measures ¹⁰	Implemented Projects	Participants	Projects/ Participant	Therms/ Project
Residential Programs					
Home Energy Rebate	6,894 ¹¹	5,733	4,774	1.20	145
Home Energy Jumpstart	25,293 ¹²	6,356	5,935	1.07	50
Multi-family	65,353	16,573	2,947	5.62	347
Business Programs					
C&I Prescriptive Rebate	3,763	103	82	1.26	13,130
Small Business Energy Savings	936	445**	384	1.16	2,096

** - There were 445 unique PGL SBES projects (95 projects installed both DI and CI projects).

Source: Navigant analysis of GPY3 programs tracking data (August 28, 2014 data extract)

¹⁰ For reporting measure counts in this table, if a measure quantity is reported in the tracking system in linear feet, MBH or in square feet, Navigant treated each row entry of such measure as one measure quantity in this table. The actual linear feet, MBH or square feet are reported in Section 3.4 at the program level analysis. As an example, for PGL MCEEP there were 341,182 linear feet of pipe insulation, but Navigant treated each row entry of pipe insulation in the tracking system as one measure, and this summed up to 2,299 measures.

¹¹ Of the 1,648 total participants that received rebates for programmable thermostats, 22 had more than one installed: however, the savings from only one installation per household can be attributable to the program.

¹² Of the 2,309 total participants that received rebates for programmable thermostats, 50 had more than one installed: however, the savings from only one installation per household can be attributable to the program. Of the 111 total participants that had existing thermostats reprogrammed, one had more than one reprogrammed, however the savings from only one reprogramming per household can be attributable to the program.

Table 3-2. GPY3 North Shore Gas Volumetric Findings Details

	Installed Measures ¹³	Implemented Projects	Participants	Projects/ Participant	Therms/ Project
Residential Programs					
Home Energy Rebate	5,050 ¹⁴	3,841	3,386	1.13	150
Home Energy Jumpstart	4,472 ¹⁵	932	784	1.19	51
Multi-family	5,608	1,874	388	4.8	54
Business /C&I Programs					
C&I Prescriptive Rebate	304	19	19	1.00	7,404
Small Business Energy Savings	672	346 **	333	1.04	1,020

** - There were 346 unique NSG SBES projects (55 projects installed both DI and CI projects).

Source: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract)

Additional volumetric findings include:

1. The Peoples Gas GPY3 Multi-family program installed a total of 40,383 direct install measures and 24,970 comprehensive measures, making an overall 65,353 program measures in GPY3. The PGL program implemented 16,573 projects (14,850 direct install projects and 1,723 comprehensive projects). The direct install projects were composed of 14,741 in-unit and 109 common area projects. The comprehensive projects were composed of 853 projects installed through Trade Ally Partner Installation (TAPI), and 858 incentive projects.
2. The North Shore Gas GPY3 Multi-family installed a total of 5,296 direct install measures and 312 comprehensive measures, making an overall 5,608 program measures in GPY3. NSG implemented 1,874 projects including 1,824 direct install projects (1,811 in-unit and 13 common area projects) and 50 comprehensive projects (including 45 TAPI and 5 incentive projects).
3. The Peoples Gas GPY3 C&I Prescriptive Rebate program installed 3,763 measures (1,259 direct install and 2,504 prescriptive measures), and implemented 103 projects from 82 participants (12 direct install projects and 91 contractor installed projects).
4. The North Shore Gas GPY3 C&I Prescriptive program installed 304 measures from 19 projects and participants (only 1 direct install project and 18 prescriptive projects).

¹³ *Ibid.* As an example, NSG MCEEP had DWH boiler tune-up with 3,290 MBH total input capacities. Navigant treated each row entry of DWH boiler tune-up as 1 measure, and this summed up to 12 measures.

¹⁴ Of the 1,611 total participants that received rebates for programmable thermostats, 13 had more than one installed: however, the savings from only one installation per household can be attributable to the program.

¹⁵ Of the 241 total participants that received rebates for programmable thermostats, 16 had more than one installed: however, the savings from only one installation per household can be attributable to the program. Of the 16 total participants that had existing thermostats reprogrammed, two had more than one reprogrammed, however the savings from only one reprogramming per household can be attributable to the program.

5. The Peoples Gas GPY3 Small Business program installed 936 measures (378 direct install and 558 contractor installed) from 445 projects and 384 participants (153 direct install projects, 387 contractor installed projects, and 95 projects which had both direct install and contractor install measures).
6. The North Shore Gas GPY3 Small Business program included 346 projects from 333 participants (112 direct installed projects, 289 contractor installed projects), while 55 projects had both direct installed and contractor installed measures.

3.3 Verified Gross Program Impact Results

As described in Section 2, tracking system ex ante energy savings were verified using the assumptions and algorithms as specified in the TRM version 2.0 or through engineering analysis for non-deemed measures. As discussed in Section 3.1, the TRM version 3.0 was used in some cases to correct errata in the savings input for space heating high-efficiency boilers and furnaces, boiler tune-ups and boiler reset controls, and also for water efficiency bathroom and kitchen aerators. The programs’ verified gross realization rates were determined by calculating the ratio of the verified gross savings and the tracking ex ante gross savings.

Table 3-3 provides the Peoples Gas programs level summary of the verified gross savings and realizations rates. As shown, the Peoples Gas programs all achieved 100% verified gross realization rates, except the Home Energy Jumpstart program that received a 99% verified gross realization rate. Program-specific details are provided in Section 3.4.

Table 3-3. GPY3 Peoples Gas Verified Gross Impact Savings Estimates

Program	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Residential Programs				
Home Energy Rebate	6,894 ¹⁶	1,015,839	1.00	1,012,945
Home Energy Jumpstart	25,293 ¹⁷	333,915	0.99	330,600
Multifamily (MCEEP)	65,353	5,749,844	1.00	5,748,408
Business Programs				
C&I Prescriptive Rebate	3,763	1,351,330	1.00	1,352,408
Small Business Energy Savings	936	927,592	1.00	930,911

Source: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract).

¹⁶ Of the 1,648 total participants that received rebates for programmable thermostats, 22 had more than one installed: however, the savings from only one installation per household can be attributable to the program.

¹⁷ Of the 2,309 total participants that received rebates for programmable thermostats, 50 had more than one installed: however, the savings from only one installation per household can be attributable to the program. Of the 111 total participants that had existing thermostats reprogrammed, one had more than one reprogrammed, however the savings from only one reprogramming per household can be attributable to the program.

Table 3-4 provides the North Shore Gas programs-level summary of the verified gross savings and realizations rates. As shown, the North Shore Gas programs all achieved 100% verified gross realization rates except the Small Business program that achieved a 102% verified gross realization rate and the Home Energy Jumpstart program that received a 98% verified gross realization rate. Very minor adjustments were applied in some cases to the ex ante savings to achieve the verified gross savings. Program-specific details are provided in Section 3.4.

Table 3-4. GPY3 North Shore Gas Verified Gross Impact Savings Estimates

Program	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Residential Programs				
Home Energy Rebate	5,050 ¹⁸	721,771	1.00	720,068
Home Energy Jumpstart	4,472 ¹⁹	50,937	0.98	49,772
Multifamily (Multi-family)	16,573	100,500	1.00	100,335
Business Programs				
C&I Prescriptive Rebate	304	140,314	1.00	140,670
Small Business Energy Savings	4,550	347,444	1.02	352,962

Source: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract).

3.4 Program-Level Verified Gross Impact Results

This section provides program-level summary gross impact savings. Here, we detail the program’s specific measure input parameter estimates, verified measure quantity, determination of the verified gross realization rates, and the verified gross savings. Key findings from each program are outlined.

¹⁸ Of the 1,611 total participants that received rebates for programmable thermostats, 13 had more than one installed: however, the savings from only one installation per household can be attributable to the program.

¹⁹ Of the 241 total participants that received rebates for programmable thermostats, 16 had more than one installed: however, the savings from only one installation per household can be attributable to the program. Of the 16 total participants that had existing thermostats reprogrammed, two had more than one reprogrammed, however the savings from only one reprogramming per household can be attributable to the program.

3.4.1 Home Energy Rebate Program

Table 3-5 indicates the input parameters to estimate verified gross savings for the Peoples Gas and North Shore Gas Home Energy Rebate programs.

Table 3-5. Peoples Gas and North Shore Gas GPY3 HER Program Verified Gross Savings Parameters

Input Parameters	Verified Value	Deemed or Evaluated?
Quantity of Measures Installed	Varies	Evaluated
Gross Realization Rate (PGL/NSG)	PGL = 100%, NSG = 100%	Evaluated
Attic Insulation	Varies	Deemed TRM v2.0
Boiler Reset Controls	97.44	Evaluated
Boiler Tune-up	28.867	Evaluated
Combination Boiler Tankless Water Heater	197.32	Evaluated
Duct Sealing	1.1967	Deemed TRM v2.0
Furnace ≥ 92% Early Replacement	379.26	Deemed TRM v2.0
Furnace ≥ 92% Replace on Burnout	135.21	Deemed TRM v2.0
Furnace ≥ 95% Early Replacement	407.57	Deemed TRM v2.0
Furnace ≥ 95% Replace on Burnout	163.52	Deemed TRM v2.0
Furnace ≥ 97% Early Replacement	423.19	Deemed TRM v2.0
Furnace ≥ 97% Replace on Burnout	179.13	Deemed TRM v2.0
Furnace Tune-up	15.48	Evaluated
Hydronic Boiler ≥ 90% Early Replacement	646.13	Deemed TRM v2.0
Hydronic Boiler ≥ 90% Replace on Burnout	154.22	Deemed TRM v2.0
Hydronic Boiler ≥ 95% Early Replacement	695.17	Deemed TRM v2.0
Hydronic Boiler ≥ 95% Replace on Burnout	203.26	Deemed TRM v2.0
Indirect Water Heater	52.83	Deemed TRM v2.0
Pipe Insulation - Hydronic Boiler	0.66	Deemed TRM v2.0
Pipe Insulation - Steam Boiler	1.22	Deemed TRM v2.0
Pipe Insulation - Water Heater	0.75	Deemed TRM v2.0
Programmable Thermostat	29.5	Deemed TRM v2.0
Storage Tank Water Heater	23.63	Deemed TRM v2.0
Tankless Water Heater	43.1	Deemed TRM v2.0

Source: Program documentation, Navigant analysis, and Illinois TRM documents.

As shown in Table 3-6, the GPY3 Peoples Gas Home Energy Rebate program reported ex ante gross energy savings of 1,015,249 therms. Evaluation adjustments resulted in verified gross energy savings of 1,012,945 therms, reflecting the program’s gross realization rate of 100%.

Table 3-6. Peoples Gas GPY3 HER Program Impact Results

Measure Category	Unit	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Attic Insulation	Square Foot	1,606,074	220,539	1.00	220,539
Boiler Reset Controls	Boiler	3	357	0.82	292
Boiler Tune-up	Boiler	145	4,465	0.94	4,186
Combination Boiler Tankless Water Heater	Each	14	2,755	1.00	2,762
Duct Sealing	CFM	30,283	36,273	1.00	36,240
Furnace	Furnace	2,902	661,590	1.00	660,741
Furnace Tune-up	Furnace	208	3,591	0.90	3,220
Hydronic Boiler	Boiler	33	20,144	1.00	20,090
Indirect Water Heater	Each	3	158	1.00	158
Pipe Insulation - Hydronic Boiler	Linear Foot	9,498	6,663	1.00	6,696
Pipe Insulation - Steam Boiler	Linear Foot	532	619	1.00	619
Pipe Insulation - Water Heater	Linear Foot	4,755	3,554	1.00	3,566
Programmable Thermostat	Household	1,648	49,319	0.99	48,616
Storage Tank Water Heater	Each	64	1,515	1.00	1,512
Tankless Water Heater	Each	86	3,708	1.00	3,707
Total			1,015,249	1.00	1,012,945

Source: Program tracking data and Navigant analysis.

As shown in Table 3-7, the GPY3 North Shore Gas Home Energy Rebate program reported ex ante gross energy savings of 721,771 therms. Evaluation adjustments resulted in verified gross energy savings of 720,068 therms, reflecting the program’s gross realization rate of 100%.

Table 3-7. North Shore Gas GPY3 HER Program Impact Results

Measure Category	Unit	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Attic Insulation	Square Foot	183,678	17,972	1.00	17,972
Boiler Reset Controls	Boiler	3	294	1.00	292
Boiler Tune-up	Boiler	49	1,461	0.97	1,414
Combination Boiler Tankless Water Heater	Each	4	789	1.00	789
Duct Sealing	CFM	10,821	12,956	1.00	12,949
Furnace	Furnace	2,462	610,531	1.00	609,938
Furnace Tune-up	Furnace	584	9,733	0.93	9,040
Hydronic Boiler	Boiler	23	13,929	1.00	13,925
Indirect Water Heater	Each	4	211	1.00	211
Pipe Insulation - Hydronic Boiler	Linear Foot	1,009	669	1.00	666
Pipe Insulation - Steam Boiler	Linear Foot	290	353	1.00	354
Pipe Insulation - Water Heater	Linear Foot	1,459	1,095	1.00	1,094
Programmable Thermostat	Household	1,611	47,888	0.99	47,525
Storage Tank Water Heater	Each	92	2,165	1.00	2,174
Tankless Water Heater	Each	40	1,725	1.00	1,724
Total			721,771	1.00	720,068

Source: Program tracking data and Navigant analysis

Key findings include:

1. The PGL Home Energy Rebate program implemented 5,733 projects with 1,012,945 therms verified gross savings. The PGL program had an increase of 8% in verified savings in GPY3 compared to GPY2, and a decrease of 6% in program participation since GPY2.
2. The NSG Home Energy Rebate program implemented 3,841 projects with 720,068 therms verified gross savings. The NSG program had a 118% increase in verified savings and a 91% increase in participation since GPY2.
3. Furnaces accounted for about 65% of the PGL program savings and 85% of NSG program savings in GPY3.
4. The evaluation team found that a number of measures labeled “PG” for Peoples Gas were found in the North Shore Gas program. Additionally, a number of measures labeled “NSG” for North Shore Gas were found in the Peoples Gas program. This did not affect savings in any way. However, it could present confusion when consolidating program savings.
5. The following are the evaluation reviews and discussions of adjustments made to estimate the verified gross saving, using the program tracking data, default unit savings from the *Integrays_Master_Measure_Document* and the Illinois TRM (v2.0 or v3.0 for errata correction):

- a. Navigant applied programmable thermostat and thermostat reprogramming savings for a maximum of one unit per household. The Illinois TRM v2.0 uses heating assumptions that are on a per-household basis, and not a per-thermostat basis. Therefore, if there are multiple thermostats per household, a maximum of one unit of savings should be applied.
- b. Navigant reviewed Franklin Energy's savings assumptions for the boiler tune-up measure, because it is not a residential TRM measure. Navigant found the assumptions to be reasonable and therefore applied the supplied gross savings value of 28.867 therms/unit to the quantity of boiler tune-ups found in the tracking database. However, Navigant determined that gross savings values of 31.25 therms/unit, 29.78 therms/unit, and 30.79 therms/unit were used in the tracking system.
- c. Navigant reviewed Franklin Energy's savings assumptions for the boiler reset controls measure, because it is not a residential TRM measure. Navigant found the assumptions to be reasonable and therefore applied the supplied gross savings value of 97.44 therms/unit to the quantity of boiler reset controls measures found in the tracking database. However, Navigant determined that gross savings value of 119.05 therms/unit were used for Peoples Gas boiler reset controls measures in the tracking system.
- d. Navigant reviewed Franklin Energy's savings assumptions for the furnace tune-up measure, because it is not a residential TRM measure. Navigant found the assumptions to be reasonable and therefore applied the supplied gross savings value of 15.475 therms/unit to the quantity of furnace tune-up measures found in the tracking database. However, Navigant determined that gross savings values of 16.67 therms/unit and 17.27 therms/unit were used for furnace tune-up measures in the tracking system.

3.4.2 Home Energy Jumpstart Program

Table 3-8 indicates the input parameters to estimate verified gross savings for the Peoples Gas and North Shore Gas Home Energy Jumpstart program.

Table 3-8. Peoples Gas and North Shore Gas GPY3 HEJ Program Verified Gross Savings Parameters

Input Parameters	Verified Value	Deemed or Evaluated?
Quantity of Measures Installed	Varies	Evaluated
Gross Realization Rate (PGL/NSG)	PGL = 99%, NSG = 98%	Evaluated
Bathroom Aerator	0.865	Deemed TRM v2.0
Kitchen Aerator	4.77	Deemed TRM v2.0
Pipe Insulation – Domestic Hot Water	0.85	Deemed TRM v2.0
Pipe Insulation – Hot Water Boiler	0.656	Evaluated
Programmable Thermostat	52.6	Deemed TRM v2.0
Reprogram Thermostat	52.6	Deemed TRM v2.0
Showerhead	19.9	Deemed TRM v2.0
Water Heater Setback	6.4	Deemed TRM v2.0

Source: Program documentation, Navigant analysis, and Illinois TRM documents.

As shown in Table 3-9, the GPY3 Peoples Gas Home Energy Jumpstart program reported ex ante gross energy savings of 333,915 therms. Evaluation adjustments resulted in verified gross energy savings of 330,600 therms, reflecting the program’s gross realization rate of 99%.

Table 3-9. Peoples Gas GPY3 HEJ Program Impact Results

Measure Category	Unit	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Bathroom Aerator	Each	7,873	6,799	1.00	6,810
Kitchen Aerator	Each	4,667	22,268	1.00	22,262
Pipe Insulation	Linear Foot	29,831	23,890	1.00	23,886
Programmable Thermostat	Household	2,309	124,439	0.98	121,453
Reprogram Thermostat	Household	111	5,896	0.99	5,839
Showerhead	Each	7,555	150,617	1.00	150,345
Water Heater Setback	Each	1	6	1.00	6
Total			333,915	0.99	330,600

Source: Program tracking data and Navigant analysis

As shown in Table 3-10, the GPY3 North Shore Gas Home Energy Jumpstart program reported ex ante gross energy savings of 50,937 therms. Evaluation adjustments resulted in verified gross energy savings of 49,772 therms, reflecting the program’s gross realization rate of 98%.

Table 3-10. North Shore Gas GPY3 HEJ Program Impact Results

Measure Category	Unit	Verified Measure Quantity	Ex Ante Gross Savings	Verified Gross Realization Rate	Verified Gross Savings
Bathroom Aerator	Each	1,895	1,637	1.00	1,639
Kitchen Aerator	Each	512	2,439	1.00	2,442
Pipe Insulation	Linear Foot	4,308	3,495	1.00	3,497
Programmable Thermostat	Household	241	13,641	0.93	12,677
Reprogram Thermostat	Household	16	1,053	0.80	842
Showerhead	Each	1,441	28,672	1.00	28,676
Total			50,937	0.98	49,772

Source: Program tracking data and Navigant analysis

Key findings include:

1. The PGL Home Energy Jumpstart program implemented 6,356 projects with 330,600 therms verified gross savings. The PGL program had an increase of 30% in verified savings in GPY3 compared to GPY2, and an increase of 48% in program participation since GPY2.
2. The NSG Home Energy Jumpstart program implemented 932 projects with 49,772 therms verified gross savings. The NSG program had a 128% increase in verified savings and a 125% increase in participation since GPY2.
3. Showerheads accounted for about 45% of the PGL program savings and 56% of NSG program savings in GPY3.
4. The following are the evaluation reviews and discussions of adjustments made to estimate the verified gross saving, using the program tracking data, default unit savings from the *Integritys_Master_Measure_Document* and the Illinois TRM (v2.0 or v3.0 for errata correction):
 - a. Navigant applied programmable thermostat and thermostat reprogramming savings for a maximum of one unit per household. The Illinois TRM v2.0 uses heating assumptions that are on a per-household basis, and not a per-thermostat basis. Therefore, if there are multiple thermostats per household, a maximum of one unit of savings should be applied.

3.4.3 Multi-family Comprehensive Energy Efficiency Program (Multi-family)

The Multi-family program in GPY3 was delivered through four paths: Direct Installation, Trade Ally Partner Installation (TAPI), and through Custom and Prescriptive Incentives. The direct install included in-unit and common area measures. The TAPI, Custom, and Prescriptive Incentive categories constituted the comprehensive component of the Multi-family program designed in GPY3

in addition to the direct install measures offered in the previous program years. Table 3-11 indicates the input parameters to estimate verified gross savings from the Multi-family GPY3 program.

Table 3-11. GPY3 PGL and NSG Multi-family Program Verified Gross Savings Parameters

Input Parameters	Verified Value	Deemed or Evaluated?
Quantity of Measures Installed	Vary with measure type	Evaluated
Gross Realization Rate (PGL/NSG)	PGL = 100%, NSG = 100%	Evaluated
Bathroom Aerator	IU = 1.5, CA = 6.86. Adjusted common area	Deemed TRM v2.0 & v3.0
Kitchen Aerator	IU = 4.19, CA = 6.86. Adjusted common area	Deemed TRM v2.0 & v3.0
Showerhead	IU = 24.87, CA = 21.64	Deemed TRM v2.0
High-Efficiency Boilers	Vary. Most verified as acceptable. Minor adjustments applied	Deemed TRM v3.0
Boiler Cutout/Reset Control	1.64	Deemed TRM v2.0
Clothes Washers	79.31	Evaluated
Boiler Tune-up (Heating)	Vary. Adjusted based on TRM v3.0	Deemed TRM v3.0
Custom measures (bathroom exhaust DCV, linkageless control, etc.)	Custom assumptions. All verified as acceptable.	Evaluated
DI Pipe Insulation	0.850	Deemed TRM v2.0
Draft Damper	0.205	Deemed TRM v2.0
Duct Sealing	0.778	Deemed TRM v2.0
High-Efficiency Furnace	Vary. All IU and CA savings were verified as acceptable.	Deemed TRM v2.0 & v3.0
Furnace Tune-up	12.57 (IU 40-99 MBH), 25.15 (IU 100-250 MBH).	Evaluated
Improved Turndown Burner Replace/ Linkageless Controls/ High-Eff DHW/O2 Trim	Custom assumptions. All verified as acceptable	Evaluated
MF Single-Pipe Steam System Balancing/ IMP Venting	51.32	Evaluated
MF Single-Pipe Steam Boiler Averaging Controls	49.27	Evaluated
Large Gas Water Heater	1.67	Deemed TRM v2.0
DHW/HW Boiler Pipe Insulation/Wrap	Vary. Mostly verified as acceptable. Minor adjustments	Deemed TRM v2.0
Pre-Rinse Sprayer	DI = 135.35 or Presc. = 117.84	Deemed TRM v2.0
Programmable Thermostat	DI-IU = 34.21, P-IU = 19.16, CA = 178	Deemed TRM v2.0
Attic and Roof Insulation	1.00	Evaluated
HVAC Steam Trap Repair/Replacement	Audited = 330.76, Unaudited = 89.37	Deemed TRM v2.0
Tankless Water Heater	243.22	Deemed TRM v2.0
Water Heater	148	Deemed TRM v2.0

Source: Program documentation, Navigant analysis, and Illinois TRM documents.

Table 3-12 provides a breakdown of the GPY3 Peoples Gas Multi-family program by installation categories, implemented projects and gross savings. Overall, the PGL program reported ex ante gross energy savings of 5,749,844 therms. Evaluation adjustments resulted in verified gross energy savings of 5,748,408 therms, reflecting the program’s gross realization rate of 100%.

Table 3-12. GPY3 Peoples Gas Multi-family Impact Results by Program Category

Measure Category	Projects Installed	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)	Percent Verified Gross Savings
Direct Install Measures					8%
In-unit	14,741	436,929	1.00	436,674	94%
Common Area	109	27,276	1.01	27,592	6%
<i>Direct Install Subtotal</i>	<i>14,850</i>	<i>464,205</i>	<i>1.00</i>	<i>464,266</i>	
Trade Ally Participant Installations (TAPI)					55%
In-unit	2	234	0.97	226	0%
Common Area	851	3,147,847	1.00	3,151,596	100%
<i>TAPI Subtotal</i>	<i>853</i>	<i>3,148,081</i>	<i>1.00</i>	<i>3,151,823</i>	
Prescriptive Incentive Measures					30%
In-unit	51	13,079	1.00	13,105	1%
Common Area	817	1,750,660	1.00	1,745,395	99%
<i>Prescriptive Incentive Subtotal</i>	<i>868</i>	<i>1,763,738</i>	<i>1.00</i>	<i>1,758,500</i>	
Custom Measures					7%
Common Area	12	373,819	1.00	373,819	7%
PGL PY3 Multi-family Total	16,583*	5,749,844	1.00	5,748,408	100%

*- Overall, PGL GPY3 program implemented 16,573 projects (10 projects installed, both TAPI and Incentive projects).

Source: Program tracking data and Navigant analysis.

Additional breakdown of the PGL Multi-family GPY3 gross savings by direct install measures versus comprehensive measures are shown in Table 3-13. Key findings from the measure savings adjustments are presented below in the key findings section.

Table 3-13. Peoples Gas GPY3 Multi-family Impact Results by Measure

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	13,520	20,536	1.01	20,725
Kitchen Aerator	Each	11,983	50,208	1.00	50,292
DI Pipe Insulation	Linear Foot	8,485	25,352	1.00	25,409
Pre-Rinse Sprayers	Each	3	407	1.00	407
Programmable/Reprogram Thermostat	Each	639	22,442	1.00	22,435
Showerhead	Each	13,877	345,261	1.00	344,998
<i>Direct Install Subtotal</i>			464,205	1.00	464,266
Comprehensive (TAPI/Incentive/MF Custom) Measures					
Attic and Roof Insulation	Square Foot	4,917	4,940	1.00	4,917
Boiler Cutout/Reset Control	MBH	7,449	12,202	1.00	12,216
High Efficiency Boilers	MBH	122,452	189,655	1.00	189,151
Boiler Tune-up	MBH	382,234	190,431	1.01	192,262
Clothes Washers	Each	8	635	1.00	635
Draft Damper	MBH	56,568	11,583	1.00	11,583
Duct Sealing	CFM	274	213	1.00	213
High-Efficiency Furnace	Each	74	8,619	1.00	8,620
Pipe Insulation	Linear Foot	332,697	3,199,973	1.00	3,202,345
Furnace Tune-Up	Furnace	14	234	0.97	226
High-Efficiency DHW	Each	1	10,554	1.00	10,554
Improved Turndown Burner Replace	MBH	41,624	41,816	1.00	41,816
Large Gas Water Heater	MBH	1,048	1,757	1.00	1,753
Linkageless Controls	MBH	39,846	40,030	1.00	40,030
MF Single-Pipe Steam Boiler Averaging Controls	Dwell Unit	13,631	674,230	1.00	671,607
MF Single-Pipe Steam System Balancing/IMP Venting	Dwell Unit	5,564	288,247	0.99	285,534
O2 Trim	MBH	4,198	4,218	1.00	4,218
Programmable/Reprogram Thermostat	Each	267	6,362	1.00	6,386
Steam Trap Repair/Replacement	Each	1,697	224,387	1.00	224,516
Tankless Water Heater	Each	22	1,146	1.00	1,148
Water Heater	Each	4	589	1.01	592

Measure Category	Quantity Unit	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Custom Measures		12	373,819	1.00	373,819
<i>Comprehensive Subtotal</i>			5,285,638	1.00	5,284,142
PGL PY3 Multi-family Total			5,749,844	1.00	5,748,408

Sources: Program tracking data and Navigant analysis

Table 3-14 provides a breakdown of the GPY3 North Shore Gas Multi-family program by installation categories and gross savings. Overall, the NSG program reported ex ante gross energy savings of 100,500 therms. Evaluation adjustments resulted in verified gross energy savings of 100,335 therms, reflecting the program’s gross realization rate of 100%.

Table 3-14. North Shore Gas GPY3 Multi-family Impact Results by Program Category

Measure Category	Projects Installed	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)	Percent Verified Gross Savings	
Direct Install Measures					71%	
In-unit	1,811	61,313	1.00	61,205	87%	
Common Area	13	9,512	1.00	9,526	13%	
<i>Direct Install Subtotal</i>		1,824	70,825	1.00	70,731	
Trade Ally Participant Installations (TAPI)					28%	
In-unit	19	3,049	0.97	2,953	10%	
Common Area	26	25,469	1.00	25,549	90%	
<i>TAPI Subtotal</i>		45	28,517	1.00	28,502	
Prescriptive Incentive Measures					1%	
In-unit	2	164	1.00	164	15%	
Common Area	3	994	0.94	938	85%	
<i>Prescriptive Incentive Sub-total</i>		5	1,158	0.95	1,102	
NSG PY3 Multi-family Total		1,874	100,500	1.00	100,335	100%

Sources: Program tracking data and Navigant analysis

Additional breakdown of the NSG Multi-family GPY3 gross savings by direct install measures versus comprehensive measures is shown in Table 3-15. Key findings from the measure savings adjustments are outlined below.

Table 3-15. North Shore Gas GPY3 MCEEP 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	1,840	2,760	1.00	2,771
Kitchen Aerator	Each	1,416	5,925	1.00	5,941
Pipe Insulation	Linear Feet	1,876	9,659	1.00	9,661
Programmable/Reprogram Thermostat	Each	432	14,792	1.00	14,779
Showerhead	Each	1,511	37,689	1.00	37,579
<i>Direct Install Subtotal</i>			70,825	1.00	70,731
Comprehensive (TAPI/Incentive/MF Custom) Measures					
High-Efficiency Boilers	MBH	210	587	0.90	530
Boiler Tune-up	MBH	8,600	8,854	1.01	8,913
High-Efficiency Furnace	Each	1	106	1.00	106
Pipe Insulation	Linear Feet	1,824	16,687	1.00	16,709
Furnace Tune-Up	Each	235	3,049	0.97	2,954
Large Gas Water Heater	MBH	200	335	1.00	335
Programmable/Reprogram Thermostat	Each	3	58	1.00	57
<i>Comprehensive Subtotal</i>			29,675	1.00	29,604
NSG PY3 Multi-family Total			100,500	1.00	100,335

Sources: Program tracking data and Navigant analysis

Key findings include:

1. The Peoples Gas direct install projects accounted for only 8% of the GPY3 savings, and the comprehensive projects accounted for 92% of the verified gross savings (TAPI-55%, Incentive-30%, and Custom-7%). In terms of measures, common area domestic hot water and steam boiler pipe wraps and insulations accounted for the bulk (56%) of the overall verified savings for PGL in GPY3. Boiler combustion management upgrades—including single-pipe steam boiler averaging controls and steam system balancing and improved venting—accounted for the second highest savings (19%). Direct install showerheads accounted for 6% and custom projects accounted for 7% of the overall GPY3 verified gross savings. Direct install in-unit measures had 94% of the direct install verified gross savings compared with almost 100% verified savings from common area measures for the comprehensive projects.

2. The North Shore Gas direct install projects accounted for the bulk of the GPY3 savings, 71%, with the remaining 29% from comprehensive projects (TAPI-28% and Incentive-1%). In terms of measures, direct install showerheads contributed to 37% and programmable and reprogrammed thermostats accounted for 15% of the GPY3 NSG program verified gross savings. Domestic hot water and steam boiler pipe insulations accounted for 27% of the verified gross savings. Direct install in-unit measures had 87% of the direct install verified gross savings compared with about 90% of the verified gross savings from common area measures for the comprehensive projects.
3. Overall, the Peoples Gas Multi-family program in GPY3 achieved over 200% increase in verified gross savings, although with 39% decrease in projects installed compared to GPY2. The North Shore Gas Multi-family program in GPY3 realized 35% less savings and close to 61% less in project participation compared to GPY2.
4. The following are the evaluation reviews and discussions of adjustments made to estimate the verified gross saving, using the Multi-family program tracking data, default unit savings from the *Integritys_Master_Measure_Document* and the Illinois TRM (v2.0 or v3.0 for errata correction²⁰):
 - a. The evaluation team applied corrections to the ex ante savings from the common area bathroom and kitchen aerators by adjusting the average flow rate of the baseline faucet from 1.2 to 1.39 gallons per minute.²¹ The verified common area bathroom/kitchen aerator savings increased from 4.59 therms to 6.86 therms.
 - b. The ex ante savings assumptions for common area high-efficiency boilers, furnaces, boiler tune-ups, and reset control measures were consistent with the errata adjustments as discussed in the tracking system review, Section 3.1. The evaluation team applied minor adjustments, where necessary.
 - c. The implementation contractor assumed a 2.37% reduction in gas consumption savings factor for common area boiler tune-ups compared to the TRM 1.6% deemed default value. The ex ante custom value was based on actual data from pre- and post-boiler combustion efficiency estimates from other residential program studies.²² The evaluation team found the average 2.37% savings factor as reasonable. The measure verified gross savings increased by 1%.
 - d. The savings from furnace tune-ups were not deemed in the TRM. The IC applied a reduction in gas consumption, a custom savings factor of 1.92% based on actual data. The savings algorithm applied a TRM adjustment for Multi-family in-unit installations, and assumed an 80% furnace combustion efficiency before tune-up (Effpre). The Effpre is considered as errata in the TRM (v3.0) for common area space

²⁰ The SAG ruling on the errata correction using the TRM (v3.0) is discussed in Section 3.1 from the tracking system review.

²¹ Navigant used non-residential savings assumptions and algorithm for the common area faucet aerators. This measure was marked as errata; see reference *Illinois_Statewide_TRM_Effective_060114_Version_3_0_021414_Final_Clean.pdf* (see pages starting from 10, page 13 specifically for the errata explanation). The baseline GPM change can be seen from the TRM Section 5.4.4 (page 552).

²² The Integritys Master Measure Document_8282014 provides pre- and post-combustion efficiencies from 53 projects from the PGL/NSG Residential Home Energy Program. The averaged savings factor was 2.37%.

- heating. Since this measure is not deemed in the TRM, the evaluation team did not adjust the savings.
- e. The evaluation team reviewed a sample of project invoices and furnace model specifications to verify that the high-efficiency furnace ex ante savings assumed a 75,000 British thermal units per hour (BTUH) input capacity. We found the ex ante savings as reasonable and did not apply any adjustment, although these estimates were lower compared to input capacity assumptions and savings estimates from the *Integrus Master Measure Document*.
 - f. The evaluation team estimated that Single-Pipe Steam Boiler Averaging Controls can realize 49.3 therms savings per dwelling unit (some projects claimed 60.9 therms, which we adjusted.) The Single-Pipe Steam System Balancing/ IMP Venting can realize 51.3 therms per dwelling unit (we adjusted those projects which claimed 63.3 therms.)
 - g. The evaluation team found that project #508852 did not complete a furnace tune-up as was claimed in the tracking database. The verified measure from the project documentation was a medium-size 2-4 inch straight pipe insulation. We adjusted the unit savings from 16.3 therms to 11.7 therms. Project #332137 installed steam pipe wraps of various sizes; we adjusted the tracking savings to match the *Integrus Master Measure Document*, and increased the measure verified savings. For projects #545003 and #610247, the tracking measure description is common area "DI HW Boiler Pipe Wrap Small (<=2)"; we adjusted the savings accordingly from 2.78 therms to 2.37 therms per linear foot to match the *Integrus Master Measure Document*.
 - h. We identified 12 Peoples Gas projects with custom savings inputs. We reviewed the savings input assumptions for a sample of projects including #492892 (parking DCV), #386120 (bathroom exhaust DCV), and #573189 (DHW setback schedule). For project #573189, although the TRM provides 6.4 therms deemed value for water heater temperature setbacks, the project installed a large gas central boiler and required additional custom input to verify the savings. We verified the custom assumptions as reasonable and did not adjust the claimed savings.

3.4.4 C&I Prescriptive Rebate Program

Table 3-16 indicates the input parameters to estimate verified gross savings for the Peoples Gas and North Shore Gas, C&I Prescriptive program.

Table 3-16. GPY3 PGL and NSG C&I Prescriptive Program Verified Gross Savings Parameters

Input Parameters	Verified Value	Deemed or Evaluated?
Quantity of Measures Installed	Vary with measure type	Evaluated
Gross Realization Rate (PGL/NSG)	PGL = 100%, NSG = 100%	Evaluated
Bathroom/Kitchen Aerator	6.86 (Adjusted common area errata)	Deemed TRM v3.0
High-Efficiency Boilers	Vary. All verified as acceptable with minor adjustment	Deemed TRM v3.0
Boiler Cutout/Reset Control	0.93	Deemed TRM v3.0
Boiler Tune-up (Heating)	0.186	Deemed TRM v3.0
Building DCV - Commercial	Custom assumptions. All verified as acceptable	Evaluated
ENERGY STAR Fryer	505.24	Deemed TRM v2.0
HVAC Steam trap repair/replacement - Audited	330.16 (< 15 psi), 328.57 (> 15 psi)	Deemed TRM v2.0
Industrial Burner Tune-up	0.589	Deemed TRM v2.0
High-Efficiency Furnace	130.84 (>92% AFUE), 163.55 (>95% AFUE)	Deemed TRM v3.0
HVAC Steam Trap No Audit	89.37	Evaluated
HVAC Steam Trap Repair/Replacement	330.76	Deemed TRM v2.0
HW/Steam Pipe Insulation	Vary. All verified as acceptable with minor adjustment	Deemed TRM v2.0
Improved Turndown Burner Replace	Custom assumptions. All verified as acceptable	Evaluated
Infrared Heater	3.01	Deemed TRM v2.0
DI Pipe Insulation (DHW)	0.881	Deemed TRM v2.0
Industrial Steam Trap (LP, MP, and HP)	Vary. All verified as acceptable	Deemed TRM v2.0
Infrared Salamander Broiler	239.68	Deemed TRM v2.0
Linkageless Controls	Custom assumptions. All verified as acceptable	Evaluated
Pre-Rinse Sprayer	DI = 135.35 or Presc. = 117.84	Deemed TRM v2.0
Programmable Thermostat	178	Evaluated
Kitchen Hood DCV	Custom assumptions. All verified as acceptable	Evaluated
Showerhead	21.64	Deemed TRM v2.0
Large Gas Water Heater	1.67	Deemed TRM v2.0
O2 Trim	Custom assumptions. Verified as acceptable	Evaluated

Source: Program documentation, Navigant analysis, and Illinois TRM documents.



As shown in Table 3-17, the GPY3 Peoples Gas C&I Prescriptive program reported ex ante gross energy savings of 1,351,330 therms. Evaluation adjustments resulted in verified gross energy savings of 1,352,408 therms, reflecting the program’s gross realization rate of 100%.

Table 3-17. GPY3 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	462	2,174	1.46	3,169
Kitchen Aerator	Each	387	1,777	1.49	2,654
Pre-Rinse Sprayer	Each	1	136	1.00	136
Showerhead	Each	409	9,761	0.91	8,849
<i>Direct Install Subtotal</i>			<i>13,848</i>	<i>1.07</i>	<i>14,808</i>
Prescriptive Incentive Measures					
Boiler Tune-up (Heating)	MBH	242,344	45,007	1.00	45,095
Building DCV - Commercial	Square Foot	376,355	48,785	1.00	48,785
ENERGY STAR Fryer	Each	2	1,010	1.00	1,010
High-Efficiency Boilers	MBH	66,238	59,466	1.00	59,466
High-Efficiency Furnace	Each	7	1,079	1.00	1,079
HVAC Steam Trap Repair/Replacement	Each	1,802	512,780	1.00	512,780
Improved Burner Turndown Replacement	MBH	113,036	41,400	1.00	41,400
Industrial Burner Tune-up	MBH	47,946	28,235	1.00	28,235
Industrial Steam Trap Repair/Replacement	Each	366	497,531	1.00	497,561
Infrared Heater	MBH	120	360	1.00	360
Kitchen Hood DCV	HP	48	27,075	1.00	27,075
Linkageless Controls	MBH	130,348	39,554	1.00	39,554
O2 Trim	MBH	25,106	2,792	1.00	2,792
Pipe Insulation (DHW & Steam/HW Boilers)	Linear Foot	8,878	13,030	1.00	13,030
Programmable Thermostat	Each	109	19,378	1.00	19,378
<i>Prescriptive Incentive Subtotal</i>			<i>1,337,482</i>	<i>1.00</i>	<i>1,337,600</i>
PGL C&I Prescriptive Total			1,351,330	1.00	1,352,408

Sources: Program tracking data and Navigant analysis

As shown in Table 3-18, the GPY3 North Shore Gas C&I Prescriptive program reported ex ante gross energy savings of 140,314 therms. Evaluation adjustments resulted in verified gross energy savings of 140,670 therms, reflecting the program’s gross realization rate of 100%.

Table 3-18. GPY3 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)
Direct Install Measures					
Bathroom Aerator	Each	151	693	1.49	1,036
Showerhead	Each	22	475	1.00	476
<i>Direct Install Subtotal</i>			<i>1,168</i>	<i>1.29</i>	<i>1,512</i>
Prescriptive Incentive Measures					
Boiler Cutout/Reset Controls	MBH	59,872	55,690	1.00	55,690
Boiler Tune-up (Heating)	MBH	2,000	371	1.00	372
ENERGY STAR Fryer	Each	2	1,010	1.00	1,010
High-Efficiency Boilers	MBH	5,000	3,373	1.00	3,373
High-Efficiency Furnace	Each	4	621	1.00	621
HVAC Steam Trap Repair/Replacement	Trap	13	4,292	1.00	4,292
Improved Burner Turndown Replacement	MBH	33,810	2,296	1.00	2,296
Industrial Steam Trap Repair/Replacement	Trap	40	50,128	1.00	50,139
Pre-Rinse Sprayer	Each	2	236	1.00	236
Infrared Heater	MBH	40	120	1.00	120
Infrared Salamander Broiler	Each	1	240	1.00	240
Large Gas Water Heater	MBH	398	663	1.00	663
Linkageless Controls	MBH	33,810	7,054	1.00	7,054
Pipe Insulation (DHW & Steam/HW Boilers)	Linear Foot	4,818	12,696	1.00	12,696
Programmable Thermostat	Each	2	356	1.00	356
<i>Prescriptive Incentive Subtotal</i>			<i>139,146</i>	<i>1.00</i>	<i>139,158</i>
NSG C&I Prescriptive Total			140,314	1.00	140,670

Source: Program tracking data and Navigant analysis

Key findings include:

1. Both the Peoples Gas and North Shore Gas C&I Prescriptive direct install projects accounted for only 1% of verified gross savings, and the contractor installed projects contributed 99%. The PGL program had a decrease of 71% in verified savings and a decrease of 86% in program participation in GPY3 compared to GPY2. The NSG program had a 32% decrease in verified savings and a 69% decrease in participation in GPY3 compared to GPY2. These decreases are the result of the creation of the Multi-family Comprehensive Program. In GPY1 and GPY2, the Multi-family program was direct install only and all other projects were processed through C&I.
2. Steam trap measures accounted for about 75% of the PGL program savings in GPY3. The NSG program savings had boiler cutout/reset controls accounting for 40% and steam trap measures 39% for the bulk of the GPY3 savings.
3. The following are the evaluation reviews and discussions of adjustments made to estimate the verified gross saving, using the C&I Prescriptive program tracking data, default unit savings from the *Integrys_Master_Measure_Document* and the Illinois TRM (v2.0 or v3.0 for errata correction):
 - a. The evaluation team applied corrections to the ex ante savings from common area bathroom and kitchen aerators by adjusting the average flow rate of the baseline faucet from 1.2 to 1.39 gallons per minute. The verified aerator savings increased from 4.59 therms to 6.86 therms for an unknown location in a commercial building.
 - b. The evaluation team verified that the ex ante savings from high-efficiency boilers, furnaces, boiler tune-ups, and reset control measures were consistent with the errata adjustments as discussed in the tracking system review, Section 3.1. The evaluation team applied minor adjustments, where necessary.
 - c. The evaluation team reviewed a sample of project invoices and furnace model specifications to verify that the high-efficiency furnaces installed through the program likely had 75,000 BTUH input capacity. This assumption was consistent with the ex ante savings estimates, although much higher savings were calculated in the *Integrys Master Measure Document*, which assumed a higher input capacity.
 - d. For projects that performed mass replacement of steam traps, the evaluation team verified that the ex ante savings applied the required TRM adjustment to the savings. The tracking database did not provide adequate description of the type, size, and quantities of industrial steam traps installed in GPY3. The evaluation team reviewed the project's documentation from the Bensight Tracking System to verify the measure quantities and savings from industrial steam traps. No adjustment was applied.
 - e. The evaluation team identified eight projects with custom input savings assumptions (including projects #350233, #526539, #370984, and #472771). These measures included building DCV-commercial measures, and boiler upgrade measures such as linkageless controls, improved burner turndown replacement, and O2 Trim. We reviewed the project files, invoices, and measure specifications. We verified that the input assumptions are reasonable and we did not apply any adjustments.

3.4.5 Small Business Energy Savings

Table 3-19 indicates the input parameters to estimate verified gross savings for the Peoples Gas and North Shore Gas, Small Business Energy Savings program.

Table 3-19. PGL and NSG GPY3 SBES Program Verified Gross Savings Parameters

Input Parameters	Verified Value*	Deemed or Evaluated?
Quantity of Measures Installed	Vary with measure type	Evaluated
Gross Realization Rate (PGL/NSG)	PGL = 100%, NSG = 102%	Evaluated
Bathroom/Kitchen Aerator	6.86 (Corrected errata in TRM v2.0 and used TRM v3.0 algorithm and assumptions)	Deemed TRM v3.0
High-Efficiency Boilers	Vary. All verified as acceptable with minor adjustment	Deemed TRM v3.0
Boiler Cutout/Reset Control	0.93	Deemed TRM v3.0
Boiler Tune-up	Vary. All verified as acceptable	Deemed TRM v3.0
Custom Measure	Custom assumptions. All verified as acceptable	Evaluated
Dry Cleaner Steam Trap	Audited - 513.93, Unaudited - 138.64	Deemed TRM v2.0
ENERGY STAR Convection Oven	306	Deemed TRM v2.0
ENERGY STAR Fryer	505.1	Deemed TRM v2.0
High-Efficiency Furnace	131.93 (>92% AFUE), 163.55 (>95% AFUE)	Deemed TRM v3.0
Furnace Tune-up	13.03 (40-99 MBH), 22.33 (100-250 MBH)	Evaluated
HVAC Steam Trap Repair/Replacement	330.76	Deemed TRM v2.0
HW/Steam Pipe Insulation	Vary. All verified as acceptable	Deemed TRM v2.0
Improved Turndown Burner Replace	Custom assumptions. All verified as acceptable	Evaluated
Infrared Heater SBES PY3	3.01	Deemed TRM v2.0
Large Gas Water Heater	1.67	Deemed TRM v2.0
Linkageless Controls	Custom assumptions. All verified as acceptable	Evaluated
Pre-Rinse Sprayer	135.35	Deemed TRM v2.0
Programmable Thermostat	178	Evaluated
Rack Ovens	1033.2	Evaluated
Showerhead	21.64	Deemed TRM v2.0
Tankless Water Heater	242.64	Deemed TRM v2.0

* Measure savings values are in therms.

Source: Program documentation, Navigant analysis, and Illinois TRM documents.

As shown in Table 3-20, the GPY3 Peoples Gas Small Business program reported ex ante gross energy savings of 927,592 therms. Evaluation adjustments resulted in verified gross energy savings of 930,957 therms, reflecting the program’s gross realization rate of 100%.

Table 3-20. Peoples Gas GPY3 SBES Program Impact Results

Measure Category	Unit	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Direct Install Measures					
Bathroom Aerator	Each	1,777	8,097	1.51	12,187
Kitchen Aerator	Each	142	649	1.50	974
Pre-Rinse Sprayer	Each	38	5,075	1.00	5,064
Showerhead	Each	1,236	26,649	1.00	26,741
<i>Direct Install Subtotal</i>			<i>40,470</i>	<i>1.11</i>	<i>44,966</i>
Contractor Installed Measures					
High-Efficiency Boiler	MBH	30,579	19,209	1.00	19,209
Boiler Cutout/Reset Control	MBH	2,008	1,867	1.00	1,867
Boiler Tune-up	MBH	36,751	7,767	1.00	7,765
Dry Cleaner Steam Trap	Trap	666	314,901	1.00	314,882
ENERGY STAR Fryer	Each	1	505	1.00	505
High-Efficiency Furnace	Each	41	7,205	0.83	5,978
Furnace Tune-up	Each	12	276	1.00	277
HVAC Steam Trap Repair/Replacement	Trap	927	261,215	1.00	261,005
HW/Steam Pipe Insulation	Linear Foot	26,120	148,802	1.00	148,724
Improved Turndown Burner Replace	MBH	3,538	3,539	1.00	3,539
Infrared Heater	MBH	285	858	1.00	857
Large Gas Water Heater	MBH	476	797	1.00	797
Linkageless Controls	MBH	787	787	1.00	787
Programmable Thermostat	Each	540	95,722	1.00	96,120
Rack Ovens	Each	2	2,060	1.00	2,067
Tankless Water Heater	Each	1	243	1.00	243
Custom Measures	Each	3	21,369	1.00	21,369
<i>Contractor Install Sub-total</i>			<i>887,122</i>	<i>1.00</i>	<i>885,991</i>
PGL SBES PY3 Total			927,592	1.00	930,957

Sources: Program tracking data and Navigant analysis

As shown in Table 3-21, the GPY3 North Shore Gas Small Business program reported ex ante gross energy savings of 347,447 therms. Evaluation adjustments resulted in verified gross energy savings of 352,975 therms, reflecting the program’s gross realization rate of 102%.

Table 3-21. North Shore Gas GPY3 SBES Program Impact Results

Measure Category	Unit	Verified Measure Quantity	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
Direct Install Measures					
Bathroom Aerator	Aerator	1,934	8,887	1.49	13,263
Kitchen Aerator	Aerator	328	1,507	1.49	2,249
Pre-Rinse Sprayer	Sprayer	6	814	1.00	812
Showerhead	Showerhead	1,354	29,231	1.00	29,294
<i>Direct Install Subtotal</i>			40,439	1.13	45,618
Contractor Installed Measures					
Dry Cleaner Steam Trap	Trap	342	160,763	1.00	160,753
ENERGY STAR Convection Oven	Unit	2	612	1.00	612
High-Efficiency Furnace	Furnace	2	327	1.00	327
Furnace Tune-up	Furnace	3	81	1.00	80
HW/Steam Pipe Insulation	Ln Ft	13,613	55,758	1.00	55,755
Programmable Thermostat	Thermostat	493	87,391	1.00	87,754
Custom Measure	Unit	1	2,076	1.00	2,076
<i>Contractor Installed Subtotal</i>			307,008	1.00	307,357
NSG SBES PY3 Total			347,447	1.02	352,975

Sources: Program tracking data and Navigant analysis

Key findings include:

1. The Peoples Gas Small Business direct install projects contributed 5% of verified gross savings, and the contractor installed projects had 95% of the GPY3 verified gross savings. The North Shore Gas Small Business direct install projects contributed 12%, and the contractor installed projects had 88% of the GPY3 verified gross savings.
2. The PGL program had a 63% increase in the verified savings in GPY3 compared to GPY2, although with close to the same number of program participants since GPY2. The NSG program had a 35% increase in verified savings in GPY3 compared to GPY2, with about 180% increase in participation. The results indicate a consistent year-to-year increase in program savings and participation for both PGL and NSG since program inception in GPY1.
3. The PGL/NSG program savings increased partly as a result of additional measure mix introduced in GPY3. Steam and hot water boiler pipe insulation introduced in GPY3

accounted for about 16% of the verified gross savings for both PGL and NSG. Savings from dry cleaner steam trap replacements which contributed to the bulk of the savings in GPY2 were much lower in GPY3 (close to 50% less for both PGL and NSG), whereas savings increased for other measures such as the programmable thermostats (NSG – from 13% to 25%) and HVAC steam trap replacements (PGL – from 12% to 28%).

4. The following are the evaluation reviews and discussions of adjustments made to estimate the verified gross savings, using the Small Business program tracking data, default unit savings from the *Integrays_Master_Measure_Document* and the Illinois TRM (v2.0 or v3.0 for errata correction):
 - a. The evaluation team used the TRM (v3.0) algorithm and assumptions and changed the common area bathroom and kitchen aerators average flow rate of the baseline faucet from 1.2 to 1.39 gallons per minute. The measure unit savings increased from 4.59 therms to 6.86 therms for an unknown location in a commercial building.
 - b. The evaluation team verified that the ex ante savings from high-efficiency boilers, furnaces, boiler tune-ups, and reset control measures were consistent with the errata adjustments as discussed in the tracking system review, Section 3.1.
 - c. The evaluation team found that the high-efficiency furnace ex ante savings did not match the estimates from the *Integrays Master Measure Document*. We verified the furnace input capacities as 75,000 BTUH after reviewing the invoices and furnace model specifications from a sample of projects including #443983 and #541990. We estimated 131.93 therms for the >92% AFUE furnace compared to 185.19 therms ex ante savings, and 163.55 therms for the >95% AFUE furnace, which was close to 163.40 therms ex ante savings.
 - d. The furnace tune-up measure is not deemed in the TRM, but the measure ex ante savings was based on the TRM (v3.0) assumptions and errata correction. We found the assumptions as custom and reasonable and did not adjust the savings.
 - e. For projects that performed mass replacement of steam traps, the evaluation team verified that the ex ante savings applied the required TRM adjustment to the savings.
 - f. The evaluation team identified three projects (#252133, #297016, and #394478) with non-deemed custom savings estimates for pipe insulation, HVAC boilers, and controls. We verified the input assumptions as reasonable, and did not adjust the savings.

4 Net Impact Evaluation

As noted in Section 2, the NTGR values used to calculate the net verified savings for GPY3 were deemed through a consensus process by the Illinois SAG.²³ No further NTGR research was planned or conducted for GPY3. Table 4-1 below details the NTGR values used to calculate the program-level net savings.

Table 4-1. Peoples Gas and North Shore Gas GPY3 Programs NTGR Values

Program	GPY3 SAG Consensus NTGR†	NTGR used for GPY3 Evaluation
Residential Programs		
Home Energy Rebate	0.82 (PGL) 0.80 (NSG)	0.82 (PGL) 0.80 (NSG)
Home Energy Jumpstart	0.96	0.96
Multi-family	0.90	0.90
C&I Programs		
C&I Prescriptive Rebate	0.63	0.63
Small Business Energy Savings	0.99	0.99

Source: † A deemed value. Approved by consensus of the Illinois Energy Efficiency SAG.

For the programs that were delivered through multiple paths in GPY3 – Multi-family and Small Business – Franklin Energy tracked ex ante net savings by applying a different NTGR for each path in the program. Navigant recommends applying a single NTGR per program for GPY3 as approved by SAG consensus and has used those NTGR values for reporting verified net savings in GPY3. However, Navigant recommends applying NTGR values by program path for GPY4. As shown by the results in Table 4-2 and Table 4-3, both methods provide very similar results.

When converting ex ante gross to ex ante net savings for tracking and reporting, Franklin Energy combines a gross savings adjustment factor with a net-to-gross ratio. The gross savings factor used by Franklin Energy accounts for potential gross realization rate adjustments by evaluation after the year ends, and is based on the previous year verified gross realization rate. The Franklin Energy equation for GPY3 ex ante net savings is:

$$\text{GPY3 Ex Ante Net} = \text{GPY3 Ex Ante Gross} * \text{GPY2 Verified Gross RR} * \text{GPY3 NTGR}$$

²³ SAG (http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls).

When evaluation reports verified results, the verified net energy savings are calculated by a similar equation – multiplying the verified gross savings estimates by a net-to-gross ratio – except that Evaluation uses the verified gross realization based on the current evaluated year, not the previous year. Evaluation reports the verified net savings using this equation:

$$\text{GPY3 Verified Net} = \text{GPY3 Ex Ante Gross} * \text{GPY3 Verified Gross RR} * \text{GPY3 NTGR}$$

As shown, the difference between the two equations for GPY3 is that Franklin Energy used the GPY2 verified gross realization rate (from the previous year evaluation) and Evaluation uses the GPY3 verified gross realization rate (from the year currently being evaluated).

Table 4-2 and Table 4-3 provide the verified net savings for GPY3 Peoples Gas and North Shore Gas programs, respectively.

Table 4-2. GPY3 Peoples Gas Programs Verified Net Savings

Programs	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)*	GPY3 Verified Gross RR ²⁴ ‡	Verified Gross Savings (Therms)	NTGR†	Verified Net Savings (Therms)
Residential Programs						
Home Energy Rebate	1,015,839	841,318	1.00	1,012,945	0.82	830,615
Home Energy Jumpstart	333,915	298,119	0.99	330,600	0.96	317,376
Multi-family	5,749,844	5,211,081	1.00	5,748,408	0.90	5,173,566
Business Programs						
C&I Prescriptive Rebate	1,351,330	853,831	1.00	1,352,409	0.63	852,017
Small Business Energy Savings	927,591	928,604	1.00	930,957	0.99	921,647

‡ Based on evaluation review of the programs tracking database and measure savings using the Illinois TRM (v2.0 & v3.0).

† Deemed values. Source: Approved by the SAG (http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls).

* When converting ex ante gross to ex ante net savings for tracking and reporting, Franklin Energy combines an additional adjustment factor with the deemed net-to-gross ratio. The additional factor accounts for potential gross realization rate adjustments, and is based on the previous year realization rate. The equation for GPY3 is:

$$\text{GPY3 Ex Ante Net} = \text{GPY3 Ex Ante Gross} * \text{GPY2 Verified Gross RR} * \text{GPY3 NTGR}$$

Sources: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract).

²⁴ Verified Gross Realization Rate (RR) = Verified Gross Savings/Ex Ante Gross Savings.

Table 4-3. GPY3 North Shore Gas Programs Verified Net Savings

Programs	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)*	GPY3 Verified Gross RR‡	Verified Gross Savings (Therms)	NTGR†	Verified Net Savings (Therms)
Residential Programs						
Home Energy Rebate	721,771	588,966	1.00	720,068	0.80	576,055
Home Energy Jumpstart	50,937	43,521	0.98	49,772	0.96	47,781
Multi-family	100,500	92,168	1.00	100,335	0.90	90,301
Business Programs						
C&I Prescriptive Rebate	140,315	88,609	1.00	140,671	0.63	88,623
Small Business Energy Savings	347,444	350,065	1.02	352,976	0.99	349,446

‡ Based on evaluation review of the programs tracking database and measure savings using the Illinois TRM (v2.0 & v3.0).

† Deemed values. Source: Approved by the SAG ([http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ Peoples Gas and North Shore Gas GPY1-GPY3 and Phase II Plan.xls](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,2013%20Meeting/Peoples%20Gas%20and%20North%20Shore%20Gas%20GPY1-GPY3%20and%20Phase%20II%20Plan.xls)).

* When converting ex ante gross to ex ante net savings for tracking and reporting, Franklin Energy combines an additional adjustment factor with the deemed net-to-gross ratio. The additional factor accounts for potential gross realization rate adjustments, and is based on the previous year realization rate. The equation for GPY3 is:
 $GPY3 \text{ Ex Ante Net} = GPY3 \text{ Ex Ante Gross} * GPY2 \text{ Verified Gross RR} * GPY3 \text{ NTGR}$.

Source: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract)

Table 4-4 and Table 4-5 below provide the year-over-year comparison of the Peoples Gas programs and North Shore Gas programs, including comparison of GPY3 program’s detail versus GPY2 program’s detail. All programs show substantial growth from launch in GPY1 to third-year maturity in GPY3.

Table 4-4. Peoples Gas Programs GPY1-GPY3 Yearly Comparison

Program	GPY1 Verified Net Savings (therms)	GPY2 Verified Net Savings (therms)	GPY3 Verified Net Savings (therms)	GPY1-GPY3 Portfolio Total (therms)	Year-Over-Year Difference (GPY3/GPY2)
Home Energy Rebate	155,658	769,516	830,615	1,755,789	108% (+8%)
Home Energy Jumpstart	14,949	243,853	317,376	576,178	130% (+30%)
Multi-family	179,019	1,643,910	5,173,566	6,996,495	315% (+215%)
C&I Prescriptive Rebate	227,249	2,930,443	852,017	4,009,709	29% (-71%)
Small Business Energy Savings	88,714	566,727	921,647	1,577,088	163% (+63%)

Sources: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract); Navigant analysis of GPY1/GPY2 PGL/NSG Home Energy Rebate Program Evaluation Reports_final; Navigant analysis of GPY1/GPY2 PGL/NSG Home Energy Jumpstart Program Evaluation Reports_final; Navigant analysis of GPY/GPY2 ComEd/PGL/NSG Multi-Family Home Energy Savings Program Evaluation Reports_final; Navigant analysis of GPY1 and GPY2 PGL/NSG C&I Prescriptive Rebate Program Evaluation Reports_final; Navigant analysis of GPY1/GPY2 ComEd/PGL/NSG Small Business Energy Savings Program Evaluation Report_final

Table 4-5. North Shore Gas Programs GPY1-GPY3 Yearly Comparison

Program	GPY1 Verified Net Savings (therms)	GPY2 Verified Net Savings (therms)	GPY3 Verified Net Savings (therms)	GPY1-GPY3 Portfolio Total (therms)	Year-Over-Year Difference (GPY3/GPY2)
Home Energy Rebate	104,992	264,489	576,055	945,536	218% (+118%)
Home Energy Jumpstart	N/A	20,984	47,781	69,765	228% (+128%)
Multi-family	79,268	139,176	90,301	308,745	65% (-35%)
C&I Prescriptive Rebate	42,542	130,447	88,623	261,612	68% (-32%)
Small Business Energy Savings	43,515	259,115	349,446	652,076	135% (+35%)

Sources: Navigant analysis of GPY3 programs tracking data (August 12-28, 2014 data extract); Navigant analysis of GPY1/GPY2 PGL/NSG Home Energy Rebate Program Evaluation Reports_final; Navigant analysis of GPY1/GPY2 PGL/NSG Home Energy Jumpstart Program Evaluation Reports_final; Navigant analysis of GPY/GPY2 ComEd/PGL/NSG Multi-Family Home Energy Savings Program Evaluation Reports_final; Navigant analysis of GPY1 and GPY2 PGL/NSG C&I Prescriptive Rebate Program Evaluation Reports_final; Navigant analysis of GPY1/GPY2 ComEd/PGL/NSG Small Business Energy Savings Program Evaluation Report_final

5 Process Evaluation

The GPY3 process evaluation activities for the programs were limited to interviews with programs staff and the implementation contractor staff to verify information about marketing and outreach strategies made in GPY3 that impacted customer and trade ally participation and satisfaction.

Information gathered through interviews and other communication did not raise concerns by the evaluation team that merited follow-up process research in GPY3. The observations will be considered when planning GPY4 evaluation activities.

6 Findings and Recommendations

This section summarizes the key findings and recommendations. This section is repeated in its entirety in the Executive Summary.

Savings Verification Process

Finding 1. Franklin Energy produces a spreadsheet to document their methodology, assumptions, and algorithms for setting per unit savings values for each program measure. The values documented in the spreadsheet are programmed into the tracking system. Franklin Energy provides Navigant with the measure documentation spreadsheet on request and direct real-time access to the program tracking system to review project specific documents, quantities, and invoices to verify savings. This approach is effective for facilitating evaluation savings verification.

Recommendation 1. Franklin Energy should consider establishing with evaluation an early review process of per unit measure savings, to occur as early as practical before or soon after the start of a program year. The early review could consist of a walk-through of the savings approach by measure, and an initial review by evaluation to identify potential adjustments, and resolution of differences. Later revisions by Franklin Energy could be sent to Navigant when they occur. This may reduce end-of-year evaluation adjustments.

Verified Gross Realization Rates

Finding 2. Franklin Energy has developed a process for accurately tracking program savings. For nearly all measures, we found Franklin Energy had correctly applied the TRM, used reasonable approaches for custom inputs and measures, and accurately transferred measure savings documentation to programmed values in the tracking system. Navigant has previously verified accurate tracking of quantities and data quality control practices, and did not observe errors in tracking quantities in GPY3. Relatively minor adjustments were made to per unit measure savings for 12 measures across the five programs evaluated in this report. All programs had a verified gross realization rate of 100% (100% is a rounded value, actual values were very slightly different) except the North Shore Gas Small Business Program that had 102%. The majority of final adjustments may have been identified through the structured savings verification early review process recommended above.

Recommendation 2. If Franklin Energy chooses to embed GPY3 realization rates into tracked net savings for GPY4, we recommend a value of 1.00 for each of the five programs evaluated in this report.

Net Savings

Finding 3. For the programs that were delivered through multiple paths in GPY3 – Multi-family, C&I Prescriptive, and Small Business – Franklin Energy tracked ex ante net savings by applying a different NTGR for each path in the program. The alternative would have been to use a single NTGR value for the entire program, specifically the

values allowed for deeming by SAG consensus. Navigant reviewed both methods and concluded application of NTGR by path would more accurately represent the program. Navigant has reviewed the GPY3 NTGR values Franklin Energy used for the paths and found them to be reasonable.

Recommendation 3. Navigant recommends applying a single NTGR per program for GPY3 as approved by SAG consensus and has used those NTGR values for reporting verified net savings in GPY3. However, Navigant recommends applying NTGR values by program path for GPY4. As shown by the results in Table 4-2 and Table 4-3, both methods provide very similar results.

7 Appendices

The program-specific reports will be attached as separate appendices.

7.1 *TRM Recommendations*

Navigant compared the list of non-deemed measures offered through the five TRM-based programs evaluated in this report to the latest version of the TRM, the version 4 draft, to identify measures for potential inclusion in the TRM version 5 update process. The TRM Technical Advisory Committee should consider the following in future updates of the TRM:

1. Add the measure MF Single-Pipe Steam System Balancing/ IMP Venting.
2. Add the measure MF Single-Pipe Steam Boiler Averaging Controls.
3. We recommend that the TRM explicitly state the unit basis for savings presented in the TRM. For some measures, the unit basis has been implied by the algorithm, but not explicitly stated.