Business Energy Efficiency Rebate Program GPY2 Evaluation Report

Final

Energy Efficiency Plan: Gas Plan Year 2 (6/1/2012-5/31/2013)

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E. Executive Summary

This report presents a summary of the findings and results from the Impact and Process Evaluation of the program year two (GPY2) Nicor Gas Business Energy Efficiency Rebate Program (BEER program)[1]. The BEER Program provides incentives to increase the market share of new, highly efficient space heating, water heating, and commercial kitchen equipment as well as cost-effective improvement and additions to existing equipment. Participants must purchase and install equipment covered by the program. A rebate form must be filled out and submitted within 90 days of installation. Customers may receive a rebate without pre-approval for participation. 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 measure mix during the GPY2 period. The majority of the savings from the measures installed in GPY2 are derived from deemed values contained in the Illinois Technical Reference Manual (TRM)[2]. The GPY2 evaluation involved verifying the compliance of the BEER program to the TRM or applied necessary research adjustments to non-deemed savings. Additional secondary research was conducted to verify the reasonableness of the TRM steam trap savings assumptions and algorithm. The evaluation did not conduct participant free ridership analysis in GPY2, but relied on the Illinois Energy Efficiency Stakeholder Advisory Group (SAG)[3] approved value from the GPY1 program evaluation as a deemed estimate of the GPY2 program net impact. The scope of the GPY2 evaluation included additional net-to-gross (NTG) research to assess and quantify participating trade ally free ridership and spillover, and non-participating trade ally spillover to enable future refinement of program verified net savings estimation. The process evaluation effort in GPY2 was limited to interviews with participating and non-participant trade allies to examine their influence, challenges and satisfaction with the program. The BEER program is implemented by CLEAResult, formerly Resource Solutions Group (RSG), for the Nicor Gas Rider 30 Energy Efficient Portfolio period.

E.1. Program Savings

Table E-1 summarizes the natural gas savings from the BEER program.

[1] The GPY2 program year began June 1, 2012 and ended May 31, 2013.

[2] State of Illinois Energy Efficiency Technical Reference Manual. Final as of September 14th, 2012. Effective June 1st, 2012.

[3] See http://www.ilsag.info/ for more information on the SAG and net-to-gross framework.

Table E-1. GPY2 Total Program Natural Gas Savings

Savings Category	Energy Savings (Therms)
Ex Ante Gross Savings (Therms)	3,314,210
Ex Ante Net Savings (Therms)	2,685,959
Verified Gross Savings (Therms)	3,314,314
Verified Net Savings (Therms)	2,419,449
Verified Gross Realization Rate	1.00 ‡
Net to gross ratio (NTG)	0.73†

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

E.2. Program Savings

Table E-2 summarizes the program savings by measure end-use category.

Table E-2. Nicor Gas BEER GPY2 Program Results by Measure End-use Category

Rebate Measure Kind	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate‡	Verified Gross Savings (Therms)	NTG‡	Verified Net Savings (Therms)	Sample (90/10 Significance?)
Boiler Controls	8,532	1.00‡	8,531	0.73†	6,228	NA
Boiler Tune-Up	201,171	1.00‡	201,171	0.73†	146,855	NA
Boilers	79,188	1.00‡	79,188	0.73†	57,807	NA
Commercial Kitchen	83,634	1.00‡	83,634	0.73†	61,053	NA
Furnaces	54,879	1.00‡	54,879	0.73†	40,061	NA
Pipe Insulation	183,642	1.00‡	183,642	0.73†	134,059	NA
Pool Cover	28,859	1.00‡	28,859	0.73†	21,067	NA
Programmable Thermostats	73,514	1.00‡	73,514	0.73†	53,665	NA
Space Heating	23,588	1.00‡	23,588	0.73†	17,219	NA
Steam Traps	2,570,014	1.00‡	2,570,118	0.73†	1,876,186	NA
Water heaters	7,190	1.00‡	7,190	0.73†	5,249	NA
Program Total	**3,314,210**	**1.00‡**	**3,314,314**	**0.73†**	**2,419,449**	**NA**

Source: Utility tracking data and Navigant analysis.
‡ Based on evaluation research findings; †SAG approved NTG deemed value.

E.3. Impact Estimate Parameters

In the course of estimating verified gross and net savings, the evaluation team used a variety of parameters in its calculations. Most of the measure savings parameters were deemed for this program year and others were adjusted based on evaluation research. The key parameters used in the analysis are shown in Table E-3.

Table E-3. Impact Estimate Parameters

Parameter	Data Source	Deemed or Evaluated?
Quantity of measures installed	Program tracking system	Evaluated
Net-to-Gross Ratio (NTGR)	SAG Spreadsheet †	Deemed
Verified Gross Realization Rate	Program tracking data	Evaluated
HVAC Measures Savings	Illinois TRM, version 1.0, section 4.4‡	Deemed
Hot Water End-use Measures Savings	Illinois TRM, version 1.0, sections 4.2 and 4.3‡	Deemed
Steam Traps Savings	Illinois TRM, version 1.0, section 4.4.15‡	Deemed
Commercial Kitchen Measures Savings	Illinois TRM, version 1.0, section 4.2‡	Deemed
Pipe Insulation (HW/Steam Boiler)	TRM and CLEAResult Workpaper- Pipe Insulation- Hot Water and Steam (August 2011, v1.0)	Evaluated
Pool Cover Savings	CLEAResult Workpaper-Pool and Spa Covers (August 2011, v2.0)	Evaluated
Programmable Thermostat Savings	Evaluation Research (used GPY1 value)	Evaluated

Source: Utility tracking data and Illinois TRM (version 1.0)
Source: CLEAResult Workpaper on Pipe Insulation and Pool Covers
http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf.

E.4. Participation Information

Overall, the Nicor Gas BEER program performed very well in GPY2 compared to GPY1. The program installed 3,077 measures (90% increase) and implemented 688 projects (158% increase) from 540 participants (128% increase). Table E-4 below shows the overall GPY2 program participation statistics.

Table E-4. GPY2 BEER Program Primary Participation Detail

Participation	Nicor Gas GPY2 BEER
Total Installed Measures	3,077
Implemented Projects	688
Business Participants	540
Projects/Participant	1.27
Therms/Project	4,817

Source: Utility tracking data and Navigant analysis.

E.5. Conclusions and Recommendations

The following provides insight into key program findings and recommendations.

Program Savings Goals Attainment

Finding 1. The GPY2 BEER program achieved verified net savings of 2,419,449 Therms, which is 19 percent more than the program's filed net savings goal of 2,026,900 Therms[4]. Compared to GPY1, the BEER program increased net energy savings by 90 percent in GPY2. Steam traps continue to be a very significant factor in the savings increase.

Recommendation 1a. In an effort to maintain a high level of customer and trade ally engagement and satisfaction the program should continue to provide program marketing and outreach. The program should also continue to actively look outside of the organizations that are currently active within the program to find potential unconventional program allies, such as trade organizations, local banks, and environmental advocates.

Recommendation 1b. In order to further encourage customers to participate in the program up to their greatest potential, the program could provide an additional bonus incentive to the customers if they install measures in multiple end-use categories. For instance, a bonus incentive of 10% could be achieved by combining installations of cohesive measures such as water heating equipment and commercial kitchen equipment. Additional bonuses could be offered for combining more measure end-uses.

Recommendation 1c. In the effort to improve attractiveness of measures when natural gas prices are relatively low, the IC should continue to compile and promote specific examples of the non-energy benefits of gas measures (reduced maintenance, improved performance, reliability, waste reduction, pollution control, etc.) from past participants – if possible supported by quantified impacts or actual quotations.

Net-to-Gross Ratio

Finding 2. The GPY2 program verified net savings is based on a NTG ratio of 0.73 deemed by the SAG, from GPY1 evaluation research findings.

Recommendation 2a. The IC should consider the process of the adding an impact statement to the application phase of the project, which could include questions regarding customer

[4] The GPY2 BEER program goals as filed in the EEP Plan (*Rider 30 EEP Program Portfolio Operating Plan, v1.1).* Revised GPY2 operational goals were exceeded by a similar amount.

capital planning (i.e. was the project part of regularly scheduled maintenance?), planned efficiencies in the absence of the program (i.e. would the customer have installed the same efficiency equipment without the availability of the program incentive?), and based on the preponderance of evidence, does the customer need to or are they planning to replace the equipment within the near future (e.g. within 4 years)? By identifying the above issues at the beginning of the project application cycle, project free ridership can be identified and appropriate program planning can be done to mitigate the effects.

Recommendation 2b. Potential participants with low free-ridership may have financial barriers that rebates alone cannot overcome, and may show little interest in pursuing initial projects. Nicor Gas promotes loan, grant, and financing resources to address financial barriers, and might consider facilitating targeted partnerships. For example, Nicor Gas could consider assembling tailored packages of financial solutions to targeted groups of participants who share common issues of limited capital, investment criteria, or financing. Possible packages may include interest rate buy-downs or on-bill financing, using revolving loan funds of rate-payer money or on-bill repayment using third-party funds, similar to that being pioneered by investor owned utilities (IOUs) in California[5]. The financial solutions packages, such as revolving loan funds, could target specific market segments such as hospitals or mid-sized industry, leveraging industry association networks in delivery or administration. Additional options may include investment grade energy studies, and quantifying non-energy benefits to improve the calculated rate of return. Productivity and environmental experts could be included in the partnership.

Verified Gross Realization Rates

1. **Finding 3a.** The program realization rate has been stable at 1.0 in GPY1 and GPY2.

   The program tracking system is accurately recording measure savings estimates based on deemed or partially deemed values from the State of Illinois Energy Efficiency Technical Reference Manual (Illinois TRM)[6]. Navigant did not adjust the program claimed savings in the tracking system, except for a minor rounding adjustment to steam trap savings. The difference between program ex ante and verified savings was 104 Therms with the overall program verified gross realization rate of 1.00.

   Recommendation 3a.

   No specific recommendation is offered. Navigant expects that the IC will continue to review and update the program measure savings with any new updates to the TRM for GPY3 program year.

   Finding 3b. The Illinois TRM has different equivalent full load hours for low, mid and high rise offices for space heating equipment. The tracking system appears to assume a single value for all office types. Similarly, the TRM has different hours of use assumptions for strip malls versus department store retail business categories. The single values may not accurately represent the actual breakdown of program participants.

[5] Discussed in the *"Energy Efficiency Investment Report "*released by the American Council for an Energy-Efficient Economy (ACEEE) on February 2014. Report Number F1401.

[6]Illinois Statewide Energy Efficiency Technical Reference Manual (TRM), Version 1.0, Effective_060112.

Recommendation 3b. The IC should assess the feasibility of collecting additional details from participants and modifying the program application forms and the tracking system to match the TRM business categories.

Finding 3c. The tracking system does not provide the customer documentation showing that installed steam traps replaced 100 percent failed open or blow through steam traps. This information is required to evaluate TRM compliance and verify eligible installed quantities and savings.

Recommendation 3c. The IC should consider whether additional fields should be provided in the tracking system to provide the documentation that the steam trap replaced quantities were inspected and found in failed open/leaking/blow-through condition. If not accessible through the tracking system, evaluation will make a separate request to the IC for verification documentation to support savings claimed.

Savings Estimates

Finding 4a. Steam trap replacements continue to be the major contributor to the BEER program savings, and accounted for 77.5 percent of the program savings in GPY2; close to 96 percent of the steam trap savings in GPY2 came from high pressure industrial steam trap replacements. Steam trap savings in GPY2 were 7.5 percent less as a percentage of total savings when compared to GPY1 savings, while savings from other measures improved in GPY2 (e.g. pipe insulation increased from 2.0 percent to 5.5 percent, boiler tune-ups increased from 2.0 percent to 6.1 percent).

Recommendation 4a. The program should continue to seek opportunities and adopt strategies that increase the savings from other program qualified measures, where the results will bring about achieving or exceeding program targets.

Finding 4b. . The evaluation team found that while the Illinois TRM steam trap savings algorithm and assumptions are comparable to findings from other industry TRMs, savings estimates vary significantly depending on measure-specific conditions and steam trap characteristics. The lack of Illinois data and details in the Illinois TRM on the prevailing steam trap types, population percentages of trap types and orifice sizes, and percent of those that fail open suggest the TRM savings estimates may not adequately reflect Illinois market conditions.

Recommendation 4b. Since steam trap savings contribute most of the BEER program savings, Navigant recommends additional studies to assess the various types of steam traps in the Illinois market to estimate population percentages of trap type and orifice size and percentages that fail open. Savings estimates can follow the approach used in Wisconsin as discussed in Appendix 7.2, based on weighted averages of prevailing trap types, orifice sizes and operating pressure ranges. This study may include billing analysis and/or on-site data collection to establish more accurate estimates of savings.

Program Participation

Finding 5. Overall verified program savings (+90%), measure count (+90%) and projects per participant (+12%) increased in GPY2, with restaurant business types having the highest projects per participant in GPY2. In contrast, overall average savings per project were down (-26%) as more measures with smaller per unit savings replaced steam trap

measures or projects. Heavy and light industries continue to have the largest therms savings per project, and these customers implemented mainly steam trap measures.

Recommendation 5. Although the program has met the filed net savings goal for PY2, the IC should continue to pursue new and innovative ways of targeting high potential measures and trade ally segments through specific targeted marketing efforts, including:

- Undertake regular market research, including penetration analysis for the program, to aid in identifying potential markets.
- Recruit program staff, trade allies, or auditors with connections to potential target communities or markets that have high energy savings potential.

Trade Ally Satisfaction and Other Participation.

Finding 6. Overall, participating trade allies and contractors are very familiar and satisfied with the BEER program. On the question of satisfaction, twenty-five out of thirty participating trade allies (83%) gave a score of four or five (highest), indicating their strong satisfaction with the program. On the question of program marketing and outreach, about half of the survey respondents said the program marketing is working well, but the other half called for continuous improvement to the outreach.

Recommendation 6. The program should consider whether outreach activities can be improved and expanded, because about half of the participating trade allies interviewed recommended continuing improvements.

Finding 7. Non-participating trade allies surveyed provided several reasons why they had not submitted an application, although many reasons appeared fixable. In general, non-participating trade allies indicated less familiarity with the program (48 percent gave scores of four to five indicating the highest familiarity with the program) than participating trade allies (77 percent indicated highest familiarity).

Recommendation 7a. The IC should review the recommendations raised by non-participant trade allies as elaborated in Table 7-13 in Appendix 7.3 to improve on the dissemination of information to both program trade allies and those potential trade allies working with other utilities.

Recommendation 7b. The IC should continue to encourage non-participating trade allies to pursue and submit projects to the program. The IC should continue to maintain a commercial and industrial specific list of non-participating trade allies. By identifying potential trade allies, the IC will be better able to target new contractors to further increase program participation and savings.

Recommendation 7c. Nicor Gas and the IC should continue to provide additional non-financial incentives to trade allies to promote their interest in the program, such as sporting event tickets or a trade ally recognition program, in which trade allies that have championed the program are recognized by Nicor Gas as leaders in their field, either through the existing BEER website, or through industry newsletters. This recognition may encourage non-participating trade allies or trade allies that have participated in the program in previous years to become more active.

Overall, the GPY2 BEER program built on a solid foundation from GPY1 to substantially expand its impacts. The program increased participation year over year and exceeded planned energy savings targets in GPY2 compared to GPY1. The programs' tracking system is accurately recording measure counts and measure savings, contributing to the GPY2 gross realization rates of 1.00. In GPY2, the

program net-to-gross ratio used to estimate program verified net savings was deemed from the previous year as 0.73.

1. Introduction

1.1 Program Description

This report presents a summary of the findings and recommendations from the Impact and Process Evaluation of the GPY2 Nicor Gas Business Energy Efficiency Rebate Program (BEER program)[7]. The BEER program provides incentives to increase the market share of new, highly efficient space heating, water heating, and commercial kitchen equipment as well as cost-effective improvements and additions to existing equipment. Participants must purchase and install equipment covered by the program. A rebate form must be filled out and submitted within 90 days of installation. Customers may receive a rebate without pre-approval for participation.

The BEER program works closely with the Nicor Gas Business Custom program and the other business programs within the portfolio to target both end-use customers and trade allies. The BEER 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 key to this program's success. To increase measure uptake in any period, the program may provide incentives to trade allies for specific, limited-time promotions. The implementation contractor conducts PEEZZA training sessions which educate contractors and trade allies regarding program offerings and energy efficient measures.

No major changes were introduced to the program measure mix during the GPY2 period. Navigant worked with program management and implementation staff to implement the GPY1 evaluation suggestions in the program Theory and Logic Model and the program Verification, Due Diligence and Tracking System Review memos. The agreement between Navigant and the program management and implementation staff led to a proposed change in Navigant's approach to evaluating the program and suggestions to program modifications going forward. Detail of Navigant's related follow-up memo on the logic model and tracking system review is attached in the Appendix 7.4.

The GPY2 BEER program gross impact evaluation effort was primarily based on the Illinois Technical Reference Manual (TRM) or application of necessary research adjustment to non-deemed savings. The evaluation did not conduct participant surveys and participant free ridership analysis in GPY2, but relied on the Stakeholder Advisor Group (SAG) approved value from the GPY1 program evaluation as a deemed estimate to determine the program's net impact. The scope of the GPY2 evaluation included additional net-to-gross (NTG) research to assess and quantify participating trade ally free ridership and spillover, and non-participating trade ally spillover. The process evaluation effort in GPY2 was limited to interviews with participating and non-participant trade allies to examine their influence, challenges and satisfaction with the BEER program.

[7] The GPY2 program year began June 1, 2012 and ended May 31, 2013.

1.2 Evaluation Objectives

The Evaluation Team identified the following key researchable questions for GPY2:

1.2.1 Verification, Due Diligence, and Tracking System Review

1. What is the status of the implementation of Navigant's recommendations detailed in the team's Verification, Due Diligent and Tracking System Review memo?
2. What is the status of the implementation of Navigant's recommendations for key performance indicators (KPIs) detailed in Navigant's Logic Model and Program Theory memo? What are the tracked results for each KPI?

1.2.2 Impact Questions

1. What is the level of gross therms savings induced by the program in GPY2?
2. How reasonable are the TRM savings values for steam traps?
3. What are the net impacts from the program? What is the level of free ridership associated with this program and how can it be reduced? What is the level of spillover associated with this program?
4. Did the program meet its energy savings goals? If not, why not?
5. Are the assumptions and calculations of savings in the tracking data in compliance with the statewide TRM? If not, what changes are required?

1.2.3 Process Questions

1. Has the program been successful in achieving its key program indicators in GPY2?
2. Are trade allies contributing to free ridership or spillover?? Did eligible trade allies participate in the program? If not why? In what ways can the program increase trade ally participation? How can trade allies become more engaged in championing the program?

2. Evaluation Approach

This evaluation of the BEER program reflects the second full-scale year of Rider 30 Nicor Gas Energy Efficiency Portfolio. The sections below describe the data that Navigant collected, the method of collection, and the method for analyzing the data to answer the impact and process questions. Since most of the BEER program's savings are derived based on the TRM and Navigant reviewed the savings calculations for this program in GPY1, the GPY2 evaluation involved limited gross impact evaluation activity. Specifically, gross savings were evaluated by (1) reviewing the tracking system to determine whether all fields are appropriately populated, (2) reviewing new measures' algorithms and values in the tracking system to assure that they are appropriately applied, and (3) cross-checking total measures and savings recorded in the tracking database.

Navigant did not conduct participant customer surveys for GPY2 for NTG analysis, but applied a deemed value from SAG for the GPY2 verified net savings. For the additional NTG research, Navigant conducted interviews with participant trade allies for trade ally free ridership and spillover assessment, and non-participant trade ally spillover research. Navigant included both participating and non-participating trade allies working across all measure types, but with more emphasis on trade allies who have installed steam trap measures. Non-participant trade allies were defined as those trade allies that attended a program PEEZZA event in either GPY1 or GPY2, but have not participated in the program in either program year, trade allies that participated in the program in PY1, but not in PY2, and trade allies that have never participated in the program or its trainings

2.1 Primary Data Collection

2.1.1 Overview of Data Collection Activities

The core data collection activities included the following list:

1. Interviews with implementation contractor and program management staff.
2. Interviews with participating and non-participating trade allies.
3. Review of secondary sources including internal manuals, tracking database, Illinois TRM and other TRM from different jurisdictions to support secondary research on steam traps.
4. Engineering desk file review of ten (10) steam trap projects to support the secondary research on steam traps.

Program tracking data was requested from the program implementer CLEAResult, including:

- Contact information for participating customers, participant and non-participant trade allies, including name, address, and telephone number.
- Date of participation.
- Number and type of measures installed.
- Tracked gross savings estimates.
- Additional data request on steam trap leakage inspection.

Table 2-1 below summarizes the surveys, interviews, and other primary data sources used to answer the impact and process questions noted earlier. The proposed sample sizes and approximate timing of each activity is also presented.

Table 2-1. Core Data Collection Activities

N	What	Who	Target Completes	Completes Achieved	When	Comments
Impact Assessment						
1	Measure Savings Review	Program Tracking System/ IL_TRM	all	all	June-Aug 2013	Source of information for verified gross analysis
2	Engineering Desk File Reviews	Steam Trap Projects File Reviews	10	10	June-Aug 2013	Source of information to support secondary research on steam traps
3	Telephone Survey	Participant Trade Allies	≤40	30	July-Aug 2013	Data collection supporting NTG and process analysis in the same instrument.
4	Telephone Survey	Non-Participant Trade Allies	≤30	31	July-Aug 2013	Data collection supporting NTG and process analysis in the same instrument.
5	Literature Review	Steam Trap Secondary Research	Multiple	Multiple	June-Aug 2013	Values for steam traps savings calculations and best practices

2.1.2 Verified Savings Parameters

Navigant estimated verified per unit savings for each program measure using impact algorithm sources found in the Illinois TRM for deemed measures, and evaluation research for non-deemed measures. Table 2-2 below presents the sources for parameters that were used in verified gross savings analysis indicating which were examined through GPY2 evaluation research and which were deemed. For measures not included in the Illinois TRM, Navigant reviewed ex-ante values and engineering assumptions provided by the implementation contractor, including pool cover, outdoor/indoor hot water and steam pipe insulation measures[8,9].

[8] CLEAResult Workpaper-Pool and Spa Covers (August 2011, v2.0)
[9] RSG Workpaper- Pipe Insulation- Hot Water and Steam (August 2011, v1.0)

Table 2-2. Verified Gross and Net Savings Parameter Data Sources

Parameter	Data Source	Deemed or Evaluated?
NTG	SAG Spreadsheet	Deemed
Gross Realization Rate	Evaluation research	Evaluated
Boiler Cutout/Reset Control	TRM v1.0 (section 4.4.4)	Deemed
Boiler Tune-Up	TRM v1.0 (section 4.4.2)	Deemed
High Efficiency Boilers	TRM v1.0 (section 4.4.10)	Deemed
High Efficiency Furnaces	TRM v1.0 (section 4.4.11)	Deemed
Pre-Rinse Sprayer	TRM v1.0 (section 4.2.11)	Deemed
Commercial Kitchen Equipment	TRM v1.0 (section 4.2)	Deemed
Water Heaters	TRM v1.0 (section 4.3.1 and 4.3.4)	Deemed
Indoor/Outdoor HW/Steam Pipe Insulation	Illinois TRM, v2.0 (section 4.4.14), CLEAResult Workpaper (v1.0)	Evaluated
Pool Cover	CLEAResult Workpaper	Evaluated
Space Heating (Infrared Heaters)	TRM v1.0 (section 4.4.12)	Deemed
Programmable Thermostats	Use GPY1 evaluation value	Evaluated
Steam Traps	TRM v1.0 (section 4.4.15)	Deemed

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CLEAResult Workpapers

2.1.3 Verified Gross Program Savings Analysis Approach

Navigant reviewed the programs' tracking systems and procedures to verify that the program accurately reported measure counts. The majority of the BEER program tracking system lookup unit savings were verified to be based on deemed values and algorithms from the Illinois TRM, with some exceptions for measures that were not included in the applicable TRM version. For non-deemed commercial and industrial measures including programmable thermostats, Navigant relied on previous year's non-deemed values to verify the claimed savings and verified the engineering assumptions and ex ante savings for steam pipe and hot water indoor/outdoor pipe insulation measures provided by the implementation contractor. The verified gross savings are the product of verified per unit savings and verified measure quantities. The details of Navigant's engineering review are provided in Appendix 7.2.1.

2.1.4 Verified Net Program Savings Analysis Approach

In GPY2 the NTG ratio estimate used to calculate the net verified savings was deemed, based on the previous year's evaluation research and defined through a negotiation process with SAG.[10] For the BEER program, the NTG ratio estimate was 0.73.

2.1.4.1 Free-Ridership

As noted above, participant free ridership results from GPY1 evaluation research was deemed for GPY2 to calculate the program verified net savings. For the pilot NTG and net impact research, additional participant trade ally free-ridership was investigated to supplement the research findings net-to-gross ratio. A total of thirty (30) participant trade ally surveys were completed to support the trade ally free ridership research. See Appendix 7.2.4 for details on trade ally free ridership algorithm and results.

2.1.4.2 Spillover

Since NTG was deemed for GPY2, no participant spillover assessment was conducted. For the pilot NTG and net impact research, participant and non-participant trade ally spillover were investigated to support the spillover and NTG research. A total of thirty (30) participant trade allies and thirty-one (31) non-participant trade ally surveys were completed. See Appendix 7.2.4 for details on participant and non-participant trade ally spillover algorithm and results.

2.1.5 Process Evaluation

Navigant did not conduct participant customer surveys for GPY2 for process evaluation. The GPY2 process evaluation activities focused on participant and non-participant trade allies to investigate their contribution to free ridership and spillover. Navigant attempted to interview forty participating trade allies but completed thirty (30) interviews. For the non-participating trade allies, Navigant completed thirty-one (31) interviews. Navigant interviewed participating trade allies about their satisfaction with the program and why customers eligible to participate in the program did not. Trade allies were asked about how the incentive program has impacted their business, including how their business operations, sales and stocking practices have changed since they began participating in the program. Non-participating trade ally interviews focused on what it would take to get them to participate in the program going forward.

[10] *http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf*.

3. Gross Impact Evaluation

The gross impact analysis involved tracking system review, verification of installed measures and measure savings. The verified savings were calculated by multiplying the quantity of measures installed by the verified measure unit savings. The program verified gross realization rate was determined by the ratio of the verified savings and the tracking ex ante savings. Navigant estimated that the BEER program achieved verified gross savings of 3,314,314 Therms and a 1.00 verified gross realization rate.

3.1 Tracking System Review

Navigant reviewed the BEER program status of implementing recommendations made for 1) key performance indicators (KPI) in the program logic model review and 2) processes in our review of verification, due diligence, and tracking systems (VDDTSR) of the program in GPY1. Our review was based on information collected through telephone interviews with program management staff from Nicor Gas and the implementation contractor[11]. A follow up memo on Navigant's recommendations was presented to Nicor Gas on June 21, 2013. A copy of the memo is attached to this report in Appendix 7.4.

Listed below are the key findings from the tracking system review, including recommendations to improve the program tracking system.

1. Navigant used an extract from the program's tracking information (June 3, 2013 data extract) to verify the GPY2 program ex ante inputs, including measure counts and claimed savings. Navigant verified that the program is adequately tracking projects information and measure savings input parameters. Navigant verified that the program tracking system continued to capture relevant data required to track the program's actions for reporting and evaluation activities.

2. The tracking system could provide additional information about which steam trap projects received inspection prior to replacement or whether there were possible instances of mass replacements. This information is needed to make an informed evaluation decision on TRM compliance and verified savings. Navigant did a follow up request with CLEAResult to confirm which projects received inspection. Navigant found that CLEAResult employs a third party auditing firm to inspect steam trap projects. The evaluation team did not apply leakage adjustments for possible mass replacements because most of the installed measures and savings came from industrial high pressure steam traps, and the TRM (v 1.0) requires no adjustment in that circumstance.

3. The Illinois TRM has different equivalent full load hours for low, mid and high rising offices, but the tracking system appears to assume a single value for all office types. Similarly, the TRM has different assumptions for strip mall versus department store retail business

[11] Interview with Tom Kovalak of Nicor Gas on 05/28/2013, and Nathan Warren of CLEAResult on 05/29/2013

categories. These single values may not accurately represent the actual breakdown of program participants. The program should assess the feasibility of collecting this additional detail from participants and modifying the program application forms and the tracking system as appropriate.

4. Overall, the evaluation team verified that the BEER program tracking ex ante unit measure savings were consistent with the Illinois TRM assumptions and algorithms. Navigant did not adjust the program claimed savings in the tracking system, except a minor rounding adjustment to steam trap savings. The difference between program ex ante and verified savings was 104 Therms with overall program verified gross realization rate of 1.00.

3.2 Program Volumetric Findings

Overall, the BEER program performed very well in GPY2 compared to the previous year. The key GPY2 volumetric findings are summarized in Table 3-1. The total number of rebated unit measures was 3,077. The total measure savings quantity based on savings unit of measurement is 711,319. The participant business characterization is provided in Table 3-2.

Table 3-1. Nicor Gas GPY2 BEER Program Installed Measures by End-use Type

Rebate Measure Kind	Savings Unit	Installed Measures (Rebate Quantity)	Verified Measures (Rebate Quantity)	Installed Measures (Savings Quantity)	Verified Measures (Savings Quantity)
Boiler Controls	MBH	10	10	7118	7,118
Boiler Tune-Up	MBH	173	173	669,922	669,922
Boilers	Unit	93	93	93	93
Commercial Kitchen	Unit	360	360	360	360
Furnaces	Unit	154	154	154	154
Pipe Insulation	Linear Foot	42	42	20,376	20,376
Pool Cover	Square Feet	6	6	11,057	11,057
Programmable Thermostats	Thermostat	413	413	413	413
Space Heating	Unit	47	47	47	47
Steam Traps	Trap	1,733	1,733	1,733	1,733
Water heaters	Water Heater	46	46	46	46
Total		**3,077**	**3,077**	**711,319**	**711,319**

Source: Navigant Evaluation Team Analysis of Tracking Data and Deemed Savings Review

Table 3-2. GPY2 BEER Program Business Characterization and Gross Savings

Sector	Projects		Business Participants		Projects / Part.	Ex Ante Gross Savings		Therm / Project
	Count	%	Count	%		Therms	%	
Assembly	84	12%	77	14%	1.09	489,474	15%	5,827
College/University	5	1%	5	1%	1.00	5,081	0%	1,016
Grocery	2	0%	2	0%	1.00	8,479	0%	4,240
Heavy and Light Industry	46	7%	42	8%	1.10	1,544,973	47%	33,586
Hotel/Motel	17	2%	16	3%	1.06	35,089	1%	2,064
K-12 School	4	1%	4	1%	1.00	2,612	0%	653
Medical	18	3%	15	3%	1.20	103,641	3%	5,758
Miscellaneous	50	7%	44	8%	1.14	692,465	21%	13,849
Multifamily	159	23%	59	11%	2.69	200,220	6%	1,259
Office	27	4%	26	5%	1.04	16,819	1%	623
Restaurant	251	36%	231	43%	1.09	58,470	2%	233
Retail/Service	25	4%	19	4%	1.32	156,886	5%	6,275
TOTAL	**688**		**540**		**1.27**	**3,314,210**		**4,817**

Source: Utility tracking data and Navigant analysis.

Key findings include:

1. Overall verified program savings (+90%), measure count (+90%) and projects per participant (+12%) increased in GPY2, with multifamily business types having the highest number of projects per participant in GPY2 (restaurant category had the highest number of projects or business participants). In contrast, overall average savings per project were down (-26%) as more other measures with smaller per unit savings replaced steam trap measures or projects. Heavy and light industry business types continue to have the largest therms savings per project, and these customers implemented mainly steam trap measures.

2. Steam trap replacements continue to be the major contributor to the BEER program savings, and accounted for 77.5 percent of the program savings in GPY2, although this savings was 7.5 percent less as a percentage of the total compared to GPY1, while savings from other measures improved in GPY2 (e.g. pipe insulation from 2.0 percent to 5.5 percent, boiler tune-up from 2.0 percent to 6.1 percent).Space heating commercial steam traps constituted 60 percent of total steam trap installations in GPY2, but contributed 3.6 percent of steam trap total savings. The bulk of the steam trap savings (95.6 percent) in GPY2 were due to high pressure industrial steam trap replacements.[12]

3. Participants who installed measures spanned various business categories. The bulk of the savings came from the heavy and light industry business sectors. The restaurant business sector had the highest number of projects or business participant in GPY2.

[12] Overall, Steam traps have contributed 80 percent (85 percent in GPY1 and 77.5 percent in GPY2) of BEER program savings since Rider 30 commencement.

4. Comparing year over year volumetric results from GPY1 and GPY2, the performance of the BEER program in GPY2 is over 90 percent greater in terms of measure count and verified gross energy saving, and over 150 percent greater in installed projects.

3.3 Gross Program Impact Parameter Estimates

As described in Section 2, ex ante energy savings were verified using the assumptions and algorithm as specified in the TRM (v1.0) or through engineering analysis for non-deemed measures. Table 3-3 indicates the input parameters to estimate verified gross savings.

Table 3-3. Verified Gross Savings Parameters

Input Parameters	Value	Unit	Deemed or Evaluated?
Measure Quantity	Vary		Evaluated
Verified Gross Realization Rate	1.00		Evaluated
Commercial HVAC Steam Traps	89.2 (can vary)	Therms/unit	Deemed TRM v1.0
Programmable Thermostat	178.0	Therms/unit	Evaluated
Furnace <225 MBH > 95% AFUE	All verified as acceptable	Therms/unit	Deemed TRM v1.0
Furnace <225 MBH > 92% AFUE	All verified as acceptable	Therms/unit	Deemed TRM v1.0
Industrial Steam Traps (varying psig)	All verified as acceptable	Therms/unit	Deemed TRM v1.0
Food Service Appliances (Commercial Kitchen)	All verified as acceptable	Therms/unit	Deemed TRM v1.0
Gas Water Heater >=0.67 EF	119.0	Therms/unit	Deemed TRM v1.0
Pre Rinse Sprayers	117.9	Therms/unit	Deemed TRM v1.0
Boiler Cutout/Reset Controls	Vary with building type	Therms/MBTU	Deemed TRM v1.0
Boiler Tune-up (Heating)	Vary with building type	Therms/MBTU	Deemed TRM v1.0
High Efficient Boilers	Vary with building type	Therms/MBTU	Deemed TRM v1.0
Boiler Tune Up, Process	Vary with building type	Therms/MBTU	Deemed TRM v1.0
Infrared Heaters	451.0	Therms/unit	Deemed TRM v1.0
Large Gas Water Heater >=88% TE	251.2	Therms/unit	Evaluated
Outdoor Pool Covers (sq.ft)	2.6	Therms/sq.ft	Evaluated
Indoor Pipe HW/Steam Insulation (Ln.ft)	7.8	Therms/Ln.ft	Evaluated
Outdoor Pipe HW/Steam Insulation (Ln.ft)	22.6	Therms/Ln.ft	Evaluated

Source: Utility tracking data and Navigant analysis; Illinois TRM (version 1.0)

3.4 Development of the Verified Gross Realization Rate

The program verified gross realization rate was determined by calculating the ratio of the verified gross savings and the tracking ex ante gross savings. Verified gross realization rates by end-use group were calculated for the program as shown in Table 3-4. The BEER program GPY2 verified gross realization rate is 1.00. The program realization rate has been stable at 1.00 in GPY1 and GPY2.

Table 3-4. BEER Program GPY2 Gross Realization Rate by End-use Category

Rebate Measure Kind	Verified Measures (Rebate Quantity)	Ex Ante Gross Savings	Verified Gross Realization Rate	Verified Gross Savings	GPY2 Gross Savings (percent)
Boiler Controls	10	8,532	1.00	8,531	0.3%
Boiler Tune-Up	173	201,171	1.00	201,171	6.1%
High Efficiency Boilers	93	79,188	1.00	79,188	2.4%
Commercial Kitchen	360	83,634	1.00	83,634	2.5%
High Efficiency Furnaces	154	54,879	1.00	54,879	1.7%
Steam/HW Pipe Insulation	42	183,642	1.00	183,642	5.5%
Pool Cover	6	28,859	1.00	28,859	0.9%
Programmable Thermostats	413	73,514	1.00	73,514	2.2%
Space Heating	47	23,588	1.00	23,588	0.7%
Steam Traps	1,733	2,570,014	1.00	2,570,118	77.5%
Water heaters	46	7,190	1.00	7,190	0.2%
Total	**3,077**	**3,314,210**	**1.00**	**3,314,314**	**100.0%**

Source: Utility tracking data and Navigant analysis

Table 3-5 provides disaggregation of the steam trap measure types and gross realization rates and compares the percent contribution of savings from different types of steam traps.

Table 3-5. Steam Trap Measures Installed in GPY2

Rebate Measure Kind	Verified Unit Savings (Therms/Trap)	Measures (Rebate Quantity)	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	% Steam Trap Gross Savings
Steam Trap, Commercial	89	1,038	92,656	1.00	92,656	3.6%
Ind. Med. Pressure >=15 <30 psig	581	15	8,715	1.00	8,722	0.3%
Ind. Med. Pressure >=30 <75 psig	854	14	11,956	1.00	11,960	0.5%
Ind. High Pressure >=75 <125 psig	2941	406	1,194,046	1.00	1,194,063	46.5%
Ind. High Pressure >=125 <175 psig	4449	211	938,739	1.00	938,818	36.5%
Ind. High Pressure >=175 <250 psig	5890	32	188,480	1.00	188,482	7.3%
Ind. High Pressure >=250 psig	7966	17	135,422	1.00	135,416	5.3%
Total		**1,733**	**2,570,014**	**1.00**	**2,570,118**	**100.0%**

Source: Utility tracking data and Navigant analysis

As noted above, space heating commercial steam traps constituted 60% of total steam trap measures installed in GPY2, but contributed 3.6 percent of steam trap total savings. High pressure industrial steam trap replacements constituted 95.6 percent of the GPY2 steam trap savings.

3.5 Verified Gross Program Impact Results

The verified gross impact results for the GPY2 BEER program is 3,314,314 Therms as shown in Table 3-6. The evaluation research was not based on a sampling strategy to verify measure gross savings since the TRM was used to determine verified savings.

Table 3-6. Nicor Gas GPY2 BEER Program Verified Gross Impact Savings Estimates

Category	Sample	Energy Savings (Therms)	90/10 Significance?
HVAC Application			
Ex-Ante GPY2 Gross Savings	†NA	469,730	†NA
Verified Gross Realization Rate‡		1.00	
Verified Gross Savings‡		469,730	
Pipe Insulation			
Ex-Ante GPY2 Gross Savings	†NA	183,642	†NA
Verified Gross Realization Rate‡		1.00	
Verified Gross Savings‡		183,642	
Hot Water End-use			
Ex-Ante GPY2 Gross Savings	†NA	7,190	†NA
Verified Gross Realization Rate‡		1.00	
Verified Gross Savings‡		7,190	
Industrial/Process Steam Traps			
Ex-Ante GPY2 Gross Savings	†NA	2,570,014	†NA
Verified Gross Realization Rate‡		1.00	
Verified Gross Savings‡		2,570,118	
Commercial Kitchen Equipment			
Ex-Ante GPY2 Gross Savings	†NA	83,634	†NA
Verified Gross Realization Rate‡		1.00	
Verified Gross Savings‡		83,634	
Nicor Gas BEER GPY2 Total			
Ex-Ante GPY2 Gross Savings	†NA	3,314,210	†NA
Verified Gross Realization Rate‡		1.00	
Verified Gross Savings‡		**3,314,314**	

Source: Evaluation Team analysis.
†NA when the TRM determines the gross savings.

4. Net Impact Evaluation

As noted in Section 2, the SAG[13] approved a net-to-gross ratio of 0.73 to be used to calculate GPY2 verified net savings for the BEER program. This deemed value was based on the previous year's evaluation research. For this reason, no participant free ridership or spillover research for impact estimation were performed in GPY2.

Using the SAG-approved NTGR, the evaluation team calculated verified net savings of 2,419,449 Therms for the GPY2 BEER program as shown in Table 4-1. The estimates are not statistically significant at the 90/10 level since no sampling was performed.

Table 4-1. Nicor Gas GPY2 BEER Program Verified Net Savings Estimates by Measure Kind

Rebate Measure Kind	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate‡	Verified Gross Savings (Therms)	NTG‡	Verified Net Savings (Therms)	Sample (90/10 Significance?)
Boiler Controls	8,532	1.00‡	8,531	0.73†	6,228	NA
Boiler Tune-Up	201,171	1.00‡	201,171	0.73†	146,855	NA
Boilers	79,188	1.00‡	79,188	0.73†	57,807	NA
Commercial Kitchen	83,634	1.00‡	83,634	0.73†	61,053	NA
Furnaces	54,879	1.00‡	54,879	0.73†	40,061	NA
Pipe Insulation	183,642	1.00‡	183,642	0.73†	134,059	NA
Pool Cover	28,859	1.00‡	28,859	0.73†	21,067	NA
Programmable Thermostats	73,514	1.00‡	73,514	0.73†	53,665	NA
Space Heating	23,588	1.00‡	23,588	0.73†	17,219	NA
Steam Traps	2,570,014	1.00‡	2,570,118	0.73†	1,876,186	NA
Water heaters	7,190	1.00‡	7,190	0.73†	5,249	NA
Program Total	**3,314,210**	**1.00‡**	**3,314,314**	**0.73†**	**2,419,449**	**NA**

Source: Utility tracking data and Navigant analysis.
‡ Based on evaluation research findings
†SAG approved NTG deemed value.

[13] *Nicor_Gas_NTG_Results_and_Application_GPY1-3*

As shown in Table 4-2, the BEER program exceeded planned GPY2 net energy savings targets by 19 percent.

Table 4-2. Nicor Gas GPY2 BEER Program Planned and Actual Accomplishments

Program	Ex Ante Net Savings (Therms)	Verified Net Savings (Therms)	Planned GPY2 Net Savings	% Planned Net Savings Achieved
Total	**2,685,959**	**2,419,449**	**2,026,900**	**119%**

Source: Nicor Rider 30, ICC Quarterly Report 4th Quarter PY2 Final; The GPY2 BEER program goals as filed in the EEP Plan (Rider 30 EEP Program Portfolio Operating Plan, v1.1).
Navigant analysis of GPY2 BEER Program tracking data (June 3, 2013 data extract)

Table 4-3 below provides a comparison of GPY2 BEER program findings versus GPY1 findings. The GPY2 BEER Program exceeded the previous year verified net savings by 90 percent, due to increases in installed measures by 90 percent and implemented projects by 158 percent.

Table 4-3. Nicor Gas Rider 30 BEER Program Yearly Comparison

Program Result	GPY1	GPY2	Year over Year Difference (GPY2/GPY1)
Ex Ante Gross Therms	1,742,478	3,314,210	190%
Verified Gross Therms	1,742,478	3,314,314	190%
Verified Gross Realization Rate	1.00	1.00	unchanged
Verified Net Therms	1,272,009	2,419,449	190%
Net-to-Gross Ratio	0.73	0.73	unchanged
Total Installed Measures	1,621	3,077	190%
Unique Projects	267	688	258%
Business Participation	237	540	228%
Projects/Participant	1.13	1.27	112%
Therms/Project	6,526	4,817	74%

Navigant analysis of GPY2 BEER Program tracking data (June 3, 2013 data extract)
GPY1 BEER Program Evaluation Report_Final

5. Process Evaluation

The process evaluation findings of the BEER program are organized by the process research questions outlined in Section 1 of this report. Navigant did not conduct participant or customer surveys for GPY2 for process evaluation. The GPY2 process evaluation activities were focused on participant and non-participant trade allies to investigate their contribution to free ridership and spillover, their satisfaction with the program and why customers or trade allies eligible to participate in the program did not. The detail process findings are provided in themes below.

1. Has the program been successful in achieving its key program indicators in GPY2?

As noted in Section 3, Navigant reviewed the BEER program status of implementing recommendations made for 1) key performance indicators (KPI) in the program logic model review and 2) processes in our review of verification, due diligence, and tracking systems (VDDTSR) of the program in GPY1. Navigant concludes that the BEER program staff including the IC has implemented all of the recommended KPIs identified in the Logic Model and Program Theory (LMPT) memo (dated July, 2012). The program has implemented or is in the process of implementing most of the recommendations for VDDTSR. Navigant recommends that the IC should revisit the recommendation related to incorporating customer satisfaction into the current program tracking database once the implementation of the TrakSmart® tracking database has occurred to determine if there would be an added value of combining the customer satisfaction results with the program tracking database.

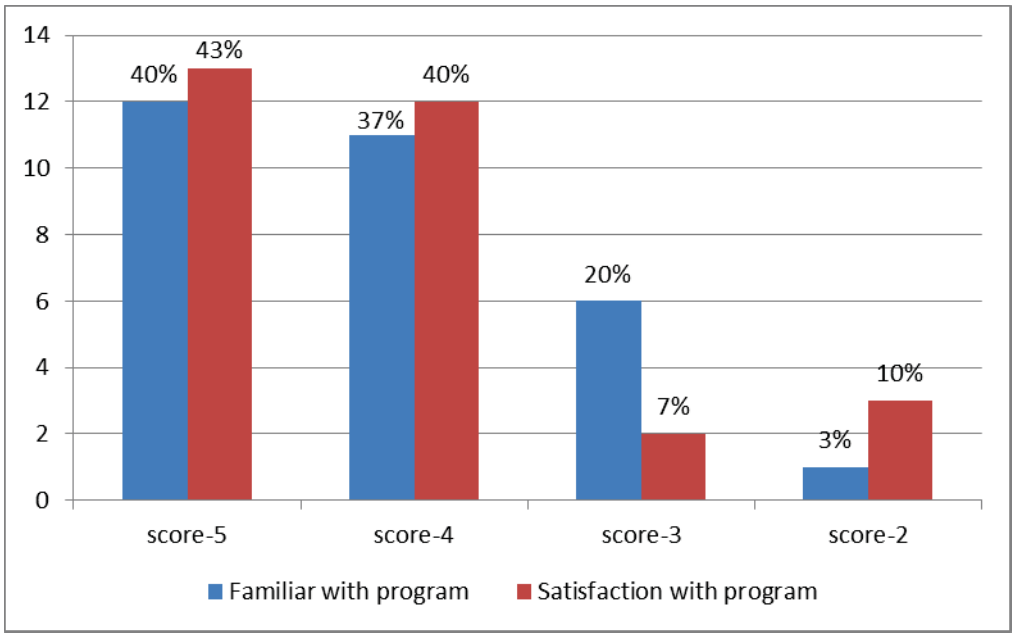
2a. Are Trade Allies contributing to free ridership or spillover?

Participating trade allies and contractors reported a high level of free-ridership (61%, described in Appendix 7.2.4), raising questions whether they taking steps to effectively screening out free-riders or pursuing customers with low free-ridership potential.

2b. Are participant Trade Allies familiar with and satisfied with the program?

From the tracking system, Navigant identified that approximately 200 trade allies have participated in the BEER program in GPY2. A sample of Trade allies were asked a series of questions regarding participation, satisfaction with the program and marketing effectiveness, and suggested changes to reach a targeted audience.

Figure 5-1. Trade Ally Familiarity and Satisfaction with BEER Program



Source: Evaluation Team analysis

As shown in Figure 5-1, overall, participant trade allies and contractors are very familiar and satisfied with the BEER program. On a scale from zero to five, where zero is not at all familiar/satisfied and five is very familiar/satisfied, twenty-three out of the thirty-one respondents (77%) gave a score of five or four of their familiarity with the BEER program, and six respondents (20%) gave a score of three. On the question of satisfaction, trade allies indicated their strong satisfaction with the program. Twenty-five respondents (83%) gave a score between five or four, and two respondents gave a score of three, and other three respondents gave a score of two. Two respondents with lower satisfaction score indicated they had difficulty getting the rebates approved for their customers.

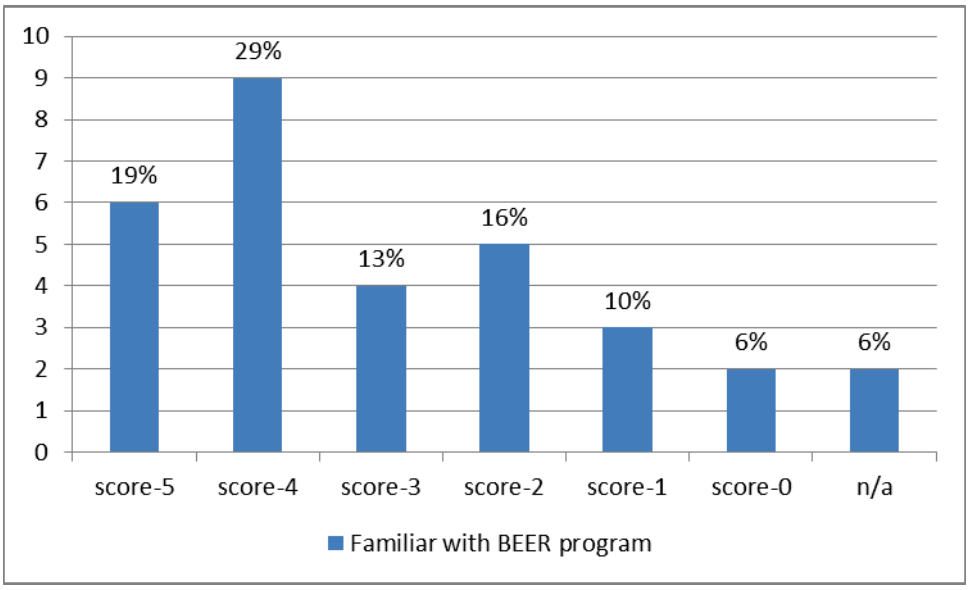
When respondents were asked whether they have attended any Nicor Gas training sessions and how they will rank the overall effectiveness of the training session, fifteen indicated they have attended a training session, twelve respondents have not, and the other three said though they did not attend a training session, they were involved in a Nicor Gas webinar or a promotional event. Of those who responded "Yes", ten gave a score of five or four, and four gave a score of three or two of the effectiveness of the training session (overall 93% of those attended think the trainings were effective).

Among the suggestions to improve the program, majority of participant trade allies suggested the incentives should be increased. Some were concerned about the possibility of the program reducing the incentives in GPY3. One trade ally suggested the program should engage with small businesses over a long period of time because it is easy for them to forget about programs like the BEER program. Another trade ally said better understanding of the applications and differences of applications between programs is crucial to avoid confusion to customers. Some trade allies suggested that once qualified as a contractor, the application submission process should be a lot easier, and the rules on invoices should be relaxed or even stop requiring the exact model number of equipment if a serial number is provided. On the question of program marketing and outreach, about half of the survey respondents said the program marketing is working well, but the other half called

for continuous improvement to the outreach activities; some suggested reaching out face-to-face, bill inserts, radio or TV adverts. One respondent said so many contractors are calling the customers for the same thing (to win customer business) and that there should be more organization.

2c. Are Non-Participant Trade Allies familiar with the program and what ways can the Program increase their Participation? How can Trade Allies become more engaged in Championing the Program?

Figure 5-2. Non-Participant Trade Ally Familiarity with BEER Program



Source: Evaluation Team analysis

As shown in Figure 5-2, of the thirty-one non-participant trade allies interviewed, fifteen (48%) gave a score of five or four, indicating their high familiarity with the BEER program. Twelve respondents (39%) gave a score between three and one, indicating they are somewhat familiar with the program, but two respondents said they are not at all familiar with the program and gave a zero score, and two others did not respond.

Respondents who attended a Nicor Gas training session, but did not submit any project applications to the BEER program were asked to give their reasons for not participating. Table 7-13 in the Appendix 7.3 provides insight into reasons given by trade ally respondents who attended a training session but did not submit an application. Among the reasons given were:

- Customers were still communicating with CLEAResult engineers, trying to explain to them about their product (Modified Venturi Nozzles). In the opinion of the non-participant trade allies, some CLEAResult engineers did not understand the customers' products, although the customer experience is that the technology is qualified in other states;
- Does not sell high efficiency equipment (measures do not qualify for the program) because customers perceived them as too expensive, and that Nicor Gas program rebates aren't high enough; and
- Never submitted an application because customers received lots of grants including Rural Energy for American Program (REAP) grants, but those dried up. Customers are considering participation in future Nicor Gas programs.

On the question of what the program can do or change to enable trade allies to promote the program and help customers complete program applications, suggestions given by non-participant trade allies were:

- Would be helpful for the program administrator to send someone to our office to have a refresh on the programs;
- Sales is driven by end-users so the program needs to get information to end users;
- The timing should be less stringent, it is hard to apply for rebates on short timeline projects;
- Increase incentives;
- Give out leads to contractors; and
- Approve customers' technology such as the modified venturi nozzles. Navigant could not establish whether measures which were problematic for BEER incentives were referred to the Nicor Gas Custom program.

6. Conclusions and Recommendations

This section summarizes the key impact and process findings and recommendations. Overall, the GPY2 BEER program built on a solid foundation from GPY1 to substantially expand its impacts. The BEER Program increased participation year over year and exceeded planned energy savings targets in GPY2 compared to GPY1. The programs' tracking system is accurately recording measure counts and measure savings, contributing to GPY2 gross realization rates of 1.00. In GPY2, the program net-to-gross ratio used to estimate program verified net savings was deemed from the previous year as 0.73. Additional NTG research by incorporating trade ally free ridership did not produce the results to support refinement of the program NTG.

Program Savings Goals Attainment

Finding 1. The GPY2 BEER program achieved verified net savings of 2,419,449 Therms, which exceeded the program's filed net savings goal of 2,026,900 Therms[14] by 19 percent. Compared to GPY1, the BEER program increased net energy savings by 90 percent in GPY2. Steam traps continue to be a very significant factor in the savings increase.

Recommendation 1a. In an effort to maintain a high level of customer and trade ally engagement and satisfaction the program should continue to provide program marketing and outreach. The program should also continue to actively look outside of the organizations that are currently active within the program to find potential unconventional program allies, such as trade organizations, local banks, and environmental advocates.

Recommendation 1b. In order to further incentivize customers to participate in the program to their greatest potential, the program could provide an additional bonus incentive to the customer if they install measures in multiple end-use categories. For instance, a bonus incentive of 10% could be achieved by combining installations of cohesive measures such as water heating equipment and commercial kitchen equipment. By combining more measure end-uses, the potential for the bonus level could also increase.

Recommendation 1c. In the effort to improve attractiveness of program measures when natural gas prices are relatively low, the IC should continue to compile and promote specific examples of the non-energy benefits of gas measures (reduced maintenance, improved performance, reliability, waste reduction, pollution control, etc.) from past participants – if possible supported by quantified impacts or actual quotations.

Net-to-Gross Ratio

Finding 2. The GPY2 program verified net savings is based on a NTG ratio of 0.73 deemed by the SAG, from GPY1 evaluation research findings.

Recommendation 2a. The IC should consider the process of the adding an impact statement at the application phase of the project, which could include questions regarding customer capital planning (i.e. was the project part of regularly scheduled maintenance?), planned efficiencies in the absence of the program (i.e. would the customer have installed the same efficiency equipment without the availability of the program incentive?), and based

[14] The GPY2 BEER program goals as filed in the EEP Plan (*Rider 30 EEP Program Portfolio Operating Plan, v1.1).* Revised GPY2 operational goals were exceeded by a similar amount.

on the preponderance of evidence, doe the customer need to or are they planning to replace the equipment within the near future (e.g. within 4 years)? By identifying the above issues at the beginning of the project application cycle, project free ridership can be identified and appropriate project planning can be done to mitigate the effects.

Recommendation 2b. Potential participants with low free-ridership may have financial barriers that rebates alone cannot overcome, and may show little interest in pursuing initial projects. Nicor Gas promotes loan, grant, and financing resources to address financial barriers, and might consider facilitating targeted partnerships. For example, Nicor Gas could consider assembling tailored packages of financial solutions to targeted groups of participants who share common issues of limited capital, investment criteria, or financing. Possible packages may include interest rate buy-downs or on-bill financing, using revolving loan funds of rate-payer money or on-bill repayment using third-party funds, similar to that being pioneered by investor owned utilities (IOUs) in California[15]. The financial solutions packages, such as revolving loan funds, could target specific market segments such as hospitals or mid-sized industry, leveraging industry association networks in delivery or administration. Additional options may include investment grade energy studies, and quantifying non-energy benefits to improve the calculated rate of return. Productivity and environmental experts could be included in the partnership.

Verified Gross Realization Rates

2. **Finding 3a.** The program realization rate has been stable at 1.0 in GPY1 and GPY2.

The program tracking system is accurately recording measure savings estimates based on deemed or partially deemed values from the Illinois TRM. Navigant did not adjust the program claimed savings in the tracking system, except for a minor rounding adjustment to steam trap savings. The difference between program ex ante and verified savings was 104 Therms with overall program verified gross realization rate of 1.00.

Recommendation 3a.

No specific recommendation is offered. Navigant expects that the IC will continue to review and update the program measure savings with any new updates to the TRM for the GPY3 program year.

Finding 3b. The Illinois TRM has different equivalent full load hours for low, mid and high rise offices for space heating equipment, but the tracking system appears to assume a single value for all office types. Similarly, the TRM has different hours of use assumptions for strip mall versus department store retail business categories. The single values may not accurately represent the actual breakdown of program participants.

Recommendation 3b. The IC should assess the feasibility of collecting additional details from participants and modifying the program application forms and the tracking system to match the TRM business categories.

Finding 3c. The tracking system does not provide the customer documentation showing that installed steam traps replaced 100 percent failed open or blow through steam traps. This

[15] Discussed in the *"Energy Efficiency Investment Report "*released by the American Council for an Energy-Efficient Economy (ACEEE) on February 2014. Report Number F1401.

information is required to evaluate TRM compliance and verify eligible installed quantities and savings.

Recommendation 3c. The IC should consider whether additional fields should be provided in the tracking system to provide the documentation that the steam trap replaced quantities were inspected and found in failed open/leaking/blow-through condition. If not accessible through the tracking system, evaluation will make a separate request to the IC for verification documentation to support savings claimed.

Savings Estimates

Finding 4a. Steam trap replacements continue to be the major contributor to the BEER program savings, and accounted for 77.5 percent of the program savings in GPY2; close to 96 percent of the steam trap savings in GPY2 came from high pressure industrial steam trap replacements. Steam trap savings in GPY2 were 7.5 percent less as a percentage of total savings when compared to GPY1 savings, while savings from other measures improved in GPY2 (e.g. pipe insulation from 2.0 percent to 5.5 percent, boiler tune-up from 2.0 percent to 6.1 percent).

Recommendation 4a. The program should continue to seek opportunities and adopt strategies that increase the savings from other program qualified measures, where the results will bring about achieving or exceeding program targets.

Finding 4b. The evaluation team found that while the Illinois TRM steam trap savings algorithm and assumptions are comparable to findings from other industry TRMs, savings estimates vary significantly depending on measure-specific conditions and steam trap characteristics. The lack of Illinois data and details in the Illinois TRM on the prevailing steam trap types, population percentages of trap types and orifice sizes, and percent of those that fail open suggest the TRM savings estimates may not adequately reflect Illinois market conditions.

Recommendation 4b. Since steam trap savings contribute most of the BEER program savings, Navigant recommends additional studies that will assess the various types of steam traps in the Illinois market to determine the population percentages of each trap type and orifice sizes and percentages of those that fail open. Savings estimates can follow the approach used in Wisconsin as discussed in Appendix 7.2, based on weighted averages of prevailing trap types, orifice sizes and operating pressure ranges. This study may include billing analysis and/or on-site data collection to establish a more accurate estimate of savings.

Program Participation

Finding 5. Overall verified program savings (+90%), measure count (+90%) and projects per participant (+12%) increased in GPY2, with multifamily business types having the highest number of projects per participant in GPY2. In contrast, overall average savings per project were down (-26%) as more measures with smaller per unit savings replaced steam trap measures or projects. Heavy and light industry business types continue to have the largest therms savings per project, and these customers implemented mainly steam trap measures.

Recommendation 5. Although the program has met the targeted net goal for PY2, the IC should continue to pursue new and innovative ways of targeting high potential measures and trade ally segments through specific targeted marketing efforts, including:

- Undertake regular market research including penetration analysis for the program to aid in identifying potential new markets.
- Recruit program staff, trade allies, or auditors with connections to potential target communities or markets that have a high energy savings potential.

Trade Ally Satisfaction and Other Participation.

Finding 6. Overall, participating trade allies and contractors are very familiar and satisfied with the BEER program. On the question of satisfaction, twenty-five out of thirty participating trade allies (83%) gave a score of four or five (highest), indicating their strong satisfaction with the program. On the question of program marketing and outreach, about half of the survey respondents said the program marketing is working well, but the other half called for continuous improvement to the outreach.

Recommendation 6. The program should consider whether outreach activities can be improved and expanded, because about half of the participating trade allies interviewed recommended continuing improvements.

Finding 7. Non-participating trade allies surveyed provided several reasons why they had not submitted an application, although several reasons were fixable. In general, non-participating trade allies indicated less familiarity with the program (48 percent gave scores of four to five indicating the highest familiarity with the program) than participating trade allies (77 percent indicated highest familiarity).

Recommendation 7a. The IC should review the recommendations raised by non-participant trade allies as elaborated in Table 7-13 in the Appendix 7.3 to improve on the dissemination of information to both program trade allies and those potential trade allies working with other utilities.

Recommendation 7b. The IC should continue to encourage non-participating trade allies to pursue and submit projects to the program. The IC should continue to maintain a commercial and industrial specific list of non-participating trade allies. By identifying potential trade allies, the IC will be better able to target new contractors to further increase program participation and savings.

Recommendation 7c. Nicor Gas and the IC should continue to provide additional non-financial incentives to trade allies to promote their interest in the program, such as sporting event tickets or a trade ally recognition program, in which trade allies that have championed the program are recognized by Nicor Gas as leaders in their field, either through the existing BEER website, or through industry newsletters. This recognition may encourage non-participating trade allies or trade allies that have participated in the program in previous years to become more active.

Process Review.

Finding 8. Navigant reviewed the BEER program status of implementing recommendations made for the key performance indicators (KPI) in the program logic model review and the processes in our review of verification, due diligence, and tracking systems (VDDTSR) of the program in GPY1. Navigant concludes that the BEER program staff including the IC has implemented all of the recommended KPIs identified in the Logic Model and Program Theory (LMPT) memo (dated July, 2012). The program has implemented or is in the process of implementing most of the recommendations for VDDTSR.

Recommendation 8. Navigant recommends that the program should continue to track the identified KPIs throughout GPY3. The IC should revisit the recommendation related to incorporating customer satisfaction into the current program tracking database once the implementation of the TrakSmart® tracking database has occurred to determine if there would be an added value of combining the customer satisfaction results with the program tracking database.

7. Appendix

7.1 Glossary

High Level Concepts

Program Year

- EPY1, EPY2, etc. Electric Program Year where EPY1 is June 1, 2008 through May 31, 2009, EPY2 is June 1, 2009 through May 31, 2010, etc.
- GPY1, GPY2, etc. Gas Program Year where GPY1 is June 1, 2011 through May 31, 2012, GPY2 is June 1, 2012 through May 31, 2013.

There are two main tracks for reporting impact evaluation results, called Verified Savings and Impact Evaluation Research Findings.

Verified Savings composed of

- Verified Gross Energy Savings
- Verified Gross Demand Savings
- Verified Net Energy Savings
- Verified Net Demand Savings

These are savings using deemed savings parameters when available and after evaluation adjustments to those parameters that are subject to retrospective adjustment for the purposes of measuring savings that will be compared to the utility's goals. Parameters that are subject to retrospective adjustment will vary by program but typically will include the quantity of measures installed. In EPY5/GPY2 the Illinois TRM was in effect and was the source of most deemed parameters. Some of ComEd's deemed parameters were defined in its filing with the ICC but the TRM takes precedence when parameters were in both documents.

Application: When a program has deemed parameters then the Verified Savings are to be placed in the body of the report. When it does not (e.g., Business Custom, Retrocommissioning), the evaluated impact results will be the Impact Evaluation Research Findings.

Impact Evaluation Research Findings composed of

- Research Findings Gross Energy Savings
- Research Findings Gross Demand Savings
- Research Findings Net Energy Savings
- Research Findings Net Demand Savings

These are savings reflecting evaluation adjustments to any of the savings parameters (when supported by research) regardless of whether the parameter is deemed for the verified savings analysis. Parameters that are adjusted will vary by program and depend on the specifics of the research that was performed during the evaluation effort.

Application: When a program has deemed parameters then the Impact Evaluation Research Findings are to be placed in an appendix. That Appendix (or group of appendices) should be labeled Impact Evaluation Research Findings and designated as "ER" for short. When a program does not have deemed parameters (e.g., Business Custom, Retrocommissioning), the Research Findings are to be in the body of the report as the only impact findings. (However, impact findings may be summarized in

the body of the report and more detailed findings put in an appendix to make the body of the report more concise.)

Program-Level Savings Estimates Terms

N	Term Category	Term to Be Used in Reports‡	Application†	Definition	Otherwise Known As (terms formerly used for this concept)§
1	Gross Savings	Ex-ante gross savings	Verification and Research	Savings as recorded by the program tracking system, unadjusted by realization rates, free ridership, or spillover.	Tracking system gross
2	Gross Savings	Verified gross savings	Verification	Gross program savings after applying adjustments based on evaluation findings for only those items subject to verification review for the Verification Savings analysis	Ex post gross, Evaluation adjusted gross
3	Gross Savings	Verified gross realization rate	Verification	Verified gross / tracking system gross	Realization rate
4	Gross Savings	Research Findings gross savings	Research	Gross program savings after applying adjustments based on all evaluation findings	Evaluation-adjusted ex post gross savings
5	Gross Savings	Research Findings gross realization rate	Research	Research findings gross / ex-ante gross	Realization rate
6	Gross Savings	Evaluation-Adjusted gross savings	Non-Deemed	Gross program savings after applying adjustments based on all evaluation findings	Evaluation-adjusted ex post gross savings
7	Gross Savings	Gross realization rate	Non-Deemed	Evaluation-Adjusted gross / ex-ante gross	Realization rate
1	Net Savings	Net-to-Gross Ratio (NTGR)	Verification and Research	1 – Free Ridership + Spillover	NTG, Attribution
2	Net Savings	Verified net savings	Verification	Verified gross savings times NTGR	Ex post net
3	Net Savings	Research Findings net savings	Research	Research findings gross savings times research NTGR	Ex post net
4	Net Savings	Evaluation Net Savings	Non-Deemed	Evaluation-Adjusted gross savings times NTGR	Ex post net
5	Net Savings	Ex-ante net savings	Verification and Research	Savings as recorded by the program tracking system, after adjusting for realization rates, free ridership, or spillover and any other factors the program may choose to use.	Program-reported net savings

‡ "Energy" and "Demand" may be inserted in the phrase to differentiate between energy (kWh, Therms) and demand (kW) savings.

† **Verification** = Verified Savings; **Research** = Impact Evaluation Research Findings; **Non-Deemed** = impact findings for programs without deemed parameters. We anticipate that any one report will either have the first two terms or the third term, but never all three.

§ Terms in this column are not mutually exclusive and thus can cause confusion. As a result, they should not be used in the reports (unless they appear in the "Terms to be Used in Reports" column).

Individual Values and Subscript Nomenclature

The calculations that compose the larger categories defined above are typically composed of individual parameter values and savings calculation results. Definitions for use in those components, particularly within tables, are as follows:

Deemed Value – a value that has been assumed to be representative of the average condition of an input parameter and documented in the Illinois TRM or ComEd's approved deemed values. Values that are based upon a deemed measure shall use the superscript "D" (e.g., delta watts^{D}, HOU-Residential^{D}).

Non-Deemed Value – a value that has not been assumed to be representative of the average condition of an input parameter and has not been documented in the Illinois TRM or ComEd's approved deemed values. Values that are based upon a non-deemed, researched measure or value shall use the superscript "E" for "evaluated" (e.g., delta watts^{E}, HOU-Residential^{E}).

Default Value – when an input to a prescriptive saving algorithm may take on a range of values, an average value may be provided as well. This value is considered the default input to the algorithm, and should be used when the other alternatives listed for the measure are not applicable. This is designated with the superscript "DV" as in X^{DV} (meaning "Default Value").

Adjusted Value – when a deemed value is available and the utility uses some other value and the evaluation subsequently adjusts this value. This is designated with the superscript "AV" as in X^{AV}

Glossary Incorporated From the TRM

Below is the full Glossary section from the TRM Policy Document as of October 31, 2012[16].

Evaluation: Evaluation is an applied inquiry process for collecting and synthesizing evidence that culminates in conclusions about the state of affairs, accomplishments, value, merit, worth, significance, or quality of a program, product, person, policy, proposal, or plan. Impact evaluation in the energy efficiency arena is an investigation process to determine energy or demand impacts achieved through the program activities, encompassing, but not limited to: *savings verification*, *measure level research*, and *program level research*. Additionally, evaluation may occur outside of the bounds of this TRM structure to assess the design and implementation of the program.

Synonym: **Evaluation, Measurement and Verification (EM&V)**

> **Measure Level Research**: An evaluation process that takes a deeper look into measure level savings achieved through program activities driven by the goal of providing Illinois-specific

[16] IL-TRM_Policy_Document_10-31-12_Final.docx

research to facilitate updating measure specific TRM input values or algorithms. The focus of this process will primarily be driven by measures with high savings within Program Administrator portfolios, measures with high uncertainty in TRM input values or algorithms (typically informed by previous savings verification activities or program level research), or measures where the TRM is lacking Illinois-specific, current or relevant data.

Program Level Research: An evaluation process that takes an alternate look into achieved program level savings across multiple measures. This type of research may or may not be specific enough to inform future TRM updates because it is done at the program level rather than measure level. An example of such research would be a program billing analysis.

Savings Verification: An evaluation process that independently verifies program savings achieved through prescriptive measures. This process verifies that the TRM was applied correctly and consistently by the program being investigated, that the measure level inputs to the algorithm were correct, and that the quantity of measures claimed through the program are correct and in place and operating. The results of savings verification may be expressed as a program savings realization rate (verified ex post savings / ex ante savings). Savings verification may also result in recommendations for further evaluation research and/or field (metering) studies to increase the accuracy of the TRM savings estimate going forward.

Measure Type: Measures are categorized into two subcategories: custom and prescriptive.

Custom: Custom measures are not covered by the TRM and a Program Administrator's savings estimates are subject to retrospective evaluation risk (retroactive adjustments to savings based on evaluation findings). Custom measures refer to undefined measures that are site specific and not offered through energy efficiency programs in a prescriptive way with standardized rebates. Custom measures are often processed through a Program Administrator's business custom energy efficiency program. Because any efficiency technology can apply, savings calculations are generally dependent on site-specific conditions.

Prescriptive: The TRM is intended to define all prescriptive measures. Prescriptive measures refer to measures offered through a standard offering within programs. The TRM establishes energy savings algorithm and inputs that are defined within the TRM and may not be changed by the Program Administrator, except as indicated within the TRM. Two main subcategories of prescriptive measures included in the TRM:

Fully Deemed: Measures whose savings are expressed on a per unit basis in the TRM and are not subject to change or choice by the Program Administrator.

Partially Deemed: Measures whose energy savings algorithms are deemed in the TRM, with input values that may be selected to some degree by the Program Administrator, typically based on a customer-specific input.

In addition, a third category is allowed as a deviation from the prescriptive TRM in certain circumstances, as indicated in Section 3.2:

Customized basis: Measures where a prescriptive algorithm exists in the TRM but a Program Administrator chooses to use a customized basis in lieu of the partially or fully deemed inputs. These measures reflect more customized, site-specific calculations (e.g., through a simulation model) to estimate savings, consistent with Section 3.2.

7.2 Detailed Impact Research Findings and Approaches

7.2.1 Gross Impact Results

Table 7-1 shows the measure level quantities and verified savings in GPY2.

Table 7-1. GPY2 BEER Program Verified Gross Savings by Measure Type

Savings Measure Description	Measure Unit	Measures (Savings Quantity)	Ex Ante Gross Energy Savings (Therms)	Verified Gross Energy Savings (Therms)	Verified Gross Realization Rate
Boiler Reset Controls	Unit	10	8,532	8,531	1.00
Boiler Tune Up, Process	Unit	24	66,490	66,490	1.00
Boiler Tune Up, Space Heating	Unit	149	134,681	134,681	1.00
Commercial Steam Trap	Unit	1,038	92,656	92,656	1.00
Commercial Steamer	Unit	6	9,216	9,216	1.00
Condensing Boilers	Unit	87	67,937	67,937	1.00
Convection Oven	Unit	22	12,342	12,342	1.00
Fryer	Unit	21	20,828	20,828	1.00
Furnace, >=92% AFUE	Unit	28	6,961	6,961	1.00
Furnace, >=95% AFUE	Unit	126	47,918	47,918	1.00
Griddle	Unit	2	298	298	1.00
Hydronic Boilers	Unit	6	11,251	11,251	1.00
Indoor/Outdoor Pipe Insulation	Linear foot	42	183,642	183,642	1.00
Industrial Steam Trap	Unit	695	2,477,358	2,477,462	1.00
Infrared Charbroiler	Unit	3	1,983	1,983	1.00
Infrared Heaters	Unit	44	19,844	19,844	1.00
Infrared Rotisserie Oven	Unit	1	554	554	1.00
Infrared Salamander Broiler	Unit	5	1,195	1,195	1.00
Outdoor Pool Covers	Unit	6	28,859	28,859	1.00
Pasta Cooker	Unit	9	12,420	12,420	1.00
Pre-Rinse Spray Valves	Unit	291	24,798	24,798	1.00
Programmable Thermostat	Unit	413	73,514	73,514	1.00
Steam Boilers	Unit	3	3,744	3,744	1.00
Storage Water Heater	Unit	46	7,190	7,190	1.00
GPY2 Program Total		**3,077**	**3,314,210**	**3,314,314**	**1.00**

Source: Utility tracking data and Navigant analysis.

7.2.2 Savings Input Parameters for Hot Water and Steam Pipe Insulation Measures

The following algorithm from the TRM (v2.0) [17] was used as the bases to review and verify gross savings for steam pipe and hot water pipe insulation measures.

$$Verified\ Gross\ Annual\ Therm\ Savings\ per\ Foot = ((Qbase - Qeff) \times HOURS) / (100{,}000 \times \eta Boiler)) \times CF$$

Where:

- Q_{base} = Heat Loss from Bare Pipe (Btu/hr/ft). See Table 7-2 below.
- Q_{eff} = Heat Loss from Insulated Pipe (Btu/hr/ft). See Table 7-2 below.
- Hours = Annual operating hours (actual or defaults by piping use and building type)
- 100,000 = conversion factor (1 Therm = 100,000 Btu)
- ηBoiler = Efficiency of the boiler being used to generate the hot water or steam in the pipe (=80.7% for HW or steam boilers)
- CF = Heat loss correction factor of 1.00 (not considered in the TRM or by CLEAResult, and Navigant is proposing this should be considered by the TRM Technical Committee).

Following the TRM v2.0 description of the steam pipe insulation measure savings input, the heat loss estimates (Qbase and Qeff) provided in the CLEAResult Workpapers were reviewed by Navigant using the 3E Plus v4.0 software program[18]. The energy savings analysis is based on adding a 1.5 inch or 2.0-inch thick insulation around bare pipe. Details of the input parameters to 3E plus are shown in Table 7-2 below. Navigant determined that the engineering assumptions in the Workpapers were reasonable, and did not apply any adjustments to ex-ante savings for these measures.

[17] State of Illinois Energy Efficiency Technical Reference Manual, Version 2.0, section 4.4.14; (Ilinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean).

[18] 3E Plus is a heat loss calculation software provided by the NAIMA (North American Insulation Manufacturer Association).

Table 7-2. Steam/HW Pipe Insulation Savings Parameters

Parameter	Value	Data Source
Base case/material	2in. diam. Horiz. pipe, bare surface (steel for steam and copper for HW)	CLEAResult Pipe Insulation Workpaper
R value of pipe insulation (steam/HW pipes)	5	Engineering assumption
Linear feet of pipe	1	Standard value
Insulation material	cellular glass block, Gr1, C552-03, thermal conductivity 0.31Btu.in / hr.ft2.ºF@75ºF	CLEAResult Pipe Insulation Workpaper
Pipe temperature (steam boiler)	225 F	Proposed value for TRM measure
Pipe temperature (HW boiler)	150 F	Proposed value for TRM measure
Ambient temperature	75F (indoor), 48.6F (outdoor)	Engineering assumption
Combustion Efficiency	80.7% (steam), 81.9% (HW)	Proposed TRM v2.0 value
Nominal Pipe Size	Vary	Engineering assumption/ TRM v2.0 proposal
BTU loss/hr, uninsulated	Vary	Calculation using 3E Plus
BTU loss/hr, insulated	Vary	Using 3E Plus
BTU loss/hr, savings	Vary	Using 3E Plus
Hours of Operation/year	4963 (TRM v2.0 - assume recirculation heating season), but varies for CLEAResult	TMY3 Weather Data from O'Hare Int'l Airport
Heat Loss Correction Factor	1.00	Engineering Assumption
BTU/therm Conversion Factor	100,000	Standard value
Therms/year saved	Vary	Calculation
Nominal Therms/year saved	Vary (Average of all pipe sizes)	Calculation

Source: CLEAResult Workpaper on Pipe Insulation and Navigant input analysis

7.2.3 Steam Traps Secondary Research

Steam trap measures continue to have major impact on the BEER program; they contributed a combined total of 80% of the BEER program savings since Rider 30 commencement (85% in GPY1 and 78% in GPY2). As part of the GPY2 evaluation, Navigant conducted secondary research on commercial and industrial steam trap impacts. The objective was to assess the reasonableness of the Illinois TRM assumptions for estimating steam trap therms savings. The research also included a review of primary and secondary data from other similar programs in Illinois or elsewhere, which either validate current methodology and estimates or provides improved savings estimations. This

section outlines Navigant's approach and findings from the steam trap research. The findings are based on a combined review of both GPY1 and GPY2 tracking database with steam trap installations. Details of the measures installed since Rider 30 commencement are shown in Table 7-3.

Table 7-3. Nicor Gas BEER Program GPY1/GPY2 Steam Trap Installations

Rebate Measure Kind	Verified Unit Savings (Therms/ Trap)	Measures (Rebate Quantity)	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	% Steam Trap Verified Gross Savings
Steam Trap, Commercial	89	1,596	142,318	1.00	142,318	3.5%
Industrial/Process Low Pressure	636	2	1,272	1.00	1,272	0.0%
Steam Trap, Industrial Medium Pressure >=15 <30 psig	581	15	8,715	1.00	8,722	0.2%
Steam Trap, Industrial Medium Pressure >=30 <75 psig	854	39	33,306	1.00	33,310	0.8%
Steam Trap, Industrial High Pressure >=75 <125 psig	2941	468	1,376,388	1.00	1,376,405	34.0%
Steam Trap, Industrial High Pressure >=125 <175 psig	4449	341	1,517,109	1.00	1,517,188	37.5%
Steam Trap, Industrial High Pressure >=175 <250 psig	5890	141	830,490	1.00	830,492	20.5%
Steam Trap, Industrial High Pressure >=250 psig	7966	17	135,422	1.00	135,416	3.3%
Total		**2,619**	**4,045,020**	**1.00**	**4,045,124**	**100%**

GPY1 tracking data (PY1 Measures Recalculated_10062012_Nicor)
GPY2 tracking data (RSG_R-30-Totals-and-Reconciliation-Date - Business EER_6-03-13)

Research Approach

The approach adopted to investigate the BEER program steam trap impact included:

1. Develop a firm understanding of Nicor Gas steam traps activity, including determining:
   a) Average number of traps installed per customer,
   b) Average therms savings claimed per customer,
   c) Analyze market characterization of participants.
2. Compare the Illinois TRM methodology including the engineering assumptions and algorithms for estimating steam trap savings to other industry standards.

3. Review the reasonableness of the current TRM values of steam trap savings, and how they compare with other industry TRMs.
4. Investigate how other programs are offering steam traps, whether prescriptive or custom, and if custom how savings are estimated.

Data Collection

The following documents were studied:

1. BEER program PY1 and PY2 tracking data with participants and installation data
2. Engineering desk review of 10 project's documentation[19]
3. Steam traps Workpaper from CLEAResult[20]
4. Review TRMs from Illinois[21], Arkansas[22] and Wisconsin Focus on Energy[23].
5. Steam trap savings assumptions from Minnesota[24]

Research Findings

Steam Trap Participants Characterization

A total of 55 paid projects from 36 business participants have implemented steam trap measures since Rider 30 commencement. Steam traps for commercial heating applications constitute bulk of the installed measures, accounting for 61% of total installed steam traps, but contributed 3.5% of the total savings from steam traps. The bulk of the 96% of savings came from high pressure industrial steam traps.

Overall, there were 1.53 projects per business participant with an average of 73,546 Therms per project (a breakdown to 1.56 projects per participant and 3,389 Therms per project in the case for commercial applications, and 1.53 projects per participant and 150,104 Therms per project for industrial applications).

Steam trap savings were highly concentrated in a few participants. Bulk of the total steam trap savings come from five out of the 36 participants and these participants accounted for 82% of total savings, with one participant contributing 31% of the savings. Nine (9) out of the 36 participants conducted self-installations, and these projects contributed 47% of the total steam trap savings.

Table 7-4 gives the business categorization of the BEER program including both GPY1 and GPY2. Participants who installed steam traps represent a range of business sectors.

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19 CLEAResult provided documentation of 10 steam trap projects for Navigant's review on 7/31/2013
20 Nicor BEER - Steam Trap Workpaper3.8.12 (Revision #4)
21 Illinois_Statewide_TRM_Effective_060113_Version_2.0_060713_Clean (Section 4.4.16)
22 Arkansas Public Service Commission, TRM (Version 2.0, Approved in Docket 10-100-R)
23 Wisconsin Public Service Commission, Focus on Energy Evaluation, Business Programs: Deemed Savings (Manual V1.0, March, 2010)
24 mn.gov/commerce/energy/images/Steam-Traps.xls

Table 7-4. Nicor Gas BEER Program GPY1/GPY2 Business Characterization

Sector	Projects		Business Participants		Projects / Part.	Ex Ante Gross Energy Savings		Therm / Project
	Count	%	Count	%		Therm	%	
Assembly	6	11%	3	8%	2.00	357,544	9%	59,591
College/University	4	7%	2	6%	2.00	2,830	0%	707
Heavy and Light Industry	13	24%	10	28%	1.30	1,415,576	35%	108,890
Hotel/Motel	1	2%	1	3%	1.00	12,926	0%	12,926
Medical	2	4%	2	6%	1.00	14,894	0%	7,447
Retail/Service	14	25%	9	25%	1.56	152,489	4%	10,892
Miscellaneous	15	27%	9	25%	1.67	2,088,761	52%	139,251
TOTAL	**55**		**36**		**1.53**	**4,045,020**		**73,546**

Source: Utility tracking data and Navigant input analysis

The miscellaneous category accounts for the most energy savings from steam traps (76%), the highest number of projects per participant (1.67), and the largest therms per project (139,251 Therms). The heavy and light industry sector accounts for the second largest share of projects (24%) and the second largest share of participants (28%), though with a lower 1.3 projects per participant, but contributed over 35% of total steam trap savings.

Comparing Illinois TRM Steam Trap Assumptions with Other Industry TRMs

The following algorithm was applied in the Illinois TRM to estimate steam trap gross savings.

$$\Delta therm = S * (Hv/B) * Hours * A * L / 100{,}000$$

Where:

S = Maximum theoretical steam loss per trap
Hv = Heat of vaporization of steam
B = Boiler efficiency
Hours = Annual operating hours of steam plant
A = Adjustment factor for reducing the S to the average steam flow
L = Leaking & blow-through factor

Navigant compared the Illinois TRM steam trap savings algorithm and assumptions to other TRMs from Arkansas (AR), Minnesota (MN) and Wisconsin (WI). Navigant found the Illinois savings algorithm as consistent with other TRMs. The savings assumptions vary depending on the prevailing market share of steam trap types, prevailing trap orifice sizes, operating pressure and pressure range to which savings value applies, climate zone, and estimated hours of use. Table 7-5 summarizes the findings from comparing the savings assumptions. Generally, Navigant found Illinois savings assumptions as reasonable compared to other TRM values. Some Illinois TRM parameters vary slightly lower (e.g. heat of vaporization and average steam loss per trap estimates), Northern Illinois uses up to 4,272 hours for commercial heating applications (WI uses up to 4,664 hours and MN uses

up to 4,001 hours). For industrial steam trap applications, the IL-TRM assumes 7,752 hours, Minnesota uses 8,760 hours and Wisconsin uses 4,745 hours (this WI annual boiler operating hours is deemed from operating hours for standard lighting in an industrial facility). Unlike Illinois and Wisconsin TRMs, other TRMs do not discuss leaking and blow-thru factors applied in cases of mass replacements without auditing. Others do not apply a discharge rate leakage factor to the estimated energy savings as used in Illinois. Best practices recommend that steam trap reviews and repairs should be performed on an annual basis, which may reduce the average time that a steam trap would leak, possibly as much as six months, which would reduce the savings estimate by half[25]. The IL-TRM assumes steam discharge leakage factor of 50% (referred to as the Enbridge Factor in the CLEAResult steam strap workpaper). Although the WI-TRM discusses this factor, it was not applied to their estimated savings. The Minnesota and Arkansas TRMs do not include this factor.

Table 7-5. Reasonableness of Illinois TRM Assumptions with Other Industry TRMs

Parameters	Illinois vs. Other Industry TRMs: Steam Trap Commercial Application?	Illinois vs. Other Industry TRMs: Steam Trap Industrial Application?
Heat of vaporization (Btu/lb)	Reasonable. Vary slightly lower.	Reasonable. Vary slightly lower.
Average installed boiler efficiency	Reasonable. Many TRMs use 80% (AR uses 70%).	Reasonable. Many TRMs use 80% (AR uses 70%).
Annual operating hours	Reasonable. Varies depending on climate zone.	Reasonable. Varies but not widely, WI value is much lower.
Average steam loss (lb/hr per trap)	Reasonable. Varies but not widely.	Reasonable. Varies but not widely.
Leaking&blow-thru factor	Reasonable. IL uses 27%, WI consider 30%. Not found in other TRMs.	IL uses 16%. Not found in other TRMs.
Derating Factor/Leakage Factor	Same 50% derating factor. IL uses 50% LF. Mentioned in WI TRM but not applied. The MN & AR did not discuss.	Same 50% derating factor. IL uses 50% LF. Mentioned in WI TRM but not applied. The MN & AR did not discuss.

Source: Navigant research

Comparing Illinois TRM Steam Trap Savings with Other Industry TRMs

Table 7-6 shows examples of the steam trap savings estimates compared with findings from other industry TRMs (estimates are based on mass replacements without prior auditing). Comparing savings estimates across different states and market is difficult. For instance, while the Illinois TRM savings are based on assumptions from 3/16-inch orifice size for medium pressure and 1/4-inch for high pressure steam traps, the Wisconsin estimates consider the market prevalence of each trap type in terms of percentage population of each trap type and orifice size, and determines the average therms saved for each operating pressure across the spectrum of orifice sizes and weighted average

[25] Wisconsin Public Service Commission, Focus on Energy Evaluation (Business Programs: Deemed Savings Parameter Development, Final Report, November, 2009)

of therms saved from each steam system pressure. Hence, to better compare the results from Wisconsin and Minnesota, we considered only the typical estimates from 3/16-inch (medium pressure at 15psig) and ¼-inch size for the high pressure (100 or 150 psig). We also applied a leakage factor of 50% to estimates from Wisconsin and Minnesota as was used in Illinois to see how the results compare.

Table 7-6. Comparison of Illinois TRM Steam Trap Savings Estimates with Other TRMs

States/ Jurisdiction TRM	HVAC Heating (Therms/Trap)	Dry Cleaning (Therms/Trap)	Industrial Steam Trap (Therms/Trap)		
	Up to 15psig (orifice size varies)	1/8-inch @75psig	3/16-inch @ >=15 <30psig	1/4-inch @ >=75 <125psig	1/4-inch @ >=125 <175psig
Illinois	330	514	581	2,941	4,449
Wisconsin*	455	n/a	439	3,018	4,333
Minnesota*	311	n/a	n/a	4,561	n/a
Rhodes Island/ Massachusetts	257	n/a	n/a	n/a	n/a

Source: Navigant research

**- Note: WI and MN savings estimates are halved by assuming leakage factor of 50% for comparison purpose (Wisconsin HVAC heating steam trap savings is 910 therms, which when halved gives 455therms; 8,666 therms for high pressure steam trap becomes 4,449therms).*

It must be emphasized that, while the Wisconsin estimates would be higher if a more reasonable hours of use values were used for the high pressure steam traps, the overall Wisconsin estimates are much lower compared to Illinois since final numbers are weighted by the combined population percentages of trap types and sizes and operating pressure ranges. A typical example is that a ¼-inch high pressure steam trap (up to 100psig or range from 50-125psig) will give 6,035 Therms (3,018 therms with leakage factor) but at the same pressure, results from the combination of several orifice sizes at different prevailing market percentages will produce a significantly lower weighted savings of 756 Therms (378 Therms with leakage factor).

Overall, Navigant can determine that the Illinois TRM steam trap savings algorithm and assumptions are comparable to findings from other industry TRMs, however, the lack of details of the prevailing steam trap types, population percentages of trap types and orifice sizes and those that fail open in the Illinois TRM savings estimate may suggest savings are not adequately reflecting the market condition (considering similar findings from the Wisconsin TRM). Navigant recommends additional research be conducted to assess the various types of steam traps in the Illinois market, determine the population percentages of each trap type and orifice sizes and percentages of those that fail open. Savings estimates can follow the approach used in Wisconsin or else based on weighted averages. Also considering that a detailed steam trap impact assessment study from the Pacific Gas and Electric

Mass Markets Program found that up to 33% of the program ex ante savings could be achieved after a billing analysis study (on commercial cleaning/laundry facilities)[26], Navigant recommends that similar study can be done in Illinois to inform potentially better savings estimates.

7.2.4 Net Program Impact Results

Net-to-gross ratio (NTGR) of 0.73 was deemed by the SAG for GPY2 verified net savings estimation. This section provides additional details of the NTG research effort in GPY2 aimed at providing trade ally free ridership and spillover parameters to improve the overall NTG estimate of the BEER program. The GPY2 trade ally telephone interviews captured the additional information needed to refine Navigant's research net impact analysis.

Research NTGR Sampling Approach

For the participating trade ally sampling, customer-level savings data that can be attributed to the trade ally were analyzed by project size to inform the sample design. Trade ally attributed savings were sorted from largest to smallest and placed into one of two strata such that each contains half of the estimated total trade ally energy savings. Table 7-7 shows the tracking population and the trade ally sample draw. Navigant completed thirty (30) trade ally interviews to estimate participant trade ally free ridership and spillover. Sampling of participating trade allies attempted to achieve a minimum of 90/10 confidence and precision on the contractor generated therms savings at the program level. In order to achieve the designed confidence and precision, Navigant attempted to conduct a census of the contractors that generate the top portion of program savings. Contractors that contribute a smaller proportion of the savings were sampled in order to achieve a balanced perspective. An additional thirty-one (31) trade ally non-participant interviews were completed for the trade ally non-participant spillover and process evaluation.

Table 7-7. C&I Prescriptive Program Sampling Summary

Survey Target	Population	Sample	Completed	Planned Confidence/Precision
Participant	n/a	n/a	n/a	n/a
Participant Trade Ally	200	≤40	30	90/10
Non-Participant Trade Ally	606	Census ≤30	31	n/a

Source: Utility tracking data and Navigant input analysis

In an effort to improve the response rate of the trade ally surveys, Navigant worked with the implementation contractor to verify the trade ally contact name and telephone number data in the tracking system is accurate prior to initiating outreach to sampled trade allies.

[26] KEMA Steam Trap Impact Assessment –Final Report, Prepared for Pacific Gas and Electric Company, October 2007.

The research finding NTG is calculated using the customer participant free-ridership rate from GPY1, and then adding the participant, participating trade ally, and non-participating trade ally spillovers, as follows:

$$NTG_{Program\ research\ pilot\ calculation=} 1 - \frac{(FR_{Part.} + FR_{TA})}{2} + SO_{Part.} + SO_{Part.TA} + SO_{Non-Part.TA}$$

Where $NTG_{Program}$ = Program NTG
$FR_{Part.}$ = Participant Free-Ridership
FR_{TA} = Trade Ally Free-Ridership
$SO_{Part.}$ = Participant Spillover
SO_{PartTA} = Participating TA Spillover
$SO_{Non\text{-}PartTA}$ = Non-Participating TA Spillover

Table 7-8 below presents the sources for parameters that were used in verified gross savings analysis indicating which were examined through GPY2 evaluation research and which were deemed.

Table 7-8. NTG Research Savings Parameter Data Sources

Parameter	Data Source	Deemed or Evaluated?
Research Findings Net-to-gross Ratio (NTGR)	GPY2 Evaluation Research	Evaluated
Free ridership (Participating Customer)	GPY1 Evaluation Research	Evaluated
Free ridership (Participating Trade Allies)	GPY2 Evaluation Research	Evaluated
Spillover (Participating Customer, PSO)	GPY1 Evaluation Research	Evaluated
Spillover (Participating TA, TSO)	GPY2 Evaluation Research	Evaluated
Spillover (Non-Participant TA TNSO)	GPY2 Evaluation Research	Evaluated

Source: Navigant Research

7.2.4.1 Free-Ridership

Participant Free Ridership

Participant free ridership results from GPY1 was used in GPY2 to calculate the research findings net-to-gross ratio. Participant free ridership value of 0.27 is derived from the SAG deemed GPY2 verified NTG of 0.73.

Trade Ally Free Ridership

Navigant was unable to reach the target number of trade allies (40 targeted) even given the aid from Nicor Gas staff and IC staff. Given the variability of the program measures, this was particularly a problem for the BEER program, as there is a need for appropriate representation by all measure end-uses and major groups. As shown in Table 7-9, the sample of trade allies for the free ridership research represented only 34 percent of the BEER program participant/customer savings attributable

to participant trade allies. Navigant was unable to reach many of the larger therm contributing trade allies in terms of the customer savings.

Table 7-9. Trade Ally Free Ridership Sampling Analysis

Population (Customer Gross Therms)				Sample (Customer Gross Therms)			Free Ridership
Strata	**Count**	**Therms**	**Therms weight**	**Count**	**Therms**	**Therms weight**	**Strata FR**
Boiler Measures (Boilers, Tune-ups and Controls)	54	328,880	0.13	7	72,135	0.08	0.38
Steam Traps	15	1,858,605	0.72	3	629,022	0.72	0.69
Other Equipment	131	374,089	0.15	20	177,964	0.20	0.45
Program Overall	200	2,561,574	1.00	30	879,122	1.00	0.61
Percent Sample Therms of Population						0.34	

Source: Navigant research

From the analysis of the thirty participant trade ally interview responses, Navigant estimated trade ally average free ridership of 0.61 at ±15% overall relative precision at 90% confidence level, as shown in Table 7-10. It should be noted that of the 30 trade allies surveyed, only three indicated that they had installed steam traps. These three trade allies represented 629,022 (approximately 72%) of the total surveyed gross therms compared to the total program gross therms savings attributable to steam traps of 1,858,605 therms (approximately 73%).

Table 7-10. Trade Ally Free Ridership and Relative Precision at 90% Confidence Level

Sample Strata	Trade Ally Population (N=200)	Trade Ally Free-rider Interviews (n=30)	Relative Precision (± %)	Low	FR (Mean)	High
Boiler Measures (Boilers, Tune-ups and Controls)	54	7	55%	0.17	0.38	0.59
Steam Traps	15	3	58%	0.29	0.69	1.09
Equipment	131	20	25%	0.34	0.45	0.57
Total	200	30	15%	0.52	0.61	0.71

Source: Navigant research

Below are samples of the trade ally free ridership questions that were asked:

1. Using a 0 to 5 likelihood scale where 0 is not all likely and 5 is extremely likely, how likely is it that you would have recommended that your customers install the rebated energy efficiency measures without the program?

2. Using the scale from 0 to 5, where 0 is not at all influential and five is very influential, how influential was the program on your decision to recommend these specific high efficiency measures?
3. If the program had not existed, approximately what percentage of the rebated measures would your customers have purchased?

    - To make sure I understand correctly, you installed XX measure 1 through the program from June 2012 to May 2013, and you think that XX% [RESPONSE FROM ABOVE] of these, or XX, would still have been installed if the program had not existed?

The trade ally FR score is determined using the following formula, where the percentage of measure is determined using the answers to question three above:

Trade Ally FR = (% Measures Installed Without Program) * 100%

7.2.4.2 Spillover

Participant Spillover

Participant spillover is calculated using the following algorithm:

$$Participant\ SO = [(Savings\ Associated\ with\ Additional\ High\ Efficiency\ Measures \\ /Total\ Participant\ Savings\ x\ \ Program\ Influence\ Score)]$$

The savings values associated with the additional high efficiency measures is taken from the Illinois TRM when available, and from other third party industry documents if not in the TRM.

Participant spillover was assessed qualitatively in GPY1, but no spillover was quantified. The GPY2 NTG research assumed a participant spillover of zero.

Participant Trade Ally Spillover

Participant trade ally spillover was estimated as 0.2%, using the following algorithm:

Trade Ally SO = (Percentage of Program Qualified Sales – Percentage of Program Sales) * Program Influence Score

Below is a sample of the spillover questions that were used to obtain the above algorithm:

1. Approximated what percentage of your total sales were rebated measure sales? Was it more than 50% or less than 50%? More or less than 75% or 25%? Etc.

2. On a scale from zero to five, where zero is not at all influential and five is very influential, how influential was participating in the program on your decision to increase the frequency that you recommended measures that would qualify for the program to your customers?

3. Since you participated in the program, what percentage of your sales was for measures that would qualify for the Program?

4. Using a 0 to 5 likelihood scale where 0 is not all likely and 5 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 sold the same percentage of measures that would qualify for the program to your customers?

Trade allies were asked to estimate what percentage of their sales were high efficiency (program qualified) and the percentage of sales that were rebated program sales. The trade allies were asked to rate the influence of the program on the quantity of program qualified sales. The influence of the program was rated on a zero to five scale, where zero is not at all influential, and five is extremely influential. The trade allies were also asked the likelihood that the same quantity of program qualified sales would have been sold had the program not been available, also using a zero to five scale.

The difference between program qualified sales and program sales is potential spillover. This difference was discounted based on the level of influence of the program. The program influence score was calculated using the following formula:

$$Program\ Influence\ Score = Average\left[\left(1 - \frac{Likelihood\ Score}{5}\right), \frac{Influence\ Score}{5}\right] * 100\%$$

Trade allies who report that the program had no influence (score of zero) had their increase in sales discounted by 100 percent. Trade allies who report very little influence (score of 1 or 2) had their increase in sales discounted by 50 percent. Trade allies who reported an influence score of 3 or higher did not have their increase in sales discounted.

Non-Participating Trade Ally Spillover

Table 7-11 shows the composition of non-participant trade ally list received from CLEAResult.

Table 7-11. Non-Participant Trade Ally List

Non-Participants	Number of TAs
PEEZZA Session Attendee	29
Never Participated	532
Participated in PY1	45
Total	606

Source: Utility tracking data and Navigant input analysis

Thirty-one (31) trade ally non-participant interviews were completed for the trade ally non-participant spillover and process evaluation. Fifteen of those were trade allies who attended the PEEZZA Session, and sixteen never participated in the training session or the program. Navigant observed only ten PEEZZA attendees answered the spillover questions, but only two were identified as potential spillover candidates, and their savings and spillover percentages were quantified. The spillover measures identified were steam traps, gas storage water heater, furnaces and boiler measures. To estimate the spillover, Navigant used the Illinois TRM and the quantity of measures by the trade ally sales that can be credited to the program, and used the therms per measure from the TRM to calculate estimated spillover therms savings that can be credited to the program. Comparing this with program overall verified gross savings Navigant estimated non-participating trade ally spillover of 2%. The non-participant survey could not distinguish which program influenced the non-participant trade allies (BEER or the Custom program), so the non-participant spillover savings would be best credited to the BEER Program because the measures were similar to prescriptive measures.

Below is a sample of the spillover questions that were asked that apply to the above algorithm:

1. Before you participated in the program/attended the program training session, how often did you recommend that your customers purchase high efficiency measures that would qualify for the program? Was it more than 50% or less than 50%? More or less than 75% or 25%? Etc.

2. Before you participated in the program/attended the program training, what percentage of your sales were for high efficiency measures that would qualify for the program? Was it more than 50% or less than 50%? More or less than 75% or 25%?

3. Since participated in the program/attended the program training, have you recommended high efficiency measures to your customers more often, less often, or the same amount?

4. What do you think the percentage of measures that would qualify for the Program would have been?

5. Using a 0 to 5 likelihood scale where 0 is not all likely and 5 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 sold the same percentage of measures that would qualify for the Program to your customers?

6. Please select one of the following which best describes your typical average annual sales in dollars?
   a. <$100,000
   b. Greater than $100,000 but less than $250,000
   c. Greater than $250,000, but less than $500,000
   d. Greater than $500,000, but less than $1 Million
   e. Greater than $1 Million
   f. Don't know
   g. Refused

Table 7-12 shows the estimated parameters with a research finding NTG of 0.58. Although, it was expected that the additional NTG research would improve the program overall NTG, the resulted NTG of 0.58 is lower than expected. Navigant recommends future studies should revisit the trade ally net to gross estimates, with the hope that more trade ally participation in the survey may produce more statistically representative results.

Table 7-12. GPY2 Research Finding Net-to-Gross Estimate

Interview Type	Research Estimated Values
Participant Free-ridership Score (P)[27]	0.27
Trade Ally Free Rider Score (T)	0.61
Participant Spillover (PSO)	0.00
Participating Trade Ally Spillover (TSO)	0.002
Trade Ally Non-Participant Spillover (TNSO)	0.02
Net-to-Gross (1-(P+T)/2) +PSO+TSO+TNSO)	0.58

Source: Evaluation Team analysis.

[27] The deemed participant free ridership and spillover values from GPY1 evaluation research are used here as an example to estimate the proposed combined net-to-gross ratio and the research finding net savings.

7.3 Additional Process Findings

Trade Ally Non-Participants

Respondents who attended a Nicor Gas training session, but did not submit any project applications to the BEER program were asked to give their reasons for not participating. Table 7-13 provides insight into reasons given by respondents who attended a Nicor Gas training session but did not submit an application.

Table 7-13. Trade Ally Non-Participant Responses on Nicor Gas Trainings in GPY2 BEER Program

Attended Nicor Gas Training	Reasons For Not Participating In GPY2 BEER Program
Yes	Customers haven't had opportunity. They do owner direct and hasn't had need.
Yes	Customers too large and opt out of program and are administering their own program.
Yes	Heating season hasn't started
Yes	Have 2 in the works.
Yes	Poor communication with CLEAResult (misunderstanding of customer measure -modified venturi nozzle).
Yes	Customers defer to other trade allies for gas measures because they do not have capacity to do gas.
Yes	We are a manufacturer so they do not sell to customers.
Yes	Customers are still communicating with engineers trying to explain to them about their products. Some engineers do not understand their product. It is qualified in other states.
Yes	Works on big projects on behalf of the university so it is not in her name but has done through university.
Yes	Not as much work in the Nicor territory, compared to Peoples Gas
Yes	Service company with not much opportunity for new equipment. For boiler tune-ups and such, it is usually up to the customers to submit an application, not this company.
Yes	Don't sell high efficiency equipment because it is too expensive. The rebates aren't high enough. None of the equipment on sale qualifies to the program.
Yes	Golden egg principle. Must be alternative motives to a utility company giving out $500k incentives.
Yes	Customers have talked about it. There were lots of Rural Energy for American Program (REAP) grants given out (10-20% of project cost) but those dried up.

Source: Survey responses and Navigant analysis.

7.4 Data Collection Instruments

7.4.1 Non-Participating Trade Ally Survey Guide

Nicor Gas

Non-Participating Trade Ally In-Depth Interview Guide

Respondent name:	
Respondent phone number:	
Respondent title:	
Email Address:	
Respondent Company	
Date:	
Status:	

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NAVIGANT

Introduction

(Note: the interviewer should change the introduction to match his/her own interviewing style)

Hi, may I please speak with [NAME]?

Background

Hello, this is _____ from Navigant Consulting calling on behalf of Nicor Gas. THIS IS NOT A SALES CALL. I am calling about Nicor Gas' Business Energy Efficiency Rebate Program. Our records indicate that you took part in a Nicor Gas training for the Business Energy Efficiency Rebate Program, sometimes referred to as PEEZZA training sessions. Is this correct? [IF NOT, ASK IF SOMEONE ELSE IN THEIR FIRM MAY HAVE PARTICIPATED AND GET A PHONE NUMBER. IF NO ONE, THANK CONTACT AND TERMINATE SURVEY.]

This survey will take about 20 minutes. Is now a good time? [If not, schedule call-back]

Before we start, I would like to inform you that for quality control purposes, this call may be monitored by my supervisor. For the sake of expediency, we will be recording this interview. I will also be referring to the Business Energy Efficiency Rebate Program simply as "the Program".

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 types of businesses does your company primarily serve?

2. Can you briefly summarize your roles and responsibilities at your company? For how long have you carried these out?

NAVIGANT

Marketing and Participation

3. How familiar are you with the Business Energy Efficiency Rebate Program? On a scale from 0 to 5, where zero is not at all familiar and five is very familiar, how would you rank your familiarity?

   [IF THE CONTACT HAS NO KNOWLEDGE OF THE PROGRAM]

   1. Is there someone else within your company that may be more familiar with the program? [IF YES – RECORD CONTACT INFORMATION INFORMATION]
   2. Would you like to receive information about the program or be contacted by a Nicor Gas representative to hear more about the benefits of the program?

NAVIGANT

[IF YES – RECORD INFORMATION] THANK & TERMINATE

4. How and when did your firm (the contractor) become aware of the program? What other methods can the utilities and program implementers use to boost program awareness with contractors?

5. Our records indicate that you attended a Nicor Gas training session. Can you please describe the training sessions that you attended – what kinds of information were you given that you recall? [OPEN ENDED]

    a. Did you find the training sessions a good use of your time?

    b. What information did you think was the most useful?

    c. What information did you think was the least useful?

    d. Have you made any changes to what products you market or how you market energy efficiency technologies since attending the training session?

6. Did you attend the training to learn about the:

    a. Business Energy Efficiency Rebate Program,

    b. the Business Custom Incentive Program, or

    c. Both

    d. Don't Know

7. What type of energy efficient equipment does your company install? [OPEN ENDED – ACCEPT MULTIPLE RESPONSES. IF MULTIPLE MEASURES – REQUEST A PERCENTAGE BREAKDOWN FOR EACH MEASURE] DO NOT READ LIST BELOW.

    a. Water Heating Equipment (e.g. gas storage water heaters, etc.)

    b. Space Heating Equipment (e.g. space heating boilers, natural gas furnaces, infrared heaters, etc.)

    c. Energy Efficient Improvements (e.g. Steam traps, boiler tune-ups, boiler controls, ozone laundry system, pipe insulation, etc.)

    d. Commercial Kitchen Equipment (e.g. pre-rinse spray valves, infrared broilers, griddles, fryers, etc.)

    e. High Efficiency Burner Replacements

    f. High Efficiency Furnace Replacements

NAVIGANT

g. High Efficiency Boiler Replacements

h. Burner and Furnace Controls

i. Regenerative Thermal Oxidizers (RTO) systems

j. Process Heat Recovery

k. Other [PROBE FOR CLARIFICATION]

8. Our records show that you attended a Nicor Gas training session, but you have not yet submitted any project applications to the program. Is that your understanding as well? Can you tell me why not? [PROBE AS TO WHY THE CONTRACTOR HAS NOT PARTICIPATED]

    a. Were there any other reasons why you did not participate? Can you elaborate more?

9. Is there anything we can do to change the program so you would be more likely to promote it and help customers complete program applications? [OPEN ENDED – PROBE FOR FURTHER EXPLANATION]

    a. Do you have any other suggestions for improving the program? Can you elaborate more?

10. Have you received any promotional materials from Nicor Gas regarding the program? [IF YES] Can you please describe the promotional materials that you received?

    a. Did you use the promotional material or find it useful?

11. Have you looked at the program website to find information? [IF YES] Did you find the information that you needed?

    a. [IF YES] Did you find the information on the website useful?

Program Spillover

PRIOR TO CONDUCTING PROGRAM SPILLOVER - REVIEW PROGRAM QUALIFYING MEASURES WITH RESPONDENT FOR THE PROGRAM THAT THEY ASSOCIATED WITH IN QUESTION 5.

COMMON CUSTOM PROGRAM MEASURES INCLUDE: High-efficiency burner replacements, High-efficiency furnace replacements, High-efficiency boiler replacements, Burner and furnace controls, Process heat recovery technologies, including flue stack and condensing economizers, Regenerative thermal oxidizers, Condensate return system improvements, Direct-fired heaters, Destratification fans, Air side measures: Make-up air units, Custom roof top tune-ups, Energy recovery ventilators.

NAVIGANT

COMMON PRESCRIPTIVE MEASURES INCLUDE: Water Heating Equipment (e.g. gas storage water heaters, etc.), Space Heating Equipment (e.g. space heating boilers, natural gas furnaces, infrared heaters, etc.), Energy Efficient Improvements (e.g. Steam traps, boiler tune-ups, boiler controls, ozone laundry system, pipe insulation, etc.), and Commercial Kitchen Equipment (e.g. pre-rinse spray valves, infrared broilers, griddles, fryers, etc.)

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7.4.2 Participating Ally Survey Guide