

# Home Energy Efficiency Rebate Program GPY4 Evaluation Report

FINAL

Energy Efficiency Plan:  
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 findings and results from the evaluation of the Nicor Gas program year four (GPY4)<sup>1</sup> Home Energy Efficiency Rebate Program (Home EER). Under the Home EER Program, cash incentives were offered to encourage Nicor Gas customers to purchase higher efficiency water and space-heating equipment. Formerly, the program offered central air conditioning rebates jointly with ComEd, but as of GPY4, that portion of the program is no longer offered.

### 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 <sup>2</sup> (Therms)	4,656,854
Verified Gross Realization Rate	1.03‡
Verified Gross Savings (Therms)	4,775,472
Net to gross ratio (NTGR)	0.79†
Verified Net Savings (Therms)	3,772,623

Source: Utility tracking data and Navigant analysis.

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

‡ Based on evaluation research findings

**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)
High Efficiency Furnace	3,954,229	1.00‡	3,951,255	0.79†	3,121,491
Programmable Thermostat	662,754	1.18‡	784,507	0.79†	619,760
High Efficiency Boiler	34,715	1.00‡	34,700	0.79†	27,413
Storage Water Heater	5,156	0.97‡	5,011	0.79†	3,958

Source: Utility tracking data and Navigant analysis.

† A deemed value. SAG approved NTG

‡ Based on evaluation research findings.

<sup>1</sup> The GPY4 program year began June 1, 2014 and ended May 31, 2015.

<sup>2</sup> From Tracking System

## E.2. Impact Estimate Parameters

The evaluation used parameters as defined by the Illinois Technical Resource Manual (TRM).

**Table E-3. Impact Estimate Parameters**

Parameter	Data Source	Deemed or Evaluated?
Net to Gross Ratio	SAG Nicor Gas NTG Summary Report†	Deemed
Realization Rate	Evaluation Research	Evaluated

Source: Navigant analysis

† Source:

[http://ilsagfiles.org/SAG\\_files/NTG/2015\\_NTG\\_Meetings/Final\\_2015\\_Documents/Nicor\\_Gas\\_NTG\\_Summary\\_GPY1-5\\_2015-03-01\\_Final.pdf](http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf)

## E.3. Participation Information

The program had 20,351 participants in GPY4 and distributed 32,721 measures as shown in the following table.

**Table E-4. GPY4 Primary Participation**

Participation	Nicor Gas
Participants	20,351
Total Measure Types	4
Installed Measures	32,721

Source: Utility tracking data and Navigant analysis

Table E-5 shows participation at the measure level. The most common measure is high efficiency furnaces with 92.62% of participating homes installing the measure.

**Table E-5. GPY4 Measure Participation Detail**

Measure	Total Participants	Percent of Participating Homes Installing Measure
High Efficiency Furnace	18,849	92.62%
Programmable Thermostat	13,508	66.38%
Storage Water Heater	236	1.16%
High Efficiency Boiler	128	0.63%

Source: Navigant analysis.

#### ***E.4. Findings and Recommendations***

The following provides insight into key program findings and recommendations:

##### **Program Savings**

**Finding 1.** The Nicor Gas Home EER Program achieved 3,772,623 verified net therms savings for GPY4, and had 20,351 program participants. Nicor Gas achieved 244 percent of its GPY4 savings goal of 1,545,100 therm savings. Ninety-two percent of the program savings were from high efficiency furnace participants.

##### **Tracking System**

**Finding 2.** The customer specific values for Gas Boiler Load and Gas Furnace Heating Load are not listed in the tracking data, though the ex ante savings estimates appear to use the correct values.

**Recommendation 1.** Navigant recommends including fields for Gas Boiler Load and Gas Furnace Heating Load in the tracking database to accurately capture all necessary information for gross savings calculations.

**Finding 3.** Six “Furnace, >95% - Early Retire” projects list an existing AFUE value of 80% in the tracking data, although the ex ante savings estimates appear to use an existing AFUE value of 64.4% (the Illinois TRM v3.0 default value for early retirement furnaces with an unknown existing AFUE).

**Recommendation 2.** Navigant recommends using the known existing AFUE value when available to calculate gross savings for early retirement furnaces. This gives the most accurate estimate of actual savings.

##### **Gross Realization Rates**

**Finding 4.** The ex ante gross savings for programmable thermostats were consistently slightly lower than the verified gross savings for the measure. This is because the ex ante savings estimates used Gas Heating Consumption values from the Illinois TRM v2.0 instead of the more current Illinois TRM v3.0. The Gas Heating Consumption values in version 3.0 are higher than those found in version 2.0, resulting in higher overall savings for the measure as well as the program as a whole.

**Recommendation 3.** The IC should be sure to use the most current version of the Illinois TRM when calculating ex ante savings estimates. This will make evaluation savings adjustments less likely.

##### **Process Evaluation**

**Finding 5.** The program is no longer offering a joint rebate with ComEd (the Complete System Replacement [CSR] program) as of the start of GPY4. The program also eliminated several measures with very low savings and participation. By simplifying the program and focusing on the higher saving measures, the program resources can be used more effectively.

**Finding 6.** The Quality Assurance/Quality Control Plan provided by CLEAResult met or exceeded the California Best Practices in almost every area. Navigant determined that the program did not need to allow for a reduction in required inspections based on observed performance and demonstrated quality work because of the larger number of participating contractors in the program. However, Navigant found that it was unclear

if the program uses the inspection and verification function as a training tool for participating contractors.

**Recommendation 4.** QA/QC Plan should include information about how the program is using the results of the inspection and verification process in its training materials for participation contractors. If the program does not currently use the results of the inspection and verification process in its contractor training process, Navigant suggests that Nicor Gas and CLEAResult develop a plan to include them in future program years.



## 1. Introduction

### 1.1 Program Description

Under the Home Energy Efficiency Rebate (Home EER) Program, cash incentives and education were offered to encourage upgrading of water- and space-heating equipment among residential customers of Nicor Gas. The Home EER Program was designed to conserve natural gas and to lower participants' monthly energy bills. Both rental and owner-occupied dwellings are eligible for rebates for furnaces, boilers, programmable thermostats, and storage water heaters. Program participants must be residential customers of Nicor Gas in order to receive rebates for gas saving measures, and the premises must be used for residential purposes in existing buildings.

The Home EER Program offers customers rebates to invest in long-term savings through better technology and high efficiency equipment. Rebates are offered for the installation of high-efficiency furnaces, boilers, programmable thermostats, and water heaters. The dollar amount of the rebate depends on the size and efficiency of the replacement measures and ranged from \$200 to \$700 for bundle installations. Bundle installations included  $\geq 97\%$  AFUE furnaces, storage water heaters, and programmable thermostats. The GPY4 Home EER Program was implemented by CLEAResult (CR) and ran from June 1, 2014 through May 31, 2015.

### 1.2 Evaluation Objectives

In line with Navigant's program evaluation plans for the Nicor Gas GPY4 portfolio of energy efficiency programs, the Evaluation Team identified the following key researchable impact evaluation questions for GPY4:

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)?

The Evaluation Team also identified a number of process evaluation questions for research in GPY4, including:

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 Quality Assurance/Quality Control (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 Nicor Gas Home EER Program reflects the fourth full-scale year of program operation. During GPY4, 20,351 residential customers participated in the program. Navigant performed a tracking system review to determine ex ante gross savings by measure. To determine verified gross savings by measure, the evaluation team performed a measure verification for measures included in the Illinois TRM. These were compared to find the measure and program level realization rates for the Home EER Program.

### 2.1 Overview of Data Collection Activities

The core data collection activities included a tracking system review, engineering analysis, and interviews with implementer staff. The full set of data collection activities is shown in the following table.

**Table 2-1. Core Data Collection Activities**

What	Who	Target Completes	Completes Achieved	When
<i>Impact Assessment</i>				
Tracking System Review	Participants	Census	Census	December 2015
Engineering Analysis	Participants	Census	Census	December 2015
<i>Process Assessment</i>				
In Depth Interviews	Program Manager/Implementer Staff	1-2	1	March 2015

Source: Navigant

### 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. Table 2-2. Verified Gross Savings Parameters lists the source of the parameters that Navigant used. The Illinois TRM allows for some custom values to be used in the algorithms as well. Navigant used Nicor Gas HEER tracking data for these values.

**Table 2-2. Verified Gross Savings Parameters**

Measure	Input Parameter Source
High Efficiency Furnaces	Illinois TRM version 3.0 – Section 5.3.7
Programmable Thermostats	Illinois TRM version 3.0 – Section 5.3.11
High Efficiency Boilers	Illinois TRM version 3.0 – Section 5.3.6
Storage Water Heaters	Illinois TRM version 3.0 – Section 5.4.2

Source: Navigant

### 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 Technical Reference Manual version 3.0 (Illinois TRM). Navigant used the tracking data for participant location and equipment specifications.

### 2.4 Verified Net Program Savings Analysis Approach

Verified net energy savings were calculated by multiplying the Verified Gross Savings estimates by a net-to-gross ratio (NTGR). For GPY4, the evaluation team used NTGR values that were based on past evaluation research and approved through a consensus process with SAG.<sup>3</sup>

### 2.5 Process Evaluation

The process evaluation included a review of program changes from GPY3 and GPY4, and a review of the program Quality Assurance/Quality Control process, with suggestions made for improvement.

<sup>3</sup>[http://ilsagfiles.org/SAG\\_files/NTG/2015\\_NTG\\_Meetings/Final\\_2015\\_Documents/Nicor\\_Gas\\_NTG\\_Summary\\_GPY1-5\\_2015-03-01\\_Final.pdf](http://ilsagfiles.org/SAG_files/NTG/2015_NTG_Meetings/Final_2015_Documents/Nicor_Gas_NTG_Summary_GPY1-5_2015-03-01_Final.pdf)

### 3. Gross Impact Evaluation

This evaluation of the Nicor Gas Home EER Program reflects the fourth full-scale year of program operation. During GPY4, 20,351 residential customers participated in the program. Navigant performed a tracking system review to determine ex ante gross savings by measure. To determine verified gross savings by measure, the evaluation team performed a measure verification for measures included in the Illinois TRM. These were compared to find the measure and program level realization rates for the Home EER Program.

#### 3.1 Tracking System Review

Navigant performed a verification of the program tracking database to determine ex ante gross savings totals. The purpose of the tracking system review was to ensure these systems gather the data required to accurately calculate program savings. Navigant used customer site locations, measure quantities, efficiencies, and other such recorded information as inputs to Illinois TRM algorithms to determine verified gross savings.

Key findings include:

1. The customer specific value for Gas Boiler Load is not listed in the tracking data, though the ex ante savings estimates appear to use the correct values.
2. The customer specific value for Gas Furnace Heating Load is not listed in the tracking data, though the ex ante savings estimates appear to use the correct values.
3. Six "Furnace, >95% - Early Retire" projects list an existing AFUE value of 80% in the tracking data, although the ex ante savings estimates appear to use an existing AFUE value of 64.4% (the Illinois TRM v3.0 default value for early retirement furnaces with an unknown existing AFUE).

#### 3.2 Program Volumetric Findings

In GPY4 the Nicor Gas Home EER Program served 20,351 participants that installed a total of 32,721 projects across 4 different measures. This is a decrease of approximately 26 percent from GPY3, which had a total of 27,617 projects across 10 different measures. The decrease is due to the discontinuation of the direct installation pilot portion of the program that took place in GPY3. The program also had a reduced savings goal compared to GPY3.

Key findings include:

1. High Efficiency Furnaces show the most participation and savings for the program. Programmable Thermostats have the second most participation and savings for the Home EER Program.
2. Storage water heaters showed the lowest savings for the program.

**Table 3-1. GPY4 Volumetric Findings Detail**

Measure	Total Participants	Percent of Participating Homes Installing Measure
High Efficiency Furnace	18,849	92.62%
Programmable Thermostat	13,508	66.38%
Storage Water Heater	236	1.16%
High Efficiency Boiler	128	0.63%

Source: Navigant analysis.

### 3.3 Gross Program Impact Parameter Estimates

Navigant calculated verified gross savings from the GPY4 HEER program using algorithms and parameters defined in the Illinois TRM version 3.0. Navigant used the Illinois TRM for all measures.

**Table 3-2. Verified Gross Savings Parameters**

Measure/Input Parameters	Ex Ante Value	Verified Value	Unit	Source
High Efficiency Furnaces	Varies	Varies	therms/unit	Illinois TRM version 3.0 – Section 5.3.7
Programmable Thermostats	Varies	Varies	therms/household	Illinois TRM version 3.0 – Section 5.3.11
High Efficiency Boilers	Varies	Varies	therms/unit	Illinois TRM version 3.0 – Section 5.3.6
Storage Water Heaters	Varies	Varies	therms/unit	Illinois TRM version 3.0 – Section 5.4.2

Source: Navigant analysis

The GPY4 HEER tracking database provided most input parameters necessary to calculate savings using the Illinois TRM version 3.0.

### 3.4 Development of the Verified Gross Realization Rate

Navigant determined verified gross realization rates by comparing the ex ante gross savings with the verified gross savings. The results are shown below.

**Table 3-3. Verified Gross Realization Rates**

Measure	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Realization Rate
High Efficiency Furnace	3,954,229	3,951,255	1.00
Programmable Thermostat	662,754	784,507	1.18
High Efficiency Boiler	34,715	34,700	1.00
Storage Water Heater	5,156	5,011	0.97
<b>TOTAL</b>	<b>4,656,854</b>	<b>4,775,472</b>	<b>1.03</b>

Source: Utility tracking data and Navigant analysis

### 3.5 Verified Gross Program Impact Results

As shown in the table above, the largest relative savings discrepancy was in programmable thermostat measure which received a realization rate of 1.18. Additionally, the storage water heater measure received a realization rate of 0.97.

The ex ante gross savings for programmable thermostats were consistently slightly lower than the verified gross savings for the measure. This is because the ex ante savings estimates used Gas Heating Consumption values from the Illinois TRM v2.0 instead of the more current Illinois TRM v3.0. The Gas Heating Consumption values in version 3.0 are higher than those found in version 2.0, resulting in higher overall savings for the measure as well as the program as a whole.

Navigant determined the verified gross savings for storage water heaters to be lower than the ex ante gross savings because one project (Vendor Project ID PRJ-359676) showed ex ante gross savings of 162.4 therms in the tracking database. This is significantly higher than any other storage water heater project’s savings. The most likely reason for this a clerical error.

The resulting total program verified gross savings is 4,775,472 therms as shown in the following table.

**Table 3-4. Verified Gross Impact Savings Estimates**

	Gross Energy Savings (Therms)
Ex Ante GPY4 Gross Savings	4,656,854
Verified Gross Realization Rate	1.03‡
Verified Gross Savings	4,775,472

Source: Utility tracking data and Navigant analysis.

‡ Based on evaluation research findings

## 4. Net Impact Evaluation

For GPY4, SAG<sup>4</sup> deemed the NTGR value of 0.79 to calculate net savings for Nicor Gas. Table 4-1 shows the verified GPY4 net savings by measure type.

**Table 4-1. Verified Net Savings by Measure**

Measure	Verified Gross Savings (therms)	Verified Net Savings (Therms)
High Efficiency Furnace	3,951,255	3,121,491
Programmable Thermostat	784,507	619,760
High Efficiency Boiler	34,700	27,413
Storage Water Heater	5,011	3,958
<b>TOTAL</b>	<b>4,775,472</b>	<b>3,772,623</b>

Source: Utility tracking data and Navigant analysis

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<sup>4</sup> Documentation available from the Illinois SAG web site at: <http://www.ilsag.info/net-to-gross-framework.html>

## 5. Process Evaluation

### 5.1 Program Changes

The primary program change in GPY4 was separating the Home EER Program from the ComEd Heating, Cooling, and Weatherization program. The Home EER program no longer offers the combined rebate (the Combined System Replacement, or CSR) for participants purchasing both high efficiency furnaces and central air conditioning units as of GPY4. Customers are still able to receive a rebate from ComEd for a qualifying air conditioning unit but need to apply directly to ComEd. This may have a small impact on overall participant satisfaction because customers are now required to submit two separate applications, but this does not appear to have an impact on program participation or savings.

The program also removed several measures at the beginning of GPY4, including bathroom and kitchen aerators, showerheads, hot water pipe insulation, and high efficiency windows. These measures represented approximately 3% of the overall program participation in GPY3; therefore their removal is unlikely to have a significant impact on participating customers. By eliminating these measures with lower participation and savings, the program can reduce processing costs and focus program resources on the measures with higher participation and savings.

### 5.2 QA/QC Activities

As part of the process evaluation, Navigant reviewed the Home EER Program QA/QC procedures as presented in the Nicor Gas Home Rebates PY4 Quality Assurance/Quality Control Plan as provided by CLEAResult. Navigant compared the QA/QC procedures to the California Best Practices Self-Benchmarking Tool.<sup>5</sup> The results of the comparison are included in Table 5-1. The Home EER Program QA/QC plan thoroughly explains the participation requirements, the rebate processing logic, and the data and information controls.

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<sup>5</sup> Available at <http://eebestpractices.com/benchmarking.asp>. The Best Practices materials and web site are managed by Pacific Gas and Electric Company under the auspices of the California Public Utility Commission in association with the California Energy Commission, San Diego Gas and Electric, Southern California Edison, and Southern California Gas Company.



**Table 5-1. QA/QC Best Practices and Navigant Assessment**

Best Practices	Navigant Assessment
Use measure product specification in program requirements & guidelines	Exceeds Requirement - The QA/QC plan explains the measure requirements clearly and thoroughly.
Verify accuracy of rebates, coupons, invoices to ensure the reporting system is recording actual product installations by target market	Meets Requirement
Develop inspection and verification procedures during the program design phase	Meets Requirement
Consider administrative cost in designing the verification strategy	Meets Requirement
Provide quick and timely feedback to applicants	Meets Requirement
Ensure that inspectors have adequate training in identifying and explaining reasons for failure	Meets Requirement
Use the inspection and verification function as a training tool	Unclear – Navigant recommends adding language to the QA/QC plan to explain how the results of inspections will be included in future trade ally training documents and presentations.
Establish a streamlined inspection scheduling process	Meets Requirements
Build in statistical features to the sampling protocol to allow reduction in required inspections based on observed performance and demonstrated quality work	Not applicable. Given the number of participating contractors in the program, Navigant approves the current QA/QC procedure of randomly selecting residential sites, while also including installations done by contractors whom the program have received complaints about.

*Source: Best Practices from California Best Practices Self-Benchmarking Tool. Assessment from Navigant.*

## 6. Findings and Recommendations

This section summarizes the key impact and process findings and recommendations.

### Program Savings

**Finding 1.** The Nicor Gas Home EER Program achieved 3,772,623 verified net therms savings for GPY4, and had 20,351 program participants. Nicor Gas achieved 244 percent of its GPY4 savings goal of 1,545,100 +therm savings. Ninety-two percent of the program savings were from high efficiency furnace participants.

### Tracking System

**Finding 2.** The customer specific values for Gas Boiler Load and Gas Furnace Heating Load are not listed in the tracking data, though the ex ante savings estimates appear to use the correct values.

**Recommendation 1.** Navigant recommends including fields for Gas Boiler Load and Gas Furnace Heating Load in the tracking database to accurately capture all necessary information for gross savings calculations.

**Finding 3.** Six “Furnace, >95% - Early Retire” projects list an existing AFUE value of 80% in the tracking data, although the ex ante savings estimates appear to use an existing AFUE value of 64.4% (the Illinois TRM v3.0 default value for early retirement furnaces with an unknown existing AFUE).

**Recommendation 2.** Navigant recommends using the known existing AFUE value when available to calculate gross savings for early retirement furnaces. This gives the most accurate estimate of actual savings.

### Gross Realization Rates

**Finding 4.** The ex ante gross savings for programmable thermostats were consistently slightly lower than the verified gross savings for the measure. This is because the ex ante savings estimates used Gas Heating Consumption values from the Illinois TRM v2.0 instead of the more current Illinois TRM v3.0. The Gas Heating Consumption values in version 3.0 are higher than those found in version 2.0, resulting in higher overall savings for the measure as well as the program as a whole.

**Recommendation 3.** The IC should be sure to use the most current version of the Illinois TRM when calculating ex ante savings estimates. This will make evaluation savings adjustments less likely.

### Process Evaluation

**Finding 5.** The program is no longer offering a joint rebate with ComEd (the Complete System Replacement [CSR] program) as of the start of GPY4. The program also eliminated several measures with very low savings and participation. By simplifying the program and focusing on the higher saving measures, the program resources can be used more effectively.

**Finding 6.** The Quality Assurance/Quality Control Plan provided by CLEAResult met or exceeded the California Best Practices in almost every area. Navigant determined that the program did not need to allow for a reduction in required inspections based on observed performance and demonstrated quality work, because of the larger number of participating contractors in the program. However, Navigant found that it was unclear

if the program uses the inspection and verification function as a training tool for participating contractors.

**Recommendation 4.** QA/QC Plan should include information about how the program is using the results of the inspection and verification process in its training materials for participation contractors. If the program does not currently use the results of the inspection and verification process in its contractor training process, Navigant suggests that Nicor Gas and CLEAResult develop a plan to include them in future program years.