



**Energy Efficiency Plan Year 2
(6/1/2012-5/31/2013)
Evaluation Report:
Summary and Compendium**

DRAFT

**Presented to
Nicor Gas Company**



An AGL Resources Company

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1. Portfolio Level Results and Recommendations

The goal of this report is to present a summary of the findings and results from the impact and process evaluation of the energy efficiency programs offered by Nicor Gas in Gas Program Year 2 (GPY2), which ran from June 1, 2012 to May 31, 2013.

1.1 Portfolio Level Impact Results

The Nicor Gas portfolio reported 13,345,226 therms of gross savings during GPY2, as shown in Table 1-1. Evaluation review of these ex-ante gross savings estimates on a program-by-program basis concluded that 111% of the reported gross savings had been realized. With the exception of the Business Custom program, Navigant applied net-to-gross (NTG) ratios as deemed by the Illinois Statewide Advisory Group (SAG)¹, resulting in an overall portfolio NTG ratio of 0.78. The individual program evaluations resulted in an ex-post net savings estimate of 11,535,008 therms.

Table 1-1. Portfolio Year 2 Results – Ex Ante and Ex Post Savings

	Ex-Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)	Net-to- Gross Ratio	Verified Net Savings (therms)
Home Energy Efficiency Rebates (HEER)	2,847,533	1.00	2,858,644	0.69†	1,972,464
Home Energy Savings (HES)	253,445	1.08	273,900	0.86†	235,554
Multifamily Home Energy Savings (MFHES)	628,088	1.00	628,071	0.96†	602,171
Residential New Construction (RNC)	242,112	0.91	220,300	0.80†	176,240
Elementary Energy Education (EEE)	217,254	1.51	327,689	0.79†	258,875
Behavioral Energy Savings Pilot (BES)	11,955*	1.70	20,722*	N/A	20,722
Business Energy Efficiency Rebates (BEER)	3,314,210	1.00	3,314,314	0.73†	2,419,449
Business Custom (Custom)	3,317,145	1.29	4,263,751	0.72‡	3,069,901
Economic Redevelopment (ER)	132,207	0.85	112,363	0.70†	78,654
Emerging Technologies (ETP)	8,734	0.99	8,714	1.00†	8,714
Small Business Energy Savings (SBES)	1,719,681	1.25	2,143,013	1.00†	2,143,013
Business New Construction (BNC)	255,509	1.04	265,503	0.52†	138,062
Building Performance with Energy Star (BPwES)	N/A	N/A	N/A	N/A	N/A
Portfolio Total	13,345,226	1.11	14,840,110	0.78	11,535,008

Source: Navigant Analysis and Nicor Gas Project Files

¹ See <http://www.ilsag.info/> for more information on the SAG and net-to-gross framework.



*Net therms are reported in lieu of gross therms in this case.

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

‡ Based on evaluation research findings

Definitions

Key definitions are provided in the below bullets and described in more detail in Appendix 4.1.

- Ex-Ante Gross Therms are savings as recorded by the program tracking system, unadjusted by realization rates, free ridership, or spillover. This information comes from Nicor Gas’s data tracking system and those of their implementation contractors.
- The realization rate represents verified gross savings / tracking system gross savings
- Verified Gross Savings are the gross program savings after applying adjustments based on evaluation findings for only those items subject to verification review for the Verification Savings analysis.
- Net-to-Gross (NTG) is the ratio of Verified Gross Savings program savings attributed to program influence or 1 – Free Ridership + Spillover.
- Verified Net Savings are the verified gross savings times NTG ratio.

Nicor Gas fell short of their filed goals for net program savings for the second program year. The achieved net therm savings for PY2 was 11,535,008 therms, 14% below their filed goal² of 13,401,596 therms. There were four programs that met or exceeded filed goals, the other programs were unable to meet filed goals but were often closer to revised goals. Nicor Gas is closer to goal by percentage than in GPY1 (in GPY1, the overall portfolio was short by approximately 21.7%).

1.2 Portfolio Level Process Results

The primary objective of the process evaluation effort is to gather market intelligence to help program designers and managers structure their programs to achieve cost-effective savings while maintaining high levels of customer satisfaction. Specific process evaluation methods and objectives vary based on each individual program’s needs and stage of development, and detailed process findings are reported separately for each program in the individual evaluation reports. Navigant did not conduct satisfaction research for most programs due to high levels of customer satisfaction in GPY1. A comparison of GPY2 customer satisfaction scores across applicable programs is presented in Table 1-2.

Table 1-2. Summary of Customer Satisfaction Scores

Program	Sector	Customer Satisfaction	
		Score	Details
Home Energy Savings	Residential	94% for non-EI2; 100% for EI2	Scores of 7-10 on a 10-point scale
Business Energy Efficiency Rebates	C&I	83%	Scores of 4-5 on a 5-point scale
Business Custom	C&I	96%	Scores of 4-5 on a 5-point scale

Source: Navigant Analysis

² Nicor Gas program goals as filed in the EEP Plan (*Rider 30 EEP Program Portfolio Operating Plan, v1.1*).



1.3 Portfolio Level Cost Effectiveness

Navigant will review Nicor Gas' cost effectiveness analysis for GPY1-3 at the end of GPY3.

1.4 High Level Conclusions and Recommendations

Program Tracking Data

The program implementation contractor (IC) tracking systems are generally sufficiently designed and populated with the information needed for program evaluation purposes. However, improvements could be made in some program's project and customer information tracking databases. The identified improvements include collecting or updating tracking information to aid in the evaluation team's ability to calculate accurate savings. In particular, EEE should discontinue hard coding savings values, HES should track participant type, SBES should update and correct errors to improve coordination of data transfers, and BEER should consider collecting additional details to match customers to TRM business types and investigate if including customer satisfaction would be a valuable data field to track within the database.

Gross Savings Estimates

The gross savings realization rates were 1.0 or greater for most programs (MFHES, EEE, HES, HEER, BESP, SBES, BEER, Business Custom, RCx, and BNC) and were less than one for RNC, ER, and ET, resulting in an overall portfolio realization rate of 1.11. The ER program was determined not to be cost effective and was discontinued in GPY3, the RNC impact evaluation was limited by amount of billing analysis data available, and the ETP program had a realization rate of nearly one (.99).

Net-to-Gross Ratios

Program NTG ratios were deemed by the SAG, with the exception of the Business Custom program. For the Business Custom program, Navigant recommends adding an impact statement at the application phase of the project which could include questions regarding customer capital planning (e.g., whether the project was part of regularly scheduled maintenance), planned efficiencies in the absence of the program (e.g., whether the customer would have installed the same efficiency equipment without the availability of the program incentive), or project timeline (i.e. whether the customer needs to or is planning to replace the equipment within 4 years). Answers to these questions can assist Nicor Gas in assessing an application's likely level of free ridership. Identifying the level of free ridership at the project application stage may support Nicor Gas in planning and mitigating risk in the Custom program or other programs, such as BEER.

Participants with low free ridership may have financial barriers that rebates alone cannot overcome. Nicor Gas might consider facilitating targeted financial partnerships (e.g. tailored packages of financial solutions to a targeted pool of participants) in order to increase participation. Nicor Gas should also continue promotion of financial options currently available to commercial customer through external programs and organizations³.

³ <http://nicorgasrebates.com/programs/financing-resources#comm>



Residential Furnace Early Replacement Analysis

Navigant research found that forty-six percent of furnaces that were installed as *secondary* units (the measure that did *not* cause the participant to contact a trade ally) by ComEd program Complete System Replacement (CSR) participants can be considered early replacement measures instead of replace-on-burnout measures. The Illinois TRM contains a different savings algorithm for HVAC units which are considered early replacement based on a set of criteria including cost of repairs and efficiency rating. Navigant recommends that the Illinois TRM also allows deemed rates of early replacement as outlined in the findings of the HEER GPY2 evaluation report.

Increasing Awareness of Program, Benefits, and Nicor Gas Sponsorship

Process evaluation results of several programs identify opportunities to increase awareness among participants and trade allies. Several programs should increase and expand their marketing outreach to both trade allies and customers. Some programs could benefit from marketing to specific segments as well as emphasizing non-energy benefits from program participation. In particular, the SBES program should continue to market by sector and by geographic area due to a successful pilot with a dry cleaners association.

Trade Ally Partnership

For several programs, Navigant recommends expanded outreach to target potential new trade allies as well as continuing improvements to current trade ally marketing and communications. Nicor Gas could encourage additional participation by trade allies through targeting marketing efforts towards non-participating trade allies or other specific trade ally segments through special promotions.

2. Evaluation Methods

The Nicor Gas EM&V team developed an evaluation work plan for each program in the portfolio. Methods employed consisted of a combination of surveys, secondary research, on-site data collection, modeling, engineering review, program database and other information reviews, and staff interviews. Table 2-1 summarizes the main impact evaluation tasks for each program, and Table 2-2 summarizes process evaluation tasks.

All programs conducted program manager interviews, reviewed the tracking database, performed QA/QC, and conducted in-depth interviews with program implementers. These contributed to both impact and process evaluations.

Table 2-1. Impact Evaluation Methods

	Tracking System Review/TRM Verification Review	Project File Review	On-Site M&V	Impact Survey	Other Research
HEER	✓			140	Survey non-participating trade allies, early replacement study
HES	✓			172	
MFHES	✓				Savings from steam pipe insulation, ShowerStart
RNC	✓				Billing analysis/modeling
EEE	✓				
BES	✓				Literature review
BEER	✓	10		61	Steam trap literature review
Custom	✓	20	10	10	Billing analysis, early impact reviews Parallel path
ER	✓	14	7		Billing analysis
ET	✓	2			Literature review
RCx	✓	26	10		
SBES	✓				Thermostat research
BNC	✓	30			Interactive effects study, billing analysis/modeling

Source: Navigant Analysis

Table 2-2. Process Evaluation Methods

	Telephone Surveys/In-Depth Interviews of Program Staff	Telephone Surveys/In-Depth Interviews of Participants	Telephone Surveys/In-Depth Interviews of Participating Trade Allies	Other Research
HEER	2			Survey non-participating trade allies
HES	3	172	5	Verification ride-alongs Audit pricing analysis
MFHES	4			
RNC	3		11	
EEE	3			
BES	3			
BEER			30	
Custom	2	16	14	Survey non-participating trade allies
ER	2			
ETP	7			
RCx	4			Survey non-participating gas retrocommissioning service providers
SBES	3	29	8	Logic model and program theory
BNC	2			Focus group

Source: Navigant Analysis

3. Program Level Results and Recommendations

For each of the Nicor Gas programs evaluated, this section provides a program level summary and discusses key impact findings and recommendations and key process findings and recommendations.

3.1 Home Energy Efficiency Rebates

3.1.1 Program Summary

The Home Energy Efficiency Rebate (HEER) program offers cash incentives and education to encourage upgrading of water- and space-heating equipment among residential customers of Nicor Gas, and central air conditioning (CAC) systems for ComEd customers through the complete system replacement (CSR) portion of the program. The HEER program was designed to conserve natural gas and electricity, and lower participants' monthly energy bills. Both rental and owner-occupied dwellings are eligible for rebates for furnaces, boilers, water heaters, and air conditioning systems. Customers must be active residential customers of Nicor Gas in order to receive rebates for gas saving measures and the premises must be used for residential purposes in existing buildings.

The HEER program promises customers a quick turn-around rebate to invest in long-term savings through better technology. Rebates are offered for the installation of high-efficiency furnaces, boilers, programmable thermostats, domestic hot water (DHW) pipe insulation, windows, water heaters, and air conditioning systems. The dollar amount of the rebate depends on the size and efficiency of the replacement measures and ranged from \$20 to \$1,000. The GPY2 HEER program is implemented by Resource Solutions Group (RSG).

3.1.2 Results and Recommendations

See Table 3-1 and below for a program level savings summary and a summary of the key impact and process findings and recommendations.

Table 3-1. HEER Program Savings

	Therm Savings
Ex-Ante Gross Savings	2,847,533
Verified Gross Realization Rate	1.00
Verified Gross Savings	2,858,644
NTG Ratio	0.69 †
Verified Net Savings	1,972,464

Source: Navigant Analysis

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

Program Savings Goals Attainment

Finding 1. Nicor Gas achieved 88% of its GPY2 goal of 2,235,590 therm savings, and 53% of its targeted program participants. Nicor Gas also fell short of the implementation contractor's revised goals for PY2. Eighty-nine percent of the program savings were from high efficiency furnace participants.

Gross Realization Rates

Finding 2. The pipe insulation realization rate was 0.93 because the implementation contractor (IC) recorded the incorrect savings value. Additionally, the programmable thermostat realization rate was 0.99 because an incorrect in-service rate was used for self-installed thermostats. Storage water heaters received a realization rate of 1.27 because the baseline efficiency assumption used in the ex-ante gross savings estimates was for the incorrect size water heater.

Recommendation. The IC should thoroughly check the savings algorithms, assumptions, and deemed savings values being used in the program tracking system to ensure that they match the recommendations in the Illinois TRM.

Recommendation. To ensure that the program meets the requirements as defined in the Illinois TRM, the HEER program must ensure that contractors who install programmable thermostats know 1) how to program a programmable thermostat, 2) that the thermostats should be programmed using an appropriate set back schedule (such as the one suggested by ENERGY STAR), and 3) that they should instruct the homeowners on the appropriate use of a programmable thermostat. The program should also clearly indicate in the program tracking database whether a thermostat was installed by a contractor or by the customer.

Savings Estimates.

Finding 3. The savings algorithms used to determine the ex-ante gross savings estimates for windows were not immediately apparent. It is not a measure detailed in the Illinois TRM, and the documentation provided did not provide the level of detail needed to thoroughly investigate the measure.

Recommendation. While the windows measure is no longer in use for the HEER program, Navigant recommends that any measure not in the Illinois TRM have an accompanying calculator and/or work paper to detail how ex ante savings estimates are calculated. The indirect water heater measure is a good example of this.

Trade Ally Participation: Spillover and Application Process

Finding 4. Forty-seven percent of non-participating trade allies interviewed reported that they had sold program qualified measures without applying for rebates for those measures, resulting in therm savings amounting to 4% of the program's gross savings. When asked why they did not submit these measures to the program, the most commonly cited reason was the perception or experience that the program requirements were burdensome. In many cases the trade allies claimed they relied on their customers to apply for the program, however Navigant was unable to find any evidence that those customers submitted program applications without a trade ally.

Recommendation. Navigant recommends including the non-participating trade ally spillover savings rate, 4% of program gross savings, to future NTGR for this program.

Recommendation. Because Nicor Gas completely revised the application for GPY3 to simplify it, Navigant recommends an outreach effort to ensure that all "drop-out" trade allies are aware of the new, simplified application process. This effort could also include temporarily offering trade ally spiffs, which would encourage trade allies to utilize the new application.



Finding 5. Of the never-participated trade allies who agreed to complete the survey, fifty-six percent reported that they were unaware of the HEER program.

Recommendation. Navigant suggests that there are additional opportunities for Nicor Gas to increase program awareness among contractors in the service territory, and that the program would benefit from additional trade ally outreach efforts.

Early Replacement Analysis

Finding 6. Forty-six percent of furnaces that were installed as *secondary* units (the measure that did *not* cause the participant to contact a trade ally) by CSR participants were reported to be early replacement measures instead of replace-on-burnout measures. Early replacement was calculated based on the condition, age, and repair history of the replaced units. Fourteen percent of furnaces installed as the *primary* CSR measures (the measure that caused the participant to contact a trade ally) were reported to be early replacement, and seven percent of furnaces replaced by furnace-only participants were reported to be early replacement.

Recommendation. Navigant recommends that the Illinois TRM account for early replacement rates of furnaces as described above: 46% for *secondary* units of CSR participants, 14% for *primary* units of CSR participants, and 7% of furnace-only participants, rather than consider all CSR measures as replace-on-burnout.

Recommendation. Navigant suggests that Nicor Gas consider the addition of an early replacement component to the stand-alone furnace program. This could include marketing materials, data collection, and additional incentives that would promote and encourage the early replacement of units that may be working, but are highly inefficient. The program qualifications may be similar to those for the furnace early replacement program currently offered in Ameren territory, where an additional rebate is offered for units that are working, and also either has an AFUE level of less than 75% or is more than thirty years old.

3.2 Home Energy Savings

3.2.1 Program Summary

The Home Energy Savings (HES) program is a joint program of Nicor Gas and ComEd, with Nicor Gas being the lead utility and CSG being the implementing contractor. The HES program provides discounted whole-home assessments (e.g., energy assessments) to customers to identify opportunities for installing energy efficiency measures and weatherizing the home. Assessments are performed by CSG Energy Advisors and weatherization type improvements such as air sealing and insulation are performed by contracted weatherization providers. During the assessment, CFLs, showerheads, kitchen and bath aerators, hot water temperature setback and education, programmable thermostat setting, and pipe insulation were directly installed or service provided at no additional charge for instant energy savings. A programmable thermostat was also offered at a reduced price for interested participants.

CSG's dedicated assessment staff generate a recommendation report for customers using proprietary software that takes into account customer home characteristic information. The customer report outlines recommended measures, potential savings, payback periods, and the amount of incentives available for recommended work. Customers choose the projects they would like to pursue. A program-eligible contractor is then assigned to perform the work and discounts are offered instantaneously. The contractor is responsible for submitting paperwork to CSG to receive rebate funds. Customers who pursued weatherization projects in GPY2 after July 2012 were eligible to receive incentives of 70% of costs for the recommended weatherization upgrades (up to \$1,750 per home) due to partnership with



EI2 and additional funding (extra \$500). If work was done before July 2012 it was the standard rebate amount of 50% up to \$1250.

In GPY2, the program partnered with Energy Impact Illinois (EI2) which hosted informational “house parties” where program contractors and EI2 staff presented information on the program as an additional outreach avenue for potential participants.

3.2.2 Results and Recommendations

In GPY2, the HES program sought to achieve 545,466 therms and 700 MWh of net savings⁴ through the implementation of home energy assessments to promote discounted weatherization services and the direct installation of energy efficiency measures in residential Nicor Gas and/or ComEd in Nicor Gas territory single-family home residences or two to four unit buildings. To meet these goals, CSG planned to complete approximately 2,203 whole-home assessments to achieve approximately 749 completed jobs in GPY2.

Overall, the program performed well in GPY2 relative to GPY1. Assessment participation and weatherization participation targets were met, though therms savings goals were not. Furthermore, participants were generally satisfied with the program, though some areas for streamlining were identified. For a summary of program savings, see Table 3-2, below.

Table 3-2. HES Program Savings

	Therm Savings
Ex-Ante Gross Savings	253,445
Verified Gross Realization Rate	1.08
Verified Gross Savings	273,900
NTG Ratio	0.86 †
Verified Net Savings	235,554

Source: Navigant Analysis

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

Key impact and process findings and recommendations are outlined below.

Program Savings Achievement

Finding 1. GPY2 verified net gas savings do not meet the original savings goals. However, gas gross savings achieved are in line with the implementation contractor’s revised goals.

Recommendation. Navigant recommends adjusting program savings goals for future program years based on lessons learned in GPY2 and the program participation and savings findings presented in this report.

⁴ These savings targets were set before GPY1 as part of a three year plan and were revised with the implementation contractor in GPY2. This report uses the savings figures from the original three year plan and makes note of performance relative to the revised IC goals.



Gross Realization Rates

Finding 2. Navigant reports overall gross realization rates of 100% for MWh and 108% for therms.

Recommendation. Navigant recommends updating ex-ante calculations for kitchen and bathroom faucet aerators based on clarifications presented in the Illinois TRM version 2.0. Additionally, Navigant recommends applying programmable thermostat savings at the household level rather than per unit installed to be in line with the TRM, and to calculate ex-ante programmable thermostat education savings based on clarifications in the TRM v2.0.

Net-to-Gross Rate

Finding 3. Navigant calculates overall verified net savings using an overall program SAG-deemed NTGR value of 0.86. The evaluation team also determined an overall research NTGR for future use of 1.05 (0.94 Direct Install, 1.11 Weatherization) for gas savings utilizing full-participant, assessment-only participant, and trade ally research findings.

Tracking System Review

Finding 4. The evaluation team found that though it is possible to identify full-participants from assessment-only participants in the tracking database judging by their measure installations, there is no unique field clearly designating full-participants from assessment-only participants.

Recommendation. Navigant recommends adding a field in the tracking database for participant type to distinguish full-participants from assessment-only participants. This will help ensure proper differentiation between the two participants groups in the tracking data for analysis.

Program Participation

Finding 5. The GPY2 HES program saw participation of 2,760 total home energy assessments with weatherization jobs completed at 825 residences (these 825 weatherization jobs include 95 carry-over participants that received assessments in GPY1). This is more than double GPY1 participation, with an increase in total participants of 156% and an increase in weatherization jobs of 158%.

Assessment Pricing

Finding 6. Nine months of GPY2 data suggest that promoting the HES program with a \$49 (participant) assessment cost is a cost-effective way to bring participants into the HES program.

Recommendation. Navigant recommends that Nicor Gas and ComEd retain the \$99 assessment pricing and selectively lower assessment pricing to \$49 to increase participation as necessary.

Incentive Level

Finding 7. Navigant determined that conversion rates and average savings per household did not increase between GPY1 and GPY2 despite an increase in incentive levels from \$1,250 to \$1,750. Other program factors in GPY2, described below, may have depressed the conversion rate.

Recommendation. Navigant recommends Nicor Gas and ComEd continue with the increased incentive level with the expectation that these incentives, when combined with improvements described below will, increase conversions and lead to deeper savings per participant.

Full Participation Barriers

Finding 8. Though the program generally rated high in satisfaction, the lowest satisfaction score for both full participants and assessment-only participants was “the time it took to schedule the Home Energy Savings program assessment.” Some assessment-only participants may have been deterred from full participation due to scheduling and follow-up issues. While CSG added assessors to reduce participant wait times, wait times still remained high and pressure on the assessors to complete assessments appears likely to have impacts on program conversion rates.

Recommendation. Navigant recommends addressing any aspects of program processes that may be causing assessment scheduling, post-assessment application processing, or weatherization contractor assignment delays. Ensuring sufficient assessor staffing levels may help alleviate assessment scheduling delays. Navigant recommends that CSG allow the number of assessors to increase or decrease as needed according to participation demand. In addition, the program may increase conversion rates by ensuring proper during-assessment weatherization support and by conducting post-assessment follow-up communications to maintain participant interest in the program and to ensure their understanding of participation procedures.

EI2 House Party Outreach

Finding 9. EI2 house party participants accounted for 13% of participants, about 10% of program savings, and participants were generally more satisfied with the program and understood the participation process and program offerings better than Non-EI2 house party participants. On the other hand, EI2 house party participant conversion rates were considerably lower than non-participant rates.

Recommendation. With EI2’s withdrawal from the program, Navigant recommends CSG assess the benefits and costs of replicating key components of the house party outreach model and identifying other ways of leveraging community-based outreach approaches.

Future Evaluation Risk

Finding 10. Given that GPY2 and GPY3 NTGR are based on GPY1 research, Navigant has reason to believe that future NTGR research may yield notably different results given interim changes in incentive levels, assessment pricing, and/or outreach methods.

Recommendation. The above should be taken into consideration when planning program changes.

3.3 *Multifamily Home Energy Savings*

3.3.1 Program Summary

The Multi-Family Home Energy Savings (MFHES) is a jointly administered program with Commonwealth Edison Company (ComEd). MFHES is in its second year of implementation.

The MFHES program secures energy savings through direct installation of low-cost efficiency measures, such as water efficient showerheads, faucet aerators, programmable thermostats, water heater temperature setbacks and hot water pipe wrap insulation at eligible multi-family residences. A secondary objective of the program is to identify energy saving opportunities in the common areas of multi-family buildings through a brief visual inspection of common area lighting and/or central plant



locations to channel customers to other programs offered by the utilities. Primary target markets for the program include property management firms, trade and professional organizations, building owners and contractors who service multi-family buildings. During GPY2, the MFHES program expanded its scope to offer direct installation measures in common areas of eligible multi-family properties. Eligible buildings may have individual meters or master-metered systems.

In March 2013, the program transitioned to a new design and delivery structure, called the Multi-Family Comprehensive Energy Efficiency Program (MCEEP).⁵ The MCEEP provides direct install measures in residential dwelling units and common areas, as before. In addition, the new program offers technical services and financial incentives to install whole-building energy efficient measures at eligible multi-family properties. Such whole-building measures may include upgrades or improvements to central plant and HVAC systems and controls, central lighting systems and building shell improvements, among others. These measures may be installed by contractors or by a participant's own maintenance staff. Honeywell Smart Grid Solutions implemented the program from the beginning of the program year until the program's transition in March 2013. In March 2013, Franklin Energy Services, LLC (Franklin Energy) became the primary implementation contractor for the ComEd/Nicor Gas program.

3.3.2 Results and Recommendations

Overall, the GPY2 Multi-Family program tracking system is accurately recording measure savings and counts. The majority of program savings were from direct install measure installation in residential dwelling units, as opposed to common areas. Although the program fell short of its energy savings and participation goals in GPY2, the GPY3 program's expanded design and delivery may enable it to achieve a higher percentage of planned energy savings.

In GPY2, the Net-to-Gross Ratios used to calculate the Net Verified Savings were deemed through a consensus process by the Illinois Stakeholder Advisory Group⁶ based on GPY1 evaluation research. The Net-to-Gross Ratio for gas measures installed in residential dwelling units was 0.96 and for measures installed in common areas was 0.93. Table 3-3 below provides a summary of program savings.

⁵ In practice, the MCEEP program continued to implement existing MFHES measures through the end of the EPY5/GPY2 program year as new MCEEP program components were being developed. Therefore, this report presents results from the complete program year in one section.

⁶ Document provided by Nicor Gas to the SAG summarizing the SAG-approved NTGR for Nicor Gas for GPY1-GPY3 as negotiated in March-August 2013. Distributed in the SAG meeting on August 5-6, 2013. [http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor Gas Net-to-Gross Results and Application GPY1-3.pdf](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/Nicor%20Gas%20Net-to-Gross%20Results%20and%20Application%20GPY1-3.pdf).

Table 3-3 MFHES Program Savings

	Therm Savings
Ex-Ante Gross Savings	628,088
Verified Gross Realization Rate	1.00
Verified Gross Savings	628,071
NTG Ratio	0.96 †
Verified Net Savings	602,171

Source: Navigant Analysis

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

The following provides insight into key program findings and recommendations.

Program Savings Attainment

Finding 1. The GPY2 Multi-Family program achieved approximately 27 percent of the program original savings goal⁷ and approximately 31 percent of the program revised savings goal.⁸ Of the total program savings in GPY2, approximately 96 percent of the verified net savings were from measures installed in residential dwelling units.

Recommendation. None. As already planned in GPY3 to increase energy savings, the program has expanded its scope and added new offerings designed to encourage participants to implement common area measures. The implementation contractor should continue to identify common area and whole-building measure energy savings opportunities for participants.

Verified Gross Realization Rates

Finding 2. The program is accurately tracking measure counts. Appropriate quality control and quality assurance procedures are in place. With minor exceptions, the program tracking system is accurately recording measure savings estimates based on deemed or partially deemed values from the Illinois TRM. The GPY2 Multi-Family program verified gross realization rate was 100 percent.⁹

Recommendation. As detailed below, Navigant recommends making minor adjustments to ex-ante measure savings for kitchen aerators and bathroom aerators installed in common areas.

Savings Estimates

Finding 3. Kitchen aerators and bathroom aerators installed in common areas were the only measures with savings estimates that the evaluators changed. These measures accounted for all of the differences in the program’s ex-ante gross savings and verified gross savings.

Recommendation. The implementation contractor should make minor adjustments to ex-ante measure savings for kitchen aerators and bathroom aerators installed in common areas.

⁷ The GPY2 MFHES program goals as filed in the Nicor Gas Energy Efficiency Plan 2011-2014 (Revised Plan Filed Pursuant to Order Docket No. 10-0562, Dated: May 24, 2011)”.

⁸ Nicor Gas provided to Navigant a revised GPY2 operational goal of 1,973,894 net therms (source: Nicor Gas GPY2 Revised Goals for Evaluation, received on December 20, 2013).

⁹ The value of 100 percent is rounded.



Future Evaluation Risk

Finding 4. The GPY2 Multi-Family Program achieved a 100 percent verified gross realization rate,¹⁰ but the program design is changing in GPY3.

Recommendation. Based on GPY2 program evaluation findings, evaluation risk associated with the direct installation portion of the program is relatively limited. The GPY3 program is expanding its scope to include additional measures that have not been evaluated under the Multi-Family program, which carries some risk associated with new design and delivery mechanisms. However, this risk is somewhat mitigated by the fact that most of the measures associated with the GPY3 program have been evaluated as part of other Nicor Gas programs, including the Business Energy Efficiency Rebate program and the Business Custom program and/or included in the Illinois Technical Reference Manual (TRM). The related measure research in the Illinois TRM, evaluation research realization rates and NTG ratios are available to calibrate ex ante savings to assure realistic projections.

3.4 Residential New Construction

3.4.1 Program Summary

The Residential New Construction (RNC) program is jointly offered by Nicor Gas and ComEd. Nicor Gas is the lead utility as the majority of the avoided cost benefits are from natural gas. Residential Science Resources (RSR) implements the program for both utilities. The program launched in early 2012 and did not claim any savings in the first plan year but met or exceeded gas savings goals for GPY2 and the planning goal of completing 600 homes.

The program relies on networks of builders and HERS raters to garner participation and has already attracted several raters and builders to the program. The current program structure relies heavily on raters to recruit builders to the program, and the current incentives are as such weighted towards raters. The RNC program pays incentives of \$500 per home to raters and \$300 per home to builders; builders receive additional incentives from ComEd for installing program-qualified ENERGY STAR electric appliances. To qualify for the program, homes must achieve savings of at least 10% over an equivalent code-compliant new home based on REM/Rate modeling. The residential energy code in Illinois changed mid-program year: homes permitted through December 2012 were under IECC 2009, and homes permitted in 2013 were under IECC 2012. Due to the length of construction, this resulted in just five of the 688 GPY2 homes being permitted under IECC 2012.

3.4.2 Results and Recommendations

Overall, the program performed well in its first full year, exceeding energy and participation targets and enrolling several new builders and raters with homes in the pipeline moving into GPY3. The program has moved well beyond just “getting off the ground” and is looking forward to increasing marketing and outreach to expand the program in future years. Table 3-4 below and the following findings and recommendations provide additional suggestions for how to improve the program as it grows.

¹⁰ The value of 100 percent is rounded.

Table 3-4. RNC Program Savings

	Therm Savings
Ex-Ante Gross Savings	242,112
Verified Gross Realization Rate	0.91
Verified Gross Savings	220,300
NTG Ratio	0.80 †
Verified Net Savings	176,240

Source: Navigant Analysis

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

Gross Impact Findings

Finding 1. The program exceeded RSR’s GPY2 gross therm energy savings goals by 23%, despite a gross realization rate of less than 100%.¹¹ This goal was surpassed because the program completed more homes than targeted for Nicor Gas. The program devised successful outreach strategies such as identifying and targeting areas with high construction rates to gain new participants.

Finding 2. A 2011 study for the Midwest Energy Efficiency Alliance (MEEA) and the Illinois Department of Commerce and Economic Opportunity (DCEO) indicated that compliance with IECC 2009 is below 100% in Illinois.¹² Unfortunately, the study did not provide data in a format that could support evaluation adjustments to the code baseline.

Recommendation. Conduct or leverage further research on regional compliance with IECC 2012 in order to determine whether the baseline should be adjusted in future evaluations.

Finding 3. Although program homes all exceeded code on a performance basis by at least 10%, Navigant observed that on average certain characteristics met individual code requirements more consistently than others.

Recommendation. Work with builders and raters to improve areas below code, such as wall and foundation insulation levels, as well as those that are at or just above code, such as window U-values, major appliances, and cooling equipment. Since IECC 2012 has stricter requirements for air sealing and duct sealing, efficiency in these areas alone may not bring homes up to program standards as reliably as in GPY2.

Net Impact Findings

Finding 4. Navigant’s qualitative analysis of rater interview data indicated that free-ridership could be as high as 33% to 67% for homes built under IECC 2009 code.

Recommendation. Increase educational opportunities for builders and raters in order to increase the program’s influence on building practices

Finding 5. Code enforcement is reportedly high in this region and meeting code is a clear area of influence for many builders.

¹¹ The program also exceeded the gas savings goals for GPY2 as filed in Nicor Gas’ Energy Efficiency Plan by 286%.

¹² “Measuring the Baseline Compliance Rate for Residential and Non-Residential Buildings in Illinois Against the 2009 International Energy Conservation Code.” Association of Professional Energy Consultants, Inc. June 30, 2011.

Process Findings

Finding 6. Raters were satisfied with the program, specifically with their interactions with program staff and the application process. Given the recent launch of the program (Spring 2012), it is operating smoothly and has been able to move on from early roadblocks.

Finding 7. Builders were satisfied with their interaction with HERS raters, but many did not have significant interaction with the program and did not view their HERS raters as agents of the program. This lack of connection to the program could lead to low self-reported attribution in future evaluations.

Recommendation. Increase direct builder outreach in order to build stronger relationships with them through the following avenues:

- One-on-one meetings with builders
- Builder training sessions for both technical skills and marketing techniques
- Having a clear “go-to” person or contact list for builders seeking technical support or looking for guidance on program requirements

Finding 8. Builders and raters both expressed a desire for marketing materials to help them spread program awareness and explain the benefits of program homes.

Recommendation. Create separate marketing materials for both builders and prospective homeowners, tailored to the needs of each group. For example:

- Builder materials should advertise the program and provide clear examples of ways to qualify for the program.
- Customer materials should help builders market to their clients by explaining the benefits of a program home in terms the average prospective homeowner can understand.

3.5 *Elementary Energy Education*

3.5.1 Program Summary

The Elementary Energy Education (EEE) program is jointly offered by Nicor Gas and ComEd who engaged National Energy Foundation (NEF) to implement the program which is branded “THINK! ENERGY.” The program targets 5th grade students in public and private schools that are customers of Nicor Gas or jointly Nicor Gas and ComEd. Schools receive an invitation to participate and register to schedule the interactive presentations; alternatively, schools could register on the program website to join a waiting list if the program was fully-enrolled when they registered. Schools that had participated in the GPY1 program were also invited to participate. After the presentation, students take home a kit that includes water conservation measures; instruments to measure water and ambient temperature, as well as water flow rates, CFLs, and a household report card where participants used the form to report details of their family’s participation. Students and teachers are incentivized to return the household report cards with a \$100 mini-grant for each class that completes and returns 80% of their cards. Students are also incentivized to receive a program wristband if they complete and return a card. New in GPY2 teachers that returned 80% of the HRCs were entered into a raffle to win an iPad. NEF based the program’s savings on the installation rate of implemented measures reported in the household report card against the number of kits that were reported taken home.



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

3.5.2 Results and Recommendations

Overall, the program performed well in GPY2, exceeding energy savings and participation targets. Schools are pleased with the program: 100 of the 120 schools that participated in GPY1 participated again in GPY2. For a summary of program savings, see Table 3-5 below.

Table 3-5. EEE Program Savings

	Therm Savings
Ex-Ante Gross Savings	217,254
Verified Gross Realization Rate	1.51
Verified Gross Savings	327,689
NTG Ratio	0.79 †
Verified Net Savings	258,875

Source: Navigant Analysis

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

The following provides insight into key program findings and recommendations.

Program Savings Goals Attainment

Finding 1. The verified total net gas savings exceeded the Nicor Gas planning goal of 207,900 net therms.

Program Participation

Finding 2. The overall participation goal of 15,000 kits distributed (1,000 kits for Nicor Gas only participants and 14,000 kits Joint participants) was met with 1,007 kits distributed to Nicor Gas only schools and 13,997 kits distributed to Joint schools.

Tracking System Review

Finding 3. Although Navigant was able to approximate the ex ante savings claims through the NEF program reports, the actual values in the tracking data were hard-coded.

Recommendation. Rather than hard-coding the values in the tracking system for GPY3, NEF should document and incorporate the algorithms/assumptions for the savings so they can be verified.

Finding 4. NEF did not calculate savings for single family homes separately from multi-family homes for water heating measures; there is a substantial difference in household size, showerhead counts, faucet counts, and water usage in single family vs. multi-family homes.

Recommendation. The program should calculate savings for single family homes separately from multi-family homes in GPY3 tracking system for water heating measures.



Gross Realization Rates

Finding 5. The program achieved a gross savings realization of 1.51 for gas. This is principally due to Navigant using the Illinois TRM v 1.0 ISRs, while NEF calculated ISRs from the HRC data. The ISRs in the IL TRM are higher than those calculated from the HRC data.

Review Process.

Finding 6. Some program changes increased savings by simply increasing and meeting participation goals and by switching to a more efficient showerhead. Other program changes may have increased actual ISRs: 1) increasing the HRC return rate, 2) switching to a showerhead with a higher participation satisfaction rating, and 3) better educational presentations.

Recommendation. As these improvements may increase actual ISRs, the program should consider conducting research periodically on ISRs of the top-saving measures by, for example, surveying students in randomly selected classes in early spring to capture persistence.

Future Evaluation Risk

Finding 7. A future evaluation risk for the program is the ISRs for the program measures. Currently, the Illinois TRM Version 1.0 requires this program to use ISRs that were developed for direct install programs and that are almost two times the ISRs that Navigant found in our primary research in GPY1 and in the program's HRC data for GPY2. For GPY3/EPY6, Navigant will use the Illinois TRM Version 2.0 which states that ISRs for measures distributed through efficiency kits can be determined through evaluation. These ISRs will likely be closer to the ISRs we found in our primary research in GPY1, that is, much lower than the ISRs in Illinois TRM Version 1.0.

3.6 Behavioral Energy Savings Pilot

3.6.1 Program Summary

In GPY2, Nicor Gas implemented the Behavioral Energy Savings Pilot (BES) program via two efforts:

1. Conservation Services Group (CSG) and its subcontractor, MyEnergy.com, implemented the primary program component: ENERGYBUZZ. Nicor Gas soft-launched ENERGYBUZZ in August 2012 (GPY2).
2. The former BES program administrator, Wisconsin Energy Conservation Corporation (WECC), implemented a secondary program component: Take the Pledge. Nicor Gas launched Take the Pledge in April 2012 (GPY1), and ended it in December 2012 (GPY2) due to low participation. Upon closure of the Take the Pledge program, Nicor Gas moved all current Take the Pledge participants over to the ENERGYBUZZ program. WECC passed oversight of the ENERGYBUZZ program to Nicor Gas at the end of GPY2 (May 2013).

The BES program is open to all Nicor Gas residential customers with an online Nicor Gas account. The program also has two secondary target audiences: community partners for outreach collaboration and businesses for rewards donations. For the purposes of this evaluation, a program participant is defined as a customer who has both 1) created an account on the MyEnergy.com website and 2) linked that account with their Nicor Gas online billing account.



Nicor Gas conducts BES program efforts based on two overall strategies:

1. Drive people to visit the ENERGYBUZZ website and create an account through marketing and outreach efforts.
2. Engage account holders to save energy by distributing monthly email summaries of their energy use, providing access to online tools that show them how to save energy, and offering participants the opportunity to earn points and redeem them for rewards.

The pilot period for BES is three years, commencing with the GPY1 implementation year.

3.6.2 Results and Recommendations

BES results are summarized in Table 3-6 below and findings and recommendations resulting from the GPY2 program evaluation follow.

Table 3-6. BES Program Savings

	Therm Savings
Ex-Ante Net Savings	11,955
Realization Rate	1.70
Verified Net Savings	20,722
NTG Ratio	N/A

Source: Navigant Analysis

Finding 1. The literature provided three relevant annual savings values of 2.4%, 2.6% and 2.1% per household, resulting in a combined average annual savings value of 2.3% per household.

Recommendation. Nicor Gas uses an ex ante net savings value of 15 therms per household, equaling 1.3% of the annual average residential usage in 2009.¹³ This value seems conservative based on the limited available research; Navigant calculated a Research Findings Net Savings value by applying the 2.3% average to Nicor Gas customers' 2009 annual usage of 1,136.5 therms per household; the Research Findings Net Savings value is 26 therms per household. Navigant and Nicor Gas will discuss whether it is reasonable to refine the Research Findings Net Savings value based on analysis of participant usage data via the PY3 evaluation, given the program size and participation rate.

Finding 2. According to program data, only 28% of customers who created a MyEnergy.com account completed the sign-up process by linking their Nicor Gas online account to the MyEnergy.com platform.¹⁴

Recommendation. Nicor Gas should continue to look for solutions to this issue, such as a single sign on option. Nicor Gas should also consider conducting a survey of participants who have not linked their accounts to understand the barriers and look to other MyEnergy.com programs for lessons learned.

¹³ The 2010 Nicor Gas Market Potential Study established 1,136.5 therms as the average overall usage of all premise and heat types. Bass & Company. (2010). *Nicor Gas Market Potential Study Report*.

¹⁴ Total overall percentage as of August 2012 through April 2013.



Finding 3. The program is not tracking KPIs related to participant participation in other Nicor Gas programs. Channeling participants into other Nicor Gas programs is one of the key expected outcomes of the BES program.

Recommendation. Navigant recommends that program management begin tracking program-channeling KPIs at the latest when the tracking system is operational and activity by the same account can be easily aggregated.

Finding 4. Current participation and savings goals do not reflect the program's actual launch date and have not been adjusted to reflect implementation realities.

Recommendation Nicor Gas should review the implementation contractor's expected scenarios and corresponding program needs to assess appropriate adjustments to participation and savings goals. This will allow the pilot's success to be measured against realistic goals. Nicor Gas should also explore automatically enrolling customers with Nicor Gas web accounts in the BES program, while still allowing customers who do not currently have an account to create one as desired. Adding an opt-out component to the program model would allow the program to reach more customers, and may alleviate some of the program's participation challenges.

Finding 5. While some mass promotion of the program has taken place, program marketing had not been fully implemented at the time of this evaluation and some questioned whether the mass promotion efforts were optimal.

Recommendation. Nicor Gas should continue to track and optimize marketing efforts to ensure the best use of program resources while achieving new participant accounts.

3.7 Business Energy Efficiency Rebates

3.7.1 Program Summary

The Business Energy Efficiency Rebate (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.

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.

3.7.2 Results 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. Table 3-7 shows program level savings and a discussion of findings and recommendations follows.

Table 3-7. BEER Program Savings

	Therm Savings
Ex-Ante Gross Savings	3,314,210
Verified Gross Realization Rate	1.00
Verified Gross Savings	3,314,314
NTG Ratio	0.73 †
Verified Net Savings	2,419,449

Source: Navigant Analysis

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

Program Savings Goals Attainment

Finding 1. The GPY2 BEER program exceeded the program’s filed net savings goal of 2,026,900 therms¹⁵ 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. 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. 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. 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. 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

¹⁵ 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.

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 project planning can be done to mitigate the effects.

Recommendation. 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 California¹⁶. 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

Finding 3. 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.

Finding 4. 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. 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 5. 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. 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

¹⁶ Discussed in the “*Energy Efficiency Investment Report*” released by the American Council for an Energy-Efficient Economy (ACEEE) on February 2014. Report Number F1401.



through the tracking system, evaluation will make a separate request to the IC for verification documentation to support savings claimed.

Savings Estimates

Finding 6. 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. 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 7. 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. 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 (further discussed in program evaluation), 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 8. 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. Although the program has met the targeted net goal for GPY2, 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 9. 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. 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 10. 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. The IC should review the recommendations raised by non-participant trade allies to improve on the dissemination of information to both program trade allies and those potential trade allies working with other utilities.

Recommendation. 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. 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 11. 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. 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.



3.8 Business Custom

3.8.1 Program Summary

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

No major changes were introduced to the program during the GPY2 period. The majority of the savings from the measures installed in GPY2 are derived from energy management system controls and boiler upgrades in the heavy and light industry business category. The GPY2 evaluation involved applying the necessary research to verify the reported savings and any necessary adjustments for measures not deemed in the Illinois TRM. The evaluation conducted net-to-gross (NTG) research to assess and quantify participant free ridership and spillover to determine program verified net savings. The evaluation efforts included interviews with participating and non-participating trade allies to examine their influence, challenges and satisfaction with the program. The Business Custom program was implemented in GPY2 by CLEARResult.

3.8.2 Results and Recommendations

Overall, the GPY2 Business Custom program built on a solid foundation from GPY1 to substantially expand its impacts. The Business Custom program did not meet its GPY2 participation and savings targets, but still increased both participation and savings in GPY2 compared to GPY1. Table 3-8 outlines program savings and a discussion of program findings and recommendations follows.

Table 3-8. Custom Program Savings

	Therm Savings
Ex-Ante Gross Savings	3,317,145
Verified Gross Realization Rate	1.29
Verified Gross Savings	4,263,751
NTG Ratio	0.72 ‡
Verified Net Savings	3,069,901

Source: Navigant Analysis

‡ Based on evaluation research findings

Program Savings Goals Attainment

Finding 1. The GPY2 Business Custom program achieved verified net savings were 10 percent less than the program’s filed net savings goal of 3,417,000 therms. However, compared to GPY1, the Business Custom Program increased net energy savings by 288 percent in GPY2.

Recommendation. To further increase program savings, the program should continue to encourage program trade allies and contractors to market the program and inform



customers of the program incentives. The program implementers 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. In order to improve attractiveness of measures when natural gas prices are relatively low, consider compiling and promoting specific examples of the non-energy benefits of gas measures (reduced maintenance, improved performance, reliability, etc.) from past participants – if possible supported by quantified impacts or actual quotes.

Recommendation. Nicor Gas could consider using segmenting strategies to tailor their marketing messages to specific customers, and use sales analytics to provide feedback to program implementation staff. Improvements in technology have made it possible to implement customer relationship management techniques, use data analytics to target marketing, and track performance based sales incentives among staff.

Recommendation. The technical successes and customer satisfaction that Nicor Gas has generated in the first two program years are good leverage points that Nicor Gas could consider using to an advantage. This could involve replicating technical successes at other facilities (supported by case studies and outreach), and building an energy partnership with customers to encourage repeat participation and multi-year project planning.

Net-to-Gross Ratio

Finding 2. Navigant calculated a NTG ratio of 0.72 based on evaluation research conducted on GPY2 participants. This value is an increase of 36 percent compared to the NTG ratio calculated in GPY1.

Recommendation. The IC should consider 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 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 four 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. Potential participants with low free-ridership may have financial barriers that rebates alone cannot overcome, and may show little interest in pursuing initial projects. If that is the IC's experience, Nicor Gas should tailor financial solutions with participants who raise the issue of limited capital, investment criteria, or financing to help overcome specific barriers that are common within customer segments. Possible solutions may include interest rate buy-downs, investment grade energy studies, on-bill financing, quantifying non-energy benefits to improve the calculated rate of return, and facilitating partnerships for grants, loans, and financing arrangements. In addition, Nicor Gas should continue to promote the financing options currently available to commercial customers through external programs and organizations¹⁷.

Verified Gross Realization Rates

Finding 3. The research finding realization rate on ex ante gross savings is 1.29. This value is an increase of 40 percent compared to the realization rate achieved in GPY1. The key factor in

¹⁷ <http://nicorgasrebates.com/programs/financing-resources#comm>



the increased realization rate was the use of updated weather and metering data in the project evaluations. The use of these updated data resulted in evaluated savings that were greater than the reported savings.

Savings Estimates

Finding 4. The GPY2 ex ante gross savings are 3,317,145 therms and the verified gross savings are 4,263,751 therms. The ex ante net savings are 2,388,344 therms and the verified net savings are 3,069,901. Heavy and light industry business types represent 65 percent of the GPY2 gross savings and continue to have the largest therm savings per project. These customers implemented mainly control systems and boiler upgrades.

Recommendation. The program should continue to seek opportunities and adopt strategies that increase the savings beyond current successes with control systems and boiler upgrades for industrial business types. Strategies might include targeted marketing or targeted incentive increases. For example, the Business Custom program currently offers bonus incentives for projects that are above 25,000 therms. The Bonus Incentive Opportunity removes the standard 50 percent project cost cap and doubles the available incentive to \$2/therm¹⁸. Nicor Gas should consider lowering the estimated therms requirement from 25,000 therms to allow for more projects to be submitted through this opportunity. In GPY3, 53 of the total 73 projects were below the 25,000 therm threshold. These 53 projects accounted for 12 percent (410,108 therms) of the overall program ex ante savings. By lowering the therm requirement, the program may encourage customers to participate in the program that otherwise would have not (due to capital financial constraints) while increasing program awareness and reducing overall free ridership. Nicor Gas might also consider targeting bonus incentives for repeat participants, to expand the comprehensiveness of past participant treatments and exert higher influence on projects (potentially helping to lower free-ridership).

Program Participation

Finding 5. Overall program verified gross savings (+186 percent), measure count (+119 percent) and projects per participant (+18 percent) increased in GPY2. Heavy and light industry business types continue to have the largest therms savings per project, and these customers implemented mainly energy management controls and boiler upgrades. The number of participants in GPY2 was 62, 44 percent less than the goal of 110.

Recommendation. The program did not meet the targeted participation goal for GPY2, so 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 a high energy savings potential.

Recommendation. The program should consider having special incentive promotions for targeted measures. For example, the program could offer a limited time offer of increasing the incentive by 50 percent for trade allies that perform a burner replacement. Ideal measure for this type of offering would be measures that are not currently predominant in the program.

¹⁸ http://www.nicorgasrebates.com/images/pdfs/CUSTOM_BonusIncentive_Final.pdf

Recommendation. The program should include any relevant special offerings on the program pre-approval application. This brings visibility to the offerings of potential applicants when reviewing the process and may act as a catalyst for encouraging participation.

Trade Ally Satisfaction and Other Participation

Finding 6. Overall, approximately half of the interviewed trade allies and contractors are very familiar with the Business Custom program. Eight out of 14 participating trade allies interviewed (57 percent) gave a score of 5 or 4 (highest on a scale of 0 to 5) of their familiarity with the program. On the question of satisfaction, nine respondents (64 percent) indicated very high satisfaction with responses of 5 or 4. Three respondents with a lower satisfaction score indicated they received a lower rebate than expected due to final estimates of their project savings. Two additional respondents indicated the processes involved with the program were confusing and discouraging

Recommendation. Nicor Gas should consider offering an option to “lock-in” an incentive at the pre-approval stage. The incentive could be paid at a lower rate (e. g., 80 percent of regular incentives) to cover the risk of under-performing projects. Over-performing projects would still be paid at the lower incentive level.

Recommendation. Nicor Gas and the IC should consider providing additional non-financial incentives to trade allies to promote their interest in the program, such as 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 Business Custom program website, or through industry news letters. This recognition may encourage other trade allies to become more active.

Recommendation. The program should encourage trade allies to participate in future evaluation surveys. The program may consider adding a note to the terms and conditions for trade ally participation that trade allies should be aware they may be contacted by an independent evaluator to complete a survey of their experience with the program.

Recommendation. In order to further incentivize contractors to participate in the Business Custom program, Nicor Gas could offer a special onetime offering of a cash bonus for trade allies that submit a Final Application within a certain month. For each Final Application submitted by a trade ally between the first and last day of the chosen month, they could be entered into a drawing to win the predetermined cash prize (e. g., \$1,000 gift card). These incentives encourage trade allies to submit projects in a timely manner, allowing for better program planning, while also having the added benefit of attracting trade allies that may not have otherwise participated in the program. Additionally, this would reward particularly active trade allies, encouraging them to remain active and possibly become champions for the program.

3.9 Economic Redevelopment

3.9.1 Program Summary

The Economic Redevelopment Program (ER) program targets existing commercial, industrial, and commercial-sized multifamily facilities and properties undergoing major renovation in established “redevelopment areas” and encourages that they incorporate energy efficiency measures into the renovation process. The program provides technical assistance and enhanced incentives to render energy efficiency projects more affordable within these economically challenged communities. The Energy Center of Wisconsin (ECW) is the implementation contractor (IC) for this program. CNT Energy



(a non-profit organization founded by the Center for Neighborhood Technology), located in Chicago, conducts marketing and outreach for the program, including recruiting qualified potential participants. The target audiences for outreach include chambers of commerce, economic development departments, building owners, architecture firms and contractors.

The ER experienced slow participation uptake rates in GPY1 but, due to a successful marketing and outreach campaign, significantly increased program participation from one project in GPY1 to 15 projects in GPY2. However, the ER program will be discontinued as a separate program after GPY3, and only the remaining projects in the pipeline will be completed; additional project will be directed to another Nicor Gas program.

3.9.2 Results and Recommendations

Overall, the ER made significant progress in program participation and savings in GPY2. However, Nicor Gas determined that the ER program was not cost-effective and discontinued the program, deciding to complete only the remaining projects in the pipeline and to redirect any additional incoming projects to another Nicor Gas program. Table 3-9 below outlines ER program savings and a discussion of findings and recommendations follows.

Table 3-9. ER Program Savings

	Therm Savings
Ex-Ante Gross Savings	132,207
Verified Gross Realization Rate	0.85
Verified Gross Savings	112,363
NTG Ratio	0.70 †
Verified Net Savings	78,654

Source: Navigant Analysis

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

Gross Realization Rates

Finding 1. Navigant’s GPY2 ER program evaluation resulted in a realization rate of 0.85.

Finding 2. Three out of the five projects with the lowest realization rates were evaluated using billing data to directly compare the pre- and post-implementation periods (ER-01, ER-04, and ER-07).

Finding 3. Navigant determined a low realization rate for ER-15. This project’s ex-ante savings were a high percentage of the facility’s billed gas consumption. The ex-ante savings methodology utilized customized algorithms and inputs rather than guidelines specified in the Illinois TRM.

Recommendation. Prior to approving incentive payment for a project, Navigant recommends that Nicor Gas compare the claimed savings to the site’s billed energy usage to assess the reasonableness of the claimed savings.

Recommendation. Navigant recommends that the IC use the Illinois TRM to calculate savings where applicable.



Review Process

Finding 4. Despite thorough review of the project files and follow-up with the IC, the Navigant team could not identify baseline conditions upon which the ex-ante savings calculations are dependent for some projects (i.e. ER-06, ER-08, and ER-11).

Recommendation. Verification of claimed savings is greatly aided when thorough documentation of baseline conditions are provided, including:

- Pre-existing equipment and operation description,
- Energy savings assumptions and methodologies,
- Standard maintenance practices and history, and
- Inspection results.

While the IC is collecting this information, Navigant stresses the importance of sufficient project documentation to accurately portray the program's selection of baseline conditions for all projects.

Process Evaluation Findings

Finding 5. The two main factors that likely led to the discontinuation of the ER program were:

1. Customers lacked the upfront capital to fund energy efficiency projects; and
2. Customers needed longer implementation periods to complete energy efficiency projects.

Recommendation. Navigant recommends that future programs aimed at community-based organizations increase the incentive amounts and/or restructure the program so that customers receive incentives earlier in the project timeline.

Recommendation. Navigant recommends that future programs aimed at community-based organizations allow for extended multi-year project timelines, granting these organizations more time to collect funding to install energy efficiency measures.

Finding 6. Lack of upfront capital was more of a barrier for community-based organizations, such as churches, YMCAs, homeless shelters, community assistance centers, and other community-based organizations, than for multifamily facilities located in Tax Increment Financing (TIF) districts or enterprise zones. This was because community-based organizations prioritized their funds for community service and day-to-day operations rather than management staff of multifamily facilities who prioritize budget for facility improvement projects in order to retain tenancy.

Recommendation. Navigant recommends that Nicor Gas consider implementing a shared savings program for these types of customers, providing upfront financial assistance and allowing the customer to pay back the investment with the savings associated with the project.

Finding 7. The most successful outreach strategy to customers was likely through utilization of CNT Energy's personal relationships with non-profit organizations to directly contact the people most involved in the energy efficiency investment decisions of these projects.

Recommendation. Navigant encourages Nicor Gas to continue this method of outreach to these customer types as future potential ER program projects are absorbed into other Nicor Gas programs.

Finding 8. Economic development agencies did not provide a significant number of leads to potential customers because they typically focused on assisting large commercial customers



to relocate their business rather than on commercial entities planning to renovate their existing facilities.

3.10 Emerging Technologies

3.10.1 Program Summary

The Nicor Gas Energy Efficiency Program’s Emerging Technology (ET) program is designed to identify energy efficient emerging technologies or practices (i.e., measures) that Nicor Gas can incorporate into their Energy Efficiency Program (EEP) to achieve greater program savings and provide better value to their customers. The ET program finds potential energy-saving technologies by soliciting applications from trade allies, manufacturers, implementation contractors, and other stakeholders.

The Gas Technology Institute (GTI) manages the ET program as the implementation contractor with sub-contractor support from Livingston Energy Innovations (LEI). As detailed in the ET Program Operations Manual, LEI provides program support for a variety of ET program activities, including: program design, development, and launch; transfer of technologies into programs; and business development with stakeholders.¹⁹

During GPY2, ET program implemented many new processes that they had designed in GPY1. This program evaluation is focused on the newly implemented processes as well as changes made to processes implemented in GPY1 during the program’s infancy.

3.10.2 Results and Recommendations

Table 3-10 documents the verified net therm savings for the ET program in GPY2, which includes energy savings from the two individual pilot assessment projects: the condensing RTU and on-demand controls.

Table 3-10. ET Program Savings

	Therm Savings
Ex-Ante Gross Savings	8,734
Verified Gross Realization Rate	0.99
Verified Gross Savings	8,714
NTG Ratio	1.00 †
Verified Net Savings	8,714

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

The evaluation team also identified the following findings and recommendations.

Spreadsheet quality control and documentation

Finding 1. During the engineering desk review for the on-demand controls pilot assessment, the evaluation team identified three spreadsheet errors which impacted the pilot assessment

¹⁹ From “Nicor Gas ETP Program Operations Manual Final to WECC 03-29-12.” The complete list of activities that the ETP identifies as areas in which LEI will contribute can be found on page 8.

results. The evaluation team notified ET program so that they could promptly correct the errors.

Recommendation. The evaluation team recommends that the ET program implement a simple process for detailed quality-control review of pilot assessment spreadsheets. Such a review process need not be onerous and by its very nature should encourage proliferation of best practices, thereby reducing the quality-control burden over time and improving work quality.

Finding 2. During the engineering desk review, the evaluation team identified five questions regarding analysis inputs/calculations, the sources for which were not always clearly documented or explained.

Recommendation. The evaluation team recommends that the ET program ensure that spreadsheets are easily interpreted by others and that the analysis could be recreated by others by requiring basic documentation for each input value. Constants should be clearly labeled, including the source, and calculations should be simple and clear to enable easy interpretation. Should an anomaly arises in the data, ET program should include a simple explanation to indicate if and how they address it.

HDD temperature basis

Finding 3. The ET program projection for annual energy consumption for the condensing RTU was based on the annual heating degree days (HDD) using a 65°F basis. Review of a plot of gas consumption versus HDD shows that using a basis at a lower temperature may be more appropriate for this projection.

Recommendation. The evaluation team recommends that the ET program consider revising the condensing RTU calculations using an HDD60 basis for RTU1 and HDD63 basis for RTU2. While the impact is small in this case, adjustment of the HDD basis is an important component of any heating-measure analysis that should not be overlooked. For measures that rely on regression analysis of the HDD data, this is particularly important.

Process Findings and Recommendations

Finding 4. The evaluation team found valuable improvements in the ET program's technology evaluation processes. In GPY2, the ET program learned valuable lessons during implementation of their pilot assessment and technology transitioning processes. These lessons have led to process refinements that will promote continued program success in GPY3.

Finding 5. With the integration of a market evaluation, the ET program created a more comprehensive approach to technology evaluations that captures both the technical and market components and helps promote technology success. ET program has improved their focus on the non-technical aspects of successful program design that are required for the EEP to successfully deploy a technology and realize targeted therm savings.

Finding 6. ET program first began transitioning technologies in GPY2 and has recognized the value in a formalized process to promote success. They plan to integrate into the process a webinar to help launch the technology deployment by gathering key stakeholders and providing valuable education in a coordinated effort. Further, they expect greater interfacing with EEP ICs in the future, which will help promote success of ET program technologies in the EEP.

Finding 7. The ET program has faced hurdles due to the submission deadline for work papers. The deadline is in January each year and falls in the middle of heating season, when gas technologies are often being field tested.

Recommendation. The evaluation team recommends that ET program identify an optimal timeline for work paper submission and work with Nicor Gas to determine a potential pathway for changing the submission deadline. Moving this deadline will eliminate conflict with heating technology testing and coincide better with natural pilot assessment cycles.

3.11 *Retro-Commissioning*

3.11.1 Program Summary

The ComEd Retro-Commissioning (RCx) program has been offered each of the five electric program years and GPY2 marked the second year where the program was offered as a joint utility program with Nicor Gas. The RCx program offering is a natural fit for joint delivery due to the intensive investigation and analysis of heating, ventilation and air-conditioning (HVAC) systems. Individual measures frequently save both electricity and gas, and analyzing one while neglecting the other would be a lost opportunity.

The program helps commercial and industrial customers improve the performance and reduce energy consumption of their facilities through the systematic evaluation of existing building systems. In general, the program pays for 100% of a detailed retro-commissioning study contingent upon a participant's commitment to spend a certain amount of their own money implementing recommendations in the study that have a payback of 18 months or less. Retro-commissioning recommendations typically include low-cost or no-cost HVAC measures like (1) scheduling equipment with occupancy, (2) optimizing temperature set points and controls to operate equipment efficiently and (3) repairing worn-out or failed components²⁰ that manifest themselves as energy waste rather than affecting the ability of the whole system to maintain comfort. The measures can usually be implemented in the course of normal maintenance or through improvements to sensors or control programs with existing building automation systems (BAS).

The program is co-managed by ComEd/Nicor Gas and a single implementer, Nexant Inc. Nexant manages the day-to-day operation of the program including marketing, interacting with customers, working with program-approved retro-commissioning service providers (RSPs), and reporting progress and savings to the utilities.

3.11.2 Results and Recommendations

In general, the program continues to perform as it did in prior years. A steady flow of projects are generating savings. The program has evolved to capture the diverse customer base in the commercial building market sector. Facilities receiving district energy can participate and smaller buildings that are part of a campus are eligible to participate as well. The implemented savings is between five and seven percent of participant annual gas consumption, on average. The program savings are outlined in Table 3-11 below and a discussion of findings and recommendations follows.

²⁰ For example, broken damper linkages that permit introducing too much ventilation air in extreme weather conditions. Servicing or replacing the linkages so they perform as intended would be a retro-commissioning measure.

Table 3-11. RCx Program Savings

	Therm Savings
Ex-Ante Gross Savings	397,353
Verified Gross Realization Rate	1.02
Verified Gross Savings	403,126
NTG Ratio	1.02 †
Verified Net Savings	411,189

Source: Navigant Analysis

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

Program Savings Goals Attainment

Finding 1. Nicor Gas energy savings fell well-short of goals (1,024,308 therms), though program managers expect GPY3 savings will make up for some of this shortfall due to long implementation lead times for some retro-commissioning measures.²¹

Recommendation. The GPY3 pipeline of projects appears to be a continuation of past performance for all utilities except North Shore Gas²². Goals attainment is very dependent on the number of projects processed by the program. GPY2 projects involved two more RSPs than GPY1 (11 versus 9) but that still leaves more than 50% of participating RSPs without a completed project. Working with the new RSPs to complete projects and enroll future participants should be a priority for meeting future goals.

Gross Realization Rates

Finding 2. A few RSPs are recommending retrofit measures among their retro-commissioning measures that are covered in the Illinois TRM or might be included in future versions of the Manual. These measures include faucet aerators (TRM) and V-Bank filters for ventilation systems.

Recommendation. When measures are covered in the TRM consider using the algorithms there for *ex ante* estimates rather than custom methods for consistency. Consider proposing V-bank filters for deemed savings through the prescriptive program. Base deemed savings on research from pre- and post-installation measurements through retro-commissioning verification processes.

Service Provider Participation

Finding 3. Eleven RSPs participated in GPY2. This is an increase from nine last year, but one RSP submitted almost 40% of projects and the top 4 active RSPs submitted 70% of projects while all others submit three or less. Tracking data show that 15 RSPs have pipeline projects including six that have not completed projects in the past.

Recommendation. Consider focusing marketing and follow-up efforts with new or less active RSPs to help them understand the value proposition for themselves and their customers for participating in the program.

²¹ ICC Quarterly Report 4th Quarter PY2 Final.xls, Nicor Gas, July 16 email.

²² North Shore Gas has one pipeline participant for GPY3 in a recent tracking review

Participant Building Operator Certification Training

Finding 4. One requirement of the program is successful completion of Level I Building Operator Certification training by at least one participant representative within one year of completing the retro-commissioning project. The training is well received, anecdotally, and serves to support savings persistence. Successful tracking of this requirement, however, has only recently been implemented. Data show that thirteen individuals representing eight GPY1 participants (of 50) have completed the training. For GPY2 fifteen individuals, representing eleven participants, have completed the training. The one year window for compliance almost ensures this will be a recurring evaluation concern. Program leverage is weak on this requirement as the RSP is paid for the study long before the *participant* must comply.

Recommendation. Consider stronger tools for enforcing this program requirement – such as requiring participants to pay for training tuition prior to program completion. The program might collect the tuition in escrow and pay for the training when the participant enrolls. Compile a list of testimonials from operators who have recently completed the training describing the benefits of training.

Processes.

Finding 5. Program Managers identified coordination with the controls contractors as a barrier to program success. These contractors are brought in to do much of the project work and in some cases, have not implemented projects correctly. Also, program managers identified that customer implementation funding and customer staff availability to participate in the retro-commissioning process continue to be barriers for the program.

Recommendation. Consider closer coordination with controls contractors, either by Nexant or also by utility staff. Closer coordination and more frequent monitoring will ensure that contractors are on track to implement projects successfully. Also, since funding and staff availability continue to be obstacles, the program could consider increasing funding and staffing to meet program goals.

Overall the program is addressing the barriers to retro-commissioning and operational savings in commercial buildings. There are a large number of registered service providers with varying degrees of activity in the service territory. Anecdotal comments suggest that participants are more aware of the program and the benefits of retro-commissioning, in general.

3.12 Small Business Energy Savings

3.12.1 Program Summary

The Small Business Energy Savings (SBES) program is designed to achieve energy savings goals by educating ComEd, Nicor Gas, and Peoples Gas/North Shore Gas small business customers about electric and natural gas savings opportunities through on-site assessments and added incentives. The implementers, Nexant for ComEd/Nicor Gas and Franklin Energy for ComEd/Peoples Gas/North Shore Gas, provide energy advisors who conduct high-level walk-through assessments of customer sites. Customers are able to achieve immediate savings with the direct installation of specific products during the assessment at no cost to them. The no-cost measures promoted by the program include low-flow faucets and showerheads, pre-rinse spray valves, vending machine controls, and compact fluorescent lights.



Further savings opportunities are offered to customers through incentives of 30 to 70 percent for selected low-cost electric and natural gas energy efficiency measures that may be installed by a local contractor at a second on-site visit. If the premises are rented, the program implementer coordinates participation in the program with the landlord or property owner. Trade allies are assigned on a rotating schedule based on geography unless the contractor recommended the program to the customer.

Rather than a geographic focus, Nicor Gas concentrated on a particular market segment with untapped savings potential: steam traps at dry cleaners, venues which in the greater Chicago area are mostly owned and operated by Korean-Americans. Working closely with the Chicago-based Korean-American Dry Cleaners Association (KADCA), Nexant recruited bilingual trade allies with experience installing steam traps at dry cleaners. After verifying that the participating trade allies understood the Program, could explain it properly, and were recommending and installing measures correctly per the standard SBES process, these trade allies were allowed to perform the assessments on their own. At the same time, Nicor Gas raised the steam trap incentive offered to dry cleaners to 100 percent starting in February 2013 and extending through the end of GPY2.

3.12.2 Results and Recommendations

The SBES program succeeded not only in meeting its goals for gas savings in GPY2, but in fact strongly exceeded them, which dramatically increased the program’s energy savings compared to the previous program year. This resulted in part from overall good execution on the part of the utilities and the program implementers, as well as increased familiarity with the program goals and processes on the part of participating trade allies. However, two other important factors should not be overlooked, namely the creative thinking and risk-taking on the part of program managers at both utilities. Their willingness to experiment with nontraditional approaches and take on the risks inherent in such efforts in order to overcome existing barriers to adoption of energy efficiency measures, were key elements in the Program’s success this year. Table 3-12 below summarizes SBES energy savings and a discussion of findings and recommendations follows.

Table 3-12. SBES Program Savings

	Therm Savings
Ex-Ante Gross Savings	253,445
Verified Gross Realization Rate	1.08
Verified Gross Savings	273,900
NTG Ratio	0.86 †
Verified Net Savings	235,554

Source: Navigant Analysis

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

Program Savings Goals Attainment

Finding 1. The SBES program success was driven partly by the accomplishments of the geo-marketing pilot program, which comprised 15 percent of total program net savings, though the core program also performed well.

Recommendation. The program should expand the geo-marketing pilot program to other communities in its service territory.

Finding 2. The SBES program exceeded its GPY2 net therms savings goal by 247 percent. The program achieved 20 times the verified net savings it did in GPY1. This outstanding success is largely attributable to Nicor Gas’s innovative focus on dry cleaner steam trap replacements, which accounted for 74 percent of total Program therms savings.

Recommendation. The program should continue the steam trap special and expand it to other parts of Nicor Gas’s service territory.

Program Tracking System Review

Finding 3. Navigant found several examples where the tracking system needed updating or correction, including building-type lookups, unit savings values for some measure types, notably lighting, and inconsistencies between the data provided by the implementation contractors and what was reported in the Frontier tracking system. We detailed these findings in Section 3.1.

Recommendation. Update and correct the tracking systems, and improve coordination of data transfer from the implementers’ data systems to Frontier.

Pilot Program Findings.

Finding 4. The geo-marketing pilot program succeeded in raising uptake rates in the six small communities it targeted in GPY2. ComEd’s decision to commit extra resources to these communities, allow cooperating trade allies flexibility in tailoring their marketing approaches to local conditions, work closely with local businesses and community organizations, and set an aggressive, time-limited incentive, were all key factors driving the pilot’s success. The main features of this marketing model could be extended to other venues besides small communities.

Recommendation. The program should extend the pilot program to other small and mid-sized communities, and think creatively about adapting the geo-marketing delivery model to other settings where feasible (e.g., to “vertical communities” in apartment buildings and high-rise office buildings, as well as to urban neighborhoods that have had sub-par uptakes with the Program).

Finding 5. The experiences of the individual trade allies who delivered the geo-marketing pilot program in GPY2 suggest that there is no single marketing strategy that guarantees success in all circumstances. Approaches that worked in some communities failed to pay off in others, and not all trade allies were equally adept at making mid-course corrections to improve performance.

Recommendation. The program should allow maximum flexibility to the trade allies participating in future geo-marketing pilots, to allow them to experiment with alternative approaches and make adjustments as they gain experience working in each location. The Program should bring participating trade allies together (e.g., sponsor a conference or awards dinner) to share their experiences of what worked and generate ideas for overcoming barriers in the future.

Finding 6. The program’s success in increasing therms savings in GPY2 rests mainly on the success of the steam trap special offer, which Nicor Gas and Nexant implemented in collaboration with the Korean-American Dry Cleaner Association. This group provided the program with access to trusted, experienced, bilingual trade allies, along with valuable publicity and credibility with this hard-to-reach customer segment. Nicor Gas’s decision to

engage creatively with an ethnic/language-based group, and set an aggressive, time-limited incentive, were also key factors in assuring the Program’s success in GPY2.

Recommendation. The program should seek out other opportunities to work with non-traditional trade and community groups to promote steam trap replacements in non-dry cleaning venues, such as high-rise buildings, apartments and condo complexes. The Program should also consider expanding the focus to include other gas-saving measures, such as boiler tune-ups/replacements.

Trade Ally and Other Participation.

Finding 7. Some trade allies participating in the GPY2 geo-marketing pilot indicated that the time they had been given to prepare to enter and market the pilot in each test community had been too short.

Recommendation. The program should give pilot program trade allies more notice before starting the pilot program in each targeted community, to allow them sufficient to develop marketing strategies, and contact local subcontractors and community leaders.

Finding 8. Trade allies participating in the GPY2 steam trap special reported encountering steam traps in service well beyond the recommended replacement age. Some dry cleaner proprietors appeared to be unaware of the large impact that leaking traps could have on their energy bills – indeed, some were reportedly unaware that they *had* steam traps or what their function is.

Recommendation. This lack of awareness represents a program barrier, but also represents an opportunity for Nicor Gas to strengthen and extend its cooperative relationship with KADCA. Nicor Gas should produce and distribute educational materials aimed at educating dry cleaner owners and others about steam traps, including proper maintenance and replacement schedules (federal guidelines recommend replacement every five to eight years). These could be translated into Korean and distributed cooperatively with the Association.

Finding 9. Some trade allies involved in the GPY2 steam trap special found that some customer boilers at participating dry cleaner were old and in deteriorated condition; they recommended extending the special offer to include boiler replacements.

Recommendation. Nicor Gas should consider developing an initiative to promote replacement of older, inefficient boilers. However, current Illinois rules provide a perverse incentive that serves to discourage replacement of older, inefficient boilers by crediting utilities with relatively low savings in such cases (so-called “replace-on-burnout”) that do not reflect the full social value of these measures. For this reason, Nicor Gas should propose alterations to these rules to the ICC that would alleviate this problem.

3.13 Business New Construction

3.13.1 Program Summary

The Business New Construction (BNC) Service program aims to capture immediate and long-term energy efficiency opportunities that are available during the design and construction of new buildings, additions, and renovations in the non-residential market. The program is jointly offered by ComEd and Nicor Gas. The ComEd program has been operating since June 1, 2009. Nicor Gas joined the program to offer natural gas rebates in June 2011.



The Energy Center of Wisconsin (ECW) implements the program for both ComEd and Nicor Gas. ECW reaches out to design professionals and customers at the beginning of the design process to engage them in the program as early as possible. Prior to GPY2, the program offered incentives through three tracks: Systems, Comprehensive, and Small Buildings. In GPY2, the program transitioned toward a single performance-based, Comprehensive track model which eliminates the remaining tracks previously offered. The Comprehensive track offers customers with building facilities greater than 20,000 square feet incentives for whole-building electric and therm savings. The change to a single track only affects new projects initiated in GPY2 or later. Future program years for electric and gas are likely to see more Comprehensive Track projects and fewer projects from the Systems and Small Buildings Tracks. Since New Construction projects typically take longer than one program year to complete, more than half of all projects completed in GPY2 were Systems Track projects initiated in past years. Additionally, one project was completed in GPY2 through the Small Buildings track which contained lighting and day-lighting requirements for buildings under 20,000 square feet.

3.13.2 Results and Recommendations

The BNC program achieved evaluation-adjusted gross savings of 265,503 therms, but fell short of its goal of 168,000 net therms (the revised savings targets established in the GPY2 contract), achieving savings of 138,062 net therms. Table 3-13 below provides detail on program savings.

Table 3-13. BNC Program Savings

	Therm Savings
Ex-Ante Gross Savings	255,509
Verified Gross Realization Rate	1.04
Verified Gross Savings	265,503
NTG Ratio	0.52 †
Verified Net Savings	138,062

Source: Navigant Analysis

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

The program had 111 projects in EPY5/GPY2, consisting of 41 ComEd-only projects and 70 projects completed as ComEd and Nicor Gas joint projects. Of these 70 joint projects, 28 had therm savings eligible for incentives paid by Nicor Gas. In GPY2, the program transitioned from three incentive tracks (Systems, Comprehensive, and Small Building) toward a single performance-based, Comprehensive Track model which eliminates the remaining tracks previously offered. The change to a single track only affects new projects initiated in GPY2 or later. Thus, in GPY3 and beyond, the program is likely have an increasing number of Comprehensive Track projects and decreasing projects in the other tracks. Since New Construction projects often take longer than one program year to complete, more than half of the projects initiated in past years and completed in GPY2 were Systems Track, as shown below. Additionally, one project was completed in GPY2 through the Small Buildings track.

Given program maturity and historically high participant satisfaction, the GPY2 process evaluation was limited to activities that provided information on participant characteristics, program implementation changes, and program challenges, particularly for the newer Nicor Gas program offerings.



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

Program Savings Goals Attainment

Finding 1. Nicor Gas achieved evaluation-adjusted gross savings of 265,503 therms, but fell short of its goal of 168,000 net therms, achieving savings of 138,062 net therms.²³ This was primarily because the agreed upon NTG was lower than the planning value.

Recommendation. The program should continue to target projects with both gas and electric savings and target sectors with high levels of gas use and potential savings.

Gross Realization Rates

Finding 2. The gross realization rate for therms savings is 104%. Engineering review of a sample of projects revealed that most energy savings modeling and calculations are reasonable and meet program guidelines. However, a few issues repeat across multiple projects as a result of not following program guidelines.

Recommendation. Calculating savings according to the program guidelines will result in gas realization rates closer to 100% for future projects.

Finding 3. The calculations for demand controlled ventilation (DCV) and energy recovery ventilation (ERV) include a minimum economizer operation temperature indicating that the units are not in heating mode until below that temperature. Although economizers may operate to this temperature, many buildings can still see DCV and ERV savings at higher temperatures. For all five applicable projects, this temperature is set to a relatively low value (35°F) for buildings with moderate internal gains common to the program.

Recommendation. The program should consider using a more reasonable assumption for the maximum outdoor temperature below which DCV and ERV savings may occur. For many buildings this will be between 55-60°F, though this is dependent on internal gains and should be determined on a project-specific basis. If a building has an abnormal balance temperature that requires a lower set-point, this should be clearly documented.

Finding 4. Two major renovation projects used existing parameters (e.g., the existing exterior wall construction) as the baseline for savings calculations. Renovations that expose the interior of the wall are required by law to bring the wall construction to code. In one case, the evaluation team's review of the project documentation indicated that keeping the existing wall was appropriate. For the second project, we determined that the level of interior demolition necessitated using code as the baseline.

Recommendation. Major retrofit projects that use existing parameters as baseline (such as shell) that are less than current code minimum should be reviewed to ensure reasonableness and documented accordingly. Specifically, we encourage using code minimums in all cases where the renovations are significant and the exterior walls are likely to be exposed.

Finding 5. Two projects used baseline equipment inconsistent with ASHRAE 90.1 Appendix G. The evaluation team changed the equipment specifications in the evaluation-adjusted model to use the appropriate baseline.

²³ Including interactive therm penalties from joint projects. When these penalties are removed, the verified Nicor Gas savings are 137,441 net therms.



Recommendation. We recommend that the implementation team describe any deviations from ASHRAE 90.1 Appendix G in the project's supporting documentation.

Process Evaluation

Finding 6. Attaining gas goals continues to be a challenge, as the gas side of the program has not had as long to mature and grow. However, program staff are actively working to increase gas savings in several ways such as researching new construction trends in the Nicor Gas service territory and mining past participation data to target sectors with high savings potential, as well as investigating new gas measures.

Recommendation. In addition to focusing on past participant data mining, also target previously untapped sectors with large gas loads. For example, the large hot water loads in the hospitality and food service sectors may be a potential source of savings.

Finding 7. The program has worked to improve its screening of projects for potential free-riders in several ways, including limiting participation to projects earlier in the design process and discussing large projects with the evaluation team in advance.

Recommendation. In addition to continuing these efforts and moving forward with the "real-time" self-report net-to-gross pilot for GPY3, plan to use market research to capture outside spillover now that the program is maturing.

Finding 8. The evaluation team observed that while ECW required large projects to be inspected if they were not randomly selected, the same protocol of randomly selecting 50% of projects for inspection remained in place for EPY5/GPY2. The implementation team indicated that a new system could be developed if the program grows to the point where the current system is too inefficient.

Recommendation. Consider developing a new and more efficient verification sampling system now so that it is already in place by the time the program is too large for the current approach.

3.14 *Building Performance with Energy Star*

3.14.1 Program Summary

The Building Performance with ENERGY STAR® (BPwES) pilot offers select customers in the hospitality and assisted living market segments one year or more of no-cost benchmarking and consulting services aimed at helping participants set and continuously track progress towards energy performance improvement targets at their regional facilities within the Nicor Gas service territory. Initial baseline and ongoing monthly benchmarking will be performed in ENERGY STAR's Portfolio Manager, as well as through a third-party benchmarking tool that provides a weather-normalized view of the participants' energy performance across their entire portfolio.

3.14.2 Results and Recommendations

The pilot did not generate anticipated participation levels over the two year pilot period and will not be continuing in GPY3. The primary areas of inquiry were to identify the barriers that prevented the pilot from succeeding and the lessons learned that should be applied to future similar efforts.



The program implementer, Ecova, reports that there would be benefits in combining Nicor Gas and ComEd's versions of this pilot. The implementation contractor found that it was sometimes difficult to speak with site level engineers and have them go through two different utilities if they were interested in both electric and gas measures. Having completely separate programs doubles the paperwork and can cause confusion. Furthermore, Ecova reports that it might be helpful to be able to come to a facility with a complete solution, and not just look at natural gas or electric measures separately. Customers want to see electric and gas opportunities together rather than one or the other.

The relative success of the ozone laundry systems gas measure allowed it to be integrated into other commercial and industrial programs as an offering. The measure's lower capital investment and two- to four-year payback criteria made it successful in relation to other higher-cost gas measures. Savings generated by the measure were credited to the Custom Program in GPY2 and Nicor Gas reports that in GPY3 the measure is being offered through the BEER program.

4. Appendices

The program-specific reports will be attached as separate appendices.

4.1 Glossary

ComEd, Nicor Gas, Peoples Gas, and North Shore Gas EM&V Reporting

Program Year

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

There are two main tracks for reporting impact evaluation results, called Verified Savings and Impact Evaluation Research Findings, summarized in Table 4-1 below.

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 EPY4/GPY1 ComEd's deemed parameters were defined in its filing with the ICC. The Gas utilities agreed to use the parameters defined in the TRM, which comes into official force for EPY5/GPY2.

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.)

Table 4-1. 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 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, 2012²⁴.

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.

²⁴ IL-TRM_Policy_Document_10-31-12_Final.docx



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 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.

4.2 *Home Energy Efficiency Rebate*

Home Energy Efficiency Rebate Program GPY2 Evaluation Report

Final

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

Presented to
Nicor Gas Company

February 27, 2014

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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 Nicor Gas program year two (GPY2)¹ Home Energy Efficiency Rebate Program (Home EER)². Under the Home EER program, cash incentives were offered to encourage Nicor Gas customers to purchase higher efficiency water and space-heating equipment, and air conditioning systems for ComEd customers through the complete system replacement (CSR) portion of the program. For GPY2, the Home EER program added rebates for several new measures, including pipe insulation, programmable thermostats, and high efficiency windows.

E.1. Program Savings

The following two tables summarize the total program savings and program savings by measure.

Table E-1. GPY2 Program Results

Savings Category	Nicor Gas
Ex Ante Gross Savings ³ (Therms)	2,847,533
Verified Gross Realization Rate	1.00‡
Verified Gross Savings (Therms)	2,858,644
Net to gross ratio (NTGR)	0.69†
Verified Net Savings (Therms)	1,972,464

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

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

² While the Home EER and CSR program are jointly offered by Nicor Gas and ComEd, this report covers the evaluation of the Nicor Gas component of the program.

³ From Tracking System

Table E-2. GPY2 Program Results by Measure

Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
High Efficiency Boiler	21,802	1.00‡	21,803*	0.69†	15,044
High Efficiency Furnace	2,545,517	1.00‡	2,545,849*	0.69†	1,756,636
Pipe Insulation	704	0.93‡	655	0.69†	452
Programmable Thermostat	216,819	0.99‡	215,475	0.69†	148,678
Storage Water Heater	44,246	1.27‡	56,329	0.69†	38,867
Indirect Water Heater	805	1.11‡	894	0.69†	617
High Efficiency Windows	17,639	1.00‡	17,639	0.69†	12,170

Source: Utility tracking data and Navigant analysis.

* Have higher verified gross savings due to rounding.

† A deemed value. SAG approved NTG

‡ Based on evaluation research findings.

E.3. Impact Estimate Parameters

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

Table E-3. Impact Estimate Parameters

Parameter	Data Source	Deemed or Evaluated?
NTGR	SAG Spreadsheet†	Deemed
RR	Evaluation research	Evaluated

Source: Navigant analysis

† Document provided by Nicor Gas to the SAG summarizing the SAG-approved NTGR for Nicor Gas for GPY1-GPY3 as negotiated in March-August 2013. Distributed in the SAG Meeting on August 5-6, 2013.

[http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor Gas NTG Results and Application GPY1-3.pdf](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013/Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf).

E.4. Impact Estimate Parameters for Future Use

In the course of our GPY2 research, the evaluation researched the parameters used in impact calculations, including those in the Illinois TRM. Some of those parameters are eligible for deeming for future program years or for inclusion in future versions of the TRM. The parameters that the evaluation team recommended for future use in the TRM are shown in the following table.

Table E-4. Impact Estimate Parameters for Future Use

Parameter	Value	Data Source
Early Replacement Rate for a Furnace that is Replaced by a Furnace-Only Participant	7%	Evaluation team research.
Early Replacement Rate for a Furnace that is a Primary CSR Measure.	14%	Evaluation team research.
Early Replacement Rate for a Furnace that is a Secondary CSR Measure.	46%	Evaluation team research.
Non-Participant TA Spillover	0.04	Evaluation team research

Source: Navigant analysis

E.5. Participation Information

The program had 17,167 participants in GPY2 and distributed 22,230 measures as shown in the following table.

Table E-5. GPY2 Primary Participation Detail

Participation	Nicor Gas
Participants	17,167
Total Measures	9
Installed Measures	22,230

Source: Utility tracking data and Navigant analysis.

E.6. Conclusions and Recommendations

The following provides insight into key program findings and recommendations:

Program Savings

Finding 1. The Nicor Gas Home EER program achieved 1,972,464 verified net therms savings for PY2, and had 17,167 program participants. Nicor Gas achieved 88% of its original GPY2 savings goal of 2,235,590 therm savings, and 53% of its targeted program participants. Nicor Gas also fell short of the implementation contractor’s revised goals for PY2. Eighty-nine percent of the program savings were from high efficiency furnace participants.

Gross Realization Rates

Finding 2. The pipe insulation realization rate was 0.93 because the implementation contractor (IC) recorded the incorrect savings value. Additionally, the programmable thermostat realization rate was 0.99 because an incorrect in-service rate was used for self-installed thermostats. Storage water heaters received a realization rate of 1.27 because the

baseline efficiency assumption used in the ex-ante gross savings estimates was for the incorrect size water heater.

Recommendation 2a. The IC should thoroughly check the savings algorithms, assumptions, and deemed savings values being used in the program tracking system to ensure that they match the recommendations in the Illinois TRM.

Recommendation 2b. To ensure that the program meets the requirements as defined in the IL TRM, the Home EER program must ensure that contractors who install programmable thermostats know 1) how to program a programmable thermostat, 2) that the thermostats should be programmed using an appropriate set back schedule (such as the one suggested by ENERGY STAR), and 3) that they should instruct the homeowners on the appropriate use of a programmable thermostat. The program should also clearly indicate in the program tracking database whether a thermostat was installed by a contractor or by the customer.

To ensure that an ISR of 100% would be supported by primary research in an evaluation, Navigant also recommends the program consider making some or all of the following changes to the program implementation process: 1) make ENERGY STAR pre-programming a requirement for all qualified thermostats; 2) include properly programming the rebated thermostats as part of the list of measure requirements on the program application, literature, and website; and 3) implement a verification process to ensure that programmable thermostats installed by participating contractors are being properly programmed at the time of installation.

Trade Ally Participation: Spillover and Application Process

Finding 3. Forty-seven percent of non-participating trade allies interviewed reported that they had sold program qualified measures without applying for rebates for those measures, resulting in therm savings amounting to 4% of the program’s gross savings. When asked why they did not submit these measures to the program, the most commonly cited reason was the perception or experience that the program requirements were burdensome. In many cases the trade allies claimed they relied on their customers to apply for the program, however Navigant was unable to find any evidence that those customers submitted program applications without a trade ally.

Recommendation 3a. Navigant recommends including the non-participating trade ally spillover savings rate, 4% of program gross savings, to future NTGR for this program.

Recommendation 3b. Because Nicor Gas completely revised the application for GPY3 to simplify it, Navigant recommends an outreach effort to ensure that all “drop-out” trade allies are aware of the new, simplified application process. This effort could also include temporarily offering trade ally spiffs, which would encourage trade allies to utilize the new application.

Finding 4. Of the never-participated trade allies who agreed to complete the survey, fifty-six percent reported that they were unaware of the Home EER program.

Recommendation 4. Navigant suggests that there are additional opportunities for Nicor Gas to increase program awareness among contractors in the service territory, and that the program would benefit from additional trade ally outreach efforts.

Early Replacement Analysis

Finding 5. Forty-six percent of furnaces that were installed as *secondary* units (the measure that did *not* cause the participant to contact a trade ally) by CSR participants can be considered early replacement measures instead of replace-on-burnout measures. Early replacement was calculated based on the condition, age, and repair history of the replaced units. Fourteen percent of furnaces installed as the *primary* CSR measures (the measure that caused the participant to contact a trade ally) can be considered early replacement, and seven percent of furnaces replaced by furnace-only participants can be considered early replacement.

Recommendation 5a. Navigant recommends that the Illinois TRM account for early replacement rates of furnaces as described above: 46% for *secondary* units of CSR participants, 14% for *primary* units of CSR participants, and 7% of furnace-only participants, rather than consider all CSR measures as replace-on-burnout.

Recommendation 5b. Navigant suggests that Nicor Gas consider the addition of an early replacement component to the stand-alone furnace program. This could include marketing materials, data collection, and additional incentives that would promote and encourage the early replacement of units that may be working, but are highly inefficient. The program qualifications may be similar to those for the furnace early replacement program currently offered in Ameren territory, where an additional rebate is offered for units that are working, and also either has an AFUE level of less than 75% or is more than thirty years old.

1. Introduction

1.1 Program Description

Under the Rider 30 Home Energy Efficiency Rebate (Home EER) program, cash incentives and education were offered to encourage upgrading of water- and space-heating equipment among residential customers of Nicor Gas, and central air conditioning (CAC) systems for ComEd customers through the complete system replacement (CSR) portion of the program. The Home EER program was designed to conserve natural gas and electricity, and lower participants' monthly energy bills. Both rental and owner-occupied dwellings are eligible for rebates for furnaces, boilers, water heaters, and air conditioning systems. Customers must be active residential customers of Nicor Gas in order to receive rebates for gas saving measures, or Nicor Gas and ComEd to receive rebates for high efficiency furnaces and air conditioning systems under the CSR portion of the program, and the premises must be used for residential purposes in existing buildings.

The Home EER program promises customers a quick turn-around rebate to invest in long-term savings through better technology. Rebates are offered for the installation of high-efficiency furnaces, boilers, programmable thermostats, domestic hot water (DHW) pipe insulation, windows, water heaters, and air conditioning systems. The dollar amount of the rebate depends on the size and efficiency of the replacement measures and ranged from \$20 to \$1,000. The GPY2 Rider 30 Home EER program is implemented by Resource Solutions Group (RSG) and ran from June 1, 2012 through May 30, 2013.

1.2 Evaluation Objectives

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

1.2.1 Impact Questions

1. Are interactive effects of "bundled" measures being properly captured?
2. What is the rate of non-participating and "drop-out" trade ally spillover?
3. What is the rate of early replacement of air conditioners and furnaces participating in the Home EER/CSR program?
4. What are the program's net and gross savings?
5. Are the TRM algorithms applied appropriately and the tracking system calculating savings correctly?

1.2.2 Process Questions

6. What are the reasons that trade allies may have participated in GPY1 but not chosen to continue participating in GPY2, and how can Nicor Gas increase trade ally retention?

2. Evaluation Approach

This evaluation of the Nicor Gas Home EER program reflects the second full-scale year of program operation. During GPY2, 17,167 residential customers participated in the program. Navigant performed a tracking system review to determine ex ante gross savings by measure. To determine verified gross savings by measure, the evaluation team performed a measure verification for measures included in the Illinois TRM and a workpaper review for all other measures. These were compared to find the measure and program level realization rates for the Home EER program. The NTG ratio was determined using a combination of participant and participating trade ally free-ridership rates, and participating trade ally spillover rates from the GPY1 evaluation. For GPY2, a non-participating trade ally spillover rate was calculated in order to inform future program NTG ratios.

2.1 Overview of Data Collection Activities

The core data collection activities included non-participating trade ally surveys and participant surveys. The full set of data collection activities is shown in the following table.

Table 2-1. Core Data Collection Activities

N	What	Who	Target Completes	Completes Achieved	When	Comments
<i>Impact Assessment</i>						
1	Tracking System Review	Participants	Census	Census	May – September 2013	
2	Engineering Analysis	Participants	Census	Census	May – September 2013	
3	Telephone Survey	Non-Participating Trade Allies	50-70	60	September-October 2013	Data collecting supporting SO analysis
4	Telephone Survey	Program Participants	70 CSR/ 70 Furnace	70 CSR/ 70 Furnace	September-October 2013	Data collection supporting early replacement analysis.
<i>Process Assessment</i>						
5	In Depth Interviews	Program Manager/Implementer Staff	2-5	2	May – September 2013	

2.2 Verified Savings Parameters

Navigant used the Illinois TRM Version 1.0 methodology to calculate verified gross savings. However, both indirect water heaters and windows did not have methodologies included in the Illinois TRM. For these measures, Navigant verified workpapers provided by RSG. For the measures it covers, the Illinois TRM deems many values used in the algorithms. Table 2-2 lists the source of the

parameters that Navigant used. The Illinois TRM allows for some custom values to be used in the algorithms as well. Navigant used Nicor HEER tracking data for these values.

Table 2-2 Verified Gross Savings Parameters

Measure	Input Parameter Source
High Efficiency Boilers	Illinois TRM version 1.0 – Section 5.3.5
High Efficiency Furnaces	Illinois TRM version 1.0 – Section 5.3.6
DHW Pipe Insulation	Illinois TRM version 1.0 – Section 5.4.1, Nicor Gas memo ⁴
Programmable Thermostats	Illinois TRM version 1.0 – Section 5.3.10
Storage Water Heaters	Illinois TRM version 1.0 – Section 5.4.2
Indirect Water Heaters	RSG workpaper
Windows	RSG workpaper

Source: Navigant analysis

2.3 Verified Gross Program Savings Analysis Approach

For the deemed savings estimates, Navigant calculated independent estimates of the savings for each measure based on the Illinois Technical Reference Manual (Illinois TRM). Navigant used the tracking data for participant location and equipment specifications. There was no TRM algorithm for both Indirect Water Heaters and Windows. In these cases, Navigant verified assumptions from RSG workpapers and then estimated savings based on them.

2.4 Verified Net Program Savings Analysis Approach

Verified net energy savings were calculated by multiplying the Verified Gross Savings estimates by a net-to-gross ratio (NTGR). For GPY2/EPY5, the evaluation team used NTGR values that were based on past evaluation research and defined through a negotiation process through SAG.⁵ Navigant also conducted non-participating trade ally spillover research to inform future NTG ratios, discussed in Section 3.6.2 and detailed in Section 7.2.2.1.

2.5 Process Evaluation

The GPY2 evaluation activities included an inquiry into the reasons that trade allies may have participated in the Home EER program in GPY1, but did not participate in GPY2. Trade ally interviews attempted to establish the reasons why trade allies did not continue participating and the steps that the utility can take to increase trade ally retention.

⁴ Nicor Gas Comments on HEER Report_010214 memo from Scott Dimetrosky of Apex Analytics (on behalf of Nicor Gas) and Atticus Doman of CLEAResult, January 2, 2014.

⁵ http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf

3. Gross Impact Evaluation

This evaluation of the Nicor Gas Home EER program reflects the second full-scale year of program operation. During GPY2, 17,167 residential customers participated in the program. Navigant performed a tracking system review to determine ex ante gross savings by measure. To determine verified gross savings by measure, the evaluation team performed a measure verification for measures included in the Illinois TRM and a workpaper review for all other measures. These were compared to find the measure and program level realization rates for the Home EER program.

3.1 Tracking System Review

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

Key findings include:

1. In both the High Efficiency Boilers and High Efficiency Furnaces measures, some AFUE values are recorded as decimals, while other are recorded as whole number percentages. For instance, a 92.5% AFUE boiler is recorded as 0.925 in one project, but as 92.5 in another project. It is recommended that this be standardized to either decimals or whole number percentages, but not both.
2. The quantity recorded for all DHW Pipe Insulation projects is one. It is unlikely that all pipe insulation projects had just one foot of insulation installed. It is recommended to record the actual linear feet of pipe insulation installed.

3.2 Program Volumetric Findings

In GPY2, the Nicor Gas Home EER program served 17,167 participants that installed a total of 22,320 projects across 9 different measures. This is an increase of approximately 115% from GPY1, which had a total of 10,327 projects across 5 different measures.

Key finding include:

1. High Efficiency Furnaces show the most participation and savings for the program. Programmable Thermostats have the second most participation and savings for the Home EER program.
2. Pipe Insulation showed the lowest savings for the program.

Table 3-1. GPY2 Volumetric Findings Detail

Measure	Total Participants	Percent of Participating Homes Installing Measure
High Efficiency Boiler	92	0.5%
High Efficiency Furnace	14,932	87%
DHW Pipe Insulation	108	0.6%
Programmable Thermostat	3,907	23%
Storage Water Heater	1,937	11%
Indirect Water Heater	22	0.1%
High Efficiency Windows	177	1%

Source: Navigant analysis.

3.3 Gross Program Impact Parameter Estimates

Navigant calculated verified gross savings from the GPY2 HEER program using algorithms and parameters defined in the Illinois TRM version 1.0. Navigant used the Illinois TRM for all measures except indirect water heaters and windows for which RSG work papers were used.

Table 3-2 Verified Gross Savings Parameters

Measure	Input Parameter Source
High Efficiency Boilers	Illinois TRM version 1.0 – Section 5.3.5
High Efficiency Furnaces	Illinois TRM version 1.0 – Section 5.3.6
DHW Pipe Insulation	Illinois TRM version 1.0 – Section 5.4.1, Nicor Gas memo ⁶
Programmable Thermostats	Illinois TRM version 1.0 – Section 5.3.10
Storage Water Heaters	Illinois TRM version 1.0 – Section 5.4.2
Indirect Water Heaters	RSG workpaper
High Efficiency Windows	RSG workpaper

Source: Navigant analysis

The GPY2 HEER tracking database provided most input parameters necessary to calculate savings using the Illinois TRM version 1.0 and the provided RSG workpapers.

⁶ Nicor Gas Comments on HEER Report_010214 memo from Scott Dimetrosky of Apex Analytics (on behalf of Nicor Gas) and Atticus Doman of CLEAResult, January 2, 2014.

Interactive effects (of a participant implementing multiple space heating measures or multiple water heating measures) to savings were not calculated by the program or by the evaluation team. The TRM does not define a method for determining relevant interactive effects; explicitly capturing interactive effects would require developing a new method to estimate them. The TRM does, however, account for various efficiencies of furnaces for their programmable thermostat measure, which achieved the second largest savings of all measures for this program. Thus, the evaluation team expects that developing a method to explicitly capture interactive effects for this program would yield negligible results and, thus, would not warrant the cost to calculate them.

3.4 Development of the Verified Gross Realization Rate

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

Table 3-3. Verified Gross Realization Rates

Measure	Ex-Ante Gross Savings (therms)	Verified Gross Savings (therms)	Realization Rate
High Efficiency Boiler	21,802	21,803	1.00
High Efficiency Furnace	2,545,517	2,545,849	1.00
DHW Pipe Insulation	704	655	0.93
Programmable Thermostat	216,819	215,475	0.99
Storage Water Heater Generic	44,246	56,329	1.27
Indirect Water Heater Generic	805	894	1.11
Window	17,639	17,639	1.00
TOTAL	2,847,533	2,858,644	1.00

Source: Utility tracking data and Navigant analysis

3.5 Verified Gross Program Impact Results

As shown in the table above, the largest savings discrepancy was in the storage water heater measure which received a realization rate of 1.27. Additionally, pipe insulation received a realization rate of 0.93.

The pipe insulation ex ante gross savings were higher than the verified gross savings because Nicor Gas claimed 6.4 therms per 6 linear feet while Navigant determined the gross savings to be 6.0 therms per 6 linear feet. This savings value is based on the assumptions provided by Nicor Gas and RSG⁷ applied to the Illinois TRM algorithm.

The programmable thermostat verified gross savings were lower than the ex-ante gross savings because RSG used an inappropriate in-service rate (ISR) for self-installed thermostats. The ISR used in the ex-ante gross savings for all non-self-install thermostat projects was 100% while the Illinois TRM prescribes an ISR of 56% for programmable thermostats that are not direct installed. The ISR of

⁷ Nicor Gas Comments on HEER Report_010214 memo from Scott Dimetrosky of Apex Analytics (on behalf of Nicor Gas) and Atticus Doman of CLEAResult, January 2, 2014.

100% is to be used when thermostats have been direct installed by the program or installed by a qualified contractor. All other installations are to receive an ISR of 56%.⁸

To ensure that the program meets the requirements as defined in the IL TRM, the Home EER program must ensure that contractors who install programmable thermostats know 1) how to program a programmable thermostat, 2) that the thermostats should be programmed using an appropriate set back schedule (such as the one suggested by ENERGY STAR), and 3) that they should instruct the homeowners on the appropriate use of a programmable thermostat. The program should also clearly indicate in the program tracking database whether a thermostat was installed by a contractor or by the customer.

To ensure that an ISR of 100% would be supported by primary research in an evaluation, Navigant also recommends the program consider making some or all of the following changes to the program implementation process: 1) make ENERGY STAR pre-programming a requirement for all qualified thermostats; 2) include properly programming the rebated thermostats as part of the list of measure requirements on the program application, literature, and website; and 3) implement a verification process to ensure that programmable thermostats installed by participating contractors are being properly programmed at the time of installation.

Navigant determined the verified gross savings for storage water heaters to be higher than the ex-ante gross savings because a lower baseline efficiency was used in the engineering analysis. The Illinois TRM recommends a baseline efficiency of 0.575 for 50 gallon storage water heaters. A baseline efficiency of 0.594 was being used to calculate the ex-ante gross savings.

⁸ Per email from Sam Dent of VEIC dated February 3, 2014.

The resulting total program verified gross savings is 2,766,657 therms as shown in the following table.

Table 3-4. GPY2 Verified Gross Impact Savings Estimates

	Gross Energy Savings (Therms)
Ex-Ante GPY2 Gross Savings	2,847,533
Verified Gross Realization Rate	1.00‡
Verified Gross Savings	2,858,644

Source: Utility tracking data and Navigant analysis.

‡ Based on evaluation research findings

3.6 Impact Estimate Parameters for Future Use

In the course of our GPY2 research, the evaluation team researched parameters used in impact calculations including those in the Illinois TRM. Some of those parameters are eligible for deeming for future program years or for inclusion in future versions of the TRM. The evaluation team recommends the parameters shown below in Table 3-5.

Table 3-5. Impact Estimate Parameters for Future Use

Parameter	Value	Data Source
Early Replacement Rate for a Furnace that is Replaced by a Furnace-Only Participant	7%	Evaluation team research.
Early Replacement Rate for a Furnace that is a Primary CSR Measure.	14%	Evaluation team research.
Early Replacement Rate for a Furnace that is a Secondary CSR Measure.	46%	Evaluation team research.
Non-Participant TA Spillover	0.04	Evaluation team research

Source: Navigant analysis

3.6.1 Early Replacement

The GPY2 evaluation activities included a survey of Home EER furnace participants and Home EER and CSR participants who replaced a furnace and central air conditioning (CAC) units simultaneously. These two groups of participants were surveyed to determine the rate at which furnaces and CAC units were replaced early as opposed to being replaced when the units failed (replace on burnout). The purpose of this analysis is to inform future changes to the Illinois Technical Resource Manual, which currently does not account for additional early replacement savings for furnaces and CAC units replaced simultaneously

CSR participants were asked questions to determine whether they contacted a trade ally because of issues with their furnace or their CAC unit. The unit (furnace or CAC unit) that initially caused the customer to contact the trade ally was labeled the “primary unit”. The furnace or CAC unit that was also replaced but did not initially prompt the customer to contact the trade ally was labeled the “secondary unit”. The CSR participants were asked a series of questions about the condition of the primary unit and the secondary unit replaced to determine the rate of early replacement.

Forty-six percent of furnaces that were installed as *secondary* units (the measure that did *not* cause the participant to contact a trade ally) by CSR participants can be considered early replacement measures instead of replace-on-burnout measures. Early replacement was calculated based on the condition, age, and repair history of the replaced units. Fourteen percent of furnaces installed as the *primary* CSR measures (the measure that caused the participant to contact a trade ally) can be considered early replacement, and seven percent of furnaces replaced by furnace-only participants can be considered early replacement.

3.6.2 Non-Participating Trade-Ally Spillover

To calculate non-participating trade ally spillover, two groups of non-participating trade allies were included: so-called “drop out” trade allies (those who had participated in GPY1 but did not participate in GPY2) and true non-participating trade allies. Non-participating trade ally spillover was determined using a method comparing sales of program-qualified furnaces before either GPY1 participation or becoming aware of the program, and after GPY1 participation or becoming aware of the program. The methodology also accounted for the influence of the program on any potential spillover. A detailed presentation of the spillover methodology can be found in Section 7.2.2.1.

In the future, Navigant suggests that the Illinois TRM deem the early replacement rate for furnaces as described above: 46% for *secondary* units of CSR participants, 14% for *primary* units of CSR participants, and 7% of furnace-only participants, rather than consider all CSR measures as replace-on-burnout. Nicor Gas is also modifying the CSR program applications to ensure that they will also begin collecting information to determine the early replacement rate for future use. The evaluation team also suggests that the deemed NTGR be increased to include the non-participant trade ally spillover. These changes would allow for a more accurate estimate of gross and net savings, accounting for savings not currently considered.

4. Net Impact Evaluation

For GPY2, SAG⁹ deemed the NTGR value of 0.69 to calculate net savings for Nicor Gas. Table 4-1 shows the verified GPY2 net savings by measure type.

The overall program NTGR was calculated during the GPY1 evaluation by averaging the GPY1 participant and the trade ally free-ridership rates, and then adding the GPY1 participant, and participating trade ally spillover, as follows:

$$NTG_{Program} = 1 - \frac{(FR_{part.} + FR_{TA})}{2} + SO_{part.} + SO_{part.TA}$$

Where NTGProgram = Program NTGR
 FRPart. = Participant Free-Ridership
 FR_{TA} = Trade Ally Free-Ridership
 SO_{Part.} = Participant Spillover

The resulting program GPY1 NTG ratio is as follows:

$$1 - \frac{0.38 + 0.37}{2} + 0 + 0.06 = 0.69$$

Table 4-1. Verified Net Savings by Measure

Measure	Verified Gross Savings (therms)	Verified Net Savings (Therms)
High Efficiency Boiler	21,803	15,044
High Efficiency Furnace	2,545,849	1,756,636
DHW Pipe Insulation	655	452
Programmable Thermostat	215,475	148,678
Storage Water Heater Generic	56,329	38,867
Indirect Water Heater Generic	894	617
Window	17,639	12,170
TOTAL	2,858,644	1,972,464

Source: Utility tracking data and Navigant analysis

⁹ Document provided by Nicor Gas to the SAG summarizing the SAG-approved NTGR for Nicor Gas for GPY1-GPY3 as negotiated in March-August 2013. Distributed in the SAG Meeting on August 5-6, 2013. [http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013/Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf).

5. Process Evaluation

5.1 Non-Participating Trade Ally Process Finding

This section discusses the process results obtained from interviews with 60 non-participating trade allies. More detailed results can be found in Section 7.3.1.

5.1.1 Reasons for Trade Ally Non-Participation

One of the main reasons for non-participation among trade allies who have never participated is unawareness. Of the forty-one never participated trade allies that the evaluation team surveyed, 23 (56%) reported that they were unaware of the program. Based on this response rate, it appears that there are additional opportunities for Nicor Gas to increase its outreach efforts to these non-participating trade allies. Increasing the number of contractors who are aware of the program will help increase participation and program savings.

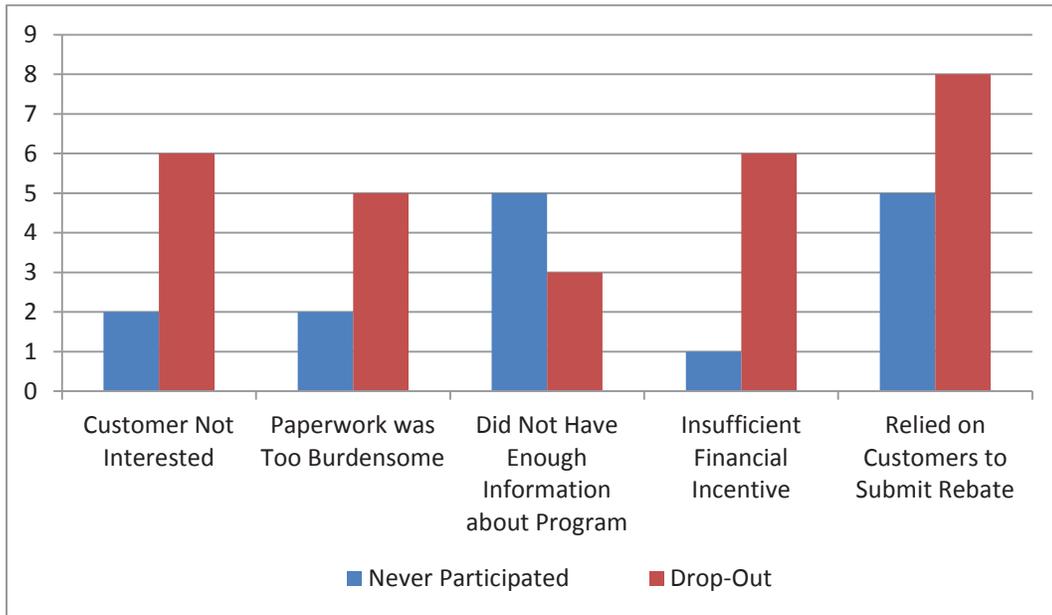
Non-participating trade allies who reported that they sold program-qualified furnaces but did not submit the measures for a rebate were asked the reasons that they did not submit them to the program. The most commonly cited reason (by thirteen trade allies) was that the trade allies were relying upon their customers to submit the rebates to Nicor Gas instead of doing it themselves. Another commonly cited reason was that the customers were not interested in participating in the program. When asked why their customers were not interested in participating in the program, the trade allies stated that the customers thought that the program rebates were not sufficient to warrant the effort to submit the application.

The trade allies also stated that they did not submit rebate application for program qualified furnaces because they themselves thought that the program paperwork was burdensome. Reasons also cited were that the trade ally did not have enough information about the program, and that the financial incentive was insufficient.

None of the trade allies reported that either they or any of the customers had prior bad experiences with any Nicor Gas or other utility program that would discourage them from participating in the Home EER program.

The trade allies who never participated in the program were more likely to report that they did not submit rebates for all qualified furnaces because they did not have sufficient information about the program. However, the “drop-out” trade allies were more likely to report that they thought that the program application process was too burdensome, and they were more likely to rely on their customers to complete and submit the application. In order to verify if any of these customers applied for the program rebate on their own, Navigant compared the trade ally contact information in the tracking database to the survey respondents. By definition, drop-out trade allies are not in the GPY2 tracking database, and less than 1% of GPY2 applications contained no trade ally contact information. Together this suggests that very few, if any, of these customers submitted rebate applications without a trade ally.

**Figure 5-1. Reason for Not Submitting Qualified Furnaces for a Rebate
(Never Participated: n = 13, Drop-Out: n = 21)**



Source: Evaluation Team analysis.

5.1.2 Suggestions for Improving Trade Ally Retention

The non-participating trade allies were also asked if they had any recommendations for changes that could be made to the program to increase participation by contractors like themselves. The most commonly cited changes were to simplify the rebate process, increase incentives, and provide more information about the program. These responses are consistent with previous trade ally survey responses.

The “drop-out” trade allies participated in GPY1, and would have used the Home EER program’s original rebate application. Nicor Gas significantly changed the program application for GPY3, as suggested in the GPY1 program evaluation. The program application was simplified and clarified, and Navigant will be evaluation the trade ally response to the new application as part of the GPY3 evaluation process.

Navigant suggests that Nicor Gas make an effort to reach out to the “drop-out” trade allies to inform them of the new program application. Because none of the trade allies reported any negative experiences with the Home EER program beyond the application process, Navigant believes that efforts to promote the new application process will encourage the “drop-out” trade allies to reconsider future program participation.

5.1.1 Other Suggestions for Program Improvement

Several of the non-participating trade allies had some additional comments that are worth considering. One of the contractors requested that advanced notice be given to trade allies of any impending specials. He mentioned a specific instance where rebates were increased shortly after he had sold a standard efficiency furnace to a customer, and felt that had he known about the future special, he could have upsold a high efficiency unit. Another contractor mentioned that as a smaller

contractor, in-person training sessions are often inconvenient, and he would prefer webinar type training sessions, where he could learn about the program without committing additional travel time.

Also mentioned by a non-participating trade ally was a desire to see the program add additional incentives for quality installation practices, such as the use of Manual J or Manual D, or post-installation combustion analysis. A couple of contractors also mentioned including rebates to contractors (spiffs) as part of the rebate process. These were smaller contractors, who stated that the rebates process had been more complicated and time consuming than they had anticipated, and they felt that without an additional incentive they were unwilling and unable to encourage their customers to participate in the program.

6. Conclusions and Recommendations

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

Program Savings Goals Attainment

Finding 1. The Nicor Gas Home EER program achieved 1,972,464 verified net therms savings for PY2, and had 17,167 program participants. Nicor Gas achieved 88% of its GPY2 goal of 2,235,590 therm savings, and 53% of its targeted program participants. Nicor Gas also fell short of the implementation contractor's revised goals for PY2. Eighty-nine percent of the program savings were from high efficiency furnace participants.

Gross Realization Rates

Finding 2. The pipe insulation realization rate was 0.93 because the implementation contractor (IC) recorded the incorrect savings value. Additionally, the programmable thermostat realization rate was 0.99 because an incorrect in-service rate was used for self-installed thermostats. Storage water heaters received a realization rate of 1.27 because the baseline efficiency assumption used in the ex-ante gross savings estimates was for the incorrect size water heater.

Recommendation 2a. The IC should thoroughly check the savings algorithms, assumptions, and deemed savings values being used in the program tracking system to ensure that they match the recommendations in the Illinois TRM.

Recommendation 2b. To ensure that the program meets the requirements as defined in the IL TRM, the Home EER program must ensure that contractors who install programmable thermostats know 1) how to program a programmable thermostat, 2) that the thermostats should be programmed using an appropriate set back schedule (such as the one suggested by ENERGY STAR), and 3) that they should instruct the homeowners on the appropriate use of a programmable thermostat. The program should also clearly indicate in the program tracking database whether a thermostat was installed by a contractor or by the customer.

To ensure that an ISR of 100% would be supported by primary research in an evaluation, Navigant also recommends the program consider making some or all of the following changes to the program implementation process: 1) make ENERGY STAR pre-programming a requirement for all qualified thermostats; 2) include properly programming the rebated thermostats as part of the list of measure requirements on the program application, literature, and website; and 3) implement a verification process to ensure that programmable thermostats installed by participating contractors are being properly programmed at the time of installation.

Savings Estimates.

Finding 3. The savings algorithms used to determine the ex-ante gross savings estimates for windows were not immediately apparent. It is not a measure detailed in the Illinois TRM, and the documentation provided did not provide the level of detail needed to thoroughly investigate the measure.

Recommendation. While the windows measure is no longer in use for the HEER program, Navigant recommends that any measure not in the Illinois TRM have an accompanying calculator and/or workpaper to detail how ex ante savings estimates are calculated. The indirect water heater measure is a good example of this.

Trade Ally Participation: Spillover and Application Process

Finding 4. Forty-seven percent of non-participating trade allies interviewed reported that they had sold program qualified measures without applying for rebates for those measures, resulting in therm savings amounting to 4% of the program’s gross savings. When asked why they did not submit these measures to the program, the most commonly cited reason was the perception or experience that the program requirements were burdensome. In many cases the trade allies claimed they relied on their customers to apply for the program, however Navigant was unable to find any evidence that those customers submitted program applications without a trade ally.

Recommendation 4a. Navigant recommends including the non-participating trade ally spillover savings rate, 4% of program gross savings, to future NTGR for this program.

Recommendation 4b. Because Nicor Gas completely revised the application for GPY3 to simplify it, Navigant recommends an outreach effort to ensure that all “drop-out” trade allies are aware of the new, simplified application process. This effort could also include temporarily offering trade ally spiffs, which would encourage trade allies to utilize the new application.

Finding 5. Of the never-participated trade allies who agreed to complete the survey, fifty-six percent reported that they were unaware of the Home EER program.

Recommendation 5. Navigant suggests that there are additional opportunities for Nicor Gas to increase program awareness among contractors in the service territory, and that the program would benefit from additional trade ally outreach efforts.

Early Replacement Analysis

Finding 6. Forty-six percent of furnaces that were installed as *secondary* units (the measure that did *not* cause the participant to contact a trade ally) by CSR participants can be considered early replacement measures instead of replace-on-burnout measures. Early replacement was calculated based on the condition, age, and repair history of the replaced units. Fourteen percent of furnaces installed as the *primary* CSR measures (the measure that caused the participant to contact a trade ally) can be considered early replacement, and seven percent of furnaces replaced by furnace-only participants can be considered early replacement.

Recommendation 6a. Navigant recommends that the Illinois TRM account for early replacement rates of furnaces as described above: 46% for *secondary* units of CSR participants, 14% for *primary* units of CSR participants, and 7% of furnace-only participants, rather than consider all CSR measures as replace-on-burnout.

Recommendation 6b. Navigant suggests that Nicor Gas consider the addition of an early replacement component to the stand-alone furnace program. This could include marketing materials, data collection, and additional incentives that would promote and

encourage the early replacement of units that may be working, but are highly inefficient. The program qualifications may be similar to those for the furnace early replacement program currently offered in Ameren territory, where an additional rebate is offered for units that are working, and also either has an AFUE level of less than 75% or is more than thirty years old.

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, 2012¹⁰.

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

¹⁰ 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 Detailed Verified Gross Savings Approach and Findings

High Efficiency Boilers

Nicor Gas rebates two levels of high efficiency boilers: greater than 90% AFUE and greater than 95% AFUE. In both cases, RSG correctly applied the Illinois TRM algorithm for residential boilers.

$$\Delta \text{therms} = \text{Gas_Boiler_Load} \times \left(\frac{1}{\text{AFUE}_{\text{base}}} - \frac{1}{\text{AFUE}_{\text{eff}}} \right)$$

Table 7-1. Verified Gross Savings Parameters

Input Parameters	Ex Ante Value	Verified Value	Deemed or Evaluated?
Gas_Boiler_Load	Actual based on customer site location	Actual based on customer site location	Evaluated
AFUE _{base}	80%	80%	Deemed Illinois TRM
AFUE _{eff}	Actual AFUE of installed equipment	Actual AFUE of installed equipment	Evaluated
Δtherms	Varies	Varies	Evaluated

Source: Navigant analysis.

High Efficiency Furnaces

Nicor Gas rebates two levels of high efficiency furnaces: greater than 92% AFUE and greater than 95% AFUE. In both cases, RSG correctly applied the Illinois TRM algorithm for residential furnaces.

$$\Delta \text{therms} = \text{Gas_Furnace_Load} \times \left(\frac{1}{\text{AFUE}_{\text{base}}} - \frac{1}{\text{AFUE}_{\text{eff}}} \right)$$

Table 7-2. High Efficiency Furnaces Parameters

Input Parameters	Ex Ante Value	Verified Value	Deemed or Evaluated?
Gas_Furnace_Load	Actual based on customer site location	Actual based on customer site location	Evaluated
AFUE _{base}	80%	80%	Deemed Illinois TRM
AFUE _{eff}	Actual AFUE of installed equipment	Actual AFUE of installed equipment	Evaluated
Δtherms	Varies	Varies	Evaluated

Source: Navigant analysis.

Pipe Insulation

Nicor Gas rebates insulation on domestic hot water pipes. The tracking system shows that each project listed had a quantity of one and savings of 6.4 therms. Navigant was unable to recreate this savings value using the Illinois TRM algorithm. However, a memo from Nicor Gas dated January 2, 2014 details the assumptions used to determine the ex ante savings.¹¹

$$\Delta \text{therms} = \left(\left(\frac{1}{R_{\text{exist}}} - \frac{1}{R_{\text{new}}} \right) \times (L \times C) \times \Delta T \times 8766 \right) / \eta_{\text{DHW}} / 100,000$$

Table 7-3. Pipe Insulation Parameters

Input Parameters	Ex Ante Value	Verified Value	Deemed or Evaluated?
R _{exist}	1.0	1.0	Deemed Illinois TRM
R _{new}	4.0	4.0	Verified from Nicor Gas memo ¹² .
L	6.0	6.0	Verified from Nicor Gas memo.
C	0.196	0.196	Verified from Nicor Gas memo.
ΔT	60	60	Deemed Illinois TRM
η _{DHW}	0.78	0.78	Deemed Illinois TRM
Δtherms	6.4	6.0	Evaluated

Source: Navigant analysis.

Programmable Thermostat

The Home EER program rebates programmable thermostats for residential gas customers. From the analysis performed, Navigant has determined that RSG used the incorrect in-service rate for this

¹¹ Nicor Gas Comments on HEER Report_010214 memo from Scott Dimetrosky of Apex Analytics (on behalf of Nicor Gas) and Atticus Doman of CLEAResult, January 2, 2014.

¹² Nicor Gas Comments on HEER Report_010214 memo from Scott Dimetrosky of Apex Analytics (on behalf of Nicor Gas) and Atticus Doman of CLEAResult, January 2, 2014.

measure. According to the Illinois TRM, if the thermostat was direct installed or contractor installed, it is to receive an in-service rate of 100%. All other methods of installation are assigned an in-service rate of 56%. Projects that were determined to be contractor installed received an ISR of 100%. All others received an ISR of 56%. The ISRs were assigned based on information provided by Samuel Dent of VEIC.

$$\Delta therms = \%FossilHeat \times Gas_Heating_Consumption \times Heating_Reduction \times HF \times Eff_ISR$$

Table 7-4. Programmable Thermostats Parameters

Input Parameters	Ex Ante Value	Verified Value	Deemed or Evaluated?
%FossilHeat	100%	100%	Deemed Illinois TRM
Gas_Heating_Consumption	Actual	Actual	Deemed Illinois TRM
Heating_Reduction	6.2%	6.2%	Deemed Illinois TRM
HF	100%	100%	Deemed Illinois TRM
Eff_ISR	100%	Self Installed: 56% Contractor Installed: 100%	Deemed Illinois TRM
Δtherms	Varies	Varies	Evaluated

Source: Navigant analysis.

Storage Water Heater

The Nicor Gas Home EER program incents storage water heaters with an energy factor (EF) greater than or equal to 0.67. Navigant’s analysis determined that RSG used a baseline EF of 0.594. The Illinois TRM recommends this value for 40 gallon water heaters. However, the tracking data shows that all of the water heaters rebated through the program in GPY2 were 50 gallon units. This means that a baseline EF of 0.575 should be used.

$$\Delta therms = \left(\frac{1}{EF_{base}} - \frac{1}{EF_{efficient}} \right) \times (GPD \times 365.25 \times \gamma_{Water} \times (T_{out} - T_{in}) \times 1.0) / 100,000$$

Table 7-5. Storage Water Heaters Parameters

Input Parameters	Ex Ante Value	Verified Value	Deemed or Evaluated?
EF _{base}	0.594	0.575	Deemed Illinois TRM
EF _{efficient}	Actual	Actual	Evaluated
GPD	50	50	Deemed Illinois TRM
γ _{Water}	8.33	8.33	Deemed Illinois TRM
T _{Out}	125°F	125°F	Deemed Illinois TRM
T _{In}	54°F	54°F	Deemed Illinois TRM
Δtherms	Varies	Varies	Evaluated

Source: Navigant analysis.

Indirect Water Heater

The Nicor Gas rebated indirect water heaters through the Home EER program in GPY2. This measure is not specified in the Illinois TRM. Therefore, the RSG workpapers were evaluated and all assumptions were verified. As such, Navigant adjusted the GPD to 50 gallons per day to match the Illinois TRM’s value for other water heater measures.

$$\Delta thermals = \left(\left(\frac{1}{Eff_{base}} - \frac{1}{Eff_{eff}} \right) \times GPD \times 365.25 \times \gamma Water \times \Delta T \times 1 \right) / 100,000$$

Table 7-6. Indirect Water Heaters Parameters

Input Parameters	Ex Ante Value	Verified Value	Deemed or Evaluated?
Eff _{base}	0.67	0.67	Evaluated
Eff _{eff}	0.90	0.90	Evaluated
GPD	45	50	Deemed Illinois TRM
γ _{Water}	8.33	8.33	Deemed Illinois TRM
ΔT	70	70	Evaluated
Δtherms	36.6	40.6	Evaluated

Source: Navigant analysis.

Windows

During GPY2, the Home EER program offered rebates for windows with a u-value less than 0.20. This measure has since been discontinued. Additionally, this measure is not specified in the Illinois TRM. Energy modeling was used to determine the savings algorithm below. Because the measure is no longer in use and had relatively few participants, Navigant has not evaluated this measure in depth.

$$\Delta thermals = 0.80 \times SqFt$$

Table 7-7. Windows Parameters

Input Parameters	Ex Ante Value	Verified Value	Deemed or Evaluated?
SqFt	Actual	Actual	Evaluated
Δtherms	Varies	Varies	Evaluated

Source: Navigant analysis.

7.2.2 Net Program Impact Methodology

For the GPY2 evaluation, Navigant used the SAG approved NTGR of 0.69 to calculate the verified net savings. Navigant also conducted non-participating trade ally spillover research for inclusion in the NTGR in future program years.

7.2.2.1 Spillover

Non-Participating Trade Ally Spill over

In order to calculate non-participating trade ally spillover using data obtained from the telephone interviews, the non-participating trade allies were asked the following:

1. What percentage of customers purchased high efficiency furnaces (those with 92% AFUE ratings of above) before participating in the Home EER program/becoming aware of the Home EER program?
2. What percentage of customer purchased high efficiency furnaces (those with 92% AFUE ratings or above) since participating in the Home EER program/becoming aware of the Home EER program?
3. (For trade allies who reported an increase in high efficient furnace sales) On a scale from zero to five, where zero is not at all influential and five is highly influential, how influential was your participation in the Home EER program/becoming aware of the Home EER program on increasing the percentage of customers who purchased high efficiency furnaces?

Both “drop-out” trade allies (those who participated in GPY1 but did not participate in GPY2) and trade allies who never participated in the program were included in the survey effort. The “drop-out” trade allies were asked about their sales from before they participated in the program and their sales since they *last* participated in the program. The trade allies who had never participated were asked about their sales before they became aware of the Home EER program and their sales after they became aware of the program.

The difference between high efficiency furnace sales after participating in the program/becoming aware of the program and high efficiency furnace sales before participating in the program/becoming aware of the program was classified as potential spillover. The potential spillover was discounted based on the reported influence of the program on the high efficiency furnace sales. The trade allies were also asked the number of furnaces and boilers, regardless of efficiency, that they sold in the previous year. This was multiplied by the percentage of HE sales that were potential spillover, to give an estimate of the number of HE units each TA sold that were not part of the program. That number of units was then multiplied by 161.4 Therms to calculate the overall therm spillover savings

associated with each trade ally. The per unit savings of 161.4 therms was calculated based on an average program furnace efficiency of 95.49% AFUE.

The spillover therm savings for each trade ally was calculated using the following formula:

$$\begin{aligned} \text{Non - Part TA SO} &= (\% \text{ of HE Sales After Program Participation} \\ &\quad - \% \text{ of HE Sales Before Program Participation}) * \text{Program Influence Score} \\ &\quad * \text{Number of Total Furnaces and Boilers Sold} * 131.41 \text{ Therms} \end{aligned}$$

The program influence score was calculated by dividing the rated level of program influence (Question 3 above) by five, and was applied in increments of 20%.

The SO therm savings associated with the individual trade allies was then totaled, giving the spillover savings for the sample population. The sample population spillover was then scaled up to the entire non-participating trade ally population.

The following table presents the results of the drop-out and never-participated trade ally spillover calculations.

Table 7-8. Non-Participating Trade Ally Spillover

	Sample Population SO Savings (Therms)	N	PY2 Non- Participant Population	PY2 Non-Participant TA SO Savings (Therms)
Drop-Out Trade Allies	7,411.52	42	227	49,199
Never Participated Trade Allies	1,747.75	41*	1,164	60,943

Source: Navigant analysis.

* The never participated trade ally sample included 23 non-participating TAs who responded that they were unaware of the program.

After the population spillover savings were calculated, the spillover savings were divided by the program savings to achieve the program non-participating trade ally spillover rate. The non-participating trade ally population was calculated from a list of non-participating trade allies received from the implementation contractor. The list contained the contact information for 1,164 unique trade allies, and was used as a proxy for total non-participating trade ally population in Nicor Gas territory.

Table 7-9. Non-Participating Trade Ally Spillover

Non-Part TA SO Savings (Therms)	Program Savings	Non-Part TA SO Rate
110,142	2,545,849	0.04

Source: Navigant analysis.

It should be noted that 23 out of the 41 never participated trade allies who agreed to participate in the survey stated that they were unaware of the Home EER program. Based on this response rate, it appears that there are additional opportunities for Nicor Gas to increase its outreach efforts to these unaware non-participating trade allies. Increasing the number of contractors who are aware of the program will help increase participation and program savings.

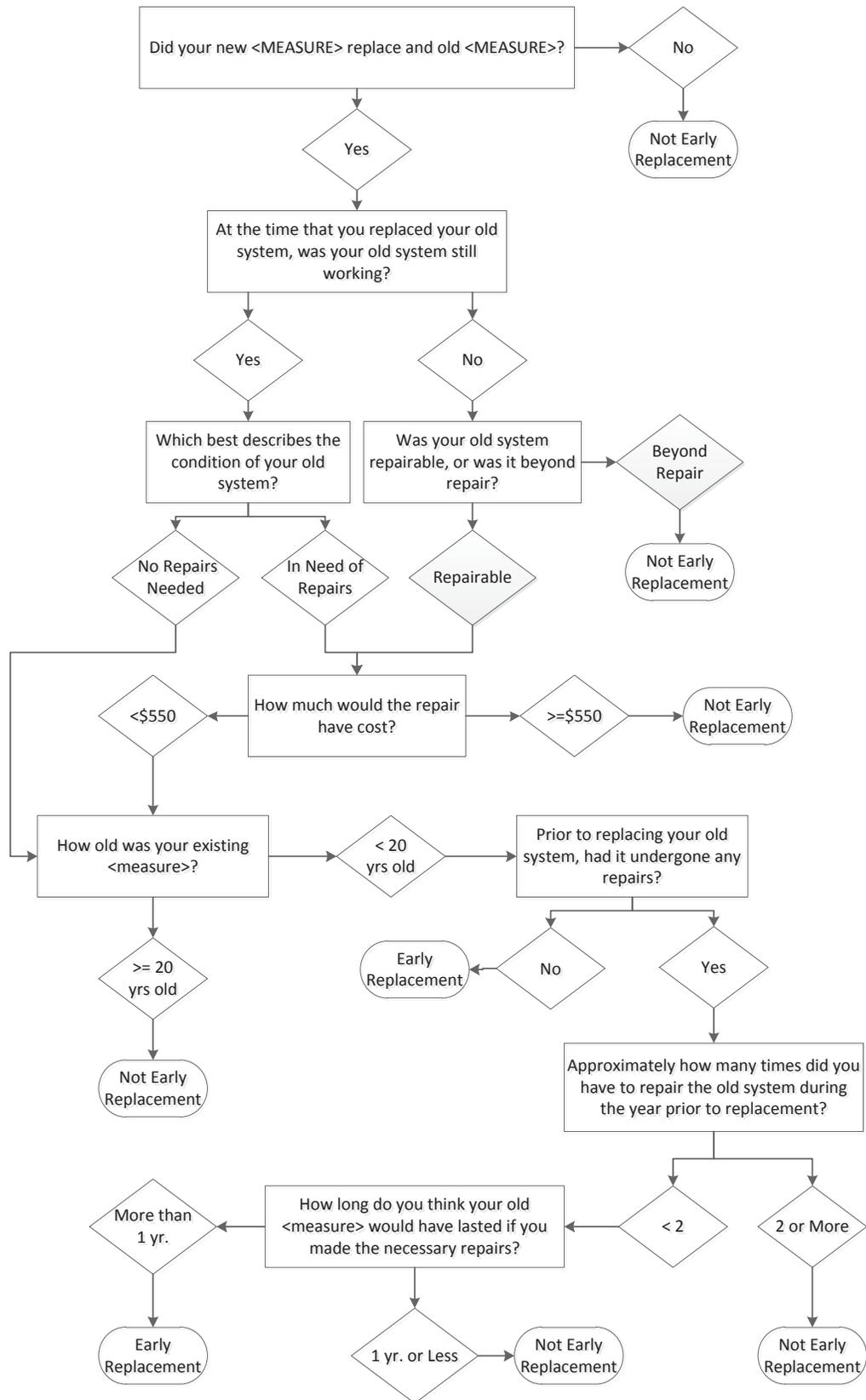
7.2.3 Early Replacement Analysis Methodology and Results

This section presents the results of the Home EER/Complete System Replacement early replacement analysis. Navigant sought to determine the number of Home EER/CSR participants for whom either the furnace, central air conditioning unit, or both units would be considered an “early replacement,” as opposed to a “standard replacement” or “replace or burnout”. The purpose of this analysis is to inform future changes to the Illinois Technical Resource Manual. Telephone interviews were conducted with seventy Home EER/CSR participants who replaced both their furnaces and central air conditioning units, and seventy Home EER participants who only replaced their furnaces.

In order to classify a replaced furnace or CAC unit, the CSR program participants were asked a series of questions about the condition of their furnaces and CAC units at the time they were replaced. The furnace participants were asked the same series of questions about the condition of their furnaces at the time they were replaced, and, if they have them, their CAC units at the time that the furnace was replaced.

The questions used to determine early replacement included questions about whether the units had undergone and repairs, the cost and number of any repairs, the age of the replaced equipment, and how long the equipment would have lasted had it not been replaced. A detailed presentation of the early replacement algorithm can be found in Figure 7-1.

Figure 7-1. CSR Early Replacement Algorithm



The seventy Home EER/CSR participants were selected randomly from the Home EER tracking database. These participants were grouped into two categories: those who initially contacted their contractor because of their furnace, and those who initially contacted their contractor because of their CAC unit. These classifications were based on self-report data from the telephone interview. Measure 1 and Measure 2 are assigned based on these categories.

Table 7-10. Home EER/CSR Participant Classification

	Measure 1	Measure 2	N
Initial Furnace Customer	Furnace	CAC	42
Initial CAC Customer	CAC	Furnace	28

Source: Navigant analysis.

The following table presents the results from the early replacement survey. As shown in the following table, there is an increase in the number of early replacement units between Measure 1 and Measure 2, from 14% to 43% for both furnaces and CAC units.

Table 7-11. Home EER/CSR Early Replacement Rates

	Measure 1 Early Replacement		Measure 2 Early Replacement	
Initial Furnace Customer	6	14%	17	40%
Initial CAC Customer	4	14%	13	46%
Total	10	14%	30	43%

Source: Navigant analysis.

Seventy Home EER furnace participants were also randomly selected from the program tracking database. The furnace participants were asked the same early replacement questions as the Home EER/CSR participants. Table 7-12 presents the results of the furnace only participant surveys. Fewer furnace only participants were classified as early replacement than CSR participants. One possible reason for the discrepancy was the high upfront cost of replacing both units. Program participants who are willing and able to pay to replace both the furnace and CAC unit are possibly more willing and able to replace their systems before it is absolutely necessary.

Table 7-12. Home EER Early Replacement Rates

	Furnace Early Replacement		n
Furnace Only Participants	5	7%	70

Source: Navigant analysis.

Navigant also calculated the early replacement rates based on the definition of early replacement found in the Illinois TRM. The Illinois TRM defines early replacement as “the removal of an existing functioning AFUE 75% or less furnace from service, prior to its natural end of life, and replacement with a new high efficiency unit.” The IL TRM defines “functioning” as fully operational unit or one

where the repair costs will not exceed \$528.¹³ Since it was not possible to determine the AFUE of the replaced units, it was assumed that they all were less than 75% AFUE. The following tables present the early replacement rate as calculated based on the TRM definition.

Table 7-13. Home EER/CSR Early Replacement Rates – TRM Calculations

	Measure 1 Early Replacement		Measure 2 Early Replacement	
	Count	Percentage	Count	Percentage
Initial Furnace Customer	15	36%	24	57%
Initial CAC Customer	8	29%	20	71%
Total	23	33%	44	63%

Source: Navigant analysis.

Table 7-14. Home EER Early Replacement Rates – TRM Calculation

	Furnace Early Replacement		n
	Count	Percentage	
Furnace Only Participants	11	16%	70

Source: Navigant analysis.

Navigant chose to include the additional components of previous repairs and expected useful life of the unit because the evaluation team feels that excluding units that were likely to be replaced within a year presents a more accurate number of units that are truly early replacement.

Navigant recommends that the Illinois TRM be changed to allow the *secondary* measure replaced by a CSR participant to be considered early replacement. Navigant proposes that the early replacement rate for the *secondary* measure be deemed at 40% for CAC units and 46% for furnaces. Additionally, Navigant recommends that 14% of the furnaces that are the *primary* unit of the HEER/CSR replacement be deemed as early replacement, and that 7% of units replaced by furnace-only participants be deemed as early replacement. These changes would allow for a more accurate estimate of gross savings, accounting for an early replacement baseline not currently considered.

7.3 Detailed Process Results

7.3.1 Non-Participating Trade Ally Survey Results

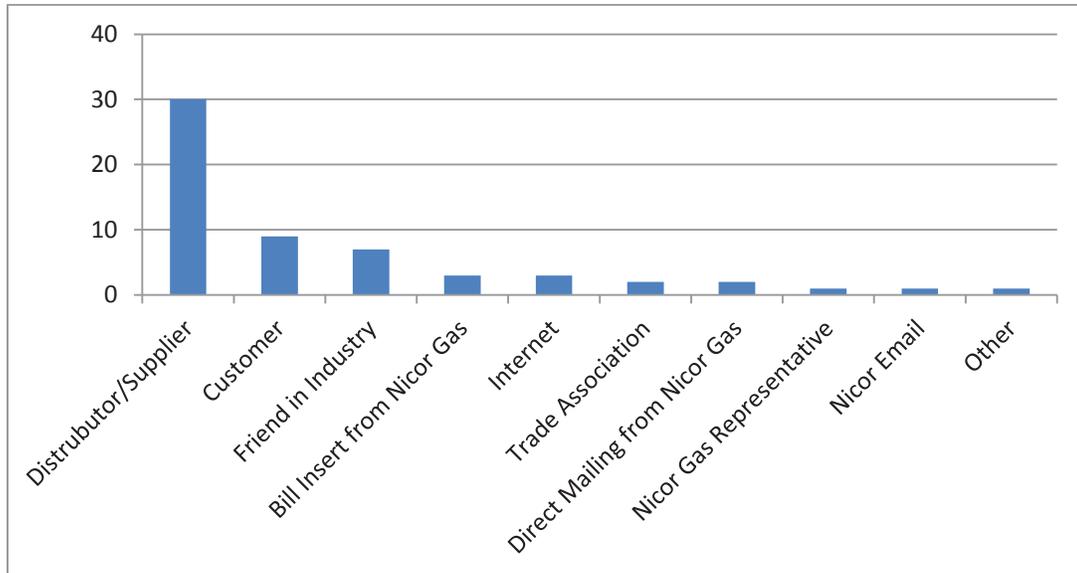
Contractor Outreach

The non-participating trade allies were asked how they were first made aware of the Nicor Gas Home EER program. Slightly more than half (51%) responded that they had been made aware of the program through their distributor or supplier. Fifteen percent of non-participating trade allies stated that they had been made aware of the program through a customer, and an additional twelve percent

¹³ IL-TRM_Policy_Document_10-31-12_Final.docx

stated that they had been made aware of the program through a friend in the HVAC/water heating industry.

Figure 7-2. Method by Which Contractor First Became Aware of Home EER Program (n = 59)



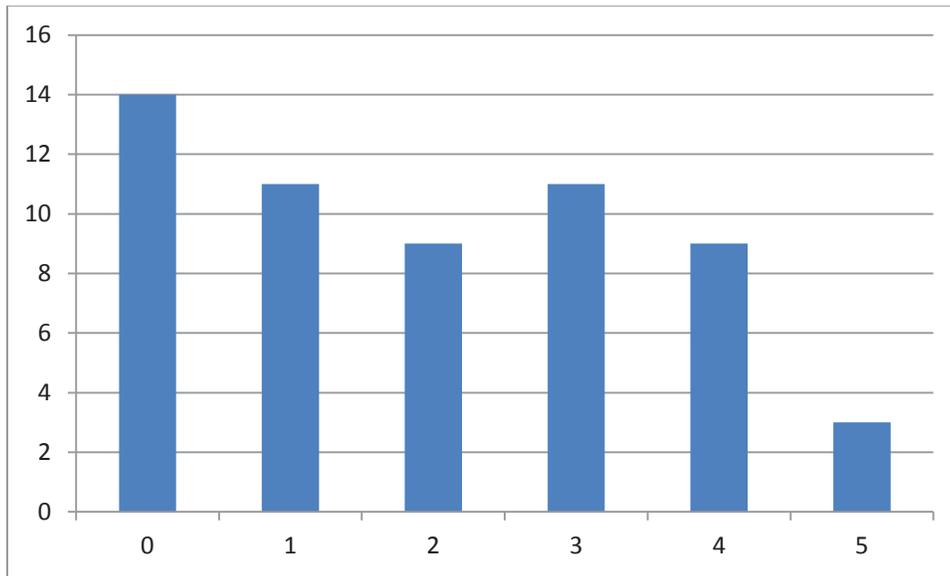
Source: Navigant analysis.

Slightly less than one-quarter (24%) of non-participating trade allies reported that they had received any Home EER promotional materials from Nicor Gas. When asked to describe the materials that they received, the trade allies cited promotional emails and printed brochures describing the program. Eighteen percent of non-participating trade allies reported attending a Nicor Gas training session, however, they were not able to provide specifics as to which type of training session it was. When asked if they had looked at the program website to find information, sixty percent of the non-participating trade allies replied that they had done so. When asked if they had been able to find the information they needed, they all replied in the affirmative.

Customer Awareness

The non-participating trade allies were asked to estimate what percentage of their customers were aware of the Nicor Gas Home EER program. The average reported percentage was 52%. Additionally, twenty-one non-participating trade allies reported that greater than 75% of their customers were aware of the program. However, when the non-participating trade allies were asked to rate their customers level of knowledge about the Home EER program, on a scale from zero to five, where zero is not at all knowledgeable and five is highly knowledgeable, the average rating given was a two. This indicated that while there may be a high level of awareness about the program, there is a lack of knowledge about the program among the customers of non-participating trade allies.

Figure 7-3. Perceived Level of Customer Home EER Knowledge (n = 57)



Source: Navigant analysis.

Price Matching

The non-participating trade allies were asked if they had ever lowered the price of a furnace to match the Home EER program rebate, without submitting an application for the rebate. Fifty (86%) of the non-participating trade allies reported that they had never done so. When the trade allies who reported that they had lowered their price to match the program rebate were asked why they did not submit a rebate for the measures, the most commonly reported reason was that they did not want to bother with the paper work and the program requirements. However, none of the trade allies indicated that price matching the rebates was something they did on a regular basis.

7.4 TRM Recommendations

The following research findings and recommendations may assist the Illinois TRM Technical Advisory Committee annual updating process:

Navigant recommends that the Illinois TRM be changed to allow the *secondary* measure replaced by a CSR participant to be considered early replacement. Navigant proposes that the early replacement rate for the *secondary* measure be deemed at 40% for CAC units and 46% for furnaces. Additionally, Navigant recommends that 14% of the furnaces that are the *primary* unit of the HEER/CSR replacement be deemed as early replacement, and that 7% of units replaced by furnace-only participants be deemed as early replacement.

7.5 Data Collection Instruments

7.5.1 Home EER/CSR Non-Participating Trade Ally Survey

INTRODUCTION AND SCREENING QUESTIONS

INTRO1 Hello, my name is _____, and I'm calling from an independent research firm on behalf of Nicor Gas. May I please speak with <CONTACT NAME>? This is not a sales call. [IF NECESSARY] We are currently conducting important research about sales of heating and cooling equipment in Nicor Gas territory. By participating in the short survey, you will help Nicor Gas understand area HVAC sales practices, which will help design better programs in the future. We will be reporting in aggregate form, and therefore your company-specific information will remain confidential.

1. CONTINUE WITH CONTACT ONCE THEY ARE ON THE PHONE
2. CONTACT NOT AVAILABLE [SCHEDULE CALLBACK]
3. NOT A GOOD TIME TO CONDUCT SURVEY [SCHEDULE CALLBACK]

[ASK IF <PART DATE> IS NOT NULL]

SCR1 We are contacting you because your company participated in the Nicor Gas Home Energy Efficiency Rebate Program in <PART DATE>, but have not participated since. Does this sound correct?

1. YES [SKIP TO FurnSO1] [CONTACT TYPE = PART]
2. NO [ASK SCR2]
888. Don't Know [ASK SCR2]
999. Refused [ASK SCR2]

[ASK IF <PART DATE> IS NULL or SCR1 = 2, 888, or 999]

SCR2 Are you familiar with Nicor Gas' Home Energy Efficiency Rebate Program, where your customers can receive financial incentives for purchasing high efficiency HVAC and water heating equipment?

1. YES [ASK SCR2a]
2. NO [SKIP TO INFO]
888. Don't Know [SKIP TO INFO]
999. Refused [SKIP TO INFO]

For the sake of brevity, from now on I'm going to refer to the Home Energy Efficiency Rebate Program as the "HEER Program" or simply "the Program".

[ASK IF SCR2 = 1]

SCR2a Did you participate in the HEER Program?

1. YES [ASK SCR1b] [CONTACT TYPE = PART]
2. NO [SKIP TO AW1] [CONTACT TYPE = NONPART]
889. Don't Know [SKIP TO AW1] [CONTACT TYPE = NONPART]
999. Refused [SKIP TO AW1] [CONTACT TYPE = NONPART]

SCR2b When did you last participate in the Program?

- RECORD DATE (e.g., approximate date is acceptable = July of 2012)
890. Don't Know

999. Refused

[ASK IF SCR2 = 2, 888, or 999]

INFO1 Would you like to receive information about the HEER Program or be contacted by a Nicor Gas representative to hear more about the benefits of the program?

- 1. YES – RECEIVE INFO [THANK AND TERMINATE]
- 2. YES – CONTACT [THANK AND TERMINATE]
- 3. YES – RECEIVE INFO AND CONTACT [THANK AND TERMINATE]
- 4. NO [THANK AND TERMINATE]
- 888. Don't Know
- 999. Refused

AWARENESS

AW1 How did you first learn about the Program as a contractor? [DO NOT READ]

- 1. Trade association [IF YES, RECORD WHICH]
- 2. Customer
- 3. Friend in the furnace/boiler/water heater industry
- 4. Radio
- 5. TV
- 6. Other news media
- 7. Bill insert from Nicor Gas
- 8. Direct mailing to me from Nicor Gas
- 9. Nicor Representative
- 10. RSG Representative
- 11. Other Utility
- 777. Other RECORD VERBATIM
- 888. Don't Know
- 999. Refused

AW2 When did you first learn about the Program?

RECORD APPROXIMATE DATE

- 888. Don't Know
- 999. Refused

AW3 On a scale from zero to five, where zero is not at all knowledgeable and five is highly knowledgeable, how knowledgeable are you about the Program?

RECORD RATING

- 888. Don't Know
- 999. Refused

AW4 Have you received any promotional materials from Nicor Gas regarding the program?

- 1. Yes [ASK AW4a]
- 2. No
- 888. Don't Know
- 999. Refused

AW4a Can you please describe the promotional materials that you received?

RECORD VERBATIM

888. Don't Know

999. Refused

AW5 Have you attended any Nicor Gas training sessions, such as a Nicor Gas PEEZA session with Program representatives?

1. Yes [ASK AW5a]

2. No

888. Don't Know

999. Refused

AW5a Can you please describe the training sessions that you attended?

RECORD VERBATIM

888. Don't Know

999. Refused

AW6 Have you looked at the program website to find information?

1. Yes [ASK AW6a]

2. No

888. Don't Know

999. Refused

AW6a Did you find the information that you needed?

1. Yes

2. No

888. Don't Know

999. Refused

CSR1 Are you familiar with the Complete System Replacement, or CSR, aspect of the HEER program? [IF NECESSARY] The CSR Program is a joint program run with ComEd, where your customers can receive an additional rebate for replacing their central air conditioning unit at the same time as their furnace.

1. Yes [ASK CSR2]

2. No [SKIP TO FURNSO1]

888. Don't Know [SKIP TO FURNSO1]

999. Refused [SKIP TO FURNSO1]

CSR2 Using the same 0 to 5 scale, where zero is not at all familiar and 5 is very familiar, how familiar are you with the CSR program?

RECORD RATING

888. Don't Know

999. Refused

CSR3 Did you participate in the CSR Program?

1. YES [ASK CSR3a] [CSR CONTACT TYPE = PART]

2. NO [SKIP TO AW7] [CSR CONTACT TYPE = NONPART]

888. Don't Know [SKIP TO AW7] [CSR CONTACT TYPE = NONPART]

999. Refused [SKIP TO AW7] [CSR CONTACT TYPE = NONPART]

[IF CSR3a = 1]

CSR3a When did you last participant in the Program?

RECORD DATE

888. Don't Know

999. Refused

DROP OUT PARTICIPANT SPILLOVER

[ASK FurnSO1 – FurnQuanPart_A IF CONTACT TYPE = PART]

I'm going to ask you a few questions about your HVAC sales in Nicor Gas territory. Please answer ONLY for sales in Nicor Gas territory.

Furnaces

FurnSO1 Before you participated in the Program, of all the furnaces you sold, what percentage of your customers purchased high efficiency furnaces, meaning those with 92% AFUE ratings or above? [PROBE FOR PERCENTAGE]

RECORD PERCENTAGE

888. Don't Know

999. Refused

FurnSO2 Since participating in the Program, has the percentage of your customers who purchase high efficiency furnaces (those with 92% AFUE ratings or above) increased, decreased, or remained the same? I'm asking specifically about the time period after you *last* participated in the program.

1. INCREASED FREQUENCY

2. DECREASED FREQUENCY

3. REMAINED THE SAME [SKIP TO FurnQuanPart]

888. Don't Know

999. Refused

FurnSO3 Since you last participated in the Program, of all the furnaces you sold, what percentage of your customers purchased high efficiency furnaces (those with 92% AFUE ratings or above)? [IF NECESSARY] Remember, I'm asking specifically about the time period after you *last* participated in the program. [PROBE FOR PERCENTAGE]

RECORD PERCENTAGE

888. Don't Know

999. Refused

PERCENT EFFIC = FurnSO3 or FurnSO1 if FurnSO2 = 3

CONSISTENCY CHECK:

[ASK IF FurnSO2 = 1 AND FurnSO3 < FurnSO1] or [ASK IF FurnSO2 = 2 AND FurnSO3 > FurnSO1]

FurnConCh I noticed that you stated that your high efficiency furnace sales have been higher/lower since your participation in the program, but the percentage of sales that you gave was lower/higher after your participation in the program. These responses seem to contradict each other; can you help me understand this? [REPEAT QUESTIONS FurnSO1 – FurnSO3 AS NECCESARY]

[ASK IF FurnSO2 = 1]

FurnSO4 On a scale from zero to five, where zero is not at all influential and five is very influential, how influential was your participation in the Program on increasing the percentage of your customer who purchased high efficiency furnaces (those with 92% AFUE ratings or above)?

[PROBE FOR RATING]

RECORD RATING

- 888. Don't Know
- 999. Refused

[ASK ALL PARTS]

FurnQuanPart About how many furnaces, regardless of efficiency, did you sell in the past year? [IF NECESSARY] All answers given will remain confidential.

RECORD QUANTITY

- 888. Don't Know
- 999. Refused

[PROBE FOR QUANTITY IF NECESSARY]

FurnQuanPart_A Was it...

- 1. Fewer than 10
- 2. Between 10 and 25
- 3. Between 25 and 50
- 4. Between 50 and 100
- 5. Between 100 and 250
- 6. More than 250
- 888. Don't Know
- 999. Refused

[ASK CACSO1 – CACQuanPart_A IF CAC CONTACT TYPE = PART]

CACs

CACSO1 Before you participated in the CSR program, what percentage of your customer purchased high efficiency central air conditioning units, meaning those with 14.5 SEER ratings or above? [PROBE FOR PERCENTAGE]

RECORD PERCENTAGE

- 888. Don't Know
- 999. Refused

CACSO2 Since your participation in the CSR program, has the percentage of your customer who purchase high efficiency CAC units (those with 14.5 SEER ratings or above) increased, decreased, or remained the same? I'm asking specifically about the time since you *last* participated in the program.

1. INCREASED FREQUENCY
2. DECREASED FREQUENCY
3. REMAINED THE SAME [SKIP TO CACQuanPart]
888. Don't Know
999. Refused

CACSO3 Since you last participated in the CSR program, what percentage of your customers purchased high efficiency CAC units (those with 14.5 SEER ratings or above)? [IF NECESSARY] Remember, I'm asking specifically about the time since you *last* participated in the program. [PROBE FOR PERCENTAGE]

RECORD PERCENTAGE

888. Don't Know
999. Refused

CONSISTENCY CHECK:

[ASK IF CACSO2 = 1 AND CACSO3 < CACSO1] or [ASK IF CACSO2 = 2 AND CACSO3 > CACSO1]
 CACConCh I noticed that you stated that your high efficiency CAC sales have been higher/lower since your participation in the program, but the percentage of sales that you gave was lower/higher after your participation in the program. These responses seem to contradict each other; can you help me understand this? [REPEAT QUESTIONS CACSO1 –CACSO3 AS NECESSARY]

[ASK IF CACSO2 = 1]

CACSO4 On a scale from zero to five, where zero is not at all influential and five is very influential, how influential was your participation in the CSR program on increasing the percentage of your customer who purchased high efficiency furnaces (those with 14.5 SEER ratings or above)?

RECORD RATING

888. Don't Know
999. Refused

[ASK ALL CSR PARTS]

CACQuanPart About how many total CAC units did you sell in the past year? I'm asking about all CAC units, not just high efficiency ones. [IF NECESSARY] All answers given will remain confidential.

RECORD QUANTITY

888. Don't Know
999. Refused

[PROBE FOR QUANTITY IF NECESSARY]

CACQuanPart_A Was it...

1. Fewer than 10
2. Between 10 and 25
3. Between 25 and 50
4. Between 50 and 100
5. Between 100 and 250
6. More than 250
888. Don't Know

999. Refused

AWARE NON-PARTICIPANT SPILLOVER

[ASK FurnSO5 – FurnQuanNP_A IF CONTACT TYPE = NONPART]

Furnaces

FurnSO5 Before you learned about the Program, of all the furnaces you sold, what percentage of your customers purchased high efficiency furnaces, those with 92% AFUE ratings or above? [PROBE FOR PERCENTAGE]

RECORD PERCENTAGE

- 888. Don't Know
- 999. Refused

FurnSO6 Since you've learned about the Program, has the percentage of your customers who purchase high efficiency furnaces (those with 92% AFUE ratings or above) increased, decreased, or remained the same?

- 1. INCREASED FREQUENCY
- 2. DECREASED FREQUENCY
- 3. REMAINED THE SAME [SKIP TO FurnQuanNP]

- 888. Don't Know
- 999. Refused

FurnSO7 Since you've learned about the Program, of all the furnaces you sold, what percentage of your customers purchased high efficiency furnaces (those with 92% AFUE ratings or above)? [PROBE FOR PERCENTAGE]

RECORD PERCENTAGE

- 888. Don't Know
- 999. Refused

PERCENT EFFIC = FurnSO7 or FurnSO5 if FurnSO6 = 3

CONSISTENCY CHECK:

[ASK IF FurnSO6 = 1 AND FurnSO7 < FurnSO6] or [ASK IF FurnSO6 = 2 AND FurnSO7 > FurnSO6]

FurnConCh I noticed that you stated that your high efficiency furnace sales have been higher/lower since you learned about the program, but the percentage of sales that you gave was lower/higher after you learned about the program. These responses seem to contradict each other; can you help me understand this? [REPEAT QUESTIONS FurnSO5 – FurnSO7 AS NECCESARY]

[ASK IF FurnSO6 = 1]

FurnSO8 On a scale from zero to five, where zero is not at all influential and five is very influential, how influential was learning about the Program on increasing the percentage of your customers who purchased high efficiency furnaces (those with 92% AFUE ratings or above)? [PROBE FOR RATING]

RECORD RATING

- 888. Don't Know

999. Refused

FurnQuanNP About how many furnaces, regardless of efficiency, did you sell in the past year? [\[IF NECESSARY\]](#) All answers given will remain confidential.

RECORD QUANTITY

888. Don't Know

999. Refused

[\[PROBE FOR QUANTITY IF NECESSARY\]](#)

FurnQuanNP_A Was it...

1. Fewer than 10

2. Between 10 and 25

3. Between 25 and 50

4. Between 50 and 100

5. Between 100 and 250

6. More than 250

888. Don't Know

999. Refused

[\[ASK CACSO5 – CACQuanNP_A IF CSR CONTACT TYPE = NONPART\]](#)

CAC

CACSO5 Before you learned about the CSR program, what percentage of your customer purchased high efficiency CAC units, meaning those with 14.5 SEER ratings or above? [\[PROBE FOR PERCENTAGE\]](#)

RECORD PERCENTAGE

888. Don't Know

999. Refused

CACSO6 Since you've learned about the CSR program, has the percentage of your customer who purchased high efficiency CAC units (those with 14.5 SEER ratings or above) increased, decreased, or remained the same?

1. INCREASED FREQUENCY

2. DECREASED FREQUENCY

3. REMAINED THE SAME [\[SKIP TO CACQuanNP\]](#)

888. Don't Know

999. Refused

CACSO7 Since you've learned about the CSR program, what percentage of your customers purchased high efficiency CAC units (those with 14.5 SEER ratings or above)? [\[PROBE FOR PERCENTAGE\]](#)

RECORD PERCENTAGE

888. Don't Know

999. Refused

CONSISTENCY CHECK:

[ASK IF CACSO6 = 1 AND CACSO7 < CACSO6] or [ASK IF CACSO6 = 2 AND CACSO7 > CACSO6]

CACConCh I noticed that you stated that your high efficiency CAC sales have been higher/lower since you learned about the program, but the percentage of sales that you gave was lower/higher after you learned about the program. These responses seem to contradict each other; can you help me understand this? [REPEAT QUESTIONS CACSO5 – CACSO7 AS NECESSARY]

[ASK IF CACSO6 = 1]

CACSO8 On a scale from zero to five, where zero is not at all influential and five is very influential, how influential was learning about the CSR program on increasing the percentage of your customer who purchased high efficiency CAC units (those with 14.5 SEER ratings or above)?

RECORD RATING

- 888. Don't Know
- 999. Refused

CACQuanNP About how many CAC units did you sell in the past year? I'm asking about all CAC units, not just high efficiency ones. [IF NECESSARY] All answers given will remain confidential.

RECORD QUANTITY

- 888. Don't Know
- 999. Refused

[PROBE FOR QUANTITY IF NECESSARY]

CACQuanNP_A Was it...

- 1. Fewer than 10
- 2. Between 10 and 25
- 3. Between 25 and 50
- 4. Between 50 and 100
- 5. Between 100 and 250
- 6. More than 250
- 888. Don't Know
- 999. Refused

PRICE MATCHING

PM1 In your best estimate, approximately what percentage of your customers are aware of the Nicor Gas HEER program?

RECORD PERCENTAGE

- 888. Don't Know
- 999. Refused

PM2 Using a zero to five scale, where zero is not at all knowledgeable and five is highly knowledgeable, how knowledgeable are you customers about the HEER program?

RECORD RATING

- 888. Don't Know
- 999. Refused

PM3 Have you ever had to lower your sales price on a furnace to match the program rebate, without submitting a program application for a rebate?

1. Yes [ASK PM4]
2. No
888. Don't Know
999. Refused

PM4 Why did you not submit a rebate for these units?

- RECORD VERBATIM
888. Don't Know
 999. Refused

[ASK PM5 – PM8 IF CSR CONTACT TYPE = PART OR NONPART]

PM5 In your best estimate, approximately what percentage of your customers are aware of the CSR program?

- RECORD PERCENTAGE
888. Don't Know
 999. Refused

PM6 Using a zero to five scale, where zero is not at all knowledgeable and five is highly knowledgeable, how knowledgeable are your customers about the CSR program?

- RECORD RATING
888. Don't Know
 999. Refused

PM7 Have you ever had to lower your sales price on a CAC unit to match the program rebate, without submitting a program application for a rebate?

1. Yes [ASK PM8]
2. No
888. Don't Know
999. Refused

PM8 Why did you not submit a rebate for these units?

- RECORD VERBATIM
888. Don't Know
 999. Refused

PROCESS SECTION

Barriers to participation

B1 Earlier you stated that approximately <PERCENT EFFIC> percent of your sales since you <participated in/learned about> the program were for energy efficiency furnaces, but you did not submit rebates for these units. Can you explain why you chose not to? [DO NOT READ, ACCEPT UP TO 3]

1. Customers not interested
2. Paper work was too burdensome
3. Did not have enough information about the program
4. Insufficient financial incentive
5. Personal dissatisfaction with prior HEER program participation

- 6. Personal dissatisfaction with prior Nicor Gas program participation
- 7. Personal dissatisfaction with other utility program participation
- 8. Customer dissatisfaction with prior HEER program participation
- 9. Customer dissatisfaction with prior Nicor Gas program participation
- 10. Customer dissatisfaction with prior other utility program participation

777. OTHER – RECORD VERBATIM

888. Don't Know

999. Refused

[IF B1 = 1]

B1a Do you know why your customers were not interested in participating?

RECORD VERBATIM

888. Don't Know

999. Refused

[IF B1 = 5, 6, 7 ASK B1b and B1c]

B1b Do you remember what program it was?

RECORD VERBATIM

888. Don't Know

999. Refused

B1c Can you describe how you were dissatisfied with your experience?

RECORD VERBATIM

888. Don't Know

999. Refused

[IF B1 = 8, 9, 10 ASK B1d and B1e]

B1d Did your customer mention what program it was?

RECORD VERBATIM

888. Don't Know

999. Refused

B1e Do you know why your customer was dissatisfied with their experience?

RECORD VERBATIM

888. Don't Know

999. Refused

B2 Do you have any recommendations for changes that can be made to the program to increase participation by contractors like yourself?

RECORD VERBATIM

888. Don't Know

999. Refused

B3 If the HEER program were to offer a rebate directly to you, the trade ally, to subsidize the sale of a high efficiency furnace, would you be more likely to participate in the program, less likely to participate in the program, or neither more or less likely to participate?

1. More Likely

2. Less Likely

3. Neither

- 888. Don't Know
- 999. Refused

B4 If the HEER program were to offer a rebate directly to its trade allies to subsidize the sale of high efficiency furnaces, what affect would this have on the price that your customers pay for a high efficiency unit? Would you

1. Lower the price of HE furnaces across the board for all customers by the full amount of the incentive
2. Use the incentive money to decrease the cost of HE furnaces only as necessary to sell more units
3. Sell the all HE furnaces at the same price and retain the incentive money

- 888. Don't Know
- 999. Refused

INSTALLATION PRACTICES/EARLY REPLACEMENT SECTION

Now I'd like to ask you a few questions about your general installation practices.

D1 When you install HVAC equipment, about what percent of the time do you typically...
[\[READ EACH AND RECORD % FOR EACH, 777 FOR DO NOT SELL CAC UNITS, 888 FOR DON'T KNOW AND 999 FOR REFUSED\]](#)

- A Perform a load calculation to determine proper equipment sizing?
- B Measure for and adjust the airflow level?
- C Charge the refrigerant to the manufacturer's recommended sub-cooling value?
- D Check the quality of the duct sealing of associated ducts?
- E Perform duct sealing as part of the HVAC installation?

D2 About how often do you recommend replacing both heating and cooling equipment when a customer decides to replace one or the other? Would you say always, most of the time, sometimes, or never?

1. Always
2. Most of the time
3. Sometimes
4. Never [\[SKIP TO INFO\]](#)

- 888. Don't know
- 999. Refused

D3 What are the main reasons you would recommend replacing both units at the same time? [\[DO NOT READ, UP TO 3 MULTIPLE RESPONSES ALLOWED\]](#)

1. Sell more units
2. More cost effective for the customer
3. To ensure system compatibility
4. The other unit is close to failing
5. Units are a similar age
6. To convert them to a type of unit we sell and maintain

777.Other [\[SPECIFY\]](#)

- 888. Don't know
- 999. Refused

D4 About what percentage of the time do your customers follow through on this recommendation?

RECORD PERCENTAGE

- 888. Don't Know
- 999. Refused

D5 In your opinion, what is the primary reason customers do not follow through on the recommendation to replace both units at the same time? [\[DO NOT READ LIST; RECORD ONE ANSWER\]](#)

- 1. Do not wish to pay the upfront costs
- 2. Cannot afford to incur upfront costs at this time
- 3. Believe the other unit is in good enough shape/will last longer
- 4. Moving soon
- 777. Other [\[SPECIFY\]](#)
- 888. Don't Know
- 999. Refused

[\[ASK ALL\]](#)

INFO Would you like to receive additional information about the Program or be contacted by a Nicor Gas representative to hear more about the benefits of the program?

- 1. YES – RECEIVE INFO
- 2. YES – CONTACT
- 3. YES – RECEIVE INFO AND CONTACT
- 4. NO
- 888. Don't Know
- 999. Refused

[\[INSERT STANDARD THANK YOU AND SIGN OFF\]](#)

7.5.2 Early Replacement Participant Survey

INTRODUCTION AND SCREENING QUESTIONS

INTRO1 Hello, my name is _____, and I'm calling on behalf of Nicor Gas to ask your help in evaluating the energy efficiency program that gave you a rebate on equipment you had installed in your home in <PARTIC_DATE>. Let me assure you that this is not a sales call.

May I speak with <CUST NAME>?

- 4. CONTINUE WITH CUSTOMER ONCE THEY ARE ON THE PHONE
- 5. CUSTOMER NOT AVAILABLE [SCHEDULE CALLBACK]
- 6. NOT A GOOD TIME TO CONDUCT SURVEY [SCHEDULE CALLBACK]

INTRO2 Nicor Gas has hired us to evaluate their energy efficiency programs, and we'd like to talk briefly with you because records in Nicor Gas' files show that you took part in their Home Energy Efficiency Rebate program this past year and installed a high efficiency furnace and redeemed a program rebate.

SCR1 Do you live at <SERVICE_ADDRESS>?

- 3. Yes [SKIPTO SCR2]
- 4. No
- 5. Not now, but did live there
- 889. Don't Know [THANK AND TERMINATE]
- 999. Refused [THANK AND TERMINATE]

SCR2 The **Home Energy Efficiency Rebate** Program gives a cash rebate for Nicor Gas customers buying a high-efficiency furnace. The check may have been paid directly to the equipment contractor, in which case you should have been seen a credit reducing the cost of equipment on the contractor's bill. Do you remember the program?

- 1. Yes [SKIPTO EQT1]
- 2. No, I don't recall having any equipment installed in the past year (since June 2012) [SKIPTO SCR2A]
- 3. Yes, I had equipment installed but I don't recall hearing about a Nicor Gas rebate. [SKIPTO EQT1]
- 888. Don't Know
- 999. Refused

SCR2a Is there someone in the household at <SERVICE_ADDRESS> who might recall the program and could talk about your household's experience with the Home Energy Efficiency Rebate program?

- 1. Yes [ASK TO SPEAK WITH PERSON WHO RECALLS PROGRAM & CONTINUE WITH THAT PERSON; take call-back info] [SKIPTO INTRO2]
- 2. No, I'm sure your records are in error. [THANK AND TERMINATE]
- 888. Don't Know
- 999. Refused

The following questions refer to the Home Energy Efficiency Rebate Program, which may be referred to as "the Program" or the "HEER Program" throughout the survey for the sake of brevity.

[ASK IF PARTTYPE = FURN]

SCR3 Our records indicate that you purchased and received a rebate for a high efficiency furnace from the HEER program. Does this sound correct?

- 1. Yes [SKIPTO C1]
- 2. No [ASK SCR3a]
- 888. Don't Know [THANK AND TERMINATE]
- 999. Refused [THANK AND TERMINATE]

SCR3a Do you recall what equipment you purchased through the program?

- 1. Boiler
- 2. Water Heater
- 3. Central Air Conditioner [ASK SCR3b]
- 888. Don't Know [THANK AND TERMINATE]
- 999. Refused [THANK AND TERMINATE]

SCR3b You stated that you received a rebate for a central air conditioning unit, which would have been part of a packaged rebate along with a high efficiency furnace. Does this sound familiar?

- 1. Yes [SKIPTO A1] [PARTTYPE = CSR]
- 2. No [THANK AND TERMINATE]
- 888. Don't Know [THANK AND TERMINATE]
- 999. Refused [THANK AND TERMINATE]

[ASK IF PARTTYPE = CSR]

SCR4 Our records indicate that you purchased and received a rebate for a high efficiency furnace and a high efficiency central air conditioning unit through the complete system replacement portion of the HEER program. Does this sound correct?

- 1. Yes [SKIPTO A0]
- 2. No [ASK SCR4a]
- 888. Don't Know [THANK AND TERMINATE]
- 999. Refused [THANK AND TERMINATE]

SCR4a Did you recall what equipment you purchased through the program?

- 1. Furnace Only [ASK SCR4b]
- 2. Boiler [THANK AND TERMINATE]
- 3. Water Heater [THANK AND TERMINATE]
- 4. Central Air Conditioner Only [ASK SCR4c]
- 888. Don't Know [THANK AND TERMINATE]
- 999. Refused [THANK AND TERMINATE]

SCR4b You stated that you received a rebate for a furnace only, and did not purchase or receive a rebate for a central air conditioning unit. Is this correct?

- 1. Yes [SKIPTO C1] [PARTTYPE = Furn]
- 2. No [THANK AND TERMINATE]
- 888. Don't Know [THANK AND TERMINATE]
- 999. Refused [THANK AND TERMINATE]

SCR4c You stated that you received a rebate for a central air conditioning unit, which would have been part of a packaged rebate along with a high efficiency furnace. Does this sound familiar?

1. Yes [SKIPTO A0] [PARTTYPE = CSR]
2. No [THANK AND TERMINATE]
888. Don't Know [THANK AND TERMINATE]
999. Refused [THANK AND TERMINATE]

CSR PARTICIPANTS

[ASK IF A0 – B8 IF PARTTYPE = CSR]

A0 Thinking back to when you first decided to contact a contractor, what was the main reason you decided to call a contractor? [DO NOT READ – ACCEPT ONLY ONE RESPONSE]

1. Furnace broke down [MEASURE 1 = FURNACE]
2. Furnace appeared to be at end of useful life [MEASURE 1 = FURNACE]
3. Furnace was not working optimally [MEASURE 1 = FURNACE]
4. Needed new furnace [MEASURE 1 = FURNACE]
5. CAC unit broke down [MEASURE 1 = air conditioning system (AC)]
6. CAC unit appeared to be at end of useful life [MEASURE 1 = air conditioning system (AC)]
7. CAC unit was not working optimally [MEASURE 1 = air conditioning system (AC)]
8. Needed new CAC [MEASURE 1 = air conditioning system (AC)]
9. Something else broke down, not the furnace or CAC unit [ASK A0a]
10. Learned there were rebates or discounts available for a limited time [ASK A0a]
11. Decided to replace furnace to save energy/money [MEASURE 1 = FURNACE]
12. Decided to replace CAC to save energy/money [MEASURE 1 = air conditioning system (AC)]
777. Other [PROBE FOR AC OR FURNACE, ASSIGN MEASURE 1]
888. Don't Know
999. Refused

[ASK IF A0 = 9 or 10]

A0a When you were deciding to replace your furnace and air conditioning system, did you first decide to replace your furnace or your air conditioning system?

1. Furnace [MEASURE 1 = FURNACE]
2. Air Conditioning system [MEASURE 1 = air conditioning system (AC)]
3. Both at same time [MEASURE 1 = FURNACE]
888. Don't know
999. Refused

[IF MEASURE 1 = FURNACE, MEASURE 2 = air conditioning system (AC)]

[IF MEASURE 1 = air conditioning system (AC), MEASURE 2 = FURNACE]

A1 Did your new <MEASURE 1> replace an old <MEASURE 1>?

1. Yes
2. No [SKIP TO B1]
888. Don't Know

999. Refused

[ASK A2 and A3 IF A0 IS NOT 1 or 4]

A2 At the time you replaced your old system with a new <MEASURE 1>, was your old <MEASURE 1> still working?

- 1. Yes
- 2. No [SKIP TO A4]
- 888. Don't Know
- 999. Refused

A3 Which of the following best describes the condition of your old <MEASURE 1>?

- 1. The old system was working with no need of repair
- 2. The old system was working but needed repair
- 888. Don't Know
- 999. Refused

[ASK IF A0 = 1 or 4 or IF A2 = 2]

A4 Was your old <MEASURE 1> repairable, or was it beyond repair?

- 1. Repairable
- 2. Beyond Repair
- 888. Don't Know
- 999. Refused

[ASK IF A4 = 1 or IF A3 = 2]

A5 Do you remember how much the repair would have cost? Was it...

- 1. Less than \$550
- 2. More than \$550
- 888. Don't Know
- 999. Refused

A6 How old was your existing <MEASURE 1>? [IF NEEDED] In years.

NUMERIC OPEN END

- 888. Don't know
- 999. Refused

[ASK IF A6 = 888, 999]

A6a. What would you estimate the approximate age of your old <MEASURE 1> to be?

- 1. Less than 2 years
- 2. 2 to (less than) 5 years
- 3. 5 to (less than) 10 years
- 4. 10 to (less than) 15 years
- 5. 15 to (less than) 20 years
- 6. 20 or more years
- 888. Don't know
- 999. Refused

A7 Prior to replacing your old <MEASURE 1>, had it undergone any repairs?

- 1. Yes
- 2. No
- 888. Don't know
- 999. Refused

[ASK IF A7 = 1]

A7a Approximately how many times did you have to repair the old <MEASURE 1> during the year prior to replacement?

NUMERIC OPEN END

- 888. (Don't know)
- 999. (Refused)

A8 How long do you think your old <MEASURE 1> would have lasted if you had made the necessary repairs? Would you say..?

- 1. 1 year or less
- 2. 2 or 3 years
- 3. 4 or 5 years
- 4. or more than five years
- 888. Don't know
- 999. Refused

Now I have a few questions about the other equipment that you replaced as part of the CSR program, the <MEASURE 2>.

B1 Did your new <MEASURE 2> replace an old <MEASURE 2>?

- 1. Yes
- 2. No [\[SKIP TO Q1\]](#)
- 888. Don't Know
- 999. Refused

B2 At the time you replaced your old system with a new <MEASURE 2>, was your old <MEASURE 2> still working?

- 1. Yes
- 2. No [\[SKIP TO B4\]](#)
- 888. Don't Know
- 999. Refused

B3 Which of the following best describes the condition of you old <MEASURE 2>?

- 1. The old system was working with no need of repair
- 2. The old system was working but needed repair
- 888. Don't Know
- 999. Refused

[\[ASK IF B2 = 2\]](#)

B4 Was your old <MEASURE 2> repairable, or was it beyond repair?

- 1. Repairable
- 2. Beyond Repair

- 888. Don't Know
- 999. Refused

[ASK IF B4 = 1 or IF B3 = 2]

B5 Do you remember about how much the repair would have cost? Was it...

- 1. Less than \$550
- 2. More than \$550
- 888. Don't Know
- 999. Refused

B6 How old was your existing <MEASURE 2>? [IF NEEDED] In years.

NUMERIC OPEN END

- 888. Don't know
- 999. Refused

[ASK IF B6 = 888, 999]

B6a. What would you estimate the approximate age of your old <MEASURE 2> to be?

- 1. Less than 2 years
- 2. 2 to (less than) 5 years
- 3. 5 to (less than) 10 years
- 4. 10 to (less than) 15 years
- 5. 15 to (less than) 20 years
- 6. 20 or more years
- 888. Don't know
- 999. Refused

B7 Prior to replacing your old <MEASURE 2>, had it undergone any repairs?

- 1. Yes
- 2. No
- 888. Don't know
- 999. Refused

[ASK IF B7 = 1]

B7a Approximately how many times did you have to repair the old <MEASURE 2> during the year prior to replacement?

NUMERIC OPEN END

- 888. (Don't know)
- 999. (Refused)

B8 How long do you think your old <MEASURE 2> would have lasted if you had made the necessary repairs? Would you say..?

- 1. 1 year or less
- 2. 2 or 3 years
- 3. 4 or 5 years
- 4. or more than five years
- 888. Don't know
- 999. Refused

FURNACE ONLY PARTICIPANTS

[ASK IF C1 – D8 IF PARTTYPE = FURN]

C1 Did your new furnace replace an old furnace?

1. Yes
2. No [SKIP TO D1]
888. Don't Know
999. Refused

C2 At the time you replaced your old system with a new furnace, was your old furnace still working?

1. Yes
2. No [SKIP TO C4]
888. Don't Know
999. Refused

C3 Which of the following best describes the condition of your old furnace?

1. The old system was working with no need of repair
2. The old system was working but needed repair
888. Don't Know
999. Refused

[ASK IF C2 = 2]

C4 Was your old furnace repairable, or was it beyond repair?

1. Repairable
2. Beyond Repair
889. Don't Know
999. Refused

[ASK IF C4 = 1 or IF C3 = 2]

C5 Do you remember how much the repair would have cost? Was it...

1. Less than \$550
2. More than \$550
889. Don't Know
999. Refused

C6 How old was your existing furnace (in years)?

NUMERIC OPEN END

888. Don't know
999. Refused

[ASK IF C6 = 888, 999]

C6a. What would you estimate the approximate age of your old furnace to be?

1. Less than 2 years
2. 2 to (less than) 5 years
3. 5 to (less than) 10 years
4. 10 to (less than) 15 years

- 5. 15 to (less than) 20 years
- 6. 20 years
- 888. Don't know
- 999. Refused

- C7 Prior to replacing your old furnace, had it undergone any repairs?
- 1. Yes
 - 2. No
 - 888. Don't know
 - 999. Refused

[ASK IF C7 = 1]

- C7a Approximately how many times did you have to repair the old furnace during the year prior to replacement?
- NUMERIC OPEN END
- 888. (Don't know)
 - 999. (Refused)

- C8 How long do you think your old furnace would have lasted if you had made the necessary repairs? Would you say..?
- 1. 1 year or less
 - 2. 2 or 3 years
 - 3. 4 or 5 years
 - 4. or more than five years
 - 888. Don't know
 - 999. Refused

- D1 Do you currently have a central air conditioning system?
- 1. Yes
 - 2. No [SKIP TO Q1]
 - 888. Don't Know [SKIP TO Q1]
 - 999. Refused [SKIP TO Q1]

- CSR1 When you replaced your furnace, did you consider replacing your air conditioning system at the same time?
- 1. Yes, and I replaced my air conditioning system. [ASK B1 – B7, MEASURE 2 = air conditioning system]
 - 2. Yes, I considered replacing my air conditioning system, but did not replace it.
 - 3. No, I did not consider replacing my air conditioning system.
 - 000. Other [RECORD VERBATIM]
 - 888. Don't know
 - 999. Refused

[ASK IF CSR1 = 2]

- CSR2 What were the reasons that you did not replace your air conditioning unit? [DO NOT READ, ACCEPT MULTIPLE]
- 1. Too expensive

- 2. Air Conditioning System works fine
- 3. Repair costs were reasonable
- 000. Other [RECORD VERBATIM]
- 888. (Don't know)
- 999. (Refused)

D3 Which of the following best describes the condition of your air conditioning system at the time that you replaced your furnace?

- 1. The CAC unit was working with no need of repair
- 2. The CAC unit was working but needed repair
- 888. Don't Know
- 999. Refused

[ASK IF D3 = 2]

D5 Do you remember how much the repair cost? Was it...

- 1. Less than \$550
- 2. More than \$550
- 888. Don't Know
- 999. Refused

D6 How old is your existing air conditioning system (in years)?

NUMERIC OPEN END

- 888. Don't know
- 999. Refused

[ASK IF D6 = 888, 999]

D6a. What would you estimate the approximate age of your old air conditioning system to be?

- 1. Less than 2 years
- 2. 2 to (less than) 5 years
- 3. 5 to (less than) 10 years
- 4. 10 to (less than) 15 years
- 5. 15 to (less than) 20 years
- 6. 20 or more years
- 888. Don't know
- 999. Refused

[SKIP IF D3 = 2]

D7 Has your air conditioning system undergone any repairs?

- 1. Yes
- 2. No
- 888. Don't know
- 999. Refused

[ASK IF D3 = 2 or IF D7 = 1]

D7a Approximately how many times have you had to repair your air conditioning system over the past year?

NUMERIC OPEN END

888. (Don't know)

999. (Refused)

D8 How long do you think your air conditioning system will last? Would you say..?

1. 1 year or less
2. 2 or 3 years
3. 4 or 5 years
4. or more than five years

888. Don't know

999. Refused

DEMOGRAPHICS

Q1. I have just a few questions left to ask for classification purposes. "First, do you own or rent the home at <SERVICE_ADDRESS>?"

1. Own
2. Rent
000. Other, specify
888. Don't know
999. Refused

Q2. What type of home do you live in? Is it a...

1. Single Family detached,
2. Single Family attached (duplex, town home, etc.)
3. Multifamily Apartment or Condominium
000. Other, specify
888. Don't know
999. Refused

Q3. How many people currently live full-time in that home, at least six months of the year, including you?

ENTER NUMBER OF PEOPLE

888. Don't know

999. Refused

Q4. Approximate when was your home built? [\[READ LIST ONLY IF NEEDED\]](#)

1. Before 1950
2. 1950 – 1959
3. 1960 – 1969
4. 1970 – 1979
5. 1980 – 1989
6. 1990 – 1999
7. 2000 – 2009
8. Since 2010
888. Don't know
999. Refused

Comments Do you have any comments about the HEER program that you would like to share today?



RECORD SUMMARY

888. Don't know

999. Refused

Thank you for taking the time to help with our survey and the helpful information you provided.
Have a nice day/evening.



4.3 *Home Energy Savings*

Home Energy Savings Program GPY2/EPY5 Evaluation Report

Final

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

Presented to
Nicor Gas Company
Commonwealth Edison Company

March 25, 2014

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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 GPY2/EPY5 Home Energy Savings (HES) Program¹. The Home Energy Savings Program is a joint program of Nicor Gas and Commonwealth Edison (ComEd), with Nicor Gas leading the program implementation. The Home Energy Savings program (HES) provides single-family homeowners who are customers of Nicor Gas or ComEd in the Nicor Gas territory a home weatherization service package. The weatherization package includes a comprehensive home energy assessment that includes combustion safety testing, direct installation of selected energy efficiency and water-saving measures, and incentives for installing a recommended package of weatherization measures. In GPY2/EPY5, the utilities partnered with Energy Impact Illinois (EI2)², which added outreach efforts and funded an increase in incentives from GPY1/EPY4 levels. The program also piloted a reduction in the home assessment fee from \$99 to \$49 over a three month period. The reduction in the assessment fee led to an influx of participants that caused assessment delays due to implementation contractor, Conservation Service Group (CSG), staff limitations. CSG ultimately hired additional assessors in response to the participation demand.

E.1. Program Savings

Table E-1 summarizes the program savings by utility and measure. The GPY2/EPY5 HES program realized net energy savings of 235,554 therms and 973 MWh.

Table E-1. GPY2/EPY5 Program Results³

Savings Category	Nicor Gas (Therms)	ComEd (MWh)
Ex-ante Gross Savings ⁴	253,445	1,122
Verified Gross Realization Rate	1.08‡	0.999‡
Verified Gross Savings	273,900	1,121
Net to gross ratio (NTGR)	0.86†	0.87†
Verified Net Savings	235,554	973

Source: Navigant analysis of GPY2/EPY5 tracking data.

† A deemed value. ComEd overall NTG based on deemed measure-specific NTG values.

‡ Based on evaluation research findings.

¹ The GPY2/EPY5 program year began June 1, 2012 and ended May 31, 2013.

² Energy Impact Illinois is a non-profit alliance effort to promote energy-efficiency products and services to residential and business owners - led by the Chicago Metropolitan Agency of Planning in partnership with the City of Chicago, City of Rockford, gas and electric utilities, Illinois Home Performance with Energy Star, and other stakeholders. Its web site is www.energyimpactillinois.org.

³ The results include 95 GPY1/EPY4 audit participants that received weatherization work in GPY2/EPY5 and thus contributed to GPY2/EPY5 weatherization savings. Navigant notes when these GPY1/EPY4 audit participants are excluded from certain GPY2/EPY5 process analyses.

⁴ Based on tracking data extract from CSG, along with TRM savings update extract for gas measures

Table E-2 and Table E-3 present the ex-ante and verified gross and net electric and gas savings for the GPY2/EPY5 HES program, by measure. Direct install measures for the HES program include CFLs, low-flow showerheads, low-flow kitchen and bathroom faucet aerators, hot water heater temperature setback, pipe insulation, programmable thermostats, and programmable thermostat education. Weatherization measures include attic, wall, duct, and floor insulation, along with air sealing measures.

Table E-2. EPY5 Electric Program Results, by Measure

Research Category	Measure	Ex-ante Gross Savings (MWh)	Verified Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Direct Install Measures	9 Watt CFL	74	1.00‡	74	0.89†	66
	14 Watt CFL	269	0.998‡	268	0.89†	239
	19 Watt CFL	132	0.995‡	131	0.89†	117
	23 Watt CFL	122	1.00‡	122	0.89†	108
	9 Watt Globe CFL	211	1.00‡	211	0.89†	187
	Shower Head	19	1.01‡	19	0.94†	18
	Kitchen Aerator	0.4	1.18‡	0.4	0.94†	0.4
	Bathroom Aerator	2.2	1.13‡	2.5	0.94†	2.3
	Hot Water Temperature Setback	0.4	0.23‡	0.1	0.94†	0.1
	Pipe Insulation	3.9	1.21‡	4.7	0.94†	4.4
	Programmable Thermostat*	-	-	-	-	-
	Programmable Thermostat Education*	-	-	-	-	-
Subtotal		834	0.998	833	0.89	742
Weatherization Measures	Attic Insulation	119	1.00	119	0.80†	95
	Wall Insulation	1.7	1.00	1.7	0.80†	1.4
	Floor Insulation (Other)	3.1	1.00	3.1	0.80†	2.5
	Duct Insulation & Sealing	1.6	1.00	1.6	0.80†	1.3
	Air Sealing	163	1.00	163	0.80†	130
Subtotal		288	1.00	288	0.80	230
Total		1,122	0.999	1,121	0.87	973

Source: Navigant analysis of GPY2/EPY5 tracking data.

† A deemed value.

‡ Based on evaluation research findings.

*Programmable thermostats were not included as an electric measure by ComEd in EPY5.

Table E-3. GPY2 Gas Program Results, by Measure

	Measure	Ex-ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Direct Install Measures	9 Watt CFL	0	-	0	0.86†	0
	14 Watt CFL	0	-	0	0.86†	0
	19 Watt CFL	0	-	0	0.86†	0
	23 Watt CFL	0	-	0	0.86†	0
	9 Watt Globe CFL	0	-	0	0.86†	0
	Shower Head	47,053	1.00‡	47,053	0.86†	40,466
	Kitchen Aerator	792	0.96‡	758	0.86†	652
	Bathroom Aerator	8,143	1.02‡	8,307	0.86†	7,144
	Hot Water Temperature Setback	2,566	1.00‡	2,573	0.86†	2,213
	Pipe Insulation	7,903	0.96‡	7,583	0.86†	6,521
	Programmable Thermostat	5,637	0.93‡	5,216	0.86†	4,486
	Programmable Thermostat Education	0	-	21,060	0.86†	18,112
Subtotal		72,095	1.28	92,550	0.86†	79,593
Weatherization Measures	Attic Insulation	82,645	1.00	82,645	0.86†	71,075
	Wall Insulation	16,150	1.00	16,150	0.86†	13,889
	Floor Insulation (Other)	12,933	1.00	12,933	0.86†	11,122
	Duct Insulation & Sealing	76	1.00	76	0.86†	65
	Air Sealing	69,546	1.00	69,546	0.86†	59,809
Subtotal		181,350	1.00	181,350	0.86†	155,961
Total		253,445	1.08	273,900	0.86†	235,554

Source: Navigant analysis of GPY2/EPY5 tracking data.

† A deemed value.

‡ Based on evaluation research findings.

E.3. Impact Estimate Parameters

In the course of estimating verified gross and net savings, the evaluation used a variety of parameters in its calculations. Most of the parameters for direct install measure savings calculations were deemed. Deemed values for CFLs were provided by ComEd and sourced from the Illinois TRM v1.0. For showerhead, aerator, and pipe insulation measures, the evaluation used custom input values obtained during site visits as well as deemed parameters. The evaluation used deemed values from the TRM for hot water temperature setback and programmable thermostat savings. For weatherization measure savings estimates, CSG used its own calculations in its proprietary EnergyMeasure® Home (EM HOME) software, which Navigant verified in GPY1/EPY4 (see Section

2.3 for detail). For net savings calculations, SAG deemed an overall NTGR value for Nicor Gas and measure-level NTGR values for ComEd savings. Navigant provides further overview of impact parameters in Section 2.2.

E.4. Impact Estimate Parameters for Future Use

In the course of our GPY2/EPY5 research, the evaluation team conducted research on parameters used in impact calculations including those in the Illinois TRM. SAG did not deem a measure-level NTGR value for programmable thermostats savings for ComEd. As a result, Navigant referenced NTGR values for comparable programs in the Northeast, shown in Table E-4. The evaluation team also determined a trade ally (TA) NTGR estimate from in-depth interviews and assessment-only participant spillover from phone surveys. The parameters shown in the table below are for future program years and were not used to calculate verified gross and net savings for GPY2/EPY5. The evaluation team’s parameters recommended for future use are further discussed in sections 4.2 and 7.3.3.

Table E-4. Impact Estimate Parameter for Future Use

Parameter	Value	Data Source
Programmable Thermostats NTGR – ComEd	0.90	Research Findings Sources: 2010 Gas Efficiency Annual Report by the Massachusetts Joint Utility ⁵ and Efficiency Vermont Year 2010 Savings Claim ⁶
TA Weatherization Measure NTGR estimate (1 – Free Ridership + Spillover)	0.98 (1 - 0.07 + 0.05)	Navigant Trade Ally Interviews (n= 5 of 9 and 54% of total savings) ⁷
Full Participant Overall Spillover	2% gas/1% electric	GPY2/EPY5 Full Participant Survey (n=104)
Assessment-only Overall Spillover	9% gas/6% electric	GPY2/EPY5 Assessment-only Survey (n=68)
Overall Program NTGR	1.05 gas (0.94 Direct Install, 1.11 Weatherization) 0.85 electric (0.80 Direct Install, 1.02 Weatherization)	Navigant GPY1/EPY4 and GPY2/EPY5 Full Participant, GPY2/EPY5 Assessment-only Participant, and GPY2/EPY5 TA Surveys

⁵ “2010 Gas Energy Efficiency Annual Report”, Boston Gas Company, Colonial Gas Company and Essex Gas Company each d/b/a National Grid, August 2011, page 67.

⁶ “Year 2010 Savings Claim”, Efficiency Vermont, April 1, 2011, page 162

⁷ One trade ally’s interview results were omitted because the evaluation team believes their responses to key NTG questions were not reasonable, likely due to misunderstanding of interview questions.

E.5. Participation Information

The GPY2/EPY5 HES program had 2,760 total participants. Table E-5 provides an overview of electric and gas measure participation during GPY2/EPY5. Overall program participation and weatherization jobs increased about 156% from GPY1/EPY4 levels.

Table E-5. GPY2/EPY5 Primary Participation Detail

Participation	Nicor Gas	ComEd
Participants (Assessments)	2,760 total participants	
Direct Install Measures	9,415	19,072
CFL Installations	-	18,910
Low-Flow Showerheads	2,148	41
Kitchen and Bathroom Faucet Aerators	3,856	55
Hot Water Temperature Setback	1	402
Pipe Insulation (Linear Feet)	65	2,433
Weatherization Participants	825 total participants ⁸	

Source: Navigant analysis of GPY2/EPY5 tracking data.

E.6. Conclusions and Recommendations

The following provides insight into key program impact and process findings and recommendations.

Program Savings Achievement

Finding 1. The GPY2/EPY5 program set to achieve net savings of 700 MWh and 545,466 therms. Navigant reports verified gross savings of 1,121 MWh and 273,900 therms and verified net savings of 973 MWh and 235,554 therms. GPY2/EPY5 verified net gas savings do not meet the original savings goals while electric savings exceed them. However, both gas and electric gross savings achieved are in line with the implementation contractor’s revised goals.

Recommendation. Navigant recommends adjusting program savings goals for future program years based on lessons learned in GPY2/EPY5 and the program participation and savings findings presented in this report.

Gross Realization Rates

Finding 2. Navigant reports overall gross realization rates of 100% for MWh and 108% for therms.

Recommendation. Navigant recommends updating ex-ante calculations for kitchen and bathroom faucet aerators based on clarifications presented in the Illinois TRM version

⁸ These 825 weatherization jobs include 95 carry-over participants that received assessments in GPY1/EPY4.

2.0. Additionally, Navigant recommends applying programmable thermostat savings at the household level rather than per unit installed to be in line with the TRM, and to calculate ex-ante programmable thermostat education savings based on clarifications in the TRM v2.0.

Net-to-Gross Rate

Finding 3. Navigant calculates overall verified net savings using SAG-deemed NTGR values of 0.87 for electric savings and 0.86 for gas savings. SAG deemed electric NTGR values on a measure-specific basis, and deemed an overall program NTGR for gas savings. The evaluation team also determined an overall research NTGR for future use of 0.85 for electric savings (0.80 Direct Install, 1.02 Weatherization) and 1.05 (0.94 Direct Install, 1.11 Weatherization) for gas savings utilizing full-participant, assessment-only participant, and trade ally research findings.

Tracking System Review

Finding 4. The evaluation team found that though it is possible to identify full-participants from assessment-only participants in the tracking database judging by their measure installations, there is no unique field clearly designating full-participants from assessment-only participants.

Recommendation. Navigant recommends adding a field in the tracking database for participant type to distinguish full-participants from assessment-only participants. This will help ensure proper differentiation between the two participants groups in the tracking data for analysis.

Program Participation

Finding 5. The GPY2/EPY5 HES program saw participation of 2,760 total home energy assessments with weatherization jobs completed at 825 residences (these 825 weatherization jobs include 95 carry-over participants that received assessments in GPY1/EPY4). This is more than double GPY1/EPY4 participation, with an increase in total participants of 156% and an increase in weatherization jobs of 158%.

Assessment Pricing

Finding 6. Nine months of GPY2/EPY5 data suggest that promoting the HES program with a \$49 (participant) assessment cost is a cost-effective way to bring participants into the HES program.

Recommendation. Navigant recommends that Nicor Gas and ComEd retain the \$99 assessment pricing and selectively lower assessment pricing to \$49 to increase participation as necessary.

Incentive Level

Finding 7. Navigant determined that conversion rates and average savings per household did not increase between GPY1/EPY4 and GPY2/EPY5 despite an increase in incentive levels from \$1,250 to \$1,750. Other program factors in GPY2/EPY5, described below, may have depressed the conversion rate.

Recommendation. Navigant recommends Nicor Gas and ComEd continue with the increased incentive level with the expectation that these incentives, when combined with improvements described below will, increase conversions and lead to deeper savings per participant.

Full Participation Barriers

Finding 8. Though the program generally rated high in satisfaction, the lowest satisfaction score for both full participants and assessment-only participants was “the time it took to schedule the Home Energy Savings program assessment.” Some assessment-only participants may have been deterred from full participation due to scheduling and follow-up issues. While CSG added assessors to reduce participant wait times, wait times still remained high and pressure on the assessors to complete assessments appears likely to have impacts on program conversion rates.

Recommendation. Navigant recommends addressing any aspects of program processes that may be causing assessment scheduling, post-assessment application processing, or weatherization contractor assignment delays. Ensuring sufficient assessor staffing levels may help alleviate assessment scheduling delays. Navigant recommends that CSG allow the number of assessors to increase or decrease as needed according to participation demand. In addition, the program may increase conversion rates by ensuring proper during-assessment weatherization support and by conducting post-assessment follow-up communications to maintain participant interest in the program and to ensure their understanding of participation procedures.

EI2 House Party Outreach

Finding 9. EI2 house party participants accounted for 13% of participants, about 10% of program savings, and participants were generally more satisfied with the program and understood the participation process and program offerings better than Non-EI2 house party participants. On the other hand, EI2 house party participant conversion rates were considerably lower than non-participant rates.

Recommendation. With EI2’s withdrawal from the program, Navigant recommends CSG assess the benefits and costs of replicating key components of the house party outreach model and identifying other ways of leveraging community-based outreach approaches.

Future Evaluation Risk

Finding 10. Given that GPY2/EPY5 and GPY3/EPY6 NTGR are based on GPY1/EPY4 research, Navigant has reason to believe that future NTGR research may yield notably different results given interim changes in incentive levels, assessment pricing, and/or outreach methods.

Recommendation. The above should be taken into consideration when planning program changes.

Overall the program performed well in GPY2/EPY5 relative to GPY1/EPY4. Assessment participation, weatherization participation, and electric savings targets were met, though therms savings goals were not met compared to the original savings goal. GPY2/EPY5 therm savings narrowly fell short of CSG’s revised goals. Areas for program improvement generally concern streamlining the program sign-up processes, including improving scheduling, and helping assessment-only customers understand the program and their assessment results to help convince them to participate in full weatherization work.

1. Introduction

1.1 Program Description

The Home Energy Savings (HES) program is a joint program of Nicor Gas and Commonwealth Edison (ComEd), with Nicor Gas leading the program implementation. In GPY2/EPY5⁹, the HES program sought to achieve 545,466 therms and 700 MWh of net savings¹⁰ through the implementation of home energy assessments to promote discounted weatherization services and the direct installation of energy efficiency measures in residential Nicor Gas and/or ComEd in Nicor gas territory single-family home residences or two to four unit buildings. To meet these goals, the implementation contractor, Conservation Services Group (CSG), planned to complete approximately 2,203 whole-home assessments to achieve approximately 749 completed jobs in the second program year that ended May 31, 2013.

1.1.1 Implementation Strategy

The HES program provides discounted whole-home assessments (e.g., energy assessments) to customers to identify opportunities for installing energy efficiency measures and weatherizing the home. Program activities are implemented through CSG staff and contracted weatherization providers. During the assessment, CFLs, showerheads, aerators, hot water temperature setback, programmable thermostat setting, and pipe insulation were directly installed at no additional charge for instant energy savings. A programmable thermostat was also offered at a reduced price for interested participants. CSG's dedicated assessment staff generate a recommendation report for customers using proprietary software that takes into account customer home characteristic information. The customer report outlines recommended measures, potential savings, payback periods, and the amount of incentives available for recommended work. Customers choose the projects they would like to pursue. A program-eligible contractor is then assigned to perform the work and discounts are offered instantaneously. The contractor is responsible for submitting paperwork to CSG to receive rebate funds. Customers who pursued weatherization projects in GPY2/EPY5 were eligible to receive incentives of 70% of costs for the recommended weatherization upgrades (up to \$1,750 per home).

1.1.2 Program Marketing and Outreach

The Home Energy Savings program utilizes an integrated marketing plan that includes website content, direct mail promotions to residents, and some community events along with direct promotion by weatherization contractors. The marketing message stresses the importance of homeowners' need to care for their home investment and energy performance. Messaging focuses on getting customers to take advantage of the program's key benefits, savings, and comfort. Trade allies also benefit from the program by having credibility established through participating with the utilities. Furthermore, the program provides program-related administrative and technical training, and standardizes high-quality practices in the market through a quality assurance and control

⁹ Gas Program Year 2/Electric Program Year 5

¹⁰ These savings targets were set before GPY1/EPY4 as part of a three year plan and were revised with the implementation contractor in GPY2/EPY5. This report uses the savings figures from the original three year plan and makes note of performance relative to the revised IC goals.

(QA/QC) process. In GPY2/EPY5, the program partnered with Energy Impact Illinois (EI2) which hosted informational “house parties” where program contractors and EI2 staff presented information on the program as an additional outreach avenue for potential participants.

1.2 Evaluation Objectives

The Evaluation Team identified the following key researchable questions for GPY2/EPY5:

1.2.1 Impact Questions

1. What is the level of verified gross and net annual energy (kWh and therm) savings induced by the program?
2. What are the net impacts from the program, especially among assessment-only participants?¹¹ 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, including non-participant spillover?
3. Did the program meet its energy and demand savings goals? If not, why not?
4. Are the assumptions and calculations for the direct-install measures in compliance with the statewide TRM and reflective of sound engineering judgment for both gas and electric impacts? If not, what changes are required?

1.2.2 Process Questions

1. Has the program changed since GPY1/EPY4, and if so, why and how?
2. What effects have the assessment pricing and weatherization incentive amounts had to date on conversion rates and measure installations? How will an incentive move to 70% from 50% affect program uptake?
3. What effect did EI2’s informational parties have on participation and conversion rates? What will be the impact of their discontinuation? Is there a low cost way to maintain the benefits?
4. Why did assessment-only participants not follow through with weatherization work and what can be done to encourage their participation in future program years?

¹¹ Ultimately, the evaluation team did not conduct participant free ridership research in GPY2/EPY5 at the request of Nicor Gas. The IL SAG deemed GPY2/EPY5 NTG values.

2. Evaluation Approach

This evaluation of the HES program reflects the second full-scale year of joint program operation. The evaluation team conducted both primary and secondary research to address key impact and process questions.

2.1 Overview of Data Collection Activities

The core data collection activities included in-depth interviews with program staff and trade allies, participant surveys, and post-assessment quality assurance and quality control (QAQC) verification ride-alongs. The full set of data collection activities is shown in the following table.

Table 2-1. Core Data Collection Activities

Method	Subject	Quantity	Date	Gross Impacts	Net Impacts	Process
Telephone Survey	Assessment-only participants (GPY1/EPY4 and early GPY2)	68 including both GPY1/EPY4 and GPY2/EPY5 participants	Late Spring/ Early Summer 2013	X	X	X
Telephone Survey	Full Participants (includes EI2 info party participants)	104 (stratified between EI2 and non-EI2 participants)	Late Spring/ Early Summer 2013	X	X	X
In-Depth Telephone Interviews	Program manager and IC staff	3-4	Spring 2013	X		X
In-Depth Telephone Interview	Participating weatherization subcontractors	5	Late Spring/ Early Summer 2013		X	X
Verification Ride-alongs	CSG QAQC Staff	2 sites	Early June 2013			X

2.2 Verified Savings Parameters

Navigant calculated verified gross direct install savings from the GPY2/EPY5 HES program using algorithms, assumptions, and parameters defined in the Illinois TRM version 1.0. Additionally, Navigant sourced HVAC and water heating variables from the tracking database provided by CSG. Navigant used SAG-deemed NTGR to calculate verified net savings. The key parameters used in the analysis are shown in Table 2-2.

Table 2-2. Impact Estimate Parameters

Parameter	Value	Data Source	Deemed, Evaluated, or Research Findings
NTGR – Nicor Gas All Measures	0.86	SAG Spreadsheet †	Deemed
NTGR – ComEd CFLs	0.89	SAG Spreadsheet ‡	Deemed
NTGR – ComEd Water Savings Measures	0.94	SAG Spreadsheet ‡	Deemed
NTGR – ComEd Weatherization Measures	0.8	SAG Spreadsheet ‡	Deemed
CFL In-Service Rate	0.97	Illinois TRM, v1.0, Section 5.5.1	Deemed
Showerhead In-Service Rate	0.98	Illinois TRM, v1.0, Section 5.4.5	Deemed
Faucet Aerators In-Service Rate	0.95	Illinois TRM, v1.0, Section 5.4.4	Deemed

†*Nicor Gas – Net-to-Gross Results and Application, GPY1-3, Table 1 (Revised). July 2, 2013*

‡ [http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ComEd PY5-PY6 Proposal Comparisons with SAG.xls](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/ComEd%20PY5-PY6%20Proposal%20Comparisons%20with%20SAG.xls)

Version 1.0 of the Illinois TRM does not include a discussion of savings for the programmable thermostat education measure. However, version 2.0 of the Illinois TRM defines the programmable thermostat measure to include programmable thermostat education. Navigant referenced version 2.0 of the TRM to determine verified savings for the programmable thermostat education measure for GPY2/EPY5.

2.3 Verified Gross Program Savings Analysis Approach

For direct install measures in GPY2/EPY5, Navigant performed an engineering review. CSG provided the original tracking data and updated savings adjustments for direct install measures based on the Illinois TRM version 1.0.

For weatherization projects, in GYP1/EPY4 Navigant performed a thorough literature review to compare evaluated savings values for projects with weatherization offerings similar to the HES program. Based on the findings from the literature review, Navigant determined that the savings values from CSG’s EnergyMeasure® HOME (EM HOME) model compare favorably with evaluated savings for similar programs and climates. Navigant accepts CSG’s weatherization measure savings assumptions for GPY2/EPY5. Further detail on Navigant’s weatherization literature review can be found in the GY1/EP4 HES Report.¹²

2.4 Verified Net Program Savings Analysis Approach

Verified net energy savings were calculated by multiplying the Verified Gross Savings estimates by a net-to-gross ratio (NTGR). For GPY2/EPY5, the evaluation team used NTGR values that were based

¹² Energy Efficiency ComEd Plan Year 4, Nicor Gas Plan Year 1 (6/1/2011-5/31/2012) evaluation Report: Home Energy Savings Program. May 2013.

on past evaluation research and defined through a negotiation process through SAG.¹³ Navigant also researched free ridership and spillover from the TA perspective, and spillover from full participants and assessment-only participants for future NTGR estimates.

2.5 Process Evaluation including QAQC Verification Ride-Along

Whereas GPY1/EPY4 process evaluation activities included a particular focus on non-participant outreach and marketing effectiveness, GPY2/EPY5 process activities focused on better understanding full and assessment-only participation, including optimizing program conversion rates, assessment pricing, and incentive levels. Navigant's evaluation also researched the dynamics of the EI2 house parties.

While the GPY1/EPY4 telephone interviews targeted full participants only, the GPY2/EPY5 evaluation involved telephone interviews with both full participants and assessment-only participants, with an emphasis on better understanding the latter group. The assessment-only survey was stratified between GPY1/EPY4 and GPY2/EPY5 participants, and the full participant survey was stratified between EI2 house party and non-EI2 house party referred participants.

Though trade ally interviews focused primarily on net impact-related questions, the evaluation team also touched on key process questions. Detailed results from trade ally interviews are outlined in Appendix 7.3.

Navigant also conducted two ride-along verification checks with CSG post-assessment QAQC staff to verify CSG's QAQC activities. Navigant compared field observations of CSG staff's QAQC inspection activities against best practices and the protocols outlined in the program operations manual. An overview of findings is included Section 5.1, and the complete memo of findings is included as an attachment in Appendix 7.5.

¹³ http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf

3. Gross Impact Evaluation

In this section Navigant presents verified savings for the GPY2/EPY5 HES program. Navigant performed a tracking system review on the original tracking system provided by CSG and calculated verified gross program savings. Navigant determined the following findings and recommendations:

Tracking System Review

Finding 1. The evaluation team found that though it is possible to identify full-participants from assessment-only participants in the tracking database judging by their measure installations, there is no unique field clearly designating full-participants from assessment-only participants.

Recommendation. Navigant recommends adding a field in the tracking database for participant type to distinguish full-participants from assessment-only participants. This will help ensure proper differentiation between the two participants groups in the tracking data for analysis.

Ex-ante Savings

Finding 2. The evaluation team calculated ex-ante gross savings from the tracking system ex-ante gross savings values of 253,445 therms and 1,122 MWh.

Verified Gross Savings

Finding 3. Navigant calculated overall gross impact savings of 273,900 therms and 1,121 MWh, respectively.

Verified Gross Realization Rates

Finding 4. Navigant reports an overall gross realized savings rate of 108% for therm savings and 100% for electric savings.

Recommendation. Navigant recommends updating ex-ante calculations for kitchen and bathroom faucet aerators based on clarifications presented in the Illinois TRM version 2.0. Additionally, Navigant recommends applying programmable thermostat savings at the household-level rather than per unit installed and to calculate ex-ante programmable thermostat education savings based on clarifications in the TRM v2.0.

3.1 Tracking System Review

For the GPY2/EPY5 evaluation, Navigant reviewed the tracking system provided by CSG to verify the completeness and accuracy of the tracking system data and to identify any issues that would affect the impact evaluation of the HES program. CSG provided ex-ante electric savings in the original CSG tracking database and also provided a companion spreadsheet with recalculated ex-ante gross therm savings for direct install measures based on the parameters and algorithms in the Illinois TRM version 1.0. Navigant found these documents sufficient to complete the gross impact evaluation of the HES program.

Key findings from the tracking system review include:

1. Navigant identified one project with claimed ex-ante electric savings that had a gas hot water heater. Navigant reassigned savings to gas for this participant.
2. Navigant identified several project entries with erroneous pipe length entries of over 9 ft. CSG clarified that these were data entry errors. Navigant updated ex-ante savings to cap the pipe insulation savings to 9 ft. (6 ft. on the hot water pipe and 3 ft. on the cold water pipe).
3. Navigant identified nine projects with ex-ante savings claimed for multiple programmable thermostats. Navigant capped ex-ante deemed savings at one programmable thermostat per household.
4. Navigant identified multiple programmable thermostat education participants that were cross-listed with the programmable thermostat participants. In the case where the tracking system had crossover participants for a new programmable thermostat and for thermostat education, Navigant applied the thermostat savings to the programmable thermostat measure.
5. Navigant determined that it would be helpful for the evaluation team if there were a field in the tracking database designating full-participants and assessment-only participants.

Table 3-1 below shows the ex-ante energy savings claimed for the HES program for GPY2/EPY5, including both direct install and weatherization measures. The number of participants and the number of installed units among participants with gas water heaters and electric water heaters are also included for each measure.

Table 3-1. GPY2/EPY5 Ex-Ante Gross Impact, by Measure

	Measure	Total Participants GWH/EWH†	Installed Units GWH/EWH†	Therms	MWh
Direct Install Measures	9 Watt CFL	0/639	0/2473	0	74
	14 Watt CFL	0/1398	0/6068	0	269
	19 Watt CFL	0/750	0/2444	0	132
	23 Watt CFL	0/810	0/2587	0	122
	9 Watt Globe CFL	0/794	0/5338	0	211
	Shower Head	1361/26	2148/41	47,053	19
	Kitchen Aerator	284/7	332/9	792	0
	Bathroom Aerator	1526/24	3524/46	8,143	2.2
	Hot Water Temperature Setback	388/1	402/1	2,566	0.4
	Pipe Insulation	1244/32	2433/65*	7,903	3.9
	Programmable Thermostat	99/0	107/0	5,637	-‡
	Programmable Thermostat Education	463/0	469/0	0‡	-‡
Subtotal			9415/19072	72,095	834
Weatherization Measures	Attic Insulation	-	-	82,645	119
	Wall Insulation	-	-	16,150	1.7
	Floor Insulation (Other)	-	-	12,933	3.1
	Duct Insulation & Sealing	-	-	76	1.6
	Air Sealing	-	-	69,546	163
Subtotal		-	-	181,350	288
Total			9415/19072	253,445	1,122

Source: Navigant analysis of GPY2/EPY5 tracking data.

†Participants and installed units broken out for participants with gas and electric hot water heaters. The first number represents the participants or installed units for gas water heaters, and the second number is for electric water heaters.

‡ Programmable thermostats were not included as an electric measure by ComEd in EPY5. Nicor Gas did not claim savings for programmable thermostat education in GPY2/EPY5. Navigant estimated savings for the measure as discussed in appendix 7.2.1.

*Installed units for pipe insulation is reported in 3 ft. segments

3.2 Program Volumetric Findings

In order to better understand measure installation patterns, the evaluation team looked at the homes that installed each measure as a percentage of total homes that received an assessment. Table 3-2 below shows the percentage of assessed homes that installed each measure offered in the HES program. In GPY2/EPY5, 2,760 participants received an assessment. CFLs, pipe insulation, bathroom aerators, and showerheads were the most common direct install measures, while attic insulation and air sealing were the most common weatherization measures. The least common direct install measure

was the programmable thermostat, and the least common weatherization measures were wall insulation and duct insulation and sealing.

Table 3-2. Percent of Participating Home Installing Each Program Measure Type, GPY2/EPY5

	Measure	Total Participants	Percent of Participating Homes Installing Measure
Direct Install Measures	Assessment Fee	2,760	100%
	All CFL Types	2,196	80%
	Shower Head	1,387	50%
	Kitchen Aerator	292	11%
	Bathroom Aerator	1,550	56%
	Hot Water Temperature Setback	389	14%
	Pipe Insulation	1,276	46%
	Programmable Thermostat	99	4%
	Programmable Thermostat Education	463	17%
Weatherization Measures	Attic Insulation	820	30%
	Wall Insulation	66	2%
	Floor Insulation (Other)	444	16%
	Duct Insulation & Sealing	12	0.4%
	Air Sealing	812	29%

Source: Navigant analysis of GPY2/EPY5 tracking data.

According to revised GPY2/EPY5 program goals, the program set out to achieve participation goals of 2,203 assessments and 749 weatherization jobs. After review of the tracking system, Navigant reports participation in the HES program in GPY2/EPY5 of 2,760 assessments and 825 weatherization jobs.

Table 3-3 shows the program participation and goal comparison between GPY1/EPY4 and GPY2/EPY5. Table 3-4 shows the verified comparison between GPY1/EPY4 and GPY2/EPY5.

Table 3-3. GPY1/EPY4 and GPY2/EPY5 Program Participation Goals Comparison

GPY1/EPY4 June 2011 – May 2012	GPY2/EPY5 June 2012 – May 2013
2,100 Audits	2,203 Audits
630	749
Weatherization	Weatherization
Jobs	Jobs

Source: GPY1/EPY4 goals are based on Nicor Gas Rider 30 EEP Program Portfolio Operating Plan v.1.1, January 24, 2012, pp77-78. GPY2/EPY5 goals are based on figures reported by Nicor Gas to Navigant by way of internal communication.

Table 3-4. GPY1/EPY4 and GPY2/EPY5 Verified Program Participation Comparison

GPY1/EPY4 June 2011 – May 2012	GPY2/EPY5 June 2012 – May 2013
1,080 Audits	2,760 Audits
320	825 ¹⁴
Weatherization	Weatherization
Jobs	Jobs

Source: Navigant analysis of GPY1/EPY4 and GPY2/EPY5 tracking data.

3.3 Gross Program Impact Parameter Estimates

Navigant calculated verified gross savings from the GPY2/EPY5 HES program using algorithms and parameters defined in the Illinois TRM versions 1.0 and 2.0. Navigant used the Illinois TRM for all direct install measures except for programmable thermostat education. Programmable thermostat education is not defined in the TRM v1.0. However, the Illinois TRM v2.0 includes additional clarification for programmable thermostat education savings.

¹⁴ The results include 95 GPY1/EPY4 audit participants that received weatherization work in GPY2/EPY5 and thus contributed to GPY2/EPY5 weatherization savings. Navigant when these GPY1/EPY4 audit participants are excluded from certain GPY2/EPY5 process analyses.

Table 3-5. Verified Gross Savings Parameters

Measure	Deemed Input Parameter Source
All CFL Types	Illinois TRM v1.0 - Section 5.5.1
Shower Head	Illinois TRM v1.0 - Section 5.4.5
Kitchen Aerator	Illinois TRM v1.0 - Section 5.4.4
Bathroom Aerator	
Hot Water Temperature Setback	Illinois TRM v1.0 - Section 5.4.6
Pipe Insulation	Illinois TRM v1.0 - Section 5.4.1
Programmable Thermostat	Illinois TRM v1.0 - Section 5.3.10
Programmable Thermostat Education	Illinois TRM v2.0 - Section 5.3.11

The GPY2/EPY5 CSG tracking database provided all input parameters necessary to calculate savings using the Illinois TRM v1.0 and 2.0 for all measure installations.

For all CFL electricity savings calculations, Navigant applied the Waste Heat Factor (WHF) savings parameter for all measure installations in residences with air conditioning. Navigant did not apply waste heat savings for residences without air conditioning, as recorded in the GPY2/EPY5 CSG program tracking database. Navigant applied the WHF only for verified electric CFL savings. Research findings savings in Section 7.2.1.3 of this report include the WHF for therm savings as well.

For all direct install water-saving measures, Navigant applied gas savings calculations for all measures installations with gas hot water system and applied electric savings for measure installations with electric hot water systems. This data was provided for each participant in the CSG GPY2/EPY5 tracking database. Additionally, Navigant applied gas savings calculations for all programmable thermostat measures installed in residences with gas space heating and applied electric savings for thermostat installations in residences with electric space heating. This methodology was used for both programmable thermostat and programmable thermostat education measures.

As an example, the Illinois TRM version 1.0 deems savings of 86.4 kWh for electric hot water heater temperature turndown, and 6.4 therms for a gas hot water heater temperature turndown. Navigant applied the deemed electric savings only to households with electric hot water heaters and applied the deemed gas savings only to households with gas hot water heaters. CSG used the same methodology in calculating ex-ante savings.

Navigant performed a thorough literature review in GYP1/EPY4 to compare evaluated savings values for projects with similar weatherization offerings as the HES program. This was done in order to ‘vet’ the ex-ante savings for weatherization measures in the HES program. Based on the findings from the literature review, Navigant determined that the savings values from CSG’s EnergyMeasure® HOME (EM HOME) model compares favorably with evaluated savings for similar

programs and climates. Navigant accepts CSG’s weatherization measure savings assumptions for GPY2/EPY5. Further detail on Navigant’s weatherization literature review can be found in the GY1/EP4 HES Report.¹⁵

3.4 Development of the Verified Gross Realization Rate

Navigant performed a detailed engineering review of the ex-ante savings assumptions provided by CSG and developed verified gross MWh and therm savings values for all of the direct install and weatherization measures. Adjustments to ex-ante savings values were based on assumptions and algorithms in the IL TRM version 1.0, as well as engineering judgment. Table 3-6 provides an overview of updates to the ex-ante formulas and assumptions.

Table 3-6. GPY2/EPY5 Gross Measure Savings Methodology

Measure	Navigant Update
All CFL Types	Navigant applied waste heat factor cooling savings (WHFe) to homes with air conditioning, as reported in the CSG tracking database. Navigant did not assign cooling WHF to homes without A/C. This adjustment is specified in the IL TRM version 1.0.
Shower Head	No adjustments to ex-ante formulas and assumptions were made.
Kitchen and Bathroom Aerators	The Illinois TRM version 2.0 includes additional example equations which further clarify the usage of specific parameters in the energy and gas savings equations. For verified gross energy and gas savings for this program year, Navigant accepted the ex-ante approach to savings calculations, and therefore did not adjust the ex-ante formulas and assumptions for the GPY2/EPY5 program year. Navigant also identified a minor error in the calculation of total faucets per household for a small number of projects in the CSG tracking database. The evaluation team updated the total faucets per household in the ex-post calculations.
Hot Water Temperature Setback	Navigant identified one project with claimed ex-ante electric savings that had a gas hot water heater. Navigant reassigned savings to gas for this participant. Navigant also updated the ex-ante deemed savings based on the IL TRM version 1.0. Deemed savings in the TRM are lower than the ex-ante deemed savings for this measure, causing a low realization rate, as shown in Table 3-7.
Pipe Insulation	Navigant identified several project entries with erroneous pipe length entries of over 9 ft. CSG clarified that these were data entry errors. Navigant updated ex-ante savings to cap the pipe insulation savings to 9 ft. (6 ft. on the hot water pipe and 3 ft. on the cold water pipe). Navigant also updated the ex-ante savings based on the IL TRM algorithms and parameters.
Programmable Thermostat	Navigant identified nine projects with ex-ante savings claimed for multiple programmable thermostats. Navigant capped ex-ante deemed savings at one programmable thermostat per household. Heating savings in the IL TRM version 1.0 is based on annual household heating consumption. Therefore,

¹⁵ Energy Efficiency ComEd Plan Year 4, Nicor Gas Plan Year 1 (6/1/2011-5/31/2012) evaluation Report: Home Energy Savings Program. May 2013.

Measure	Navigant Update
	based on the current definition of savings in the TRM, Navigant’s judgment is that multiple programmable thermostats installed in the same household should not be given multiple units of savings.
Programmable Thermostat Education	No ex-ante savings were claimed for the programmable thermostat education measure. The IL TRM version 2.0 clarifies the deemed programmable thermostat savings measure to also include savings for participants who were taught how to use setback schedules with a programmable thermostat who were previously using the thermostat as a manual, non-programmed thermostat. Navigant identified multiple programmable thermostat savings participants that were cross-listed with the programmable thermostat participants. In the case where the tracking system had crossover participants for a new programmable thermostat and for thermostat education, Navigant applied the thermostat savings to the programmable thermostat measure. This effectively eliminated the thermostat savings for the education component of the measure for cross-listed participants.
Weatherization Measures	No adjustments to ex-ante formulas and assumptions were made. Navigant performed verification in GPY1/EPY4 of CSG’s EnergyMeasure® HOME (EM HOME) software used to calculate weatherization savings.

The verified gross realization rate is the ratio of verified gross savings to ex-ante gross savings from the program tracking system.

As shown in Table 3-7 below, the GPY2/EPY5 verified savings was 273,900 therms and 1,121 MWh, resulting in verified gross realization rates of 108% for therms and 100% for MWh, respectively. The HES program did not claim ex-ante savings for the programmable thermostat education measure. Navigant assigned verified savings for this measure, causing the verified gross realization rate to be over 100% for therms.

3.5 Verified Gross Program Impact Results

This section details the results of Navigant’s verified gross impact analysis for the HES program. Navigant calculated verified gross savings with algorithms and assumptions based on the Illinois TRM version 1.0 and, for programmable thermostat education, TRM version 2.0. This includes applying the TRM-specified in-service rates for direct install measures. Verified gross savings for weatherization measures all use an in-service rate of 1, where CSG’s QAQC findings inform the installation rates, and a persistence rate of 1 is assumed since weatherization measure uninstallation is unlikely. Table 3-7 summarizes the verified gross results by measure type.¹⁶

¹⁶ The evaluation team calculated an alternative savings estimate for the program as a whole in Appendix 0, which utilizes Navigant’s measure-level installation and persistence rate findings for direct install measures rather than the IL TRM. This was done for reference purposes only.

Table 3-7. GPY2/EPY5 Verified Gross Impact Savings Estimates by Measure Type

	Measure	Therms	Therms RR*	MWh	MWh RR*
Direct Install Measures	9 Watt CFL	0	-	74	100%
	14 Watt CFL	0	-	268	100%
	19 Watt CFL	0	-	131	100%
	23 Watt CFL	0	-	122	100%
	9 Watt Globe CFL	0	-	211	100%
	Shower Head	47,053	100%	19	101%
	Kitchen Aerator	758	96%	0.4	118%
	Bathroom Aerator	8,307	102%	2.5	113%
	Hot Water Temperature Setback	2,573	100%	0.1	23%
	Pipe Insulation	7,583	96%	4.7	121%
	Programmable Thermostat	5,216	93%	‡	-
Programmable Thermostat Education	21,060 †	-	‡	-	
Subtotal		92,550	128%	833	100%
Weatherization Measures	Attic Insulation	82,645	100%	119	100%
	Wall Insulation	16,150	100%	1.7	100%
	Floor Insulation (Other)	12,933	100%	3.1	100%
	Duct Insulation & Sealing	76	100%	1.6	100%
	Air Sealing	69,546	100%	163	100%
Subtotal		181,350	100%	288	100%
Total	Total Savings	273,900	108%	1121	100%

Source: Navigant analysis of GPY2/EPY5 tracking data.

*RR = Realization Rate. This is the ratio of verified gross to ex-ante gross savings.

†The program did not claim any savings for the programmable thermostat measure which results in an overall realization rate that is above 1.0, even though all individual measures have a realization rate below 1.0.

‡ Programmable thermostats were not included as an electric measure by ComEd in EPY5.

Low-flow showerheads by far accounted for the most direct install therm savings as a percentage of total direct install therm savings, followed by programmable thermostat education, bathroom aerators, and pipe insulation. CFLs, especially 9-watt globe and 14-watt spiral, accounted for most of the electric savings in the direct install measure category. Amongst weatherization measures, attic insulation and air sealing accounted almost all gas and electric savings.

4. Net Impact Evaluation

This section details the results of Navigant’s verified net impact analysis for the HES program, which includes adjustments for both free ridership and spillover in the net-to-gross analysis. Navigant presents the following key overall finding:

Verified Net Savings:

Finding 1. Navigant reports verified net savings of 973 MWh and 235,554 therms.

Research Findings NTGR:

Finding 2. Navigant determined an overall program electric research finding NTGR of 0.85 and gas NTGR of 1.05 by consolidating GPY1/EPY4 full-participant FR, GPY2/EPY5 full-participant SO, GPY2/EPY5 assessment-only SO, and GPY2/EPY5 TA FR and SO interview feedback.

4.1 Verified Net Savings

Navigant used the NTGR values shown in Table 4-1 to calculate verified net savings.

Table 4-1. GPY2/EPY5 Nicor Gas and ComEd Deemed NTGR Values

Parameter	Value	Data Source	Deemed, Evaluated, or Research Findings
NTGR – Nicor Gas All Measures	0.86	SAG Spreadsheet †	Deemed
NTGR – ComEd CFLs	0.89	SAG Spreadsheet ‡	Deemed
NTGR – ComEd Water Savings Measures	0.94	SAG Spreadsheet ‡	Deemed
NTGR – ComEd Weatherization Measures	0.80	SAG Spreadsheet ‡	Deemed

† [http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf)

[6,%202013%20Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf](http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August%205-6,%202013%20Meeting/Nicor_Gas_NTG_Results_and_Application_GPY1-3.pdf)

‡ http://ilsagfiles.org/SAG_files/Meeting_Materials/2013/August 5-6, 2013 Meeting/ComEd PY5-PY6 Proposal Comparisons with SAG.xls

Navigant applied the NTGR values above to verified gross measure savings to determine measure-specific verified net program savings, shown in Table 4-2.

Table 4-2. GPY2/EPY5 Verified Net Impact Savings Estimates by Measure Type

	Measure	Therms	Therms NTGR	MWh	MWh NTGR
Direct Install Measures	9 Watt CFL	0	-	66	89%
	14 Watt CFL	0	-	239	89%
	19 Watt CFL	0	-	117	89%
	23 Watt CFL	0	-	108	89%
	9 Watt Globe CFL	0	-	187	89%
	Shower Head	40,466	86%	18	94%
	Kitchen Aerator	652	86%	0.4	94%
	Bathroom Aerator	7,144	86%	2.3	94%
	Hot Water Temperature Setback	2,213	86%	0.1	94%
	Pipe Insulation	6,521	86%	4.4	94%
	Programmable Thermostat	4,486	86%	0	-
	Programmable Thermostat Education	18,112	-	0	-
Subtotal		79,593	86%	742	89%
Weatherization Measures	Attic Insulation	71,075	86%	95	80%
	Wall Insulation	13,889	86%	1.4	80%
	Floor Insulation (Other)	11,122	86%	2.5	80%
	Duct Insulation & Sealing	65	86%	1.3	80%
	Air Sealing	59,809	86%	130	80%
Subtotal		155,961	86%	230	80%
Total	Total Savings	235,554	86%	973	87%

Source: Navigant analysis of GPY2/EPY5 tracking data.

All told, GPY2/EPY5 program net impacts, using evaluated parameters, are 235,554 therms and 973 MWh. The combined effect of the gross impact realization rates and net-to-gross ratios on the HES program results in verified net savings that are 93% and 87% of ex-ante therms and kWh savings, respectively.

4.2 Impact Estimate Parameters for Future Use

In the course of our GPY2/EPY5 research, the evaluation did research on parameters used in impact calculations including those in the Illinois TRM. Some of those parameters are eligible for deeming for future program years or for inclusion in future versions of the TRM and were not used to calculate verified gross savings for GPY2/EPY5. The evaluation team’s parameters recommended for future use are shown in Table 4-3.

Table 4-3. Impact Estimate Parameters for Future Use

Parameter	Value	Data Source
Programmable Thermostats NTGR – ComEd	0.90	Research Findings Sources: 2010 Gas Efficiency Annual Report by the Massachusetts Joint Utility ¹⁷ and Efficiency Vermont Year 2010 Savings Claim ¹⁸
TA Weatherization Measure NTGR estimate (1 – FR + SO)	0.98 (1 - 0.07 + 0.05)	Navigant Trade Ally Interviews (n= 5 of 9 and 54% of total savings) ¹⁹
Full Participant Overall Spillover	2% gas/1% electric	GPY2/EPY5 Full Participant Survey (n=104)
Assessment-only Overall Spillover	9% gas/6% electric	GPY2/EPY5 Assessment-only Survey (n=68)
Overall Program NTGR	1.05 gas (0.94 Direct Install, 1.11 Weatherization) 0.85 electric (0.80 Direct Install, 1.02 Weatherization)	Navigant GPY1/EPY4 and GPY2/EPY5 Full Participant, GPY2/EPY5 Assessment-only Participant, and GPY2/EPY5 TA Surveys

SAG did not deem a programmable thermostats NTGR value for ComEd in EPY5. For GPY2/EPY5, programmable thermostats were not installed in electrically-heated homes. If programmable thermostats are installed in electrically-heated homes in future program years, Navigant recommends using a deemed NTGR value of 0.90 for the programmable thermostats measure, based on an average NTGR value from comparable programs as shown above in Table 4-3.

Additionally, the Illinois TRM version 2.0 includes additional example equations which further clarify the usage of specific parameters in the energy and gas savings equations for kitchen and bathroom faucet aerators. CSG did not apply these factors in GPY2/EPY5. Navigant recommends using these parameters in future program years. A full discussion is presented in Appendix 7.2.1.1.

Navigant determined a TA weatherization measure NTGR of 0.98, consisting of a 7% free ridership estimate and a 5% volume increase spillover. Navigant also gauged full participant and assessment-only participant spillover and found 2% gas and 1% electric full participant overall spillover and 9% gas and 6% electric assessment-only participant overall spillover. Navigant consolidated full-participant, assessment-only, and trade ally NTGR feedback into an overall program NTGR of 1.05 for gas, and 0.85 for electric. See sections 4.2.1, 4.2.2, and 4.2.3 for methodology detail and a discussion of findings.

¹⁷ “2010 Gas Energy Efficiency Annual Report”, Boston Gas Company, Colonial Gas Company and Essex Gas Company each d/b/a National Grid, August 2011, page 67.

¹⁸ “Year 2010 Savings Claim”, Efficiency Vermont, April 1, 2011, page 162

¹⁹ One trade ally’s interview results were omitted because the evaluation team believes their responses to key NTG questions were not reasonable, likely due to misunderstanding the questions.

4.2.1 Trade Ally Weatherization NTGR Calculation Methodology and Results

The trade ally NTGR methodology was based on the one used for the GPY1/EPY4 Home Energy Efficiency Rebate (HEER) program evaluation. The evaluation team made modifications given the HES program provides weatherization measures wherein conversion rates and participation volume are key criteria in establishing free ridership rather than the adoption and sales of energy efficient equipment in higher efficiency measure promoting rebate programs such as HEER.

Trade Ally Perspective of Participant Free Ridership

To calculate participant free ridership using data obtained from the trade ally interviews²⁰, the trade allies were asked about their pre-program and post-program leads, converted projects, and projects outside of the program to determine a market share free ridership. The market share free ridership estimates the number of projects that a contractor had in the program in the current year that would have otherwise been part of the contractor’s participants even without the program. Contractors that had fewer projects in the past than the current total number of projects outside of the program are given a zero free ridership because the program has led to a considerable increase in project volume.

$$\text{Market Share FR} = \frac{[\text{PAST \# OF PROJECTS}] - [\text{TOTAL \# OF PROJECTS OUTSIDE OF PROGRAM}]}{[\text{TOTAL NUMBER OF CURRENT PROJECTS}]}$$

The evaluation team then calculated an alternate free ridership based on the contractor’s likelihood for implementing the same number of measures without the program and their perception of the program’s influence on customers’ decision to implement weatherization measures.

$$\text{Alternate FR} = \frac{[\text{PROGRAM INFLUENCE SCORE}] - (10 - [\text{PROGRAM IMPORTANCE SCORE}])}{20}$$

The evaluation team then averaged the two free ridership scores to estimate an overall free ridership score per contractor.

Participating Trade Ally Volume Increase Spillover

The evaluation team calculated spillover that may have occurred due to an increase in contractor customer volume due to program influence that may have not participated in the program. To calculate participating trade ally spillover using data obtained from the trade ally interviews, the trade allies were asked to estimate approximately what percentage of their leads followed through with weatherization work prior to the program and after the program. Then their self-reported estimate for the percentage of customers that are currently outside of the program was used to estimate potential volume increase spillover.

$$SO = ([\text{Current Conversion Rate}] - [\text{Preprogram Conversion Rate}]) * [\% \text{ Customers Outside of Program}]$$

By determining the change in TA conversion rates between GPY2/EPY5 and their pre-program conversion rates and multiplying it against the current percentage of customers outside of the

²⁰ Please see Appendix 0 for the survey instrument

program, the evaluation team estimated potential spillover that has resulted from the program increasing contractor conversion rates. Other qualitative spillover insights due to the program’s potential influence on the adoption of higher installation standards and on non-participating contractors are provided in the TA interview results discussion in Appendix 7.3.3.

Participating Trade Ally Weatherization NTGR Findings

Using the methods outlined above, Navigant determined a trade ally free ridership of 7% and participation volume increase spillover of 5% for weatherization measures. The resulting overall trade ally weatherization NTGR amounts to 0.98.²¹

Table 4-4. Trade Ally Weatherization NTGR

	FR	SO	NTGR
GPY2/EPY5 TA Research	0.07	0.05	0.98

Source: Navigant analysis of GPY2/EPY5 TA Research

4.2.2 Full Participant and Assessment-only Spillover Methodology and Results

Navigant conducted full participant and assessment-only phone surveys to determine the HES program’s spillover effects on both direct-install measures and weatherization measures.²² The evaluation team was particularly interested in identifying to what extent the program’s assessments were influential in encouraging the installation of weatherization measures outside of the program. The evaluation team did not conduct assessment-only participant free-ridership research under the assumption that their direct install free ridership would be comparable to full participants. Weatherization measure free ridership for assessment-only participants is not applicable since they did not pursue weatherization measures through the program.

Spillover Calculation Methodology

The evaluation team conducted a phone survey where the surveyor asked full participant and assessment-only participants whether they had installed additional direct install and/or weatherization measures after participating in an assessment. Individuals that responded in the affirmative were asked to identify what measures they installed and how influential on a scale of zero to ten the program was in their decision to install those measures, ten being “very influential.” Participants that reported a score of eight or higher were eligible for program spillover. Navigant then looked at spillover-eligible participant-specific responses to identify whether their spillover savings should be attributed to gas or electric savings depending on their home’s heating fuel source in order to avoid double-counting savings. The evaluation team further determined spillover eligibility by comparing respondent reported-spillover measures against their tracking system installed measures. Spillover was not counted for participants that already had a weatherization measure installed as part of the program (with the exception of respondents that reported installing additional insulation to make up for program constraints).

The evaluation team assigned electric direct install spillover savings per unit based on deemed savings values; however, therm savings per spillover measure installed were based on custom

²¹ NTGR = 1-FR+SO

²² The GPY2/EPY5 full participant spillover findings were used to update GPY1/EPY4 research findings to better reflect current program conditions and because the survey sample size was larger in GPY2/EPY5.

calculations of actual therm savings using participant-specific data from the tracking database. Since weatherization measure savings are not deemed per unit like direct install measures, weatherization savings for air sealing, wall insulation, attic insulation, and other insulation were all given respective average savings per participant installation based on program tracking system data.

Total survey participant direct install and weatherization spillover savings estimated using the methods above were then averaged per survey participant (104 full, 68 assessment-only) and applied to the entire participant populations of 825 full and 2,030 assessment-only customers. The resulting full and assessment-only participant spillover savings were divided respectively by total full and assessment-only participant program savings to establish direct install, weatherization, and overall program spillover estimates

Considerations and Measure-Specific Adjustments to Spillover

The evaluation team applied the following measure-specific adjustments to spillover reflecting the approach used in GPY1/EPY4 full participant research.

Compact Fluorescent Bulbs

The impact credit granted for CFL spillover adoptions must avoid double counting impact credit accrued already through the ComEd midstream residential lighting program. We continue to use the approach used in the GPY1/EPY4 evaluation that assumes that 1) the market share of program bulbs is not a readily available number, and 2) the residential lighting program EPY3 evaluation results indicated a substantial amount of free ridership (41%), and there is no reason that one program's free ridership cannot be another program's net impact. Thus, it is not necessary that bulbs be un-incented for them to legitimately qualify for credit under the HES Program.²³ Due to the uncertainty in this area, we take the conservative approach used in the PY3 evaluation and assume that only 50% of the impact arising from CFL spillover adoptions is creditable to the program. Again, even if these customers purchased a discounted bulb, the purchase decision was either influenced by both programs (making the 50% assumption reasonable) or influenced by only the HES program (making the 50% assumption conservative).

Pipe Insulation, Insulation, and Air Sealing

In the case of pipe insulation, the ex-ante impact is based on the installation of up to nine linear feet. Customers that report the installation of additional pipe insulation up to a total of nine linear feet outside of the program and that give the program an influence score of 8 or more qualified as spillover. Similarly, participants in the HES program that reported spillover adoptions of insulation and air sealing measures were credited an impact equivalent to the average verified impact over all the participants as a fraction of the total participant sample's savings for the particular measure.

²³ There is some available evidence regarding the CFL market share of residential lighting program bulbs. The PY3 residential lighting general population survey revealed that 87% of CFLs are purchased at stores participating in the ComEd lighting program. Among program stores, the shelf space dedicated to ComEd program CFL bulbs is 53% of the overall shelf space dedicated to CFLs (for standard bulbs), and 62% for specialty bulbs. If we assume shelf space relates directly to sales share, than 46% of standard CFLs and 54% of specialty bulbs are Residential Lighting program bulbs.

Full-participant Spillover Findings

The evaluation team’s full participant spillover findings are presented in Table 4-5.

Table 4-5. Full Participant GPY2/EPY5 Spillover Results

	Gas	Electric
Direct Install	0%	2%
Weatherization	2%	1%
Overall	2%	1%

Source: Navigant analysis of GPY2/EPY5 Full Participant Survey

Most full participant spillover savings for direct install measures came from additional CFLs that were installed after the program. Weatherization measure spillover mostly came from individuals that reported installing the measure outside of the program was cheaper for them for the particular measure (potentially self-installs) or that the program could not do a certain installation due to space accessibility issues or other constraints.

Assessment-only Spillover Findings

The evaluation team’s assessment-only participant spillover findings are presented in Table 4-6.

Table 4-6. Assessment-only Spillover Results

	Gas	Electric
Direct Install	1%	1%
Weatherization	13%	6%
Overall	9%	6%

Source: Navigant analysis of GPY2/EPY5 Assessment-only Survey

Section 5.2.4 includes a discussion of assessment-only spillover process findings.

4.2.3 Overall Research NTGR: Combining Full-Participant, Assessment-only, and TA NTGR Research

The evaluation team consolidated GPY1/EPY4 full-participant, GPY2/EPY5 assessment-only, and GPY2/EPY5 TA NTGR research to establish overall gas and electric NTGR results for the program. Since TA NTGR feedback was for weatherization measures only (TAs were not involved with the assessments where DI measures were installed), the evaluation team needed to separate NTGR calculations between direct install and weatherization measures for all respondent types before combining results into an overall program NTGR.

Table 4-7. Full and Assessment-only Direct Install FR, SO, and NTGR Results

Direct Install	Gas			Electric		
	FR	SO	NTGR	FR	SO	NTGR
Full-participant (GPY1/EPY4 FR, GPY2/EPY5 SO)	0.08	0.00	0.93	0.23	0.02	0.79
Assessment-only Participant*	0.08*	0.01	0.93	0.23*	0.01	0.78
Combined SO (Full and Assessment-only)		0.01		-	0.03	-

Source: Navigant analysis of GPY1/EPY4 and GPY2/EPY5 full-participant and GPY2/EPY5 assessment-only participant surveys

*Evaluation team adopted full participant direct install FR for assessment-only participants since no separate FR research was conducted

Table 4-8. Full, Assessment-only, and TA Weatherization FR, SO, and NTGR Results

Weatherization	Gas			Electric		
	FR	SO	NTGR	FR	SO	NTGR
Full-participant (GPY1/EPY4 FR, GPY2/EPY5 SO)	0.18	0.02	0.84	0.17	0.006	0.86
Assessment-only Participant	NA	0.13	NA	NA	0.057	NA
Combined SO (Full and Assessment-only)		0.15		-	0.06	-
TA	0.07	0.05	0.98	0.07	0.05	0.98

Source: Navigant analysis of GPY1/EPY4 and GPY2/EPY5 full-participant, GPY2/EPY5 assessment-only participant surveys, and GPY2/EPY5 trade ally interviews

Navigant assigned a 75% weighting to TA FR feedback and 25% to participants. Navigant assigned a greater weight to trade ally free ridership feedback because the evaluation team believes trade allies are more aware of the effects of the program on the weatherization market than participants. Navigant believes participants are less able to determine the effects of the program on their participation if the program did not exist than trade allies with experience in the market.

Table 4-9. TA and Participant FR Weights

FR Results Weighting	
TA Weighting	75%
Participants Weighting	25%

The evaluation team used full-participant direct install free ridership research findings and full-participant and assessment-only direct install spillover results to determine a direct install NTGR. For weatherization measures, the evaluation team weighed the trade ally and full-participant free ridership findings before applying the combined full-participant, assessment-only, and trade ally spillover results. Trade ally spillover results were treated cumulatively with participants because trade ally spillover research gauged business volume increases that may have been due to the program that did not go through the program while participant spillover gauged the installation of additional measures outside of the program. The evaluation team does not believe there is overlap between participant and trade ally spillover, since program trade allies would foreseeably direct customers to the program.

Table 4-10. Direct Install and Weatherization Consolidated FR, SO, NTGR

	Gas			Electric		
	FR	SO	NTGR	FR	SO	NTGR
Direct install (not weighted)	0.08	0.01	0.94	0.23	0.03	0.80
Weatherization (75% TA, 25% Participant FR)	0.10	0.20	1.11	0.10	0.11	1.02

Source: Navigant analysis of GPY1/EPY4 and GPY2/EPY5 full-participant, GPY2/EPY5 assessment-only participant surveys, and GPY2/EPY5 trade ally interviews

The evaluation team applied the respective direct install and weatherization NTGRs to GPY2/EPY5 direct install and weatherization gross savings to establish research verified net savings that were then summed and compared against the overall program verified gross savings to determine an overall program consolidated research findings NTGR for gas and electric savings. In Table 4-11 Navigant presents the overall program consolidated research findings NTGR for gas and electric savings.

Table 4-11. Overall GPY2/EPY5 Program Research Findings NTGR (Participant and TA Research Findings Consolidated)²⁴

	Gas	Electric
FR	9%	20%
SO	14%	5%
NTGR	1.05	0.85

Source: Navigant analysis of GPY1/EPY4 and GPY2/EPY5 full-participant, GPY2/EPY5 assessment-only participant surveys, and GPY2/EPY5 trade ally interviews

²⁴ For comparative purposes, the GPY1/EPY4 NTGRs, determined using only full participant surveys, were 0.86 for gas and 0.82 for electric. Integrating assessment-only and trade ally spillover research has resulted in higher NTGR values.

5. Process Evaluation

The following sections summarize findings for Navigant’s post-assessment QAQC verification ride-alongs and key researchable process questions. Navigant determined the following findings and recommendations:

QAQC Verification Ride-alongs

Measure QAQC

Finding 1. Navigant determined that contractor weatherization work and measures were sufficiently QAQC checked according to and as defined by the program manual. However, direct install measure installation verification was less consistent and not a priority during the QAQC visit.

Recommendation. Navigant recommends the program manual clearly state when Direct Install (DI) measure installations should be verified. Navigant believes that DI measure verification should occur during all assessment and weatherization work QAQC inspections since these inspections are already sampled from the larger participant population and need no further sub-sampling.

DI Measure Verification Tracking

Finding 2. It appears that given the short time-frame for the QAQC visit, staff may not have enough time to fill out all QAQC forms; as a result, they may be skipping certain sections, such as DI measure verification. Without thorough documentation procedures in place for verifying DI measure installations and noting discrepancies, the program may miss out on opportunities to identify error trends that can be improved upon.

Recommendation. Navigant recommends revamping the forms so that they are easy to fill out, trimmed down to just the essentials, and prioritized with the most important QAQC items first. This may help promote QAQC check consistency. In addition, Navigant recommends having post-installation QAQC assessors review DI measures against a project-specific checklist that is printed and brought on site during QAQC assessment so that the assessors do not rely on memory when reviewing DI measures. Finally, the program may benefit from emphasizing that QAQC staff track discrepancies such as installation errors and opportunities for education on appropriate forms.

Programmable Thermostat Education

Finding 3. Navigant’s low GPY1/EPY4 and GPY2/EPY5 survey installation rate findings for programmable thermostat education measures (about 30%) were in part supported by discussions with QAQC staff. Navigant found that QAQC staff (one of which reported being an assessor as well) may not properly understand how and when to implement the programmable thermostat education measure as intended by the program.

Recommendation. Navigant recommends CSG review assessor installation practices for the programmable thermostat education measure to ensure assessors have a clear understanding of how and when to implement the measure.

Program Participation

Assessment Pricing

Finding 1. Nine months of GPY2/EPY5 data suggest that promoting the HES program with a \$49 (participant) assessment cost is a cost-effective way to bring participants into the HES program.

Recommendation. Navigant recommends that Nicor Gas and ComEd retain the \$99 assessment pricing and selectively lower assessment pricing to \$49 to increase participation as necessary.

Incentive Level

Finding 2. Navigant determined that conversion rates and average savings per household did not increase between GPY1/EPY4 and GPY2/EPY5 despite an increase in incentive levels from \$1,250 to \$1,750.

Recommendation. Navigant recommends Nicor Gas continue with the increased incentive level with the expectation that these incentives with the improvements described below will increase conversion and lead to deeper savings per participant.

Full Participation Barriers

Finding 3. Higher than expected participation led to assessor staffing challenges in GPY2/EPY5. This may have created a barrier to participation by 1) preventing assessors from taking adequate time to explain the full participation process during the assessment, and 2) being backlogged in scheduling assessments and weatherization/contractor assignments.

Recommendation. It appears that planning enough time for assessors to explain and promote the weatherization phase during the assessment is a key program process for encouraging higher conversion rates.

Finding 4. Though the program generally rated high in satisfaction, the lowest satisfaction score for both full participants and assessment-only participants was “the time it took to schedule the Home Energy Savings program assessment.” Some assessment-only participants may have been deterred from full participation due to scheduling and follow-up issues. While CSG added assessors to reduce participant wait times, wait times still remained high and pressure on the assessors to complete assessments appears likely to have impacts on program conversion rates.

Recommendation. Navigant recommends addressing any aspects of program processes that may be causing assessment scheduling, post-assessment application processing, or weatherization contractor assignment delays. Ensuring sufficient assessor staffing levels may help alleviate assessment scheduling delays. Navigant recommends that CSG allow the number of assessors to increase or decrease as needed according to participation demand. In addition, the program may increase conversion rates by ensuring proper during-assessment weatherization support and by conducting post-assessment follow-up communications to maintain participant interest in the program and to ensure their understanding of participation procedures.

EI2 House Party Outreach

Finding 4. EI2 house party participants accounted for 13% of participants, about 10% of program savings, and participants were generally more satisfied with the program and understood the participation process and program offerings better than Non-EI2 house

party participants. On the other hand, EI2 house party participant conversion rates were considerably lower than non-participant rates.

Recommendation. With EI2’s withdrawal from the program, Navigant recommends CSG assess the benefits and costs of replicating key components of the house party outreach model and identifying other ways of leveraging community-based outreach approaches.

5.1 QAQC Verification Ride-along Results

Navigant conducted two QAQC ride-alongs with two CSG QAQC staff (a new assessor and an experienced assessor) in order to verify program post-assessment QAQC practices. Field observations were compared against the program operation manual protocols for QAQC practices to identify potential discrepancies.

5.1.1 Measure QAQC

Navigant determined that contractor weatherization work and measures were sufficiently QAQC checked according to and as defined by the program manual. However, direct install measure installation verification was less consistent and not a priority during the QAQC visit. Navigant verified practices outlined in the program operations manual and found that there appears to be ambiguity in the manual as to when Direct Install (DI) measures should be checked. The program manual defines two QAQC types: a QAQC of assessor work and a QAQC of weatherization contractor work. According to the program manual, the assessment QAQC, which emphasizes review of home assessment procedures and verification of direct install measure installation, should either be done as a ride-along with new assessors or as part of contractor weatherization work QAQC. However, the program manual section outlining the contractor QAQC procedures does not outline direct install measure verification as a priority. As a result, it is not clear when a contractor QAQC is defined as one where assessment work including DI measures should be reviewed in addition to contractor work verification procedures. As such, DI measure verification appears to not be strongly and clearly emphasized in the post-installation (contractor) QAQC effort both in the program manual and as observed in Navigant’s ride-alongs.

5.1.2 DI Measure Verification Tracking

It appears that given the short time-frame for the QAQC visit, staff may not have enough time to fill out all parts of QAQC forms; as a result, they may be skipping certain sections, such as DI measure verification. The less thorough review of DI measures was evident in Navigant’s ride-alongs with post-installation (contractor) QAQCs, which resulted in potential lost opportunities for program improvement. QAQC staff relied on memory to recall what DI measures were installed in the particular home, and one assessor reported that they do not always check for DI measures. One of the assessors made notes on DI measures, while the other did not during the assessment (but may have in the car after the assessment).

Both assessors found pipe insulation DI measure errors.²⁵ The first did not seem to make note of it on a form, while the other intended to fix the error before the end of the inspection, but given the other

²⁵ In the first pipe insulation error, the assessor found that the pipe insulation was installed on the wrong portion of the pipe which made the insulation less effective- it wasn’t installed on the first nine feet of pipe. In the second pipe insulation error, the assessor found that the pipe insulation was installed too close to the flue- it should not be within six inches of the flue.

priorities, he forgot and Navigant staff did not see him take note of the error on the forms. These are both examples of the potential for making program improvements that can be lost due to some inconsistencies in defining DI measure verification procedures.

5.1.3 Programmable Thermostat Education

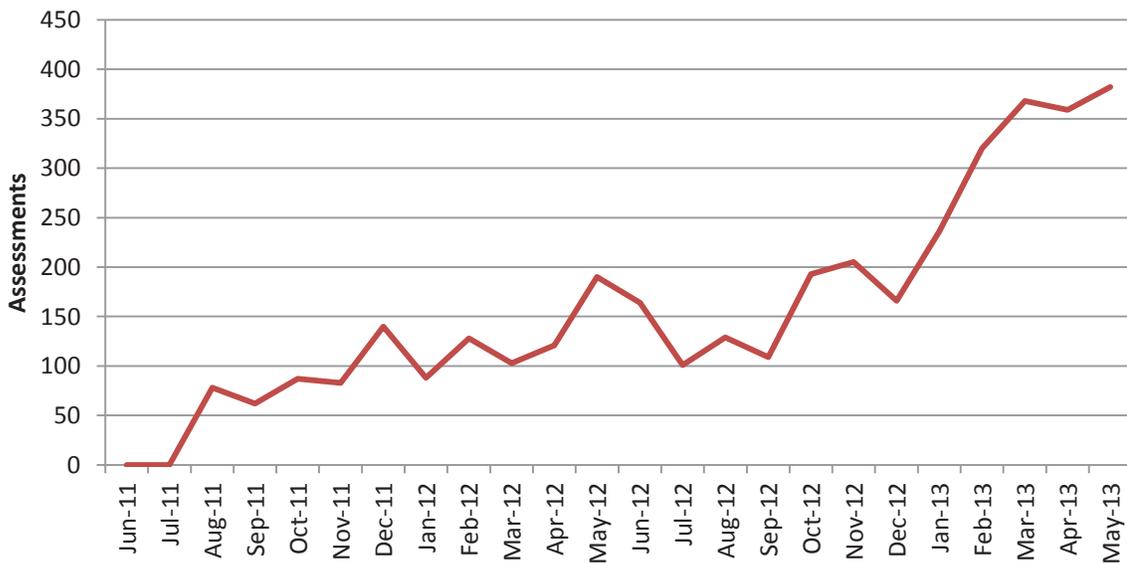
Navigant’s low GPY1/EPY4 and GPY2/EPY5 survey installation rate findings for programmable thermostat education measures (about 30%) were in part supported by discussions with QAQC staff. Navigant found that QAQC staff (one of which reported being an assessor as well) may not properly understand how and when to implement the programmable thermostat education measure as intended by the program. QAQC staff reported that they do not conduct programmable thermostat education measures unless they are installing a programmable thermostat as well- whereas the education measure is intended for existing programmable thermostats. They explained that they wouldn’t want to program an existing programmable thermostat for liability reasons and because of time constraints. One QAQC staff personnel also noted that customer engagement varies, which affects their ability to implement the measure as well. Thus, there appears to be potential for misunderstanding for assessors as to when and how to conduct the measure, as the measure is intended to be done on homes with an existing programmable thermostat. Navigant recommends CSG review assessor installation practices for the programmable thermostat measure to ensure assessors have a clear understanding of how and when to implement the measure.

5.2 Program Participation

Navigant conducted full participant and assessment-only participant surveys in addition to trade ally in-depth interviews and a tracking system data analysis to answer key researchable process questions.

Navigant compared monthly assessment and conversion rate data between GPY1/EPY4 and GPY2/EPY5 to identify trends between the two years. Figure 5-1 below shows that the number of assessments per month has generally increased since GPY1/EPY4.

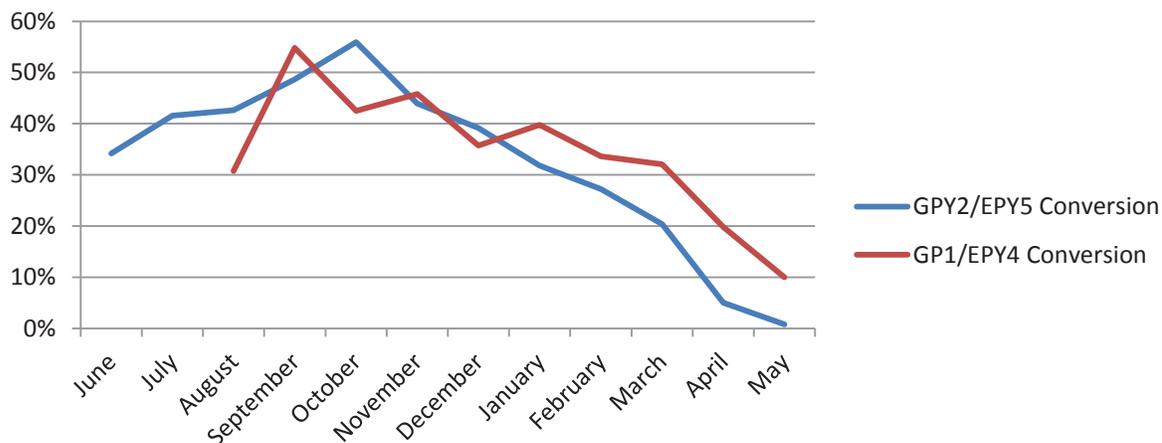
Figure 5-1. Assessments per Month GPY1/EPY4 through GPY2/EPY5



Source: Navigant Analysis of GPY1/EPY4 and GPY2/EPY5 tracking data

Navigant also compared conversion rates between program years. Conversion rates were assigned to the month of the assessment conducted, so if an assessment was conducted in January, and that project’s weatherization work was conducted in February, the conversion is attributed to the month of January. Figure 5-2 below shows that conversion rates have generally followed a trend over the last two program years, despite a three month period in GPY2/EPY5 when assessment prices were reduced to \$49 from \$99. The data shows that conversion rates are highest in the late summer and early fall and steadily decrease through the program year. Figure 5-2 also shows that though the program had similar conversion rates per month in GPY2/EPY5 as in GPY1/EPY4 through January, the program began to have lower conversion rates after December during GPY2/EPY5 than in the same time period in GPY1/EPY4. Note that the fourth quarter results for each program year do not capture assessment participants that will have received weatherization work in the following program year. As a result, the conversion rates for the fourth quarter appear lower due to available data than they are in practice.

Figure 5-2. Comparison of Conversion Rates by Month between GPY1/EPY4 and GPY2/EPY5



Source: Navigant Analysis of GPY1/EPY4 and GPY2/EPY5 tracking data

5.2.1 Assessment Price, Conversion Rates, and Measure Installations

The HES program reduced assessment prices to \$49 from \$99 for 201 participants between the months of June and August, 2012. Navigant reviewed tracking system data to compare incentive cost per unit of energy saved between \$99 and \$49 assessment participants to determine which pricing is more cost effective. The analysis included only incentive costs - both utility and EI2 contributions - and the program management fee associated with the conversions, both of which were pulled from the tracking system extract.²⁶ Navigant allocated EI2 incentive funding to total Nicor and ComEd costs based on their comparative MMBTU savings ratio.²⁷ Navigant’s analysis excludes fourth quarter

²⁶ All analyses and utility-specific costs assume the current cost allocation between ComEd and Nicor Gas as reflected in the tracking system data.

²⁷ Since EI2 contributed money to weatherization incentives, their involvement had an effect on the program that cannot be ignored.

assessment participants because their conversions would not all have occurred in the program year. Two snapshots of the cost findings are presented:

- Nine months GPY2/EPY5 showing EI2 contributions separately
- Direct Install (DI) and weatherization-specific results for nine months of GPY2/EPY5

Navigant's analysis of nine months of GPY2/EPY5 data excluding fourth quarter assessment participants yielded the results in Table 5-1.

In total, the participant \$49 assessments appear more cost effective for both utilities (looking at tracking data costs only), while the \$99 assessment delivers higher conversion rates and higher per participant savings. Higher \$99 conversion rates and the resulting greater weatherization incentive costs more than offset the lower cost to the utility of the \$99 assessment.

Looking separately at direct install and weatherization costs per therm saved, the assessment and direct install measures cost less per unit saved for \$49 assessments relative to \$99 assessments, while weatherization measures cost more (see Table 5-2).

Table 5-1. Nine Months GPY2/EPY5 Overall Assessment Cost Comparison

		Nine Months GPY2/EPY5 Overall	
		\$99	% Diff
Participation	Participation (Assess-only and Full P)	1419	201
	Full Participants	571	60
	Assessment-only	848	141
	Conversion Rate*	40%	30%
Costs**	Nicor Cost	\$840,386	\$ 104,392
	ComEd Cost	\$180,236	\$24,136
	EI2 Cost	\$234,789	\$12,645
	EI2 Cost Nicor Allocation	\$209,463	\$11,155
	EI2 Cost ComEd Allocation	\$25,326	\$1,490
	Total Nicor Cost (Nicor + EI2 Allocation)	\$1,049,849	\$115,548
	Total ComEd Cost (ComEd + EI2)	\$205,562	\$25,626
	Total Cost**	\$1,255,411.65	\$141,173.43
Savings	Therms Saved	179,067	21,617
	kWh Saved	634,916	84,661
	MMBTU Nicor	17,906.72	2,161.74
	MMBTU ComEd	2,165.07	288.69
	Therms Saved per Participant	126.19	107.55
	kWh Saved per Participant	447.44	421.20
	Nicor \$/Therm	\$4.69	\$4.83
Costs per Unit of Energy Saved	ComEd \$/kWh	\$ 0.28	\$0.29
	EI2 \$/Therm	\$1.17	\$0.52
	EI2 \$/kWh	\$0.04	\$0.02
	Nicor \$/Therm with EI2 Allocation	\$5.86	\$5.35
	ComEd \$/kWh with EI2 Allocation	\$0.32	\$0.30

Source: Navigant Analysis of GPY2/EPY5 tracking data.

*Overall \$99 conversion rate includes some \$99 assessments that occurred during the \$49 assessment promotion period

**Incentives and Program Management Fee

Table 5-2. Nine Months GPY2/EPY5 DI and Weatherization by Assessment Cost Comparison

	Nine Months GPY2/EPY5 DI and Weatherization		
	\$99	\$49	% Diff
DI and Assess Measure Cost Nicor	\$172,144	\$32,078	
DI and Assess Measure Cost ComEd	\$62,311	\$11,375	
DI and Assess Measure Cost EI2	\$-	\$-	
Weather Measure Cost Nicor	\$668,242	\$72,314	
Weather Measure Cost ComEd	\$117,925	\$12,761	
Weather Measure Cost EI2	\$234,789	\$12,645	
Nicor EI2 Allocation Ratio	0.89	0.88	
ComEd EI2 Allocation Ratio	0.11	0.12	
Weather Measure Cost Nicor with EI2 allocation	\$877,706	\$83,469	
Weather Measure Cost ComEd with EI2 allocation	\$143,251	\$14,251	
Total DI + Weatherization Cost	\$1,255,412	\$141,173	
Total Full Participant Costs	\$1,115,166	110,886	
DI Measure Savings therms	51,480	8,530	
DI Measure Savings kwh	438,948	61,387	
Weather Measure Savings therms	127,588	13,088	
Weather Measure Savings kwh	195,968	23,274	
Overall Savings therms	179,067	21,617	
Overall Savings kWh	634,916	84,661	
Total Therm Savings DI + Weatherization	179,067	21,617	
Total kWh Savings DI + Weatherization	634,916	84,661	
Total Full Participant Savings therms	148,208	16,048	
Total Full Participant Savings kWh	369,644	41,103	
DI Participants	1,419	201	
Avg DI Savings/DI Participant therms	36	42	17%
Avg DI Savings/DI Participant kWh	309	305	-1%
Total/Full Participants	1,419/571	201/60	
Avg W Savings/Total and Full Participants - therms	90/223	65/218	-28%/ -2%
Avg W Savings/Total and Full Participants - kWh	138/343	116/388	-16%/ 13%
DI + Assess \$/DI Therm Savings	\$3.34	\$3.76	12%
DI + Assess \$/DI kWh Savings	\$0.14	\$0.19	31%
Weather \$/Weather Therm Savings	\$6.88	\$6.38	-7%
Weather \$/Weather kWh Savings	\$0.73	0.61	-16%

Source: Navigant Analysis of GPY2/EPY5 tracking data.

It must be kept in mind that the data are not definitive and repeating and expanding this analysis may make sense once the program marketing and operations are largely stable. Navigant identified the following causes for uncertainty with the data:

- The data reflect only incentive costs and program management fees and do not include full marketing and implementation costs
- The program was ramping up its delivery and marketing capabilities during this period so other factors than the assessment cost may have influenced the conversion rate differences
- The \$49 assessment offering occurred during the summer only, a traditionally low period for this program. Consequently the \$49 results could be unrepresentative of year-round results
- EI2 house parties were active during this period and will not necessarily be active going forward

With the above in mind, the available nine months of data suggest that promoting the HES program with a \$49 (participant) cost is a cost-effective way to bring participants into the HES program. Promoting the program with a \$49 assessment offering could yield additional savings at lower cost than the \$99 price but deliver fewer conversions with their deeper savings.

5.2.2 Incentive Levels, Conversion Rates, and Measure Installations

The program increased incentives of 50% (up to \$1,250 per home) of weatherization costs in GPY1/EPY4 to 70% (up to \$1,750 per home) in GPY2/EPY5. By comparing program-year-level data in the GPY1/EPY4 and GPY2/EPY5 tracking databases, Navigant found that the GPY2/EPY5 conversion rate was 26% compared to 29% in GPY1/EPY4.²⁸

²⁸ The 95 GPY1/EPY4 audit participants that received weatherization work in GPY2/EPY5 were not included in the total full participants in GPY2/EPY5 for calculating conversion rates across the program year, since GPY2/EPY5 participants that will receive weatherization work in GPY3/EPY6 are not captured yet either. The reported conversion rates are approximate. Once GPY2/EPY5 audit participants that receive weatherization work in GPY3/EPY6 will be factored in, the GPY2/EPY5 conversion rate will increase. For example, the GPY1/EPY4 conversion rate increases to 38% when the 95 GPY1/EPY4 participants that received weatherization work in GPY2/EPY5 are included in the full participant count for GPY1/EPY4. The latter adjustment to GPY1/EPY4 conversion rates could be done once GPY2/EPY5 data became available during GPY3/EPY6. The same will be done for GPY2/EPY5 once GPY3/EPY6 data becomes available, allowing the evaluation team to identify which GPY2/EPY5 audit participants ultimately received weatherization work in GPY3/EPY6.

Table 5-3. Conversion Rate and Savings Comparison GPY1/EPY4 and GPY2/EPY5

	GPY1/EPY4	GPY2/EPY5
Total Assessment-only and Full-Participants	1,080	2,760
Total Full Participants	315	730
Conversion Rate	29%	26%
Avg kWh Savings/Household	536	406
Avg therm Savings/Household	102	99
kWh % Difference GPY2/EPY5 vs GPY1/EPY4		-24%*
Therms % Difference GPY2/EPY5 vs GPY1/EPY4		-2%

Source: Navigant analysis of GPY1/EPY4 and GPY2/EPY5 tracking data.

**The decrease in electric savings may be attributed to changes in the CFL baseline wattage between GPY1/EPY4 and GPY2/EPY5 as well as there being no electric programmable thermostat heaters in GPY2/EPY5 compared to GPY1/EPY4.*

The above results in Table 5-3 show that annual conversion rates and average savings per household did not increase between GPY1/EPY4 and GPY2/EPY5 despite an increase in incentive levels from \$1250 to \$1750. One factor for the lack of increase in conversion rates despite an increase in the incentive offerings may be due to assessment and weatherization job scheduling delays that may have occurred as a result of higher than planned participation in GPY2/EPY5. Though the conversion rate is lower in GPY2/EPY5 than GPY1/EPY4, the number of assessment participants in GPY2/EPY5 nearly tripled.

During interviews, CSG noted that program volume increased in the fourth quarter of 2012 which resulted in an assessment backlog of more than three to five weeks. The resulting demand on assessors' time may have resulted in less thorough assessments where assessors may have had less time to devote to the customer, making sure they understand the assessment reports, and helping to convince them to participate in weatherization work. Notably, one contractor cited a lack of assessor focus on promoting projects rather than focusing on achieving a target number of assessments done per month as a barrier to customer weatherization participation. The contractor felt the assessors were not spending enough time with customers to educate and otherwise prime them to undertake the project. This contractor's sentiment was paralleled in participant survey result findings described below.

Contractors further cited delays between the assessment and weatherization work without sufficient follow-up to encourage home owners to follow-through with work as potential barriers that may have depressed conversion rates. Contractors interviewed noted that, although the price point is the primary determinant of weatherization participation, timing is an additional important factor. One contractor said customers are more likely to pursue projects if the program can minimize the time between when the program gets introduced to the customer and when the assessment is done, and then the time to when the project is scheduled.

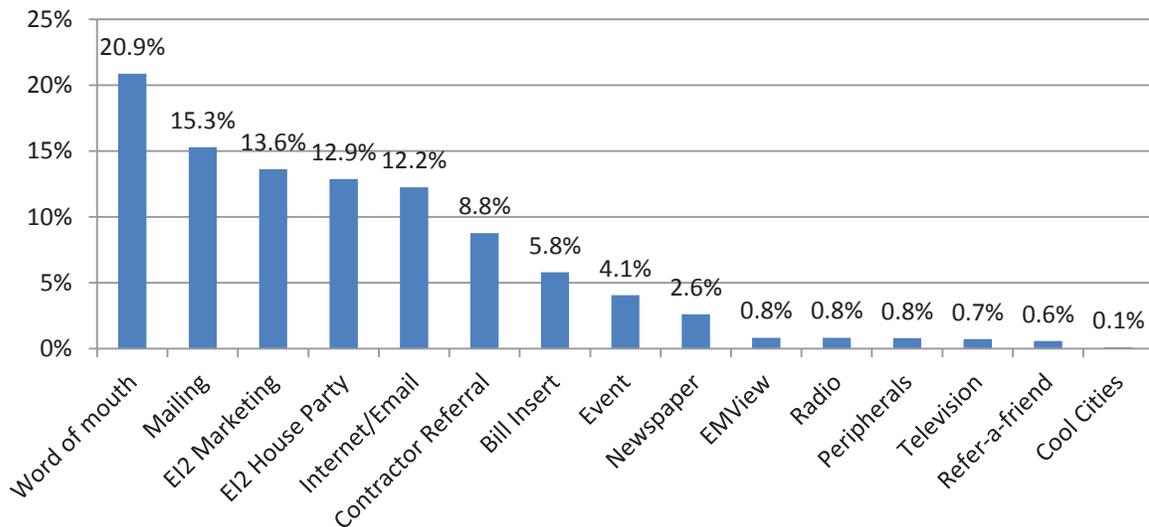
Navigant notes similar assessment timing and quality sentiment trends in the full and assessment-only participant feedback in section 5.2.4 below. Assessment-only participants noted that the greatest sources of dissatisfaction with the program were that the program was not helpful, that there were

scheduling issues (including lack of prompt follow-up after assessment), and insufficient program information and understanding despite the home assessment.

5.2.3 EI2 House Party Outreach Model Analysis

According to CSG tracking data, EI2 house parties accounted for about one-tenth of total program participation referrals (13%), which, along with Internet referrals, made it the fourth most common referral source after EI2 marketing, program mailers, and word of mouth. Furthermore, EI2 house parties accounted for about 8% of full participant participation and 10% of both electric and gas total savings.

Figure 5-3. Total Program Referral Sources (n=2,760)



Source: Navigant analysis of GPY2/EPY5 tracking data.

EI2 Conversion Rates

Navigant reviewed the EI2 referral conversion rate against Non-EI2 referral participants. The EI2 conversion rate was 19% compared to 31% for Non-EI2 participants. According to Navigant’s survey data comparing EI2 against Non-EI2 full participants, EI2 participants reported being more likely to have done major changes to their home to save energy than the average participant prior to learning about the program. Two-thirds of EI2 full participants also reported having been hosts of a house party as well. Another potential reason for the lower EI2 conversion rate may have to do with the nature of the event, where some house party attendees may be friends and family that attend the event and get an assessment more out of curiosity rather than prior intention of having weatherization work done on their home.

Table 5-4. EI2 vs. Non-EI2 Participation and Savings²⁹

	EI2	Non-EI2
Total Participants	355	2405
Total Full Participants	68	757
Conversion Rate	19%	31%
Total kWh Savings	112,808	1,007,989
Total Therm Savings	25,912	247,988
Avg kWh/Household	318	419
Avg therm/Household	73	103

Source: Navigant analysis of GPY2/EPY5 tracking data.

EI2 Model Strengths

Navigant used full participant survey data (n=104) and trade ally interviews (n=5) to better understand EI2 house party outreach strengths. According to Navigant’s survey data, more EI2 full participants generally gave program process scores a rating of seven or higher on a ten-point scale than non-EI2 participants (see Table 5-5). The biggest difference in scoring distributions between EI2 and non-EI2 participants was for the “information received about the program” category, where 100% of EI2 participants rated it a seven or higher compared to 91% of non-EI2 participants.

Table 5-5. Non-EI2 vs EI2 Program Process Satisfaction Scores

Category	% of Non-EI2 Ratings 7+	% of EI2 Ratings 7+
Program sign up process	91%	97%
The instant rebate	94%	97%
Measures received	87%	93%
Time it took to schedule an assessment	87%	89%
Time it took to schedule the insulation work	84%	83%
The representative that visited to conduct the assessment	93%	94%
Contractor who installed weatherization upgrades	93%	97%
Info received about the program	91%	100%
The House Party program informational session	NA	100%
The Home Energy Savings program overall	94%	100%

Source: Navigant analysis of survey data.

²⁹ Non-EI2 full participants and savings values include 95 GPY1/EPY4 audit participants that received weatherization work in GPY2/EPY5.

Contractors interviewed had a number of observations and opinions about the EI2 informational parties. A key strength of the informational parties, one contractor noted, was having an independent third party hosting and conducting the party so that the contractor was presenting on behalf of the program as a participating contractor. This resulted in a “no-pressure” approach for prospective customers to size up the program without feeling they are getting a biased sales pitch. One contractor who is a proponent of the house party outreach method has noticed that the independent third party setting ending with the end of the EI2-supported house party outreach method is causing prospective customers to have a more guarded interest in the program. Another trade ally noted that a challenge with the house party outreach method is that some people schedule parties and then cancel them. Nonetheless, the same respondent said that when they actually get a house party they get an average of two to three job referrals per house party.

Considering that EI2 house party attendees accounted for 13% of program participants and about 10% of electric and gas savings, discontinuing the EI2 program could risk a substantial amount of future program savings. A simple way to maintain the benefits provided by EI2 house parties (principally, a productive channel with thorough program information) can be to continue to host house parties, leveraging EI2’s methods and materials. The program could also benefit from promotion through relevant community networks.³⁰ For example, NSTAR Electric Company (NSTAR) notes in their 2009-2012 three year evaluation plan that a successful community outreach model involves understanding and addressing the unique needs of partner communities to achieve cost-effective energy savings. NSTAR sought to promote through

“... community-based organizations that have long-standing relationships with homeowners, tenants and small businesses in economically marginalized communities and other groups that have a strong record of clean energy education and outreach, [to] develop a ‘community mobilization outreach model’ that implements a large-scale bundled neighborhood approach to energy efficiency retrofitting.”

NSTAR chose community organizations to promote their programs based on 1) their existing and long-standing ties with potential participants in the program and/or 2) their strong record of clean energy education and outreach.

Properly selecting communities for community-based outreach is important as well. NSTAR program administrators selected communities with the greatest opportunities for success because community-based efforts require a substantial and focused effort by both the program administrator and the community. Then the utility and program administrator partnered with community-based organizations (chosen based on the criteria noted above) in those communities to develop outreach

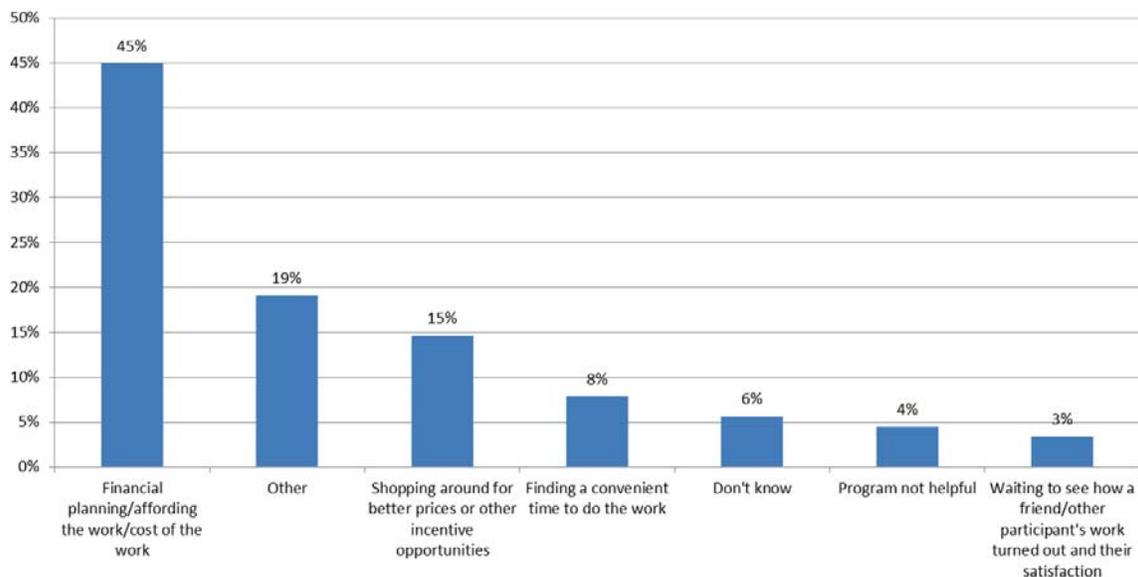
³⁰ Navigant conducted a literature review to identify examples of community outreach at other utilities. The evaluation team found that NSTAR Electric Company (NSTAR) in Massachusetts had particularly successful community-based outreach efforts. NSTAR conducted community-based pilots designed to test a number of partnerships in 2011 between the Program Administrators and local communities to achieve broader participation in audit and weatherization type energy efficiency programs. Program outreach was conducted by local community groups and measures were installed through the company’s existing vendors. According to NSTAR’s evaluation report (NSTAR Electric 2011 Energy Efficiency Annual Report, pg. 47), while the overall results and successes of these outreach activities varied by community, the utility determined that community outreach is an important component to enhancing the company’s ability to achieve greater program participation and energy savings. The HES program may benefit from more actively leveraging community groups to help promote the program, including promoting informational house parties.

and program delivery strategies. In partnering with community organizations, the utility and program administrator sought to educate the organizations about the energy efficiency services delivery process and learn about the interests and skill sets of the community-based groups with respect to potentially delivering agreed-upon program components in selected communities.³¹

5.2.4 Barriers to Full Participation and Assessment-only “Do-It-Yourself” Spillover

The evaluation team reviewed assessment-only survey results to identify barriers to full participation. The primary reason assessment-only participants gave for not completing the recommended weatherization work was “Financial planning/affording the work/cost of the work” (45% of responses, n=89). Other top reasons included shopping around for better prices or other incentive opportunities, and finding a convenient time to do the work.

Figure 5-4. Assessment-Only Weatherization Participation Barriers



Source: Navigant analysis of survey data.

Assessment-only participants further noted that the greatest sources of dissatisfaction with the program were that the program was not helpful, that there were scheduling issues (including lack of prompt follow-up after assessment), and insufficient program information and understanding despite the home assessment. As noted previously, contractors similarly cited financial concerns and timing as top barriers to participation. Contractors noted long wait times for scheduling weatherization work without sufficient follow-up to encourage home owners to follow-through with work. One contractor notes that projects have a better chance of being done if the program can minimize the time between when the program gets introduced to the customer and when the assessment is done, and then the time to when the project is scheduled (see Appendix 7.3 for detailed trade ally interview findings).

³¹ See Massachusetts Joint Statewide Three-Year Electric Energy Efficiency Plan, 2010-2012, pgs. 115-118. <http://www.env.state.ma.us/dpu/docs/electric/09-120/11209nstptl.pdf>

Assessment-only participant suggestions for program improvement include providing better participation information, explaining the applicability of the program to various home types (and lack thereof), and addressing concerns over lack of information and/or comprehensiveness during the assessment.

Assessment-only Spillover Process Findings

Navigant found indication of do-it-yourself spillover among assessment-only participants as described in Section 4.2.2. About 22% of assessment-only participants did some form of weatherization work after the program, though not all attributed influence to the program. Of the 68 assessment-only participants that were interviewed, there was one instance of air sealing, two instances of wall insulation, two of attic insulation, and one of other insulation that were installed and eligible as program spillover (participants reported program influence scores of 8 or higher). Of the 15% of assessment-only participants that indicated that they were “shopping around” for better incentives/deals, about 38% followed-through with insulation work outside of the program, and none of those attributed high influence to the program for doing that work.

5.2.4.1 Full and Partial Participant Program Process Satisfaction Score Comparison

Navigant further compared full participant and assessment-only participant survey results for program process satisfaction to identify experience differences between the two groups as well as to identify lowest scoring processes that may need attention. Generally, more full participants scored program processes a seven or above on a ten-point scale. The process that received the most low scores for both full participants and assessment-only participants was “the time it took to schedule the Home Energy Savings program assessment.” Only 60% of assessment-only participants gave it a score of seven or higher. This suggests that some assessment-only participants may have been deterred from full participation due to scheduling and follow-up issues.

Table 5-6. Assessment-only and Full-Participant Satisfaction Average Score Comparison

	% Assessment-only (GPY2/EPY5) Score 7+	% Full Participant Score 7+
The process to sign up for the program	73%	97%
The time it took to schedule the Home Energy Savings program assessment (energy audit)?	60%	89%
The representative that visited your home to conduct the home energy assessment (energy audit)?	81%	94%
Information you received about the program	79%	100%
The House Party program informational session you attended*	100%	100%
The Home Energy Savings program overall?	73%	100%

Source: Navigant analysis of survey data.

*This question was asked only of survey respondents that reported attending an EI2 house party.

In sum, assessment-only participants identified finances, other potential better offers, and timing as the most important barriers in continuing to participate in the program after their home assessment. The program may benefit from establishing protocols for following-up with customers shortly after their assessments to both ensure their understanding of the program next steps and to help promote their participation in the program. Directly addressing any customer concerns over finances, convenient scheduling for weatherization work and the competitiveness of the rebates during follow-up could help promote their full participation in the program. Ensuring assessor staff have time to address these issues during assessments could prove helpful for increasing conversion rates as well.

6. Conclusions and Recommendations

Overall, the program performed well in GPY2/EPY5 relative to GPY1/EPY4. Assessment participation, weatherization participation, and electric savings targets were met, though therms savings goals were not. Furthermore, participants were generally satisfied with the program, though some areas for streamlining were identified. Key impact and process findings and recommendations are outlined below.

Program Savings Achievement

Finding 1. The GPY2/EPY5 program set to achieve net savings of 700 MWh and 545,466 therms. Navigant reports verified gross savings of 1,121 MWh and 273,900 therms and verified net savings of 973 MWh and 235,554 therms. GPY2/EPY5 verified net gas savings do not meet the original savings goals while electric savings exceed them. However, both gas and electric gross savings achieved are in line with the implementation contractor's revised goals.

Recommendation. Navigant recommends adjusting program savings goals for future program years based on lessons learned in GPY2/EPY5 and the program participation and savings findings presented in this report.

Gross Realization Rates

Finding 2. Navigant reports overall gross realization rates of 100% for MWh and 108% for therms.

Recommendation. Navigant recommends updating ex-ante calculations for kitchen and bathroom faucet aerators based on clarifications presented in the Illinois TRM version 2.0. Additionally, Navigant recommends applying programmable thermostat savings at the household level rather than per unit installed to be in line with the TRM, and to calculate ex-ante programmable thermostat education savings based on clarifications in the TRM v2.0.

Net-to-Gross Rate

Finding 3. Navigant calculates overall verified net savings using SAG-deemed NTGR values of 0.87 for electric savings and 0.86 for gas savings. SAG deemed electric NTGR values on a measure-specific basis, and deemed an overall program NTGR for gas savings. The evaluation team also determined an overall research NTGR for future use of 0.85 for electric savings (0.80 Direct Install, 1.02 Weatherization) and 1.05 (0.94 Direct Install, 1.11 Weatherization) for gas savings utilizing full-participant, assessment-only participant, and trade ally research findings.

Tracking System Review

Finding 4. The evaluation team found that though it is possible to identify full-participants from assessment-only participants in the tracking database judging by their measure installations, there is no unique field clearly designating full-participants from assessment-only participants.

Recommendation. Navigant recommends adding a field in the tracking database for participant type to distinguish full-participants from assessment-only participants. This

will help ensure proper differentiation between the two participants groups in the tracking data for analysis.

Program Participation

Finding 5. The GPY2/EPY5 HES program saw participation of 2,760 total home energy assessments with weatherization jobs completed at 825 residences (these 825 weatherization jobs include 95 carry-over participants that received assessments in GPY1/EPY4). This is more than double GPY1/EPY4 participation, with an increase in total participants of 156% and an increase in weatherization jobs of 158%.

Assessment Pricing

Finding 6. Nine months of GPY2/EPY5 data suggest that promoting the HES program with a \$49 (participant) assessment cost is a cost-effective way to bring participants into the HES program.

Recommendation. Navigant recommends that Nicor Gas and ComEd retain the \$99 assessment pricing and selectively lower assessment pricing to \$49 to increase participation as necessary.

Incentive Level

Finding 7. Navigant determined that conversion rates and average savings per household did not increase between GPY1/EPY4 and GPY2/EPY5 despite an increase in incentive levels from \$1,250 to \$1,750. Other program factors in GPY2/EPY5, described below, may have depressed the conversion rate.

Recommendation. Navigant recommends Nicor Gas and ComEd continue with the increased incentive level with the expectation that these incentives, when combined with improvements described below will, increase conversions and lead to deeper savings per participant.

Full Participation Barriers

Finding 8. Though the program generally rated high in satisfaction, the lowest satisfaction score for both full participants and assessment-only participants was “the time it took to schedule the Home Energy Savings program assessment.” Some assessment-only participants may have been deterred from full participation due to scheduling and follow-up issues. While CSG added assessors to reduce participant wait times, wait times still remained high and pressure on the assessors to complete assessments appears likely to have impacts on program conversion rates.

Recommendation. Navigant recommends addressing any aspects of program processes that may be causing assessment scheduling, post-assessment application processing, or weatherization contractor assignment delays. Ensuring sufficient assessor staffing levels may help alleviate assessment scheduling delays. Navigant recommends that CSG allow the number of assessors to increase or decrease as needed according to participation demand. In addition, the program may increase conversion rates by ensuring proper during-assessment weatherization support and by conducting post-assessment follow-up communications to maintain participant interest in the program and to ensure their understanding of participation procedures.

EI2 House Party Outreach

Finding 9. EI2 house party participants accounted for 13% of participants, about 10% of program savings, and participants were generally more satisfied with the program and understood the participation process and program offerings better than Non-EI2 house party participants. On the other hand, EI2 house party participant conversion rates were considerably lower than non-participant rates.

Recommendation. With EI2's withdrawal from the program, Navigant recommends CSG assess the benefits and costs of replicating key components of the house party outreach model and identifying other ways of leveraging community-based outreach approaches.

Future Evaluation Risk

Finding 10. Given that GPY2/EPY5 and GPY3/EPY6 NTGR are based on GPY1/EPY4 research, Navigant has reason to believe that future NTGR research may yield notably different results given interim changes in incentive levels, assessment pricing, and/or outreach methods.

Recommendation. The above should be taken into consideration when planning program changes.

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, 2012³².

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 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

³² IL-TRM_Policy_Document_10-31-12_Final.docx

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

This section presents the results of Navigant’s research findings savings and approaches. These findings are provided for reference purposes, and are not indicative of the overall verified program savings. Navigant presents detailed verified program results in the main body of the report.

7.2.1.1 Research Findings TRM Parameter and Algorithm Adjustments

Navigant performed a detailed engineering review of the ex-ante savings assumptions provided by CSG. Navigant recommends the following changes to measure savings calculations for CFLs and kitchen and bathroom faucet aerators. Navigant used the findings presented in Table 7-1 to inform the research findings savings calculations. Navigant applied these changes to the research findings savings; they do not affect verified savings.

Table 7-1. Research Findings Impact Adjustments

Measure	Navigant Update
All CFL Types	Per the Illinois TRM version 1.0 and 2.0, Navigant applied heating penalty calculations for CFLs to overall gas savings. Navigant applied the gas heating penalty to participants who installed CFLs in gas heated homes. The inclusion of heating penalty for gas heated homes caused total program therm savings to decrease.
Kitchen and Bathroom Aerators	The Illinois TRM version 2.0 includes additional example equations which further clarify the usage of specific parameters in the energy and gas savings equations for kitchen and bathroom faucet aerators. Navigant applied these updated assumptions for parameter to the kitchen and bathroom faucet aerator measures. This change caused kitchen aerator savings to increase and bathroom faucet aerator savings to decrease. Navigant recommends that this change be applied to aerator savings calculations for GPY3/EPY6.

The following equations and parameters are sourced from the Illinois TRM version 2.0.

Compact Fluorescent Bulbs

Per Section 5.5.1 of the IL TRM v 2.0, the total gas heating penalty for compact fluorescent bulb installations in gas heated homes is calculated as follows:

$$\Delta\text{Therms} = - (((\text{WattsBase} - \text{WattsEE}) / 1000) * \text{ISR} * \text{Hours} * \text{HF} * 0.03412) / \eta_{\text{Heat}}$$

Where:

WattsBase = Baseline wattage of lighting equipment

WattsEE = Efficient wattage of lighting equipment

ISR = In Service rate

Hours = Annual hours of use
 HF = Heating Factor = 49% for interior/unknown locations; 0% for exterior/unheated locations
 nHeat = 70% efficiency of heating system

While Navigant did apply heating penalty for electric savings for the verified program savings, Navigant did not apply the same heating penalty to verified gas savings. Navigant applied the heating penalty to gas heated homes for the research findings savings.

Kitchen and Bathroom Aerators

Per Section 5.4.4 of the IL TRM v 2.0, total electric and gas savings for kitchen and bathroom faucet aerators is calculated as follows:

$$\Delta\text{Therms} = \% \text{FossilDHW} * ((\text{GPM_base} * \text{L_base} - \text{GPM_low} * \text{L_low}) * \text{Household} * 365.25 * \text{DF} / \text{FPH}) * \text{EPG_gas} * \text{ISR}$$

$$\Delta\text{kWh} = \% \text{ElectricDHW} * ((\text{GPM_base} * \text{L_base} - \text{GPM_low} * \text{L_low}) * \text{Household} * 365.25 * \text{DF} / \text{FPH}) * \text{EPG_electric} * \text{ISR}$$

The Illinois TRM version 2.0 includes additional example equations which further clarify the usage of specific parameters in the energy and gas savings equations for kitchen and bathroom faucet aerators. Navigant reviewed these clarifications and recommends the following methods for savings calculations:

DF = Drain Factor. The Illinois TRM version 1.0 is ambiguous to the application of DF. Based on clarification in the Illinois TRM version 2.0, Navigant applied a DF of 75% for kitchen aerators and 90% for bathroom aerators to the research findings savings calculations. Ex-ante calculations utilized the unknown DF of 79.5% for kitchen and bathroom aerators combined. Navigant recommends using the measure-specific DF in future program year savings calculations.

FPH = Faucets per Household. The Illinois TRM version 1.0 is ambiguous to the application of FPH in the savings equations. Based on clarification in the Illinois TRM version 2.0, Navigant used the total kitchen faucets per household in the kitchen aerators savings calculation, and the total bathroom faucets per household in the bathroom faucet aerator savings calculation. If the faucet quantities were unknown, Navigant applied the TRM-specific deemed FPH (1.0 for kitchen faucets and 2.83 for bathroom faucets). These parameters were used to calculate research findings savings for this measure. Navigant recommends using the measure-specific FPH in future program year savings calculations.

Based on research findings updates to CFL and faucet aerator savings, Navigant presents research findings gross savings by measure in Table 7-2. These gross savings utilize TRM-specific in-service rates.

Table 7-2. Research Findings Gross Savings with TRM-Specified In-Service Rates

	Measure	Therms	Therms RR	MWh	MWh RR
Direct Install Measures	9 Watt CFL	-473	-	74	1.00
	14 Watt CFL	-1797	-	268	1.00
	19 Watt CFL	-947	-	131	1.00
	23 Watt CFL	-903	-	122	1.00
	9 Watt Globe CFL	-800	-	211	1.00
	Shower Head	47,053	1.00	19	1.01
	Kitchen Aerator	1,432	1.81	1	2.27
	Bathroom Aerator	3,580	0.44	1	0.52
	Hot Water Temperature Setback	2,573	1.00	0	0.23
	Pipe Insulation	7,583	0.96	5	1.21
	Programmable Thermostat	5,216	0.93	0	-
	Programmable Thermostat Education	21,060	-	0	-
	Subtotal		83,576	1.16	832
Weatherization Measures	Attic Insulation	82,645	1.00	119	1.00
	Wall Insulation	16,150	1.00	2	1.00
	Floor Insulation (Other)	12,933	1.00	3	1.00
	Duct Insulation & Sealing	76	1.00	2	1.00
	Air Sealing	69,546	1.00	163	1.00
Subtotal		181,350	1.00	288	1.00
Total		264,926	1.05	1,120	1.00

7.2.1.2 Survey-Determined Installation and Persistence Rates

This section details the installation and persistence rate results based on full participant surveys conducted in GPY2/EPY5.

The installation rate is a ratio of customer-reported measure installations to those contained in the program tracking database. The persistence rate is used to reflect the removal of program measures, which can be thrown away, given away, sold, or put into storage. Unlike the installation rate, which can be gauged immediately after a contractor completes work, gauging persistence requires factoring in a period of time after installation before it can be properly measured. Multiplying an installation rate and a persistence rate results in an in-service rate for a measure, which signifies the percentage of a measure reported in the tracking system that is currently verified installed. Thus the in-service rate is multiplied against tracking system ex-ante data to determine verified gross savings.

Navigant used TRM-prescribed in-service rates to calculate verified gross savings for direct install measures. However, for program research findings savings, the evaluation team conducted a participant survey to determine estimates for in-service rates these measures. The survey gauged installation rates for measures the tracking system reported installed for each survey participant.

Following the installation rate question battery, all respondents were asked a two-part persistence question to identify 1) participants that reported uninstalling one of the measures installed in the program, and 2) which measures were uninstalled by each participant that reported uninstalling something.

Table 7-3 shows the installation and persistence rate results for direct install and weatherization measures from Navigant’s participant surveys alongside the in-service rates deemed in the Illinois TRM for direct install measures.

Table 7-3. Survey-Determined Direct Install Measure Installation and Persistence Rates Compared to TRM In-Service Rates

Measure	n=	Survey Installation Rate †	Survey Persistence Rate	Research Findings In-Service Rate	TRM In-Service Rate
All CFL Types	86	-	-	0.97‡	0.97
Low Flow Shower Head	96	0.99†	0.82	0.82	0.98
Kitchen Aerator	19	0.79†	0.88	0.88	0.95
Bathroom Aerator	94	0.97†	0.93	0.93	0.95
Hot Water Temperature Setback	19	0.63†	1.0	1.0	1.0
Pipe Insulation	81	0.80†	1.0	1.0	1.0
Programmable Thermostat	8	0.75†	1.0	1.0	1.0
Programmable Thermostat Education	36	0.31^	0.88^	0.27^	1.0

Source: Navigant participant surveys

† Navigant reports an installation rate of 1 for these measures as noted in CSG’s QAQC findings.

^ Navigant utilized the survey determine installation and persistence rates to calculate in-service rate for this measure. During QAQC ride-along trips and through conversations with program implementation staff, Navigant identified programmable thermostat education as a measure that is potentially inconsistently reported in the program tracking database, and also a measure that is not consistently implemented in each residence. Since this is a behavioral measure where an individual might reset the programming, there is also precedent to expect relapse and an in-service rate of less than 1. Since the TRM does not provide an estimate for this measure, the evaluation team will continue to use this value to estimate a survey-determined in-service rate for research findings gross savings calculations.

‡ Navigant gauged an overall research findings in-service rate for CFLs based on survey questions.

Note that according to the participant survey some installation rates are less than 100%. This may be due to respondent self-report recollection error. Navigant confirmed that CSG performs adequate QAQC follow-up checks on homes and accepts their reported installation rate of 100% for all measures except for programmable thermostat education. Navigant also assumed an installation rate and persistence rate of 1 for weatherization measures and did not gauge it in the survey as it is unlikely weatherization measures would be uninstalled. As a result, weatherization measures were all assigned an in-service rate of 1.

7.2.1.3 Research Findings Gross Program Impact Results

This section presents the evaluated HES Program gross savings based on the evaluation team’s research findings for direct install and weatherization measures for reference purposes (whereas the

verified gross savings in the body of the report were based on TRM-prescribed gross parameter estimates for direct install measures). These savings values include the installation rates, persistence rates, and in-service rates determined utilizing the participant surveys. Table 7-4 presents the gross program savings and realization rates based on research findings.

Table 7-4. GPY2/EPY5 HES Program Research Findings Gross Savings

	Measure	Therms	Therms RR*	MWh	MWh RR*
Direct Install Measures	9 Watt CFL	-474	-	74	1.00
	14 Watt CFL	-1801	-	269	1.00
	19 Watt CFL	-949	-	132	1.00
	23 Watt CFL	-905	-	122	1.00
	9 Watt Globe CFL	-802	-	211	1.00
	Shower Head	39,440	0.84	16	0.84
	Kitchen Aerator	1,319	1.67	0.7	2.09
	Bathroom Aerator	3,513	0.43	1.1	0.51
	Hot Water Temperature Setback	2,573	1.00	0.1	0.23
	Pipe Insulation	7,583	0.96	4.7	1.21
	Programmable Thermostat	5,216	0.93	0.0	-
	Programmable Thermostat Education	5,631	-	0.0	-
	Subtotal		60,344	0.84	830
Weatherization Measures	Attic Insulation	82,645	1.00	119	1.00
	Wall Insulation	16,150	1.00	1.7	1.00
	Floor Insulation (Other)	12,933	1.00	3.1	1.00
	Duct Insulation & Sealing	76	1.00	1.6	1.00
	Air Sealing	69,546	1.00	163	1.00
Subtotal		181,350	1.00	288	1.00
Total		241,694	0.95	1,118	1.00

Source: Navigant analysis

*RR = Realization Rate. This is the ratio of research findings gross to ex-ante gross savings.

7.2.2 Research Findings Net Program Impact Results

This section details the results of Navigant’s research net impact analysis for the HES program, which includes adjustments for both free ridership and spillover in the net-to-gross analysis.

7.2.2.4 Free-Ridership, Spillover, and Net-to-Gross

The objective of the free ridership assessment is to estimate the impact of program incited measures that would have been installed even in the absence of the program. This cannot be measured directly due to the inability to observe behavior in the absence of the program. Thus, free ridership is assessed

as a probability score for each measure. The evaluation relies on self-reported data collected during participant telephone surveys to assign free ridership probability scores to each measure. The objective of the spillover assessment is to estimate the impact arising from efficient measures installed as a result of the program that were not incented by the program. The evaluation also relies on self-reported data collected during the telephone surveys to identify these measures and assess the role of the program in the decision to install. Summing the free ridership and spillover scores and subtracting them from a factor of 1.0 results in a net-to-gross ratio that the evaluation team applied to research findings gross savings to estimate research findings net program savings.

Navigant calculated net-to-gross values for each direct install and weatherization measure based on the free ridership and spillover results determined using full and assessment-only participant surveys. Navigant utilized free ridership values from GPY1/EPY4 full-participant research, and updated spillover values based on GPY2/EPY5 full and assessment-only participant surveys. The evaluation team also used trade ally free ridership and spillover feedback that was combined with participant results as described in Section 4.2.3. Overall program free ridership, spillover, and NTGR values are shown in Table 7-5.

Table 7-5. Overall Program Research Findings NTGR (Participant and TA Research Findings Consolidated)

	Gas	Electric
FR	9%	20%
SO	14%	5%
NTGR	1.05	0.85

Source: Navigant analysis of GPY1/EPY4 and GPY2/EPY5 full-participant and GPY2/EPY5 assessment-only participant surveys

7.2.2.5 Research Findings Net Program Impact Results

This section presents the evaluated HES Program net savings based on the evaluation team’s research findings for direct install and weatherization net-to-gross values (whereas the verified net savings in the body of the report were based on deemed net-to-gross values). The table below presents the net program savings and realization rates based on research findings.

Table 7-6. Research Findings Net Program Savings and Realization Rates

	Therms	Therms RR*	MWh	MWh RR*
Direct Install	87,113	-	701	-
Weatherization	197,813	0.82	295	0.83
Overall	284,926	0.81	996	0.81

Source: Navigant analysis

*RR = Realization Rate. This is the ratio of research findings gross to ex-ante gross savings.

Table 7-7 shows the overall program ex-ante and researching findings gross and net savings.

Table 7-7. GPY2/EPY5 Overall HES Program Research Findings Savings

Retailer Category	Energy Savings (MWh)	Energy Savings (Therms)
Ex-Ante Gross	1,122	253,445
Ex-Ante Net	906 ³³	242,416 ³⁴
Research Findings Realization Rate [†]	1.20	1.00
Research Findings Gross	1,118	241,694
NTG Ratio [‡]	0.85	1.05
Research Findings Net	952.89	253,548.06
Planning Net Savings Goal	700	545,466
% Net Goal Achieved	136%	46%

Source: Navigant analysis

* CFLs, temperature turndown, and thermostats are deemed; showerheads, aerators, pipe insulation are partially deemed; all weatherization measures are not deemed.

† Research findings realization rate represent the ratio between research findings gross and ex-ante gross savings.

‡ Overall NTG is the ratio between verified/research net and gross savings.

7.3 Trade Ally Interview Results Overview

Though trade allies were interviewed primarily to establish a trade ally NTGR, participating weatherization contractors were also asked to give their perspectives on the program’s strengths and weaknesses in terms of program marketing and outreach, and customer participation motives and barriers. Evaluation process research questions were addressed with the contractors, including effects of the weatherization incentive amounts and the EI2 informational party outreach method. A total of five out of nine program contractors were interviewed for this task. The following subsections summarize the findings from these interviews.

7.3.1 Trade Ally Reporting on Program Awareness and Marketing and Outreach Effectiveness

Similarly as found in the last evaluation cycle for this program, the contractors report that the program is reaching the right audience given its broad-based approach. One respondent stated their company doesn’t have to do any marketing because the volume of business generated by the program keeps them busy.

Contractor reactions to the EI2 informational house parties were generally positive. One respondent said the parties were the best marketing strategy in the two years their company had been involved in the program, and another respondent said they were “great.” However, another contractor said the

³³ The CSG tracking system did not provide ex-ante net savings values. As a result Navigant used the value ComEd reported to the ICC in its GPY2 Q4 filing:

http://ilsagfiles.org/SAG_files/Quarterly_Reports/ComEd/ComEd%20PY5,%20Q4.pdf

³⁴ The CSG tracking system did not provide ex-ante net savings values. As a result Navigant used the value Nicor Gas report to the ICC in its GPY2 Q4 filing: ICC Quarterly Report 4th Quarter PY2 Final.xlsx

parties they attended were generally “average to poor” in terms of recruiting customers though that contractor did have one party they considered a success for recruiting customers.

The contractors had a number of observations and opinions about the EI2 informational parties. A key strength of the informational parties, one respondent noted, was having an independent 3rd party hosting and conducting the party, so the contractor was presenting on behalf of the program as a participating contractor – a “no-pressure” approach for prospective customers to size up the program without feeling they’re getting a biased sales pitch. One contractor that is currently trying to return to the house party outreach method without EI2 has noticed that the independent 3rd party setting going away is causing prospective customers to have a more guarded interest in the program. One trade ally also noted a challenge with the house party outreach method is that some people schedule parties and then cancel them. Nonetheless, the same respondent said that when they actually get a house party they get an average of 2-3 jobs per house party. An important consideration to note for scheduling house parties that some party attendees may live in an apartment building or have other problems that disqualify them from the program such as not living in the program’s service area.

Word of mouth was also cited by contractors as an effective marketing strategy, along with advertising the program’s high incentive levels.

Three of the five contractors interviewed said they had “tagged” a number of their own customers into the program, indicating that the outreach strategy is having some use for building customer relationships and bringing customers into the program.

Two of the contractors interviewed reported being involved with “reach-back” efforts to attempt to promote previous assessment participants to change their mind and follow-through with weatherization work. That contractor, whose firm was one that was able to use their own staff for assessments, reported mixed success with the effort. The contractor reported it was hard to track previous participants, especially former house party participants, to see if they had ultimately followed-through with work, or even obtained an assessment. According to the contractor, there was “grey area” in the reach-back marketing effort that could be cleared up if the contractor had more control over the customer participation process. As a result of such grey areas, this contractor did a lot of blind reaching out that sometimes involved helping customers understand their assessment results, as some customers didn't know how to interpret their assessment results.

7.3.2 Trade Ally Reporting on Customer Participation Motives and Barriers to Participation

Customer Participation:

The contractors interviewed generally agreed that customers understand the program and its participation process, though one contractor said there could be some further streamlining of the program as there are many “moving parts.” This contractor suggested a brown-bag or other networking meeting to discuss ways to further streamline the program process.

From the contractors’ point of view, customers appear to understand much of the assessment report information, though a contractor noted that it depends on how knowledgeable a customer is about energy efficiency in the first place. One contractor said customers understand about 2/3 of the report, and that fraction could be improved through a more customer-friendly report orientation and added assessor training in presenting the reports. Contractors noted that the EI2 informational house parties were very helpful for explaining the various details of the program including the assessment phase.

Contractors cited two barriers to participation relative to the program process: call center wait times (one contractor noted this) and delays between the assessment and actually installing specified projects (multiple contractors noted this). Interviewees indicated that there have been very few project cancellations, however.

Project work orders specify what the contractors are to install. There are few situations where customers ask to not have a measure installed that was specified in the project work order, so that problem has not been a major issue. On the other hand, one contractor said that there are sometimes problems with work order specifications whereby a work order item can't or shouldn't be installed – or they find there is an item that should be installed but was not specified in the work order. In such cases the contractor has to go through a change order process that can be problematic because of the time those order changes take to be completed, the time and cost to the contractor in addressing the changes, and addressing those changes with customers. This contractor suggested it would be useful to review the change order process and also improve assessor training to better ensure proper work order specification.

The contractors generally agreed the invoicing and documentation processes are acceptable even though they have some concern about the extent of paperwork involved, and one contractor particularly noted that some improvements have been made. A request was also made to pay contractors more quickly.

One contractor expressed concern that they do not have access to assessment infiltration test results so that they can compare with their own measurements made when they are sealing a home during a project. This situation has caused added time and cost to reconcile test results, including having to submit change orders regarding what air sealing is actually needed. This contractor suggested an effort to fully align program and contractor infiltration test procedures, as well as to provide contractors with infiltration test results.

In terms of barriers to installing weatherization projects, contractors said the price point is primary (that is, household budget priorities dictate against the project). Timing is also important: one contractor said projects have a better chance of being done if the program can minimize the time between when the program gets introduced to the customer and when the assessment is done, and then the time to when the project is scheduled. There have been situations where there have been delays in the process such that customers lose interest.

One contractor cited a lack of assessor focus on selling projects rather than focusing on achieving a target number of assessments done per month. The contractor felt the assessors were not spending enough time with customers to educate and otherwise prime them to undertake the project.

As to whether additional kinds of efficiency improvements might help improve participation rates, one contractor suggested a separate track for duct sealing, and another contractor suggested bundling appliance and HVAC equipment efficiency improvements with the program might be a good idea. There appears to be trade ally interest in adding to the program's measure scope.

Incentives Levels:

The contractors interviewed had little insight regarding the effect of the discounted energy assessment price on either overall assessment participation rates or conversions to actual

weatherization projects. One respondent thought the discount increased interest and that the \$49 level seemed “about right” in terms of garnering customer interest in having an assessment, but the remainder of those interviewed had no opinion.

As to the project incentive level having been increased in the last program year (to \$1,750 from \$1,250), three contractors indicated they saw an uptick in business, so from that perspective the higher incentive was successful. Along with the higher incentive level, two contractors also stated they felt the offer being a limited-time offer also spurred customers to action. On the down side, however, two contractors complained that it took longer for the program to process the paperwork and that slowed getting contractors paid, which in turn caused problems with contractors’ cash flow.

Program Influence:

The contractors interviewed mostly agreed that relatively low natural gas prices are not significantly depressing customers’ willingness to participate in the program, though one contractor did say they believe interest in the program is lower than it would be if gas prices were higher. Two contractors cited customers’ interest in improving comfort as an important reason to participate rather than a concern over current gas prices.

Contractors had difficulty evaluating the do-it-yourself (DIY) market, either as prompted by assessments that customers follow through on their own, or in general, though one respondent said he felt the general market is “significant.” Two contractors felt at least a handful of customers who’ve had assessments through the program have taken the DIY route, but were unsure of that percentage – anywhere from 5% to 25% was speculated. Two interviewees asserted that many DIY installations are done poorly, that customers can do more harm than good because they don’t know how to properly do the job. Furthermore, one trade ally reported that without an assessment many people wouldn’t attempt DIY weatherization work, short of someone marketing in a compelling way, because of a lack of detailed understanding of weatherization energy efficiency in the market.

7.3.3 Trade Ally NTGR Results

Calculation Methodology:

The trade ally NTGR methodology was based on the one used for the GPY1/EPY4 Home Energy Efficiency Rebate program evaluation. The evaluation team made modifications given the HES program provides weatherization measures wherein conversion rates and participation volume are key criteria in establishing free ridership rather than the adoption and sales of energy efficient equipment.

Trade Ally Perspective of Participant Free Ridership

To calculate participant free ridership using data obtained from the trade ally interviews, the trade allies were asked about their pre-program and post-program leads, converted projects, and projects outside of the program to determine a market share free ridership. The market share free ridership estimates the number of projects that a contractor had in the program in the current year that would have otherwise been part of the contractor’s participants even without the program. Contractors that had fewer projects in the past than the current total number of projects outside of the program are given a zero free ridership because the program has led to a considerable increase in project volume.

$$\text{Market Share FR} = \frac{[\text{PAST \# OF PROJECTS}] - [\text{TOTAL \# OF PROJECTS OUTSIDE OF PROGRAM}]}{[\text{TOTAL NUMBER OF CURRENT PROJECTS}]}$$

The evaluation team then calculated an alternate free ridership based on the contractor’s likelihood for implementing the same number of measures without the program and their perception of the program’s influence on customers’ decision to implement weatherization measures.

$$\text{Alternate FR} = \frac{[\text{PROGRAM INFLUENCE SCORE}] - (10 - [\text{PROGRAM IMPORTANCE SCORE}])}{20}$$

The evaluation team then averaged the two free ridership scores to estimate an overall free ridership score per contractor.

Participating Trade Ally Volume Increase Spillover

The evaluation team calculated spillover that may have occurred due to an increase in contractor participation volume due to the program that may have not gone through the program. To calculate participating trade ally spillover using data obtained from the trade ally interviews, the trade allies were asked to estimate approximately what percentage of their leads followed through with weatherization work prior to the program and after the program. Then their self-reported estimate for the percentage of customers that are currently outside of the program was used to estimate potential volume increase spillover.

$$SO = ([\text{Current Conversion Rate}] - [\text{Preprogram Conversion Rate}]) * [\% \text{ Customers Outside of Program}]$$

By determining the change in conversion rate between PY2 and their pre-program conversion rates and multiplying it against the current percentage of customers outside of the program, the evaluation team estimated potential spillover that has resulted from the program increasing contractor conversion rates. Other qualitative spillover insights due to higher installation standards adoption and non-participant contractor influence are provided in the TA interview results discussion below.

Free Ridership:

In this evaluation cycle, only weatherization contractors were polled regarding their opinions about the program’s free ridership influence (the previous evaluation cycle reported both energy advisors’ and contractors’ estimate of program influence). The current evaluation’s finding of the program being very influential in customers’ decisions to select measures to install (8+ on a 0-10 scale) confirms the finding from last year and was supported by all respondents. This suggests the program continues to play a significant role in helping customers decide what weatherization to install.

Further, the program continues to influence what then actually gets installed, with four of the five contractors interviewed stating from 6.5-10 on a 0-10 point influence scale. This influence applied for the “tagged” customers of all the contractors interviewed, and for all customers of four of the five contractors interviewed. The dissenting contractor felt that the non-tagged customers they served are showing a low influence level on measures installed (2 on the 0-10 scale) because that contractor believes the energy advisors generating the contractor’s projects are not doing a good job, for example by not accurately identifying appropriate measures to install.

The contractors interviewed estimated 25-50% lower energy savings without the program across all customers, and either about the same or somewhat better energy impact among their tagged

customers. Thus, contractors see a difference with having the program in terms of its general influence on ultimate energy savings.

Based on the interviewed contractors' responses, the free ridership estimate for the GPY2/EPY5 program year is 7%.

Program Spillover:

All the contractors interviewed have at least 4% of their customers being program non-participants, and as such all contractors were asked about possible program spillover. To reiterate, customers are non-participants primarily for economic and qualification reasons, though a few are lost due to program delays or a general distrust of utilities.

Contractors are evenly divided as to whether the program influenced them to install measures to higher standards (either for in-program or out-of-program customers): three said it did and two said it did not. Improving practices per BPI's and the program's QA/QC standards was cited by one contractor, and incorporating health and safety issues into their practice was cited by another contractor. The level of influence on practice standards ranged from 5 to 10 on a 0-10 scale. Thus, the program continues to help at least some contractors improve their weatherization practices.

As to whether contractors have been influenced by the program to install more efficiency measures (including those not incented by the program) in their work outside the program beyond what they'd have done absent the program, two of the five contractors interviewed said it did, which is a similar fraction as found in the last evaluation cycle for this program. Spray foam applications, air sealing and BPI-grade installations were cited as measures (or installation quality) being done outside, but influenced by the program. Both contractors who said the program influenced such work said the level of influence was 5 on a 0-10 point influence scale, while the other two said the program had no influence (0 on a 0-10 point scale), so a rough influence scale average of 2.5 is estimated for the five contractors interviewed.

Based on the interviewed contractors' responses, the spillover estimate for the GPY2/EPY5 program year is 5%.³⁵

Non-Participant TA Spillover:

Three of the five contractors interviewed said they believe the program is putting pressure on non-program contractors' to lower their prices (the other two respondents did not know). One respondent said, emphatically, that weatherization is a very low-margin business in general, so the program really is just helping them be profitable at all by way of the incentives available to cover project costs and a modest profit. Another contractor said that pricing comparisons are difficult to make because of the program's project-based structure and higher quality standard, either or both of which may or may not be incorporated in non-participating contractors' weatherization projects.

7.3.4 Trade Ally Suggested Program Adjustments and Enhancements

None of the contractors interviewed have had issues installing the program's qualifying products.

³⁵ One trade ally's interview results were omitted because the evaluation team believes their responses to key NTG questions were not reasonable, likely due to misunderstanding the questions.

As to the overall program design and operations, two of the four contractors interviewed felt the program generally is in good working order, though one of them suggested continuing to work on speeding up the post-assessment program processes. A third respondent cited the Prescriptive program as a useful evolution to complement the HES program design. The fourth contractor cited significant problems with the work order process, saying there are too many inaccuracies coming out of the assessments (e.g., wrong measurements, inappropriate scope of work) and that too much time is being taken to rectify the mistakes the contractor is seeing in work orders they are being given. This contractor ascribes the problem to inadequately trained or qualified energy advisors, as well as the administrative process to handle change orders. This contractor suggests improving assessor sales skills and technical expertise, and for having advisors spend more time with customers whom they believe will take the additional time as they'll become better educated and better understand what's needed to do a program-quality project.

The program's big strength, reported one contractor, is the incentive but also the health and safety aspect of the program's assessments. This contractor also said it's a shame that house party model has been discontinued in GPY3/EPY6 because its collegial approach proved helpful in educating customers and providing independent credibility (i.e., not just the potentially biased view of a contractor one-on-one with a customer with little knowledge about energy efficiency).

One contractor suggested the program try to enhance the teamwork relationships among the contractors, advisors and program staff through group meetings to address program weaknesses and that would include all those interested, not just individual meetings between staff and a given contractor as this contractor has experienced. This contractor also likes the idea of a contractor being able to use their own energy assessors as advisors to conduct assessments and so have a cradle-to-grave relationship with customers. A benefit of such an approach also could be better work order consistency (which has been problematic for this contractor). Such developments of course would need to be carefully administered to ensure program-procedural consistency and high-quality work, but the suggestions seem to have merit.

7.4 Data Collection Instruments

7.4.1 Joint HES PY2 Full Participant Survey