



energySMART Energy Saving Kits

GPY 4 Evaluation Report

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

FINAL

April 29, 2016

Prepared for:

Nicor Gas Company

Submitted by:

Navigant Consulting, Inc.

Katherine Wolf, Senior Consultant

360.828.4013

Katherine.Wolf@navigant.com

Crystal Berry, Senior Consultant

608.497.2340

Crystal.Berry@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

Disclaimer: This report was prepared by Navigant Consulting, Inc. ("Navigant") for Nicor Gas based upon information provided by Nicor Gas and from other sources. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Navigant nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

TABLE OF CONTENTS

E. Executive Summary.....	1
E.1. Program Savings	1
E.2. Impact Estimate Parameters	2
E.3. Participation Information	2
E.4. Finding and Recommendations	3
1. Introduction.....	4
1.1 Program Description	4
1.2 Evaluation Objectives	4
2. Evaluation Approach.....	5
2.1 Overview of Data Collection Activities	5
2.2 Verified Savings Parameters	5
2.3 Verified Gross Program Savings Analysis Approach	6
2.4 Verified Net Program Savings Analysis Approach	6
2.5 Process Evaluation	6
3. Gross Impact Evaluation.....	7
3.1 Tracking System Review	7
3.2 Program Volumetric Findings	8
3.3 Gross Program Impact Parameter Estimates	8
3.4 Development of the Verified Gross Realization Rate	9
3.5 Verified Gross Program Impact Results	10
4. Net Impact Evaluation.....	13
5. Process Evaluation.....	14
5.1 Program Manager Interview and Program Changes	14
5.2 Program QA/QC Procedures	14
5.3 Program Improvement	15
6. Findings and Recommendations.....	16
Appendix A.....	17

LIST OF FIGURES AND TABLES

Tables

Table E-1. GPY4 Program Results.....	1
Table E-2. GPY4 Program Results by Measure.....	2
Table E-3. Impact Estimate Parameters	2
Table E-4. GPY4 Primary Participation Detail.....	3
Table 2-1. Data Collection Activities.....	5
Table 2-2 Verified Gross Savings Parameters	5
Table 3-1. GPY4 In Service Rates	7
Table 3-2. GPY3 Volumetric and Participation Findings	8
Table 3-3 Verified Gross Savings Parameters	8
Table 3-4. Verified Gross Savings by Measure.....	9
Table 3-5. Verified Gross Realization Rates	10
Table 3-6. GPY4 Verified Gross Impact Savings Estimates	11
Table 4-1. GPY3 Verified Net Impact Savings Estimates	13

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 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. GPY4 Program Results

Savings Category	Nicor Gas
Ex Ante Gross Savings ² (Therms)	1,006,079
Verified Gross Realization Rate (RR)	0.70 ‡
Verified Gross Savings (Therms)	699,839
Net to Gross Ratio (NTGR)	0.84 †
Verified Net Savings (Therms)	587,865

Source: Utility 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 GPY4 program year began June 1, 2014 and ended May 31, 2015.

² From Program Tracking System

Table E-2. GPY4 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	138,153	0.74 ‡	102,409	0.84†	86,023
Kit 2					
Faucet aerators and two showerheads	867,927	0.69 ‡	597,431	0.84†	501,842

Source: 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

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/Meeting_Materials/2013/August_5-6_2013_Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf.

E.3. Participation Information

The program distributed 41,583 Kits to program participants in GPY4, with each kit containing four or five measures, depending on the number of showerheads requested.

³ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 3.0 June 1, 2014. Please add a link.

Table E-4. GPY4 Primary Participation Detail

Participation	Nicor Gas
Participants	41,583
Distributed Measures	198,790

Source: Program tracking data and Navigant analysis.

E.4. Finding and Recommendations

This section summarizes the key findings and recommendations.

Tracking System Review

Finding 1. The base gallons per minute (GPM_base) input that Nicor Gas used in the showerhead energy savings algorithm was the value prescribed by the Illinois TRM Version 3.0 for *direct installed* units, 2.67 gpm. The Illinois TRM shows the correct value for a non-direct install program as 2.35 gpm. This lowered the measure level savings for showerheads by over 230,000 therms and consequentially resulted in a lower realization rate.

Recommendation 1. To capture the most accurate measure savings, use the base gallons per minute for the correct program type, "other" (non-direct install), from the Illinois TRM.

In Service Rates

Finding 2. Navigant used the in service rates (ISRs) that Navigant calculated based on our fall 2014 survey research⁴. Nicor Gas used ISRs from the GPY2 Nicor Gas Elementary Energy Education evaluation. Using the Navigant research resulted in lower overall verified gross kit savings by over 110,000 therms, and likewise lower realization rates for each kit.

Recommendation 2. 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.

Participation Rates

Finding 3. 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 decreased in GPY4 compared to GPY3, from 110,458 kits to 41,583 kits. This is likely due to the intentionally limited marketing conducted in GPY4.

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

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 shower heads 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 three (GPY3) on June 1, 2013.

1.2 Evaluation Objectives

As planned, the Nicor Gas program year four (GPY4) evaluation primarily focused on the following key researchable questions for GPY4:

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)?

Process Questions:

1. What changes have been made to the program since GPY3 and how have these changes affected program satisfaction, participation, savings, and costs?
2. Are the QA/QC activities adequate and unbiased (including procedures for incentive approval, complaints, assuring product quality, etc.)
3. What opportunities exist for program improvement in terms of program administration and implementation?

2. EVALUATION APPROACH

This evaluation of the Kits Program reflects the second full-scale year of program operation (June 1, 2014 through May 31, 2015). During GPY4, program tracking data showed that 41,583 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 3.0⁵ 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. 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 GPY4. The process evaluation for GPY4 was limited in scope as planned.

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	November 2015
Engineering Analysis	Participants	Census	Census	November 2015

2.2 Verified Savings Parameters

Navigant used the Illinois TRM Version 3.0 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.

Table 2-2 Verified Gross Savings Parameters

Measure	Input Parameter Source
Low Flow Showerhead	Illinois TRM version 3.0 – Section 5.4.5
Low Flow Bathroom Faucet Aerator	Illinois TRM version 3.0 – Section 5.4.4
Low Flow Kitchen Faucet Aerator	Illinois TRM version 3.0 – Section 5.4.4

Source: Navigant analysis

⁵ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 3.0 June 1, 2014. Please add a link.

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 3.0, 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. For GPY4, the evaluation team used a NTGR value that was deemed.

2.5 Process Evaluation

As part of the process evaluation, Navigant performed a review of the program materials and conducted an interview with the program manager.

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 3.0 and installation data drawn from Navigant’s telephone survey conducted in fall 2014⁶. 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 findings include:

1. The base gallons per minute (GPM_base) input that Nicor Gas used in the showerhead energy savings algorithm was the value prescribed by the Illinois TRM for *direct installed* units, 2.67 gpm. The Illinois TRM shows the correct value for a *non-direct install* program as 2.35 gpm.⁷ This lowered the measure level savings for showerheads and consequentially resulted in a lower realization rate.
2. Navigant used the in service rates (ISRs) calculated using participant survey results as part of Navigant’s fall 2014 survey research.⁸ Nicor Gas used ISRs taken from the GPY2 Nicor Gas Elementary Energy Education evaluation. The aerator ISRs that Navigant used were higher than those used by Nicor Gas. However, the showerhead ISRs that Navigant used were lower than the ISRs used by Nicor Gas. This resulted in lower overall verified gross kit savings, and therefore a lower realization rates for each kit. The ISRs used by Nicor Gas and Navigant are shown below.

Table 3-1. GPY4 In Service Rates

Measure	Nicor Gas ISR	Navigant ISR
Kit 1 Showerhead	0.81	0.65
Kit 2 Showerhead	0.81	0.67
Bath Aerator	0.48	0.63
Kitchen Aerator	0.48	0.60

Source: Navigant analysis

⁶ Nicor Gas Kits ISR and Process Results Final 2015 08 28

⁷ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 3.0, pg. 562.

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

3.2 Program Volumetric Findings

In GPY4, the Nicor Gas energySMART Kits program distributed two different types of kits to the 41,583 participants.

The key finding of this analysis is that Kit Type 2 (which includes two low flow showerheads) had significantly higher participation and accounted for 78% of the kits distributed through the program. This translated to 85% of total program savings being attributed to Kit 2 distributions.

Table 3-2. GPY3 Volumetric and Participation Findings

Kit	Showerheads	Bathroom Faucet Aerators	Kitchen Faucet Aerators	Total Participants
Kit 1 Participants Faucet aerators and one showerhead	9,125	18,250	9,125	9,125
Kit 2 Participants Faucet aerators and two showerheads	64,916	64,196	32,458	32,458
Total	74,041	83,166	41,583	41,583

Source: Navigant analysis.

3.3 Gross Program Impact Parameter Estimates

Navigant calculated verified gross savings from the GPY4 Kits Program using algorithms and parameters defined in the Illinois TRM Version 3.0. Navigant has no new recommendations for the Illinois TRM based on the GPY4 evaluation.

Table 3-3 Verified Gross Savings Parameters

Measure	Input Parameter Source
Low Flow Showerhead	Illinois TRM Version 3.0 – Section 5.4.5
Low Flow Bath Aerator	Illinois TRM Version 3.0 – Section 5.4.4
Low Flow Kitchen Aerator	Illinois TRM Version 3.0 – Section 5.4.4

Source: Navigant analysis

The GPY4 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 3.0. 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.

Table 3-4. Verified Gross Savings by Measure

Measure	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Realization Rate
Kit 1 Showerhead	11.61	6.77	0.58
Kit 2 Showerhead	11.61	6.98	0.60
Bath Aerator	0.35	0.46	1.31
Kitchen Aerator	2.83	3.54	1.25

Source: Navigant analysis

The primary reason for the varying realization rates is the difference in the ISR rates that Navigant and Nicor Gas used, as explained above.

The showerhead realization rate was also lowered because Nicor Gas used a base gallons per minute (GPM_{base}) value of 2.67 gpm (the GPM_{base} for direct installed showerheads) instead of the Illinois TRM value of 2.35 gpm for non-direct installed showerheads (the GPM_{base} value for this program type). This resulted in the ex ante gross savings for this measure being lower than the verified gross savings. The algorithm and assumptions for this measure are shown below.

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

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”; 2.35
- GPM_{low}: Average flow rate, in gallons per minute, of the low-flow faucet aerator “as-used”; 1.5
- L_{base}: Average baseline length of faucet use per capita for all faucets in minutes; 7.8
- L_{low}: Average retrofit length of faucet use per capita for all faucets in minutes; 7.8
- Household: Average number of people per household; 2.56
- SPCD: Showers Per Capita Per Day; 0.6

⁹ Ibid.

- SPH: Showerheads Per Household; 1.79
- EPG_{gas}: Energy per gallon of hot water supplied by gas; 0.00501
- ISR: In-Service Rate; 0.65 for Kit 1, 0.67 for Kit 2

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	138,153	102,409	0.74
Kit 2	867,927	597,431	0.69
TOTAL	1,006,079	699,839	0.70

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 lower than 1.00 at the kit and program level. The large difference between the ex ante gross savings and the verified gross savings occurred because Nicor Gas used ISR values from the GPY2 Nicor Gas Elementary Energy Education evaluation and because Nicor Gas used an incorrect base gallons per minute value to determine showerhead savings. The resulting total program verified gross savings is 699,839 therms as shown in the following table.

Table 3-6. GPY4 Verified Gross Impact Savings Estimates

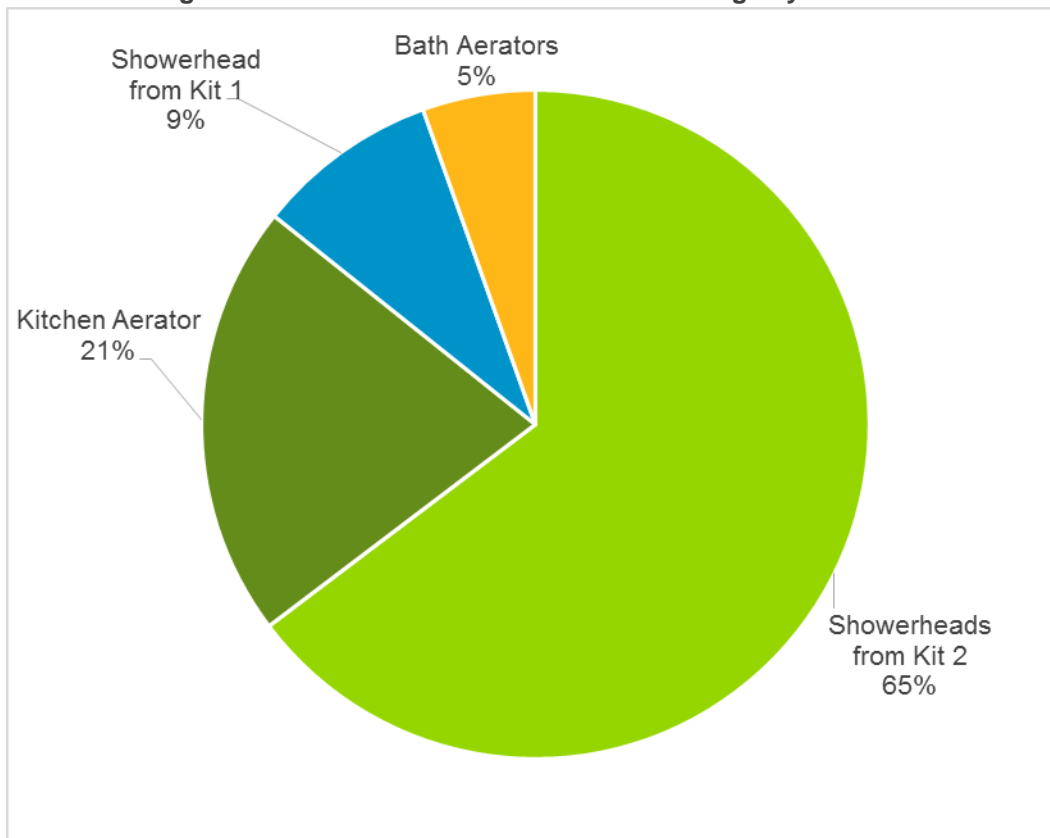
	Gross Energy Savings (Therms)
Showerhead from Kit 1	
Ex Ante GPY3 Gross Savings	105,917
Verified Gross Realization Rate	0.58 ‡
Verified Gross Savings	61,748
Showerheads from Kit 2	
Ex Ante GPY3 Gross Savings	753,500
Verified Gross Realization Rate	0.60 ‡
Verified Gross Savings	452,800
Bath Aerator	
Ex Ante GPY3 Gross Savings	29,145
Verified Gross Realization Rate	1.31 ‡
Verified Gross Savings	38,252
Kitchen Aerator	
Ex Ante GPY3 Gross Savings	117,631
Verified Gross Realization Rate	1.25 ‡
Verified Gross Savings	147,039
Total Ex Ante Gross Savings	1,006,079
Verified Gross Realization Rate	0.70 ‡
Total Verified Gross Savings	699,839

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 GPY4, 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 net savings.

Table 4-1. GPY3 Verified Net Impact Savings Estimates

	Energy Savings (Therms)
Verified Gross Savings	699,839
Net-to-Gross Ratio	0.84†
Verified Net Savings	587,865

Source: Utility tracking data and Navigant analysis.

† Deemed value. Source: http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor Gas NTG Results and Application GPY1-3.pdf

5. PROCESS EVALUATION

The GPY4 process evaluation effort consisted of a review of the program materials and an interview with the program manager. The program manager interview discussed any implemented or planned changes to the program that could affect program satisfaction, participation, savings, or costs.

5.1 Program Manager Interview and Program Changes

The program manager interview revealed that no changes were made to the program implementation process in GPY4 compared to GPY3. The GPY3 suggestions for program improvement were presented in the Nicor Gas energySMART Energy Saving Kits Program In-Service Rate and Process Analysis Memo Dated July 2, 2015 and included one recommended change to the program process (allowing participants to request either one or two bathroom faucet aerators) that Nicor Gas declined to implement, citing the cost of allowing for additional kit customization. In the GPY3 evaluation report, Navigant made recommendations to improve Nicor Gas' internal verification survey, although it is likely that there was not enough time between the GPY3 evaluation report and the GPY4 evaluation for Nicor Gas to implement the changes.

Program participation decreased compared to the previous year from 110,458 kits to 41,583 kits. According to the program manager, because GPY3 was the first year of the program and because it was heavily promoted then, the pool of eligible participants was at the highest level. Although the program is open to all Nicor Gas residential customers, there is a subset of customers who want to request a kit and are willing to install the measures contained in the kit. And because each Nicor Gas residential customer is allowed to request only one kit, as each program year passes, the eligible market gets smaller due to previous participation.

According to the program manager, the three-year goal for GPY4-6 is 60,000 kits distributed. Because of the high participation in GPY3, Nicor Gas conducted a more limited promotion of the program in GPY4. The GPY4 marketing effort included advertisements in Chicago Magazine and Naperville Magazine, emails, bill inserts, and a post card mailing. The marketing materials used consistent branding and eye-catching graphics and statistics to promote the Energy Saving Kits. It's possible that the marketing effort allowed the program to reach customers who were unaware of the program during GPY3, despite the decrease in participation.

5.2 Program QA/QC Procedures

The energySMART Energy Saving Kits QA/QC procedures are detailed in two documents provided to the evaluation team in September of 2015: AM Conservation – Product Quality Control Measures and AM Conservation Group Kit Quality Assurance. The QA/QC procedures are primarily the responsibility of the company who provides the Kits to Nicor Gas, AM Conservation Group, Inc. (AMCG).

The documentation provided by AMCG describes multiple layers of quality assurance, including supervisor oversight during the assembly process, random inspections of completed kits by the warehouse manager, and random inspections by the project manager. While having multiple layers of random quality assurance inspections is necessary to ensure that the materials are correctly packaged and assembled, the program QA materials do not explain how many random inspections are completed.

While it is possible that the number of random inspections performed is adequate to ensure that the kits are properly packaged and assembled, the number of inspections performed and the results should be reported in the quality assurance documentation. It was also not clear from the documentation whether the quality assurance inspection results were presented to Nicor Gas.

AMCG also provided documentation related to their product quality control inspections. The documentation detailed several requirements for the measures that are included in the kits, including manufacturing in an ISO 9001 certified factory and products that are manufactured to WaterSense standards. AMCG also detailed the process used to inspect the measures that are included in the kits. This includes a visual inspection for damage on the product packaging and a random inspection of 1% of all items. If any issues are revealed during these first inspections, the company will perform inspections on an additional 5% of those items. If the second set of inspections reveals a persistent issue, AMCG will return the defective measures to the manufacturer. The quality control documentation also includes destructive and non-destructive testing conducted by AMCG. It is not clear from the documentation how often or why these tests are performed or how and when results are reported, or if the results of the quality control inspections are presented to Nicor Gas as part of a regular report.

5.3 Program Improvement

Because the GPY3 Energy Saving Kit Evaluation Report contained a review of the program processes and recommendation for program improvements, Navigant does not have any additional recommendations for improvements. Because there were no changes made to the program process or the measures included in the program, the participant satisfaction is expected to remain consistent with the previous evaluation efforts. However, Navigant recommends that Nicor Gas continue to implement the recommendation included in the GPY3 Evaluation Report to make changes to the internal data collection email survey to collect information on the quantity of each measure installed to accurately estimate the savings to partial kit installations.

6. FINDINGS AND RECOMMENDATIONS

This section summarizes the key impact findings and recommendations.

Tracking System Review

Finding 1. The base gallons per minute (GPM_base) input that Nicor Gas used in the showerhead energy savings algorithm was the value prescribed by the Illinois TRM Version 3.0 for *direct installed* units, 2.67 gpm. The Illinois TRM shows the correct value for a non-direct install program as 2.35 gpm. This lowered the measure level savings for showerheads by over 230,000 therms and consequentially resulted in a lower realization rate.

Recommendation 1. To capture the most accurate measure savings, use the base gallons per minute for the correct program type, "other" (non-direct install), from the Illinois TRM.

In Service Rates

Finding 2. Navigant used the ISRs calculated and reported in as part of the GPY4 program evaluation; however, Nicor Gas used ISRs from the GPY2 Nicor Gas Elementary Energy Education evaluation. This discrepancy resulted in lower overall verified gross kit savings by over 110,000 therms, and therefore a lower realization rates for each kit.

Recommendation 2. 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.

Participation Rates

Finding 3. The program achieved more than two-thirds of its three-year goal (60,000 kits) in its first year, leading Nicor Gas to intentionally decrease program marketing the following year. Program participation decreased in GPY4 compared to GPY3, from 110,458 kits to 41,583 kits. This is likely due to the intentionally limited marketing conducted in GPY4.

QA/QC Procedures

Finding 4. The contracting firm who provides the Energy Savings Kits to Nicor Gas appears to have adequate QA/QC procedures in place to ensure that the measures included in the Kits are high quality, and that each Kit is properly assembled and packaged. The QA/QC documentation lacks a few specific details however, including the number of Kits randomly inspected during each round of inspections, and why or how often the quality control testing is performed.

Recommendation 3. Update the QA/QC documentation to include the number of Kits randomly inspected and the frequency of and reason for quality control testing to be performed as well as add a process for reporting test results. Also, the results of the QA/QC inspections and tests should be presented to Nicor Gas in regular reports, if they are not already.

APPENDIX A.

To: Jim Jerozal, John Madziarczyk, Steve Grzenia, Bridgid Lutz, Nicor Gas; Scott Dimetrosky, Apex Analytics; Ted Weaver, First Tracks Consulting; Jennifer Hinman Morris, David Brightwell, ICC Staff

From: Katherine Wolf, Crystal Berry, Navigant

CC: Randy Gunn, Charley Budd, Laura Agapay-Read, Kevin Grabner, Navigant

Date: August 28, 2015

Re: Nicor Gas energySMART Energy Saving Kits Program In Service Rate and Process Analysis

This memo presents Navigant's in service rate and process research findings drawn from participant responses gathered as part of PY4 net-to-gross research conducted on the Nicor Gas energySMART Energy Saving Kits Program ("Kits Program"). The research was conducted on PY3 Kits Program participants in Fall 2014. This memo provides early feedback on the in service rate ("ISR") and process findings to inform PY5 planning. A copy of this memo will be included in the Appendix of the PY4 Kits Program evaluation report when it is completed at the end of 2015. Table 1 presents a summary of the findings and recommendations resulting from the evaluation team's fall 2014 research.

Table 1. Summary of Findings and Recommendations

Findings		Recommendations
1	Email survey respondents appear to use the status of their showerhead installations as a proxy for the entire kit installation status when completing the email survey.	→ Implement the survey changes suggested in the PY3 evaluation report to collect information on the quantity of each measure installed to accurately estimate savings of partial kit installations.
2	Eight percent of participating households had only one bathroom faucet, which may negatively affect the bathroom faucet aerator installation rate.	→ Consider either 1) allowing participants the option of receiving one or two bathroom faucet aerators in the same way that they can currently receive one or two showerheads or 2) revising the planned savings from bathroom faucet aerators downward to account for the eight percent of aerators that will be sent to homes where it is not possible for them to be installed.
3	The most common reason for removing faucet aerators was remodeling or replacing the faucet on which the unit had been installed.	→ None.
4	The ISRs of participants who completed the email survey are not significantly different from the ISRs of participants who did not complete the email survey.	→ After the email survey is revised to collect information of the quantity of each measure installed at the beginning of the survey, use the email survey to calculate ISRs. Until then, use the installation rates calculated from Navigant’s telephone survey (weighted by strata and measure savings).

Source: Navigant research

energySMART Energy Saving Kits Program

The Kits Program provides Nicor Gas customers with no-cost energy and water saving showerheads and bathroom and kitchen faucet aerators. Participants must request the kits from Nicor Gas; they are then mailed the measures along with plumbers tape, installation instructions, and literature about other Nicor Gas energy efficiency programs. After program participants receive their energySMART Kits, Nicor Gas sends an email verification survey.

When participants signed up for the kits, they were given a choice of either one or two showerheads depending on their needs. Navigant labeled these “Kit 1” and “Kit 2”:

- Kit 1: containing one showerhead, two bathroom aerators, and one kitchen aerator
- Kit 2: containing two showerheads, two bathroom aerators, and one kitchen aerator

As part of the fall 2014 Kits Program net-to-gross research, participants in the PY3 program were asked through computer assisted telephone interviews (CATI) to answer questions related to in service rate of the kits components, satisfaction with program elements, and program awareness. The in service rate refers to the ratio of the quantity of energy saving components installed minus those later removed to the total number of components sent out. The ISR is a key variable in the algorithm to estimate program level savings.

Data Collection

Table 2 and Table 3 below summarize the primary data sources used to estimate the ISR for the kit components and used for the process evaluation.

Table 2. Strata Definition for Kits Program PY4 Research

Strata	Subject	Population	Share of Total
1	GPY3 Kits Program Participants who received and completed the Program Email Survey	11,610	10.4%
2	GPY3 Kits Program Participants who received but did not complete the Program Email Survey	32,823	30.4%
3	GPY3 Kits Program Participants who did not receive the Program Email Survey	66,025	59.2%
Total	GPY3 Kits Program Participants	110,458	

Source: Navigant Consulting Analysis

Table 3. Primary Data Sources for Kits Program PY4 Research

Strata	Method	Target Completes	Actual Completes	Completed	Confidence Precision
1	Telephone Survey	75	76	December 17, 2014	90/10
2	Telephone Survey	75	38	December 17, 2014	90/14
3	Telephone Survey		37	December 17, 2014	90/14

Source: Navigant Consulting Analysis

Telephone Survey In Service Rate Methodology and Results

The evaluation team included questions in the fall 2014 telephone survey to collect the data needed to estimate in service rates for each component sent out in Kit 1 and Kit 2. The Kits Program participants were asked a series of questions to determine if the participant had installed the measures provided in the kit and if any of the measures had been uninstalled after the initial installation. Participants who stated that they “did not know” if they installed a particular component were removed from the calculation for that particular component, but not from the other component calculations. The measure level ISR results were weighted by strata, and the program ISR was weighted by strata, measure savings, and the percentage of participants that received the type of kit (Kit 1 or Kit 2).

The ISR was calculated using the following algorithm:

$$\text{In Service Rate} = \frac{\text{Units Installed} - \text{Units Removed}}{\text{Units Provided to Participants}}$$

The in service rates we estimated for the kit components are presented in Table 4.

Table 4. Kits Program and Component In Service Rates

Kit Component Measure	Respondents	ISR from PY4 Telephone Survey*	Measure Savings (kWh)	Percentage of Kits
Showerhead (Kit 1)	40	0.65	10.41	14%
Showerhead (Kit 2)	111	0.67	20.82	86%
Bathroom Aerator (Kits 1 & 2)	136	0.63	2.3	100%
Kitchen Aerator (Kits 1 & 2)	125	0.60	7.53	100%
Total Program	151	0.65†		

Source: Participant Telephone Surveys and Navigant Analysis

* Weighted by strata.

† Weighted by measures savings, and percentage of kits.

The measure level ISR numbers presented in Table 4 for Kit 2 showerhead and bathroom faucet aerators are based on the two units that are included in each kit. The 0.67 ISR for Kit 2 showerheads applies to the 222 showerheads included in the 111 kits. To calculate the total program ISR, savings were weighted according to the total savings for each measure in the kit. The savings for a bathroom aerator is 1.15 kWh, and the savings used to weight the bathroom aerators was therefore 2.3 kWh. The savings for a showerhead is 10.41 kWh. The showerheads were also weighted by the percentage of kits that received either Kit 1 (one showerhead) or Kit 2 (two showerheads) to determine the total program ISR rate.

Table 5 presents the percentage of units that were never installed and the percentage of units that were installed but later removed, by component. As can be seen, bathroom faucet aerators had the lowest installation rates but also the lowest removal rates. The installation rate for bathroom faucet aerators may be affected by the fact that 8 percent of the survey respondents had only one bathroom sink, but all kits contained two bathroom aerators. Showerheads had the highest installation rates, and kitchen faucet aerators had the highest removal rates.

Table 5. Kits Program Component Initial Installations and Removals

Kit Component Measure	% of Units Not Installed*	% of Units Removed*	n
Showerhead (Kit 1)	34%	1%	40
Showerhead (Kit 2)	28%	5%	111
Bathroom Aerator (Kits 1 & 2)	36%	1%	136
Kitchen Aerator (Kits 1 & 2)	32%	8%	125

Source: Participant Telephone Surveys and Navigant Analysis

* Weighted by strata.

Comparison of the Telephone Survey with the Nicor Gas Email Survey

To determine whether the ISR of email survey respondents is representative of the total program participant population, Navigant compared telephone survey ISRs of email survey respondents to the telephone survey ISRs of participants who did not receive or respond to the email survey. After program participants receive their energySMART Kits, Nicor Gas sends an email verification survey to determine if the kit components have *all* been installed, if *some* of the kit components have been installed (and which have been installed), or if the components have *not yet been installed* by the participant. Navigant separated the telephone survey respondents into three groups: the telephone survey participants who had received and responded to the Nicor Gas email survey (Strata 1), those who had received but did not respond to the email survey (Strata 2), and those who had not received the email survey (Strata 3). The resulting telephone research ISR per measure for each group is shown in Table 6 below. The difference between Kit 2 showerhead installations for email respondents and non-email respondents is not statistically significant.

Table 6. Telephone Survey In Service Rate for Each Participant Strata

Kit Component Measure	Strata 1: Email Survey Respondents		Strata 2: Email Survey Non-Respondents		Strata 3: Email Survey Non-Recipients	
	Telephone Survey ISR	n	Telephone Survey ISR	N	Telephone Survey ISR	N
Showerhead (Kit 1)	0.80	25	0.75	8	0.57	7
Showerhead (Kit 2)	0.75	51	0.63	30	0.67	30
Bathroom Aerator (Kits 1 & 2)	0.58	71	0.61	37	0.64	28
Kitchen Aerator (Kits 1 & 2)	0.56	63	0.58	33	0.62	29

Source: Participant telephone survey data and Navigant analysis

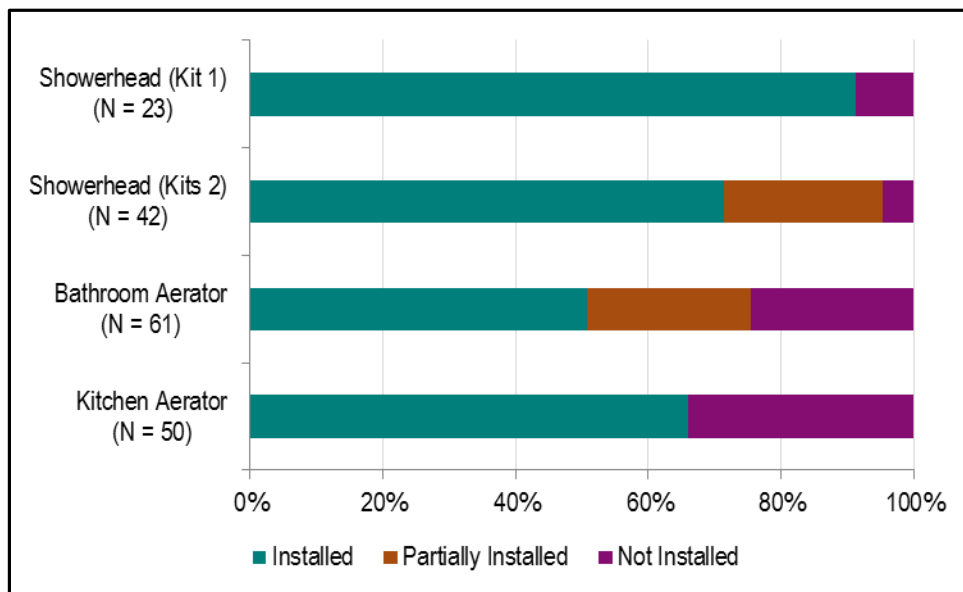
Navigant also compared email survey responses with telephone survey responses among participants who completed both surveys (Strata 1 respondents). For this comparison, the analysis only included whether the telephone survey verified if the unit was initially installed, and did not take into account if the unit was later removed. This was done because the email survey did not collect information on removals and it is therefore possible that the participants may have removed the units after completing the email survey, but before the telephone survey that occurred some months later. The telephone survey identified a few participants who installed the kit components after taking the email survey. There were two email survey respondents who had not installed the kit components when they completed the email survey but reported that they had installed the components during the phone survey. Three (n = 8) of the email survey respondents who classified themselves as “delayed installation” in the email survey reported that they had installed at least some of the kit components during the phone survey.

Figure 1 presents the telephone survey results, by kit component, for participants who responded “yes” to the email survey when asked if they had installed all of the kit components. As can be seen, the consistency of the phone survey and email survey responses varies by measure, with showerheads being the most consistent and aerators being less consistent. Among the 23 email survey respondents who received one showerhead and reported installing it in the email survey, 91% reported installing it in the telephone survey. In contrast, among the 61 email respondents who reported installing bathroom

aerators in the email survey, only 51% reported installing both of the aerators in the telephone survey. For this analysis, Navigant concludes that the telephone survey results are more accurate than the email survey results because the telephone survey verifies each measure individually, instead of asking about the kit in its entirety as the email survey did. Based on the results presented in the following figure, it appears that survey respondents may be using the installation status of their showerhead(s) as a proxy for the installation status of the entire kit.

In the PY3 energySMART Kits evaluation report, the evaluation team suggests modifications to the email survey so that it ask installation questions (including quantity installed) for each measure on the first page of the web-survey.

Figure 1. Telephone Survey Results for “Installed” Email Survey Respondents

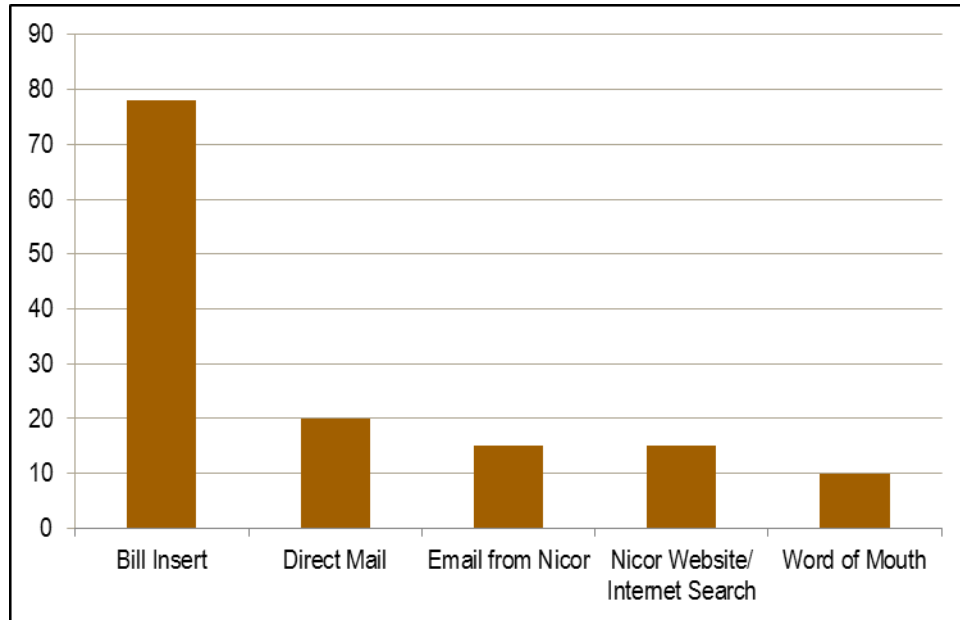


Source: Participant telephone survey data and Navigant analysis

Process Analysis

The following sections discuss the process results obtained from the fall 2014 telephone interviews with 151 energySMART Energy Saving Kit recipients. Figure 2 provides the channels for Kits Program awareness – bill inserts were the dominant source of awareness.

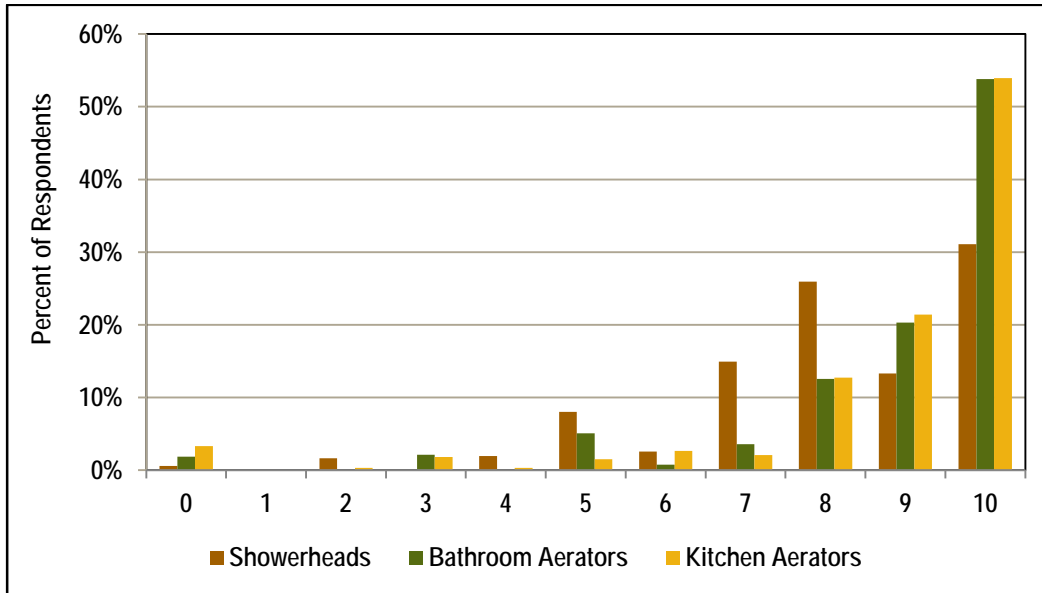
Figure 2. Program Awareness Channels (n = 138)



Source: Evaluation Team analysis.

Nicor Gas customers were asked a series of questions to determine their level of satisfaction with the individual kit components. The survey respondents were asked to rate their level of satisfaction on a scale from zero to ten, where zero means “very dissatisfied” and ten means “very satisfied”. Figure 3 presents the distribution of satisfaction levels for the various kit components, weighted by strata. As can be seen, the majority of customers were either satisfied or very satisfied with the measures that they received in their energySMART Kit. All participants were asked the satisfaction questions, including those who removed the units.

Figure 3. energySMART Kit Component Satisfaction Levels* (n = 137)



Source: Evaluation Team analysis.
*Weighted by strata.

Table 7 presents the average satisfaction level, the number of participants who rated the measure at a three or less (“dissatisfied” participants), and the number of participant who rated each component at an eight or higher (“satisfied” participants). As can be seen in the following table, the average satisfaction level was similar for all components, but the kitchen aerators had the highest number of participants who rated their satisfaction level at three or less. When asked why they gave the kitchen faucet aerators a dissatisfied score, the most common complaint was that the kitchen faucet aerator did not fit with their existing faucet (eight responses).

Table 7. Participant Satisfaction

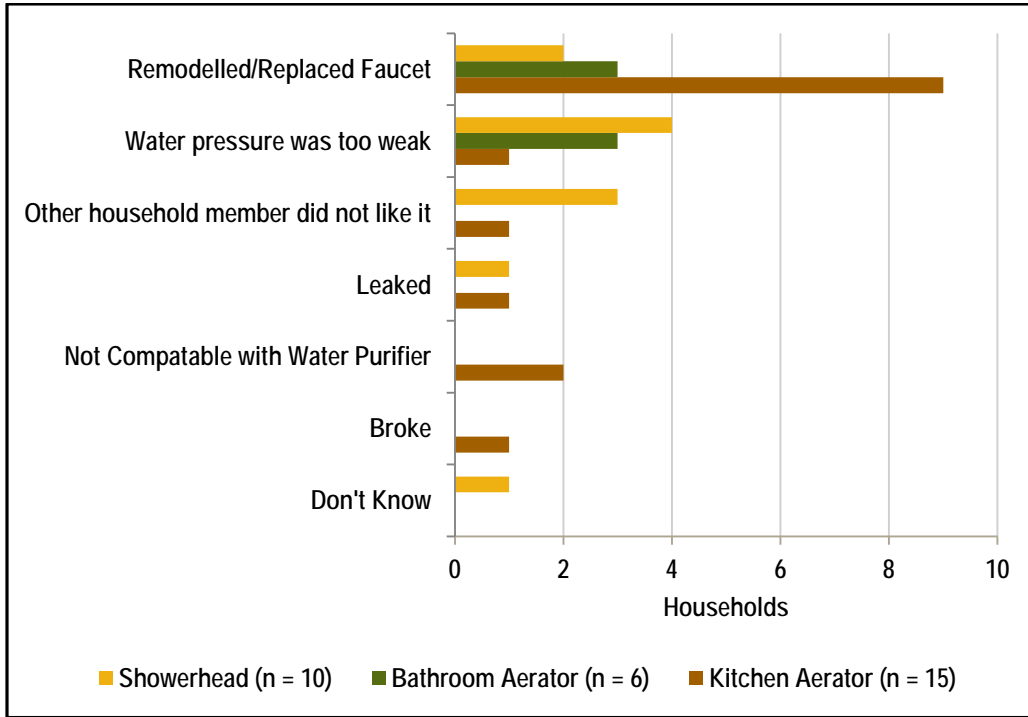
Component Type	Average Satisfaction*	Total Number Dissatisfied (<= 3)	Total Number Highly Satisfied (> 7)	N
Showerhead	8.0	3	95	137
Bathroom Aerator	8.9	6	93	112
Kitchen Aerator	8.9	11	85	104

Source: Navigant analysis
* Weighted by strata.

Participants who removed their measures were asked why they did so. As can be seen in Table 5, the measure with the highest number of removals was kitchen faucet aerators, but, as can be seen in Figure 4 below, the majority of these were removed because the household remodeled or replaced their kitchen faucet. This may explain why kitchen faucet aerators had high satisfaction ratings but also had high rates of removal. Also, half of the removed bathroom faucet aerators were removed because of a bathroom

remodel or a faucet replacement. The most common reason for removing a showerhead was not enough water pressure.

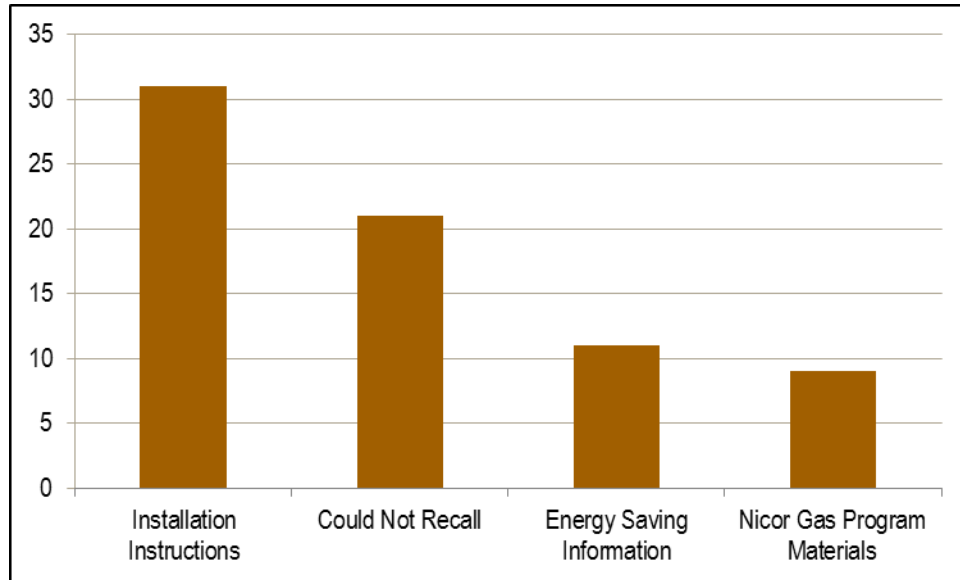
Figure 4. Reasons for Measure Removal



Source: Evaluation Team analysis.

The energySMART Kit recipients were asked to recall any materials that they received along with their Kit. Sixty-five (n = 123) of the Kit recipients remembered receiving materials. Those who did report that they recalled receiving materials with their Kit were asked what type of materials they received. While twenty-one (n = 65) of the respondents could not recall the type of materials they received, the most commonly recalled materials were component installation instructions, followed by information about energy conservation, and finally information about Nicor Gas energy efficiency programs.

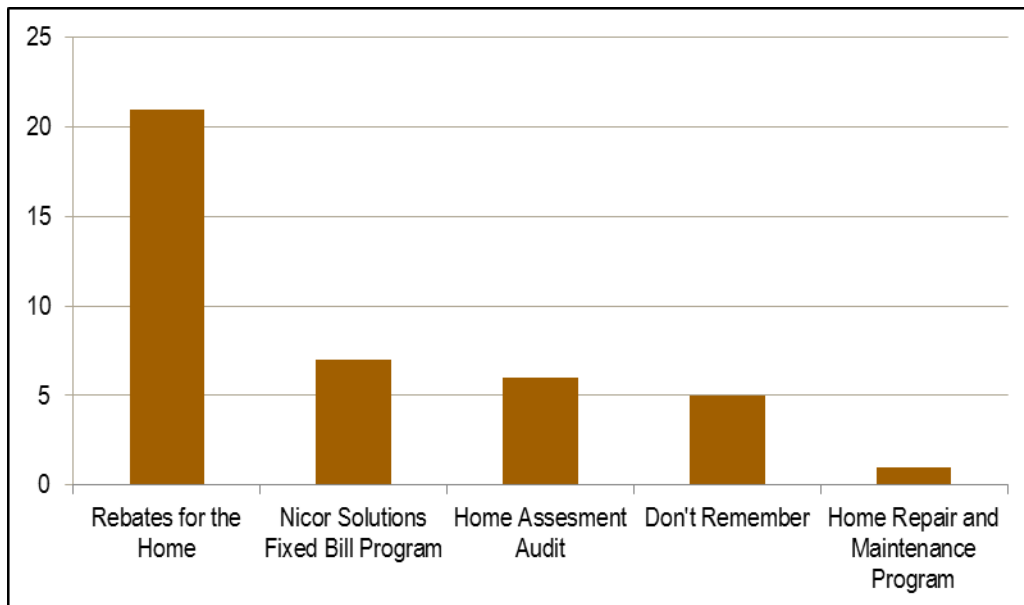
Figure 5. Materials Included in Kit (n = 65)



Source: Evaluation Team analysis.

When the energySMART participants were asked if they specifically remembered seeing any promotional materials describing other Nicor Gas efficiency programs, twenty-two (n = 151) of the Kit recipients replied in the affirmative. When the energySMART participants were asked if they are aware of any other Nicor Gas programs, forty (n = 151) stated that they were aware of other programs. Figure 6 presents the other Nicor Gas programs of which Kit recipients were aware.

Figure 6. Awareness of Other Nicor Gas Programs (n = 40)



Source: Evaluation Team analysis.

Thirteen of the energySMART Kit recipients (n = 151) stated that they had participated in other Nicor Gas programs. The vast majority of these respondents (ten participants, n = 13) of Kit recipients also received a rebate for a high efficiency furnace from Nicor Gas. One participant received a Home Energy Assessment (and two participants did not remember what they received). Three participants reported that they participated in the other Nicor Gas program after receiving their energySMART Kit. Of these three, one participant reported that the energySMART Kit influenced their decision to participate in the furnace rebate program. While the evaluation team found evidence of cross participation between the energySMART Kits program and other Nicor Gas energy efficiency programs, the evaluation team was unable to find evidence that participation in the energySMART Kits program leads to increased participation in other programs.