



Small Business Energy Efficiency Program GPY3 Evaluation Report

Final

**Energy Efficiency Plan:
Gas Plan Year 3
(6/1/2013-5/31/2014)**

**Presented to
Nicor Gas Company**

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E. Executive Summary

This report presents a summary of the findings and results of the impact and process evaluation of the Nicor Gas Small Business Energy Efficiency Program (SBEEP) in its third year of operation, which is program year 3 (GPY3).¹ SBEEP is designed to assist qualified Nicor Gas non-residential customers² to achieve gas energy savings by educating them about energy efficiency (EE) opportunities through on-site assessments conducted by trade allies and installation of no-cost direct-install (DI) natural gas energy efficiency measures. Further savings are available to participating customers through incentives offered for select contractor-installed (CI) natural gas efficient measures.

Key changes during GPY3 included the separation of Nicor Gas's SBEEP from the previously joint implementation of the Small Business Energy Savings Program with ComEd, Peoples Gas and North Shore Gas after GPY2. Also, Nexant Inc. (Nexant) continued as the implementation contractor (IC) for SBEEP in GPY3, but implementation was transitioned to CLEAResult for the next program year. The change in implementation contractor is important to note, since acting on some of the recommendations in this report will involve CLEAResult. Nicor introduced several new measures for SBEEP in GPY3, included steam heating/process pipe insulation measures. The majority of the savings from SBEEP measures installed in GPY3 were derived from deemed values contained in the Illinois Technical Reference Manual (TRM).³

As agreed to in the GPY3 plan, the scope of the GPY3 evaluation effort was limited. Navigant's evaluation, measurement and verification (EM&V) of SBEEP GPY3 impacts consisted of verifying compliance with the methods and values specified in the TRM, or, in cases of custom (i.e., non-deemed) measures, evaluating and, where appropriate, adjusting savings. The net-to-gross (NTG) value used to calculate GPY3 net savings was deemed by the Illinois Energy Efficiency Stakeholder Advisory Group (SAG).⁴ Process research of GPY3 SBEEP evaluation consisted of interviews with program and IC staff to verify information about Program performance, measures, and tracking systems.

E.1. Program Savings

Table E-1 summarizes the natural gas savings from SBEEP in GPY3. Navigant verified net savings of 2,780,216 therms.

¹ The GPY3 program year began June 1, 2013 and ended May 31, 2014.

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 State of Illinois Energy Efficiency Technical Reference Manual_Effective_060113_Version_2.0_060713_Clean.pdf

⁴ See <http://www.ilsag.info/> for more information on the SAG and the net-to-gross framework.

Table E-1. Total GPY3 SBEEP Natural Gas Savings

Savings Category	Energy Savings (Therms)
Ex-Ante Gross Savings (Therms)	2,855,341
Ex-Ante Net Savings (Therms)	2,855,341
Verified Gross Savings (Therms)	2,780,216
Gross Realization Rate	97%‡
Net to gross ratio (NTG)	1.00†
Verified Net Savings (Therms)	2,780,216

Source: Utility tracking data and Navigant analysis; ‡ Based on evaluation research findings

† Deemed value, Source: http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August_5-6,_2013_Meeting/Nicor_Gas_NTG_Results_and_Application_PY1-3.pdf.

E.2. Program Savings by Measure Type

Table E-2 summarizes the program savings by measure type.

Table E-2. Nicor Gas GPY3 SBEEP Results by Measure Type

Rebate Measure Kind	Ex-Ante Gross Savings (therms)	Gross Realization Rate‡	Verified Gross Savings (therms)	NTG†	Verified Net Savings (therms)
Bathroom Aerators (DI & CI)	30,480	112%	34,015	1.00	34,015
Kitchen Aerators (DI & CI)	1,141	154%	1,762	1.00	1,762
Showerheads	358,325	79%	281,893	1.00	281,893
Pre-Rinse Sprayers	2,139	100%	2,139	1.00	2,139
Boiler Reset Control	4,343	80%	3,474	1.00	3,474
Boiler Tune-up	5,458	80%	4,367	1.00	4,367
Efficient Furnace	21,057	96%	20,166	1.00	20,166
Furnace Tune-up	13,797	100%	13,797	1.00	13,797
Water Heater (+88% TE)	251	100%	251	1.00	251
HW Pipe Wrap/Insulation	32,122	100%	32,122	1.00	32,122
Programmable Thermostat	675,866	100%	675,866	1.00	675,866
Salon sprayer	800	100%	800	1.00	800
Steam Traps	1,709,564	100%	1,709,564	1.00	1,709,564
Program Total	2,855,341	97%	2,780,216	1.00	2,780,216

Source: Utility tracking data and Navigant analysis; ‡ Evaluation research

† A deemed value approved by the Illinois Energy Efficiency Stakeholder Advisory Group (SAG).

E.3. Impact Estimate Parameters

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

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

Parameter	Data Source	Deemed or Evaluated?
Net-to-Gross Ratio (NTGR)	SAG Spreadsheet †	Deemed
Deemed per-unit savings	IL-TRM (v2.0) and (v3.0)‡	Deemed
Non-deemed per-unit savings	Evaluation Research	Evaluated
Gross Realization Rate	Program tracking data	Evaluated

† Deemed values. Source: [http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor Gas NTG Results and Application PY1-3.pdf](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013_Meeting/Nicor_Gas_NTG_Results_and_Application_PY1-3.pdf).

‡ Source: State of Illinois Technical Reference Manuals:

Illinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean.pdf

Illinois_Statewide_TRM_Effective_060114_Version_3.0_021414_Final_Clean.pdf (for HVAC/aerator errata corrections).

E.4. Program Volumetric Details

As shown in Table E-4, SBEEP implemented 1,974 unique projects and 30,789 measures in GPY3.

Table E-4. GPY3 SBEEP Primary Participation Detail

Participation	Direct-Install	Contractor-Installed	Total
Total Implemented Projects	321	1,819	1,974*
Total Participant Customers	267	1,522	1,628**
Total Program Measures	15,749	15,040	30,789

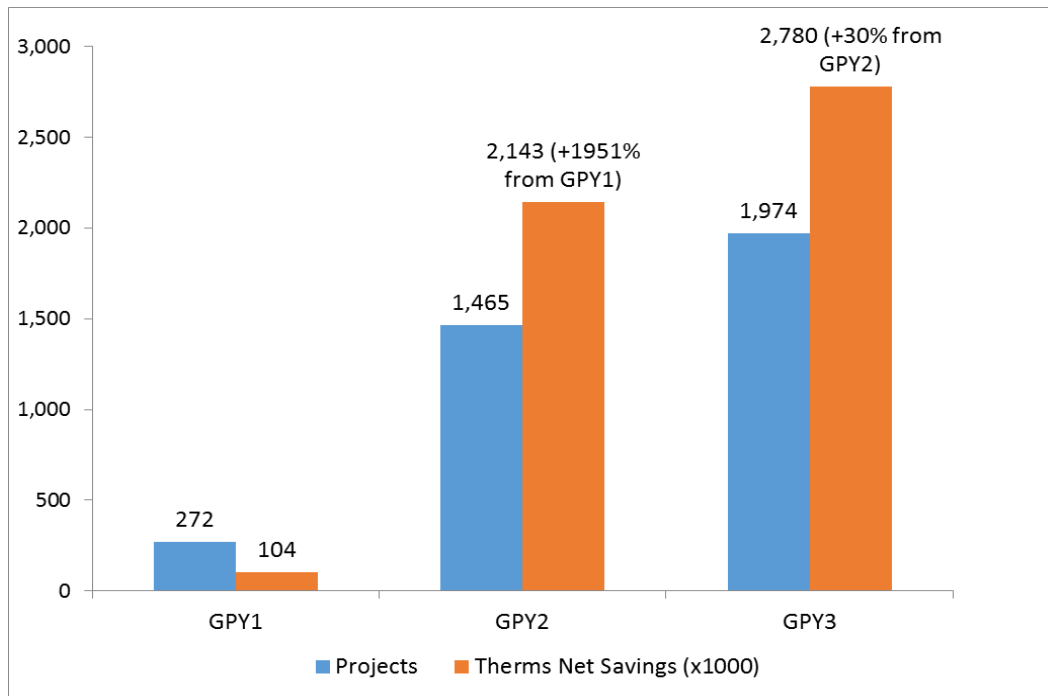
Source: Utility tracking data and Navigant analysis.

* Unique projects: excludes 166 duplicate projects which had both CI and DI measures installed.

** Unique customers: excludes 161 duplicate customer names with both CI and DI measures installed.

Figure E-1 compares the SBEEP savings in GPY3 with the savings in GPY1 and GPY2, as well as year-over-year differences in program participation and verified net savings. Participation and savings have both grown substantially since GPY1, the first full year of the Program's operation.

Figure E-1. Year-over-Year Differences in SBEEP Participation and Saving Savings



Source: Nicor Gas tracking data and Navigant analysis.

E.5. Findings and Recommendations

The following provides insights into key program findings and recommendations.

Gross Realization Rate

Finding 1. The GPY3 gross realization rate was 97 percent.⁵ The evaluation team corrected TRM errata measures by adjusting the ex-ante per-unit savings values from the tracking system for the space heating and water efficiency measures. The adjustments were to ensure compliance with the SAG and the Illinois TRM Technical Advisory Committee directive to apply corrections to TRM (v2.0) errata measures using the TRM (v3.0) effective June 1, 2013.⁶ The adjustments slightly reduced the claimed savings for the space heating measures and increased the savings for the water efficiency aerators. The evaluation team adjusted the unit savings value for showerheads downward based on the number of showers per day assumptions reported in the tracking system. Overall, the errata savings adjustments reduced the verified net savings by 75,125 therms, or 3 percent.

⁵ Gross Realization Rate = verified gross savings / tracking ex-ante gross savings

⁶ Directive from the Illinois TRM Technical Advisory Committee and the SAG indicated that when a measure error was identified (in V2 TRM) and the TAC process resulted in a consensus, the measure is identified (in V3 TRM) as an 'Errata'. In these instances the measure code indicates that a new version of the measure has been published, and that the effective date of the measure dates back to June 1st, 2013" (refer to pages 10-15 of V3 TRM).

Recommendation 1. The new GPY4 implementation contractor, CLEAResult, should review SBEEP unit measure savings values with any new updates to the TRM for GPY4 and GPY5 program years.

Savings Verification Process

Finding 2. The SBEEP tracking database contains input fields to hold most of the program measure savings assumptions, but not all of these assumptions are tracked. The evaluation team required verification of the input capacities for the condensing furnaces, boiler input capacities for the boiler tune-ups and reset control measures, and baseline and existing efficiencies for the condensing furnace measures. As noted above, Navigant adjusted the savings for these measures using the TRM (v3.0).

Recommendation 2a. To reduce the potential for evaluation savings adjustment, CLEAResult should consider producing a spreadsheet that documents the methodology, assumptions, and algorithms for establishing the unit savings values for each SBEEP measure and making that accessible to the evaluation team for review and feedback prior tracking system implementation.

Recommendation 2b. Nicor Gas and CLEAResult, together with Navigant, should explore the opportunity of granting approval for the evaluation team to gain direct real-time, read-only access to the SBEEP tracking system to review project-specific documents, quantities, and invoices for measure and savings verification. Similar arrangement exists for the Nicor Gas Business Custom Incentive Program, which has improved the efficiency of the evaluation process for implementer and evaluator.

Program Savings Goals Attainment

Finding 3. The GPY3 SBEEP achieved verified net savings of 2,780,216 therms, which is 188 percent greater than the filed GPY3 net savings goal of 965,294 therms.⁷ The GPY3 verified net savings showed an increase of 30 percent from GPY2. The increase in savings was primarily due to continued customer participation in steam trap replacements in the dry cleaning market during GPY2 and GPY3. (This single measure accounted for 84 percent of program net savings in GPY2 and 61 percent of net savings in GPY3.)

Program Participation

Finding 4. The SBEEP's biggest participation successes have been the result of matching a well-defined niche market with a motivated trade group and a widely-shared need for a particular measure (e.g. steam traps to Korean dry cleaners, showerheads to hotels/motels).

Recommendation 4. Nicor Gas should consider conducting a market assessment to identify more niche matches, to expand upon the success of dry cleaner steam traps and hotel/motel showerheads.

⁷ Nicor Rider 30 4th Quarterly Report GPY3 ICC Filing, Order Docket 10-0562.

1. Introduction

1.1 Program Description

SBEEP is designed to assist qualified Nicor Gas non-residential customers⁸ to achieve gas energy savings by educating them about energy efficiency (EE) opportunities through on-site assessments conducted by trade allies and installation of no-cost direct-install (DI) natural gas energy efficiency measures. Further savings are available to participating customers through incentives of 30 to 75 percent offered for select contractor-installed (CI) natural gas efficient measures.

New measures introduced in GPY3 SBEEP include steam heating/process pipe insulation measures. The majority of the savings from the measures installed in GPY3 are derived from deemed values contained in the Illinois Technical Reference Manual (TRM).⁹ The GPY3 evaluation involved verifying the compliance of SBEEP with the TRM, or in the case of custom measures, applying research-based adjustments where necessary to non-deemed savings. The net-to-gross (NTG) value used to calculate GPY3 net savings was deemed by the Illinois Energy Efficiency Stakeholder Advisory Group (SAG).¹⁰ Process research related to the GPY3 evaluation was conducted through interviews with program staff and implementation contractor staff to verify information about program performance, measures, and the tracking system.

1.2 Evaluation Objectives

The planned scope of the GPY3 evaluation effort was limited. The objectives of GPY3 evaluation are to:

- (1) Provide an independent calculation of the net therm savings produced by the program in GPY3
- (2) Review the assumptions and calculations of savings in the tracking data in compliance with the statewide TRM, and determine what changes are required
- (3) Interview program staff and the implementation contractor to receive an update on program marketing, delivery, goals and challenges to gain context for the GPY3 evaluation, and identify issues to consider in GPY4 planning.

⁸ 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.

⁹ State of Illinois Energy Efficiency Technical Reference Manual_Effective_060113_Version_2.0_060713_Clean.pdf

¹⁰ See <http://www.ilsag.info/> for more information on the SAG and net-to-gross framework.

2. Evaluation Approach

This evaluation of the GPY3 SBEEP reflects the third full-scale year of Rider 30 Nicor Gas Energy Efficiency Portfolio. This section describes the data that Navigant collected and the method for analyzing the data to meet the GPY3 evaluation objectives.

2.1 Primary Data Collection

2.1.1 Overview of Data Collection Activities

The core data collection activities for the GPY3 evaluation are shown in Table 2-1.

Table 2-1. GPY3 SBEEP Core Evaluation Activities

Program	Process Evaluation	NTG Research	Tracking Data Review	Project File Reviews	On-site M&V	Billing Analysis	Other
Small Business Energy Efficiency Program	PM/IC Interviews	None	Yes	No	No	No	TRM Compliance

The core activity in the GPY3 evaluation was tracking system review of measure type and savings using the tracking data received from the implementation contractor on October 2, 2014. This involved early review of the input fields of the tracking system for the program, and providing feedback to the implementation contractor of what additional inputs were necessary to track for the evaluation exercise. Additional interviews were conducted with program staff and implementation contractor staff to assess program performance, and for clarification on tracking system inputs.

As Table 2-1 indicates, the evaluation in GPY3 focused on impact evaluation through a tracking system data review, with a limited process evaluation component. As a result, the impact and process findings and recommendations are brief.

2.1.2 Verified Savings Parameters

Navigant estimated verified per-unit savings for each program measure using impact algorithm sources found in the Illinois TRM for deemed measures, and evaluation research for non-deemed measures. Table 2-2 below presents the sources for parameters that were used in verified gross savings analysis indicating which were examined through GPY3 evaluation research and which were deemed.

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

Parameter	Data Source	Deemed or Evaluated?
Measure Quantity Installed	Program tracking system	Evaluated
Net-to-Gross Ratio (NTGR)	SAG Spreadsheet †	Deemed
Gross Realization Rate	Program tracking data, TRM	Evaluated
Boiler Cutout/Reset Control	Illinois TRM, version 2.0, section 4.4.4‡ Used TRM (v3.0) for errata correction	Deemed
Space Heating Boiler Tune-Up	Illinois TRM, version 2.0, section 4.4.2‡ Used TRM (v3.0) for errata correction	Deemed
High Efficiency Furnaces	Illinois TRM, version 2.0, section 4.4.11‡ Used TRM (v3.0) for errata correction	Deemed
Pre-Rinse Sprayer	Illinois TRM, version 2.0, section 4.2.11‡	Deemed
Water Heaters Savings Assumptions	Illinois TRM, version 2.0, section 4.3‡	Deemed
Steam Traps Savings Assumptions	Illinois TRM, version 2.0, section 4.4.16‡	Deemed
Kitchen & Bathroom Faucet Aerator	Illinois TRM, version 2.0, section 4.3.2‡ Used TRM (v3.0) for errata correction	Deemed
Showerhead	Illinois TRM, version 2.0, section 4.3.3‡ Used TRM (v3.0) for errata correction	Deemed
Steam Pipe Insulation Savings	Illinois TRM, version 2.0, section 4.4.14‡	Deemed
HW Heater Insulation Jacket; Minimum R-8	Illinois TRM, version 2.0, section 4.4.14‡	Deemed
Furnace Tune-Up Savings	Evaluation Research (used GPY2 value)	Evaluated
Programmable Thermostat Savings	Evaluation Research (used GPY2 value)	Evaluated

Source: Navigant analysis of program tracking data

† Deemed values. Source: [http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor Gas NTG Results and Application PY1-3.pdf](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,2013_Meeting/Nicor_Gas_NTG_Results_and_Application_PY1-3.pdf).

‡ Source: State of Illinois Technical Reference Manuals:

Illinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean.pdf

Illinois_Statewide_TRM_Effective_060114_Version_3_0_021414_Final_Clean.pdf (for HVAC/aerator errata corrections).

2.1.3 Verified Gross Program Savings Analysis Approach

Methods for gross savings verification of TRM measures employed in GPY3 are tracking data review and engineering review of measure savings for compliance with the Illinois TRM. Version 2.0 was used for GPY3 evaluation except for measures with errata corrections where the Version 3.0 was used. For GPY3 non-deemed commercial and industrial measures, such as furnace tune-up and

programmable thermostats, Navigant relied on secondary research or previous years' non-deemed values to verify the claimed savings. The verified gross savings are the product of verified per-unit savings and verified measure quantities.

2.1.4 Verified Net Program Savings Analysis Approach

In GPY3 the NTG ratio estimate used to calculate the net verified savings was deemed by the SAG. For SBEEP, the deemed NTG ratio estimate was 1.00.

2.1.4.1 Free-Ridership

Since the NTG ratio was deemed for GPY3 and GPY4, no participant customer or trade ally free ridership was conducted as task of the GPY3 evaluation.

2.1.5 Process Evaluation

Navigant did not conduct participant customer surveys for GPY3 for process evaluation. The GPY3 process evaluation activities included interviews with program staff and implementation staff to assess program performance, the effectiveness of program implementation, and the tracking system.

3. Gross Impact Evaluation

The gross impact analysis involved tracking system review, verification of installed measures and measure savings. The verified savings were calculated by multiplying the quantity of measures installed by the verified measure unit savings. The program Gross Realization Rate was determined by the ratio of the verified savings and the tracking ex-ante savings. Navigant estimated that the SBEEP GPY3 Program achieved verified gross savings of 2,780,216 therms based on 97 percent gross realization rate.

3.1 Tracking System Review

Over the course of the GPY3 program year, Navigant and the program implementation contractor, Nexant, maintained close contact regarding the programs tracking system (PMT Data Management platform) updates and follow-up from previous program evaluation recommendations. Navigant provided early review and feedback on the additional input fields to the PMT tracking system for the GPY3 evaluation. Navigant used the data extracts from the program's tracking system received on October 2, 2014 to verify the GPY3 program ex-ante inputs including measure counts and ex-ante savings. Listed below are the key findings from the tracking system review.

1. The evaluation team used the TRM (v3.0) to correct errata and adjust the tracking gross savings for the space heating high efficiency condensing furnace, boiler tune-up and boiler reset control measures. The adjustments were in compliance with the SAG and the Illinois TRM Technical Advisory Committee's directive to apply corrections to errata measures in TRM (v2.0) using the TRM (v3.0) effective June 1, 2013.¹¹ The errata correction involved changing the measures savings formula from using input capacity for calculating savings by removing efficiency variable as described in Appendix 7.1.1. As an example, boiler reset control project SBEEP_169407 with 210 input capacity and 254 therms gross savings was changed to 203 therms verified savings (similarly, project SBEEP_169662 had 180 input capacity with 210 gross therms changed to 168 therms verified savings). For condensing furnaces, we referred to the measure description and defined AFUE and applied engineering judgment to determine the errata correction factor to adjust the claimed savings. The Gross Realization Rate for space heating measures with errata correction was 91 percent.
2. The evaluation team used the TRM (v3.0) algorithm and assumptions to correct errata and adjust the tracking savings for the bathroom and kitchen faucet aerators. The adjustment involved changing the average flow rate of the baseline faucet from 1.2 to 1.39 gallons per minute. The verified measure unit savings were calculated based on the reported business facility annual gallons mixed water per faucet assumptions in the TRM. The Gross Realization Rate for bath aerators was 112 percent and 154 percent for kitchen aerators.

¹¹ Directive from the Illinois TRM Technical Advisory Committee and the SAG indicated that when a measure error was identified (in V2 TRM) and the TAC process resulted in a consensus, the measure is identified (in V3 TRM) as an 'Errata'. In these instances the measure code indicates that a new version of the measure has been published, and that the effective date of the measure dates back to June 1st, 2013" (refer to pages 10-15 of V3 TRM).

3. The evaluation adjusted the per-unit savings from showerheads, where the number of showers per day assumptions reported in the tracking system did not produce the claimed savings. For instance, a showerhead with one shower per day should yield 21.63 therms savings annually, but several of the tracking savings are 43.4 or higher. The adjustment reduced the measure savings with 79 percent realization rate.
4. The tracking database has input fields to collect most of the program measure savings assumptions, but not all are tracked. The evaluation team required verification of the input capacities for the condensing furnaces, boiler input capacities for the boiler tune-ups and reset control measures, baseline and existing efficiencies of condensing furnaces. CLEAResult should consider developing a spreadsheet that documents the methodology, assumptions, and algorithms for setting per-unit savings values for each program measure.

3.2 Program Volumetric Findings

Table 3-2 disaggregates the program volumetric findings by program delivery channel. The GPY3 program implemented 1,974 unique projects and 30,789 measures from 1,628 participants.

Table 3-1. GPY3 SBEEP Volumetric Findings

Participation	Direct-Install	Contractor-Installed	Total
Total Implemented Projects	321	1,819	1,974*
Total Participant Customers	267	1,522	1,628**
Total Program Measures	15,749	15,040	30,789

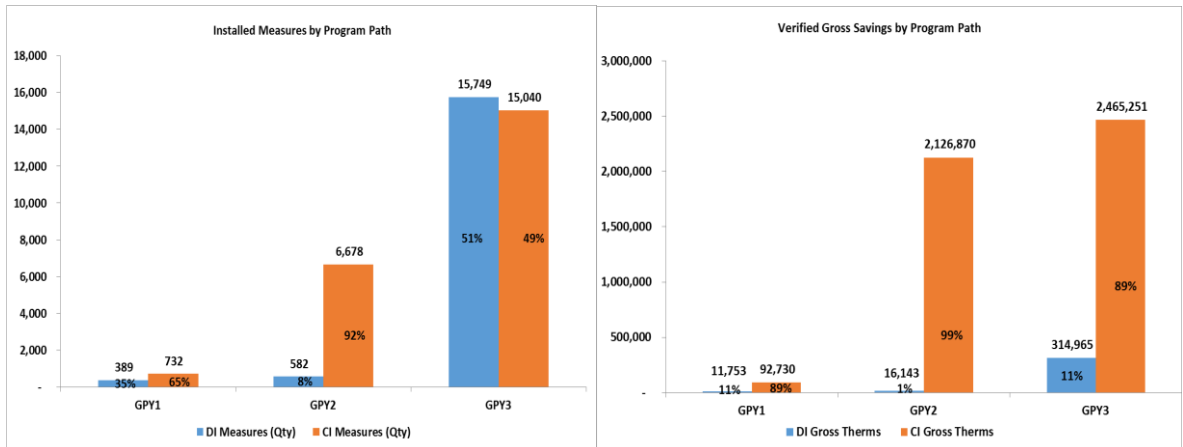
Source: Utility tracking data and Navigant analysis.

* Unique projects: excludes 166 duplicate projects which had both CI and DI measures installed.

** Unique customers: excludes 161 duplicate customer names with both CI and DI measures installed.

Figure 3-1 shows the distribution of measures and verified gross therms savings by program delivery channel since beginning of Rider 30 portfolio operations. The DI measures accounted for 51 percent of the total measure count compared to 49 percent for the CI measures. This is a significant jump from the 8 percent for DI measures in GPY2, due to increased installations of bathroom aerators and showerheads. Out of the 148 projects with showerheads, 138 projects came from Hotel/Motel/Lodging customers. These customers installed 99 percent of the 8,226 showerheads installed through the program. The savings from DI measures also increased considerably to 11 percent, up from one percent in GPY2.

Figure 3-1. Relative Importance of DI vs. CI Measures



Source: Evaluation review of GPY3 SBEEP tracking database

Table 3-2 below provides measure disaggregation for the DI and the CI measures. The program continued to see participation from customers wanting commercial steam trap replacements for dry cleaners and programmable thermostats. New measures introduced in GPY3 included steam heating/process pipe insulation measures (6,001 linear feet of pipe insulation).

Table 3-2. GPY3 SBEEP Installed Measures by Type

Program Delivery	Rebate Measure Kind	Units	Ex-Ante Measure Count	Verified Measure Count	Percent Count
Direct Install (DI)	Bathroom Aerators*	Each	7,242	7,242	23.5%
	Kitchen Aerators*	Each	246	246	0.8%
	Showerheads	Each	8,226	8,226	26.7%
	Pre-Rinse Sprayers	Each	35	35	0.1%
Contractor Installed (CI)	Bathroom Aerators*	Each	1,466	1,466	4.8%
	Kitchen Aerators*	Each	80	80	0.3%
	Boiler Reset Control	Each	14	14	0.0%
	Boiler Tune-up	Each	33	33	0.1%
	Condensing Furnace Upgrade/Replacement	Each	89	89	0.3%
	Furnace Tune-up	Each	220	220	0.7%
	Gas Water Heater up to 75 MBTUH +88% TE	Each	1	1	0.0%
	HW Heater Insulation Jacket; Minimum R-8	Each	3	3	0.0%
	Steam Heating/Process Steam Pipe Insulation	Ln Ft	6,001	6,001	19.5%
	Programmable Thermostat	Each	3,799	3,799	12.3%
	Salon sprayer	Each	8	8	0.0%
Commercial Steam Traps Dry Cleaners)	Each	3,326	3,326	10.8%	
Program Total	Program Total		30,789	30,789	100%

Source: Evaluation review of GPY3 SBEEP tracking database

* Overall 8,708 bathroom aerators and 326 kitchen aerators were installed directly by customers or through contractors and trade allies.

3.3 Gross Program Impact Parameter Estimates

As described in Section 2, ex-ante energy savings were verified using the assumptions and algorithm as specified in the TRM (v2.0) or TRM (v3.0) for errata correction or through engineering analysis for non-deemed measures. Table 3-3 indicates the input parameters to estimate verified gross savings.

Table 3-3. Verified Gross Savings Parameters

Measure/Input Parameters	Ex-Ante Value	Verified Value	Unit	Source
Measure Quantity	30,789	30,789		Evaluated
Gross Realization Rate		97%		Evaluated
Commercial Steam Traps (Dry Cleaners)	514	514	therms/unit	Deemed TRM v2.0
Programmable Thermostat	178	178	therms/unit	Evaluated
High Efficiency Condensing Furnace	Vary	Vary. Corrected errata in TRM v2.0 using TRM v3.0 algorithm and assumptions	therms/unit	Deemed TRM v3.0
Boiler Cutout/Reset Controls	Vary		therms/MBTU	
Boiler Tune-up (Heating)	Vary		therms/MBTU	
Bathroom/Kitchen Aerator	3.5	Vary with building type	therms/unit	Deemed TRM v2.0
Showerhead	Vary	Adjusted based on reported number of showers per day	therms/unit	Deemed TRM v2.0
Furnace Tune-up	63	Acceptable as is	therms/unit	Evaluated
Pre Rinse Sprayers	61	61	therms/unit	Deemed TRM v2.0
Salon Sprayer	100	100	therms/unit	Deemed TRM v2.0
Gas Water Heater +88% TE	251	251	therms/unit	Deemed TRM v2.0
HW Heater Insulation Jacket; Minimum R-8	16	16	therms/unit	Deemed TRM v2.0
Pipe Insulation	Vary	Acceptable as is	therms/Ln.ft	Deemed TRM v2.0

Source: Utility tracking data and Navigant analysis; Illinois TRM (version 2.0 & 3.0)

3.4 Development of the Gross Realization Rate

The program Gross Realization Rate was determined by calculating the ratio of the verified gross savings and the tracking ex-ante gross savings. Gross Realization Rates by measure type were calculated as shown in Table 3-4.

Table 3-4. GPY3 SBEEP Gross Realization Rate by Measure

Rebate Measure Kind	Measure Count	Ex-Ante Gross Savings (therms)	Gross Realization Rate [‡]	Verified Gross Savings (therms)
Bathroom Aerators (DI & CI))	8,708	30,480	112%	34,015
Kitchen Aerators (DI & CI)	326	1,141	154%	1,762
Showerheads	8,226	358,325	79%	281,893
Pre-Rinse Sprayers	35	2,139	100%	2,139
Boiler Reset Control	14	4,343	80%	3,474
Boiler Tune-up	33	5,458	80%	4,367
Condensing Furnace Upgrade/Replacement	89	21,057	96%	20,166
Furnace Tune-up	220	13,797	100%	13,797
Gas Water Heater up to 75 MBTUH +88% Thermal Eff.	1	251	100%	251
HW Heater Insulation Jacket; Minimum R-8	3	48	100%	48
Pipe Insulation	6,001	32,074	100%	32,074
Programmable Thermostat	3,799	675,866	100%	675,866
Salon sprayer	8	800	100%	800
Steam Trap Repair/Replacement	3,326	1,709,564	100%	1,709,564
Program Total	30,789	2,855,341	97%	2,780,216

Source: Utility tracking data and Navigant analysis

[‡] Based on Evaluation research findings

As noted above, correcting the errata in the ex-ante savings estimate resulted in less savings for the space heating high efficiency condensing furnaces, boiler tune-up and, boiler reset control measures, but increased the savings for the bathroom and kitchen aerators. Adjustment to the showerhead ex-ante savings resulted in considerably less savings, which affected the aggregated savings for the DI measures, with 81 percent gross realization rate as shown in Table 3-5 below. The overall program gross realization rate was 97 percent. Steam trap replacements in commercial dry cleaners dominated program savings, comprising roughly 61 percent of the verified savings in GPY3.¹²

¹² Steam traps in commercial dry cleaners have contributed 73 percent since introduction in PY2, or 65 percent of the overall program savings since Rider 30 commencement.

3.5 Verified Gross Program Impact Results

The verified gross impact results for the GPY3 SBEEP is 2,780,216 therms as shown in Table 3-5. The evaluation research was not based on a sampling strategy to verify measure gross savings since the TRM was mostly used to determine verified savings.

Table 3-5. GPY3 SBEEP Verified Gross Impact Savings Estimates

Category	Sample	Energy Savings (therms)	90/10 Significance?
DI Measures			
Ex-Ante Gross Savings	†NA	386,673	†NA
Gross Realization Rate‡		0.81	
Verified Gross Savings‡		314,965	
<i>Percent of Gross Savings</i>		11%	
CI Measures			
Ex-Ante Gross Savings	†NA	2,468,669	†NA
Gross Realization Rate‡		1.00	
Verified Gross Savings‡		2,465,251	
<i>Percent of Gross Savings</i>		89%	
GPY3 SBEEP Total			
Ex-Ante Gross Savings	†NA	2,855,341	†NA
Gross Realization Rate‡		0.97	
Verified Gross Savings‡		2,780,216	

Source: Utility tracking data and Navigant analysis

‡ Based on Evaluation research findings

†NA when the TRM determines the gross savings.

4. Net Impact Evaluation

As noted in Section 2, the SAG¹³ approved a net-to-gross ratio of 1.00 to be used to calculate GPY3 verified net savings for SBEEP. The evaluation calculated verified net savings of 2,780,216 therms for the GPY3 program as shown in Table 4-1.

Table 4-1. GPY3 SBEEP Verified Net Savings Estimates by End-use Category

Category	Sample	Energy Savings (therms)	90/10 Significance?
DI Measures			
Ex-Ante Gross Savings		386,673	
Gross Realization Rate‡	†NA	0.81	†NA
Verified Gross Savings‡		314,965	
Net-to-Gross (NTG) Ratio†		1.00	
Verified Net Savings		314,965	
CI Measures			
Ex-Ante Gross Savings		2,468,669	
Gross Realization Rate‡	†NA	1.00	†NA
Verified Gross Savings‡		2,465,251	
Net-to-Gross (NTG) Ratio†		1.00	
Verified Net Savings		2,465,251	
GPY3 SBEEP Total			
Ex-Ante Gross Savings		2,855,341	
Gross Realization Rate‡	†NA	0.97	†NA
Verified Gross Savings‡		2,780,216	
Net-to-Gross (NTG) Ratio†		1.00	
Verified Net Savings		2,780,216	

Source: Utility tracking data and Navigant analysis.

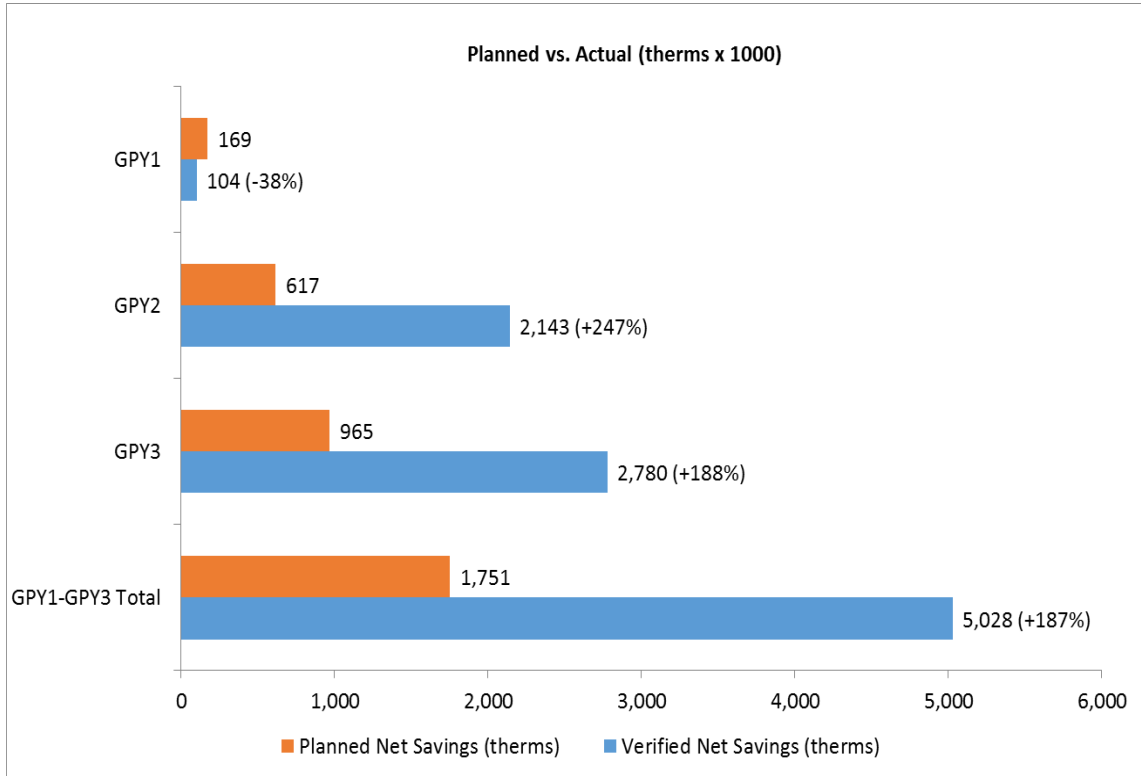
‡ Based on evaluation research findings

†SAG approved NTG deemed value.

¹³ [http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor Gas NTG Results and Application PY1-3.pdf](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013_Meeting/Nicor_Gas_NTG_Results_and_Application_PY1-3.pdf).

Figure 4-1 below provides a comparison of SBEEP verified net savings and the planned savings filed to the Illinois Commerce Commission (ICC).¹⁴ With the exception of GPY1, which is the first full year of Rider 30 operation, SBEEP greatly exceeded planned energy savings targets year over year. The GPY3 Program exceeded goals by 188 percent. Overall the SBEEP three-year total verified net savings of 5,027,712 exceeded the portfolio planned net savings of 1,751,377 therms by 187 percent.

Figure 4-1. SBEEP Yearly Comparison Actual vs. Planned Savings



Source: Navigant analysis of GPY3 SBEEP tracking data
 GPY1 SBEEP Program Evaluation Report; GPY2 SBEEP Program Evaluation Report; Nicor Gas Energy Efficiency Plan 2011-2014 (Revised Plan Filed Pursuant to Order Docket No. 10-0562)

¹⁴ Nicor Gas Energy Efficiency Plan 2011-2014 (Revised Plan Filed Pursuant to Order Docket No. 10-0562)

5. Process Evaluation

The GPY3 process evaluation activities for SBEEP was limited to interviews with programs staff and the implementation contractor staff to verify information about marketing and outreach strategies made in GPY3 that impacted customer and trade ally participation and satisfaction. The impact evaluation in GPY3 consisted of tracking data engineering review; we did not conduct project-specific file reviews or on-site visits that can also be a source of process findings.

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

6. Findings and Recommendations

This section summarizes the key findings and recommendations. Due to the limited scope of the GPY3 evaluation, this section is repeated in its entirety in the Executive Summary.

Gross Realization Rate

Finding 1. The GPY3 gross realization rate was 97 percent.¹⁵ The evaluation team corrected TRM errata measures by adjusting the ex-ante per-unit savings values from the tracking system for the space heating and water efficiency measures. The adjustments were to ensure compliance with the SAG and the Illinois TRM Technical Advisory Committee directive to apply corrections to TRM (v2.0) errata measures using the TRM (v3.0) effective June 1, 2013.¹⁶ The adjustments slightly reduced the claimed savings for the space heating measures and increased the savings for the water efficiency aerators. The evaluation team adjusted the unit savings value for showerheads downward based on the number of showers per day assumptions reported in the tracking system. Overall, the errata savings adjustments reduced the verified net savings by 75,125 therms, or 3 percent.

Recommendation 1. The new GPY4 implementation contractor, CLEAResult, should review SBEEP unit measure savings values with any new updates to the TRM for GPY4 and GPY5 program years.

Savings Verification Process

Finding 2. The SBEEP tracking database contains input fields to hold most of the program measure savings assumptions, but not all of these assumptions are tracked. The evaluation team required verification of the input capacities for the condensing furnaces, boiler input capacities for the boiler tune-ups and reset control measures, and baseline and existing efficiencies for the condensing furnace measures. As noted above, Navigant adjusted the savings for these measures using the TRM (v3.0).

¹⁵ Gross Realization Rate = verified gross savings / tracking ex-ante gross savings

¹⁶ Directive from the Illinois TRM Technical Advisory Committee and the SAG indicated that when a measure error was identified (in V2 TRM) and the TAC process resulted in a consensus, the measure is identified (in V3 TRM) as an 'Errata'. In these instances the measure code indicates that a new version of the measure has been published, and that the effective date of the measure dates back to June 1st, 2013" (refer to pages 10-15 of V3 TRM).

Recommendation 2a. To reduce the potential for evaluation savings adjustment, CLEAResult should consider producing a spreadsheet that documents the methodology, assumptions, and algorithms for establishing the unit savings values for each SBEEP measure and making that accessible to the evaluation team for review and feedback prior tracking system implementation.

Recommendation 2b. Nicor Gas and CLEAResult, together with Navigant, should explore the opportunity of granting approval for the evaluation team to gain direct real-time, read-only access to the SBEEP tracking system to review project-specific documents, quantities, and invoices for measure and savings verification. Similar arrangement exists for the Nicor Gas Business Custom Incentive Program, which has improved the efficiency of the evaluation process for implementer and evaluator.

Program Savings Goals Attainment

Finding 3. The GPY3 SBEEP achieved verified net savings of 2,780,216 therms, which is 188 percent greater than the filed GPY3 net savings goal of 965,294 therms.¹⁷ The GPY3 verified net savings showed an increase of 30 percent from GPY2. The increase in savings was primarily due to continued customer participation in steam trap replacements in the dry cleaning market during GPY2 and GPY3. (This single measure accounted for 84 percent of program net savings in GPY2 and 61 percent of net savings in GPY3.)

Program Participation

Finding 4. The SBEEP's biggest participation successes have been the result of matching a well-defined niche market with a motivated trade group and a widely-shared need for a particular measure (e.g. steam traps to Korean dry cleaners, showerheads to hotels/motels).

Recommendation 4. Nicor Gas should consider conducting a market assessment to identify more niche matches, to expand upon the success of dry cleaner steam traps and hotel/motel showerheads.

¹⁷ Nicor Rider 30 4th Quarterly Report GPY3 ICC Filing, Order Docket 10-0562.

7. Appendix

7.1 Detailed Impact Research Findings and Approaches

7.1.1 Gross Impact Savings Errata Correction

As noted in the above discussions, directive from the Illinois TRM Technical Advisory Committee and the SAG indicated that when a measure error was identified in TRM (v2.0)¹⁸ and the TAC process resulted in a consensus, the measure is identified in TRM (v3.0)¹⁹ as an ‘Errata’. In these instances the measure code indicates that a new version of the measure has been published, and that the effective date of the measure dates back to June 1st, 2013” (refer to pages 10-15 of TRM v3.0). The errata correction involved changing the measures savings formula from using input capacity for calculating savings by removing efficiency variable. This changes results in reduction of the measure unit therms savings.

The GPY3 SBEEP measures affected by this directive are the high efficiency condensing furnaces, boiler tune-up for space heating, and boiler cutout/reset control measures. Others were bathroom and kitchen aerators. This section presents the TRM (v2.0) algorithm and the errata correction using the TRM (v3.0).

7.1.1.1 High Efficiency Furnace

TRM (v2.0) Algorithm and Assumption

Time of Sale:

$$\Delta\text{Therms} = \text{EFLH} * \text{Capacity} * (1/\text{AFUE}(\text{exist}) - 1/\text{AFUE}(\text{eff})) / 100,000 \text{ Btu/Therm}$$

Early replacement

$$\Delta\text{Therms} = \text{EFLH} * \text{Capacity} * (1/\text{AFUE}(\text{base}) - 1/\text{AFUE}(\text{eff})) / 100,000 \text{ Btu/Therm}$$

TRM (v3.0) Errata Correction

Time of Sale:

$$\Delta\text{Therms} = \text{EFLH} * \text{Capacity} * ((\text{AFUE}(\text{eff}) - \text{AFUE}(\text{base}))/\text{AFUE}(\text{base}))/ 100,000 \text{ Btu/Therm}$$

Early replacement

$$\Delta\text{Therms} = \text{EFLH} * \text{Capacity} * (\text{AFUE}(\text{eff}) - \text{AFUE}(\text{exist})/ \text{AFUE}(\text{exist})) / 100,000 \text{ Btu/Therm}$$

Where:

Capacity = Nominal Heating Capacity Furnace Size (btuh)

AFUE(exist)= Existing Furnace Annual Fuel Utilization Efficiency Rating

AFUE(base) = Baseline Furnace Annual Fuel Utilization Efficiency Rating, dependent on year

AFUE(eff) = Efficient Furnace Annual Fuel Utilization Efficiency Rating.

EFHL = Equivalent Full Load Hours for heating (hr)

¹⁸ *Illinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean.pdf*

¹⁹ *Illinois_Statewide_TRM_Effective_060114_Version_3_0_021414_Final_Clean.pdf* (for measure errata corrections).

7.1.1.2 *Space Heating Boiler Tune-Up*

TRM (v2.0) Algorithm and Assumption
 $\Delta\text{therms} = \text{Ngi} * \text{SF} * \text{EFLH} / (\text{Effpre} * 100)$

TRM (v3.0) Errata Correction
 $\Delta\text{therms} = \text{Ngi} * \text{SF} * \text{EFLH} / (100)$

Where:
 Ngi = Boiler gas input size (kBtu/hr)
 SF = Savings factor
 EFLH = Equivalent Full Load Hours for heating (hr)
 Effpre = Boiler Combustion Efficiency before Tune-Up

Boiler Cutout/Reset Control

TRM (v2.0) Algorithm and Assumption
 $\Delta\text{therms} = \text{Binput} * \text{SF} * \text{EFLH} / (\text{Effpre} * 100)$

TRM (v3.0) Errata Correction
 $\Delta\text{therms} = \text{Binput} * \text{SF} * \text{EFLH} / (100)$

Where:
 Binput = Boiler Input Capacity (kBtu)
 SF = Savings factor
 Effpre = Boiler Efficiency
 EFLH = Equivalent Full Load Hours for heating (hr)

7.1.1.3 *Low Flow Faucet Aerators*

TRM (v2.0) Algorithm and Assumption
 $\Delta\text{Therms} = \% \text{FossilDHW} * ((\text{GPM}_{\text{base}} - \text{GPM}_{\text{low}}) / \text{GPM}_{\text{base}}) * \text{Usage} * \text{EPG}_{\text{gas}} * \text{ISR}$

Where:
 %FossilDHW = proportion of water heating supplied by fossil fuel heating (100%)
 EPG_gas = Energy per gallon of mixed water used by faucet with gas water heater (0.00446 therm/gal)
 GPM_base = Average flow rate, in gallons per minute, of the baseline faucet “as-used” (1.2 gal/min)
 GPM_low = Average flow rate, in gallons per minute, of the low-flow faucet aerator “as used” (0.94 gal/min)
 Usage = Estimated usage of mixed water (mixture of hot water from water heater line and cold water line) per faucet (gallons per year as shown in the Table 7-1 below)
 ISR = In service rate of faucet aerators dependent on install method (0.95)

TRM (v3.0) Errata Correction
 $\Delta\text{Therms} = \% \text{FossilDHW} * ((\text{GPM}_{\text{base}} - \text{GPM}_{\text{low}}) / \text{GPM}_{\text{base}}) * \text{Usage} * \text{EPG}_{\text{gas}} * \text{ISR}$
 GPM_base = Average flow rate, in gallons per minute, of the baseline faucet “as-used” (1.39 gal/min)
 All other factors above remain the same.

Table 7-1. Illinois TRM - Faucet Aerator Water Usage Table

Building Type	Annual Gallons Mixed water per faucet (TRM v2.0)	Annual Gallons Mixed water per faucet (TRM v3.0)
Small Office	2500	2,500
Large Office	11250	11,250
Fast Food Rest	6563	9,581
Sit-Down Rest	10800	15,768
Retail	2500	3,650
Grocery	2500	3,650
Warehouse	2500	2,500
Elementary School	3750	3,000
Jr High/High School	11250	9,000
Health	11250	16,425
Motel	1250	1,825
Hotel	875	1,278
Other	5000	5,000

Source: *Illinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean.pdf*
Illinois_Statewide_TRM_Effective_060114_Version_3_0_021414_Final_Clean.pdf (for errata corrections).