



energySMART Energy Saving Kits

GPY5 Evaluation Report

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

FINAL

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Nicor Gas Company

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E. EXECUTIVE SUMMARY

This report presents a summary of the findings and recommendations from the evaluation of the Nicor Gas program year five (GPY5) ¹ energySMART Energy Saving Kit (“Kits”) Program. Through the Kits Program, residential customers could request a set of gas saving measures, including high efficiency showerheads, kitchen faucet aerators, and bathroom faucet aerators, and the measures would be shipped to them with directions for self-installation.

E.1. Program Savings

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

Table E-1. GPY5 Program Results

Savings Category	Nicor Gas
Ex Ante Gross Savings ² (Therms)	189,660
Verified Gross Realization Rate (RR)	0.99 ‡
Verified Gross Savings (Therms)	188,235
Net to Gross Ratio (NTGR)	0.84 †
Verified Net Savings (Therms)	158,117

Source: Nicor Gas program tracking data and Navigant analysis.

‡ Based on evaluation research findings

† 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. GPY5 Program Results by Measure

Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Kit 1					
Faucet aerators and one showerhead	18,017	0.99 ‡	17,795	0.84†	14,948
Kit 2					
Faucet aerators and two showerheads	171,643	0.99 ‡	170,440	0.84†	143,169

Source: Nicor Gas program tracking data and Navigant analysis.

‡ Based on evaluation research findings.

† Source:

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

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

² From Nicor Gas Program Tracking System

E.2. Impact Estimate Parameters

The evaluation used parameters as defined by the Illinois Technical Reference Manual (TRM)³, as summarized in the following table.

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	Evaluated
In Service Rate (ISR)	Navigant Telephone Survey Data	Evaluated

Source: Navigant analysis

† Deemed values. Source:

http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GP Y1-5_2015-03-01_Final.pdf

E.3. Participation Information

The program distributed 10,844 Kits to program participants in GPY5, with each kit containing four or five measures, depending on the number of showerheads requested.

Table E-4. GPY5 Primary Participation Detail

Participation	Nicor Gas
Participants	10,844
Distributed Measures	52,634

Source: Program tracking data and Navigant analysis.

E.4. Finding and Recommendations

This section summarizes the key findings and recommendations.

In Service Rates

Finding 1. Navigant used the in-service rates (ISRs) that Navigant calculated based on our fall 2014 survey research⁴. Although Nicor Gas used the ISRs from the same source, they interchanged the ISR values for kitchen and bathroom aerators. Using the correct values resulted in lower overall verified gross kit savings by around 1,400 therms, and likewise slightly lower realization rates for each kit.

Recommendation 1. As recommended in Navigant’s August 2015 memo of ISR results, use the ISR values based on Navigant’s fall 2014 survey until the program’s email survey is modified as recommended, then use ISR values based on the program’s email survey.

³ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 4.0 June 1, 2015.

http://www.ilsag.info/il_trm_version_4.html

⁴ Nicor Gas Kits ISR and Process Results Final 2015 08 28

Participation Rates

Finding 2. The program achieved more than two-thirds of its three-year goal (60,000 kits distributed) in its first year, leading Nicor Gas to intentionally decrease program marketing the following year. Program participation further decreased in GPY5 compared to GPY3 and GPY4, from 110,458 and 41,583 kits respectively to 10,844 kits. This is likely due to the intentionally limited marketing conducted in GPY5.

1. INTRODUCTION

1.1 Program Description

The energySMART Energy Saving Kit (“Kits”) Program mails kits that consist of one or two high efficiency showerheads, two high efficiency bathroom faucet aerators, and a high efficiency kitchen faucet aerator to customers of Nicor Gas who requested the kits. Both rental and owner-occupied dwellings are eligible for kits. Customers must be active residential customers of Nicor Gas, and only one kit is available for each account number. When they apply to receive a kit from Nicor Gas, the customers are asked if they want one or two showerheads included in their kit (for the remainder of the report, kits containing one showerhead will be referred to as “Kit 1”, and kits containing two showerheads will be referred to as “Kit 2”). The energySMART Energy Saving Kit Program is implemented directly through Nicor Gas, and began in Nicor Gas program year three (GPY3) on June 1, 2013.

1.2 Evaluation Objectives

As planned, the Nicor Gas program year five (GPY5) evaluation primarily focused on the following key researchable questions for GPY5:

Impact Questions:

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)?

No process evaluation was conducted of the program for GPY5 as the evaluation team conducted an in-depth process evaluation for GPY4⁵.

⁵ Ibid and http://ilsagfiles.org/SAG_files/Evaluation_Documents/Nicor%20Gas/Nicor_Gas_GPY4_Evaluation_Reports/Nicor_Gas_GPY4_HEER_Program_Evaluation_Report_2016-08-29_Final.pdf

2. EVALUATION APPROACH

This evaluation of the Kits Program reflects the third full-scale year of program operation (June 1, 2015 through May 31, 2016). During GPY5, program tracking data showed that 10,844 residential customers requested and received an energy saving kit. To determine verified gross savings, the evaluation team verified per unit savings for each kit measure using the Illinois Technical Reference Manual (TRM) Version 4.0⁶ which deems all algorithm inputs except an in-service rate that must be determined through evaluation research. Navigant estimated in service rates using a telephone survey completed in 2014. To estimate verified gross savings, Navigant multiplied measure quantities sent from the program tracking system data times the verified per unit savings value. The verified net savings was calculated using a net-to-gross ratio (NTGR) that was deemed for GPY5.

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
Tracking System Review	Participants	Census	Census	March 2017
Engineering Analysis	Participants	Census	Census	March 2017

2.2 Verified Savings Parameters

Navigant used the Illinois TRM Version 4.0 methodology to calculate verified gross savings. The Illinois TRM deems many values used in the algorithms whose sources are shown in Table 2-2. The Illinois TRM allows for some custom values to be used in the algorithms as well. Navigant used energySMART tracking data for these values. Navigant used the in-service rates (ISRs) that Navigant calculated based on our fall 2014 survey research⁷.

Table 2-2 Verified Gross Savings Parameters

Measure	Input Parameter Source
Low Flow Showerhead	Illinois TRM version 4.0 – Section 5.4.5
Low Flow Bathroom Faucet Aerator	Illinois TRM version 4.0 – Section 5.4.4
Low Flow Kitchen Faucet Aerator	Illinois TRM version 4.0 – Section 5.4.4

Source: Navigant analysis

⁶ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 4.0 June 1, 2015. http://www.ilsag.info/il_trm_version_4.html.

⁷ Nicor Gas Kits ISR and Process Results Final 2015 08 28

2.3 Verified Gross Program Savings Analysis Approach

For the deemed savings estimates, Navigant calculated independent estimates of the savings for each measure based on the Illinois TRM Version 4.0, program tracking data, and an in-service rate calculated from previously collected telephone survey data.

2.4 Verified Net Program Savings Analysis Approach

Verified net energy savings were calculated by multiplying the verified gross savings estimates by a NTGR deemed for GPY5.

3. GROSS IMPACT EVALUATION

Navigant performed a tracking data review to determine quantity of measures distributed and the ex ante gross savings by measure. To determine the verified gross savings by measure, the evaluation team performed an engineering analysis for each kit measure using the Illinois TRM Version 4.0 and installation data drawn from Navigant’s telephone survey conducted in fall 2014⁸. The verified savings were compared with ex ante savings to calculate the measure and program level realization rates for the program.

3.1 Tracking System Review

Navigant performed a verification of the program tracking database to determine ex ante gross savings totals for each measure. The purpose of the tracking system review was to ensure these systems accurately gather the data required to calculate program savings. Navigant used measure quantities and kit equipment specifications supplied by Nicor Gas as inputs to Illinois TRM algorithms to determine verified gross savings.

Key finding:

Navigant used the in-service rates (ISRs) that Navigant calculated based on our fall 2014 survey research. Although Nicor Gas used the ISRs from the same source, they interchanged the ISR values for kitchen and bathroom aerators. Using the correct values resulted in slightly lower overall verified gross kit savings by around 1,400 therms, and likewise slightly lower realization rates for each kit. The ISRs used by Nicor Gas and Navigant are shown below.

Navigant maintains our recommendation, as detailed in our GPY3 evaluation report, that the program revise its email survey. The survey should capture all of the installation information (including quantity installed) for each individual kit component on the first page of the survey; doing so can adjust the savings for each measure up to 37% (+ or -). When the survey is changed as recommended, we will then use the email survey results to inform ISRs.

Table 3-1. GPY4 In Service Rates

Measure	Nicor Gas ISR	Navigant ISR
Kit 1 Showerhead	0.65	0.65
Kit 2 Showerhead	0.67	0.67
Bath Aerator	0.60	0.63
Kitchen Aerator	0.63	0.60

Source: Navigant analysis

3.2 Program Volumetric Findings

In GPY5, the Nicor Gas energySMART Kits program distributed a total of 10,844 kits, participants had an option to request one of two different types of kits.

⁸ Nicor Gas Kits ISR and Process Results Final 2015 08 28

The key finding of this analysis is that Kit Type 2 (which includes two low flow showerheads) had significantly higher participation and accounted for 85% of the kits distributed through the program. This translated to 90% of total program savings being attributed to Kit 2 distributions.

Table 3-2. GPY5 Volumetric and Participation Findings

Kit	Showerheads	Bathroom Faucet Aerators	Kitchen Faucet Aerators	Total Participants
Kit 1 Participants Faucet aerators and one showerhead	1,586	3,172	1,586	1,586
Kit 2 Participants Faucet aerators and two showerheads	18,516	18,516	9,258	9,258
Total	20,102	21,688	10,844	10,844

Source: Navigant analysis.

3.3 Gross Program Impact Parameter Estimates

Navigant calculated verified gross savings from the GPY5 Kits Program using algorithms and parameters defined in the Illinois TRM Version 4.0. Navigant has no new recommendations for the Illinois TRM based on the GPY5 evaluation.

Table 3-3 Verified Gross Savings Parameters

Measure	Input Parameter Source
Low Flow Showerhead	Illinois TRM Version 4.0 – Section 5.4.5
Low Flow Bath Aerator	Illinois TRM Version 4.0 – Section 5.4.4
Low Flow Kitchen Aerator	Illinois TRM Version 4.0 – Section 5.4.4

Source: Navigant analysis

The GPY5 energySMART Energy Saving Kits tracking database, Navigant’s telephone survey results, and inputs provided by Nicor Gas provided most of the input parameters necessary to calculate savings using the Illinois TRM version 4.0. While the TRM provided deemed values for most of the input parameters, it does not provide measure ISRs and instead requires research-based ISRs. Navigant used results from the participant telephone survey performed as part of Navigant’s fall 2014 research⁹. Refer to the memo “Nicor Gas Kits ISR and Process Results” for more details about these specific results.

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 results by measure are shown in Table 3-4 below.

⁹ Ibid.

Table 3-4. Verified Gross Savings by Measure

Measure	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Realization Rate
Kit 1 Showerhead	6.77	6.77	1.00
Kit 2 Showerhead	6.98	6.98	1.00
Bath Aerator	0.44	0.46	1.05
Kitchen Aerator	3.71	3.54	0.95

Source: Navigant analysis

The realization rates vary only for the aerators due to the difference in the ISR rates that Navigant and Nicor Gas used, as explained above. The algorithm and assumptions for the Aerators are shown below.

$$\Delta \text{therms} = \%FossilDHW \times ((GPM_{base} \times L_{base} - GPM_{low} \times L_{low}) \times Household \times 365.25 \times DF / FPH) \times EPG_{gas} \times ISR$$

Where:

- %FossilDHW: Proportion of water heating supplied by natural gas heating; 100%
- GPM_{base} : Average flow rate, in gallons per minute, of the baseline faucet “as-used”; 1.39
- GPM_{low} : Average flow rate, in gallons per minute, of the low-flow faucet aerator “as-used”; 0.94
- L_{base} : Average baseline length of faucet use per capita for all faucets in minutes; 1.6, 4.5 (bath, kitchen)
- L_{low} : Average retrofit length of faucet use per capita for all faucets in minutes; 1.6, 4.5 (Bath, kitchen)
- Household: Average number of people per household; 2.56
- DF: Drain Factor; 0.9, 0.75 (bath, kitchen)
- FPH: Faucets Per Household; 2.83, 1 (bath, kitchen)
- EPG_{gas} : Energy per gallon of hot water supplied by gas; 0.00341, 0.00415 (bath, kitchen)
- ISR: In-Service Rate; 0.63, 0.6 (bath, kitchen)

The ex ante gross savings, verified gross savings, and gross realization rate by kit type are shown in Table 3-5 below.

Table 3-5. Verified Gross Realization Rates

Measure	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Realization Rate
Kit 1	18,017	17,795	0.99
Kit 2	171,643	170,440	0.99
TOTAL	189,660	188,235	0.99

Source: Utility tracking data and Navigant analysis

3.5 Verified Gross Program Impact Results

As shown in the table above, the savings discrepancies resulted in realization rates slightly lower than 1.00 at the kit and program level. The small difference between the ex ante gross savings and the verified gross savings occurred because Nicor Gas interchanged the kitchen and bathroom aerator ISR values that were determined by the study conducted by Navigant in fall 2014. The resulting total program verified gross savings is 188,235 therms as shown in the following table.

Table 3-6. GPY5 Verified Gross Impact Savings Estimates

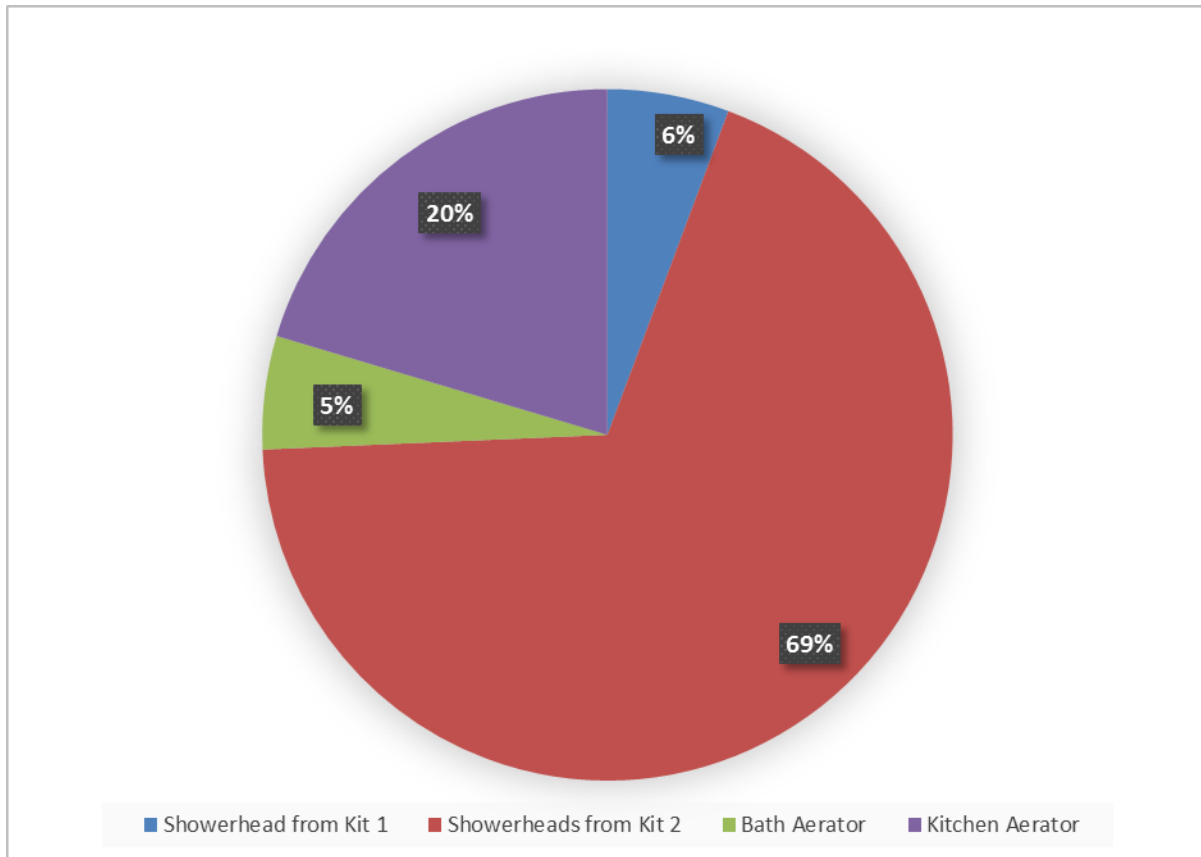
	Gross Energy Savings (Therms)
Showerhead from Kit 1	
Ex Ante Gross Savings	10,732
Verified Gross Realization Rate	1.00 ‡
Verified Gross Savings	10,732
Showerheads from Kit 2	
Ex Ante Gross Savings	129,152
Verified Gross Realization Rate	1.00 ‡
Verified Gross Savings	129,152
Bath Aerator	
Ex Ante Gross Savings	9,500
Verified Gross Realization Rate	1.05 ‡
Verified Gross Savings	9,975
Kitchen Aerator	
Ex Ante Gross Savings	40,262
Verified Gross Realization Rate	0.95 ‡
Verified Gross Savings	38,345
Total Ex Ante Gross Savings	189,660
Verified Gross Realization Rate	0.99
Total Verified Gross Savings	188,235

Source: Utility tracking data and Navigant analysis.

‡ Based on evaluation research findings

Figure 3-1 below shows the relative distribution of gross energy savings by measure.

Figure 3-1. Distribution of Gross Therm Savings by Measure



Source: Utility tracking data and Navigant analysis.

4. NET IMPACT EVALUATION

For GPY5, Navigant used an Illinois SAG approved deemed NTG value of 0.84 to calculate net savings for Nicor Gas. To calculate the verified net savings, Navigant applied the NTG ratio to the verified gross savings. Table 4-1 presents the program verified net savings.

Table 4-1. GPY5 Verified Net Impact Savings Estimates

	Energy Savings (Therms)
Verified Gross Savings	188,235
Net-to-Gross Ratio	0.84†
Verified Net Savings	158,117

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. FINDINGS AND RECOMMENDATIONS

This section summarizes the key impact findings and recommendations.

In Service Rates

Finding 1. Navigant used the in-service rates (ISRs) that Navigant calculated based on our fall 2014 survey research¹⁰. Although Nicor Gas used the ISRs from the same source, they interchanged the ISR values for kitchen and bathroom aerators. Using the correct values resulted in lower overall verified gross kit savings by around 1,400 therms, and likewise slightly lower realization rates for each kit.

Recommendation 1. As recommended in Navigant's August 2015 memo of ISR results and in its evaluation of the program in GPY3, modify the program's email survey to capture all of the installation information (including quantity installed) for each individual kit component on the first page of the survey. Until the email survey is modified so, use the ISR values based on Navigant's fall 2014 survey .

Participation Rates

Finding 2. The program achieved more than two-thirds of its three-year goal (60,000 kits distributed) in its first year, leading Nicor Gas to intentionally decrease program marketing the following year. Program participation further decreased in GPY5 compared to GPY3 and GPY4, from 110,458 and 41,583 kits respectively to 10,844 kits. This is likely due to the intentionally limited marketing conducted in GPY5.

¹⁰ Nicor Gas Kits ISR and Process Results Final 2015 08 28