



Small Business Energy Efficiency Program

GPY4 Evaluation Report

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

FINAL

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Prepared for:

Nicor Gas Company

Submitted by:
Navigant Consulting, Inc.

Paul Higgins, Associate Director
608.497.2342
paul.higgins@navigant.com

Charles Ampong, Managing Consultant
608.497.2336
charles.ampong@navigant.com

www.navigant.com



Submitted to:

Nicor Gas Company
1844 Ferry Road
Naperville, IL 60563

Submitted by:

Navigant Consulting, Inc.
30 S. Wacker Drive, Suite 3100
Chicago, IL 60606
Phone 312.583.5700
Fax 312.583.5701

Contact:

Randy Gunn, Managing Director
312.938.4242
randy.gunn@navigant.com

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

Laura Agapay-Read, Managing Consultant
312.583.4178
laura.agapay.read@navigant.com

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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 Nicor Gas program year four (GPY4)¹ Small Business Energy Efficiency Program (SBEEP or Small Business Program). The SBEEP is designed to assist qualified Nicor Gas non-residential customers² to achieve gas energy savings by educating them about energy efficiency opportunities through on-site assessments conducted by trade allies and installation of no-cost direct-install (DI) natural gas energy efficiency measures. Further energy savings are available to participating customers through prescriptive and custom incentives offered for select contractor-installed (CI) natural gas efficient measures. The SBEEP is implemented by CLEAResult.

As agreed to in the GPY4-6 three year plan, the scope of the GPY4 evaluation effort was limited. Navigant's evaluation involved verifying the compliance of the Small Business Program gross savings with the Illinois Technical Reference Manual (TRM)³ or applying, where necessary, research adjustments to non-deemed savings in the tracking database, and calculating verified net impact savings using the net-to-gross ratio (NTGR) deemed through Illinois Stakeholder Advisory Group (SAG) consensus.⁴ Navigant interviewed program staff and implementation contractor staff to verify information about the tracking system. Participant customer and trade ally NTG research are planned for GPY5/6 to provide recommendations for future use.

E.1. Program Savings

The following two tables summarize the total program savings and program savings by measure, respectively.

Table E-1 shows the GPY4 Small Business Program achieved net energy savings of 900,668 therms.

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

² To qualify for SBEEP, customers must be active Commercial and Industrial (C&I) customers of Nicor Gas who use up to 60,000 therms per year.

³ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 3.0, available at:

<http://www.ilsag.info/technical-reference-manual.html>

⁴http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf.

Table E-1. GPY4 Program Results

Savings Category	Nicor Gas
Ex Ante Gross Savings ⁵ (Therms)	915,122
Verified Gross Realization Rate (RR)	0.98*
Verified Gross Savings (Therms)	900,668
Net to Gross Ratio (NTGR)	1.00 †
Verified Net Savings (Therms)	900,668

Source: Utility tracking data and Navigant analysis.

* Based on evaluation research findings, rounded to two digits.

† Source:

http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

Table E-2 summarizes the ex-ante gross savings, verified gross savings, and verified net savings for the GPY4 Small Business Program by measure. Steam traps had the largest impact on the program savings, contributing 61 percent of GPY4 verified net savings. Pipe insulation measures contributed 14 percent, HVAC space heating, process and controls upgrades, and custom HVAC measures contributed 19 percent. Other equipment including water efficiency measures, kitchen equipment, and water heaters contributed 6 percent of the verified net savings.

⁵ From program tracking system.

Table E-2. GPY4 Program Results by Measure

Program Channel	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate*	Verified Gross Savings (Therms)	NTGR †	Verified Net Savings (Therms)
Direct Install	Faucet Aerators	10,201	1.00	10,201	1.00	10,201
	Showerheads	13,349	1.00	13,370	1.00	13,370
	Spray Valve	5,378	1.00	5,378	1.00	5,378
	Programmable Thermostat	18,333	0.66	12,068	1.00	12,068
	Water Heater Setback	102	1.00	102	1.00	102
	DHW WH Pipe Wrap	955	1.00	956	2.00	1,911
<i>DI Subtotal</i>		<i>48,318</i>	<i>0.87</i>	<i>42,075</i>	<i>1.00</i>	<i>42,075</i>
Prescriptive Incentives	Boiler Reset Controls	3,643	1.00	3,643	1.00	3,643
	Boiler Tune Up, Process	288	1.00	288	1.00	288
	Boiler Tune Up, Space Heating	6,199	1.00	6,199	1.00	6,199
	Convection Oven	3,672	1.00	3,672	1.00	3,672
	Efficient Boilers	37,070	1.00	37,070	1.00	37,070
	Efficient Furnace	35,589	1.00	35,677	1.00	35,677
	Finned-Bottom Stock Pots	51	1.00	51	1.00	51
	Fryer	12,412	1.00	12,412	1.00	12,412
	Furnace Tune Up	63	1.00	63	1.00	63
	Griddle	149	1.00	149	1.00	149
	Infrared Charbroiler	661	1.00	661	1.00	661
	Infrared Heaters	18,491	1.00	18,491	1.00	18,491
	Infrared Upright Broiler	1,089	1.00	1,089	1.00	1,089
	Outdoor Pool Covers	5,335	1.01	5,388	1.00	5,388
	Pipe Insulation	127,645	1.00	127,650	1.00	127,650
	Rack Oven	1,034	1.00	1,034	1.00	1,034
Steam Traps	544,487	1.00	544,648	1.00	544,648	
Storage Water Heater	650	1.00	650	1.00	650	
Programmable Thermostat	12,949	0.98	12,676	1.00	12,676	
<i>Prescriptive Subtotal</i>		<i>811,477</i>	<i>1.00</i>	<i>811,511</i>	<i>1.00</i>	<i>12,676</i>
Custom	Custom Measures	55,328	0.85	47,083	1.00	47,083
Program Total		915,122	0.98	900,668	1.00	900,668

Source: Program tracking data and Navigant analysis.

* Based on evaluation research findings, rounded to two digits.

† Source:

http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

E.2. Impact Estimate Parameters

Table E-3 shows the key parameters used in the GPY4 impact analysis. Navigant used impact parameters as defined by the Illinois Technical Reference Manual (TRM v3.0) to evaluate the savings for most program measures. Navigant evaluated and verified custom savings input parameters used by CLEAResult including steam trap hours of use, programmable thermostat saving factors, and custom efficiency values used to estimate ex ante savings for space heating equipment. Navigant did not conduct additional research in GPY4 on SBEEP impact savings parameters for deeming in future versions of the Illinois TRM.

For the calculation of net savings, Navigant used a NTGR deemed by the Stakeholder Advisory Group (SAG) for Nicor Gas GPY4 SBEEP savings. This report provides further overview of impact parameters in Section 2.2.

Table E-3. Impact Estimate Parameters

Parameter	Data Source	Deemed or Evaluated?
Net to Gross Ratio	SAG Document*	Deemed
Verified Gross Realization Rate	Program Tracking Data, Illinois TRM (v3.0) or custom evaluation	Evaluated
Space Heating Efficiency Inputs	Nicor Gas custom values	Evaluated
Programmable Thermostats Savings Factors	Nicor Gas custom values	Evaluated
Steam Trap HOU Values	Nicor Gas custom values	Evaluated

Source: Navigant analysis.

* Deemed values.

Source:

http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

E.3. Participation Information

Table E-4 provides an overview of GPY4 participation. The Small Business Program had 785 participants. A total of 320 participants received no-cost direct install products or services, while 470 participants received prescriptive and 8 received custom incentives. A total of 950 projects were completed through the GPY4 program, comprising the installation of 5,714 measures.

Table E-4. GPY4 Primary Participation Detail

Participation	Direct Install	Prescriptive Incentive	Custom Incentive	Program Total
Participants ⁶	320	470	8	785
Completed Projects ⁷	333	609	8	950
Installed Measures ⁸	3,527	2,179	8	5,714

Source: Program tracking data and Navigant analysis.

Note: 13 participants had both direct install and prescriptive measures

E.4. Finding and Recommendations

This section summarizes the key findings and recommendations.

Program Savings Achievement

Finding 1. Navigant verified net savings of 900,668 therms for the GPY4 Small Business Program, based on the SAG approved NTG ratio of 1.00. The verified net savings is 136 percent of the program net savings goal of 662,000 therms.⁹ Steam trap measures continued to account for the largest share of program savings, contributing 60 percent of GPY4 verified net savings. Pipe insulation measures contributed 14 percent, and HVAC space heating, process and controls upgrades, and custom HVAC measures contributed 20 percent. Other equipment, including water efficiency measures, kitchen equipment, and water heaters, contributed 6 percent of the verified net savings.

Gross Realization Rates

Finding 2. Navigant calculated an overall gross savings realization rate of 0.98 for the Small Business Program, based on verified gross savings of 900,668 therms compared with the ex ante 915,122 therms. Navigant reviewed the TRM deemed inputs and verified the custom input parameters for ex ante savings. We verified that most of the GPY4 deemed measures had a gross realization rate of 100 percent, except savings from programmable thermostats and commercial pool covers which were adjusted using the appropriate TRM savings inputs. The realization rate for programmable thermostats was lowered to 79 percent and that of commercial pool covers was 101 percent. Navigant did not adjust the water heater temperature setback savings (6.4 therms) which was based on default residential TRM assumptions.

Recommendation 1. Nicor Gas should update the ex-ante savings calculations for commercial pool covers to use TRM approved savings factors for indoor and outdoor spaces. Navigant recommends the savings inputs for programmable thermostats should be revised to be consistent with the effective version of the TRM.

⁶ Participants are defined based on the number of business accounts or names reported in the tracking system.

⁷ Projects are defined based on the unique applications submitted by customers through the GPY4 program.

⁸ For evaluation reporting purpose, if a measure quantity is reported in the tracking system in linear feet, MBH, or square feet, Navigant treated each row entry of such measure as one measure quantity in this table.

⁹ Nicor Gas Energy Efficiency Plan, June 2014 - May 2017

Finding 3. Navigant performed engineering reviews of the custom project files and verified the reasonableness of the custom inputs used to calculate the ex ante savings. Navigant compared the percentage of ex ante gross savings to annual baseline therm usage for the facilities, and if the ex ante savings exceeded 10 percent of baseline we analyzed a minimum of twelve months of post-installation billing data to estimate the verified gross savings. Navigant verified three out of the eight custom projects had 100 percent verified gross realization rate, one project had a realization rate above 100 percent and four other projects had savings adjusted downward with realization rates below 100 percent. The overall realization rate for the custom projects is 85 percent.

Recommendation 2. Nicor Gas should base ex ante savings for custom measures on at least 3 months of billing data. We recognize that some projects may require a quick turnaround, but using only one month (e.g. project NG04-070) is not sufficient to develop a reliable savings estimate. At a high level, Nicor Gas should check the engineering assumptions with the total savings claimed for the project. A few of the projects had very high savings compared with annual gas usage (50 percent or more). With such high savings rates, Nicor Gas should verify key inputs to savings calculations for plausibility and document the basis for atypical results in the project files.

Tracking System Review

Finding 4. Navigant's preliminary savings verification effort calculated low realization rates for pipe insulation measures, boilers, and furnaces, and a high realization rate for programmable thermostats. Navigant's review of the SBEEP tracking database revealed that in many instances the measure savings input parameters did not produce the claimed savings in the tracking system. When we reported this as a preliminary finding, CLEAResult informed us that when provided in the application, custom inputs were used to determine savings – otherwise TRM values were applied. We found that projects that used custom inputs to determine the ex ante savings value did not include the custom inputs in the tracking data. Although Navigant was aware from past evaluations that CLEAResult uses custom inputs, it was not clear from the tracking data which measures were affected in GPY4. Follow-up supplemental data with lookup values provided by CLEAResult enabled Navigant to verify the full claimed savings for some measures and adjust the savings for others. Navigant's verification approach was that when the ex ante savings calculation contained custom inputs, our analysis considered¹⁰ those provided by CLEAResult; when not provided, we defaulted to the TRM values.

Recommendation 3. Nicor Gas should notify the TRM Technical Advisory Committee (TAC) and evaluators prior to the start of each program year of instances where custom inputs are collected to replace TRM deemed inputs for measure savings estimation. In the case of GPY4, the custom hours of use values collected for industrial steam traps and savings adjustment factor for programmable thermostat should have triggered TAC notification, although Navigant verified the values on a custom, retrospective basis. We also emphasize that, for consistency, when custom inputs are available, even when lowering the savings compared with the deemed TRM value, the custom input be applied to the ex ante savings. The same is true when the custom input increases the savings compared with the deemed value. Following these steps will reduce the potential for an unexpected retrospective savings verification adjustment.

¹⁰ Navigant's retrospective verification of custom inputs was not constrained to using values provided on the application form or supplemental program tracking data provided by Nicor Gas.

Recommendation 4. Nicor Gas should consider updating its tracking system to accommodate the supplemental data lookup custom input variables collected from customer applications. The supplemental custom data should be provided together with the tracking database submitted for evaluation verification.

Finding 5. Nicor Gas confirmed a default heating capacity of 84,000 Btu/hr as an input variable for heating equipment when estimating savings for programmable thermostats, although the tracking system recorded 104,000 Btu/hr. Navigant did not adjust the savings based on the default heating capacities. However, Navigant used TRM (v3.0) deemed savings factors based on reported building type and building location (climate zone) to estimate programmable thermostat savings. In many instances the reported building space equivalent full load hours (EFLH) values did not produce the claimed savings, and the savings assumptions did not reflect the climate zones described in the tracking database. The savings from direct install programmable thermostats were affected the most by these issues.

Recommendation 5. Where available, Nicor Gas should consider using actual heating equipment output capacities when estimating savings for programmable thermostats.

Program Participation

Finding 6. The GPY4 Small Business Program resulted in participation of 785 participants (67 percent more than the planning goal of 469 participants). A total of 320 participants received no-cost direct install products or services, 470 received prescriptive measures, and 8 received custom incentive measures. A total of 950 projects were completed through the GPY4 program, comprising the installation of 5,714 rebate measures.

1. INTRODUCTION

1.1 Program Description

Through SBEEP, small business customers are educated about energy efficiency opportunities through on-site assessments conducted by trade allies and receive installation of no-cost direct-install (DI) natural gas energy efficiency measures. Further energy savings are available to participating customers through prescriptive and custom incentives offered for select contractor-installed natural gas efficient measures.

The measure mix did not change appreciably from the previous program year. Direct install measures include water efficient aerators, showerheads and pre-rinse spray valves, and also domestic hot water heater pipe insulation, programmable thermostats and temperature setbacks. Prescriptive and custom measures that received incentives included space heating efficient boilers and furnaces, steam, space heating, and hot water pipe insulation, and several other measures outlined in Section 3. The Small Business Energy Efficiency Program is implemented by CLEAResult. During GPY4, program tracking data showed that 785 small business customers participated in the SBEEP and installed 5,714 rebate measures.

1.2 Evaluation Objectives

As planned, the Nicor Gas SBEEP year four (GPY4) evaluation focused on the following key research topics for GPY4:

Impact Research:

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

Process Research:

The GPY4 process evaluation activities for the SBEEP were limited to interviews with program staff and the implementation contractor staff to verify information about the tracking system.

2. EVALUATION APPROACH

This evaluation of the SBEEP covers the fourth full-scale year of program operation (June 1, 2014 through May 31, 2015). To determine verified gross savings, the evaluation team verified per unit savings for each program measure using the Illinois Technical Reference Manual (TRM v3.0) for deemed input parameters or through evaluation research to verify custom inputs applied by Nicor Gas in the ex ante calculations. Navigant multiplied measure quantities reported in the program tracking system data by the verified per unit savings values. The verified net savings was calculated using a net-to-gross ratio (NTGR) that was deemed for GPY4. Navigant interviewed program staff and the implementation contractor staff to verify information about the tracking system.

2.1 Overview of Data Collection Activities

The core data collection activities included a tracking system review and an engineering analysis as shown in the table below.

Table 2-1. Data Collection Activities

What	Who	Target Completes	Completes Achieved	When
In Depth Interviews	PM/IC	2	2	May 2015
Tracking System & Engineering Review	GPY4 Projects using IL-TRM or through research	All	All	April-June 2016
Project File Reviews	GPY4 Projects with custom inputs	All	All	April-July 2016

Source: Navigant analysis

2.2 Verified Savings Parameters

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.

Table 2-2. Verified Gross and Net Savings Parameters

Measure	Input Parameter Source	Deemed or Evaluated?
NTGR	SAG Agreement*	Deemed
Gross Realization Rate	Tracking data and evaluation research	Evaluated
Faucet Aerator	Illinois TRM, v3.0, section 4.3.2†	Deemed
Showerhead	Illinois TRM, v3.0, section 4.3.3†	Deemed
Pre-Rinse Spray Valve	Illinois TRM, v3.0, section 4.2.11†	Deemed
Boiler Tune Up, Heating	Illinois TRM, v3.0, section 4.4.2†	Deemed
Boiler Tune Up, Process	Illinois TRM, v3.0, section 4.4.3†	Deemed
Boiler Cutout/Reset Control	Illinois TRM, v3.0, section 4.4.4†	Deemed
Water Heater Setback	Illinois TRM, v3.0, section 5.4.6†	Deemed
High Efficiency Boiler	Illinois TRM, v3.0, section 4.4.10† & custom input	Evaluated
High Efficiency Furnace	Illinois TRM, v3.0, section 4.4.11† & custom input	Evaluated
Commercial Pool Covers	Illinois TRM, v3.0, section 4.3.4†	Deemed
Ozone Laundry	Illinois TRM, v3.0, section 4.3.6†	Deemed
Pipe Insulation	Illinois TRM, v3.0, section 4.4.14†	Deemed
Steam Traps	Illinois TRM, v3.0, section 4.4.16† & custom input	Deemed/ Evaluated
Commercial Kitchen – Fryer/Convection Oven, Griddle/Broilers/Rack Oven	Illinois TRM, v3.0, section 4.2†	Deemed
Commercial Kitchen –	Illinois TRM, v3.0, section 4.2†	Deemed
Infrared Heaters	Illinois TRM, v3.0, section 4.4.12†	Deemed
Programmable Thermostat	Illinois TRM, v3.0, section 4.4.18†	Deemed
Storage Water Heater	Illinois TRM, v3.0, section 4.3.1†	Deemed

Source: Navigant analysis

* http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

† Illinois Statewide Technical Reference Manual for Energy Efficiency Version 3.0, available at: <http://www.ilsag.info/technical-reference-manual.html>

2.3 Verified Gross Program Savings Analysis Approach

Navigant used the Illinois TRM Version 3.0 methodology to calculate verified gross savings for measures with deemed savings. The Illinois TRM allows for some custom values to be used in the algorithms as well. CLEARResult used custom input variables collected from customer applications alongside TRM deemed inputs to estimate ex ante savings for some measures. Navigant reviewed the custom assumptions in the tracking database and supplemental data provided by CLEARResult to verify the reasonableness of the custom inputs. To estimate verified gross savings, Navigant multiplied measure quantities from the program tracking system data by the verified per unit savings value.

2.4 Verified Net Program Savings Analysis Approach

Navigant calculated the verified net energy savings by multiplying the verified gross savings estimates by the NTGR approved through the Illinois Stakeholder Advisory Group (SAG) consensus process.¹¹

2.5 Process Evaluation and Other Research

The GPY4 process evaluation activities for the SBEEP were limited to interviews with program staff and the implementation contractor staff to verify information about the tracking system.

Navigant plans to conduct participant free ridership and spillover research in GPY5 in addition to process research to provide NTG recommendations for future use and feedback on participant satisfaction and perspective about the program.

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http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf.

3. GROSS IMPACT EVALUATION

Navigant performed a verification of the SBEEP tracking database to determine the correctness and reasonableness of the data used to calculate program savings from rebated measures installed through the program. Navigant used measure quantities, program tracking data and supplemental data of equipment specifications supplied by Nicor Gas as inputs to Illinois TRM algorithms to determine verified gross savings. For custom project verification, Navigant reviewed project files and custom inputs. Navigant estimated that the GPY4 Small Business Program achieved verified gross savings of 893,550 therms and a 98 percent verified gross realization rate.

3.1 Tracking System Review

The purpose of the tracking system review was to ensure that the system gathers the required data to correctly calculate program savings. Nicor Gas and CLEAResult delivered tracking data in April 2016. Navigant's initial analysis of the tracking data savings assumptions revealed that several of the input parameters did not produce the claimed savings for some measures. Nicor Gas provided supplemental data upon request from Navigant to back up the assumptions behind the ex ante savings to resolve the discrepancies. These delays affected the GPY4 evaluation reporting timeline relative to the original evaluation plan.

Navigant's review of the tracking database shows that custom inputs were used for pipe insulation, industrial steam traps, boilers and furnaces, while TRM (v3.0) deemed inputs were used for the other program measures. CLEAResult explained that when provided in the application, custom inputs were used to determine savings, but otherwise TRM values were applied. However, Navigant found that in many instances, projects that used a custom input to determine the ex ante savings value did not include the custom input in the tracking data, or when included the custom input did not produce the claimed savings. Navigant's savings verification approach was that when the program tracking data contained custom inputs, our analysis considered those; when they were not provided, we defaulted to the TRM values unless Nicor Gas provided supplemental custom input data to support the ex ante savings calculation.¹²

The Illinois TRM Policy Document emphasizes that "prior to treating a TRM measure as a customized measure in a particular program, the Program Administrator will notify the TRM Technical Advisory Committee (TAC), and the treatment of the measure as a customized versus a prescriptively deemed measure will be discussed during the TRM Update Process. The Program Administrator is at risk for retroactive evaluation adjustments to savings in this case. Evaluators are not prohibited from using the Commission-approved TRM when evaluating a TRM measure that a Program Administrator has chosen to implement as a customized measure."¹³

From Navigant's discussion with Nicor Gas and CLEAResult, it does not appear that the TAC was notified when Nicor Gas chose to use custom hours for industrial steam trap savings. Notification of reliance on

¹² Navigant's retrospective verification of custom inputs was not constrained to using values provided on the application form or supplemental program tracking data provided by Nicor Gas.

¹³ Source:

http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Policy%20Document%20for%20IL%20TRM%2010-25-12.pdf

custom inputs to calculate ex ante savings should be given to the TAC and evaluators prior to the start of each program year.

Other measure-specific findings from the tracking system review are provided below.

1. **Boilers and Furnaces: 100% RR, 8% of Program Net Savings.** Navigant reviewed the custom input post installation efficiency values and heating capacities of furnace and boiler measures. We adjusted the savings lower for some projects (e.g. PRJ-400594 and PRJ-403289) and higher for others (e.g. PRJ-450566 and PRJ-451877), based on the TRM deemed EFLH for reported building types in the tracking database. Overall, we calculated a 100 percent verified gross realization rates for the measures.
2. **Steam Traps: 100% RR, 60% of Program Net Savings.** Nicor Gas used custom boiler efficiency values and TRM deemed hours of use (HOU) values to calculate savings for commercial and dry cleaner steam trap measures. For industrial steam traps of various sizes, Nicor Gas used custom HOU values. These custom HOU values were not provided in the tracking database but were submitted as supplemental data upon Navigant's request. Navigant verified that the custom HOU values were reasonable. The average custom HOU input for the industrial steam traps was 7,938 hours compared with the TRM deemed value of 7,752 hours. Navigant verified the ex ante savings calculations with minor adjustments, resulting in a 100 percent gross realization rate for all steam traps.
3. **Programmable Thermostats: 79% RR, 2% of Program Net Savings.** The tracking database shows a default heating capacity of 104,000 Btu/hr as an input variable for heating equipment for programmable thermostat savings. Navigant verified that this value is inconsistent with the claimed savings; rather, the ex ante used a default 84,000 Btu/hr input heating capacity. Navigant did not adjust the savings based on the default heating capacities. Instead, we recommend that actual heating capacities of existing or new heating equipment be used if available. Furthermore, Navigant used TRM (v3.0) deemed savings factors based on reported building type and building location (climate zone) to estimate programmable thermostat savings. In many instances, the reported building space EFLH values did not produce the claimed savings, and the assumptions did not reflect the climate zones described in the tracking database. The savings from direct install programmable thermostats were affected the most, resulting in an overall measure gross realization rate of 79 percent. Navigant notes that the TRM savings methodology for thermostats have changed in the next effective version of the TRM. We recommend revision of the tracking system to accommodate the changes.
4. **Custom Projects: 85% RR, 5% of Program Net Savings.** The custom component of the Small Business Program installed eight custom projects in GPY4. Navigant requested documentation for the projects and performed engineering file reviews of the energy savings inputs and assumptions. Three projects were verified with 100 percent gross realization rates, one project with realization rate above 100 percent and four other projects had savings adjusted downward with realization rates below 100 percent. The overall verified gross realization rate for the custom projects is 85 percent. Navigant compared the percentage of ex ante gross savings to annual baseline therm usage for the facilities, and if the ex ante savings was greater than 10 percent of baseline we analyzed a minimum of twelve months of post-installation billing data to estimate the verified gross savings. A few of the projects had very high savings compared to annual gas usage (50 percent or more). While the results may be accurate, Nicor Gas should verify the key inputs used to ensure they are plausible, and include a statement in the documentation indicating the

inputs were confirmed. We also noticed that project NG04-070 used only one month of billing data for the ex ante savings calculation, which is unlikely to produce a reliable savings estimate. Details of the ex post findings are provided in Section 3 (Table 3-5).

5. **Commercial Pool Covers: 101% RR, 1% of Program Net Savings.** The ex ante savings from commercial outdoor pool cover did not apply the TRM savings adjustment factor of 1.01. Navigant made the correction and calculated 101 percent verified gross realization rate for the measure.
6. **Other Measures:** Navigant verified 100 percent realization for all other program measures, some with very minor adjustments due to rounding differences. Navigant did not adjust the water heater setback savings (6.4 therms), which was based on residential TRM assumptions.

3.2 Program Volumetric Findings

Table 3-1 provides a detailed description of the GPY4 SBEEP participants by program category. The program had 785 small business participants. A total of 320 participants received no-cost direct install products or services, 470 participants received prescriptive measures, and 8 received custom incentive measures. A total of 950 projects were completed through the program in GPY4, comprising the installation of 5,714 measures.

Table 3-1. GPY4 Primary Participation Detail

Participation	Direct Install	Prescriptive Incentive	Custom Incentive	Program Total
Participants ¹⁴	320	470	8	785
Completed Projects ¹⁵	333	609	8	950
Installed Measures ¹⁶	3,527	2,179	8	5,714

Source: Program tracking data and Navigant analysis.

Note: 13 participants had both direct install and prescriptive measures

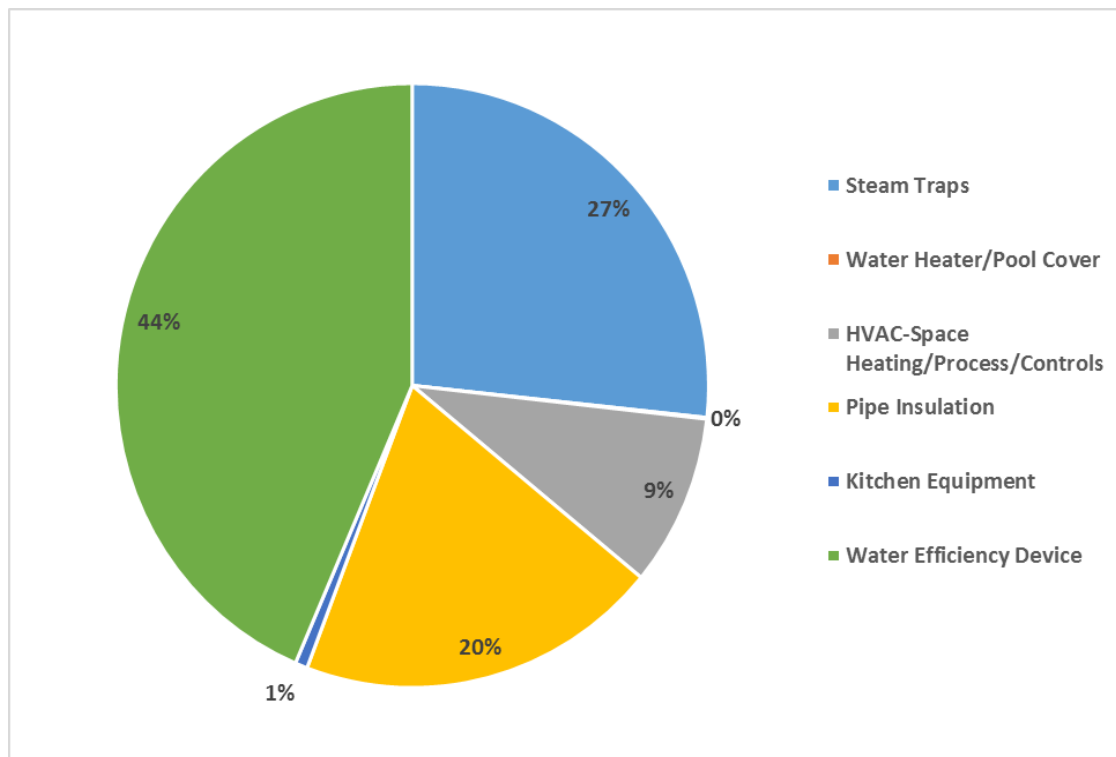
Figure 3-1 depicts the GPY4 volumetric measure counts by end-use category. Direct install water efficiency measures accounted for 44 percent of the measure count, followed by steam trap replacements with 27 percent, pipe insulation with 20 percent, and the space and process heating equipment with 9 percent. Table 3-2 provides a breakdown of the GPY4 participants by program rebate units.

¹⁴ Participants are defined based on the number of business accounts or names reported in the tracking system.

¹⁵ Projects are defined based on the unique applications submitted by customers through the GPY4 program

¹⁶ For evaluation reporting purpose, if a measure quantity is reported in the tracking system in linear feet, MBH, or square feet, Navigant treated each row entry of such measure as one measure quantity in this table.

Figure 3-1. GPY4 SBEEP Measure End-use Category (Number of Measures)



Source: Program tracking data and Navigant analysis.

Table 3-2. GPY4 SBEEP Installed Measures by Rebate Unit

Measure Category	Unit of Rebate	Ex Ante Quantity	Verified Quantity
Faucet Aerators	unit	1,703	1,703
Showerheads	unit	618	618
Spray Valve	unit	72	72
Programmable Thermostat	unit	191	191
Water Heater Setback	unit	16	16
DHW WH Pipe Wrap	Ln.ft	927	927
Boiler Reset Controls	unit	3	3
Boiler Tune Up, Process	unit	1	1
Boiler Tune Up, Space Heating	unit	26	26
Convection Oven	unit	8	8
Efficient Boilers	unit	40	40
Efficient Furnace	unit	213	213
Finned-Bottom Stock Pots	unit	1	1
Fryer	unit	24	24
Furnace Tune Up	unit	1	1
Griddle	unit	1	1
Infrared Charbroiler	unit	1	1
Infrared Heaters	unit	41	41
Infrared Upright Broiler	unit	1	1
Outdoor Pool Covers	Sq.ft	5,335	5,335
Pipe Insulation	Ln.ft	35,121	35,121
Rack Oven	unit	1	1
Steam Trap	unit	1,467	1,467
Storage Water Heater	unit	3	3
Programmable Thermostat	unit	184	184
Custom	unit	8	8

Source: Program tracking data and Navigant analysis.

3.3 Gross Program Impact Parameter Estimates

Navigant verified the ex ante savings using the assumptions and algorithms specified in the TRM v3.0 or through engineering analysis for non-deemed measures and custom inputs. Table 3-3 summarizes the input parameters and unit of savings used to estimate program verified gross savings.

Table 3-3. Verified Gross Savings Parameters

Input Parameter		Value	Unit	Deemed or Evaluated?
Verified Gross Realization Rate		1.00		Evaluated
Faucet Aerator		5.99	therms/unit	Deemed
Showerhead		21.64	therms/unit	Deemed
Pre-Rinse Spray Valve		61.14	therms/unit	Deemed
Boiler Tune Up, Heating/Process	Vary. Ex ante values accepted		therms/unit	Deemed
Boiler Reset Controls	Vary. Ex ante values accepted		therms/unit	Deemed
Efficient Boiler	Vary. Ex ante values accepted		therms/unit	Evaluated
Efficient Furnace	Vary. Ex ante values accepted		therms/unit	Evaluated
Commercial Pool Cover		2.61 for indoor, 1.01 for outdoor	therms/Sq.ft	Deemed
DHW WH Pipe Wrap		1.03	therms/Ln.ft	Deemed
Dry Cleaner/HW/ Space Heating Pipe Insulation	Vary. Ex ante values accepted		therms/Ln.ft	Evaluated
Steam Trap	Vary. Ex ante values accepted with minor adjustment to unit savings due to rounding differences		therms/unit	Evaluated
Convection Oven		306	therms/unit	Deemed
Fryer	505 for standard fryer (E>50%)		therms/unit	Deemed
Griddle		149	therms/unit	Deemed
Infrared Charbroiler		661	therms/unit	Deemed
Infrared Heaters		451	therms/unit	Deemed
Rack Oven		1,034	therms/unit	Deemed
Finned-Bottom Stock Pots		51	therms/unit	Deemed
Infrared Upright Broiler		1,089	therms/unit	Deemed
Programmable Thermostat	Vary. Adjustment for savings factors based on building type and location		therms/unit	Deemed
Water Heater Setback		6.4	therms/unit	Deemed
Rack Oven		1,034	therms/unit	Deemed
Storage Water Heater		251 for >88% TE, 148 for EF>67%	therms/unit	Deemed

Source: Navigant analysis

3.4 Development of the Verified Gross Realization Rate

Navigant determined the verified gross realization rates by comparing the ex ante gross savings with the verified gross savings. The overall program verified gross realization rate is 98 percent. Results by measure are summarized in Table 3-4.

Table 3-4. Verified Gross Savings by Measure

Measure End-use	Measure	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate*	Verified Gross Savings (Therms)
Direct Install Water Efficiency	Faucet Aerators	10,201	1.00	10,201
	Showerheads	13,349	1.00	13,370
	Spray Valve	5,378	1.00	5,378
HVAC/Process Heating	Boiler Reset Controls	3,643	1.00	3,643
	Boiler Tune Up, Process	288	1.00	288
	Boiler Tune Up, Space Heating	6,199	1.00	6,199
	Programmable Thermostat	31,282	0.79	24,744
	Water Heater Setback	102	1.00	102
	Efficient Boilers	37,070	1.00	37,070
	Efficient Furnace	35,589	1.00	35,677
	Infrared Heaters	18,491	1.00	18,491
	Furnace Tune Up	63	1.00	63
	Commercial Kitchen Equipment	Griddle	149	1.00
Infrared Charbroiler		661	1.00	661
Infrared Upright Broiler		1,089	1.00	1,089
Rack Oven		1,034	1.00	1,034
Convection Oven		3,672	1.00	3,672
Finned-Bottom Stock Pots		51	1.00	51
Fryer		12,412	1.00	12,412
Pipe Insulation	DHW WH Pipe Wrap	955	1.00	956
	Dry Cleaner/HW/ Space Heating Pipe Insulation	127,645	1.00	127,650
Steam Traps	Steam Traps	544,487	1.00	544,648
Other	Pool Covers	5,335	1.01	5,388
	Storage Water Heater	650	1.00	650
	Custom Measures	55,328	0.85	47,083
GPY4 Total		915,122	0.98	900,668

Source: Program tracking data and Navigant analysis.

* Based on evaluation research findings.

A detailed breakdown of the realization rates of the custom projects is provided in Table 3-5. As mentioned above, Navigant performed engineering review of the custom project files and verified the reasonableness of the custom inputs to calculate the ex ante savings. Navigant compared the percentage of ex ante gross savings to annual baseline therm usage for the facilities, and if the ex ante savings exceeded 10 percent of baseline we analyzed a minimum of twelve months of post-installation billing data

to estimate the verified gross savings. Navigant verified three out of the eight custom projects had 100 percent verified gross realization rate, one project with realization rate above 100 percent and four other projects had savings adjusted downward with realization rate below 100 percent. The overall realization for the custom projects is 85 percent.

Table 3-5. GPY4 SBEEP Custom Projects Savings Estimates

Project ID	Project Description	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate [‡]	Verified Gross Savings (Therms)
NG04-037	Boiler Replacement	5,283	0.81	4,297
NG04-028	Boiler Replacement	21,501	0.90	19,441
NG04-024	Destratification Fans	2,627	1.00	2,627
NG04-017	Digital Control Valves	3,239	1.00	3,239
NG03-131	Boiler & Insulation	2,932	1.38	4,058
NG04-070	Boiler controls	10,703	0.42	4,508
NG04-054	Unit Heaters	2,740	1.00	2,740
NG04-074	Controls upgrade	6,303	0.98	6,173
Total		55,328	0.85	47,083

Source: Program tracking data and Navigant analysis.

3.5 Verified Gross Program Impact Results

As shown in Table 3-6, the savings adjustments discussed above affected the verified savings and resulted in verified gross realization rate of 0.98 at the program level. The difference between the ex ante gross savings and the verified gross savings is 14,454 therms. Of the total program verified gross savings of 900,668 therms, direct install measures accounted for approximately five percent; the prescriptive component, 90 percent; and the custom component, five percent.

Table 3-6. GPY4 Verified Gross Impact Savings Estimates

Program Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate [‡]	Verified Gross Savings (Therms)
Direct Install	48,318	0.87	42,077
Prescriptive Incentives	811,477	1.00	811,509
Custom Incentives	55,328	0.85	47,083
GPY4 Total	915,122	0.98	900,668

Source: Program tracking data and Navigant analysis.

4. NET IMPACT EVALUATION

For GPY4, Navigant used the Illinois SAG approved deemed NTG value of 1.00 to calculate net savings for the Small Business Program. To calculate the verified net savings, Navigant multiplied the verified gross savings by the deemed NTG ratio. Table 4-1 presents the program net savings.

Table 4-1. GPY4 Verified Net Impact Savings Estimates

Program Category	Verified Gross Savings (Therms)	Net-to-Gross Ratio*	Verified Net Savings (Therms)
Direct Install	42,077	1.00	42,077
Prescriptive Incentives	811,509	1.00	811,509
Custom Incentives	47,083	1.00	47,083
GPY4 Total	900,668	1.00	900,668

Source: Utility tracking data and Navigant analysis.

* Deemed value. Source:

http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf

5. PROCESS EVALUATION

The GPY4 process evaluation activities for the Small Business Program were limited to interviews with program staff and the implementation contractor staff to verify information about the tracking system.

Navigant plans to conduct participant free ridership and spillover research in GPY5 in addition to process research to provide NTG recommendations for future use and feedback on participant satisfaction and perspective about the program.

6. FINDINGS AND RECOMMENDATIONS

This section summarizes the key findings and recommendations.

Program Savings Achievement

Finding 1. Navigant verified net savings of 900,668 therms for the GPY4 Small Business Program, based on the SAG approved NTG ratio of 1.00. The verified net savings is 136 percent of the program net savings goal of 662,000 therms.¹⁷ Steam trap measures continued to account for the largest share of program savings, contributing 60 percent of GPY4 verified net savings. Pipe insulation measures contributed 14 percent, and HVAC space heating, process and controls upgrades, and custom HVAC measures contributed 20 percent. Other equipment, including water efficiency measures, kitchen equipment, and water heaters, contributed 6 percent of the verified net savings.

Gross Realization Rates

Finding 2. Navigant calculated an overall gross savings realization rate of 0.98 for the Small Business Program, based on verified gross savings of 900,668 therms compared with the ex ante 915,122 therms. Navigant reviewed the TRM deemed inputs and verified the custom input parameters for ex ante savings. We verified that most of the GPY4 deemed measures had a gross realization rate of 100 percent, except savings from programmable thermostats and commercial pool covers which were adjusted using the appropriate TRM savings inputs. The realization rate for programmable thermostats was lowered to 79 percent and that of commercial pool covers was 101 percent. Navigant did not adjust the water heater temperature setback savings (6.4 therms) which was based on default residential TRM assumptions.

Recommendation 1. Nicor Gas should update the ex-ante savings calculations for commercial pool covers to use TRM approved savings factors for indoor and outdoor spaces. Navigant recommends the savings inputs for programmable thermostats should be revised to be consistent with the effective version of the TRM.

Finding 3. Navigant performed engineering reviews of the custom project files and verified the reasonableness of the custom inputs used to calculate the ex ante savings. Navigant compared the percentage of ex ante gross savings to annual baseline therm usage for the facilities, and if the ex ante savings exceeded 10 percent of baseline we analyzed a minimum of twelve months of post-installation billing data to estimate the verified gross savings. Navigant verified three out of the eight custom projects had 100 percent verified gross realization rate, one project had a realization rate above 100 percent and four other projects had savings adjusted downward with realization rates below 100 percent. The overall realization rate for the custom projects is 85 percent.

Recommendation 2. Nicor Gas should base ex ante savings for custom measures on at least 3 months of billing data. We recognize that some projects may require a quick turnaround, but using only one month (e.g. project NG04-070) is not sufficient to develop a reliable savings estimate. At a high level, Nicor Gas should check the engineering assumptions with the total savings claimed for the project. A few of the projects had very high savings compared with to

¹⁷ Nicor Gas Energy Efficiency Plan, June 2014 - May 2017

annual gas usage (50 percent or more). With such high savings rates, Nicor Gas should verify key inputs to savings calculations for plausibility and document the basis for atypical results in the project files.

Tracking System Review

Finding 4. Navigant's preliminary savings verification effort calculated low realization rates for pipe insulation measures, boilers, and furnaces, and a high realization rate for programmable thermostats. Navigant's review of the SBEEP tracking database revealed that in many instances the measure savings input parameters did not produce the claimed savings in the tracking system. When we reported this as a preliminary finding, CLEAResult informed us that when provided in the application, custom inputs were used to determine savings – otherwise TRM values were applied. We found that projects that used custom inputs to determine the ex ante savings value did not include the custom inputs in the tracking data. Although Navigant was aware from past evaluations that CLEAResult uses custom inputs, it was not clear from the tracking data which measures were affected in GPY4. Follow-up supplemental data with lookup values provided by CLEAResult enabled Navigant to verify the full claimed savings for some measures and adjust the savings for others. Navigant's verification approach was that when the ex ante savings calculation contained custom inputs, our analysis considered¹⁸ those provided by CLEAResult; when not provided, we defaulted to the TRM values.

Recommendation 3. Nicor Gas should notify the TRM Technical Advisory Committee (TAC) and evaluators prior to the start of each program year of instances where custom inputs are collected to replace TRM deemed inputs for measure savings estimation. In the case of GPY4, the custom hours of use values collected for industrial steam traps and savings adjustment factor for programmable thermostat should have triggered TAC notification, although Navigant verified the values on a custom, retrospective basis. We also emphasize that, for consistency, when custom inputs are available, even when lowering the savings compared with the deemed TRM value, the custom input be applied to the ex ante savings. The same is true when the custom input increases the savings compared with the deemed value. Following these steps will reduce the potential for an unexpected retrospective savings verification adjustment.

Recommendation 4. Nicor Gas should consider updating its tracking system to accommodate the supplemental data lookup custom input variables collected from customer applications. The supplemental custom data should be provided together with the tracking database submitted for evaluation verification.

Finding 5. Nicor Gas confirmed a default heating capacity of 84,000 Btu/hr as an input variable for heating equipment when estimating savings for programmable thermostats, although the tracking system recorded 104,000 Btu/hr. Navigant did not adjust the savings based on the default heating capacities. However, Navigant used TRM (v3.0) deemed savings factors based on reported building type and building location (climate zone) to estimate programmable thermostat savings. In many instances the reported building space equivalent full load hours (EFLH) values did not produce the claimed savings, and the savings assumptions did not reflect the climate zones described in the tracking database. The savings from direct install programmable thermostats were affected the most by these issues.

¹⁸ Navigant's retrospective verification of custom inputs was not constrained to using values provided on the application form or supplemental program tracking data provided by Nicor Gas.

Recommendation 5. Where available, Nicor Gas should consider using actual heating equipment output capacities when estimating savings for programmable thermostats.

Program Participation

Finding 6. The GPY4 Small Business Program resulted in participation of 785 participants (67 percent more than the planning goal of 469 participants). A total of 320 participants received no-cost direct install products or services, 470 received prescriptive measures, and 8 received custom incentive measures. A total of 950 projects were completed through the GPY4 program, comprising the installation of 5,714 rebate measures.