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Multi-Family Energy Savings Program Evaluation Report

FINAL

Energy Efficiency Plan:
Gas Plan Year 4
(6/1/2014-5/31/2015)

Presented to
Peoples Gas and North Shore Gas

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E. Executive Summary

This report presents a summary of the findings and results from the impact and process evaluation of the GPY4[1] Multi-Family Energy Savings Program (MESP or Multi-Family Program). The Multi-Family Program is jointly implemented by Peoples Gas (PG) and North Shore Gas (NSG) companies and Commonwealth Edison Company (ComEd). The Multi-Family Program achieves natural gas energy savings for PG and NSG and electric energy and demand savings for ComEd customers. ComEd's program is in electric program year 7 (EPY7) and PG and NSG are in gas program year 4 (GPY4).

The PG and NSG Multi-Family Program is designed to provide a "one-stop-shop" to multi-family property owners and managers to achieve comprehensive improvements in energy efficiency that previously would have required accessing multiple programs. The Multi-Family Program delivery approach consists of five paths. The direct installation and energy assessment "Jumpstart" path of the program provides free energy efficiency products in residential dwelling units and common areas. The energy assessment identifies additional comprehensive efficiency upgrades. The Prescriptive Rebate and Partner Trade Ally (PTA) paths provide standardized incentives for energy efficient equipment based on the size and efficiency of the equipment installed or on a per unit basis. The PTA path provides higher incentives to a network of trade allies selected, screened and registered with the Multi-Family Program, who in turn offer better rebates to their customers to install energy-efficient products. The program's Custom path provides technical services and custom rebates for non-standard building improvement upgrades. Multi-family property owners and managers may also participate in the PG and NSG Gas Optimization Study Program[2] that provides gas optimization assessments for multi-family buildings for operation and maintenance issues that, if corrected, deliver energy and cost savings to building owners and managers. Franklin Energy Services, LLC (Franklin Energy) is the primary implementation contractor for the ComEd and PG and NSG joint Multi-Family Program.

The GPY4 Multi-Family Program gross impact evaluation approach involved continued reliance on the Illinois Statewide Technical Reference Manual (TRM)[3] for deemed gross savings of most program measures and secondary evaluation research for verification of savings from measures with custom savings assumptions. The GPY4 verified net impact evaluation approach applied the net-to-gross (NTG) ratio approved through the Illinois Energy Efficiency Stakeholders Advisory Group (SAG) consensus process. The evaluation included focused research to investigate program best practices and the potential for improvement.

E.1. Program Savings

Table E-1 summarizes the natural gas savings from the Peoples Gas Multi-Family Program. The PG Multi-Family Program had no gas optimization projects in GPY4.

[1] The GPY4 program year began June 1, 2014 and ended May 31, 2015.

[2] There were no energy savings through the Gas Optimization Study Program in the Multi-Family Program in GPY4, and there is limited reference to the path in this report.

[3] Illinois Statewide Technical Reference Manual for Energy Efficiency Version 3.0, available at: *http://www.ilsag.info/technical-reference-manual.html*

Table E-1. GPY4 Peoples Gas Multi-Family Program Natural Gas Savings

Program/Path	Ex Ante Gross Savings[4] (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR[5]	Verified Gross Savings (Therms)	NTGR[6]	Verified Net Savings[7] (Therms)
MESP Jumpstart DI	452,123	406,910	1.00	452,306	0.90	407,075
MESP Prescriptive	299,628	251,688	0.97	291,225	0.84	244,629
MESP PTA	1,978,802	1,959,014	0.99	1,960,765	0.99	1,941,157
MESP Custom	91,521	62,234	1.39	127,547	0.68	86,732
MESP Gas Optimization	0	0	0	0	1.02	0
GPY4 MESP Total	**2,822,074**	**2,679,846**	**1.00**	**2,831,843**		**2,679,593**

Source: Evaluation analysis of GPY4 program tracking data (July 20, 2015 data extract) and Illinois Statewide Technical Reference Manuals).[8]

Note: PTA—Partner Trade Allies; DI—Direct Install

Table E-2 summarizes the natural gas savings from the GPY4 North Shore Gas Multi-Family Program. The NSG Multi-Family Program had no gas optimization or custom projects in GPY4.

Table E-2. GPY4 North Shore Gas Multi-Family Program Natural Gas Savings

Program/Path	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
MESP Jumpstart DI	27,157	24,442	1.00	27,164	0.90	24,447
MESP Prescriptive	600	540	1.00	600	0.90	540
MESP PTA	7,093	7,022	1.08	7,640	0.99	7,563
MESP Custom	0	0	0	0	0.68	0
MESP Gas Optimization	0	0	0	0	1.02	0
GPY4 MESP Total	**34,850**	**32,004**	**1.02**	**35,404**		**32,550**

Source: Evaluation analysis of GPY4 program tracking data (July 20, 2015 data extract) and Illinois Statewide Technical Reference Manuals.

Navigant adjusted the gross ex ante savings from the Peoples Gas custom measures upward after engineering file review of a sample of projects verified additional savings. Navigant increased the North Shore Gas savings from Partner Trade Ally (PTA) projects after adjusting the savings input assumptions for

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

[5] Verified Gross Realization Rate (RR) = Verified Gross Savings/Ex Ante Gross Savings.
Verified Gross Savings = RR * Ex Ante Gross Savings

[6] The Net-to-Gross Ratio (NTGR) used for calculating verified net savings is deemed prospectively through a consensus process managed by the Illinois Energy Efficiency Stakeholders Advisory Group (SAG). Deemed NTGRs (as well historical verified gross Realization Rates) are available at:
http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Peoples_Gas_and_North_Shore_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

[7] Verified Net Savings = NTGR * Verified Gross Savings

[8] Illinois Statewide Technical Reference Manual for Energy Efficiency (TRM).
Illinois_Statewide_TRM_Effective_060114_Version_3.0_022414_Clean.pdf;
Illinois_Statewide_TRM_Effective_060115_Final_02-24-15_Clean.pdf (Version 4.0 for measure errata corrections).
Available at the Illinois Commerce Commission (ICC): http://www.icc.illinois.gov/electricity/TRM.aspx

some measures. Details of the program savings adjustments are provided in the program-level analysis in Section 3.

E.2 Program Savings by Measure End-use

Table E-3 summarizes the natural gas savings from the Peoples Gas Multi-Family Program by measure end-use.

Table E-3. GPY4 Peoples Gas Multi-Family Program Natural Gas Savings

Measure End-use	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTGR*	Verified Net Savings (Therms)
Custom Measures	91,521	62,234	1.39	127,547	N/A	86,732
Hot Water Efficiency	2,004,164	1,940,886	1.00	2,004,402	N/A	1,941,100
Programmable/Reprogram Thermostat	74,510	67,354	1.00	74,436	N/A	67,287
Space Heating	651,878	609,372	0.96	625,458	N/A	584,474
GPY4 MESP Total	**2,822,074**	**2,679,846**	**1.00**	**2,831,843**		**2,679,593**

Source: Evaluation analysis of GPY4 program tracking data (July 20, 2015 data extract).

** Note: NTGR values are shown as N/A to indicate values are not defined at the measure level but at the program path level.*

Table E-4 summarizes the natural gas savings from the GPY4 North Shore Gas Multi-Family Program by measure end-use.

Table E-4. GPY4 North Shore Gas Multi-Family Program Natural Gas Savings

Measure End-use	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Hot Water Efficiency	30,078	27,644	1.00	30,091	N/A	27,655
Programmable/Reprogram Thermostat	4,056	3,650	1.00	4,050	N/A	3,645
Space Heating	716	709	1.76	1,263	N/A	1,250
GPY4 MESP Total	**34,850**	**32,003**	**1.02**	**35,404**		**32,550**

Source: Evaluation analysis of GPY4 program tracking data (July 20, 2015 data extract).

E.3 Impact Estimate Parameters for Future Use

The evaluation team in GPY4 did not conduct any additional research on impact savings parameters for deeming in future versions of the Illinois TRM. There was no net-to-gross (NTG) research conducted in the Multi-Family Program in GPY4.

E.4. Program Volumetric Detail

Table E-5 and Table E-6 show GPY4 program participation reported by the Program Administrator, Franklin Energy Services (FES) for the Peoples Gas and North Shore Gas programs. Detailed volumetric breakdown of the measure type and savings quantity are provided in the program-level analysis in Section 3.

Table E-5. GPY4 Peoples Gas Multi-Family Program Primary Participation Detail

Participation	Custom	Jumpstart DI	Incentives	PTA	Program Total
Participants*	10	1,465	101	523	2,099
Installed Projects	11	16,767	102	594	17,474
Total Measures[9]	11	44,332	531	2,831	47,705

Source: Navigant analysis of GPY4 program tracking data (July 20, 2015 data extract).
* Note: Participants are defined based on the project site address and number of accounts (ID).

Table E-6. GPY4 North Shore Gas Multi-Family Program Primary Participation Detail

Participation	Custom	Jumpstart DI	Incentives	PTA	Program Total
Participants	0	126	1	14	141
Installed Projects	0	744	1	15	760
Total Measures	0	2,194	3	16	2,213

Source: Navigant analysis of GPY4 program tracking data (July 20, 2015 data extract).

E.5. Findings and Recommendations

The following provides insight into key program findings and recommendations.[10]

Verified Net Impact

Finding 1. The GPY4 Peoples Gas Multi-Family Program achieved verified net energy savings of 2,679,593 therms. This is 149 percent of the program goal of 1,796,163 therms. The North Shore Gas program achieved verified net energy savings of 32,550 therms.[11] This is 77 percent of the program GPY4 goal of 42,267 therms. The verified net savings were calculated using deemed net-to-gross (NTG) values approved through the Illinois SAG consensus process.

Verified Gross Savings and Realization Rate

Finding 2. The GPY4 Peoples Gas Multi-Family Program achieved verified gross energy savings of 2,831,843 therms. This produced a program verified gross realization rate of 100 percent. The North Shore Gas Multi-Family Program achieved verified gross energy savings of 35,404 therms, with overall verified gross realization rate of 102 percent.

[9] For evaluation reporting purpose, if a measure quantity is reported in the tracking system in linear feet, MBH, dwelling units, or in square feet, Navigant treated each row entry of such measure as one measure quantity in this table. The actual linear feet, MBH, square feet or dwelling units are reported in Section 3.2 at the program-level analysis.
[10] The Executive Summary presents the most important of the Section 6 Findings and Recommendations. Findings and Recommendations in the Executive Summary are numbered to match Section 6 for consistent reference to individual findings and recommendations. Therefore, gaps in numbering may occur in the Executive Summary.
[11] PG-NSG Realized Savings_091515.xlsx

Finding 3. The program is accurately tracking gross savings for most TRM (v3.0) deemed measures, but the tracking system and Franklin Energy's "Master Measure Database" (MMDB) spreadsheet did not match the effective version of the TRM for GPY4 for some measures. The evaluation team used the correct GPY4 deemed equivalent full load hours (EFLH) for multi-family to calculate the verified savings for boiler tune-ups, boiler reset controls, efficient furnace and programmable thermostats. The verified savings for these measures increased.

Recommendation 1. The MMDB and the default values that feed into the tracking system should be given an additional verification check to confirm key assumptions against the effective version of the Illinois TRM for a given program year. Where the TRM provides deemed input parameters for multi-family buildings, the program should use them instead of miscellaneous assumptions, if a custom value is not available.

Finding 4: For projects 674514 and 674505, evaluation found the attic insulation custom savings calculator produced lower savings than using the TRM calculation. We referred to the TRM algorithm but used the same input assumptions to calculate the verified gross savings.

Recommendation 2. The IC should review the custom Attic Insulation Calculator and look for errors; or otherwise bring the savings approach into alignment with the TRM methodology.

Finding 5. The Peoples Gas GPY4 Multi-Family Program completed eleven custom projects. The evaluation team sampled six out of the eleven custom projects. For each of the sampled projects, we performed an engineering file review and then updated the analysis approach and inputs to determine our final, verified savings. Four of the six sample projects had verified gross realization rates above 100 percent and two had no changes to the claimed savings. Overall, the verified gross savings realization rate is 139 percent for the sample; this extrapolates to the population of custom multi-family projects at 9 percent relative precision and 90 percent confidence level. Our analysis suggests that some of the custom input assumptions are overly conservative.

Recommendation 3. The IC should more thoroughly document the sources of custom savings input assumptions and correction factors. Improving these initial input assumptions or choosing alternate savings estimation methods that reduce uncertainty will improve the accuracy of the initial savings estimates. The program should look for opportunities to capture additional low-cost or no-cost savings through existing custom projects where conservative operating strategies by the participant offer potential for adjustments that save energy.

Process Findings.

Finding 8. The highest rated areas from the Best Practices Self Benchmarking exercise are in program management and the program implementation process, where excellent scores were recorded. Lower ratings identified for program theory and design and marketing and outreach were influenced by individual practices within the categories that were scored low, not across-the-board low scores.

Finding 9. Navigant's best practice research revealed that the PG and NSG Multi-Family Program does not have a well-defined program theory.

Recommendation 6. The PG and NSG Multi-Family program design should consider developing a program theory. Used wisely, the program theory can be invaluable in identifying program strengths and weaknesses, and then used to develop marketing strategy and interventions to address barriers in the intended program process flow. In addition, the program theory can help identify missing market information needed to improve the program.

Finding 10. The benchmarking exercise indicated that the PG and NSG Multi-Family Program could improve its marketing and outreach strategy.

Recommendation 7. The program should create case studies specific to multi-family buildings to share the success stories from previous participants, which could be a source of encouragement for other participants interested in the program.

Recommendation 8. To support marketing and outreach strategy, the program should consider a market characterization study to gain a better understanding of the financial and ownership structure of the local multi-family market and the relationships among the various market actors. Enhancements to the tracking system that allow better visibility into ownership and building management portfolios may be a useful, strategic tool.

Navigant will conduct net-to-gross and process interviews with Multi-Family Program participating decision-makers for the GPY5 evaluation. This will provide an opportunity to gather primary research on some of the topics raised in the benchmarking exercise.

1 Introduction

1.1 Program Description

The Multi-Family Program is jointly implemented by Peoples Gas (PG) and North Shore Gas (NSG) companies and Commonwealth Edison Company (ComEd). ComEd's program is in electric program year seven (EPY7) and PG and NSG are in gas program year four (GPY4). The Multi-Family Program achieves electric energy and demand savings for ComEd customers and natural gas energy savings for PG and NSG.

The PG and NSG Multi-Family Program is designed to provide a "one-stop-shop" to multi-family property owners and managers to achieve comprehensive improvements in energy efficiency that would previously require accessing multiple programs. The Multi-Family Program delivery approach consists of five paths. The direct installation and energy assessment "Jumpstart" path of the program provides free energy efficiency products in residential dwelling units and common areas. The energy assessment identifies additional comprehensive efficiency upgrades. The Prescriptive Rebate and Partner Trade Ally (PTA) paths provide standardized incentives for energy efficient equipment based on the size and efficiency of the equipment installed or on a per unit basis. The PTA path provides higher incentives to a network of trade allies selected, screened and registered with the Multi-Family Program who in turn offer better rebates to their customers to install energy-efficient products. The program's Custom path provides technical services and custom rebates for non-standard building improvement upgrades. Multi-family property owners and managers may also participate in the PG and NSG Gas Optimization Study Program that provides gas optimization assessments for multi-family buildings for operation and maintenance issues that, if corrected, deliver energy and cost savings to building owners and managers. Franklin Energy Services, LLC (Franklin Energy) is the primary implementation contractor for the ComEd and PG and NSG joint Multi-Family Program.

1.2 Evaluation Objectives

The evaluation team identified the following key researchable questions for GPY4:

Impact Questions

1. What are the verified gross savings?
2. What are the verified net savings?
3. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

Process Questions

The process evaluation activities for the Multi-Family Program involved interviews with program management from the implementation contractor to gather information about program management, delivery, and marketing and outreach strategies in GPY4 to facilitate program benchmarking research. In addition, the GPY4 evaluation team conducted research to investigate best practices and approaches for improving the program. The best practice research for GPY4 included an overall assessment of the program and research on these two questions:

1. What are the best practices for the Multi-Family Program engaging customers to take a next step in energy efficiency (i.e. from assessment to installation)?

2. What successful pilot or programs have there been that focus on highly targeted neighborhood sweeps to get a concentration of participants in a particular area?

The evaluation team will conduct key decision maker and trade ally process research in GPY5 during the NTG research study.

2 Evaluation Approach

This section provides an overview of the data collection methods, gross and net impact evaluation approaches, and process evaluation approaches that occurred for the GPY4 evaluation. The GPY4 Multi-Family Program gross impact evaluation approach involved continued reliance on the Illinois Statewide Technical Reference Manual (TRM)[12] for deemed gross savings of most program measures and secondary evaluation research for verification of savings for the remaining custom measures. The GPY4 verified net impact evaluation approach applied the deemed net-to-gross (NTG) ratio approved through the Illinois Stakeholders Advisory Group (SAG) consensus process. The evaluation included focused process research to investigate program best practices and the potential for improvement.

2.1 *Overview of Data Collection Activities*

The evaluation team's core data collection activities included (1) reviewing the tracking system to check totals, (2) comparing the use of measure algorithms and assumptions in the tracking database to their use in the Illinois TRM v3.0 to ensure that they are appropriately applied, (3) engineering file review of custom projects, and (4) interviews with the implementation contractor (IC) staff. The primary data collection activities are summarized in the following table.

Table 2-1. Primary Data Collection Activities

What	Who	Completes	When	Comments
Tracking System & Engineering Review	Participating Customers	All	August – September 2015	Review measure gross savings using IL-TRM or through research
Project File Reviews	Sampled Participating Customers	6	August – October 2015	Completed custom projects
In Depth Interviews	Program Management	2	March 2015	Interview IC staff

Source: Navigant.

Additional literature resources were reviewed and billing analysis was performed to verify the savings from projects with custom input assumptions that are not deemed in the Illinois TRM.

2.2 *Verified Savings Parameters*

Verified Gross Program Savings Analysis Approach

Navigant estimated verified per-unit savings for each program measure using impact algorithms and input assumptions defined by the Illinois TRM for deemed measures[13] 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 GPY4 evaluation research and which were deemed.

[12] Illinois Statewide Technical Reference Manual for Energy Efficiency Version 3.0, available at: *http://www.ilsag.info/technical-reference-manual.html*

[13] Because the Illinois TRM provides multiple options for selecting input assumptions, Franklin Energy Services produces a "Master Measure Database" spreadsheet that documents their approach to compliance with the Illinois TRM. The spreadsheet is Integrys MMDB PY4 -052915, produced by Franklin Energy.

Table 2-2. GPY4 Verified Gross Savings Parameter Data Sources

Parameter	Data Source	Deemed or Evaluated?
Measure Quantity Installed	Program tracking system	Evaluated
Verified Gross Realization Rate	Program tracking data, TRM, Navigant	Evaluated
Residential HVAC measure savings assumptions	Illinois TRM, version 3.0, section 5.3‡	Deemed
Commercial HVAC measure savings assumptions	Illinois TRM, version 3.0, section 4.4‡	Deemed
Residential hot water measure savings assumptions	Illinois TRM, version 3.0, section 5.4‡	Deemed
Commercial hot water measure savings assumptions	Illinois TRM, version 3.0, section 4.3‡	Deemed
Steam traps savings assumptions	Illinois TRM, version 3.0, section 4.4.16‡	Deemed
Residential pipe insulation savings assumptions	Illinois TRM, version 3.0, sections 5.3 and 5.4‡	Deemed
Commercial pipe insulation savings assumptions	Illinois TRM, version 3.0, section 4.4‡	Deemed
Programmable thermostat savings assumptions	Illinois TRM, version 3.0, section 5.3‡	Deemed
Custom Analyses and Measures	Project File Review, Monthly Billing Data	Evaluated

Source: Evaluation analysis of programs data and Illinois TRM documents.
‡ Source: State of Illinois Technical Reference Manuals. Integrys MMDB PY4 -052915, produced by Franklin Energy;

Verified Net Program Savings Analysis Approach

Verified net energy savings were calculated by multiplying the verified gross savings estimates by the appropriate deemed net-to-gross ratio (NTGR) approved through a consensus process managed through the Illinois Energy Efficiency Stakeholders Advisory Group (SAG).[14]

Franklin Energy combines an additional adjustment factor with the net-to-gross ratio when converting ex ante gross to ex ante net savings for tracking and reporting. The additional factor accounts for potential gross realization rate adjustments and is based on the previous year's realization rate. This factor must be accounted for when converting ex ante net savings reported in the tracking system to ex ante gross savings. The equations used in GPY4 are:

GPY4 Ex Ante Net = Values reported in the GPY4 program tracking data
GPY4 Ex Ante Net = (GPY4 Ex Ante Gross * GPY3 Verified Gross RR) * GPY4 Deemed NTGR
GPY4 Ex Ante Gross = GPY4 Ex Ante Net / (GPY3 Verified Gross RR * GPY4 Deemed NTGR)

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

Table 2-3 presents the realization rates and NTGRs used to calculate the program-level net savings.

Table 2-3. Net-to-Gross Ratios for Evaluation of the GPY4 Multi-Family Program

Program Path/Measure	Embedded GPY3 RR Adjustment Factors†	Utility	GPY4 Deemed NTG Value	NTGR Source
Jumpstart Direct Install	1.00	PG & NSG	0.90	SAG‡
PTA Incentives	1.00	PG & NSG	0.99	
Prescriptive Rebates	1.00	PG	0.84	
	1.00	NSG	0.90	
Custom Incentives	1.00	PG & NSG	0.68	
Gas Optimization	1.00	PG & NSG	1.02	

Source: †Navigant evaluation report for the GPY3 [ ] Program is available at http://www.ilsag.info/evaluation-documents.html.
‡ Deemed Net-to-Gross Ratios (as well as historical Realization Rates) are available from:
http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Peoples_Gas_and_North_Shore_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

2.3 *Process Evaluation*

The process evaluation activities for the Multi-Family Program involved interviews with program management from the implementation contractor to gather information about program management, delivery, and marketing and outreach strategies in GPY4 to facilitate program benchmarking research. In addition, the GPY4 evaluation team conducted research to investigate best practices and approaches for improving the program. The best practice research for GPY4 included an overall assessment of the program and topical research.

3 Gross Impact Evaluation

This section presents detailed analysis and findings from the file reviews and tracking system review of the measures installed and gross savings achieved by program path and delivery channel. Overall, the Peoples Gas GPY4 Multi-Family Program achieved 2,831,843 therms of verified gross savings, representing a 100 percent gross realization rate. The North Shore Gas program achieved 35,404 therms verified gross savings, representing a 102 percent gross realization rate. The evaluation team adjusted the savings input assumptions used to calculate measure ex ante savings. These adjustments affected the gross realization rates for some measures. Details of the findings are provided below.

3.1 Program Tracking Data Review

The evaluation team downloaded the final data for the Multi-Family Program impact evaluation on July 20, 2015 from the Franklin Energy Bensight Data Management platform. We reviewed the tracking data to verify the completeness and accuracy of the tracking system data to identify any issues that would affect the impact evaluation of the program. We compared the tracking system savings input assumptions to Franklin Energy's "Master Measure Database" (MMDB) spreadsheet that documents their approach to compliance with the Illinois TRM. The evaluation team verified that the program tracking system was accurately recording measure unit counts, but some measures savings input assumptions needed revision for consistency with the approved version of the TRM for the GPY4 program.

Key findings from the tracking system review are outlined below.

a. The evaluation team verified that the gross savings estimates for efficient furnaces, programmable thermostats, boiler cutout/reset controls and boiler tune-up measures should use 2,050 equivalent full load hours (EFLH) from the TRM (v3.0) for multi-family common area space, instead of 1,163 EFLH used in the ex ante calculation. Also, for boiler tune-ups in common area space, the ex ante savings assumed either 2.35 percent or 1.6 percent savings factor for reduction in gas consumption. The evaluation team defaulted to 1.6 percent value from the TRM due to lack of adequate information to justify the 2.35 percent custom input. Overall, the adjustments increased the verified gross savings for the measures.
b. The evaluation team adjusted the savings from steam trap measures and combustion management upgrades (single-pipe steam boiler averaging controls, and single-pipe steam system balancing with venting), using the TRM (v3.0) default boiler efficiency of 80 percent. The ex ante input value was 64.8 percent boiler efficiency, presumably from the revised TRM (v4.0) effective for the GPY5 program. The evaluation did not find justification for the use of 64.8 percent boiler efficiency in GPY4.
c. Other adjustments included applying a 65 percent household factor to multi-family residential furnace savings to adjust heating consumption for non-single-family households, as required by the TRM. We also applied a minor adjustment to the significant digits for savings from programmable thermostats installed in residential spaces.
d. The Peoples Gas GPY4 Multi-Family Program completed eleven (11) custom projects. The evaluation team sampled six out of the 11 custom projects and performed engineering file reviews and analysis of the claimed savings, including billing analysis for some projects.

- Navigant's analysis found in some cases that custom input assumptions are conservative without documentation for sources of the conservative assumptions. Frequently, these input assumptions, efficiency derating factors, and safety factors lack a source or other documentation.
- In some cases, conservative custom input assumptions may represent an opportunity for additional savings at little or no additional cost to the customer. For example, in project 621440, the CO sensors for the garage direct control ventilation (DCV) were reportedly set to 40 parts-per-million (PPM). Post inspection of project 679021 revealed the ASHRAE code allows this setting to float to 50 PPM.
- For projects 674514 and 674505, evaluation found the attic insulation custom savings calculator produced lower savings than using the TRM calculation. We referred to the TRM algorithm but used the same input assumptions to calculate the verified gross savings.
- In the analysis files of projects 865389 and 489359, the system capacity and/or equipment sizing differs between the stated pre and post conditions. For instance, in one project the total air flow (CFM) is reported to increase nearly 50 percent from the baseline to the energy efficient case. If that increase in capacity is required by code (the existing system is no longer functioning, or is not meeting the loads), then the counterfactual baseline is one that delivers the required capacity using standard efficiency equipment. If, in the absence of the program, the system capacity would have remained unchanged, then the equipment present prior to participation is the correct baseline. In either condition, assuming the code required flowrate per square foot regardless of the system's actual capacity is incorrect.

3.2 *Program Volumetric Findings*

As shown in Table 3-1 and Table 3-2, the Peoples Gas Multi-Family Program reported 17,474 projects in GPY4 and distributed 47,705 measures. The North Shore Gas Multi-Family Program reported 760 projects in GPY4 and distributed 2,213 measures.

Table 3-1. GPY4 Peoples Gas Multi-Family Program Primary Participation Detail

Participation	Custom	Jumpstart DI	Incentives	PTA	Program Total
Participants*	10	1,465	101	523	2,099
Installed Projects	11	16,767	102	594	17,474
Total Measures[15]	11	44,332	531	2,831	47,705

Source: Navigant analysis of GPY4 program tracking data (July 20, 2015 data extract).
* Note: Participants are defined based on the project site address and number of accounts (ID).

Table 3-2. GPY4 North Shore Gas Multi-Family Program Primary Participation Detail

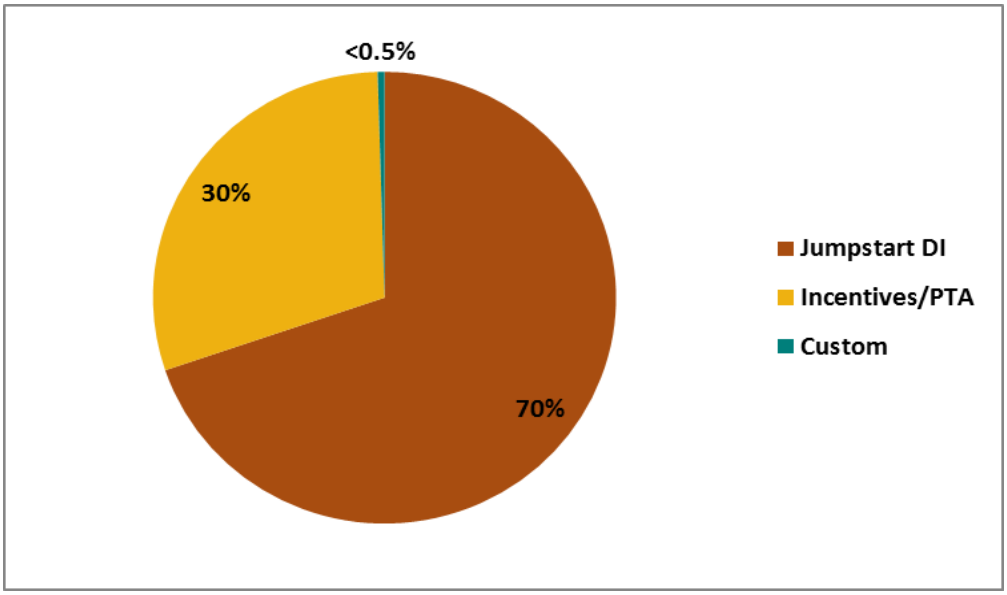
Participation	Custom	Jumpstart DI	Incentives	PTA	Program Total
Participants	0	126	1	14	141
Installed Projects	0	744	1	15	760
Total Measures	0	2,194	3	16	2,213

Source: Navigant analysis of GPY4 program tracking data (July 20, 2015 data extract).

Figure 3-1 and Figure 3-2 disaggregate the program participation by program path. About 70 percent of all Peoples Gas program participants received services through the Jumpstart direct install path, about 30 percent of participants installed Incentive and PTA measures, and less than half a percent of participants installed custom measures. Similarly, 89 percent of North Shore Gas participants received direct install measures and 11 percent participated with Incentives and PTA measures, with no custom measure installations.

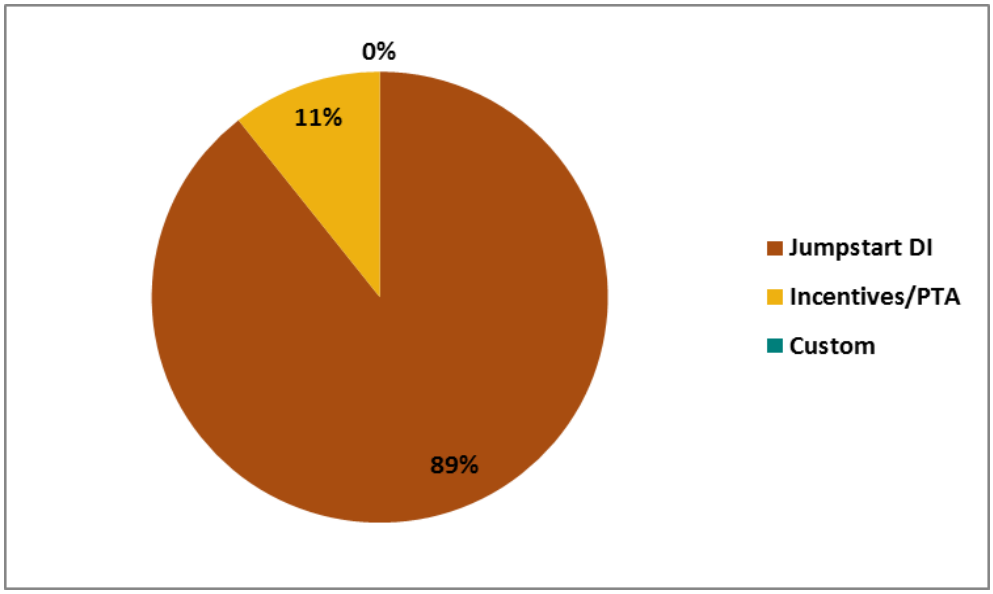
[15] For evaluation reporting purpose, if a measure quantity is reported in the tracking system in linear feet, MBH, dwelling units, or in square feet, Navigant treated each row entry of such measure as one measure quantity in this table. The actual linear feet, MBH, square feet or dwelling units are reported in Section 3.2 at the program-level analysis.

Figure 3-1. Peoples Gas: Number of Participants by Program Path



Source: Navigant Analysis

Figure 3-2. North Shore Gas: Number of Participants by Program Path



Source: Navigant Analysis

Table 3-3 and Table 3-4 disaggregate the measure quantity by installed space and the unit of measurement for incentives or savings as documented in the tracking system.

Table 3-3. Peoples Gas GPY4 Multi-Family Program Measure Count

Measure	Unit	Install Type	Ex Ante Measure Count	Verified Measure Count
Bathroom Aerators	Each	In-unit	14,152	14,152
	Each	Common Area	391	391
Kitchen Aerators	Each	In-unit	12,564	12,564
	Each	Common Area	68	68
Showerheads	Each	In-unit	15,073	15,073
	Each	Common Area	294	294
Efficient Boilers	MBH	In-unit	26,810	26,810
	MBH	Common Area	96,593	96,593
Efficient Furnace	Each	In-unit	27	27
	Each	Common Area	2	2
Programmable/Reprogram Thermostat	Household	In-unit	2,011	2,011
	Household	Common Area	1	1
Boiler Reset Controls	MBH	Common Area	39,066	39,066
Boiler Tune-up	MBH	Common Area	177,839	177,839
Pipe Insulation	Linear Foot	Common Area	230,429	230,429
Pre Rinse Sprayer	Each	Common Area	1	1
Single-Pipe Steam Boiler Averaging Controls	Dwelling Unit	Common Area	2,739	2,739
Single-Pipe Steam System Balancing w/Venting	Dwelling Unit	Common Area	1,463	1,463
Steam Traps	Each	Common Area	362	362
Water Heater (0.80 or 0.67 EF)	Each	Common Area	7	7
Water Heater 88% TE	Dwelling Unit	Common Area	1,455	1,455
Custom Measures	Each	Common Area	91,521	91,521
Total			**712,869**	**712,869**

Source: Program tracking data and Navigant analysis

Table 3-4. North Shore Gas GPY4 Multi-Family Program Measure Count

Measure	Unit	Install Type	Ex Ante Measure Count	Verified Measure Count
Bathroom Aerators	Each	In-unit	821	821
	Each	Common Area	1	1
Kitchen Aerators	Each	In-unit	505	505
	Each	Common Area	1	1
Showerheads	Each	In-unit	723	723
Prog/Reprog Thermostat	Household	In-unit	100	100
Boiler Reset Controls	MBH	Common Area	299	299
Boiler Tune-up	MBH	Common Area	2,355	2,355
Pipe Insulation	Linear Foot	Common Area	6,963	6,963
Large Gas Water Heater	Each	Common Area	597	597
Total			**12,365**	**12,365**

Source: Program tracking data and Navigant analysis

3.3 Gross Program Impact Parameter Estimates

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

Table 3-5. GPY4 Multi-Family Program Ex Ante and Verified Gross Savings Parameters

Measure	Ex Ante Gross Savings (Therms/Unit)	Verified Gross Savings (Therms/Unit)	Method	Data Source
Bathroom Aerators	CA=6.86 IU=1.24	CA=6.86 IU=1.25*	Deemed Deemed	Sections 4.3.2 TRM V3.0 Sections 5.4.4 TRM V3.0
Kitchen Aerators	CA=6.86 IU=5.12	CA=6.86 IU=5.13	Deemed Deemed	Sections 4.3.2 TRM V3.0 Sections 5.4.4 TRM V3.0
Showerheads	CA=21.78 IU=17.89	CA=21.74 IU=17.89	Deemed Deemed	Sections 4.3.3 TRM V3.0 Sections 5.4.5 TRM V3.0
Boiler Tune-up	0.19 or 0.48	0.48	Deemed	Sections 4.4.3 TRM V3.0
Boiler Reset Controls	0.93 or 1.64	1.64	Deemed	Sections 4.4.4 TRM V3.0
Efficient Boilers	Vary	Vary. Verified as reasonable	Deemed	Sections 4.4.10 TRM V3.0
Efficient Furnace	CA=223.81 IU=169.70 or 110	CA=301.86 IU=110	Deemed Deemed	Sections 4.4.11 TRM V3.0 Sections 5.3.7 TRM V3.0
Large Gas Water Heater	1.004	1.004	Deemed	Sections 5.4.2 TRM V3.0
Pipe Insulation	Vary	Vary. Verified as reasonable	Deemed	Sections 4.4.14 TRM V3.0 Sections 5.4.1 TRM V3.0
Pre Rinse Sprayer	135.56	135.56	Deemed	Sections 4.2.11 TRM V3.0
Prog/Reprog Thermostat	CA=100.56 IU Prescriptive =22.73 IU DI=40.56	CA=133.21 IU Prescriptive=22.68 IU DI=40.5	Deemed Deemed Deemed	Sections 4.4.18 TRM V3.0 Sections 5.3.11 TRM V3.0 Sections 5.3.11 TRM V3.0
Single-Pipe Steam Boiler Averaging Controls	51.82 or 61.11 or 61.07	49.48	Research	Evaluated
Single-Pipe Steam System Balancing w/Venting	63.54 or 63.57	51.46	Research	Evaluated
Steam Traps	Audited=408.33 or 408.08 No Audit=110.12	Audited=330.47 No Audit=89.23	Deemed Deemed	Sections 4.416 TRM V3.0
Water Heater (0.80 EF)	294.05	294.05	Deemed	Sections 5.4.2 TRM V3.0
Water Heater (0.67 EF)	15.24	15.24	Deemed	Sections 5.4.2 TRM V3.0
Water Heater 88% TE	13.45	13.45	Deemed	Sections 4.3.1 TRM V3.0
Custom Measures	Vary	Vary	Research	Evaluated

Source: Navigant analysis of program tracking data and Franklin Energy Services documents. Deemed values are from Illinois TRM V3.0, available at http://www.ilsag.info/technical-reference-manual.html. Abbreviations: Common Area (CA), In Unit (IU), Direct Installation (DI).

* Note: Small per unit savings differences (less than one percent) usually represent rounding differences that occur when using the TRM algorithms and inputs, and do not represent errors in the ex ante values. Errors will be identified in the text.

As we mentioned in the tracking system review section, we corrected the EFLH input value from 1,163 to 2,050 EFLH for the boiler tune-ups, boiler reset controls, efficient furnace and programmable thermostats installed in multi-family common areas. We also corrected the boiler efficiency input value from 64.8 percent to 80 percent for steam traps, as well as for single-pipe steam boiler averaging controls, and single-pipe steam system balancing with venting. These adjustments affected the programs realization rates as discussed below.

3.4 Verified Gross Program Impact Results

As shown in Table 3-6, the GPY4 Peoples Gas Multi-Family Program reported ex ante gross energy savings of 2,823,163 therms. Evaluation adjustments resulted in verified gross energy savings of 2,831,843 therms, reflecting the program's gross realization rate of 100 percent.

Table 3-6. GPY4 Peoples Gas Multi-Family 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 Aerators	Each	14,543	20,292	1.00	20,367
Kitchen Aerators	Each	12,632	64,822	1.00	64,929
Pipe Insulation	Linear Foot	6,903	25,437	1.00	25,437
Pre Rinse Sprayer	Each	1	136	1.00	136
Prog/Reprog Thermostat	Each	1,611	65,395	1.00	65,341
Showerheads	Each	15,367	276,042	1.00	276,096
Direct Install Subtotal			*452,123*	*1.00*	*452,306*
PTA & Prescriptive Incentives					
Boiler Reset Controls	MBH	39,066	37,548	1.71	64,073
Boiler Tune-up	MBH	177,839	36,388	1.60	58,331
Efficient Boilers	MBH	123,403	177,014	1.00	176,998
Efficient Furnace	Each	29	3,477	1.03	3,573
Pipe Insulation	Linear Foot	223,526	1,597,484	1.00	1,597,484
Prog/Reprog Thermostat	Each	401	9,115	1.00	9,095
Single-Pipe Steam Boiler Averaging Controls	Dwell Unit	2,739	166,558	0.81	135,526
Single-Pipe Steam System Balancing w/Venting	Dwell Unit	1,463	92,960	0.81	75,286
Steam Traps	Dwell Unit	362	137,932	0.81	111,670
Water Heater (0.80 or 0.67 EF)	Each	7	385	1.00	385
Water Heater 88% TE	Dwell Unit	1,455	19,568	1.00	19,568
Comprehensive Subtotal			*2,278,430*	*0.99*	*2,251,989*
Custom Measures					
Custom Measures		11	91,521	1.39	127,547
PG GPY4 MESP Total			**2,822,074**	**1.00**	**2,831,843**

Source: Program tracking data and Navigant analysis

As shown in Table 3-7, the GPY4 North Shore Gas Multi-Family Program reported ex ante gross energy savings of 34,850 therms. Evaluation adjustments resulted in verified gross energy savings of 35,404 therms, reflecting the program's gross realization rate of 102 percent.

Table 3-7. GPY4 North Shore Gas Multi-Family 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 Aerators	Each	822	1,029	1.00	1,033
Kitchen Aerators	Each	506	2,594	1.00	2,598
Pipe Insulation	Linear Foot	1,735	6,546	1.00	6,546
Prog/Reprog Thermostat	Each	100	4,056	1.00	4,050
Showerheads	Each	723	12,934	1.00	12,937
Direct Install Subtotal			*27,157*	*1.00*	*27,164*
PTA & Prescriptive Incentives					
Boiler Reset Controls	MBH	299	278	1.76	490
Boiler Tune-up	MBH	2,355	438	1.76	773
Large Gas Water Heater	MBH	597	600	1.00	600
Pipe Insulation	Linear Foot	5,228	6,377	1.00	6,377
Comprehensive Subtotal			*7,693*	*1.07*	*8,240*
NSG GPY4 MESP Total			**34,850**	**1.02**	**35,404**

Source: Program tracking data and Navigant analysis

As shown in Table 3-8 and Table 3-9, the Peoples Gas Partner Trade Ally path contributed 69 percent of the verified gross savings, and the Jumpstart Direct Install path and the Prescriptive Incentive path contributed 16 percent and 10 percent, respectively. The Custom path contributed 5 percent of the verified gross savings for Peoples Gas. In the North Shore Gas program, the Jumpstart Direct Install path contributed 77 percent of the verified gross savings, and the Partner Trade Ally path and the Prescriptive Incentive path contributed 21 percent and 2 percent, respectively.

Table 3-8. GPY4 Peoples Gas Multi-Family Program Impact Results by Program Channel

Program Channel	Projects Installed	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)	Percent Verified Gross Savings
Jumpstart Direct Install					**16%**
In-unit	16,639	416,901	1.00	417,062	92%
Common Area	152	35,222	1.00	35,244	8%
Direct Install Subtotal	*16,791*	*453,123*	*1.00*	*452,306*	
Partner Trade Ally (PTA)					**69%**
In-unit	4	10,614	0.99	10,527	1%
Common Area	590	1,968,188	1.00	1,950,236	99%
PTA Subtotal	*594*	*1,978,802*	*1.00*	*1,960,765*	
Prescriptive Incentives					**10%**
In-unit	21	41,762	1.00	41,752	14%
Common Area	87	257,866	0.97	249,473	86%
Prescriptive Incentive Subtotal	*108*	*299,628*	*0.97*	*291,225*	
Custom Measures					**5%**
Common Area	*11*	*91,521*	*1.00*	*127,547*	
PG GPY4 MESP Total	**17,504***	**2,822,074**	**1.00**	**2,831,843**	**100%**

Source: Program tracking data and Navigant analysis

* GPY4 PG program implemented 17,474 projects, 30 of which installed both in-unit and common area measures.

Table 3-9. GPY4 North Shore Gas Multi-Family Program Impact Results by Program Channel

Program Channel	Projects Installed	Ex Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)	Percent Verified Gross Savings
Jumpstart Direct Install					**77%**
In-unit	726	20,598	1.00	20,604	87%
Common Area	23	6,560	1.00	6,560	13%
Direct Install Subtotal	*749*	*27,157*	*1.00*	*27,164*	
Partner Trade Ally (PTA)					**21%**
Common Area	15	7,093	1.08	7,640	
Prescriptive Incentives					**2%**
Common Area	1	600	1.00	600	
NSG GPY4 MESP Total	**765**	**34,850**	**1.02**	**35,404**	**100%**

Source: Program tracking data and Navigant analysis

* GPY4 NSG program implemented 760 projects, 5 of which installed both in-unit and common area measures.

4 Net Impact Evaluation

Verified net energy savings were calculated by multiplying the verified gross savings estimates by a net-to-gross ratio. As noted in Section 2, the NTGRs used to calculate the net verified savings for the GPY4 Multi-Family Program were deemed through a consensus process managed by the Illinois SAG.

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

Table 4-1. Peoples Gas and North Shore Gas GPY4 Program NTGR Values

Program Path/Measure	Utility	GPY4 Deemed NTG Value	NTGR Source
Jumpstart Direct Install	PG & NSG	0.90	SAG‡
PTA Incentives	PG & NSG	0.99	
Prescriptive Rebates	PG	0.84	
	NSG	0.90	
Gas Optimization	PG & NSG	1.02	
Custom Incentives	PG & NSG	0.68	

Source: Documents available on the Illinois Energy Efficiency Stakeholders Advisory Group web site.
‡ Deemed Net-to-Gross Ratios are available from:
http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Peoples_Gas_and_North_Shore_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

Table 4-2 summarizes the natural gas savings from the GPY4 Peoples Gas Multi-Family Program by program path. The verified net energy savings of 2,679,593 therms represent 149 percent of the GPY4 program goal of 1,796,163 therms.[16]

Table 4-2. GPY4 Peoples Gas MESP Natural Gas Savings

Program/Path	Ex Ante Gross Savings[17] (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
MESP Jumpstart DI	452,123	406,910	1.00	452,306	0.90	407,075
MESP Prescriptive	299,628	251,688	0.97	291,225	0.84	244,629
MESP PTA	1,978,802	1,959,014	0.99	1,960,765	0.99	1,941,157
MESP Custom	91,521	62,234	1.39	127,547	0.68	86,732
MESP Gas Optimization	0	0	0	0	1.02	0
GPY4 MESP Total	**2,822,074**	**2,679,846**	**1.00**	**2,831,843**		**2,679,593**

Source: Evaluation analysis of GPY4 program tracking data (July 20, 2015 data extract).

Table 4-3 summarizes the natural gas savings from the GPY4 North Shore Gas Multi-Family Program by program path. The verified net energy savings of 32,550 therms represent 77 percent of the GPY4 program goal of 42,267 therms.

[16] PG-NSG Realized Savings_091515.xlsx
[17] The term "Ex Ante" refers to the forecasted savings reported by the Program Administrator that have not been independently verified through evaluation. Savings that have been independently verified by the Evaluation Contractor are referred to as "Verified".

Table 4-3. GPY4 North Shore Gas MESP Natural Gas Savings

Program/Path	Ex Ante Gross Savings (Therms)	Ex Ante Net Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
MESP Jumpstart DI	27,157	24,442	1.00	27,164	0.90	24,447
MESP Prescriptive	600	540	1.00	600	0.99	540
MESP PTA	7,093	7,022	1.08	7,640	0.99	7,563
MESP Custom	0	0	0	0	0.68	0
MESP Gas Optimization	0	0	0	0	1.02	0
GPY4 MESP Total	34,850	32,004	1.02	35,404		32,550

Source: Evaluation analysis of GPY4 program tracking data (July 20, 2015 data extract).

5 Process Evaluation

This section outlines Navigant's process evaluation findings from interviews with the implementation contractor (IC) staff. This was done to gather information about program management, delivery, and marketing and outreach strategies in GPY4 to facilitate program benchmarking research. Navigant conducted best practice research and compared the PG and NSG Multi-Family Program practices against certain standards in the Best Practices Self Benchmarking Tool.[18] The tool highlights the different areas of a Multi-Family Program that could be improved to increase the probability of a more successful program. Navigant conducted further research to expand on topics in the Benchmarking Tool, identify the best practices for engaging customers to take a next step in energy efficiency, and report on successful pilot efforts or programs that focus on highly targeted neighborhood sweeps to get a concentration of multi-family participants in a particular area.

Table 5-1 presents a comparison of the evaluation self-benchmarking scores for the Multi-Family Program with the potential scores from the Self Benchmarking Tool. Details of the benchmarking and best practice analysis are provided in the Appendix 7.2.

Table 5-1. Comparison of PG and NSG Multi-Family Program and Best Practices

Comparison of Program and Best Practices	Self-Benchmark Score	Potential Score	Percentage Score
Program Theory and Design	4.0	6.0	67%
Program Management – Project Management	6.0	6.0	100%
Program Management – Reporting and Tracking	7.5	8.0	94%
Program Management – Quality Control and Verification	10.0	10.0	100%
Program Implementation – Participation Process	7.75	8.0	97%
Program Implementation – Marketing and Outreach	4.5	6.0	75%

Sources: Navigant analysis using the Best Practices Self Benchmarking Tool and input from the implementation contractor.

Observations from the Benchmarking Best Practices research are summarized in the numbered items below.

1. Navigant determined that the program needs some improvement in the area of Program Theory and Design. The program could improve understanding of the financial and ownership structure of the local multi-family market and the relationships among the various market actors, and tailor new offerings to unique opportunities of the sector. A well-developed program theory is one method to identify barriers and information gaps and develop the strategies for engaging customers to take a next step in energy efficiency (i.e. from assessment to installation).
2. In the area of Project Management, the PG and NSG Multi-Family Program scored excellent within three areas of analysis: develop and retain institutional knowledge of the multi-family building sector and lessons learned as implementation structures shift over time; set reasonable,

[18] Best Practices Self Benchmarking Tool (www.eebestpractices.com/benchmarking.asp)

accurate expectations for energy savings and measure performance; and tailor project roles to the unique strengths of each implementation organization.

3. The program quality control and verification process scored excellent. Franklin Energy Services and Navigant have worked diligently over the past evaluation cycles to develop high quality standards for the program quality control and verification tasks.
4. The PG and NSG Multi-Family Program excels in the implementation of the one-stop-shop approach to program delivery, which offers a single point of contact for customers and support to building owners, and an attractive mix of eligible measures and integrated program services and rebates. There are areas where the program could expand upon the concept of the whole-building approach to encourage customers to achieve all their potential energy savings, for example building operations and maintenance training and tenant behavior.
5. The PG and NSG Multi-Family Program needs some improvement in its Marketing and Outreach strategy. The program should create case studies to share the success of previous participants. To support marketing and outreach strategy, the program could consider a market characterization study to gain a better understanding of the financial and ownership structure of the local multi-family market and the relationships among the various market actors. Enhancements to the tracking system that allow better visibility into ownership and building management portfolios may be a useful, strategic tool.
6. Other best practices identified in research include enhancing educational efforts for the PG and NSG Multi-Family Program property managers, tenants, building maintenance staff, and program trade allies. Recent studies (Summerford, et al)[19] and evaluations from Wisconsin Focus on Energy Multi-Family Program[20] have indicated that in addition to providing property managers with some general knowledge of good energy management practices, multi-family programs can benefit from including building operator training to provide a wide range of tips and ideas that building managers and staff can implement to save energy, and also provide property management maintenance staff information so as to have a better understanding of multifamily buildings, and be able to identify potential energy efficiency improvements, which could then be completed through multi-family programs. The PG and NSG Multi-Family Program can also benefit from tenant education and behavior programs, which are increasingly becoming common and incorporated into program designs to improve participant enrollment, engagement, and savings.

Navigant will conduct net-to-gross and process interviews with Multi-Family Program participating decision-makers for the GPY5 evaluation. This will provide an opportunity to gather primary research on some of the topics raised in the benchmarking exercise.

[19] Summerford J., Lorentzen M., and Giannini L., (2014), "Deep and Continuous Savings: Engaging the Multifamily Market throughout the Building Lifecycle." In this study, the authors outlined some strategies for multi-family energy efficiency programs continuous improvement through customer engagement and savings improvement through tenant and property management staff training (http://www.trcsolutions.com/resources/white-paper/deep-and-continuous-savings).

[20] CADMUS: Focus on Energy Calendar Year 2012 Evaluation Report Volume II (April, 2013). https://www.focusonenergy.com/sites/default/files/FOC_XC_CY%2012%20Report%20Volume%20II%20Final_05-3-2013.pdf

6 Findings and Recommendations

This section summarizes the key impact and process findings and recommendations.

Verified Net Impact

Finding 1. The GPY4 Peoples Gas Multi-Family Program achieved verified net energy savings of 2,679,593 therms. This is 149 percent of the program goal of 1,796,163 therms. The North Shore Gas program achieved verified net energy savings of 32,550 therms.[21] This is 77 percent of the program GPY4 goal of 42,267 therms. The verified net savings were calculated using deemed net-to-gross (NTG) values approved through the Illinois SAG consensus process.

Verified Gross Savings and Realization Rate

Finding 2. The GPY4 Peoples Gas Multi-Family Program achieved verified gross energy savings of 2,831,843 therms. This produced a program verified gross realization rate of 100 percent. The North Shore Gas Multi-Family Program achieved verified gross energy savings of 35,404 therms, with overall verified gross realization rate of 102 percent.

Finding 3. The program is accurately tracking gross savings for most TRM (v3.0) deemed measures, but the tracking system and Franklin Energy's "Master Measure Database" (MMDB) spreadsheet did not match the effective version of the TRM for GPY4 for some measures. The evaluation team used the correct GPY4 deemed equivalent full load hours (EFLH) for multi-family to calculate the verified savings for boiler tune-ups, boiler reset controls, efficient furnace and programmable thermostats. The verified savings for these measures increased.

Recommendation 1. The MMDB and the default values that feed into the tracking system should be given an additional verification check to confirm key assumptions against the effective version of the Illinois TRM for a given program year. Where the TRM provides deemed input parameters for multi-family buildings, the program should use them instead of miscellaneous assumptions, if a custom value is not available.

Finding 4: For projects 674514 and 674505, evaluation found the attic insulation custom savings calculator produced lower savings than using the TRM calculation. We referred to the TRM algorithm but used the same input assumptions to calculate the verified gross savings.

Recommendation 2. The IC should review the custom Attic Insulation Calculator and look for errors; or otherwise bring the savings approach into alignment with the TRM methodology.

Finding 5. The Peoples Gas GPY4 Multi-Family Program completed eleven custom projects. The evaluation team sampled six out of the eleven custom projects. For each of the sampled projects, we performed an engineering file review and then updated the analysis approach and/or inputs to determine our final, verified savings. Four of the six sample projects had verified gross realization rates above 100 percent and two had no changes to the claimed savings. Overall, the verified gross savings realization rate is 139 percent for the sample; this extrapolates to the population of custom multi-family projects at 9 percent relative precision and 90 percent confidence level. Our analysis suggests that some of the custom input assumptions are overly conservative. Frequently, these input assumptions, efficiency derating factors, and safety factors lack a source or other documentation.

[21] PG-NSG Realized Savings_091515.xlsx

Recommendation 3. The IC should more thoroughly document the sources of custom savings input assumptions and correction factors. Improving these initial input assumptions or choosing alternate savings estimation methods that reduce uncertainty will improve the accuracy of the initial savings estimates. The program should look for opportunities to capture additional low-cost or no-cost savings through existing custom projects where conservative operating strategies by the participant offer potential for adjustments that save energy.

Finding 6. In the analysis files for two custom projects, the system capacity and equipment sizing differs between the stated pre and post conditions. For instance, in one project the total air flow (CFM) is reported to increase nearly 50 percent from the baseline to the energy efficient case. If that increase in capacity is required by code (the existing system is no longer functioning, or is not meeting the loads), then the counterfactual baseline is one that delivers the required capacity using standard efficiency equipment. If, in the absence of the program, the system capacity would have remained unchanged, then the equipment present prior to participation is the correct baseline.[22]

Recommendation 4. The IC should closely monitor baseline input assumptions and calculations; watch for instances where system capacity changes from before to after the project and investigate further whether the system design change is due to the equipment being undersized or otherwise slated for redesign.

Program Volumetric Findings.

Finding 7. The Peoples Gas GPY4 program involved 2,099 participants (property accounts) that implemented 47,705 measures and 17,474 projects. The North Shore Gas program reported 141 participants, and implemented 2,213 measures and 760 projects. The Partner Trade Ally (PTA) component of People Gas program contributed most of the GPY4 gross savings (69 percent). For North Shore Gas, the Jumpstart Direct Install component contributed most of the GPY4 gross savings (77 percent).

Recommendation 5. The PG and NSG Multi-Family Program can continue to grow program participation through enhancing educational opportunities for participant staff, tenants, and trade allies. Tenants can be taught through engagement in behavior programs. Participant staff and trade allies can be offered rebates to attend a building operator certificate (BOC) training. The BOC training may equip them with a wide range of tips and ideas for operation of multi-family buildings and provide them the opportunity to identify potential energy efficiency improvements, which could then be completed through the Multi-Family Program.

Process Findings.

Finding 8. The highest rated areas from the Best Practices Self Benchmarking Exercise are in program management and the program implementation process, where excellent scores were recorded. Lower ratings identified for program theory and design and marketing and outreach were influenced by individual practices within the categories that scored low, not across-the-board low scores.

[22] Section 3.1 and Section 7.1 provide project specific findings. In this example project, the verified gross savings were greater than the ex ante gross savings.

Finding 9. Navigant's best practice research revealed that the PG and NSG Multi-Family Program does not have a well-defined program theory.

Recommendation 6. The PG and NSG Multi-Family program design should consider developing a program theory. Used wisely, the program theory can be invaluable in identifying program strengths and weaknesses, and then used to develop marketing strategy and interventions to address barriers in the intended program process flow. In addition, the program theory can help identify missing market information needed to improve the program.

Finding 10. The benchmarking exercise indicated that the PG and NSG Multi-Family Program could improve its marketing and outreach strategy.

Recommendation 7. The program should create case studies specific to multi-family buildings to share the success stories from previous participants, which could be a source of encouragement for other participants interested in the program.

Recommendation 8. To support marketing and outreach strategy, the program should consider a market characterization study to gain a better understanding of the financial and ownership structure of the local multi-family market and the relationships among the various market actors. Enhancements to the tracking system that allow better visibility into ownership and building management portfolios may be a useful, strategic tool.

Finding 11. In peer research, Navigant found no examples of an implementer using neighborhood sweeps in conjunction with multi-family programs. Many programs were reviewed in detail for this study and none of them mentioned neighborhood sweeps as a current or past program delivery method. Either program developers did not use neighborhood sweeps for multi-family programs or the method was not reported.

Recommendation 9. Although no examples were found to support the implementation of neighborhood sweeps to deliver a multi-family program, the method has been effective in Illinois for targeting small businesses. The success of neighborhood sweeps would depend on numerous aspects that vary by neighborhood. For instance, targeting could focus on the concentration of multi-family apartment buildings, low and moderate income rental property areas, the concentration of property ownership, and the level of involvement of the owner in the management of the property. Since the approach was not found in multi-family designs, the program staff should consider adapting lessons learned from the small business sector.

Navigant will conduct net-to-gross and process interviews with Multi-Family Program participating decision-makers for the GPY5 evaluation. This will provide an opportunity to gather primary research on some of the topics raised in the benchmarking exercise.

7 Appendix

7.1 Detailed Impact Approaches and Findings

Peoples Gas Multi-Family Custom Path Sampling and Gross Impact Findings

Most of the Peoples Gas and North Shore Gas GPY4 Multi-Family Program measures and savings were deemed through the TRM (v3.0). The Peoples Gas GPY4 Multi-Family Program completed eleven (11) custom projects. The evaluation team randomly sampled 6 out of the 11 custom projects and performed engineering file reviews and analysis of the claimed savings, including billing analysis for some projects. The engineering review of the algorithms used by the program to calculate energy savings and the assumptions that feed into those algorithms were assessed and the savings evaluation approach were classified into one of two categories, 1) reasonable and acceptable, or 2) needs revision based on evaluation findings.

A profile of the custom sample selection and summary of adjustments is provided Table 7-1.

Table 7-1. Peoples Gas GPY4 Multi-Family Program Custom Sample

Project ID	Measure Description	Ex Ante Gross (Therms)	Unweighted Verified Gross (Therms)	Unweighted Gross Realization Rate	Summary of Adjustment
621440	Parking Garage DCV	47,987	47,987	100%	OK
489359	Bathroom DCV	18,998	36,291	191%	Billing analysis
679021	Garage CO Control	10,089	22,537	223%	System rated CFM is based on minimum requirement, whereas actual capacity is 9% above this minimum.
865389	Burner Controls Upgrade	8,213	8,213	100%	OK
674514	Attic Insulation	1,374	3,110	226%	Customized Attic Insulation Calculator produced lower savings. Adjusted using TRM method.
674505	Attic Insulation	1,299	2,940	226%	

Source: Utility tracking data and Navigant analysis.

For each selected project, an in-depth application review is performed to assess the engineering methods, parameters and assumptions used to generate all ex ante impact estimates. For each measure in the sampled project, Navigant engineers estimated ex post gross savings based on their review of documentation and the IC's engineering analysis. Franklin Energy provided project documentation in electronic format for each sampled project. Documentation included some or all of scanned files of hardcopy application forms and supporting documentation from the applicant (invoices, measure specification sheets, and vendor proposals), inspection reports and photos (where available), and calculation spreadsheets.

Research Findings for the Custom Gross Impact Sample

Table 7-2 below presents the research findings results for the six sampled custom file review projects. The mean research findings gross realization rate for the custom sample was 139 percent at a relative precision of ±9 percent at 90 percent confidence level.

The stratified and weighted verified gross realization rates for the sample were applied to the population ex ante to calculate the overall custom projects verified gross savings of 127,547 therms.

Table 7-2. GPY4 Summary of Custom Sample File EM&V Results

Program	Sampling Strata	Sample Size (n)	Population (N)	Sample Ex Ante Gross Savings (Therms)	Population Ex Ante Gross Savings (Therms)	Weighted Sample-Based Verified Gross Realization Rate	Weighted Population Verified Gross Savings (Therms)
Peoples Gas	Large	1	1	47,987	47,987	1.00	47,987
	Small	5	10	39,974	43,534	1.83	79,560
	Total	***6***	***11***	***87,960***	***91,521***	**1.39**	***127,547***
Overall Confidence Interval and Relative Precision (90/10) on RR			9%				

Source: Utility tracking data and Navigant analysis.

7.2 Detailed Findings from Best Practice Process Research

This appendix provides detailed findings from best practices process research that were summarized in Section 5.

The Self Benchmarking Tool and Best Practices

The Self Benchmarking Tool referred to in Section 5 compares the score provided by the IC program manager working with the process evaluator to the potential score on a scale from 0 to 2. Zero denotes a total lack of the best practice, one denotes a partial achievement of the best practice and two denotes full achievement of the best practice. For instance, under the topic of Program Theory and Design is the following best practice: "Have a sound program plan and clearly articulated program theory that describes the logic, niche, resources and ultimate goal." The three scoring benchmarks that can be used to describe the adoption status of a written program plan and theory are:

1. There is no written program plan or program theory. (Score = 0).
2. A program plan exists. The program staff are able to explain the program niche, its resources and its ultimate goals. Some elements of a theory are included in the written program plan. (Score =1).
3. The program has a formal program plan and a fully developed, written program theory that address the program niche, its resources and its ultimate goals. Program interventions are based on the underlying theory. (Score = 2).

Navigant included each of the following program development topics to score with the Self Benchmarking Tool. Details of the scoring are provided below.

1. Program Theory and Design
2. Program Management (contains three subcategories)
3. Program Implementation (contains two subcategories)

Program Theory and Design

A program theory and design provides a structured description of the sequence of events a program is intended to cause, along with a description of why the intervention is expected to bring about change. As a simplified example, a program theory and design may start out this way:

> Outreach activities are held, trade allies and customers attend the events, customers and trade allies become aware of the program and customers become aware of energy efficiency opportunities at their facilities, customers contact trade allies, trade allies facilitate program participation, customers install energy saving products and earn rebates, and energy savings (the ultimate desired outcome) are achieved.

As program implementers and evaluators test the theories and identify program strengths and weaknesses, and better understand barriers in the sequence of events, the theory evolves to address these findings. It may be that a program has been conducting activities focused on a presumed barrier that is virtually non-existent, while missing a more significant barrier.

A Multifamily Performance Program Process Evaluation and Market Characterization study in New York[23] reports that many program designers skip over the program theory and design task. Used wisely, the program theory and design task can be invaluable in identifying program strengths and weaknesses. The program theory can be used to develop a specific marketing strategy. Lack of a defined, actionable marketing strategy is considered as the foremost and overarching barrier to marketing efforts. Without the program theory, development of the marketing plan and the marketing strategy becomes more difficult.

A study conducted for NYSERDA[24] suggests that, multi-family program designers can use the program theory to "understand the financial and ownership structure of the local multi-family market and the relationships among the various market actors".

The PG and NSG Multi-Family Program Manager and the Navigant evaluation team scored the program in the context of each benchmarking topic on the scale of 0 to 2 as described above. The PG and NSG

[23] Multifamily Performance Program Process Evaluation and Market Characterization (NYSERDA) Final Report Prepared for: New York State Energy Research and Development Authority Albany, New York; Patricia Gonzales Project Manager; Prepared by: Research Into Action, Inc. Portland, Oregon, (June, 2014).

[24] CADMUS: Residential Retrofit Contract Group First Draft Verification Report (SCE 2502 Multifamily Energy Efficiency Rebate Program). Prepared for: California Public Utilities Commission Energy Division, (November, 2008)

Multi-Family Program scored 67 percent (needs some improvement) in the area of Program Theory and Design.

Table 7-3. Best Practices for Multi-Family Programs – Program Theory and Design

Program Theory and Design	Self-Benchmark Score	Potential Score	Percentage Score
Have a sound program plan and clearly articulated program theory that describes the program logic, niche, resources and ultimate goal	1.5	2	75%
Understand the financial and ownership structure of the local multi-family market and the relationships among the various market actors	1	2	50%
Include societal and non-energy benefits in cost-effectiveness calculations (NA)	NA		
Tailor multi-family programs to the unique needs of the sector	1.5	2	75%
Total	**4**	**6**	**67%**

Source: Navigant analysis.

The scoring suggests that a better understanding of the financial and ownership structure of the local multi-family market and the relationships among the various market actors could provide the basis to refine the existing program theory and design. A well-developed program theory is one method to identify barriers and information gaps and develop the strategies for engaging customers to take a next step in energy efficiency (i.e. from assessment to installation).

Program Management: Project Management

Project management is easier if the program implementer can identify and work with the decision maker. For instance, Energy Trust of Oregon (ETO) found in their evaluation of the 2013 Multifamily Program that the decision maker on-site is generally the property manager, but the person does not usually have the authority to approve investments. They found that installing instant savings measures may not lead to incented measures.[25] They said:

> "Although Instant Savings Measures (ISMs) provide cost effective savings, it is unclear whether using ISMs as a foot in the door leads later to deeper energy saving projects. Most participants in the database had either ISMs or incented measures, but not both."

The GPY4 results in the PG and NSG program database had similar findings.

[25] Energy Trust of Oregon 2012 Multi-Family Program – Process Evaluation; Funded By: Energy Trust of Oregon; Prepared By: Ryan Bliss, Susan Lutzenhiser, Zac Hathaway, Nathaniel Albers, Research Into Action, Inc., (March, 2013).

Table 7-4. GPY4 MESP Program Participation

GPY4 MESP Program Participation	PG		NSG	
DI Participants	1,465	69%	126	87%
Non-DI Participants	634	29%	15	9%
Both DI+Non-DI	44	2%	5	4%
Unique Participants	2,099		141	

Source: Navigant analysis of GPY4 program tracking data.

The ETO program leads us directly to our research objective: how do we encourage customers who receive free measures to install incented measures? The ETO program concluded the program should be designed to create a "greater linkage between site-level and portfolio-level activities." And further, that "communicating results of a walk-through audit and following up with portfolio managers or owners is likely the best path to attaining additional energy saving projects at a site. Results indicate that deeper energy saving projects (incented projects) are associated with senior decision-makers (owners, portfolio managers and similar)."

In the area of Project Management, the PG and NSG Multi-Family Program performed much better than the first topic (Program Theory and Design). The Project Management achieved 100 percent compliance with the tasks in three areas within the Project Management topic and, thereby, scored excellent in Project Management. Our research suggests that gaining deeper insight into the multi-family financial and ownership structure could inform further evolution of implementation approaches.

Table 7-5. Best Practices for Multi-Family Programs – Program Management: Project Management

Program Management: Project Management	Self-Benchmark Score	Potential Score	Percentage Score
Develop and retain institutional knowledge of the multi-family building sector and lessons learned as implementation structures shift over time	2	2	100%
Set reasonable, accurate expectations for energy savings and measure performance	2	2	100%
Tailor project roles to the unique strengths of each implementation organization	2	2	100%
Total	**6**	**6**	**100%**

Source: Navigant analysis.

Program Management: Reporting and Tracking

Navigant's experience from participant surveys of multi-family property managers have shown that some customers perceive program applications and paperwork as cumbersome or require information that is not readily available. Navigant's findings have suggested that an electronic application could help to reduce this complaint and improve the data entry process. An online application could reduce the amount of paperwork required of Trade Allies and customers, improve the efficiency of application processing, and minimize data entry errors.[26]

[26] Nicor Gas Fall 2014 MCEEP Process Survey Results 2015-05-27 Final.docx

The Multi-Family Program scores 94 percent or excellent on Reporting and Tracking. Only one topic area was scored as needing improvement. Enhancements to the tracking system that allowed better visibility into ownership and building management portfolios may help program implementation and evaluation. In our previous Multi-Family Program survey efforts, Navigant has found it difficult to link data on ownership and property contacts directly to multiple properties in a portfolio.

Table 7-6. Best Practices for Multi-Family Programs – Program Management: Reporting & Tracking

Program Management: Reporting and Tracking	Self-Benchmark Score	Potential Score	Percentage Score
Base reporting and tracking system design on how information will be used and data needs unique to multi-family programs	1.5	2	75%
Assure that tracking systems are intuitive, straightforward, integrated and comprehensive	2	2	100%
Develop systems for long-term strategy and use	2	2	100%
Track the key components of multi-family buildings and program participation	2	2	100%
Total	**7.5**	**8**	**94%**

Source: Navigant analysis.

Program Management: Quality Control and Verification

The Navigant evaluation team did not find any secondary research reports that specifically discussed quality control and verification as a problem in the implementation of multi-family programs. The Program Manager scored the Multi-Family Program 100 percent on quality control and verification. We support this rating as the Franklin Energy Services and Navigant have worked diligently to develop high quality standards for the quality control and verification task.

Table 7-7. Best Practices for Multi-Family Programs – Program Management: Quality Control & Verification

Program Management: Quality Control & Verification	Self-Benchmark Score	Potential Score	Percentage Score
Base quality control practices on a program's vendor relationships, measure types, and project volume	2	2	100%
Conduct quality assurance and verification inspections to improve the overall understanding of how multi-family buildings function	2	2	100%
Govern post-inspection levels by cost-effectiveness as well as quality assurance considerations	2	2	100%
Conduct inspections in a timely manner	2	2	100%
Use product specifications in program requirements and guidelines	2	2	100%
Total	**10**	**10**	**100%**

Source: Navigant analysis.

Program Implementation: Participation Process

Create an Attractive Offer

Another best practice is to create an attractive offer that bundles popular measures with less popular measures. Navigant found that a multi-family program design staff could develop various ways to implement this best practice. For instance, in New York's NYSEG and RG&E program, they reduced a perceived barrier by offering a new technology (LEDs) as a gateway to other measures.[27] Here is how they plan to accomplished this:

> "Uncertain market potential, particularly for fluorescent lighting applications, was identified as an impending barrier to program delivery. To counteract this barrier, program staff suggested that the program include additional measures that have low rates of market saturation. LED lighting, for example, is especially in demand by national chains that use display case lighting. Also, LED case lighting could be an excellent "gateway measure" because this measure can be packaged with other measures, such as motors and fan controls."

Although the statement above references small business retail, the strategy could be adapted to multi-family properties. In addition, in their white paper, Summerford, Lorentzen and Giannini offered various ways to package multi-family rebates including measure bundling, performance-based packages and the multi-measure kicker.[28]

One-Stop Shopping

The Self Benchmarking Tool identifies offering a single point of contact as one of their recommended best practices. According to a recent report by the Massachusetts Energy Efficiency Advisory Council[29], one of the most effective ways to improve a multi-family program is to go beyond the single point of contact to provide owners and managers with 'one-stop shopping'. The Massachusetts study takes the concept of 'one stop shopping' further to provide participants with "an implementation model that enables building owners to develop a relationship with a person who acts as an overall project manager for each specific building or site".

The one-stop shopping service goes beyond offering a single point of contact. It could include all the residential and commercial programs as an option to multi-family customers, in addition to providing a single point of contact.

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[27] NYSEG and RG&E Multifamily Program, Small Business Direct Install (SBDI) Program, Commercial and Industrial Rebate Program (CIRP) Evaluation Report for Program Years 2010-2011.

[28] Summerford J., Lorentzen M., and Giannini L., (2014), "Deep and Continuous Savings: Engaging the Multifamily Market throughout the Building Lifecycle." In this study, the authors outlined some strategies for multi-family energy efficiency programs continuous improvement through customer engagement and savings improvement through tenant and property management staff training.

[29] Multi-Family Retrofit: Recommendations for Achieving a Fully Integrated Energy Efficiency Program Effort in Massachusetts; MA Energy Efficiency Advisory Council. February, 2015.

In a Southern California Edison (SCE) Multi-Family Program evaluation report[30], the program attempted to extend an offering for early retirement of room air conditioners and refrigerators and the turn-in program to create a one-stop shopping experience for the customer. The program also intended to help owners, managers and tenants to learn more about energy efficiency, even encouraging them to create an "energy efficient complex".

The PG and NSG Multi-Family Program meets 97 percent of the requirements of the Participation Process benchmarking.

Table 7-8. Best Practices for Multi-Family Programs – Program Implementation: Participation Process

Program Implementation: Participation Process	Self-Benchmark Score	Potential Score	Percentage Score
Offer a single point of contact for customers	2	2	100%
Offer an attractive mix of eligible measures and integrated program services that include potential program drivers, but tie rebates for the most popular measures to those less likely to be considered and installed	2	2	100%
Use a whole-building approach to achieve maximum energy savings	1.75	2	88%
Provide support to building owners throughout the process	2	2	100%
Total	**7.75**	**8**	**97%**

Source: Navigant analysis.

Program Implementation: Marketing and Outreach

Lack of awareness among multi-family customers is a common barrier identified with Multi-Family program participation. Studies have shown that it is difficult to get multi-family customers' attention in an already crowded market place. Utilities have seen the need to increase the role of trade allies in the delivery of their Multi-Family programs. According to the NYSERDA Multifamily Performance Program Process Evaluation and Market Characterization report[31] "In the upcoming program years, greater competition with NYSERDA and less market potential for energy efficiency projects are expected to be major barriers. Program staff members believe that trade allies, as the principal channel for program outreach, should be offered more opportunities to interact with the program and be more involved in program development."

One idea proposed in a recent Massachusetts study was "For customers who are not large enough to qualify for account management, promote trusted relationships between vendors and owner/management businesses, allowing for customization of measure packages, and clearing a path for vendors to work with customers to find the best solutions." [32]

[30] CADMUS: Residential Retrofit Contract Group First Draft Verification Report (SCE 2502 Multifamily Energy Efficiency Rebate Program). Prepared for: California Public Utilities Commission Energy Division, (November, 2008)
[31] Multifamily Performance Program Process Evaluation and Market Characterization (NYSERDA) Final Report Prepared for: New York State Energy Research and Development Authority Albany, New York; Patricia Gonzales Project Manager; Prepared by: Research Into Action, Inc. Portland, Oregon, (June, 2014).
[32] Multi-Family Retrofit: Recommendations for Achieving a Fully Integrated Energy Efficiency Program Effort in Massachusetts; MA Energy Efficiency Advisory Council. February, 2015.

New marketing ideas will be needed by the PG and NSG Multi-Family Program to enter the non-profit market and align the program with their objectives. In the SCE service area, the Multi-Family program is partnering with federal, state and city housing authorities. Another new approach suggested in California would utilize the existing network of community based organizations (CBOs) for outreach and promotional opportunities because "These organizations are well entrenched and carry tremendous influence in their community…"[33]

In the area of 'Marketing and Outreach', the PG and NSG Multi-Family Program scored 75 percent on the benchmarking requirements. The most difficult tasks were creating case studies to share the success of others and developing a tracking database of all multi-family properties.

Table 7-9. Best Practices for Multi-Family Programs – Program Implementation: Marketing & Outreach

Program Implementation: Marketing and Outreach	Self-Benchmark Score	Potential Score	Percentage Score
Develop and use a database or other method of tracking the population of multi-family properties and conduct periodic market assessments to update the information	1.5	2	75%
Work with property owners and other market participants to help them succeed according to their objectives, and promote program benefits that align with these objectives	2	2	100%
Build relationships with the maintenance and equipment firms responsible for system operations and maintenance (Not Scored)*	NA		
Showcase properties that have completed program upgrades	1	2	50%
Total	**4.5**	**6**	**75%**

Source: Navigant analysis.

* This practice was not scored here, but PG and NSG address this through the Gas Optimization Program.

Other Identified Best Practices

As Navigant researched the topic of best practices and how they can be implemented to increase the probability of program success, some ideas were wide-spread but not included in the current Best Practices Tool. They include the incentive structure, the need for extensive education and training and keeping the program simple to attract all types of customers.

Offer Rewarding Incentive Structure

One of the main barriers discussed by many evaluators or best practice authors is the issue of the split incentive: the owner makes the investment but the dweller receives the benefits. This is the case unless the owner provides heating or lighting to the apartment dweller. The Navigant team has identified a number of ideas from the literature to push customers toward more comprehensive savings measures by manipulating the incentive structure.

[33] CADMUS: Residential Retrofit Contract Group First Draft Verification Report (SCE 2502 Multifamily Energy Efficiency Rebate Program). Prepared for: California Public Utilities Commission Energy Division, (November, 2008)

Summerford, et al, in "Deep and Continuous Savings: Engaging the Multifamily Market throughout the Building Lifecycle", reported that the following can drive customers to make more significant energy efficiency investments:

- Escalating incentives according to incremental performance (building, trade ally)
- Bonuses for multiple measures
- Pay for performance methods
- Bulk-savings or multiple property portfolio incentives

Wisconsin Focus on Energy also offers more than one payment option depending on the number of measures installed. This allows the Program Implementer more flexibility in meeting energy savings goals.

Offer Education and Training to Maximize Savings

A powerful way to influence market players to invest in additional energy savings is education. Utilities can provide opportunities to renters and building operators.

Tenant Education and Behavior Programs - While buildings can become more and more efficient, the theory that "people use energy, buildings don't" is increasingly playing a role in identifying post-installation savings opportunities. Behavioral energy efficiency programs can provide cost-effective savings. They engage the customer (usually on the residential side) in a way that previous programs have not been able to. By leveraging insights from social sciences, these programs employ more than just monetary incentives to achieve energy savings. Existing efficiency programs are increasingly incorporating behavioral components into program design to improve participant enrollment, engagement, and savings.

Enhance Educational Efforts for Staff - Summerford, et al, and recent evaluations from Wisconsin and Massachusetts reports referenced above indicate that Multi-family Programs can benefit from including a building operator training such as the Building Operator Certification Program. The reports outline that "In addition to providing general knowledge of good energy management practices, these trainings typically include a wide range of tips and ideas that building managers and staff can implement to save energy immediately at low cost or even no cost…. In addition, property management maintenance staff (would) have a better understanding of multifamily buildings, (and will be) better able to identify potential energy efficiency improvements, which could then be completed through the programs."

Keep the Program Simple

In Maine, they learned the importance of keeping the program simple for both program partners and property owners. "The Maine Multifamily Efficiency Program (MEP) [34] offers building owners free benchmarking of their buildings and incentives for the development of an Energy Reduction Plan (ERP) and the installation of energy efficiency measures.

[34] Maine Multifamily Efficiency Program Evaluation Final 2014.

Under the original program design, the program required all projects to:

- Benchmark the building
- Complete an energy assessment
- Work with a program partner to develop an Energy Reduction Plan
- Have the Energy Reduction Plan approved

To be eligible for incentives, projects were required to have estimated energy savings of at least 20% of their baseline fuel consumption and offered two ways to estimate energy savings.[5]

A number of barriers are inherent in the design of this program such as staffing, financial factors, and proving 20% savings from baseline usage. Consequently, this program had a total of seven participants with approved Energy Reduction Plans after the first year and almost half of the Program Partners were not satisfied with the program.

In January 2014, Efficiency Maine modified the program design to add a discrete set of prescriptive measures for which incentives are available without the requirement of the upfront energy assessment or the minimum project-level energy savings threshold of 20%.