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Elementary Energy Education
GPY4 Evaluation Report

Final

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

Presented to

Nicor Gas Company

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E. Executive Summary

This report presents a summary of the findings and recommendations from the impact and process evaluation of the joint Nicor Gas, Peoples Gas, and North Shore Gas Plan Year 4 and Commonwealth Edison Company (ComEd) Plan Year 7, (GPY4/EPY7) [1] Elementary Energy Education (EEE) program. The EEE program's primary focus is to produce natural gas and electricity savings in the residential sector by motivating fifth grade students and their families to reduce energy consumption from water heating and lighting in their home. Additionally, the EEE program aims to increase participation in other Nicor Gas programs via cross-marketing and increased customer awareness of energy efficiency issues. The program underwent several changes in GPY4/EPY7. This is the first year that Peoples Gas and North Shore Gas began offering the program jointly with ComEd and Nicor Gas. The program had a new implementation contractor, Resource Action Programs (RAP); was re-branded as "SUPER SAVERS"; and implemented a "teacher-lead instruction" program model. Due to budget revisions, the program adjusted its participation target from 30,500 kits for GPY3/EPY6 to 9,550 kits for GPY4/EPY7.

E.1. Program Savings

This program is offered to schools served by Nicor Gas and an electricity delivery provider other than ComEd (Nicor Gas only) and to schools served by both Nicor Gas and ComEd ("Joint" refers to the utilities' joint service territory). The program is also offered to schools served jointly by Peoples Gas and ComEd and North Shore Gas and ComEd, however savings from those kits are not included in this report. Table E-1 and Table E-2 summarize the verified natural gas savings from the EEE Program in the Nicor Gas service territory. Verified gross savings were calculated using the Illinois TRM Version 3.0[2] algorithms and parameters.

Table E-1. GPY4/EPY7 Energy Savings

Metric	Energy Savings (Therms)	Energy Savings (kWh)	Demand Savings (kW)	Peak Demand Savings (kW)
Ex Ante Gross Savings	123,533	N/A	N/A	N/A
Verified Gross Realization Rate	0.94‡	N/A	N/A	N/A
Verified Gross Savings	115,801	1,219,997	3,879	127.88
Net to Gross Ratio	0.79†	0.76†	0.76†	0.76†
Verified Net Savings	91,483	927,198	2,948	97.19

Source: Utility tracking data and Navigant analysis.
†A deemed value
‡ Based on evaluation findings

The main source of discrepancy between the ex-ante and verified savings is that the ex-ante calculations assumed the proportion of water heating supplied by natural gas heating was equal to 100 percent, whereas the proportion of households with natural gas water heating as reported by the participants is 68 percent. There is an additional discrepancy due to the difference in the custom inputs used in the per unit savings calculations; Navigant calculated these custom inputs (e.g.,

[1] The GPY4/EPY7 program year began June 1, 2014 and ended May 31, 2015.
[2] www.ilsag.info/technical-reference-manual.html

household size, in-service rate (ISR), single- vs multi-family housing type) using the data from the student survey form. Nicor Gas used the GPY1 evaluation for these custom inputs. The ex-ante savings did not include savings from the shower timer measure. If the shower timer verified savings were not included, the realization rate would be 0.79.

E.2. Program Savings by Measure Type

Table E-2 summarizes the natural gas and electric savings from the Nicor Gas only and Joint kits by measure type.

Table E-2. GPY4/EPY7 Energy Savings

Savings Type	Measure	Ex-Ante Gross Savings	Verified Gross RR	Verified Gross Savings	NTGR	Verified Net Savings
Therms	Low Flow Showerhead	66,556	0.90‡	60,230	0.79†	47,582
	Kitchen Faucet Aerators	31,397	0.87‡	27,326	0.79†	21,588
	Bathroom Faucet Aerator	7,779	0.71‡	5,508	0.79†	4,351
	Water Heater Set-Back	17,801	0.24‡	4,354	0.79†	3,440
	Shower Timer	NA	NA	18,382	0.79†	14,522
	Total	**123,533**	**0.94‡**	**115,801**		**91,483**
kWh	Low Flow Showerhead	N/A	N/A	452,917	0.76†	344,217
	Kitchen Faucet Aerators	N/A	N/A	187,197	0.76†	142,270
	Bathroom Faucet Aerator	N/A	N/A	37,858	0.76†	28,772
	Water Heater Set-Back	N/A	N/A	11,562	0.76†	8,787
	Shower Timer	NA	NA	101,219	0.76†	76,926
	CFLs	N/A	N/A	429,245	0.76†	326,227
	Total	**-**		**1,219,997**		**927,198**
Peak kW	Low Flow Showerhead	N/A	N/A	25.48	0.76†	19.36
	Kitchen Faucet Aerators	N/A	N/A	23.66	0.76†	17.98
	Bathroom Faucet Aerator	N/A	N/A	26.50	0.76†	20.14
	Water Heater Set-Back	N/A	N/A	1.32	0.76†	1.00
	Shower Timer	NA	NA	5.70	0.76†	4.33
	CFLs	N/A	N/A	45.23	0.76†	34.37
	Total	-		**127.88**		**97.19**

Source: Utility tracking data and Navigant analysis.
† A deemed value.
‡ Based on evaluation findings

E.3. Impact Estimate Parameters

In the course of our GPY4/EPY7 research, the evaluation team used a variety of parameters in its impact calculations. The evaluation team sourced the Illinois TRM Version 3.0[3] for all deemed parameters for gross savings algorithms and sourced the student survey form for the following TRM-allowed custom parameters: installation rates, percent with gas water heating, housing type,

[3] www.ilsag.info/technical-reference-manual.html

household size, number of showerheads per household, and water heater temperature settings. The net-to-gross (NTG) value for natural gas savings was deemed in this program year, based on the Illinois Stakeholder Advisory Group's (IL SAG) consensus process and from previous evaluation research. The evaluation included a participant survey to estimate NTG values that can be used for deeming in the future. Those values are presented in the following table.

Table E-3. Impact Estimate Parameters for Future Use

Parameter	Description	Value	Data Source
NTGR	Showerhead	0.82	Participant Survey
	Bathroom Faucet Aerator	0.92	
	Kitchen Faucet Aerator	0.89	

Source: Evaluation Analysis.

E.4. Program Volumetric Detail

The EEE program distributed 9,591 kits in GPY4/EPY7 as shown in Table E-4.

Table E-4. GPY4/EPY7 Primary Participation Detail

Volumetric Parameter	Nicor Gas Total Participants or Measures Installed
Number of Total Kits Distributed	9,591
Number of Measures/Kit*	9
Number of Total Measures Distributed	83,769

Source: Utility tracking data and Navigant analysis.
*This includes instructions for a water heater setback which resulted in energy savings.

E.5. Results Summary

The following table summarizes the key metrics from GPY4/EPY7.

Table E-5. GPY4/EPY7 Results Summary

Participation	Units	GPY4/EPY7
Verified Net Savings	Therm	91,483
Verified Gross Savings	Therm	115,801
Program Realization Rate‡	%	0.94
Program NTG Ratio*	#	0.79
Showerheads Distributed	#	9,591
Bathroom Faucet Aerators Distributed	#	19,182
Kitchen Aerators Distributed	#	9,591
Water Heater Set-Back Instructions	#	9,591
Shower Timers	#	9,591
CFLs Distributed	#	26,223
Total Kits Distributed	#	9,591

Source: Utility tracking data and Navigant analysis.
*A deemed value
‡ Based on evaluation findings

E.5. Conclusions and Recommendations

The following summarizes key program findings and recommendations.[4] The program performed well in GPY4/EPY7, exceeding key participation targets for the year.

Program Participation

Finding 1. The program distributed 9,591 kits in the Nicor Gas service area, slightly exceeding the original participation targets of 9,550 kits.

Verified Gross Program Savings and Realization Rate

Finding 3. Navigant's review of the ex-ante calculations for the GPY4 Elementary Energy Education Program resulted in verified gross energy savings of 115,801 therms, resulting in a realization rate of 0.94

Finding 4. Navigant calculated different ex-post values for custom inputs used to calculate in unit savings (calculated from the student survey form responses - including in the number of people per household and in-service rates). Nicor Gas used values from Navigant's GPY1 evaluation for the custom inputs used to calculate energy savings and assumed the proportion of gas water heating used by the participants to be 100 percent. Navigant used custom inputs as calculated by the GPY4 participant responses to the parent-guardian survey form. A comparison of the custom inputs is provided in Section 3.3.

[4]The Executive Summary presents the most important of the Section 6 Findings and Recommendations. Findings and Recommendations in the Executive Summary are numbered to match Section 6 for consistent reference to individual findings and recommendations. Therefore, gaps in numbering may occur in the Executive Summary.

Recommendation 1. The program should use the parent-guardian survey data in order to calculate custom inputs where allowed by the TRM. The differences in the custom inputs as described in Finding 3, resulted in a 79% realization rate, a decrease of 26,114 therms.

Finding 5. The program did not calculate savings separately for single-family and multi-family housing types. This understates the gross savings for the program.

Recommendation 2. The program should calculate savings for CFLs, aerators, and showerheads for single family homes separately from multi-family homes to increase the degree of accuracy of its ex-ante savings estimates. Generally, the multi-family inputs result in higher savings numbers.

Finding 6. The ex-ante savings estimate for the water heater setback measure was 1.86 therms, which assumes a setback of 15 degrees and an in-service rate of approximately 30 percent. However, the temperature differential reported by participants in the program's student survey form was 7.5 degrees and the in-service rate was 20 percent, resulting in lower savings and a realization rate of 24 percent for this measure.

Recommendation 3. The implementer should update savings estimates for the water heater setback measure using the pre- and post-temperature inputs (Tpre and Tpost) and in-service rate from the program's student survey form. This difference in pre- and post-temperature inputs resulted in a realization rate of 0.24, a difference of 1,226 therms.

Finding 7. The EEE program does not currently claim savings from programmable thermostat measures. Approximately 2.2 percent of participants reported programming their programmable thermostat based on the educational materials provided in the kits. Within the written program materials, there are directions to set the thermostat to 78F in warm weather and 68F in cool weather. The TRM energy savings methodology is specified for programmable thermostats which were previously set to override mode.

Recommendation 4. In the future, if the program chooses to claim savings for this measure, it should include instructions on how to properly use a programmable thermostat (that is, how to use four programmed settings for daytime, night time, summer, and winter), in order to qualify under the TRM. To develop these instructions, the implementer could use EPA's EnergyStar program or other resources. The EnergyStar program provides information for consumers on how to program and which settings will save the most energy. EnergyStar has programmable thermostat guidelines (and video) on how to properly set and use a programmable thermostat. Additionally, many thermostat manufacturers (Honeywell, Lux, etc.) and home improvement stores (Lowe's, Home Depot), provide instructions and information on how to program a thermostat. There are significant savings associated with this measure; a programmable thermostat installed in a single family home in Chicago results in savings of 62.3 therms, using the methodology from the TRM v4.0. Assuming a 2.2 percent in-service rate for this measure results in savings of 13,206 therms.

Finding 8. Navigant concludes savings from shower timers are occurring because of the measure, however the customer survey data may not provide an accurate estimation of energy savings due to the combined uncertainties of the self-reported variables in the savings algorithm.

Recommendation 5. In order to deem a savings number for this measure to include in a future version of the TRM, Navigant recommends Nicor Gas consider collecting data from a before and after metering study for the type of shower timer contained in the kit.

1. Introduction

1.1 Program Description

This report includes Navigant Consulting Inc.'s (Navigant's) findings and recommendations from the impact and process evaluation of the joint Nicor Gas, Peoples Gas, North Shore Gas Plan Year 4 and Commonwealth Edison Company (ComEd) Plan Year 7 (GPY4/EPY7) Elementary Energy Education (EEE) program.[5] In GPY4/EPY7, the EEE program was implemented by Resource Action Programs (RAP) and was branded "SUPER SAVERS." The program targeted fifth grade students in public and private schools that are customers of Nicor Gas or jointly ComEd and Nicor Gas, ComEd and Peoples Gas, and ComEd and North Shore Gas. Schools received an invitation to participate and register to schedule the interactive presentations; alternatively, schools could register on the program website to join a waiting list if the program was fully-enrolled when they registered. Schools that had participated in the GPY3/EPY6 program were also invited to participate. New to GPY4/EPY7 was the "teacher-lead instruction" program model, as opposed to the previous model that incorporated a single, contractor-led presentation. The teacher could choose to teach the curriculum over five or ten days and focus on one kit measure per day. After the lesson, students took home a kit that included water conservation measures; instruments to measure water and ambient temperature, as well as water flow rates; CFLs; and a student survey form to report details of their family's participation. Table 1-1 below details the items included in the energy efficiency take-home kit. Students and teachers were incentivized to return the student survey form with a $50 mini-grant for each class that completed and returned 80 percent of their surveys. RAP based the program's savings on the installation rate of implemented measures reported in the student survey form against the number of kits that were reported taken home.

The EEE program's primary focus is to produce natural gas and electricity savings in the residential sector by motivating students and their families to take steps through reducing energy consumption for water heating and lighting in their home; a secondary goal of the program is to reduce residential use of water. Additionally, the EEE program aims to increase participation in other Nicor Gas, ComEd, Peoples Gas, and North Shore Gas programs via cross-marketing and increased customer awareness of energy efficiency issues.

[5] This program is jointly administered with Nicor Gas, Peoples Gas and North Shore Gas. The PY7 program year began June 1, 2014 and ended May 31, 2015 which is the same time period as Gas Program Year 4 (GPY4). This report includes electric impacts only. Impacts from natural gas measures are included in separate evaluation reports.

Table 1-1. Items Included in the Take Home Kit

Items
Intellishower showerhead (1.5 gpm)
Niagara kitchen aerator (1.5 gpm)
Two Niagara bathroom aerators (1.0 gpm)
Three 13- watt CFLs (Joint kits only)
Instructions to setback water heater temperature
Shower timer
Product Installation Instruction Booklet
Super Savers Installation Video
Flow rate test bag
Digital water and ambient temperature thermometer
Scratch n. sniff mercaptan (natural gas odorant) stickers
Student survey form.
Energy Saving Tips for the Family Booklet
Nicor Gas promotional brochure
ComEd Smart Ideas® for Your Home pamphlet (Joint kits only)

1.2 Evaluation Objectives

The evaluation team identified the following key researchable questions for GPY4/EPY7:

1.2.1 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)?

1.2.2 Process Questions

1. What changes have been made to the program since GPY3/EPY6 and how have these changes affected program satisfaction, participation, savings, and costs?
2. Are the QA/QC activities adequate and unbiased (including procedures for 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 EEE Program reflects the fourth year of program operation for Nicor Gas. For this impact evaluation, gross savings were evaluated by (1) reviewing the implementer submitted work papers to assure that savings are calculated correctly and in adherence with Illinois TRM v3.0 and (2) cross-checking totals with the tracking system. The evaluation team calculated verified net savings using a NTGR from previous evaluation research and approved through the Illinois Stakeholder Advisory Group (IL SAG) consensus process.[6] Navigant conducted a limited process review that included in-depth interviews with program staff, review of program documents and operating procedures, and analysis of parent and teacher survey responses collected by RAP and Navigant.

2.1 *Overview of Data Collection Activities*

The core data collection activities used in this evaluation included in depth interviews with program staff and review of the program tracking database. Participant surveys were used to conduct net-to-gross (NTG) research to inform NTG recommendations for the future. The full set of data collection activities are shown in Table 2-1 and Table 2-2 below.

Table 2-1. Primary Data Collection Activities

What	Who	Target Completes	Completes Achieved	When	Comments
Program Tracking Database	Participants	All	All	July - September 2015	Source of information for verified gross analysis.
In Depth Interviews	Program Manager/Implementer Staff	4	4	June and September 2015	Included staff from Nicor Gas, ComEd, PG, NSG and RAP.
Participant Survey	GPY4/EPY7 Participants	258	191	May – June 2015	NTG research conducted to be considered for use in GPY6/EPY9

Source: Navigant

Table 2-2. Additional Resources

Reference Source	Author	Application	Impacts	Process
Illinois Technical Reference Manual Version 3.0	Illinois Energy Efficiency Stakeholder Advisory Group (SAG)	EEE Measure Impact Analysis	X	
Student survey form.	From RAP	Impact Analysis	X	X

Source: Navigant

[6] Illinois Stakeholder Advisory Group, ilsag.org/net

2.2 *Verified Savings Parameters*

Navigant calculated verified gross and net program impacts for six types of measures with deemed savings values: low-flow showerheads, kitchen and bathroom faucet aerators, CFLs, water heater setback, and shower timers. These measures account for all quantifiable GPY4/EPY7 gas and electric savings.

2.2.1 Verified Gross Program Savings Analysis Approach

Verified gross and net savings resulting from the GPY4/EPY7 program were calculated by multiplying the total quantity of kits by the measure level unit savings.

Unit savings are calculated using the algorithms from the Illinois TRM v3.0; unit savings are then multiplied by the quantity, which is the number of each type of measure distributed. The Illinois TRM deems most input parameters for showerheads and faucet aerators (for detailed description of engineering algorithms and inputs used, see Section 3.3).

Table 2-3 lists the deemed input parameter source that Navigant used by measure. The Illinois TRM v3.0 allows for custom values to be used for household size, in-service rate, single- vs multi-family housing type split, hot water temperature setback set point, and % domestic hot water; Navigant based these values on the student survey form data. Navigant also calculated savings for single family homes separately from multi-family homes given the different variable values defined for these groups in the TRM, including household size and showers per household.

Table 2-3. Verified Gross Savings Parameters, Source of Deemed Inputs

Measure	Deemed Input Parameter Source
Showerheads	Illinois TRM v3.0 - Section 5.4.5
Kitchen Aerators	Illinois TRM v3.0 - Section 5.4.4
Bathroom Aerators	
CFLs	Illinois TRM v3.0 - Section 5.5.1
Water Heater Temperature Setback	Illinois TRM v3.0 - Section 5.4.6
Shower Timers	Custom Calculation

Source: Navigant

2.2.2 Verified Net Program Savings Analysis Approach

Verified net energy savings were calculated by multiplying the verified gross savings estimates by a NTGR of 0.79 for natural gas measures and 0.76 for electric measures. In GPY4/EPY7, the NTGR estimates used to calculate the net verified savings were based on past evaluation research and approved through the IL SAG consensus process.[7]

Navigant conducted NTG research in GPY4/EPY7 to inform NTG recommendations for the future. The NTG research uses a self-report method where participants answer survey questions about the

[7] A deemed value from the IL SAG consensus process "Nicor Gas Consensus NTG Values; Summary of Nicor Gas NTG Approach and Consensus Values for GPY1 through GPY5" available at http://www.ilsag.info/net-to-gross-framework.html

program. The participant survey instrument asks participants about awareness of the measures identified and their inclination to pursue corrective actions for those measures absent the program. The results from the NTG research are included in the 2015 NTG memo.

2.3 Process Evaluation

The process evaluation for GPY4/EPY7 was based on interviews with program staff and the implementation contractor, analysis of parent and teacher survey responses collected by RAP, and analysis of parent and teacher survey responses collected by Navigant.

Navigant conducted interviews with the ComEd, Nicor Gas, Peoples Gas and North Shore Gas program managers as well as with the RAP implementation staff in the summer of 2015. These interviews discussed the program's energy savings and participation, as well as changes implemented in GPY4/EPY7.

3. Gross Impact Evaluation

Navigant's review of the ex-ante calculations for the Nicor Gas GPY4/EPY7 EEE program resulted in verified gross energy savings of 115,801 therms, a gross realization rate of 94 percent.

3.1 Tracking System Review

Nicor Gas' tracking system and savings documentation for GPY4/EPY7 consisted of (1) a spreadsheet containing per unit energy savings estimates and inputs used to calculates these per unit savings estimates, and (2) a spreadsheet containing the number of kits distributed (including joint ComEd-Nicor Gas kits and Nicor Gas only kits). The algorithms and inputs for unit savings calculations were contained in the energy savings spreadsheet.

Key findings include:

1. Overall, Navigant received all applicable data needed in order to conduct the gross impact analysis.
2. Nicor Gas assumed the proportion of water heating supplied by natural gas to be 100 percent; the proportion of natural gas water heating reported by participants was 68 percent.
3. Nicor Gas assumed conservative values for many of the measure level ISRs.
4. Nicor Gas did not calculate savings for single-family homes separately from multi-family homes. This resulted in differences between ex-ante gross savings and verified gross savings.

3.2 Program Volumetric Findings

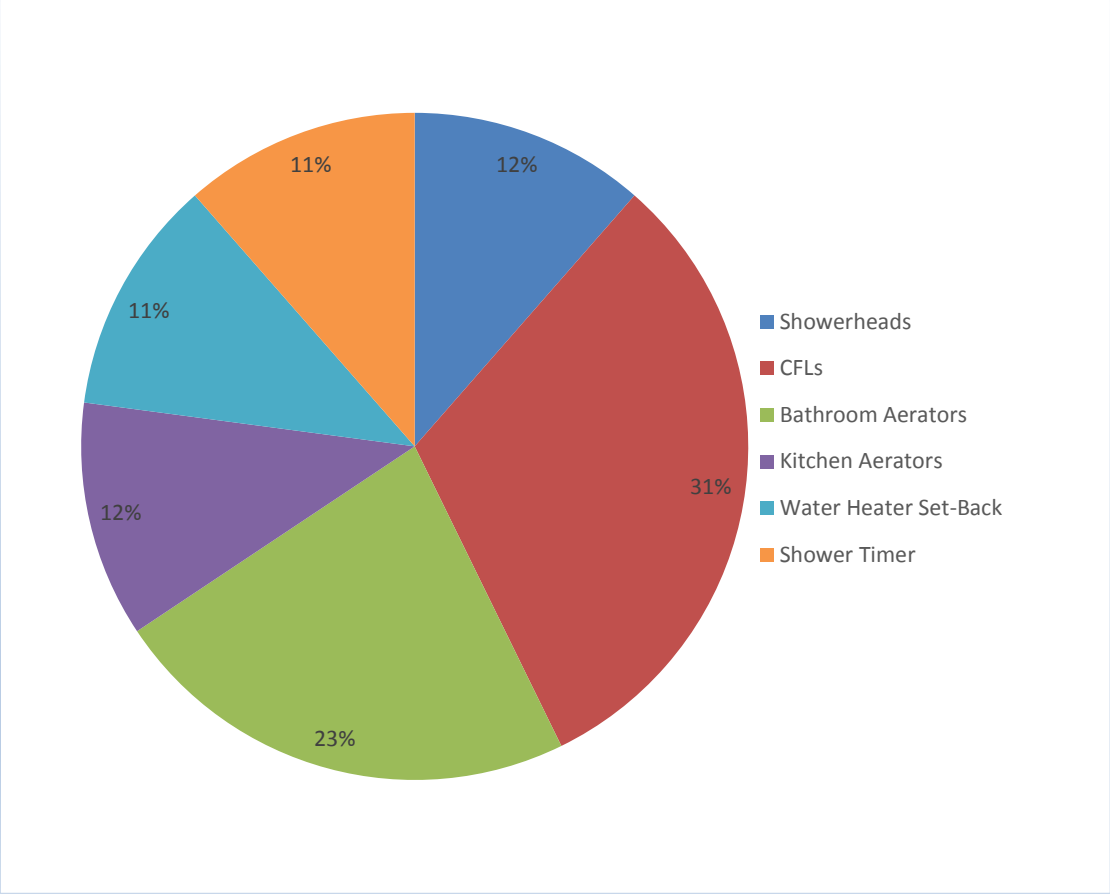
As shown in Table 3-1, the EEE program distributed 9,951 kits in GPY4/EPY7. Of these participants, 850 were in the Nicor Gas only group and 8,741 were in the joint group. Figure 3-1 shows the same information, graphically.

Table 3-1. GPY4/EPY7 EEE Program Primary Participation Detail

Volumetric Parameter	Total Participants or Measures Installed
Number of Total Kits Distributed	9,951
Showerheads Distributed	9,951
Bathroom Faucet Aerators Distributed	19,182
Kitchen Aerators Distributed	9,951
Shower Timers	9,951
Water Heater Set-Back Instructions	9,951
CFLs Distributed	26,223
Number of Total Measures Distributed	83,769

Source: Navigant analysis of Nicor Gas program tracking data.

Figure 3-1. Nicor Gas: Percentage of Measures Distributed by Type



Source: Navigant Analysis

3.3 Gross Program Impact Parameter Verification

As described in Section 2, energy and demand savings were estimated using Illinois TRM v3.0. The Illinois TRM deems most input parameters for showerheads, faucet aerators and water heater setback.

Navigant used results from the program's student survey form to calculate or adjust several input parameters. The tables below show each input variable by measure, values used by Navigant and the implementer, and whether that variable was deemed by the TRM or if a custom input was allowed. There was some difference in the custom inputs calculated by Navigant and the values used by Nicor Gas to calculate the per unit savings. Most notably, the Nicor Gas ex-ante calculations assumed the proportion of water heating supplied by natural gas heating was equal to 100 percent, whereas the proportion of households with natural gas water heating as reported by the participants is 68 percent. Additionally, Nicor Gas was conservative in the estimation of ISR and did not calculate savings separately for multifamily and single family housing, resulting in an upwards evaluation adjustment. The TRM algorithms and custom inputs used are shown in the equations and tables below.

Equation 1. Showerhead Savings Equation and Inputs, IL TRM v3.0 Section 5.4.5

$$\Delta Therms = \%FossilDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * SPCD * 365.25 / SPH) * EPG\_gas * ISR$$

Where:

%FossilDHW = *proportion of water heating supplied by Natural Gas heating*
GPM_base = *Flow rate of the baseline showerhead*
GPM_low = *As-used flow rate of the low-flow showerhead*
L_base = *Shower length in minutes with baseline showerhead*
Household = *Average number of people per household*

SPCD = *Showers Per Capita Per Day*
365.25 = *Days per year, on average.*
SPH = *Showerheads Per Household so that per-showerhead savings fractions can be determined*
EPG_gas = *Energy per gallon of hot water supplied by gas fuel*
ISR = *In service rate of showerhead*

Table 3-2. Showerhead Inputs and Variables

Value, Navigant	Value, Nicor Gas	Variable	Source	Deemed/ Custom	Discrepancy?
0.68	1.00	%FossilDHW	Survey - HCU6	Custom	Yes
2.35	2.35	GPM_base	IL TRM 5.4.5	Deemed	No
1.50	1.50	GPM_low	Specifications	Actual	No
7.80	7.80	L_base	IL TRM 5.4.5	Deemed	No
7.80	7.80	L_low	IL TRM 5.4.5	Deemed	No
365.25	365.25	days/year	IL TRM 5.4.5	Deemed	No
4.75	4.74	Household SF	Survey - HCU2	Custom	Yes
4.75	4.74	Household MF	Survey - HCU2	Custom	Yes
0.60	0.60	SPCD	IL TRM 5.4.5	Deemed	No
1.79	1.79	SPH SF	IL TRM 5.4.5	Deemed	No
1.30	1.79	SPH MF	IL TRM 5.4.5	Deemed	Yes
0.01	0.01	EPG_Gas_SF	IL TRM 5.4.5	Deemed	No
0.01	0.01	EPG_Gas_MF	IL TRM 5.4.5	Deemed	No
0.42	0.36	ISR SF	Survey - HA1	Custom	Yes
0.44	0.36	ISR MF	Survey - HA1	Custom	Yes
0.80	1.00	%SF	Survey - HCU1	Custom	Yes
0.20	0.00	%MF	Survey - HCU1	Custom	Yes

Equation 2. Aerator Savings Equation and Inputs, IL TRM v3.0 Section 5.4.4

$$\Delta Therms = \%FossilDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * 365.25 * DF / FPH) * EPG\_gas * ISR$$

Where:

%FossilDHW = *proportion of water heating supplied by Natural Gas heating*
GPM_base = *Flow rate of the baseline aerator*

GPM_low = *As-used flow rate of the low-flow aerator*
L_low = *Average retrofit length faucet use per capita for all faucets in minutes*
L_base = *Average baseline length faucet use per capita for all faucets in minutes*
Household = *Average number of people per household*
365.25 = *Days per year, on average.*
DF = *Drain Factor*
FPH = *Faucets Per Household*
EPG_gas = *Energy per gallon of Hot water supplied by gas*
ISR = *In service rate of aerator*

Table 3-3. Kitchen Aerator Inputs and Variables

Value, Navigant	Value, Nicor Gas	Variable	Source	Deemed/ Custom	Discrepancy
0.68	1.00	%FossilDHW	Survey - HCU6	Custom	Yes
1.39	1.39	GPM_base	IL TRM 5.4.4	Deemed	No
0.94	0.94	GPM_low	Specifications	Deemed	No
4.50	4.50	L_base	IL TRM 5.4.4	Deemed	No
4.50	4.50	L_low	IL TRM 5.4.4	Deemed	No
365.25	365.25	days/year	IL TRM 5.4.4	Deemed	No
4.75	4.74	Household SF	Survey - HCU2	Custom	Yes
4.75	4.74	Household MF	Survey - HCU2	Custom	Yes
0.75	0.75	DF	IL TRM 5.4.4	Deemed	No
1.00	1.00	KFPH	IL TRM 5.4.4	Deemed	No
0.0042	0.0042	EPG_gas_SF	IL TRM 5.4.4	Deemed	No
0.0048	0.0042	EPG_gas_MF	IL TRM 5.4.5	Deemed	Yes
0.35	0.30	ISR SF	Survey - HA2	Custom	Yes
0.44	0.30	ISR MF	Survey - HA2	Custom	Yes
0.80	1.00	%SF	Survey - HCU1	Custom	Yes
0.20	0.00	%MF	Survey - HCU1	Custom	Yes

Source: Additional Info for EEE.xlsx and Navigant Analysis

Table 3-4. Bathroom Aerator Inputs and Variables

Value, Navigant	Value, Nicor Gas	Variable	Source	Deemed/ Custom	Discrepancy
0.68	1.00	%GasDHW	Survey - HCU6	Custom	Yes
1.39	1.39	GPM_base	IL TRM 5.4.4	Deemed	No
0.94	0.94	GPM_low	Specifications	Deemed	No
1.60	1.60	L_base	IL TRM 5.4.4	Deemed	No
1.60	1.60	L_low	IL TRM 5.4.4	Deemed	No
365.25	365.25	days/year	IL TRM 5.4.4	Deemed	No
4.75	4.74	Household SF	Survey - HCU2	Custom	Yes
4.75	4.74	Household MF	Survey - HCU2	Custom	Yes
0.90	0.90	DF	IL TRM 5.4.4	Deemed	No
2.83	2.83	BFPH - SF	IL TRM 5.4.4	Deemed	No
1.50	2.83	BFPH - MF	IL TRM 5.4.4	Deemed	Yes
0.003	0.003	EPG_gas_SF	IL TRM 5.4.4	Deemed	No
0.004	0.003	EPG_gas_MF	IL TRM 5.4.5	Deemed	Yes
0.25	-	ISR SF, installed one	Survey - HA2	Custom	Yes
0.37	-	ISR MF, installed one	Survey - HA2	Custom	Yes
0.13	0.30	ISR SF, installed both	Survey - HA2	Custom	Yes
0.10	0.30	ISR MF, installed both	Survey - HA2	Custom	Yes
0.80	1.00	%SF	Survey - HCU1	Custom	Yes
0.20	0.00	%MF	Survey - HCU1	Custom	Yes

Source: Additional Info for EEE.xlsx and Navigant Analysis

Equation 3. Hot Water Temperature Setback Savings Equation and Inputs, IL TRM v3.0 Section 5.4.6

$$\Delta Therms = 6.4\ therms^{*}\ (Tpre - Tpost) / 15$$

Where:

6.4 Therms	*= Estimate of savings derived in UL and CLP Program Savings Documentation, 2010.*
Tpre	*= Actual hot water setpoint prior to adjustment*
Tpost	*= Actual new hot water setpoint, which may not be lower than 120 degrees*
15	*= Delta watts used to derive the UL and CLP Program Savings Documentation estimate.*

Table 3-5. Hot Water Temperature Setback Inputs and Variables

Value, Navigant	Value, Nicor Gas	Variable	Source	Deemed/ Custom	Discrepancy
6.4	6.4	UL/CLP Savings	IL TRM 5.4.6	Deemed	No
7.5	15	(Tpre-Tpost)	Survey - HA8/HA9	Custom	Yes
15	15	Delta Watts UL/CLP Savings	IL TRM 5.4.6	Deemed	No
0.20	0.29	ISR	Survey - HA7	Custom	Yes
0.68	1.00	%FossilDHW	Survey - HCU6	Custom	Yes

Source: Additional Info for EEE.xlsx and Navigant Analysis

3.4 Verified Gross Program Impact Results

The EEE program achieved verified gross savings of 115,801 therms and a gross savings realization rate of 0.94 percent in GPY4/EPY7. Table 3-6 below presents program savings at the measure group level and Figure 3-2 shows this graphically.

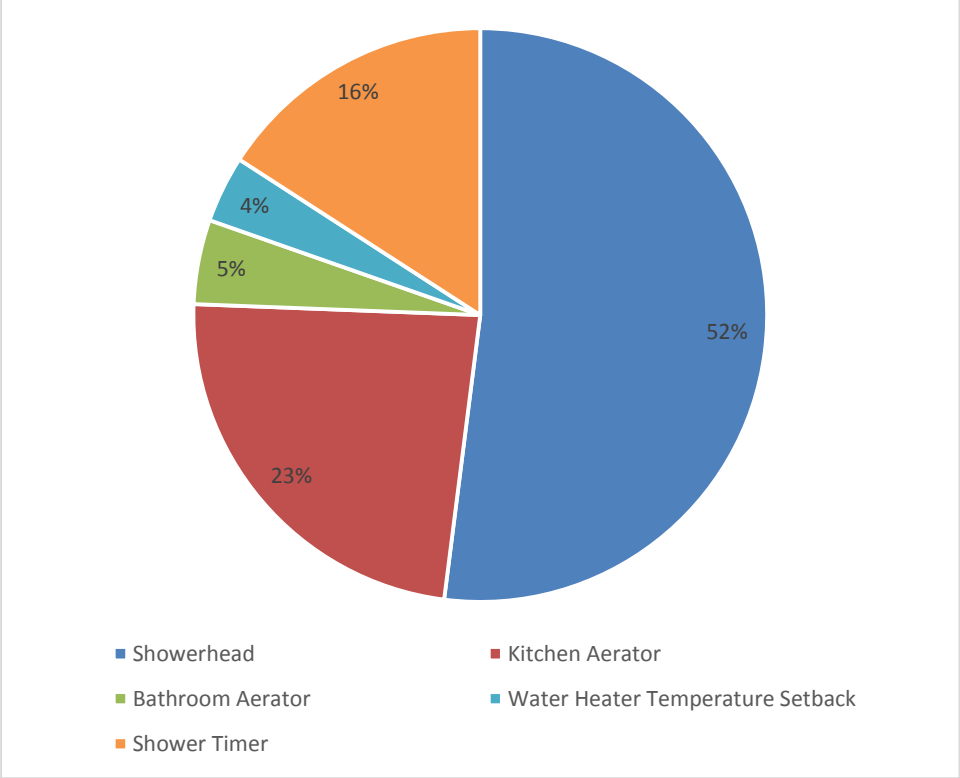
Table 3-6. GPY4/EPY7 Verified Gross Impact Savings Estimates by Measure Type

Measure	Ex Ante Gross Savings (therms)	Verified Gross RR‡	Verified Gross Savings (therms)
Low Flow Showerheads			
Low Flow Showerhead Joint Kits	60,657	0.90	54,892
Low Flow Showerhead Nicor Gas Only	5,898	0.90	5,338
Low Flow Showerhead Total	66,556	0.90	60,230
Kitchen Faucet Aerators			
Kitchen Faucet Aerators Joint Kits	28,614	0.87	24,904
Kitchen Faucet Aerators Nicor Gas Only	2,782	0.87	2,422
Kitchen Faucet Aerators Total	31,397	0.87	27,326
Bathroom Faucet Aerators			
Bathroom Faucet Aerator Joint Kits	7,089	0.71	5,019
Bathroom Faucet Aerator Nicor Gas Only	689	0.71	488
Bathroom Faucet Aerator Total	7,779	0.71	5,508
Water Heater Set-Back			
Water Heater Set-Back Joint Kits	16,223	0.24	3,968
Water Heater Set-Back Nicor Gas Only	1,577	0.24	386
Water Heater Set-Back Total	17,801	0.24	4,354
Shower Timer			
Shower Timer Joint Kits	NA	NA	16,753
Shower Timer Nicor Gas Only	NA	NA	1,629
Shower Timer Total	NA	NA	18,382
Total	123,533	0.94	115,801

Source: Navigant Analysis

‡ Based on evaluation findings

Figure 3-2. GPY4/EPY7 Verified Gross Therm Savings Estimates by Measure Type



Source: Navigant Analysis

The reason for variation in savings is some difference in the custom inputs calculated by Navigant and the custom inputs provided by Nicor Gas. As noted above, the main source of discrepancy between the ex-ante and verified savings is the ex-ante calculations assumed the proportion of water heating supplied by natural gas heating was equal to 100 percent, whereas the proportion of households with natural gas water heating as reported by the participants is 68 percent. There is an additional discrepancy due to the difference in the custom inputs used in the per unit savings calculations; Navigant calculated these custom inputs (e.g., household size, ISR, single- vs multi-family housing type) using the data from the program's student survey form. Nicor Gas used Navigant's GPY1 evaluation for these custom inputs. Nicor Gas did not calculate energy savings separately for single-family and multi-family unit savings which also contributed to variation in realization rate.

3.5 Shower Timer Measure Energy Savings

Each energy savings kit contained a shower timer; the shower timer encourages participants to save energy by limiting their shower time length to 5 minutes. Navigant included questions in the net-to-gross survey in order to estimate energy savings achieved by the shower timer. The proposed engineering algorithm and the custom inputs/variables for this measure are shown below.

Equation 4. Shower Timer Energy Savings Equation

$$\Delta therms = \%Fossil\ DHW \times Water\ Flow\ (GPM) \times (Baseline\ Shower\ Time - EEM\ Shower\ Time) \times Household\ Users \times Days\ per\ year \times SPCD \times Usage\ Factor \times EPG\_Gas$$

Table 3-7. Shower Timer Inputs and Variables

Value, Navigant	Variable	Notes on values
2.04	GPM Water Flow	Average for sample calculated using base case GPM (from the TRM) and efficient case (GPM from the low-flow shower head in the kit) multiplied by the participant reported in-service rate (ISR) of the efficient showerhead supplied in the kit
7.8	Baseline shower time, minutes	Assumed value from TRM v3.0
2.59	Household Users	Calculated from Q10B, how many family members use the shower timer?
0.69	%FossilDHW (natural gas)	Calculated from reported values on the NTG survey, this factor adjusts for shower timers that were distributed to houses with electric water heaters.
0.60	SPCD	Showers Per Capita per Day. Assumed value from TRM v3.0
0.21	Usage Factor	Calculated from survey question Q10, provides the percent of time shower timers were used by the sample of respondents. A response of "Always" is assigned a Usage Factor of 100% or 1.00. Other responses: "Often" (0.50), "Occasionally" (0.15); "Never" (0.00)
5.57	EEM Shower time, minutes	Calculated based on shower timer specifications and reported usage calculated from NTG survey question Q10C. For this sample of users, the shower timer saves 2.23 minutes (7.80 – 5.57)
365.25	days/year	Assumed value from TRM v3.0
0.005	EPG_gas	Assumed value from TRM v3.0

Sources: Survey responses, Illinois TRM v3.0, and Navigant analysis

Assuming the above variables for participants with gas water heaters, the unit savings per household for the shower timer measure is 2.69 therms. These values reflect a Usage Factor of 0.21 for Nicor Gas – if gas water heating participants "Always" used the timer, the average user would save 12.6 therms. When we include all adjustments factors, including Usage Factor and the finding that some shower timers distributed in Nicor Gas territories went to households with electric water heating, the resulting unit savings is 1.85 therms per kit for all kits distributed through the EEE program for Nicor Gas.

The total per kit unit savings multiplied by the total kits distributed through the program (9,951) in GPY4 results in gross savings of 18,382 therms. Navigant identified several limitations with using the survey data to estimate the behavioral savings for shower timers:

1. The assumed shower length in the TRM includes "shower warm up" time (i.e., the time it takes for water to come to a comfortable temperature) – it is unclear from the instructions in the kit if participants should start timer before or after shower warm up time.
2. The actual savings could be over- or under-estimated because baseline shower length was assumed to be 7.80 minutes, based on the TRM value, not survey responses. Individual household baseline shower lengths may be more or less than 7.80 minutes (although presumably if the baseline shower length was shorter than 7.80 minutes they would be unlikely to use the timer.)
3. Navigant could not find this measure in any other state TRM including Pennsylvania, Indiana, and Michigan.
4. Navigant could not find an instance of any utility claiming savings for this measure using survey data.

5. Navigant found some studies which used metering to evaluate a measure similar to this one, described below. In all cases, the measure evaluated had a more active auditory or visual element to the timer and found fewer savings than the engineering algorithms in this report.
    a. A study in New York State involved the installation of a shower orb (this illuminated globe provides feedback to user on length of shower by change color) and metering of 16 showers. This study found an increase in water usage (due to an increase in shower times) after installing the shower orb.[8]
    b. A study in Australia compared the water consumption of 151 showers before and after the installation of a shower monitor with alarm. The study found a reduction in shower time of 1.20 minutes.[9]
    c. A SDG&E study installed 8 shower monitors (auditory and visual alarms) in university dormitories found water volume savings of 11%. This study then used this data to extrapolate savings for a single family home at 9 therms/year.[10]

Overall, Navigant concludes savings are occurring because of the shower timer measure, however the customer survey data may not provide an accurate estimation of energy savings due the combined uncertainties of the multiple self-reported variables in the savings algorithm. In order to deem a savings number for this measure to include in a future version of the TRM, Navigant recommends the TRM Technical Advisory Committee consider collecting data from a before and after metering study for the type of shower timer contained in the kit.

[8] "Saving Water with a Shower Orb" https://www.rit.edu/affiliate/nysp2i/sites/rit.edu.affiliate.nysp2i/files/team_orb_-_competition_report_0.pdf

[9] "Shower Alarms reduce water and energy consumption" http://ec.europa.eu/environment/integration/research/newsalert/pdf/213na3_en.pdf

[10] "SHOWER MONITOR AND ALARM SYSTEM FINAL REPORT", http://www.etcc-ca.com/sites/default/files/reports/et12sdge0004_shower_monitor_and_alarm_system_final_report.pdf

4. Net Impact Evaluation

The program achieved verified net savings 91,483 therms. The evaluation team calculated verified net savings using a NTGR of 0.79 from previous evaluation research and approved through the Illinois Stakeholder Advisory Group (IL SAG) consensus process.[11] Table 4-1 below shows the deemed the GPY4/EPY7 verified net savings.

Table 4-1. GPY4/EPY7 Verified Net Impact Savings Estimates (Therms) by Measure Type

Measure	Ex Ante Gross Savings (Therms)	Verified Gross RR‡	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Low Flow Showerheads					
Low Flow Showerhead Joint Kits	60,657	0.90	54,892	0.79	43,365
Low Flow Showerhead Nicor Gas Only	5,898	0.90	5,338	0.79	4,217
Low Flow Showerhead Total	66,556	0.90	60,230	0.79	47,582
Kitchen Faucet Aerators					
Kitchen Faucet Aerators Joint Kits	28,614	0.87	24,904	0.79	19,674
Kitchen Faucet Aerators Nicor Gas Only	2,782	0.87	2,422	0.79	1,913
Kitchen Faucet Aerators Total	31,397	0.87	27,326	0.79	21,588
Bathroom Faucet Aerators					
Bathroom Faucet Aerator Joint Kits	7,089	0.71	5,019	0.79	3,966
Bathroom Faucet Aerator Nicor Gas Only	689	0.71	488	0.79	386
Bathroom Faucet Aerator Total	7,779	0.71	5,508	0.79	4,351
Water Heater Set-Back					
Water Heater Set-Back Joint Kits	16,223	0.24	3,968	0.79	3,135
Water Heater Set-Back Nicor Gas Only	1,577	0.24	386	0.79	305
Water Heater Set-Back Total	17,801	0.24	4,354	0.79	3,440
Shower Timer					
Shower Timer Joint Kits	NA	NA	16,753	0.79	13,235
Shower Timer Nicor Gas Only	NA	NA	1,629	0.79	1,287
Shower Timer Total	NA	NA	18,382	0.79	14,522
Total	123,533	0.94	115,801	0.79	91,483

Source: Navigant Analysis
‡ Based on evaluation findings

[11] A deemed value from the IL SAG consensus process "Nicor Gas Consensus NTG Values; Summary of Nicor Gas NTG Approach and Consensus Values for GPY1 through GPY5" available at http://www.ilsag.info/net-to-gross-framework.html

5. Process Evaluation

This section includes discussion on changes made to the EEE program in GPY4/EPY7, program QA/QC activities, participant feedback, areas for program improvement, and changes planned for GPY5/EPY8.

5.1 Program Changes since GPY3/EPY6

The program has changed in several ways since GPY3/EPY6 as described below.

5.1.1 Program Delivery Method

A major change in GPY4/EPY7 was the use of a new implementation contractor, RAP, and the delivery method of the education component of the program. The change in implementation contractor was due to the utilities' desire to test a "teacher-led instruction" program model, as opposed to the previous model that was based on a single, contractor-led presentation per school.

This model was also of special interest to Nicor Gas, which experienced significantly reduced program budgets in GPY4. The teacher-led instruction model provided the same type of educational materials and measures as the contractor-led model, but at an absolute cost reduction. The cost reduction was principally due to the elimination of the contractor-led presentation, which required travel and accommodations for contractor personnel.

The utilities and RAP worked together to overhaul the program, rebranding the program from "Think!Energy" to "Super Savers". The new energy efficiency kits have a different look and feel to them with the utilities' names more in the foreground than they were before. The delivery method of the education component of the program changed significantly. Teachers notified RAP when they wanted to begin teaching the program materials and RAP delivered the materials by that timeframe. The teachers then had the option of teaching the materials to their students over five or ten days, unlike in EPY6/GPY3, when the education component was taught to multiple classes of students during a single, contractor-led presentation per school.

After the presentation of the educational materials, the students took home an energy efficiency kit that included water conservation measures; instruments to measure water and ambient temperature, as well as water flow rates; CFLs; and a student workbook where participants used the pages to report details of their family's participation. Once the workbooks were completely filled out and brought back to class, teachers asked students to transfer their answers from the workbook onto a student survey form. These are the forms that teachers are incentivized to return back to RAP.

5.1.2 Teacher Incentives

Teachers were incentivized with a $50 mini grant for their classroom if they returned 80 percent of the completed student survey forms by the middle of March 2015. This incentive is different from the incentive offered in GPY3/EPY6, when teachers were incentivized with a $100 mini grant for returning 80 percent of the completed survey forms as well as being entered into a drawing to win an iPad.

5.1.3 Devices and Materials in Kits

No changes were made to number or type of measures included in the kits, but there were changes made to the make and model of high efficiency showerhead and CFLs included in the kits as shown in Table 5-1 below. There were also more print materials included in the kits detailing how to save energy and the utilities' other energy efficiency program offerings.

Table 5-1. GPY3/EPY6 and GPY4/EPY7 Devices Included in Kits

Measure	Make and Model for GPY3/EPY6	Make and Model for GPY4/EPY7
Showerhead	Niagara Power 1.5 gpm	Intellishower 1.5 gpm
Kitchen Aerators	Niagara 1.5 gpm	Niagara 1.5 gpm
Bathroom Aerators	Niagara 1.0 gpm	Niagara 1.0 gpm
CFLs	14-watt	13-watt

5.1.4 Participation

Another change in GPY4/EPY7 was the addition of Peoples Gas and North Shore Gas to the program. Nicor Gas offered the program jointly with ComEd as well as with Peoples Gas and North Shore Gas. Nicor Gas's participation target was scaled back to 9,550 kits from 30,500 kits in GPY3/EPY6.

Interest in this program exceeded participation targets. Several teachers who learned about the program from participating teachers contacted RAP to participate in the program but had to be put on a waitlist. RAP began marketing and outreach for the program in the middle of October 2014, and by early December 2014 the program was fully enrolled.

5.2 QA/QC Activities

The EEE QA/QC procedures are detailed in one document and was provided to the evaluation team in September 2015: Quality Control and Assurance. The QA/QC procedures are the responsibility of the implementation contractor, RAP.

RAP creates and assembles the energy efficiency kits and uses a 10-step quality assurance and control process. This process starts with generating an order through RAP's inventory control system upon receipt of customer data file and finishes with the program coordinator sending kit shipment notification information to the receiving party. An early component of the QA/QC process involves a test for kit stability, strength, and safety to ensure all measures are secure for transport to schools. According to RAP, out of 550,000 kits shipped annually, they typically see less than one-tenth of a percent return rate due to damage. RAP does not detail any processes used to inspect the measures included in the kit.

RAP applies QA/QC processes at multiple phases of the program (see Table 5-2 below) not just around the creation and shipment of the kit. However, RAP does not detail any procedures to address the issue of extra kits (i.e. kits that are sent to classes but not sent home with students) or to verify the accuracy of the $50 incentive mailed to teachers. They hold focus groups with certified educators each year which provide a critical evaluation tool for RAP to keep curriculum relevant in the classroom or make changes where necessary. They also measure customer satisfaction by asking teachers and parents to complete an evaluation form to ensure the program meets expectations. With respect to the

California best practices on QA/QC procedures, RAP's procedures should have more detail on the processes used to inspect kit measures, account for extra kits, and verify accuracy of incentives, but are otherwise adequate.

Table 5-2. Program Phases with QA/QC Processes

Program Phases
Program Planning
Program Customization
Teacher Outreach and Enrollment
Program Implementation in Classroom
Homework: Measure Installation and Home Audit
Data Collection
Assessment and Reporting

5.3 *Participant Feedback*

According to respondents of RAP's and Navigant's teacher and parent surveys, the program performed well in GPY4/EPY7. The sections below detail the results from these surveys.

5.3.1 Teacher and Parent Feedback from RAP Surveys

RAP sent an educator evaluation survey to every teacher who participated in GPY4/EPY7. The evaluation team analyzed the raw results from these questions and found that 112 teachers in the Nicor Gas service territory (about 32 percent of participating teachers) responded to the survey. About 92 percent of respondents said they would participate in the program again, and 93 percent said they would recommend this program to other colleagues. All respondents indicated the materials were clearly written and well-organized; and 95 percent indicated the products in the kit were easy to use.

Teachers reported the curriculum/lesson plans, the home-school connection resulting from the kits, and the student guides as the best program elements. Additionally, the majority of teachers (about 80 percent) reported the self-installation aspect of the kits was the best program element for students. When asked to provide possible changes to the program, the majority of teachers had no response or responded "none". Those who did respond with a change noted that some of the materials were too difficult for their students' current reading levels and that it was difficult to complete all the program material within the time constraints of the academic year.

Twenty-seven parents in the Nicor Gas service territory responded to the parent comment card included in the kit box (less than one percent of participating parents). All the respondents said they would continue to use the contents in the kit and all but one said the materials were easy for their child to use.

5.3.2 Parent and Teacher Feedback from Navigant NTG Survey

Navigant conducted NTG research as part of our GPY4/EPY7 evaluation. To estimate free-ridership and spillover effects of the program, Navigant sent a sample of participants a paper-based survey. The survey also included questions on program satisfaction. Participants were asked on a scale of 0 to 10, with 0 meaning "I was not at all satisfied" and 10 meaning "I was very satisfied", how satisfied they

were with the Super Savers program. Of the 88 parents that responded to the satisfaction questions, 64 percent said they were satisfied with the program (score of 7 or above). Thirty-two percent of parents rated the program with a five or lower with almost half of them explaining this was because they could not or did not use the equipment provided in the kit.

Teachers were also given a brief teacher survey which asked how the Super Savers program could be improved. Of the 15 teachers who returned the teacher survey return form, four said they would like to see the speaker/presenter aspect of the program from last year brought back. One teacher suggested having a letter included with the kit because some parents were confused as to why they needed to fill out the student survey form.

5.4 Program Improvement

The evaluation team learned through the satisfaction questions asked in their NTG survey that a handful of parents have interest in LEDs. In the upcoming program years, the utilities could consider offering LED lamps in place of the CFLs in the energy efficiency kit.

5.5 Planned Changes for GPY5/EPY8

Because the utilities and RAP invested in overhauling the program in GPY4/EPY7 and the participation targets were met, there are no major changes planned for GPY5/EPY8. There is a minor update planned for the kit box which includes an update on the cross promotion of the utilities' other energy efficiency programs.

6. Conclusions and Recommendations

The following summarizes key program findings and recommendations. The program performed well in GPY4/EPY7, exceeding key participation targets for the year.

Program Participation

Finding 1. The program distributed 9,591 kits in the Nicor Gas service area, exceeding the original participation targets of 9,550 kits. This includes 850 Nicor Gas only kits and 8,741 joint Nicor Gas-ComEd kits.

Finding 2. The return rate of the student survey forms for the program overall was 44 percent, exceeding the target of 40 percent, which is statistically significant to calculate the custom inputs that are allowed when determining unit savings for each measure.

Verified Gross Program Savings and Realization Rate

Finding 3. Navigant's review of the ex-ante calculations for the GPY4/EPY7 Elementary Energy Education Program resulted in verified gross energy savings of 115,801 therms, resulting in a realization rate of 0.94.

Finding 4. Navigant calculated different ex-post values for custom inputs used to calculate in unit savings (calculated from the student survey form responses - including in the number of people per household and in-service rates). Nicor Gas used values found in Navigant's GPY1 evaluation for the custom inputs and assumed the proportion of gas water heating used by the participants is 100 percent. Navigant used custom inputs as calculated by the GPY4 participant responses to the student survey form. A comparison of the custom inputs is provided in Section 3.3.

Recommendation 1. The program should use the student survey form data in order to calculate custom inputs where allowed by the TRM. The differences in the custom inputs as described in Finding 4, resulted in a 79% realization rate, a decrease of 26,114 therms.

Finding 5. The program did not calculate savings separately for single-family and multi-family housing types. This understates the gross savings for the program.

Recommendation 2. The program should calculate savings for CFLs, aerators, and showerheads for single family homes separately from multi-family homes to increase the degree of accuracy of its ex-ante savings estimates. Generally, the multi-family inputs result in higher savings numbers.

Finding 6. The ex-ante savings estimate for the water heater setback measure was 1.86 therms, which assumes a setback of 15 degrees and an in-service rate of approximately 30 percent. However, the temperature differential reported by participants in the program's student survey form was 7.5 degrees and the in-service rate was 20 percent, resulting in lower savings and a realization rate of 24 percent for this measure

Recommendation 3. The implementer should update savings estimates for the water heater setback measure using the pre- and post-temperature inputs (Tpre and Tpost) and in-service rate from the program's student survey form. This difference in pre- and post-temperature inputs resulted in a realization rate of 0.24, a difference of 1,226 therms.

Finding 7. The EEE Program does not currently claim savings from programmable thermostat measures. Approximately 2.2 percent of participants reported programming their programmable thermostat based on the educational materials provided in the kits. Within the written program materials, there are directions to set the thermostat to 78F in warm

weather and 68F in cool weather. The TRM energy savings methodology is specified for programmable thermostats which were previously set to override mode.

Recommendation 4. In the future, if the program chooses to claim savings for this measure, it should include instructions on how to properly use a programmable thermostat (that is, how to use four programmed settings for daytime, night time, summer, and winter), in order to qualify under the TRM. To develop these instructions, the implementer could use EPA's EnergyStar program or other resources. The EnergyStar program provides information for consumers on how to program and which settings will save the most energy. EnergyStar has programmable thermostat guidelines (and video) on how to properly set and use a programmable thermostat. Additionally, many thermostat manufacturers (Honeywell, Lux, etc.) and home improvement stores (Lowe's, Home Depot), provide instructions and information on how to program a thermostat. There are significant savings associated with this measure; a programmable thermostat installed in a single family home in Chicago results in savings of 62.3 therms, using the methodology from the TRM v4.0. Assuming a 2.2 percent in-service rate for this measure results in savings of 13,206 therms.

Finding 8. Navigant concludes savings from shower timers are occurring because of the measure, however the customer survey data may not provide an accurate estimation of energy savings due to the combined uncertainties of the self-reported variables in the savings algorithm.

Recommendation 5. In order to deem a savings number for this measure to include in a future version of the TRM, Navigant recommends Nicor Gas consider collecting data from a before and after metering study for the type of shower timer contained in the kit.

Tracking System Review

Finding 9. Nicor Gas provided all applicable materials needed for the impact analysis, including a listing of kits distributed and responses to the student survey form.

Verified Net Savings

Finding 10. The program achieved verified net savings of 91,483 therms. The net-to-gross ratio for the natural gas program was deemed through the Illinois Stakeholder Advisory Group consensus process at 0.79, while electric impacts are deemed at 0.76.

Process Evaluation

Finding 11. The program is performing well. Comments about the program from parents and teachers are generally uniformly positive. Of the 112 teachers in the Nicor Gas service territory who responded to the educator evaluation questions asked by RAP, 92 percent of them said they would participate in the program again.

Finding 12. Through the satisfaction questions asked in Navigant's NTG survey, the evaluation team learned that some parents are interested in LEDs.

Recommendation 6. In the upcoming program years, the utilities could consider offering LED lamps in place of the CFLs in the energy efficiency kits to keep customer satisfaction in the program high.

Finding 13. RAP appears to have adequate QA/QC procedures in place to ensure each kit is assembled, packaged, and delivered properly. The QA/QC documentation lacks a few specific details however, including processes used to inspect the measures in the kit,

address the issue of extra kits in classrooms, and verify the accuracy of the incentives mailed to teachers.

Recommendation 7. Update the QA/QC documentation to include detail on these processes.

Finding 14. The program costs were $3.37/therm in GPY4 as compared to $3.17/therm in GPY3. The evaluation team does not have a recommendation on how to reduce program costs per therm conserved but will research this in GPY5.