

**Nicor Gas  
Business Custom Incentive Program  
GPY3 Evaluation Report**

**Final**

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

**Presented to  
Nicor Gas Company**

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## E. Executive Summary

This report presents a summary of the findings and results from the impact and process evaluation of gas program year 3 (GPY3)<sup>1</sup> of the Nicor Gas Business Custom Incentive Program (Custom Program). The Custom Program is targeted to active commercial and industrial customers of Nicor Gas. It provides these customers with rebate incentives for the installation of natural gas-related energy improvements that are not specified for a prescriptive rebate under the Nicor Gas Business Energy Efficiency Rebate program. The program relies on wholesale and retail trade allies to assist in the marketing of this program. Trade ally support and engagement is considered to be a key element to the success of this program.

No major changes were introduced to the program during the GPY3 period. The majority of the savings from the measures installed in GPY3 were derived from furnace and boiler updates, installation of VFDs, EMS and controls, and burner and economizer replacements. The GPY3 impact evaluation approach involved on-site measurement and verification (M&V) and engineering desk review, and applying the necessary research to verify the reported savings or adjustments to reported savings. The GPY3 process evaluation included interviews with program staff and the implementation contractor staff to gather information about program performance, measures, and the tracking system. The Custom Program was implemented in GPY3 by CLEAResult for the Nicor Gas Rider 30 Energy Efficient Portfolio period.

### E.1. Program Savings and Results Summary

The Nicor Gas Business Custom Program achieved a 107 percent research finding gross realization rate. The verified net savings for the Custom Program is based on a 0.73 net-to-gross (NTG) ratio estimated<sup>2</sup> from a combined GPY2 and GPY3 population of projects and participant self-reported responses from telephone interviews conducted in GPY2 and GPY3, based on the research approach outlined in the Nicor Gas evaluation plan for GPY3.<sup>3</sup>

Table E-1 summarizes the natural gas savings from the Custom Program. The Custom Program achieved a verified net savings of 4,251,356 therms. The Custom Program verified net savings is 86 percent of the GPY3 planned goal of 4,941,250 net therms.<sup>4</sup>

<sup>1</sup> The GPY3 program year began June 1, 2013 and ended May 31, 2014.

<sup>2</sup> *Net-to-Gross Ratio Estimate for use in PY3 for the Nicor Gas Custom Program*, Navigant Memorandum, December 15, 2014

<sup>3</sup> Email attachment *Nicor Gas GPY3 Portfolio Evaluation Plans 2014-07-01 final* from Kevin Grabner on July 1, 2014.

<sup>4</sup> Nicor Rider 30 4<sup>th</sup> Quarterly Report PY3 ICC Filing, Order Docket 10-0562.

**Table E-1. GPY3 Custom Program Total Savings**

Savings Category	Energy Savings
Ex Ante Gross Savings (Therms)	5,430,141
Ex Ante Net Savings (Therms)	3,964,003
Verified Gross Savings (Therms)	5,823,776
Verified Net Savings (Therms)	4,251,356
Verified Gross Realization Rate	1.07‡
Net to Gross Ratio (NTG)	0.73‡‡

Source: Navigant analysis of GPY3 program tracking data (November 12, 2014 data)

‡Based on evaluation research findings from GPY3 tracking data and sample M&V

‡‡Based on evaluation research findings from combined GPY2/GPY3 participant self-reported interviews

Table E-2 summarizes the program savings by project strata. The overall 107 percent research finding gross realization rate was estimated at  $\pm 6\%$  relative precision at 90% confidence level. The NTG ratio of 0.73 was estimated at  $\pm 6\%$  relative precision at 90% confidence level.

**Table E-2. GPY3 Custom Program Savings by Project Savings Strata**

Savings Strata	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate‡	Verified Gross Savings (Therms)	NTG‡‡	Verified Net Savings (Therms)
1	2,383,559	1.19	2,842,383	0.73	1,950,504
2	1,046,231	0.88	923,296	0.73	674,006
3	2,000,351	1.03	2,058,096	0.73	1,502,410
<b>Total</b>	<b>5,430,141</b>	<b>1.07</b>	<b>5,823,776</b>	<b>0.73</b>	<b>4,251,356</b>

Source: Navigant analysis of GPY3 program tracking data (November 12, 2014 data)

‡Based on evaluation research findings from GPY3 tracking data and sample M&V

‡‡Based on evaluation research findings from a combined GPY2/GPY3 participant self-reported interviews

## E.2. Impact Estimate Parameters

The evaluation used a variety of parameters in the course of estimating verified gross and net savings. These parameters were derived based on evaluation research from participant surveys or through EM&V impact analysis. The key parameters used in the analysis are shown in Table E-3 below.

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

Parameter	Data Source	Deemed or Evaluated?
Quantity of measures installed	Program tracking data	Evaluated
Net-to-Gross Ratio (NTGR)	Evaluation Research	Evaluated
Verified Gross Realization Rate	Evaluation Research	Evaluated
Participant Survey Sample Size	Program Tracking Data/Evaluation Research	Evaluated
NTGR Confidence Interval/Precision	Program Tracking Data/Evaluation Research	Evaluated
On-site M&V Sample Size	Program Tracking Data/Evaluation Research	Evaluated
Engineering Desk Review Sample	Program Tracking Data/Evaluation Research	Evaluated

Source: Utility tracking data and Navigant analysis.

### ***E.3. Participation Information***

As shown in Table E-4 the Custom Program implemented 98 projects (+34 percent from GPY2) from 89 participants (+44 percent from GPY2). The program did not reach its GPY3 savings goal partly due to delays or cancellations of pipeline projects in the last period of the program cycle.<sup>5</sup> There have been generally lower project counts but greater savings per project versus plans in the Custom Program, which is a trend observed from the previous years of the Rider 30 program implementation.<sup>6</sup>

**Table E-4. GPY3 Custom Program Primary Participation Detail**

Participation	Nicor Gas GPY3 Custom Program
Implemented Projects	98
Business Participants	89
Projects/Participant	1.10
Ex Ante Therms/Project	55,410

Source: Utility tracking data and Navigant analysis.

<sup>5</sup> According to statements from the Nicor Rider 30 4<sup>th</sup> Quarterly Report PY3 ICC Filing, Order Docket 10-0562.

<sup>6</sup> The Custom Program achieved only 33% of the GPY3 project count participation goal. The Rider 30 Custom Program participation goals were 67 (GPY1), 204 (GPY2), and 295 (GPY3) making a total of 566 projects. The Rider 30 three year portfolio achieved 35% of expected participation and 76% of the net savings goal (Source: Nicor Gas Energy Efficiency Plan 2011-2014, Revised Plan Filed Pursuant to Order Docket No. 10-0562).

The majority of the savings from the Custom Program measures installed in GPY3 are derived from furnace and boiler updates, installation of VFDs, EMS and controls, and burner and economizer replacement.

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

The following provides insight into key program findings and recommendations.

##### **Program Savings Goals Attainment**

**Finding 1.** The GPY3 Custom Program achieved verified net savings of 4,251,356 therms. The GPY3 net program savings was 14 percent less than the filed net savings goal of 4,941,250 therms.<sup>7</sup> The verified net savings fell short of goal partly due to project delays or cancellation of pipeline projects late in the program year. The program, however, increased net energy savings by 39 percent compared with GPY2. Navigant observed that about half of the GPY3 paid projects were completed within the last quarter of the program year. We did not research the reasons for the delays and concentration of project completions in the final quarter.

**Recommendation 1a.** Recognizing that the Rider 30 Custom Program did not meet its savings goal since GPY1 may require that Nicor Gas review the program targets, incentive and bonus offerings, available financing options and other non-energy incentives to stimulate new growth. These are potential topics for evaluation research if Nicor Gas chooses to make the Custom Program a larger part of the portfolio in future years.

**Recommendation 1b.** The impact of lower gas prices on relatively capital intensive custom project implementation should be a research focus to assess the importance of this barrier on participation and identify ways to stimulate new participant interests or projects that have high energy savings potential relative to investment.

##### **Savings Verification Process**

**Finding 2.** The Parallel Path baseline early review process (“Parallel Path process”) initiated in GPY2 and continued into GPY3 benefited the implementation contractor’s pre-approval savings review process and the final ex ante project savings estimates and thus minimized evaluation adjustments to savings assumptions for those projects at the end of the GPY3 evaluation cycle. The Parallel Path process also helped Navigant to minimize the number of sample points randomly selected to achieve a 90/10 precision and confidence level on the research gross realization rates. Navigant verified that, ten (10) out of the twelve (12) M&V sample projects had their savings adjusted with research gross realization rates from 0.77 to 1.26. Only one Parallel Path project was randomly selected as part of the M&V sample.

**Recommendation 2.** Considering that several projects were delayed until the last period (half of GPY3 projects were completed in Q4 of GPY3) and considering that 10 out of 12 M&V sample projects received some adjustment in the wave one sample draw (conducted on projects completed early in the program year), the GPY4 evaluation will consider quarterly sampling or at least two waves of sampling and M&V field work, and provide

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<sup>7</sup> Nicor Rider 30 4<sup>th</sup> Quarterly Report PY3 ICC Filing, Order Docket 10-0562.

early feedback on projects that require additional verification on savings. This exercise will be coordinated with the ongoing Parallel Path process.

### Verified Gross Realization Rates

**Finding 3.** The research finding gross realization rate is 107 percent (down from 129 percent in GPY2) estimated at  $\pm 6\%$  relative precision at 90% confidence level. Six (6) out of the 12 M&V sample had their ex ante savings adjusted upwards with research gross realization between 1.01 and 1.26. For these projects the adjustments were primarily due to weather-normalized billing analysis using TMY3<sup>8</sup> data instead of actual weather data used in the energy savings model or due to updated efficient-case equation to properly reflect the utility data. Four (4) other projects had their ex ante savings adjusted with research gross realization rates below 1.00 to 0.77 due to updated hours of use data or changes in equipment capacity or efficiency. Two sample projects had no adjustment to their claimed savings. One type of savings adjustment observed in prior years and other jurisdictions occurs when the claimed project savings is the sum from multiple like-units. Downward savings adjustment occurs when the evaluation finds that some verified units have reduced or zero savings because they are redundant, they have not had a key control strategy implemented, or unit-specific data collection confirmed a unit did not fit a generalized operating assumption made for the group.

**Recommendation 3a.** The implementation contractor should work with evaluation to review the program's post inspection procedures to improve accuracy in the finalized ex ante savings estimation. Unless a project is so large that the site verification must have a sampling plan, evaluation will attempt to verify savings for 100 percent of installed units individually, and then sum to the total. Recognizing the cost and customer burden from two full inspections, CLEAResult should consider whether a joint or coordinated post-inspection procedure with evaluation could be worked out to minimize customer burden and evaluation risk.

**Recommendation 3b.** For projects that require weather normalization models for savings calculation, CLEAResult should consider using TMY data where applicable.

### Net-to-Gross Ratio

**Finding 4.** Navigant calculated a NTG ratio of 0.73 based on evaluation research conducted on GPY2 and GPY3 participants. This value is an increase of one percent compared to the NTG ratio of 0.72 calculated in GPY2. The NTG ratio of 0.73 was estimated at  $\pm 6\%$  relative precision at 90% confidence level.

**Recommendation 4.** The NTG ratio of 0.73 was deemed for the next program cycle (GPY5) as this estimated value appears to confirm the level of free ridership among the Custom Program participants.

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<sup>8</sup> The typical meteorological year (TMY) data sets are available through the National Renewable Energy Laboratory web site at [http://rredc.nrel.gov/solar/old\\_data/nsrdb/1991-2005/tmy3/](http://rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/). The TMY3s are data sets of hourly values of solar radiation and meteorological elements for a 1-year period. Their intended use is for computer simulations of solar energy conversion systems and building systems to facilitate performance comparisons of different system types, configurations, and locations in the United States and its territories.

## 1. Introduction

### 1.1 Program Description

This report presents a summary of the findings and recommendations from the impact and process evaluation of gas program year 3 (GPY3)<sup>9</sup> of the Nicor Gas Business Custom Incentive Program (Custom Program). The Custom Program provides business customers with financial incentives for the installation of natural gas-related energy improvements that are not specified for a prescriptive rebate under the Nicor Gas Business Energy Efficiency Rebate program or other Nicor Gas programs. Participants span a range of market segments and can receive incentives for a wide variety of natural gas saving technologies. Typical market segments for this program may include light and heavy industry, steel and metal working, plastics compounding and processing, hospitals, food processing, hotels, commercial laundry and other process heating intensive businesses. Large centrally-heated multifamily buildings and office buildings are also target segments for this program.

The Custom Program staff work with both trade allies and decision-makers at larger facilities to identify and quantify efficiency opportunities at their facilities. Interested customers must first submit a letter of interest and a pre-approval application to the program. The initial application includes usage history and detailed calculations and specifications for the project. Program staff review the customer's initial reported savings and screen projects using an internal cost-benefit test. Prior to issuing an approval notice, pre and post installation inspections are performed, where applicable. The Custom Program requires that a project's initial application be pre-approved prior to the start of the project.

No major changes were introduced to the program during the GPY3 period. The majority of the savings from the measures installed in GPY3 were derived from furnace and boiler updates, installation of VFDs, EMS and controls, and burner and economizer replacements. The GPY3 impact evaluation approach involved on-site measurement and verification (M&V) and engineering desk review, and applying the necessary research to verify the reported savings or adjustments to reported savings.

The evaluation through the Parallel Path process provided early feedback on baseline gross impact assumptions research for some GPY3 projects as was done in GPY2 prior to final approval. The evaluation conducted early net-to-gross (NTG) research on a sample of GPY3 participants and combined results with the GPY2 population of projects and participant self-reported telephone interviews to determine the GPY3 NTG and program verified net savings. The GPY3 process evaluation included interviews with program staff and the implementation contractor staff to verify information about program performance, measures, and the tracking system. The Custom Program was implemented in GPY3 by CLEAResult for the Nicor Gas Rider 30 Energy Efficient Portfolio period.

### 1.2 Evaluation Objectives

The evaluation team identified the following key objectives for GPY3 evaluation:

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<sup>9</sup> The GPY3 program year began June 1, 2013 and ended May 31, 2014.

- 1) Provide an independent estimate of the net therm savings produced by the program.
- 2) Continue to provide early feedback on baseline gross impact assumptions for projects selected by the implementation contractor.
- 3) Conduct net-to-gross (NTG) research to assess and quantify participating customer free ridership for GPY3 and future deeming.
- 4) Interview program staff and the implementation contractor to assess the effectiveness of the administration and implementation of the program, and
- 5) Verify if the program met its GPY3 goals and if not, suggest what can be done to improve participation.

## 2. Evaluation Approach

This section describes the analytic methods and data collection activities implemented as part of the GPY3 impact and process evaluation of the Custom Program, including the data sources and sample designs used as a basis for the data collection activities. This evaluation reflects the third full-scale year of program operation.

During GPY3, 89 facilities participated in the Custom Program and a stratified random sample of 12 projects was verified by Navigant either through on-site visits or engineering file reviews. Navigant conducted evaluation research for NTG analysis consisting of interviews with program participants for free ridership and spillover assessment. Navigant also conducted interviews with program and implementation staff as part of the process evaluation.

### 2.1 Overview of Data Collection Activities

The key evaluation activities to estimate the evaluation research finding gross and net energy savings of the Custom Program were:

- Conducted a participant telephone survey targeting a sample of the Custom Program population.
- Conducted an engineering review of the tracking database entries.
- Implemented a stratified random sampling design to select 12 projects for gross impact verification from the population of Custom Program completed projects, and collected the project documents from the IC to conduct M&V activities including engineering file reviews, telephone verifications and on-site verifications.

Program tracking data were requested from the program IC including:

- Contact information for participating customers and trade allies including name, address, and telephone number.
- Date of participation.
- Number and type of measures installed.
- Tracked gross savings estimates.
- Project specific program files.

The process analysis reflects input from the program manager and implementation contractor interviews as well as the telephone surveys of program participants. Participant free ridership and spillover were calculated using an algorithm approach based on survey self-report data using the combined data for GPY2 and GPY3.<sup>10</sup>

The full set of data collection activities is shown in Table 2-1 below.

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<sup>10</sup> *Net-to-Gross Ratio Estimate for use in PY3 for the Nicor Gas Custom Program*, Navigant Memorandum, December 15, 2014

**Table 2-1. GPY3 Custom Program Core Data Collection Activities**

N	What	Who	Target Completes	Completes Achieved	When	Comments
<i>Impact Assessment</i>						
1	Engineering File Reviews	Participant Sample	12	12	September - November 2014	All projects underwent either on-site M&V Audit or Telephone M&V Audit.
2	On-site M&V Audit	Participant Sample	10 of 12	10 of 12	September - November 2014	Data collection supporting gross impact study
3	Telephone M&V Audit and Desk File Review	Participant Sample	2 of 12	2 of 12	September - November 2014	Data collection supporting gross impact study
4	Telephone Survey	Program Participants Sample	7	7	October – December 2014	Data collection supporting NTG and process analysis in the same instrument.
<i>Process Assessment</i>						
5	In Depth Interviews	PM/IC Staff	2	2	May 2014	Data collection supporting limited process study.

## 2.2 Verified Gross and Net Savings Parameters

Navigant evaluated verified gross and net savings resulting from the GPY3 Custom Program. This section describes the analytic methods implemented as part of the GPY3 impact evaluation of the Custom Program.

### 2.2.1 Verified Gross Program Savings Analysis Approach

The objective of this aspect of the impact evaluation was to verify the accuracy of the reported GPY3 ex ante gross energy savings values in the final Custom Program tracking database submitted to the evaluation team on November 12, 2014. The savings reported in the tracking database were evaluated through engineering review at the measure-level for a sample of 12 projects, preparation of a detailed, site-specific impact evaluation report for each sampled project, and quality control review of the ex post impact estimates and implementation of any necessary revisions.

On-site or telephone verification activities were conducted on all 12 projects in the file review sample. The on-site and telephone verification activities sought to develop independent research finding gross estimates of energy savings, and to update, refine, or replace the calculation procedures that were submitted as part of the final application submittal.

### 2.2.1.1 Gross Impact M&V Sample

For the GPY3 gross impact evaluation, sampling was conducted on paid projects in the tracking database. A statistically significant sample based on 90/10 confidence/precision levels for program-level savings was drawn for the gross savings verification. Table 2-2 provides a profile of the gross impact verification sample for the Custom Program in comparison with the population.

**Table 2-2. GPY3 Custom Program Gross Impact Sample by Strata**

Population Summary			M&V Sample		
Sampling Stratum	Number of Projects (N)	Ex Ante Gross Savings (therms)	Number of Projects (N)	Ex Ante Gross Savings (therms)	Sampled % of Population (% therms)
1	8	2,383,559	2	707,279	30%
2	8	1,046,231	2	357,882	34%
3	82	2,000,351	8	119,685	6%
<b>TOTAL</b>	<b>98</b>	<b>5,430,141</b>	<b>12</b>	<b>1,184,846</b>	<b>22%</b>

*Source: Navigant analysis of Nicor Gas tracking database*

### 2.2.2 Verified Net Program Savings Analysis Approach

Navigant calculated verified net energy savings by multiplying the verified gross savings estimates by the program NTG ratio. The evaluation team's net-to-gross estimate for GPY3 combined the GPY2 and GPY3 population of projects and participant self-reported responses from telephone interviews conducted in GPY2 and GPY3, as outlined in the Nicor Gas evaluation plan for GPY3. The detailed methodology is provided in Appendix 7.1.2.

#### 2.2.2.1 Free-Ridership

Participant free-ridership assessment was conducted to support the GPY3 NTG research. A total of 7 participants were interviewed for this effort, in addition to the other 16 that were interviewed in GPY2. See the Appendix for details on participant free-ridership algorithms and results.

#### 2.2.2.2 Spillover

Participant spillover assessment was conducted to support the NTG research. A total of 7 participants were interviewed for this effort, in addition to the other 16 that were interviewed in GPY2. See the Appendix for details on participant spillover algorithms and results.

## 2.3 Process Evaluation

The GPY3 process evaluation activities included in-depth interviews with program staff and implementation staff to assess program design, program performance, the effectiveness of program implementation, and the tracking system.

### 3. Gross Impact Evaluation

This section presents the Custom Program impact evaluation results, including a tracking system review. Gross impact results are also provided below.

#### 3.1 Tracking System Review

Navigant requested the program tracking data from the IC to aid in the evaluation efforts. The Navigant evaluation team performed an independent verification of the program tracking database to determine whether the database included an appropriate level of inputs, outliers, missing values, and potentially missing variables. The purpose of the tracking system review was to ensure that the system gathered the necessary data to support future program evaluation and to allow program managers to monitor key aspects of program performance at regular intervals. The team concluded that the tracking system provided by the IC included necessary data for evaluation and program performance monitoring.

#### 3.2 Program Volumetric Findings

The Custom Program implemented 98 projects (+34% from GPY2) from 89 participants (+44% from GPY2). The program installed 99 measures of 23 different types, with 8 percent increase in measure count from GPY2. The key GPY3 volumetric findings are summarized in Table 3-1.

**Table 3-1. GPY3 Custom Program Volumetric Findings Detail**

Detail	Value
Participants	89
Measure Types	23
Measures Installed	99
Total Projects	98
Total Ex Ante Gross Savings (Therms)	5,430,141
Ex Ante Gross Therms/Project (Therms)	55,410
Ex Ante Gross Therms/Participant (Therms)	61,013
Total Incentives Amount (\$)	4,023,112

*Source: Navigant analysis*

The GPY3 program met 33 percent of its participation goal due partly to delays or cancellations of pipeline projects in the last period of the program cycle or due to the generally lower participation in the Custom Program, as observed from the previous years of the Rider 30 program implementation. The GPY3 program however achieved an ex ante gross savings of 5,430,141 therms, an increase of 64 percent in comparison to GPY2, with an average savings per project increase of 22 percent in GPY3 compared to GPY2.

Navigant provides the year to year volumetric differences and total Rider 30 program performance in Table 3-2.

**Table 3-2. Rider 30 Custom Program Performance Yearly Comparison**

Program Result	GPY1	GPY2	GPY3	Rider 30 Totals
Ex Ante Gross Therms	1,622,380	3,317,145	5,430,141	10,369,666
Verified Gross Therms	1,492,590	4,263,751	5,823,776	11,580,117
Realization Rate	0.92	1.29	1.07	1.12
Total Installed Measures	42	92	99	233
Unique Projects <sup>11</sup>	28	73	98	199
Business Participation	28	62	89	179
Projects/Participant	1.00	1.18	1.10	1.11
Gross Therms/Project	57,942	45,440	55,410	52,109
Incentives Paid (\$)	1,015,210	2,095,092	4,023,112	7,133,414

Source: Navigant analysis of GPY3 tracking data; GPY1 and GPY2 Final Evaluation Reports.

### 3.3 Gross Program Impact Parameter Estimates

The program parameters used for evaluating the program are summarized in Table 3-3 below.

**Table 3-3. GPY3 Custom Program Verified Gross Savings Parameters**

Input Parameters	Value	Deemed or Evaluated?
Research finding Realization Rate on Ex Ante Gross Savings	1.07	Evaluated
Measure Type and Eligibility	Varies	Evaluated
Participants	89	Evaluated
M&V Sample	12	Evaluated
Gross Savings per Measure	Custom	Evaluated

Source: Navigant analysis.

### 3.4 Development of the Verified Gross Realization Rate

The program verified gross realization rate (RR) was determined by calculating the ratio of the verified gross savings to the reported ex ante gross savings. Weighted realization rates by strata were calculated for the Custom Program. Results are detailed in Table 3-4 below.

<sup>11</sup> The Rider 30 Custom Program targeted participations were 67 (GPY1), 204 (GPY2), and 295 (GPY3) making a total of 566 projects. The GPY3 program achieved only 33% of the targeted participation. The Rider 30 portfolio achieved only 35% of expected participation (Source: Nicor Gas Energy Efficiency Plan 2011-2014, Revised Plan Filed Pursuant to Order Docket No. 10-0562)

**Table 3-4. GPY3 Custom Program Verified Gross Realization Rate**

Sample Strata	Projects in Sample	Projects in Population	Sample Based Ex Ante Gross Savings (therms)	Sample Based Verified Gross Savings (therms)	Sample Based Verified Gross RR
1	2	8	707,279	843,427	1.192
2	2	8	357,882	315,830	0.882
3	8	82	119,685	123,140	1.029
<b>Total</b>	<b>12</b>	<b>98</b>	<b>1,184,846</b>	<b>1,282,397</b>	<b>1.072</b>

Source: Navigant analysis

### 3.5 Verified Gross Program Impact Results

This section provides the gross impact findings based on results from the engineering file reviews, on-site verification and telephone verification activities.

The results of the sample-based research findings are summarized in the Table 3-5 below. The therm-weighted research finding sample gross realization rate was 1.072 at a relative precision of  $\pm 6$  percent at 90 percent confidence level. The resulting total program verified gross savings is 5,823,776 therms. The detailed calculations and discussion are presented in Appendix 7.1.1.

**Table 3-5. GPY3 Custom Program Ex Ante and Verified Gross Therms**

Sample Strata	Projects in Sample	Projects in Population	Sample Based Ex Ante Gross Savings (therms)	Sample Based Verified Gross Savings (therms)	Population Based Ex Ante Gross Savings (therms)	Population Based Verified Gross Savings (therms)
1	2	8	707,279	843,427	2,383,559	2,842,383
2	2	8	357,882	315,830	1,046,231	923,297
3	8	82	119,685	123,140	2,000,351	2,058,096
<b>Total</b>	<b>12</b>	<b>98</b>	<b>1,184,846</b>	<b>1,282,397</b>	<b>5,430,141</b>	<b>5,823,776</b>

Source: Navigant analysis

Out of the twelve (12) M&V sample projects six (6) had their ex ante savings adjusted upwards after the evaluation verification with research finding gross realization between 1.01 and 1.26. For these projects the adjustments were primarily due to weather-normalized billing analysis using TMY3 data instead of actual weather data used in the energy savings model or due to updated efficient-case equation to properly reflect the utility data. Four (4) other projects had their ex ante savings adjusted

below 1.00 to 0.77 due to updated hours of use data or changes in equipment capacity or efficiency. Two projects did not have adjustment to their claimed savings. Only one out of the seven Parallel Path projects in GPY3 was randomly selected as part of the M&V sample, and this project had a realization rate of 1.26.<sup>12</sup>

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<sup>12</sup> Only Parallel Path project NG02-114 was randomly selected as part of the M&V sample for onsite verification.

## 4. Net Impact Evaluation

Per SAG<sup>13</sup> direction, the Navigant team calculated the NTGR value in GPY3 and applied it retrospectively to the calculated verified gross savings. The evaluation team calculated verified net savings of 4,251,356 therms for the GPY3 Custom Program using the NTG research findings presented in Table 4-1. The net savings estimates are presented in Table 4-2 below and are statistically significant at a 90/6 confidence level and relative precision. The detailed methodology is provided in Appendix 7.1.2.

**Table 4-1. GPY3 Custom Program Research Finding Net Impact Parameter Estimates**

Parameter	Value	Deemed or Evaluated?	Source Notes
Participant Interviews	23	Evaluated	GPY2 & GPY3 Participant interview responses
Free-ridership	0.27	Evaluated	GPY2 & GPY3 EM&V analysis based on participant interview responses
Spillover	0.0	Evaluated	GPY2 EM&V analysis based on participant interview responses
Research finding overall NTG Ratio	0.73	Evaluated	GPY2 & GPY3 EM&V analysis based on participant interview responses

Source: Navigant analysis

As presented in Table 4-2, the GPY3 Custom Program had verified net savings of 4,251,356 therms.

**Table 4-2. GPY3 Custom Program Verified Net Savings by Savings Strata**

Savings Strata	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate <sup>†</sup>	Verified Gross Savings (Therms)	NTG <sup>†</sup>	Verified Net Savings (Therms)
1	2,383,559	1.19	2,842,383	0.73	2,074,940
2	1,046,231	0.88	923,297	0.73	674,006
3	2,000,351	1.03	2,058,096	0.73	1,502,410
<b>Program Total</b>	<b>5,430,141</b>	<b>1.07</b>	<b>5,823,776</b>	<b>0.73</b>	<b>4,251,356</b>

Source: Utility tracking data and Navigant analysis.

<sup>†</sup> Based on evaluation research findings.

<sup>13</sup> [http://ilsagfiles.org/SAG\\_files/Meeting\\_Materials/2013/August 5-6, 2013 Meeting/Nicor Gas NTG Results and Application GPY1-3.pdf](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,2013/Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf).

## 5. Process Evaluation

The process evaluation of the Custom Program in GPY3 solely focused on interviews with program staff and the implementation contractor staff to verify information about marketing and outreach strategies made in GPY3 that impacted customer and trade ally participation and satisfaction, the effectiveness of program implementation, and the tracking system.

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

## 6. Findings and Recommendations

This section summarizes the key evaluation findings and recommendations. This section is repeated in its entirety in the Executive Summary.

### Program Savings Goals Attainment

**Finding 1.** The GPY3 Custom Program achieved verified net savings of 4,251,356 therms. The GPY3 net program savings was 14 percent less than the filed net savings goal of 4,941,250 therms.<sup>14</sup> The verified net savings fell short of goal partly due to project delays or cancellation of pipeline projects in the last period of the program year. Navigant observed that about half of the GPY3 paid projects were completed within the last quarter of the program year. We did not research the reasons for delay. The program however increased net energy savings by 39 percent compared to GPY2.

**Recommendation 1a.** Recognizing that the Rider 30 Custom Program did not meet its savings goal since GPY1 may require that Nicor Gas review the program targets, incentive and bonus offerings, available financing options and other non-energy incentives to stimulate new growth, if Nicor Gas chooses to make the Custom Program a larger part of the portfolio in future years.

**Recommendation 1b.** The impact of lower gas prices on relatively capital intensive custom project implementation should be a research focus to assess the importance of this barrier on participation and identify ways to stimulate new participant interests or projects that have high energy savings potential relative to investment.

### Savings Verification Process

**Finding 2.** The Parallel Path process initiated in GPY2 and continued into GPY3 benefited the implementation contractor's pre-approval savings review process and the final ex ante project savings estimates and thus minimized evaluation adjustments to savings assumptions for those projects at the end of the GPY3 evaluation cycle. The Parallel Path process also helped Navigant to minimize the number of sample points randomly selected to achieve a 90/10 precision and confidence level on the research gross realization rates. Navigant verified that, ten (10) out of the twelve (12) M&V sample projects had their savings adjusted with research gross realization rates from 0.77 to 1.26. Only one Parallel Path project was randomly selected as part of the M&V sample.

**Recommendation 2a.** Considering that several projects were delayed until the last period (half of GPY3 projects were completed in Q4 of GPY3) and considering that 10 out of 12 M&V sample projects received some adjustment in the wave one sample draw (conducted on projects completed early in the program year), the GPY4 evaluation will consider quarterly sampling or at least two waves of sampling and M&V field work, and provide early feedback on projects that require additional verification on savings. This exercise will be coordinated with the ongoing Parallel Path process.

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<sup>14</sup> Nicor Rider 30 4<sup>th</sup> Quarterly Report PY3 ICC Filing, Order Docket 10-0562.

### Verified Gross Realization Rates

**Finding 3.** The research finding gross realization rate is 107 percent (down from 129 percent in GPY2) estimated at  $\pm 6\%$  relative precision at 90% confidence level. Six (6) out of the 12 M&V sample had their ex ante savings adjusted upwards with research gross realization between 1.01 and 1.26. For these projects the adjustments were primarily due to weather-normalized billing analysis using TMY3 data instead of actual weather data used in the energy savings model or due to updated efficient-case equation to properly reflect the utility data. Four (4) other projects had their ex ante savings adjusted with research gross realization rate below 1.00 to 0.77 due to updated hours of use data or changes in equipment capacity or efficiency. Two sample projects had no adjustment to their claimed savings. One type of savings adjustment observed in prior years and other jurisdictions occurs when the claimed project savings is the sum from multiple like-units. Downward savings adjustment occurs when the evaluation finds that some verified units have reduced or zero savings because they are redundant, they have not had a key control strategy implemented, or unit-specific data collection confirmed a unit did not fit a generalized operating assumption made for the group.

**Recommendation 3a.** The implementation contractor should work with evaluation to review the program's post inspection procedures to improve accuracy in the finalized ex ante savings estimation. Unless a project is so large that the site verification must have a sampling plan, evaluation will attempt to verify savings for 100 percent of installed units individually, and then sum to the total. Recognizing the cost and customer burden from two full inspections, CLEAResult should consider whether a joint or coordinated post-inspection procedure with evaluation could be worked out to minimize customer burden and evaluation risk.

**Recommendation 3b.** For projects that require weather normalization models for savings calculation, CLEAResult should consider using TMY data where applicable.

### Net-to-Gross Ratio

**Finding 4.** Navigant calculated a NTG ratio of 0.73 based on evaluation research conducted on GPY2 and GPY3 participants. This value is an increase of one percent compared to the NTG ratio of 0.72 calculated in GPY2. The NTG ratio of 0.73 was estimated at  $\pm 6\%$  relative precision at 90% confidence level.

**Recommendation 4a.** The NTG ratio of 0.73 was deemed for the next program cycle (GPY5) as this estimated value appears to confirm the level of free ridership among the Custom Program participants.

## 7. Appendix

### 7.1 Detailed Impact Research Findings and Approaches

#### 7.1.1 Gross Impact Results

##### Gross Impact Sampling

A sample of 12 projects was drawn from the implementation contractor program tracking database of a population of 98 projects. Only one out of the seven Parallel Path projects in GPY3 was randomly selected as part of the M&V sample (a majority of Parallel Path projects were paid later into the program year and so were not included in the sampling).<sup>15</sup> Projects were classified into three strata according to the level of savings to determine verified gross realization rates based on a planned target of 90/10 confidence and precision level for program-level verified gross savings. A thorough engineering review of the algorithms used by the program to calculate energy savings, and the assumptions that feed into those algorithms, was conducted for all 12 sampled projects. The savings evaluation approaches were then classified into one of two categories, 1) reasonable and acceptable, or 2) needs revision based on evaluation findings. On-site measurement and verification (M&V) was conducted for 10 out of the 12 sampled projects based on IPMVP protocols. Telephone verification to support the engineering review was performed for the remaining 2 sampled projects. A profile of the sample selection is shown below in Table 7-1. Navigant reviewed the sample to verify that there is an accurate representation by measure technology and business type within the overall sample.

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<sup>15</sup> Only Parallel Path project NG02-114 was randomly selected as part of the M&V sample for onsite verification.

**Table 7-1. GPY3 Custom Program Profile of Gross Impact Sample by Savings Strata**

Population Summary				Sample Summary		
Strata	End Use Type	Number of Projects (N)	Ex Ante Gross Savings (Therms)	Number of Projects (n)	Ex Ante Gross Savings (Therms)	Sampled Therms % of Population
1	Compressed Air, Furnace, Variable Frequency Drives	8	2,383,559	2	707,279	30%
2	Boiler, Furnace, Heat Exchangers, HVAC, Process Heat, Refractory, Regenerative Thermal Oxidizer	8	1,046,231	2	357,882	34%
3	Boiler, Building Shell, Burner / Economizer Replacement, Destratification Fans, Dock Seals, Energy Management System, Equipment Sealing, Food Service – Kitchen Hood, Furnace, Grain Dryer, Heat Exchangers, Hot Water, HVAC, Insulation, Process Heat, Refrigeration, Storage Tank, Other	82	2,000,351	8	119,685	6%
<b>Total</b>		<b>98</b>	<b>5,430,141</b>	<b>12</b>	<b>1,184,846</b>	<b>22%</b>

Source: Utility tracking data and Navigant analysis.

### Engineering Review of Project Files

For each sampled project, an in-depth review of the project files was performed to assess the engineering methods, parameters and assumptions used to generate all ex ante impact estimates. For each measure in the sampled project, evaluation team engineers estimated ex post gross savings based on their review of documentation and engineering analysis.

To support this review, CLEAResult provided project documentation in electronic format for each sampled project. Documentation included some or all scanned files of hardcopy application forms and supporting documentation from the applicant (invoices, measure specification sheets, and

vendor proposals), pre-inspection reports and photos (when required), post inspection reports and photos (when conducted), and calculation spreadsheets.

### **On-Site Verification**

An analysis plan was developed for each of the 10 projects selected for on-site verification. Each plan explained the general gross impact approach to be used (including monitoring plans), provided an analysis of the current inputs (based on the application and other available sources at that time), and identified sources needed to verify data or obtain newly identified inputs for the ex post gross impact approach. The engineer assigned to each project first called each customer to set up an appointment for the visit and explained the activities that would be taking place. On-site verification was then completed for the subset of 10 projects. The on-site verification visits included interviews with the customer, visual inspection of the installed systems and equipment, and spot measurements and short-term monitoring (e. g., less than four weeks) when required. In addition, data identified in the analysis plan was collected including records such as measured temperatures, data from equipment logs, equipment nameplate data, system operation sequences and operating schedules, and a careful description of site conditions that might contribute to baseline selection.

All engineers who conducted the on-site verification visits are trained and experienced in completing inspections for related types of projects. Each carried properly calibrated equipment required to conduct the planned activities. They checked in with the site contact upon arrival at the business, and checked out with that same site contact, or a designated alternate, upon departure. All information collected during the audit was recorded and verified for completeness before leaving the site.

### **Telephone Verification**

An analysis plan was developed for each of the 2 remaining sampled projects that underwent telephone verification. Each plan explained the general gross impact approach to be used, provided an analysis of the current inputs (based on the application and other available sources at that time), and identified sources needed to verify data or obtain newly identified inputs for the ex post gross impact approach. The engineer assigned to each project first called each customer to set up an appointment for the telephone interview and explained the nature of the verification telephone call. Telephone verification was then completed for the subset of 2 projects. The verification interviews included questions to the customer about the installed systems and equipment and any other data identified in the analysis plan that was needed for evaluation including records such as measured temperatures, data from equipment logs, equipment nameplate data, system operation sequences and operating schedules, and a careful description of site conditions that might contribute to baseline selection.

All engineers who conducted the telephone verification interviews are trained and experienced in completing evaluations for related types of projects. All information collected during the telephone interview was documented and verified for completeness before terminating the interview with the customer.

### **Site-Specific Impact Estimates**

Annual energy impacts were developed for each of the 12 sampled projects based on the data gathered on-site and via telephone, supplemental monitoring data, application information, and, in some cases, billing or interval data. Energy savings calculations are accomplished using methods that include short-term monitoring-based assessments, simulation modeling (e. g. , DOE-2), bin models, application of ASHRAE methods and algorithms, analysis of pre- and post-installation billing and interval data, and other specialized algorithms and models.

### **Research Findings for the Gross Impact Sample**

Table 7-2 below presents a summary of the research findings for the 12 sampled projects to provide insight into the engineering review, on-site verification and telephone verification research findings.

**Table 7-2. GPY3 Custom Program Summary of Sample EM&V Results**

Project ID	Measure Description	Research Finding Gross Realization Rate	Summary of Adjustment
NG02-054	Furnace Replacement	1.01	Adjustment due to analysis of additional post-implementation run-time and gas usage data.
NG02-065	Heat Exchanger Installation	0.99	Adjustment due to updated hours of use data collected during on-site visit.
NG02-089	Boiler Control System	1.24	Adjustment due to weather-normalized billing analysis using TMY3 data.
NG02-099	175HP Atlas Copco Air Compressor with Heat Recovery System	1.00	No adjustments necessary.
NG02-106	Waste Water Recovery and Heat Exchanger Installation	0.90	Adjustment due to change in equipment boiler efficiency compared to information provided by the customer.
NG02-114	Main Furnace upgrade	1.26	Adjustment due to updated efficient-case equation to properly reflect the utility data in the project files.
NG02-131	Furnace Replacement	0.77	Adjustment due to changes in HVAC usage due to poor building envelope and less ambient heat from the more efficient furnace.
NG03-004	Boiler Replacement	1.15	Adjustment due to billing analysis using TMY3 weather data rather than actual weather data in the energy savings model. The actual weather data was on average warmer than TMY3 data.
NG03-007	Burner Replacement	1.07	Adjustment due to updated hours of use data.
NG03-034	Furnace Refractory Replacement and Insulating Collars and Socks Installation	1.00	No adjustments necessary.
NG03-036	Burner Replacement	1.13	Adjustment due to billing analysis using TMY3 weather data rather than actual weather data in the energy savings model. The actual weather data was on average warmer than TMY3 data.
NG03-046	Draft Regulator Installation	0.83	Adjustment due to correction of the equipment capacity.

Source: Utility tracking data and Navigant analysis.

The project specific research finding gross realization rates and strata weighted gross realization rates are provided in Table 7-3.

**Table 7-3. GPY3 Gross Realization Rate Results for the Selected Sample by Project and Strata**

Sampled Project ID	Sample-Based Ex Ante Gross Savings (Therms)	Sampling Strata	Project-Specific Research Finding Gross Realization Rate	Sample-Based Research Finding Gross Savings (Therms)	Weighted Sample-Based Research Finding Gross Realization Rate
NG02-054	189,677	1	1.01	190,704	1.192
NG02-114	517,602	1	1.26	652,723	
NG02-131	183,107	2	0.77	141,055	0.88
NG03-034	174,775	2	1.00	174,775	
NG02-065	42,284	3	0.99	41,794	1.03
NG02-089	13,925	3	1.24	17,288	
NG02-099	24,405	3	1.00	24,405	
NG02-106	13,194	3	0.90	11,823	
NG03-004	9,143	3	1.15	10,481	
NG03-007	864	3	1.07	925	
NG03-036	10,747	3	1.13	12,155	
NG03-046	5,123	3	0.83	4,269	
<b>TOTAL</b>	<b>1,184,846</b>	<b>-</b>	<b>1.08</b>	<b>1,282,397</b>	<b>1.07</b>

Source: Utility tracking data and Navigant analysis.

The relative precision at 90 percent level of confidence for the sample is provided in Table 7-4. The mean research findings gross realization rate for the overall sample was 1.07 at a relative precision of  $\pm 6$  percent at 90 percent confidence level.

**Table 7-4. Gross Therms Relative Precision and Realization Rates at 90% Confidence Level**

Sampling Strata	Relative Precision at 90% Level of Confidence ( $\pm$ %)	Low	Mean	High	Standard Error
1	9%	1.09	1.19	1.29	0.06
2	13%	0.77	0.88	1.00	0.07
3	6%	0.97	1.03	1.09	0.03
<b>Overall Therms RR</b>	<b>6%</b>	<b>1.01</b>	<b>1.07</b>	<b>1.14</b>	<b>0.04</b>

Source: Navigant analysis

### 7.1.2 Net Program Impact Results

A net-to-gross (NTG) ratio of 0.73 was calculated in GPY3. This section provides additional details of the NTG research effort. The evaluation team's NTG estimate for GPY3 combined the GPY2 and GPY3 population of projects and participant self-reported responses from telephone interviews conducted in GPY2 and GPY3, as outlined in the Nicor Gas evaluation plan for GPY3.

#### Research NTGR Sampling Approach

The Custom Program population of completed projects for GPY2 and GPY3 were combined for the overall participant customer free ridership research. In GPY2, a sample of 16 projects was drawn from the population of 78 projects to calculate the program free ridership of 0.28. In GPY3, an additional 7 sample projects were drawn from the 28 projects completed through the midpoint of the program year to support early free ridership research. The combined GPY2 and GPY3 sampled projects resulted in a total of 23 sampled projects. The population of projects completed in GPY2 and up to the midpoint of GPY3 was 101 projects (73 from GPY2 and 28 from GPY3). The final population of completed projects for both program years was 171 projects (73 from GPY2 and 98 from GPY3).

**Table 7-5. GPY3 Custom Program Combined NTG Sample**

Method	Subject	Target Completes	Actual Completes	Completed
Telephone Survey	GPY2 Program Participants and Trade Allies	≤20	16	December 2013
Telephone Survey	GPY3 Mid-Year Program Participants and Trade Allies	≤10	7	July 2014

*Source: Utility tracking data and Navigant analysis*

Projects were stratified at the tracking record level using the population ex ante gross thermos savings. Strata were defined by project size, based on ex-ante gross energy savings boundaries that placed about one-third of program-level savings into either a large, medium, or small stratum. Strata boundaries were defined to match the same boundaries defined for the GPY2 sample draw. Navigant found that the type of measures installed through the two program years, the program delivery structure, and the project sizes did not changed substantially.

Navigant attempted to contact all trade allies noted by the customers as being highly influential (a rating of 7 or higher) during the customer free ridership survey to confirm and incorporate the customer score for the trade ally, or to investigate further spillover effects. No participant spillover research was done in GPY3. The participant spillover research from the GPY2 resulted in a spillover of zero based on the 16 participant interviews completed.

The NTG ratio was calculated using the participating customer free-ridership rate and spillover resulting from the GPY2 and GPY3 evaluations. The algorithm is as follows:

$$NTG_{Program\ research\ calculation} = 1 - FR_{Part.} + SO_{Part.}$$

Where  $NTG_{Program\ research\ calculation}$  = Program NTG resulting from evaluation research

$FR_{Part.}$  = Program Participant Free-Ridership.

$SO_{Part.}$  = Program Participant Spillover.

Table 7-6 below presents the sources for the parameters used in the verified gross savings analysis.

**Table 7-6. GPY2 and GPY3 Custom Program Combined NTG Research Savings Parameter Data Sources**

Parameter	Data Source	Deemed or Evaluated?
Research Findings Net-to-gross Ratio (NTGR)	GPY2 and GPY3 Evaluation Research	Evaluated
Participating Customer Free Ridership	GPY2 and GPY3 Evaluation Research	Evaluated
Participating Customer Spillover	GPY2 Evaluation Research	Evaluated

Source: Evaluation Research

#### 7.1.2.1 Free-Ridership

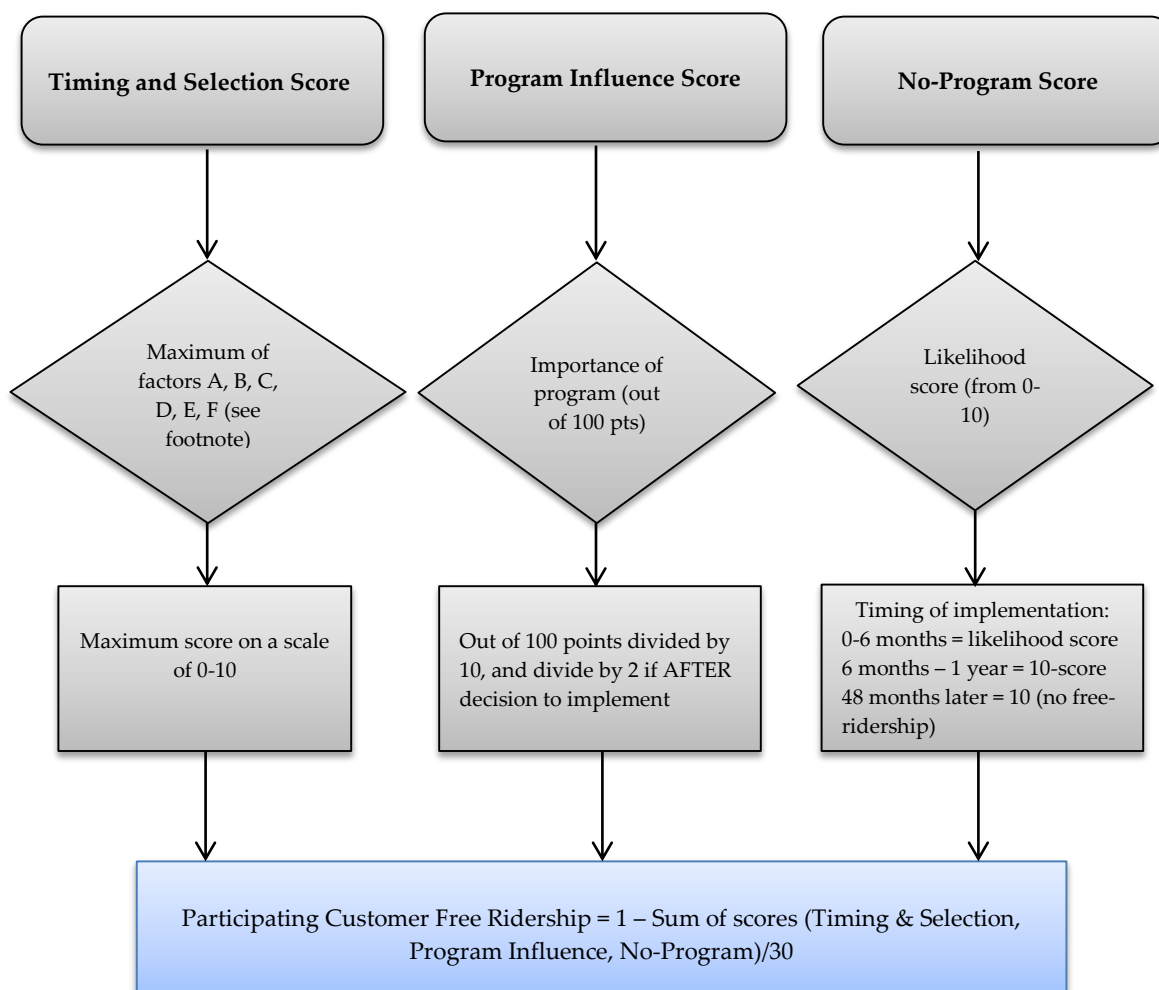
The participating customer free ridership method calculates participant free-ridership using data collected during participant telephone interviews covering the three scoring items of Timing and Selection Score<sup>16</sup> (reflects the influence of the most important of various program and program-related elements in the customer's decision to select a specific program measure at the time), Program Influence Score (captures the perceived importance of the program whether rebate, recommendation, or other program intervention), and No-Program Score (captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available).

Based on the free-ridership methodology presented in Figure 7-1. the algorithm for determining participating customer free ridership score is shown below.

$$Participating\ Customer\ Free\ Ridership = 1 - Average [(Timing\ \&\ Selection\ Score + Program\ Influence\ Score + No\ Program\ Influence\ Score)]$$

<sup>16</sup> Timing and Selection score on a scale of 0-10 takes the maximum of the following factors: A. Availability of the program incentive; B. Vendor Score (when triggered by customer and interviewed); C. Recommendation from a Nicor Gas program representative; D. Information from utility or program marketing materials; E. Endorsement or recommendation by Nicor Gas account manager; F. Other factors (recorded verbatim)

**Figure 7-1. Participant Free-Ridership Algorithm**



In a Standard Rigor Free-Ridership Assessment, program influence through vendor or a contractor is incorporated into the Timing and Selection score, if a follow-up interview has been triggered by the customer, and where the customer had not already assigned a maximum program influence score to one of the other program components. The purpose of this additional component is to assess the influence of the program on vendors for programs that are vendor-driven, where the utility has specific outreach and assistance efforts targeting vendors.

The Vendor Score is the maximum (on a scale of 0 to 10) of the following factors where 10 is associated with no free-ridership due to program influence:

1. [Score= response, on scale of 0 to 10] On a scale of 0 to 10 where 0 is not at all important and 10 is extremely, how important was the program, including incentives as well as program services and information, in influencing your decision to recommend that <customer> install the energy efficiency measure at this time?

2. [Score= 10 minus the response, on a scale from 0 to 10] And using a 0 to 10 likelihood scale where 0 is not at all likely and 10 is extremely likely, if the program, including incentives as well as program services and information, had not been available, what is the likelihood that you would have recommended this specific <measure> to <customer>?

**Table 7-7. GPY2 and GPY3 Custom Program Combined Free Ridership Sampling Analysis**

Strata	Sample (Customer Ex Ante Gross Therms)		Population (Customer Ex Ante Gross Therms)		Free Ridership
	Count	Therms	Count	Therms	Strata FR
1	3	1,812,987	10	3,678,944	0.24
2	9	1,334,994	15	2,023,343	0.37
3	11	480,266	146	3,044,999	0.25
<b>Program Overall</b>	<b>23</b>	<b>3,628,247</b>	<b>171</b>	<b>8,7472,86</b>	<b>0.27</b>
<b>Percent Sample Therms of Population (GPY2 &amp; GPY3)</b>					<b>41%</b>

Source: Navigant research

From the analysis of the 23 participating customer interview responses, Navigant estimated program participant average free ridership of 0.27 at  $\pm 6$  percent overall relative precision at 90 percent confidence level, as shown in Table 7-8.

**Table 7-8. Nicor Gas GPY2 and GPY3 Custom Program Combined Free Ridership and Relative Precision at 90% Confidence Level**

Sample Strata	Project Population	Sample Interviews	Relative Precision ( $\pm$ %)	NTG Low	NTG Mean	NTG High
1	10	3	3%	0.74	0.76	0.79
2	15	9	15%	0.54	0.63	0.72
3	146	11	16%	0.63	0.75	0.87
<b>Total</b>	<b>171</b>	<b>23</b>	<b>6%</b>	<b>0.68</b>	<b>0.73</b>	<b>0.77</b>

Source: Navigant research

#### 7.1.2.2 Spillover

The existence of participating customer spillover was examined in GPY2 using survey self-report data. Participants were asked about whether they implemented any additional energy efficiency measures at their facility being interviewed about or at different facility within Nicor Gas' service territory. Participants were also asked to rank how influential their experience participating in the

program was on the decision to implement the measures the installed. The difference between measures installed through the program and newly installed program qualified measures was potential spillover.

A program participant spillover of zero was calculated for GPY2 participants using the following algorithm:

$$\text{Participating Customer Spillover} = [(\text{Savings Associated with Additional High Efficiency Measures} / \text{Total Participant Savings})] * \text{Program Influence Score}$$

Table 7-9 shows the estimated parameters that led to a research finding NTG of 0.73.

**Table 7-9. GPY3 Custom Program Research Finding Net-to-Gross Estimate**

Parameter	Value	90/10 Significance	Data Source
Participant Customer Free-Ridership	0.27	Yes	Telephone Surveys of GPY2 and GPY3 participating customers and trade allies
Participant Customer Spillover	0.00	No	Telephone Survey of GPY2 participating customers
NTGR (= 1-FR+SO)	0.73	Yes	
Confidence and Precision (90/10)	±6%	Yes	

Source: Evaluation Team analysis.

## 7.2 Data Collection Instruments

### 7.2.1 Participating Customer Survey Guide

The survey guide used for interviews with participating customers is below.

#### EARLY NTG PARTICIPANT SURVEY – NICOR GAS BUSINESS CUSTOM DRAFT

##### INTRODUCTION

Hello, this is \_\_\_\_\_ from \_\_\_\_\_ calling on behalf of Nicor Gas. This is not a sales call. May I please speak with <PROGRAM CONTACT>?

Our records show that <COMPANY> purchased a <MEASURE DESCRIPTION>, which was recently installed and received an incentive of <INCENTIVE AMOUNT> from Nicor Gas. When signing the application form, as a part of the programs terms and conditions, you also agreed to support evaluation efforts of Nicor Gas' Business Custom Incentive Program, which includes participating in surveys like this one. I was told you're the person most knowledgeable about the financial decision making process for this project. Is this correct? [\[IF NOT, ASK TO BE TRANSFERRED TO MOST KNOWLEDGABLE PERSON OR RECORD NAME & NUMBER.\]](#)

This survey will take about 30 minutes. Is now a good time? [\[If no, schedule call-back\]](#)

1. Can you briefly describe the company you work for and the type of business it conducts? About how many are employed at your company? What type of business does you company primarily serve?
2. Can you briefly summarize your roles and responsibilities at your company? For how long have you carried these out?

##### SCREENING QUESTIONS

A0 Which of the following statements best characterizes your relation to <COMPANY>?  
[\[READ LIST\]](#)

- 1 I am an employee of <COMPANY> [\[THIS CATEGORY SHOULD INCLUDE THE OWNER/PRESIDENT/PARTNER ETC. OF THE COMPANY.\]](#)
- 2 My company provides energy-related services to <COMPANY>
- 3 I am a contractor and was involved in the installation of energy efficient equipment for this project
- 77 OTHER, SPECIFY [\[PUT OWNER/PRESIDENT/PARTNER ETC. OF THE COMPANY IN 1\]](#)
- 88 DON'T KNOW
- 99 REFUSED

[IF A0A = 3: Thank and Terminate]

[READ if A0 < 1] This survey asks questions about the energy efficiency equipment upgrades for which <COMPANY> received an incentive at <ADDRESS>. Please answer the questions from the perspective of <COMPANY>. For example, when I refer to “YOUR COMPANY”, I am referring to <COMPANY>. If you are not familiar with certain aspects of the project, please just say so and I will skip to the next question.

For the Sake of brevity, I will be referring to the Business Custom Incentive Program simply as “the Program”.

A1 Just to confirm, between June 1, 2012 and May 31, 2013 did <COMPANY> participate in the Program at <ADDRESS>? [IF NEEDED] This is a program where your business received an incentive for the completion of a natural-gas saving project.

- 1 Yes, participated as described
- 2 Yes, participated but at another location
- 3 No, did not participate in program
- 77 OTHER, SPECIFY
- 88 DON'T KNOW
- 99 REFUSED

[SKIP A2 IF A1=1,2]

A2. Is it possible that someone else dealt with the energy-efficient project installation?

- 1 Yes, someone else dealt with it
- 2 No
- 77 OTHER, SPECIFY
- 88 DON'T KNOW
- 99 REFUSED

[IF A2=1, ASK TO BE TRANSFERRED TO THAT PERSON. IF NOT AVAILABLE, THANK AND TERMINATE. IF AVAILABLE, GO BACK TO A1]

[IF A1 = 2, 3, 77, 88, 99, THANK AND TERMINATE. RECORD DISPO AS “COULD NOT CONFIRM PARTICIPATION”.]

Before we begin, I want to emphasize that this survey will only be about the <END USE> you installed through the Program at <ADDRESS>.

A3. I'd like to confirm some information in Nicor Gas' database. Our records show that you completed a <ENDUSE> project and received an incentive from the Program. Is this correct?

- 1 Yes
- 2 No
- 88 DON'T KNOW
- 99 REFUSED

[ASK IF A3 = 2]

- A3a Did you complete any project that received an incentive from the Program?
- 1 Yes [\[RECORD MEASURE NAME\]](#)
  - 2 No
  - 88 DON'T KNOW
  - 99 REFUSED

[\[IF A3A = 2, 88, 99: Thank and Terminate, Record Dispo as "Could Not Confirm Measures"\]](#)

MM1 Who identified and recommended that you install the < Type of measure installed; from program tracking dataset >? [\[DO NOT READ LIST\]](#)

- 1 ME/SOMEONE ELSE WITHIN COMPANY
- 2 CONTRACTOR
- 3 ENGINEER
- 4 ARCHITECT
- 5 MANUFACTURER
- 6 DISTRIBUTOR
- 7 OWNER
- 8 NICOR GAS REPRESENTATIVE/PROGRAM STAFF
- 77 OTHER, SPECIFY
- 88 DON'T KNOW
- 99 REFUSED

MM2 And who informed you about the availability of an incentive through Program? [\[DO NOT READ LIST\]](#)

- 1 SELF/SOMEONE AT FIRM
- 2 CONTRACTOR
- 3 ENGINEER
- 4 ARCHITECT
- 5 MANUFACTURER
- 6 DISTRIBUTOR
- 7 NICOR GAS ACCOUNT MANAGER
- 8 OWNER/DEVELOPER
- 9 PROJECT MANAGER
- 10 NICOR GAS REPRESENTATIVE/PROGRAM STAFF
- 77 OTHER, SPECIFY
- 88 DON'T KNOW
- 99 REFUSED

I'd like to ask you a few questions about the equipment that was removed when you installed the <ENDUSE> through the Program.

## REMOVED EQUIPMENT

MS1 Did the <END USE> you installed through the Program replace old or outdated equipment at this facility, or was it an addition of new equipment?

- 1 Replacement/Upgrade old or outdated equipment
- 2 Addition of new equipment
- 88 DON'T KNOW
- 99 REFUSED

[ASK MS2 – MS4 if MS1 = 1]

MS2 Approximately how old was the equipment it replaced?  
RECORD ESTIMATED AGE IN YEARS - RANGE 0 TO 100

- 88 DON'T KNOW
- 99 REFUSED

[IF RESPONDENT HAS TROUBLE ESTIMATING AGE OF EQUIPMENT]

MS2a Approximately in what year was the existing equipment purchased?  
RECORD APPROXIMATE YEAR OF PURCHASE - RANGE 1900 TO 2012

- 88 DON'T KNOW
- 99 REFUSED

MS3 How much longer do you think it would have lasted?  
RECORD ESTIMATE NUMBER OF YEARS - RANGE 0 TO 100

- 88 DON'T KNOW
- 99 REFUSED

MS4 Which of the following statements best describes the performance and operating condition of the equipment you replaced?

- 1 Existing equipment was fully functional
- 2 Existing equipment was functioning, but with minor problems
- 3 Existing equipment was fully functioning, but with significant problems
- 4 Existing equipment had failed or did not function.
- 5 Not applicable, ancillary equipment (VSD, EMS, controls, etc.)
- 77 OTHER, SPECIFY
- 88 DON'T KNOW
- 99 REFUSED

## NET-TO-GROSS MODULE

I'd now like to ask a few questions about the < Type of measure installed; from program tracking dataset > you installed through the program. Please note, when I refer to 'you', I am referring to the firm that you work for. Also, if you are unfamiliar with any aspects of the project mentioned here on out, please say so.

N00 In deciding to do a project of this type, there are usually a number of reasons that it may be undertaken. In your own words, can you tell me the primary reason that you decided to implement this project? [\[PROBE\]](#) Were there any other reasons?

RECORD REASONS [UP TO 3]

88 DON'T KNOW

99 REFUSED

N1a Was the < Type of measure installed; from program tracking dataset > project already part of a capital budget before you learned about the Program?

1 Yes, it was already part of the budget

2 No, it was not part of the budget

3 Company does not have a capital budget

88 DON'T KNOW

99 REFUSED

[\[ASK N1b IF N1a or N1 = 2, 8, 9\]](#)

N1b Did you learn of the Incentive Program before or after you budgeted for, or initially planned to implement, this < Type of measure installed; from program tracking dataset > measure?

1 Before [\[SKIP TO N3\]](#)

2 After

88 DON'T KNOW

99 REFUSED

N2 Did you learn about Nicor Gas' Program before or after you decided to implement the **high efficiency** < Type of measure installed; from program tracking dataset > measure that was installed?

1 Before

2 After

88 DON'T KNOW

99 REFUSED

N3 Next, I'm going to ask you to rate the importance of different factors that might have influenced your decision to implement this **higher efficiency** < Type of measure installed; from program tracking dataset > project. Think of the degree of importance as being shown on a scale with equally spaced units from 0 to 5, where 0 means not at all important and 5 means extremely important. Using this scale, please rate the importance of each of the following in your decision to implement the <END USE> **at this time**.

[\[FOR N3a - N3n\]](#)

RECORD 0 to 5

66 Not Applicable

88 DON'T KNOW

99 REFUSED

[IF NEEDED] How important was...

[SKIP N3a IF MS1 = 2]

N3a The age or condition of the replaced equipment

N3b The availability of the Program incentive

N3d A recommendation from an equipment vendor or contractor that helped you with the choice of the equipment

N3e Previous experience with the measure

N3f Recommendation from a Nicor Gas program representative

N3h Information from the Program or any Nicor Gas marketing materials

N3i A recommendation from a design or consulting engineer

N3j The standard practice in your business/industry

N3k Endorsement or recommendation by your Nicor Gas account manager

N3l Corporate policy or guidelines

N3m Payback on the investment

N3n Were there any other factors we haven't discussed that were influential in your decision to install this **higher efficiency** < Type of measure installed; from program tracking dataset > measure?

OTHER - RECORD

55 Nothing Else

88 DON'T KNOW

99 REFUSED

[ASK N3nn IF N3n IS NOT 55, 88, 99]

N3nn. Using the same zero to 5 scale, how would you rate the influence of this factor?

RECORD 0 to 5

66 NOT APPLICABLE

88 DON'T KNOW

99 REFUSED

Thinking about this a little differently, I would like you to compare the importance of the program with the importance of other factors in implementing the higher efficiency < Type of measure installed; from program tracking dataset > project.

You just told me that the following other factors were important:

[READ IN ONLY ITEMS WHERE THEY GAVE A RATING OF 3 or higher]

- N3a Age or condition of old/replaced equipment,
- N3e Experience with this type of equipment
- N3j Standard practice in your business/industry
- N3l Corporate policy or guidelines
- N3n RESPONSE FROM N3n

N3p If you were given a TOTAL of 100 points that reflect the importance in your decision to implement the < Type of measure installed; from program tracking dataset >, and you had to divide those 100 points between: 1) the program and 2) all other factors, how many points would you give to the importance of the PROGRAM?

RECORD POINTS FROM 0 to 100

- 888 DON'T KNOW
- 999 REFUSED

[CALCULATE VARIABLE "OTHERPTS" AS: 100 MINUS N3p RESPONSE

IF N3p = 888, 999, SET OTHERPTS = BLANK]

N3o And how many points would you give to other factors?

RECORD POINTS FROM 0 to 100

- 888 DON'T KNOW
- 999 REFUSED

[The response should be <OTHERPTS> because both numbers should equal 100. If response is not <OTHERPTS> ask INC1]

[ASK INC1 IF N3p and N3o do not add up to 100]

INC1 The last question asked you to divide a total of 100 points between the program and other factors. You just noted that you would give <N3p RESPONSE> points to the program. Does that mean you would give <OTHERPTS> points to other factors?

- 1 Yes
- 2 No
- 88 DON'T KNOW
- 99 REFUSED

[IF INC1=2, go back to N3p]

[CONSISTENCY CHECK]

[ASK IF TWO OR MORE OF N3a, N3e, N3j, N3l > 4 AND OTHERPTS < 30]

N4a Earlier you stated that factors other than the program were very important, but you gave all other factors a rating of <OTHERPTS>. Can you help me understand why you gave them this rating?

RECORD RESPONSE

- 88 DON'T KNOW

99 REFUSED

[ASK IF TWO OR MORE OF N3b, N3f, N3h, N3k > 4 AND N3p RESPONSE < 30]

N4a Earlier you stated that various aspects of the program were very important, but you gave all other factors a rating of < N3p RESPONSE >. Can you help me understand why you gave them this rating?

RECORD RESPONSE

88 DON'T KNOW

99 REFUSED

Now I would like you to think about the action you would have taken with regard to the installation of this equipment if the Nicor Gas incentive had not been available.

N5 Using a likelihood scale from 0 to 5, where 0 is "Not at all likely" and 5 is "Extremely likely", if the utility **program** had **not** been available, what is the likelihood that you would have installed exactly the same project or efficiency of equipment?

RECORD 0 to 5

88 DON'T KNOW

99 REFUSED

[ASK IF N5 > 0, ELSE SKIP TO N8]

N7 You indicated earlier that there was a <N5 RESPONSE> in 5 likelihood that you would have installed the exactly the same project or efficiency of equipment if the program had not been available. Without the program, when do you think you would have installed the < Type of measure installed; from program tracking dataset >? Would you say...

1 At the same time

2 Earlier

3 Later

4 NEVER

88 DON'T KNOW

99 REFUSED

[ASK N7a IF N7 = 3]

N7a. How much later would you have completed the < Type of measure installed; from program tracking dataset > project? Would you say...

1 Within 6 months?

2 6 months to less than 1 year later?

3 1 to less than 2 years later?

4 2 to less than 3 years later?

5 3 to less than 4 years later?

6 4 or more years later

88 Don't know

99 Refused [DON'T READ]

## PROCESS MODULE

I'd now like to ask you a few general questions about your participation in the program.

### Program Processes and Satisfaction

S1 Did you fill out the application forms for the project? (Either the initial or the final program application)

- 1 Yes
- 2 No
- 88 DON'T KNOW
- 99 REFUSED

[ASK S1baIF S1 = 1 ELSE SKIP TO S1e]

S1a Did the application forms clearly explain the program requirements and how to participate?

- 1 Yes
- 2 No
- 3 Somewhat
- 88 DON'T KNOW
- 99 REFUSED

S2 How would you rate your overall satisfaction with the program? Please use a scale of 0 to 5 where 0 is "not at all satisfied" and 5 is "very satisfied"

S3 In what ways can the program be improved?

- RECORD RESPONSE
- 88 DON'T KNOW
- 99 REFUSED

*Thank you for your participation in this survey. Nicor Gas will use this feedback to serve you better.*