

**Energy Efficiency Program Year 1  
(6/1/2011-5/31/2012)  
Evaluation Report:  
Summary and Compendium**

**FINAL**

**Presented to  
Nicor Gas Company**



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## E. Executive Summary

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 1 (GPY1), which ran from June 1, 2011 to May 31, 2012.

### E.1 Impact Evaluation

On the whole, Nicor Gas fell short of their filed goals for net program savings for the first program year (Table E-1.). The achieved net therm savings for GPY1 was 4,585,673 therms, almost 22% below their filed goal of 5,860,783 therms. The evaluation team's preliminary finding on GPY1 portfolio cost effectiveness<sup>1</sup> based on these savings, portfolio expenditures, and the Illinois TRC, is 1.64.

**Table E-1. Portfolio Year 1 Results – Planned and Actual Net Savings**

Program	Net GPY1 Target (therms)	GPY1 Ex-Post Net Results
Multifamily Home Energy Savings	1,275,075	959,087
Elementary Energy Education	138,600	86,012
Home Energy Savings	220,729	94,597
Home Energy Efficiency Rebates	1,459,670	1,096,916
Residential New Construction	N/A	N/A
Behavioral Energy Savings Pilot	N/A	N/A
Small Business Energy Savings	169,329	104,483
Business Energy Efficiency Rebates	991,607	1,272,400
Business Custom	1,169,756	800,451
Retro-Commissioning	267,700	149,713
Business New Construction	151,200	21,300
Building Performance with Energy Star	N/A	N/A
Economic Redevelopment	17,117	714
Emerging Technologies	N/A	N/A
<b>Portfolio Total</b>	<b>5,860,783</b>	<b>4,585,673</b>

Table E-2 shows that the Nicor Gas program tracking systems reported 6,421,412 therms of gross savings at the portfolio level for GPY1. Evaluation review of these ex-ante gross savings estimates on a program-by-program basis concluded that 99% of the reported gross savings had been realized. Additional evaluation work to estimate free riders and spillover effects resulted in an overall net-to-gross ratio of 0.72.

<sup>1</sup> Final results of our review of Nicor Gas' cost effectiveness analysis of GPY will be published in a separate report.

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

	Ex-Ante Gross (therms)	Realization Rate	Ex-Post Gross (therms)	Net-to- Gross Ratio	Verified Net (therms)
Multifamily Home Energy Savings	986,438	1.01	997,875	0.96	959,087
Elementary Energy Education	34,298	3.19	109,222	0.79	86,012
Home Energy Savings	104,505	1.05	109,380	0.86	94,597
Home Energy Efficiency Rebates	1,591,644	1.00	1,592,503	0.69	1,096,916
Residential New Construction	N/A	N/A	N/A	N/A	N/A
Behavioral Energy Savings Pilot	N/A	N/A	N/A	N/A	N/A
Small Business Energy Savings	104,483	1.00	104,483	1.00	104,483
Business Energy Efficiency Rebates	1,742,000	1.00	1,742,000	0.73	1,272,400
Business Custom	1,622,380	0.93	1,510,285	0.53	800,451
Retro-Commissioning	180,345	0.82	147,838	1.01	149,713
Business New Construction	54,426	1.18	64,400	0.33	21,300
Building Performance with Energy Star	N/A	N/A	N/A	N/A	N/A
Economic Redevelopment	893	1.00	893	0.80	714
Emerging Technologies	N/A	N/A	N/A	N/A	N/A
<b>Portfolio Total</b>	<b>6,421,412</b>	<b>0.99</b>	<b>6,378,879</b>	<b>0.72</b>	<b>4,585,673</b>

**Definitions**

Key definitions are provided in the below bullets and described in more detail in Appendix 5.1.

- Ex-Ante Gross Therms are the initial utility-reported total savings based on installed measures under the program. This information comes from Nicor Gas’s data tracking system and those of their implementation contractors.
- The realization rate represents the percentage of Gross Therms accepted after verification by evaluators.
- Ex-Post Gross Therms are the program savings after verification by evaluators.
- Net-to-Gross (NTG) is the ratio of ex-post gross program savings attributed to program influence.
- Ex-Post Net Therms are the accepted savings due to program influence.

## E.2. Process Evaluation

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. However, customer satisfaction is a key component of each process evaluation and a comparison of customer satisfaction scores across programs is presented in Table E-3. While there are slight differences in how each score is assessed, it can be seen that all scores indicate high levels of customer satisfaction.

**Table E-3. Summary of Customer Satisfaction Scores**

	Sector	Customer Satisfaction	
		Score	Details
Multifamily Home Energy Savings	Residential	98%	Scored higher than the planned 4.5 on a 5 point scale
Elementary Energy Education	Residential	97%	121 of 125 teachers reported they would conduct the program again
Home Energy Savings	Residential	97%	Scored 8-10 on a 10 point scale. Over 50% gave a 10 “very satisfied” rating.
Home Energy Efficiency Rebates	Residential	70%	Scored 8-10 on a 10 point scale. 35% gave a 10 “very satisfied” rating.
Residential New Construction	Residential	N/A	No completed projects
Behavioral Energy Savings Pilot	Residential	N/A	No program savings
Small Business Energy Savings	C&I	80%	Scored 8-10 on a 10 point scale.
Business Energy Efficiency Rebates	C&I	88%	Scored 8-10 on a 10 point scale.
Business Custom	C&I	100%	All 11 respondents to the participant survey indicated they were satisfied with their participation in the Custom Program
Retro-Commissioning	C&I	92%	Scored 8-10 on a 10 point scale.
Business New Construction	C&I	88%	15 of 17 participants rated the program very highly in overall satisfaction
Building Performance with Energy Star	C&I	N/A	No completed projects
Economic Redevelopment	C&I	N/A	No completed projects
Emerging Technologies	C&I	N/A	No completed projects

## E.3. High Level Conclusions and Recommendations

The program tracking systems are generally sufficiently designed and populated with the information needed for program evaluation purposes. Improvements could be made in some programs’ project and customer information tracking.

Gross savings realization rates were close to 1.0 for most programs, resulting in a portfolio realization rate of 0.99. The net-to-gross ratio for the portfolio was found to be 0.72.

Customer satisfaction rates were found to be quite high, with six of the nine programs surveyed with satisfaction rates above 90%. This suggests that the programs are being well run, that is, having no major changes needed to address program process issues.

A few secondary process improvements were identified for several programs, including streamlining application processes and improving follow-up with participants to complete projects.

To the extent feasible, Nicor Gas should consider strategic opportunities to increase customer awareness about energy efficiency programs through public events, online and social media avenues, billing inserts and other opportunities and to increase participant awareness about full program benefits through trade allies, supporting them with payback calculators and materials highlighting these benefits and the Nicor Gas branding.

## 1. Introduction to the Portfolio and Programs

Nicor Gas’s portfolio of programs includes six residential programs and eight programs targeted at business customers (Table 1-1). Details about each of these programs follow.

**Table 1-1. Portfolio Year 1 Programs and Target Savings**

	Sector	Net GPY1 Target (Therms)
Multifamily Home Energy Savings	Residential	1,275,075
Elementary Energy Education	Residential	138,600
Home Energy Savings	Residential	220,729
Home Energy Efficiency Rebates	Residential	1,459,670
Residential New Construction	Residential	N/A
Behavioral Energy Savings Pilot	Residential	N/A
Small Business Energy Savings	C&I	169,329
Business Energy Efficiency Rebates	C&I	991,607
Business Custom	C&I	1,169,756
Retro-Commissioning	C&I	267,700
Business New Construction	C&I	151,200
Building Performance with Energy Star	C&I	N/A
Economic Redevelopment	C&I	17,117
Emerging Technologies	C&I	N/A
<b>Portfolio Total</b>		<b>5,860,783</b>

### 1.1 Multifamily Home Energy Savings

The Multi-Family Home Energy Savings (MFHES) program provides natural gas energy efficiency measures to Nicor Gas, Peoples Gas, and North Shore Gas customers and electric energy efficiency measures to Commonwealth Edison Company (ComEd) customers. The lead utilities for this program are Nicor Gas and Peoples Gas and North Shore Gas. Honeywell Smart Grid Solutions (Honeywell) delivers the program to customers of served by ComEd and Nicor Gas. The Wisconsin Energy Conservation Corporation (WECC) provides program administration support to Nicor Gas. Franklin Energy Services, LLC (Franklin Energy) delivers the program to customers served by ComEd and Peoples Gas or North Shore Gas.

The program’s primary objective is to secure energy savings through direct installation of low-cost efficiency measures, such as water efficiency measures and CFLs, at eligible multifamily residences. A secondary objective of this program is to identify energy saving opportunities in the common areas of multifamily buildings through a brief visual inspection of central water heating, space heating and common area lighting equipment to channel customers to other programs offered by the utilities. This program targets building owners/property managers (collectively “decision-makers”) of buildings with five or more residential dwelling units and residential customers who live in these buildings. Multifamily buildings with individual heating systems and individual meters and buildings with central heat and central meters are both eligible to participate. ComEd has offered a multi-family program since EPY1, including offering jointly implemented pilot programs with Nicor

Gas and Peoples Gas in EPY3. Electric program year 4 (EPY4) and GPY1<sup>2</sup> was the first full year of jointly implemented program delivery.

Key performance metrics for this program include the number of participating residential dwelling units that received direct installation measures, the measures installed and corresponding gross and net energy savings, and the levels of customer satisfaction with the program reported by participating tenants and decision-makers through program customer satisfaction surveys.

## ***1.2 Elementary Energy Education***

The Elementary Energy Education (EEE) program is jointly offered by Nicor Gas and ComEd who engaged National Energy Foundation (NEF) to implement the program, branded THINK! ENERGY, and Wisconsin Energy Conservation Corporation (WECC) to serve as the Program Administrator for Nicor Gas. In GPY1/EPY4, the program targeted 5<sup>th</sup> grade students in public and large private schools that are customers of Nicor Gas or jointly Nicor Gas and ComEd. Schools received an invitation to participate and register to schedule the interactive presentations; alternatively, schools could register on the program website to join a waiting list if the program was fully-enrolled when they registered. After the presentation, students with signed parent permission forms took 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 (e.g., Scantron form) where they report details of their family's participation. Students and teachers are incentivized to return the 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. 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 to reduce 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.

The Nicor Gas and Nicor Gas-ComEd take home kit, branded "Take Action Kit," contained the following:

- Premium Oxygenics high-efficiency showerhead (2.0 gpm)
- Kitchen faucet aerator (1.5 gpm)
- Bathroom faucet aerator (1.0 gpm)
- Additional faucet plastic fittings
- Three (3) 14-watt CFL bulbs (Nicor Gas-ComEd kits only)
- Shower timer
- Flow rate test bag
- Digital water and ambient temperature thermometer

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<sup>2</sup> The Peoples Gas and North Shore Gas program year 1 (GPY1) and ComEd's program year 4 (EPY4) both began June 1, 2011 and concluded May 31, 2012.

- Fun Facts Slide Chart
- Scratch 'n sniff mercaptan (natural gas odorant) stickers
- "Turn it Off" light switch stickers
- Nicor Gas Energy Efficiency Program (EEP) sticker with website address
- Parent Comment Card (Business Reply Mail back to program implementer)
- Earn a wristband participation promotion card
- Product Installation Instructions
- Nicor Gas EEP/ComEd Smart Ideas®-branded Kit Box and Student Activity Guide
- Nicor Gas EEP promotional brochure
- ComEd Smart Ideas® for Your Home pamphlet (Nicor Gas-ComEd kits only)

### ***1.3 Home Energy Savings***

The Home Energy Savings (HES) program is a joint program of Nicor Gas and ComEd, with Nicor Gas leading the program implementation. In GPY1/EPY4<sup>3</sup>, the HES program was expected to achieve 220,729 therms and 438 MWh of net savings through the implementation of home energy assessments to promote discounted weatherization services and the direct installation of energy efficiency measures in residential Nicor Gas-ComEd single-family home residences. To meet these goals, the implementation contractor, Conservation Services Group (CSG), aimed to conduct approximately 2,100 whole-home assessments which would result in about 630 completed jobs in the first program year that ended May 31, 2012.

The HES program provides discounted whole-home assessments (e.g., energy assessments) to customers. During the assessment, energy and water conserving items are installed (listed below), and energy efficiency opportunities are identified. Program activities are implemented through CSG staff and contracted weatherization providers. During the assessment, free CFLs, low-flow showerheads, kitchen and bath low-flow aerators, hot water temperature setback, programmable thermostat setting and education, and hot water tank pipe insulation were directly installed for instant energy savings. A programmable thermostat was also offered at a reduced price for interested participants.

CSG's dedicated assessment staff conducted the energy assessments using proprietary whole-home assessment software. The energy advisors generated custom retrofit recommendation reports by entering home characteristic details gathered during the assessment into the implementation contractor's proprietary program. The customer report outlines recommended measures, potential savings, payback periods, and the amount of incentives available for recommended work. Once a customer agrees to do the minimum requirement of attic air sealing and insulation, they can then also chose to do additional measures from the list of recommendations. A program-eligible contractor is then assigned to perform the work and discounts are offered instantaneously.

Customers who pursue weatherization projects in GPY1 were eligible to receive incentives of 50% of retrofit cost for performing recommended weatherization upgrades to their home, which is capped at

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<sup>3</sup> Gas Program Year 1/Electric Program Year 4

a maximum of \$1,250 per home. This is in the form of an instant discount to the customer. The contractor is responsible for submitting paperwork to CSG to receive rebate funds.

The HES 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. The top three messages conveyed to participants about the benefits of participating are:

1. Savings and comfort;
2. Simplicity of participating and the potential to save money on home energy use as a result; and
3. Saving money and insuring one's home against rising energy prices

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 (QA/QC) process.

#### ***1.4 Home Energy Efficiency Rebates***

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 air conditioning 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 in turn to 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. In addition, 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, water heaters, and air conditioning systems. The dollar amount of the rebate depends on the size and efficiency of the replacement measures.

#### ***1.5 Residential New Construction***

The Residential New Construction Program (RNC) is jointly offered by Nicor Gas and ComEd. Nicor Gas is the lead utility as the majority of the savings will be from natural gas. Residential Science Resources (RSR) implements the program for both utilities, and WECC administers the program for Nicor Gas. The program launched in early 2012 and did not claim any savings in the first program year. RSR uses completed REM/Rate files for each home to calculate whole-house savings. In addition, ComEd incentivizes several ENERGY STAR electric appliances and claims savings from these installations.

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. The current residential energy code in Illinois is IECC 2009, though it is expected to change to IECC 2012 within the next year.

## ***1.6 Behavioral Energy Savings Pilot***

The current Nicor Gas Energy Efficiency Program (EEP) plan proposes saving 51 million therms over three years. While well-established energy efficiency measures are central to this goal, Nicor Gas recognizes the need to explore, test, and pilot innovative ideas for the future to gain a better understanding of both emerging technologies and of customer interest in more innovative program concepts. These concepts include behavioral programs.

Behavioral science research demonstrates that effective behavior change programs focus on a specific behavior to change, and actively address the barriers to making that change through multiple means, including a direct request for a commitment, comparison to a norm, specific calls to action, feedback on progress and ongoing reinforcement. The Behavioral Energy Savings Pilot (BESP) program employs all of these concepts with Nicor Gas customers.

Nicor Gas implements the BESP program via two main efforts:

- CSG and its subcontractor, MyEnergy.com, implement the primary program component: ENERGYBUZZ. Nicor Gas soft-launched ENERGYBUZZ in August 2012 (GPY2).
- The BESP program administrator, WECC, implements a secondary program component: Take the Pledge. Nicor Gas launched the Take the Pledge in April 2012 (GPY1).<sup>4</sup>

Branded as the ENERGYBUZZ program, the BESP provides participants with access to a variety of tools and ongoing communications via an online platform. The platform, part of MyEnergy.com, intends to motivate customers to take energy-saving actions through behavior changes or participation in other Nicor Gas energy efficiency programs. Participating customers receive monthly email summaries of their energy use and have access to online tools that show them how to save energy, earn redeemable reward points, and compare their savings with those of other customers. Nicor Gas drives participation in the ENERGYBUZZ Program with various marketing and outreach efforts, such as a partnership with the Kane County Cougars.

Separate from ENERGYBUZZ the BESP program also promotes behavior change through the “Take the Pledge” campaign, a partnership with the Chicago Fire professional soccer team. The campaign invites Fire fans to pledge to save energy by signing up for an account on a Chicago Fire branded MyEnergy.com site. When participants sign up, they pledge to do three to five simple tasks and then

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<sup>4</sup> Nicor Gas plans to discontinue Take the Pledge as a separate BESP program component halfway through GPY2. The GPY2 evaluation will assess savings from the Take the Pledge program according to the plan included in this report; however, Navigant will not evaluate Take the Pledge in GPY3.

come back to MyEnergy.com and check off what they have done. Eligible participants can win Chicago Fire-branded merchandise and other Chicago Fire prize opportunities.

### ***1.7 Small Business Energy Savings***

The Small Business Energy Savings (SBES) program is designed to achieve energy savings goals by educating ComEd/Nicor Gas and ComEd/Peoples Gas/North Shore Gas non-residential customers about electric and natural gas opportunities through on-site assessments. Energy advisors from Peoples Gas/North Shore Gas implementer Franklin Energy or Nicor Gas implementer Nexant conduct a high-level walk-through assessment of small business each site. Customers 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 the direct installation of low-flow faucet aerators and showerheads, pre-rinse spray valves, vending machine controls, and compact fluorescent lights. Nexant and Franklin Energy also tested offering free installed programmable thermostats to encourage customers to participate in the assessments in GPY1.

In addition, further savings are offered to customers through generous incentives of 30 to 70 percent for select, low-cost natural gas and electric energy efficiency measures that may be installed by a local contractor during a second on-site visit. If the premise is rented, the program implementer coordinates with the landlord/property owners. These low-cost measures installed by the contractor differ by gas utility but may include:

- Lighting measures
- Guest room energy management
- Installation of programmable thermostats
- Steam trap repair or replacement
- Boiler tune-up
- Boiler reset controls
- Furnaces of at least 92% AFUE
- Water heaters of at least 88% thermal efficiency
- Furnace tune-ups

Program staff maintains a list of approved local trade allies and assigns contractors on a rotating schedule unless the contractor recommends the program to the customer.

Participants must be both active C&I customers of ComEd with peak monthly demand of less than 100 kW and Nicor Gas or Peoples Gas/North Shore Gas customers who use less than 60,000 therms per year.

### ***1.8 Business Energy Efficiency Rebates***

The GPY1 Nicor Gas Business Energy Efficiency Rebates (BEER) Program provides incentives to increase the market share in businesses of new, highly efficient space heating, water heating, and commercial kitchen equipment as well as cost-effective improvement and additions to existing equipment. Participants must purchase and install equipment covered by the program. A rebate form must be filled out and submitted within 90 days of installation. Customers may receive a rebate without pre-approval for participation.

This evaluation builds on Navigant's 2011 evaluation of the Rider 29 BEER program. During Rider 29, program participation did not meet initial program planning goals. Program staff took steps to increase program marketing and outreach efforts for the Rider 30 program period. Therefore, a key element of Navigant's Rider 30 evaluation is to gauge whether the program was able to increase participation in the current economic environment, which is likely creating a barrier to participation for some trade allies and potential customers. The BEER program is a large part of Nicor Gas' GPY1 energy efficiency portfolio, so identifying strategies to meet targets is critical.

The BEER program works closely with the Nicor Gas Business Custom (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 BEER program may provide incentives to trade allies for specific, limited-time promotions.

### ***1.9 Business Custom***

The Custom program provides business customers with financial incentives for the installation of natural gas-related energy improvements that are not specified for a prescriptive rebate under the Nicor Gas BEER program or other Nicor Gas programs. Participants span a range of industries and can receive incentives for a wide variety of natural gas savings technologies. Typical industries served by this program include light and heavy manufacturing, 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 targets for this program.

The Custom program staff work with decision-makers at larger facilities to identify and quantify efficiency opportunities at their facilities. Interested customers must first submit a letter of interest and a pre-approval application to the program. The initial application includes usage history and detailed calculations and specifications for the project. Program staff review the customer's initial savings claims and screen projects using an internal cost-benefit test. For the majority of Custom program projects, the IC conducts site visits prior to approving the project. If the project is approved by program staff, the participant and program staff will make arrangements for any necessary post-installation inspections. The Custom program requires that a project's initial application be pre-approved prior to the start of the project.

It is the intent of Nicor Gas and ComEd to cooperate in offering this program, for example, by exchanging project leads. In some cases, prospective projects may have both natural gas and electricity benefits. In such cases, joint offerings will be made to the customer to address both natural gas and electricity savings. Impact evaluation efforts for Nicor Gas and ComEd will largely be independent as gas savings and electric savings are independent of each other and not interchangeable between utilities, although there may be some observed interaction of measures that influence savings.

The initial program implementation period is three years, commencing with GPY1.<sup>5</sup> The net energy savings goals for GPY1 are 1,169,756 therms and 43 participants.

The Custom program accounts for a significant portion of the targeted ex-ante impacts of Nicor Gas' GPY1 portfolio and, thus, solid Custom Program performance is key to Nicor Gas achieving its portfolio savings goals. Navigant is working with Nicor Gas and its implementation contractor, RSG, to develop an effective means to reduce the risk of non-performance to Nicor Gas through early discussions about custom project baseline assumptions.

Navigant's 2011 evaluation of the Nicor Gas Rider 29 Custom program found that the program exceeded its therm savings goals. However, the program performed well primarily due to the impacts of several large projects. This GPY1 evaluation built on Navigant's previous evaluation work. Specifically, the evaluation included a review of the program's engineering assumptions and algorithms to review applicable baselines for some projects. The evaluation also included a review of the program's marketing and outreach efforts implemented since the Nicor Gas Rider 29 program period.

### ***1.10 Retro-Commissioning***

The ComEd Retro-Commissioning (RCx) Program has been offered each of the four electric program years. Electric Program Year 4 (EPY4) also marked the first year, GPY1, where the program was offered as a joint utility program with the gas utilities with service areas overlapping ComEd's: Nicor Gas, Peoples Gas and North Shore Gas. The RCx program offering is a natural fit due to the intensive investigation and analysis of building management 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 fewer. 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 components<sup>6</sup> 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.

Supervised by ComEd for all three utilities, the program has a single IC, 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. Gas utility ICs, WECC and Franklin Energy, monitor the program for their

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<sup>5</sup> Program year designations are as follows: GPY1 begins June 1, 2011 and ends May 31, 2012; GPY2 begins June 1, 2012 and ends May 31, 2013; GPY3 begins June 1, 2013 and ends May 31, 2014.

<sup>6</sup> 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.

clients (Nicor Gas and Peoples/North Shore Gas, respectively), but do not participate in program operations.

The program is implemented in five phases: application, planning, investigation, implementation and verification. Extensive research and analysis can accompany each phase, thus the duration of engagement for a retro-commissioning project can last 12 to 18 months between contracting and verification of energy savings. Successful retro-commissioning requires experienced service providers and cooperation and buy-in of the facility staff to implement operational changes.

### ***1.11 Business New Construction***

The Business New Construction Service (BNC) 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. In EPY4/ GPY1, the program provided incentives to improve the efficiency of building systems (e.g., lighting, heating, ventilation, and air-conditioning [HVAC], and/or building envelope) in new construction (Systems Track), to improve lighting/day lighting systems beyond the systems track level of efficiency (through the Small Buildings Track) as well as through integrated whole-building design (through the Comprehensive Track). While the program Tracks being offered changed in EPY5/GPY2, projects in EPY4/GPY1 were expected to come from a mix of System, Small Buildings, and Comprehensive Tracks.

Through market preparation activities, this program has also attempted to achieve beneficial impacts that extend beyond the life and scope of the program. Market preparation entails moving the awareness and knowledge gained by designers and architects through program participation into their standard construction practice through an integrated education and training effort. There was no assessment of these activities in EPY4/GPY1.

### ***1.12 Building Performance with Energy Star***

The Building Performance with ENERGY STAR® (BPwES) Program is a two-year strategic energy management pilot program. The program offers customers in the hospitality and assisted living markets a year or more of benchmarking and consulting services to help them set and track energy performance improvement targets. The BPwES pilot has three primary objectives: 1) to penetrate and secure energy savings in the hospitality and assisted living markets; 2) to pilot the viability of an integrated program approach to target gas and electric energy savings for IC's hospitality and assisted living clients that are also customers of both Nicor Gas and ComEd; and 3) to pilot the BPwES benchmarking initiative in order to investigate the value of benchmarking for customers. A secondary objective of the BPwES pilot is to identify energy saving opportunities to channel to other Nicor Gas programs.

The BPwES pilot was initially administered by Wisconsin Energy Conservation Corporation (WECC) before Nicor Gas staff took over management. The pilot is implemented by Ecova, whose staff conduct client and market analyses, recruit participants, organize target facility opportunity assessments, and submit rebate paperwork to Resource Solutions Group (RSG) for approval and payment for completed projects.

### ***1.13 Economic Redevelopment***

The Nicor Gas Economic Redevelopment (ER) Program offers financial incentives and technical assistance for energy efficiency projects, focusing on communities in need of economic redevelopment or projects that achieve a social benefit. The program assists owners of commercial, industrial, and multi-family buildings in deciding which energy efficiency measures to implement and financing those improvements. The primary objective of the ER program is to achieve annual net energy savings of 660,000 therms through qualified projects by the end of GPY3. A secondary objective is to promote economic redevelopment by reducing energy costs for businesses and organizations that are located in economically vulnerable areas or that create jobs, offer social services, or provide affordable housing.

Through a competitive-bid RFP process, The Energy Center of Wisconsin (ECW) was chosen as the implementation contractor for the ER program. ECW provides technical resources and customer support for participants. 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. Once potential participants send in their application, program staff determines which offerings are suitable for the project. After a project is accepted into the program, ECW becomes the primary customer contact for technical support through the project lifecycle.

The ER program offers customers technical and enhanced financial resources to incent project teams to design and build projects that are more energy efficient than standard practice. The program seeks to build capacity and encourage adoption of energy efficiency measures and practices within target markets. The program offers greater incentives and resources than are typically available through other Nicor Gas programs because the program targets hard-to-reach markets. Projects accepted into the ER program may qualify for the following services:

- **Technical Assistance Services** to provide capabilities that are not yet fully adopted in the market. Services may include facilitation in the design process, reviewing plans and construction documents, assisting with research and product selections, and analyzing lifetime energy savings.
- **Design Incentives** to the design team to help offset the costs of developing designs that provide as-built performance that is more energy efficient than standard practice designs.
- **Enhanced Energy Performance Incentives** to owners and developers to help reduce cost barriers to adopting electric and gas energy saving measures that have not yet been accepted as standard practice for construction.

Two types of incentive tracks, (1) systems and (2) comprehensive, are available to qualifying projects based on project need determined by program staff.

Under the systems track, the ER program provides technical support and enhanced financial resources for specific measures, such as HVAC measures or water heating measures. In some cases, the program may provide technical or financial resources through the systems track for more complex projects that are further along in the project lifecycle. Incentives for specific technologies are based upon potential energy savings and depend upon equipment size and efficiency. The ER

program generally offers fewer technical resources to projects in the systems track due to the limited scope of influence available on these projects.

Under the comprehensive track, the ER program promotes integrated design solutions, providing projects with flexibility to meet program energy performance goals through the most cost-effective means. The comprehensive track is generally reserved for projects that are larger than 50,000 square feet and are early in the design process. Comprehensive track projects enable the ER program to influence project design and construction through technical resources (such as whole-building energy modeling) and/or financial incentives. Once the design team and ERP program staff finalize the measures that the design team intends to incorporate into a project, the project owner or developer signs a Measure Incentive Agreement, and incentive funds are reserved for the project. After the project is substantially complete, the program verifies the installed measures by conducting a site inspection.

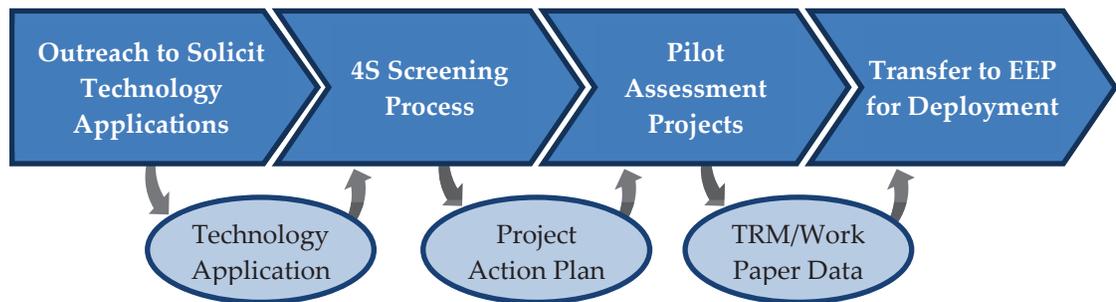
### 1.14 Emerging Technologies

The Emerging Technologies (ET) Program is designed to identify energy efficient emerging technologies or practices (i.e., measures) that Nicor Gas can incorporate into their EEP to achieve greater program savings and provide better value to their customers. The program’s stated objective is to:

“Identify emerging technologies and/or practices that are new or underutilized and have the potential for energy savings and possible future integration into the Nicor Gas energy efficiency program (EEP). ETP will achieve energy savings while being transparent, cost-effective, scalable, and developing the needed data to transition measures into the EEP.”

The ET program finds potential energy-saving technologies by soliciting applications from trade allies, manufacturers, implementation contractors, and other stakeholders. Figure 1-1 shows the overall steps of the ET program process.

**Figure 1-1: Overall ETP Process Steps**



The ET program does not have a standardized measure list or gas savings goals as found in other EEP programs. Participation in the program is tracked through the number of initial applications. The ET program measures therm savings through pilot assessment projects. 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.<sup>7</sup>

Gas Program Year 1 (GPY1) ran from June 1, 2011 to May 31, 2012, however the ET program was not operational until December 2011. Therefore, the program is still in the early stages of the implementation process. By the end of GPY1, the ET program accepted 21 applications for new emerging technologies, identified 11 applications for further evaluation after screening through the *4S: Ready, Set, Go* process, and has yet to initiate pilot assessment projects to validate energy savings. Therefore, the program evaluation is based primarily on design intent of the program, with little implementation experience to evaluate.

Unlike typical EEP rebates which encourage utility customers to purchase previously identified energy efficiency technologies, the ET program only provides incentives to encourage site-host participation in pilot assessment projects. Incentives are on an as needed basis only, and typically come in the form of program staff time, materials, labor, manufacturer discounts, or direct financial equipment buy-downs. Each pilot assessment project enables the ET program to conduct verification and due diligence of manufacturer-claimed therm savings for each technology.

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<sup>7</sup> 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.

## 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 evaluation tasks for each program.

**Table 2-1. Summary of Evaluation Tasks**

Program	Action	Impact	Process	Details
All Programs	Program manager interview	✓	✓	Program procedures, impact assumptions
	Review tracking database	✓	✓	Quality control, meet the needs of the program
	QAQC	✓	✓	Quality control, meet the needs of the program
	In-depth interviews with program implementers		✓	Process-related strengths and weaknesses
Multifamily Home Energy Savings	Measure savings review	✓		
	Engineering desk review	✓		
	Telephone surveys with participating decision-makers	✓	✓	Process issues, free rider
	Telephone surveys with participating tenants	✓	✓	Installation rate, free rider, spillover and process issues
	Documentation review	✓	✓	
Elementary Energy Education	Paper surveys of program participants	✓	✓	
	Deemed savings review	✓		
	Laboratory testing of showerhead and kitchen aerator models distributed by program	✓		
Home Energy Savings	Direct install measure savings review	✓		
	Telephone survey of participants	✓	✓	
	Telephone survey of nonparticipants	✓	✓	
Home Energy Efficiency Rebates	Deemed savings review	✓		Impact estimates
	Metering and verification of furnace participants	✓		Impact estimates

Program	Action	Impact	Process	Details
	Telephone survey of participants	✓	✓	
	Telephone survey of HVAC contractors	✓	✓	
Residential New Construction	Program literature review		✓	
Behavioral Energy Savings Pilot	Program literature review		✓	
Small Business Energy Savings	Field verification	✓		
	Engineering review of project and default savings	✓		
	Telephone surveys	✓	✓	
	In-depth interviews with participating trade allies	✓	✓	
Business Energy Efficiency Rebates	Telephone survey of participants	✓	✓	Installation rate, free rider, spillover and process issues
	Deemed savings review	✓		Impact realization rate
	In-depth interviews with participating trade allies		✓	Free rider, spillover and process issues
Business Custom	Telephone survey of participants	✓	✓	Installation rate, free rider, spillover and process issues
	In-depth interviews with participating trade allies		✓	Free rider, spillover and process issues
	Engineering desk file review	✓		
	On-site data collection	✓		
Retro-Commissioning	Engineering review of savings	✓		
	On-site verification	✓		
	In-depth interview with participants	✓	✓	Installation rate, free rider, spillover and process issues
	In-depth interview with RSPs	✓	✓	Installation rate, free rider, spillover and process issues
Business New Construction	In-depth interview with participants	✓	✓	Installation rate, free rider, spillover and process issues
	Engineering review of project files	✓		
	Focus group of active non-participants		✓	
	On-site verification	✓		
Building	Program literature review		✓	

Program	Action	Impact	Process	Details
Performance with Energy Star				
Economic Redevelopment	Telephone survey of participants	✓	✓	
	Content review of marketing materials	✓	✓	
	Engineering file review	✓	✓	
Emerging Technologies	Literature review		✓	

### 3. Portfolio Level Results and Recommendations

This section will present an overview at the portfolio level of the results and recommendations from the impact and process evaluations.

#### 3.1 Portfolio Level Impact Results

The Nicor Gas program tracking systems reported 6,421,412 therms of savings at the portfolio level for GPY1 (Table 3-1). Evaluation review of these ex-ante gross savings estimates on a program-by-program basis concluded that 99% of those estimated gross savings had been realized. Additional evaluation work to estimate free riders and spillover effects resulted in an overall net-to-gross ratio of 0.72. The results of all the individual program reviews were an ex-post estimate of 4,585,673 therms of verified net savings at the portfolio level.

**Table 3-1. Portfolio Level Program Year 1 Results**

	Ex-Ante Gross (therms)	Realization Rate	Ex-Post Gross (therms)	Net-to- Gross Ratio	Verified Net (therms)
Multifamily Home Energy Savings	986,438	1.01	997,875	0.96	959,087
Elementary Energy Education	34,298	3.19	109,222	0.79	86,012
Home Energy Savings	104,505	1.05	109,380	0.86	94,597
Home Energy Efficiency Rebates	1,591,644	1.00	1,592,503	0.69	1,096,916
Residential New Construction	N/A	N/A	N/A	N/A	N/A
Behavioral Energy Savings Pilot	N/A	N/A	N/A	N/A	N/A
Small Business Energy Savings	104,483	1.00	104,483	1.00	104,483
Business Energy Efficiency Rebates	1,742,000	1.00	1,742,000	0.73	1,272,400
Business Custom	1,622,380	0.93	1,510,285	0.53	800,451
Retro-Commissioning	180,345	0.82	147,838	1.01	149,713
Business New Construction	54,426	1.18	64,400	0.33	21,300
Building Performance with Energy Star	N/A	N/A	N/A	N/A	N/A
Economic Redevelopment	893	1.00	893	0.80	714.4
Emerging Technologies	N/A	N/A	N/A	N/A	N/A
<b>Portfolio Total</b>	<b>6,421,412</b>	<b>0.99</b>	<b>6,378,879</b>	<b>0.72</b>	<b>4,585,673</b>

#### Definitions

Key definitions are provided in the below bullets and described in more detail in Appendix 5.1.

- Ex-Ante Gross Therms are the initial utility-reported total savings based on installed measures under the program. This information comes from Nicor Gas’s data tracking system and those of their implementation contractors.
- The realization rate represents the percentage of Gross Therms accepted after verification by evaluators.
- Ex-Post Gross Therms are the program savings after verification by evaluators.
- Net-to-Gross (NTG) is the ratio of ex-post gross program savings attributed to program influence.
- Ex-Post Net Therms are the accepted savings due to program influence.

### 3.2 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. However, customer satisfaction is a key component of each process evaluation and a comparison of customer satisfaction scores across programs is presented in Table 3-2. While there are slight differences in how each score is assessed, it can be seen that all scores indicate high levels of customer satisfaction.

**Table 3-2. Summary of Customer Satisfaction Scores**

	Sector	Customer Satisfaction	
		Score	Details
Multifamily Home Energy Savings	Residential	98%	Scored higher than the planned 4.5 on a 5 point scale
Elementary Energy Education	Residential	97%	121 of 125 teachers reported they would conduct the program again
Home Energy Savings	Residential	97%	Scored 8-10 on a 10 point scale. Over 50% gave a 10 “very satisfied” rating.
Home Energy Efficiency Rebates	Residential	70%	Scored 8-10 on a 10 point scale. 35% gave a 10 “very satisfied” rating.
Residential New Construction	Residential	N/A	
Behavioral Energy Savings Pilot	Residential	N/A	
Small Business Energy Savings	C&I	80%	Scored 8-10 on a 10 point scale.
Business Energy Efficiency Rebates	C&I	88%	Scored 8-10 on a 10 point scale.
Business Custom	C&I	100%	All 11 respondents to the participant survey indicated they were satisfied with their participation in the Custom Program
Retro-Commissioning	C&I	92%	Scored 8-10 on a 10 point scale.
Business New Construction	C&I	88%	15 of 17 participants rated the program very highly in overall satisfaction
Building Performance with Energy Star	C&I	N/A	
Economic Redevelopment	C&I	N/A	
Emerging Technologies	C&I	N/A	

### **3.3 Portfolio Level Cost Effectiveness**

As part of Navigant's evaluation of Nicor Gas' energy efficiency programs for GPY1, Navigant reviewed the assumptions underpinning Nicor Gas' various energy efficiency program benefit-cost analyses. The focus of this review was on the basis for and reasonableness of the assumptions used in the Illinois TRC test calculation. A summary of preliminary findings is presented below. A full discussion of methodology and final results will be presented in a separate report.

#### **All Programs**

Across the entire portfolio, the incentive amounts are included in the utility costs for the total resource cost (TRC) calculation. The standard method for performing a TRC calculation is to exclude the total incentives, but include the entire incremental participant cost of the measure, rather than just the net cost to the participant. Since the incentive cost is netted out of the aggregate participant cost making the net impact on the TRC ratio zero.

#### **Single Family / Home Energy Savings**

Navigant's review found that most of the measure life assumptions used in this program's cost-benefit analysis were reasonable, with the exception of the 25 year measure life for retrofit measures. Navigant recommends using a weighted average life of the various retrofit measures included in the program. Additionally, Navigant found a couple minor discrepancies in the inputs, including the measure life used for thermostat education in the program versus the portfolio cost-effectiveness analysis, and the net therm savings achieved through the program versus Navigant's verified results reported in the final evaluation report.

#### **Multi-Family / Home Energy Savings**

Navigant's review found that all of the assumptions used in this program's cost-benefit analysis were reasonable. There was a minor discrepancy in the net therm savings achieved through the program as utilized in the cost-effectiveness analysis versus the final evaluation report.

#### **Home Energy Efficiency Rebate/CSR (HEER)**

Navigant found the assumptions used for the HEER program to be appropriate, and the incremental costs to be somewhat conservative. For gas storage water heaters, Nicor Gas assumed a measure life of 15 years, which is appropriate, but different from that assumed by Integrys, who jointly implemented the program. Additionally, there were small discrepancies in the total amount of reported therm savings from the HEER Program.

#### **Elementary Energy Education**

Navigant's review found that all of the assumptions used in this program's cost-benefit analysis were reasonable. However, there was a minor discrepancy in the net therm savings achieved through the program as utilized in the cost-effectiveness analysis versus the final evaluation report.

#### **Business Energy Efficiency Rebate (BEER)**

The inputs for the cost effectiveness calculation for the BEER program were almost all reasonable with the only input possibly warranting further review being the incremental cost used for convection ovens, which does not match the value in the Technical Resources Manual.

#### **C&I Custom**

The evaluation report lists a verified net savings amount of 800,451 therms, which is 59,410 therms, or roughly 7%, less than the savings amount included in the cost-effectiveness analysis. This difference appears to be due to a realization rate of 0.93 that was applied to the ex-ante gross savings based on program tracking data and on-site verification to determine the research finding gross savings in the evaluation report. This was not done for the energy savings included in the cost-effectiveness calculation. Additionally, best practice would be to use a weighted average measure life based on the distribution of measures installed through the program in each year. The 10 year estimated useful life (EUL) used in this year's analysis is a conservative value.

**C&I New Construction**

The 25 year measure life utilized in the cost-effectiveness calculation represents an upper bound of measure lives incented through the program, and is likely an aggressive assumption. The Nicor Gas Plan included a EUL of 15 years, which is likely closer to a proper weighted average. Navigant recommends utilizing the 15 year measure life from the Plan, or a weighted average measure life based on the individual measures incented through the program.

**C&I Retro-Commissioning**

Navigant's review found that all of the assumptions used in this program's cost-benefit analysis were reasonable.

**Small Business Energy Services**

Several of the measure life inputs used for this program agree with the Nicor Gas Plan, but should be updated in accordance with values in the Illinois Technical Resources Manual (IL TRM) and utilized by Integrys, who also jointly implemented the Small Business Program with Commonwealth Edison. The incremental cost values utilized for water saving measures are also quite high in comparison to values typically used, which may be resulting in conservative results for the cost-effectiveness calculations.

**Economic Redevelopment**

Only one project completed during GPY1 to be included in the cost-effectiveness calculations. All inputs to the calculations for the program are appropriate.

Preliminary portfolio level results, separated by benefit and cost components, are presented in Table 3-3.

**Table 3-3 Summary of Preliminary Portfolio Level Costs and Benefits (000's)**

	Illinois TRC Test	
	IL TRC Benefits	IL TRC Costs
Avoided Natural Gas Supply Costs	\$31,049	-
Avoided Water Use Costs	\$7,016	-
Administration & Implementation Costs	-	\$9,755
Incentives	-	\$4,156
Participant Costs	-	\$9,289
Present Value Totals	\$38,065	\$23,201
Ratio	1.64	

A summary of the preliminary program level benefits and costs is in Table 3-4 below.

**Table 3-4 - Summary of Preliminary Program Level Benefits and Costs (000's)**

Program	Benefits	Costs			IL TRC		
	Avoided Utility Costs	Admin Costs	Incentives <sup>8</sup>	Participant Costs	IL TRC Benefits	IL TRC Costs	IL TRC Test
Single Family / Home Energy Savings	\$1,095	\$664	\$534	\$314	\$1,095	\$1,414	0.77
Multi-Family / Home Energy Savings	\$12,501	\$87	\$894	-	\$12,501	\$904	13.84
Home Energy Efficiency Rebate (CSR)	\$13,426	\$2,302	\$2,523	\$7,432	\$13,426	\$11,390	1.18
Elementary Education	\$1,456	\$96	\$380	-	\$1,456	\$382	3.81
Business Energy Efficiency Rebate	\$7,285	\$513	\$375	\$338	\$7,285	\$1,111	6.56
C&I Custom	\$6,484	\$1,102	\$1,015	\$1,194	\$6,484	\$2,809	2.31
C&I New Construction	\$285	\$83	\$32	\$37	\$285	\$131	2.18
C&I Retro-Commissioning	\$656	\$152	\$177	\$115	\$656	\$439	1.50
Small Business Energy Services	\$792	\$499	\$80	\$15	\$792	\$591	1.34
Economic Redevelopment	\$7	\$52	\$1	\$0	\$7	\$52	0.14

### 3.4 Portfolio Level Conclusions and Recommendations

#### Program Tracking Data

The quality and completeness of program tracking information affect the evaluation team's ability to calculate accurate impact savings. The evaluation team found the level of quality of the program tracking systems to be generally good, however some systems need to track additional information. In particular, the Custom tracking system should track key baseline statistics (replace-on-burnout/retrofit, equipment remaining useful life, operating conditions, etc.), the Home EER system should track all items on the application, and the MFHES system should track installation rates of water efficiency measures. The quality of all program tracking systems can be improved with minor changes: requiring current primary contact information for participants and trade allies, distinguishing default values from field values, adding a Quality Control status field, and providing

<sup>8</sup> Incentives are shown in this table but are not included as costs when calculating TRC costs.

sufficient documentation of the tracking system. Sharing participation data among certain programs, especially MFHES, Custom, and BEER, will enable the proper tracking and attribution of referral project savings.

### **Gross Savings Estimates**

The gross savings realization rates were 1.0 or greater for most programs (MFHES, EEE, HES, Home EER, SBES, BEER, BNC and ER) and were less than one for Custom and RCx. To improve these realization rates, Nicor Gas should consider requiring the Custom program implementation contractor to provide sufficient documentation of baseline conditions and the retro-commissioning service providers to use program savings calculators and to account for interactive and concurrent savings.

### **Net-to-Gross Ratios**

Evaluation work to estimate free riders and spillover effects resulted in a net-to-gross ratio of 0.72 for the portfolio. While the estimated net-to-gross (NTG) ratios for three large programs were below 0.70 (BEER, Home EER and Custom) the values are not atypical of new programs. Custom may include questions regarding free ridership in their application process to help assess the risk of free riders entering the program.

### **Customer Satisfaction**

Customer satisfaction rates were found to be quite high, with several programs with satisfaction rates above 90%. This suggests that the programs are being well run, thus no major changes are needed to address program process issues.

### **Secondary Process Improvements**

While the evaluation team found no major process changes are needed, the team identified a few secondary process improvements that apply to several programs: 1) streamline application processes (Home EER, Custom, BEER and BNC); 2) improve follow up (by implementation contractor or trade ally) with participants to complete projects (MFHES, Custom and RCx); and 3) clearly communicate to participants and trade allies that their cooperation with evaluation surveys and verification is a program requirement. These process improvements should increase participation, savings, and precision of evaluation results.

### **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, in particular, basic awareness of the program (RNC and SBES); awareness of the full benefits of the program, especially the value of utility-qualified trade allies (HES, BEER, SBES and BNC); and awareness of Nicor Gas as a program sponsor (Residential and Business New Construction programs). To the extent feasible, Nicor Gas should consider strategic opportunities to increase customer awareness about energy efficiency programs through public events, online and social media avenues, billing inserts and other opportunities and to increase participant awareness about full program benefits through trade allies, supporting them with payback calculators and materials highlighting these benefits and the Nicor Gas branding.

## 4. Program Level Results and Recommendations

For each of the Nicor gas programs evaluated this section discusses separately key impact findings and recommendations and key process findings and recommendations.

### 4.1 Multifamily Home Energy Savings

#### 4.1.1 Key Impact Findings and Recommendations

As shown in Table 4-1, the GPY1 Nicor Gas GPY1 MFHES reported ex-ante gross energy savings of 986,438 therms. Evaluation adjustments resulted in verified gross energy savings<sup>5</sup> of 997,875 therms reflecting the program's gross realization rate of 1.012.<sup>9</sup> The program level NTGR for gas measures was 0.96 based on evaluation research findings, yielding net energy savings of 959,087 therms.

**Table 4-1. Nicor Gas GPY1 Energy Savings**

Savings Estimates	Nicor Gas Energy Savings (therms)
Ex-Ante Gross	986,438
Ex-Ante Net	887,795
Verified Gross	997,875
Research Findings Net	959,087
GPY1 Program NTGR	0.96

*Source: Navigant analysis*

Additional key impact evaluation findings and recommendations follow:

**Finding:** The MFHES program recruited eligible properties and applications were backed with supporting documentation.

**Finding:** For Nicor Gas, Navigant found some discrepancies between the program administrator's measure savings values using TRM inputs and assumptions and those calculated by Navigant using the same inputs and assumptions. The TRM measure value for water temperature setbacks was correctly applied.

**Recommendation:**

- Navigant recommends updating the Nicor Gas program tracking system to match TRM savings values by making minor adjustments to measure savings for water efficient showerheads (from 26.00 therms/unit to 26.21 therms/unit), kitchen faucet aerators and bathroom faucet aerators (from 2.70 therms/unit each to 2.52 therms/unit and 3.02 therms/unit, respectively) and programmable thermostats (from 34.07 therms/unit to 34.21 therms/unit) based on algorithms and inputs found in the Illinois TRM.

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<sup>9</sup> Realization rate = verified gross / ex-ante gross from the tracking system.

#### 4.1.2 Key Process Findings and Recommendations

The GPY1 MFHES program impacted 24,744 residential dwelling units, achieving 71 percent of its Nicor Gas planning estimate (Table 4-2).

**Table 4-2. Nicor Gas GPY1 Program Participation Achievements**

Program	Participation Goal (Dwelling units)	Actual Participation (Dwelling units)	Percent of Planning Estimate
Nicor Gas Individually-Metered	8,750	4,700	54%
Nicor Gas Master-Metered	26,250	20,044	76%
<b>Nicor Gas Total</b>	<b>35,000</b>	<b>24,744</b>	<b>71%</b>

*Source: Navigant analysis of program tracking data*

The GPY1 program year was efficiently delivered by Honeywell. On the gas side, the program met 75 percent of its energy planning estimate through direct installation activities at 71 percent of planned dwelling units. The program built on the previous year's implementation efforts by the IC and ComEd and through the Rider 29 pilot program with Nicor Gas. The program's continued success can be attributed to solid program design, program activities that were well aligned with anticipated outcomes and cooperation between the program's utility sponsors and implementation contractor. This section addresses the following process evaluation questions, in italics, with findings and recommendations indicated as such.

#### **Research Topic:**

*What areas could the program improve to create a more effective program for customers and help increase the energy impacts?*

**Finding:** One of the upcoming challenges for this program is increasing program uptake by overcoming participation barriers in the multi-family marketplace, including the split-incentive barrier. While the implementation contractor has undertaken a number of activities to address these challenges, Navigant recommends exploring additional ideas.

#### **Recommendations:**

- The program may be able to share information or increase communication with other ComEd or Nicor Gas programs, to provide a single point of contact for multi-family decision-makers to implement common area improvements and direct install activity in residential dwelling units; and
- The program may consider designing a pilot program to target customers using a comprehensive whole-building approach, as is implemented in some other utility service areas, such as Con Edison (New York) and DTE (Detroit). The program is currently planning a program designed to provide energy and cost savings benefits to multi-family decision-makers as well as tenants scheduled for rollout during GPY2.

**Finding:** About nine percent (2,376 dwelling units) of units at sites where field teams were performing direct installation activity did not receive any measures because the dwelling units were not available to the field teams.

**Recommendations:**

- The program should track and review reasons why a dwelling unit is not available for direct installation activity at a given multi-family site. If there are recurring reasons why dwelling units are unavailable to the program, the program may be able to develop communications or other mechanisms to reduce the number of unavailable units.

**Finding:** While the program currently tracks CFL installation rates, the program does not track installation rates for water efficiency measures.

**Recommendations:**

- The program should track water efficiency measure installation rates and review reasons why field technicians are unable to install energy efficiency measures in a given unit. In so doing, the program may find that it can achieve higher installations per dwelling unit by adding different types or styles of measures (e.g. faucet aerators or globe CFLs), such as it has in the past; and
- Emphasize to field teams the importance of installing the maximum number of eligible direct install measures in dwelling units.

**Research Topic:**

*Has the program effectively channeled customers to other programs sponsored by Nicor Gas or ComEd to implement common area efficiency measures as identified in common area assessments?*

**Findings:** The program reported that it conducted 285 central plant surveys to inspect central water heating or space heating equipment for Nicor Gas. The program reported that it conducted 31 common area lighting surveys for ComEd.

**Recommendations:**

- The program should place a greater emphasis on completing common area assessments;
- The IC should track common area referrals to other programs and participation rates from referrals and include a data point in the tracking system;
- Target common area energy efficiency opportunities through increased communication and/or co-marketing with other energy efficiency programs;
- Develop a script for follow up calls that could include ongoing customer satisfaction with direct installation measures, any action items from the property manager customer survey and to ask for referrals; and
- Follow up with property managers that have received common area recommendations using the script.

**Research Topic:**

*Is the program effectively coordinating with ComEd for electric measures and reporting?*

**Findings:** Overall, it appears that the parties responsible for jointly implementing the program continue to implement an effective process for coordination and reporting, primarily through regular coordination conference calls and frequent communication. However, at the end of the program year, the program tracking system had missing and/or misnamed data, with the IC working closely with the utilities and evaluators to identify the missing data and reconcile the program tracking systems once these issues were discovered.

**Recommendation:**

- As feasible, the program should consider adding fields, programming or other data points to streamline data transfer from the tracking system and facilitate program data review.

**Research Topic:**

*Are customers satisfied with participation in the program and customer service experiences?*

**Finding:** Overall, participants –both tenants and property managers - appear to be very satisfied with the direct install portion of the program. Navigant’s analysis indicated that 84 percent of tenants responded that they were satisfied or very satisfied with the program. Decision-makers were also satisfied with the program, with 90 percent of respondents indicating that they were satisfied or very satisfied with the program’s direct install measures and 95 percent indicating that they were satisfied or very satisfied with the program’s field team. When asked about common area recommendations and reporting, decision-makers indicated less satisfaction with the overall program (70 percent) or the summary report provided by the program. Almost half (45 percent) of those participants surveyed did not know if they received recommendations for energy efficiency improvements in common areas or central plants.

**Recommendations:**

- Participant responses to the decision-maker survey would indicate potential opportunities for the program to increase customer satisfaction through placing a greater emphasis on common area or central plant assessments and follow up recommendations to decision-makers.

## 4.2 Elementary Energy Education

### 4.2.1 Key Impact Findings and Recommendations

Table 4-3 shows deemed and verified gas savings for the Nicor Gas-only and Nicor Gas-ComEd programs. Verified gross savings were calculated using IL TRM algorithms and parameters. The overall participation goal of 10,000 kits distributed (5,000 kits each for Nicor Gas-only and Nicor Gas-ComEd) was nearly met with 4,997 kits distributed to Nicor Gas-only schools, and 4,975 kits distributed to Nicor Gas-ComEd schools. While the verified total net savings of 86,012 therms exceed the total Nicor Gas-only and Nicor Gas-ComEd total ex ante net savings estimate of 33,955 therms, the savings did not meet the overall planned net therm savings goal of 138,600 in Nicor Gas' compliance filing therms<sup>10 11</sup>.

**Table 4-3. GPY1 Deemed Gas Savings Estimates (Therms)**

	Nicor Gas-only	Nicor Gas-ComEd	Total
Ex Ante Gross	17,187	17,111	34,298
Ex Ante Net	17,015	16,940	33,955
Verified Gross <sup>12</sup>	50,119	59,104	109,222
Research Findings Net <sup>13</sup>	32,790	53,222	86,012
Research Findings NTGR	0.65	0.90	0.79

Source: Navigant Analysis

Navigant offers the following additional impact findings and recommendations for the program.

- **Finding.** Navigant's survey included students who returned their Home Report Cards (HRCs) and students who did not. Among Navigant's results, installation rates did not differ across these two groups of students. This suggests an undocumented assumption of NEF:

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<sup>10</sup> Nicor Gas EEP Final – Revision for Compliance Filing 05-37-2011 FINAL.docx, pg. 56.

<sup>11</sup> Nicor Gas submitted planning values for the program in its May 2011 compliance filing, before the release of the Illinois TRM. The planning values assumed higher savings estimates than were achieved when using the TRM input assumptions. See *Appendix, Evaluation Report: Elementary Energy Education Evaluation GPY1*

<sup>12</sup> The September 14, 2012 final version of the first State of Illinois Energy Efficiency Technical Reference Manual (TRM) (effective as of June 1, 2012) has been agreed to by Illinois Stakeholder Advisory Group (SAG) participants and is currently pending approval before the Illinois Commerce Commission in Docket No. 12-0528 as of the date of this report. The verified gross savings shown in Table 4-3 assumes that measures covered by the TRM are deemed for evaluation purposes in GPY1 Gross savings based on evaluation research findings in GPY1/EPY4 are provided in *Appendix, Evaluation Report: Elementary Energy Education Evaluation GPY1* (in particular, research findings gross savings were calculated with the in-service rate and household size based on Navigant survey results).

<sup>13</sup> The evaluation team determined the verified net savings by applying, per measure, survey-determined research findings NTG ratios to the verified gross savings which are based on TRM values and certain custom input (e.g., number of household members). Research findings NTG ratios were used rather than planning NTG ratios because the program underwent significant changes since the previous evaluation. Further discussion of net impact parameter estimates can be found in section 3.1.5.

installation rates reported in the HRCs are representative of all participants, independent of whether a participant returned an HRC.

**Recommendation:** Use HRC response rates across all participants.

- **Finding.** The evaluation team found some errors in the tracking system, including discrepancies between HRCs and entries in the tracking system, missing data, and data inconsistencies. This is most likely due to a lack of documented procedures for tracking kits, HRCs, and incentives; tracking of key performance indicators in multiple files; and a lack of method for tracking key performance indicators in the tracking system.

**Recommendation.** In order to address the tracking system inadequacies, Navigant recommends that the National Energy Foundation (NEF) consolidate their tracking system into a single master multi-user tracking database and establish clear documented procedures for tracking kits, HRCs, and incentives. Furthermore, a key element that must be incorporated into the tracking database is the ability to track the changes made by the program staff at NEF. Since multiple people have access to the tracking system, it is important that updates to key performance indicators be logged (recording when a change is made, by whom, and why).

- **Finding.** Navigant recognizes NEF's approach in estimating installation rates to be superior to simply assuming every measure in every kit distributed is installed. However, documentation of this assumption is absent and is evident only in the savings formula in the Savings Sheets.

**Recommendation.** Navigant recommends that NEF explicitly document their assumption that the installation rate of HRC non-respondents is the same as respondents. NEF can now reference this evaluation which confirms their previously untested assumption.

#### 4.2.2 Key Process Findings and Recommendations

Navigant offers the following process findings and recommendations for the program.

- **Finding.** The EEE program's research findings show in-service rates for the showerhead and aerators range from 35-45% for the Nicor Gas-only program and 19-27% for Nicor Gas-ComEd.<sup>14</sup> Survey respondents indicated that fit problems were the most common reason for not installing showerheads and aerators while water pressure concerns, leakage, and a dislike of the measures were the main reported reasons for uninstalling them.

**Recommendation.** To address the installation and persistence barriers in order to increase effective installation rates for the measures in the kit, Navigant recommends the following:

- Further research the installation and fitting problems of the showerheads and aerators (amounts to about one-third of aerators not installed, and a fifth of showerheads).

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<sup>14</sup> The large difference in rates between these two groups is unexpected, and survey results offer no clear explanation. Future evaluations may explore this with additional research.

- Evaluate features of other kitchen aerators and showerheads<sup>15</sup> for:
    - Consumer satisfaction
    - Functional performance
    - Base household water pressure requirements
- **Finding.** Teachers reported that there were difficulties coordinating program processes in cases where teacher aides or substitutes were present rather than the main classroom teacher. The evaluation team also experienced difficulties administering surveys in classrooms with substitutes present rather than teachers that originally signed up for the program.

**Recommendation.** The evaluation team recommends establishing clear protocols and explanatory materials to address situations where original or lead teachers are not present to administer the program, distribute program kits, or deliver program surveys.

- **Finding.** In some cases, teacher and student survey results indicate instructional material in the kits is insufficient for or inaccessible to everyone. Some students indicated they did not know how to install items despite the kit instructions and many students live in Spanish-speaking households.

**Recommendation.** Enhance installation instructions in the kit by:

- Providing Spanish language documentation.
  - Adding instructional photographs and/or illustrations.
  - Adding video tutorial content to the NEF website to further complement the paper-based installation instructions (in English and Spanish) and include URLs to “see more installation instructions” in paper-based installation instructions.
- **Finding.** The EEE program provides an exceptional marketing opportunity for Nicor Gas and ComEd’s other residential efficiency programs and marketing can be further improved.

**Recommendation.** While the program cross-markets other DSM programs with consistent branding collateral, Navigant recommends that the EEE program expand its efforts to channel participants to other residential programs. Such efforts could be as simple as including brief descriptions of Nicor Gas and ComEd’s other residential programs in the student and teacher guides or a refrigerator magnet with website and program names and pictures. Furthermore, creating a parent-specific “packet for parents” in the kit would better ensure that parents see the Nicor Gas and ComEd program brochures and other program referral material already included in the kit. Channeling efforts could also be as complex as adding an interactive component to the Nicor Gas and ComEd websites that maps educational content from the EEE program to other programs.

- **Finding.** Teachers reported that some parents were leery of signing the program participation permission letter.

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<sup>15</sup> For GPY2/EPY5, NEF has replaced the GPY1/EPY4 showerheads with a different brand.

**Recommendation.** The evaluation team recommends making participation in the program OPT-OUT rather than OPT-IN. Every parent would receive an OPT-OUT permission letter well before the presentation and, thus, would have the option to OPT-OUT before the child participates. However, now a non-response to the permission letter would signify OPT-IN.

### 4.3 *Home Energy Savings*

#### 4.3.1 **Key Impact Findings and Recommendations**

The evaluation effort succeeded in addressing the key research question posited by the program evaluation plan. Weatherization measure savings are calculated using Conservation Services Group's (CSG) proprietary EnergyMeasure® HOME (EM HOME) software. Navigant performed a desk review of the EM HOME software during GPY1. Key findings and recommendations associated with the research questions and evaluation plan are as follows:

- **Finding.** Program verification, due diligence, and tracking system procedures all meet or exceed aspects of national best practices, as documented.
- **Finding.** CSG tracks installation rates during subsequent weatherization or QC activities, but it does not track persistence.

**Recommendation.** Improvements in savings estimates may be achieved by tracking direct installation measure persistence as a potential program effectiveness indicator by way of follow-up checks during subsequent weatherization or QC activities.

- **Finding.** The data entry process involves taking field notes on paper and then re-entering the information into EM HOME on a computer in the work van, which is an instance of duplicate data entry.

**Recommendation.** Explore switching from paper-to-computer based data entry during the energy assessments to using tablet computers equipped with EM HOME software. This will not only remove duplicative data entry and the potential for errors associated with it, but it could also potentially speed up the assessment process, which currently takes an average of 2.5 hours. By speeding up the assessment process, CSG could use the additional time for customer education helpful to the program. Such a software change would also provide the benefit of automatic, real-time accounting for the inter-connectivity of interdependent variables.

- **Finding.** The tracking database extract did not specify whether values were field-specified or default values.

**Recommendation.** State whether building characteristics in the tracking system are field-specified or default values (e.g., heating and cooling system efficiencies), to clarify the basis for subsequent savings estimates. CSG stated that this information is visible in the EM HOME software suite, but that it would take considerable resources to be made available in the Microsoft Excel format that was used for the data extract submitted to Navigant. This

information would be helpful to the evaluation team in determining the accuracy of inputs into the tracking system. This could also be useful as part of energy assessment review and training.

- **Finding.** The EM HOME simulation engine does not integrate customer billing data.

**Recommendation.** Continue refining the EM HOME simulation engine to further improve savings estimates and reduce associated uncertainties. Explore options for improving modeling calibration using customer billing data, to provide an added dimension in estimating savings.

Table 4-4 outlines the program’s therm savings for GPY1.<sup>16</sup> The NTG Framework<sup>17</sup> calls for retroactively applying the NTG ratio for “previously evaluated programs undergoing significant changes — either in the program design or delivery, or changes in the market itself.” The evaluation team believes the HES program meets this criterion because the program changed assessment pricing and implementation contractors in GPY1. As a result this evaluation uses the NTGR calculated from our GPY1 research.

**Table 4-4. GPY1 Savings\***

	Energy Savings (Therms)
Ex-Ante Gross Savings	104,505
Ex-Ante Net Savings	96,105
Verified Gross Savings	109,380
Verified Net Savings	94,597
Overall NTG Ratio**	0.86

Source: Navigant Analysis; Nicor EEP Final – Revision for Compliance Filing 05-27-2011 FINAL

\*Temperature turndown and thermostats are deemed; showerheads, aerators, pipe insulation are partially deemed; all weatherization measures are not deemed.

\*\*Overall NTG is the ratio between verified net and verified gross savings.

In GPY1 the gas component of the program achieved 43% of planning net savings goals.

Table 4-5 presents the measure-specific therm savings for GPY1.

<sup>16</sup> The September 14, 2012 final version of the first State of Illinois Energy Efficiency Technical Reference Manual (TRM) (effective as of June 1, 2012) has been agreed to by Illinois Stakeholder Advisory Group (SAG) and the Illinois Commerce Commission in Docket No. 12-0528 as of the date of this report. The verified gross savings shown in Table 4-4 are deemed by the TRM for measures outlined in the document. Evaluation research findings for gross savings in GPY1 are provided for reference in the *Appendix, Evaluation Report: Home Energy Savings Evaluation GPY 1*.

<sup>17</sup> “Proposed Framework for Counting Net Savings in Illinois.” Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

**Table 4-5. GPY1/EPY4 Measure-Level Therms Savings\***

	Measure	Ex-Ante Gross Therms	RR	Verified Gross Therms	NTG	Verified Net Therms
	Shower Head	19,463	0.98	19,157	0.93	17,847
	Kitchen Aerator	426	0.97	412	0.99	409
	Bathroom Aerator	3,574	0.98	3,512	0.99	3,481
	Hot Water Temperature Setback	1,331	0.96	1,274	0.88	1,116
	Pipe Insulation	3,943	0.98	3,855	0.93	3,581
	Programmable Thermostat	3,261	0.90	2,946	0.90	2,651
	Programmable Thermostat Education	0	-	5,718	0.90	5,146
	<i>Subtotal</i>	31,998	1.15	36,873	0.93	34,231
Retrofit Measures	Attic Insulation	34,604	1.00	34,604	0.81	28,181
	Wall Insulation	4,316	1.00	4,316	0.78	3,367
	Floor Insulation (Other)	6,496	1.00	6,496	0.84	5,460
	Duct Insulation & Sealing	111	1.00	111	0.80	89
	Air Sealing	26,979	1.00	26,979	0.86	23,270
	<i>Subtotal</i>	72,507	1.00	72,507	0.83	60,366
	<b>Total Savings</b>	104,505	1.05	109,380	0.86	94,597

Source: Navigant analysis

\*Temperature turndown and thermostats are deemed; showerheads, aerators, pipe insulation are partially deemed; all weatherization measures are not deemed.

#### 4.3.2 Key Process Findings and Recommendations

At this stage in the program's development, Navigant finds that program processes are generally well-planned and executed, and that the program is serving participants very well. However, since the program did not reach its participation goals in GPY1, the evaluation team conducted research amongst participants, non-participants, and trade allies to determine marketing outreach effectiveness and potential barriers to participation. Navigant found that the program is using the most effective means of outreach to customers with its program mailers. The program is also targeting the right customers, evidenced by the fact that even the non-participants reported valuing energy efficiency, being interested in weatherization work, and being tentatively interested in participating (however they are not convinced by the marketing message to take action). Participants, contractors, and non-participants alike agree that marketing material content could be improved. Many program-aware non-participants that received a spring mailer about the program were unaware of the free direct install measures available through the program and thought that getting

an assessment would obligate them to purchase weatherization measures. In addition, a noteworthy portion of participants and non-participants aware of the program showed some uncertainty about the program and the utility intentions of discounting and giving out free measures.

Navigant presents the following key process findings and recommendations:

- **Finding.** Program participants and program partners were very satisfied with the program, incentive levels, and processes. About 97% of participants rated their satisfaction as 8 to 10 on a 0-10 point scale and over half of participants stated they were “very satisfied” (the highest rating).
- **Finding.** The program is using an effective means of outreach to customers. Participants and non-participants agreed that program mailers were the best way to reach them. Participants also noted that word-of-mouth and contractor referrals were other important sources of initial information about the program.
- **Finding.** The program targeted the right market of customers in its marketing mailer. Most mailed non-participants both valued energy efficiency and showed potential for participation in the program. On a four-point scale (“not at all valuable,” “somewhat valuable,” “very valuable,” “extremely valuable”), only 3% of respondents indicated energy efficiency was “not at all valuable” to them, and 60% indicated it was either “very valuable” or “extremely valuable.” Furthermore, 25% of non-participants reported that they have plans to make energy efficiency improvements to their home in the near future. When asked to indicate what they would do, the most common response was insulation work (39%). This is a strong indication of potential participants among mailed non-participants.
- **Finding.** A promising proportion of program-knowledgeable non-participants are willing to spend the money necessary to participate in the program’s weatherization component. Almost a fifth of program-knowledgeable non-participants (about 5% of all mailed customers) noted that they were willing to spend \$750-1,250 on the program if it were to save them money on their energy bills. Another 39% of program-knowledgeable non-participants (about 10% of mailed customers) reported they don’t know or are not sure how much they would spend.

**Recommendation.** The program could benefit from conducting additional focus groups to explore how best to remove barriers to participation for these program-knowledgeable non-participants.

- **Finding.** Participants, contractors, and non-participants alike agree that marketing material content could be improved. The most common participant recommendation for program improvement was for more informative, persistent, and thorough marketing about the program and its benefits.

**Recommendation.** The evaluation team suggests a workshop meeting of energy advisors, trade allies, and other program stakeholders to gather feedback on the previous year’s program efforts and associated marketing efforts, with the goal of improving the marketing material for future program years. For example, the program may benefit from posting video clips on the program website to clarify program details through a new, information-rich

medium. Implementing these recommendations may help identify some sources of participant misunderstandings of program offerings and further strengthen information available to potential participants about the program.

- **Finding.** Many program-aware non-participants were unaware of the free direct install measures available through the program. Furthermore, many non-participants thought that getting an assessment would obligate them to purchase weatherization measures.

**Recommendation.** Consider modifying the program marketing collateral to more clearly emphasize that, while strongly encouraged and that there is considerable program support to do so, customers are not obligated to purchase the weatherization measures suggested by the assessment, along with pointing out that direct install measures provide immediate savings benefits that outweigh the cost of getting an assessment. This emphasis may drive more initial participation. Furthermore, the program may attract more participants by more strongly emphasizing that the nature of the assessment is to inform customers about opportunities to save money on energy bills and to make the home more comfortable. Highlighting the low-risk nature of scheduling an assessment may help hesitant participants feel more comfortable about participating since there are no obligations to install recommended measures.

- **Finding.** A noteworthy portion of participants and non-participants aware of the program showed some uncertainty about the program and the utility intentions of discounting and giving out free measures. According to non-participant survey results, if program-aware non-participant skepticism about the program is addressed, it could increase the amount of customers that ultimately consider participation from the current 28% that reported thinking about participating upon receiving a program mailer to up to as much as 50%.

**Recommendation.** The program may benefit from addressing these concerns in its marketing and outreach materials in order to tip hesitant but interested potential participants into scheduling an assessment. Given the very high levels of participant satisfaction with the program, the program may consider providing customers summary information from real-world case studies and testimonials that address common misconceptions about the program. These could be presented on the program website, in mailers, and other marketing and outreach material. Issues to address should include why the utilities are willing to incentivize energy efficiency improvements, and the mutually-beneficial nature of the programs for customers and the utilities. Implementing this recommendation may increase the conversion rate for the program mailer.

- **Finding.** Nearly a third of mailed non-participants did not know what “weatherization” means.

**Recommendation.** Marketing material should meet the needs of the layman and use simplified terminology to describe the program offerings.

- **Finding.** Though marketing material could benefit from clarification, the overall program marketing message resonates with participant perceptions of the program’s primary benefits. The vast majority of participating customers surveyed saw the primary program benefit to be reduced energy bills (69%) and receiving a rebate on the cost of installing measures (20%).

Nearly half (46%) of participants also cited a variety of other benefits the program provided, including improved comfort, assurance that equipment is running smoothly and safely, environmental benefits, and an improved general awareness and knowledge of what’s needed to improve a home’s efficiency.<sup>18</sup>

- **Finding.** About 26% of non-participants were aware of the program (mostly through program mailers, word- of-mouth, and contractor referrals), while the remainder were not despite having received mailers. Furthermore, program administrators noted that community outreach was not strong in GPY1.

**Recommendation.** Though the program mailers are the most important source of program outreach, the program may consider seeking to capitalize on developing additional communication channels such as various social media as an extension of the word-of mouth awareness building that is already starting to be an important source of program awareness. Furthermore, the program may benefit from community outreach at events that attract the target participant demographic. Implementing these recommendations may increase participation levels and provides additional opportunities to address issues related to customer awareness and understanding about the program.

## 4.4 Home Energy Efficiency Rebates

### 4.4.1 Key Impact Findings and Recommendations

Table 4-6 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-6. GPY1 Deemed Savings Estimates**

	Therm Savings
Ex-Ante Gross	1,591,644
Ex-Ante Net	1,115,441
Verified Gross	1,592,503
Verified Net	1,096,916
NTG Ratio	0.69

Navigant’s review of the deemed savings calculations showed that Wisconsin Energy Conservation Corporation (WECC) used the Illinois Technical Resource Manual (IL TRM) algorithms correctly. There were some areas where Navigant made changes to the inputs, and we have made recommendations addressing these areas below. The remaining impact recommendations relate to the tracking system and verification and due diligence review.

- **Location tracking.** The program currently uses a zip code map to allocate addresses to each county. A customer’s county location is used to determine heat loads and thus, savings. Because some zip codes cross county lines, some customers have heating loads based on multiple counties. Navigant used GIS software to code each address to a single county, resulting in slightly different savings estimates for some customers. The program should

<sup>18</sup> Respondents were allowed multiple responses to the question on program benefits.

consider mapping participants with the GIS software or proposing that the TRM use a standard list of zip codes by county to avoid confusion.

- **Domestic hot water heater energy factor.** Navigant found that there were some domestic hot water heaters which, due to their classification as commercial units, had ratings of thermal efficiency. In most cases, WECC correctly converted these values to energy factors, but Navigant found cases where the thermal efficiency was used and also some cases where the conversion was incorrect. The tracking of these efficiencies should be improved to avoid such oversights.
- **Tracking System Review.** Though the program is functioning well from the perspective of due diligence and tracking system set up, the evaluation team found room for improvement in the tracking system database extract. Navigant recommends that steps be taken to ensure that all information present on the application be included in the tracking database, and that steps be taken to coordinate tracking efforts between Nicor Gas and ComEd to ensure consistency in utility databases.

#### 4.4.2 Key Process Findings and Recommendations

The primary process findings and recommendations are as follows:

**Finding:** Both trade allies and program participants report high levels of satisfaction with the program. However, there is still some perception that the application requirements are burdensome and complicated. One area of the program with lower levels of satisfaction was the length of time before receipt of the rebate, despite Nicor Gas meeting its goal that rebates are received within 14 days or fewer.

- **Recommendation:** Nicor Gas has taken steps to simplify and clarify the application, so Navigant will assess the success of the updated application process in GPY2. Navigant suggests expanding the use of the “instant discount” feature, which will allow the program to continue its success in meeting its goal of distributing rebates within 14 days.

**Finding:** Trade allies are instrumental in program promotion. The majority of participants were first made aware of the program through their contractors, and the trade allies are the party most responsible for explaining the program to participants.

- **Recommendation.** Navigant suggests that additional promotional material be provided to the trade allies, especially payback calculators, and that co-operative advertising be explored. Navigant also suggests that to ensure the continued successful partnership between Nicor Gas and trade allies, Nicor Gas consider creating a form of recognition for contributing trade allies.

**Finding:** Throughout the evaluation process, Navigant experienced some challenges with regards to trade ally evaluation survey responses.

- **Recommendation:** For GPY2 evaluations, Navigant plans to contact trade allies during a time of year where they are more likely to be available to speak, and also suggests that the

participating trade allies be encouraged by the implementation staff - or potentially required as a condition of program participation - to participate in the program evaluation.

## 4.5 *Residential New Construction*

### 4.5.1 **Key Impact Findings and Recommendations**

This year's impact evaluation was limited to the verification, due diligence and tracking system review (presented in *Appendix, Evaluation Report: Residential New Construction Evaluation GPY1*) and a preliminary review of the program's approach to calculating savings. Navigant's key findings and recommendations from these tasks are presented here:

- **Finding.** The program's planned verification and due diligence practices will meet most aspects of national best practices if implemented as documented.

**Recommendation.** Navigant recommends formalizing protocols for "problem" builders and raters in addition to following the excellent procedures already documented.

- **Finding.** The program's tracking system, RSR's proprietary HouseRater system, also meets or exceeds most national best practices.

**Recommendation.** Navigant recommends improving the documentation for this system, which will track extensive data at the home level, as well as linking it to the utility customer information systems.

### 4.5.2 **Key Process Findings and Recommendations**

Navigant's key process findings and recommendations are presented here:

- **Finding.** Navigant's review showed that the program has begun to successfully recruit builders and raters to the program using a variety of outreach activities. It is clear that this outreach and the development of training materials are in line with program theory.
- **Finding.** The fact that the program has been designed to operate with IECC 2012 as the baseline energy code shows that program staff is well aware of the challenges that the adoption of this code in Illinois will present.

- **Finding.** The program currently does not have any "branding" for program homes beyond their program qualification.

**Recommendation.** Navigant recommends developing program branding as soon as possible to raise program awareness among homeowners. This branding may align with existing Nicor Gas and ComEd branding.

- **Finding.** The initial program documentation does not have any formal market transformation goals; although interviews with program staff showed that market transformation is an "unwritten" goal. For example, Nicor Gas is working with the State of Illinois and the other Illinois utilities to develop building code compliance and advocacy programs for the next energy efficiency plan cycle.

**Recommendation.** Navigant recommends establishing formal market transformation goals as soon as possible. The program should also track key performance indicators related to market transformation, namely market share and program homes' time to purchase.

## 4.6 Behavioral Energy Savings Pilot

### 4.6.1 Key Findings and Recommendations

Because the program implementers were in the process of designing the BESP program during GPY1, Navigant did not conduct a full evaluation this year. Instead, Navigant worked with BESP program administrative and implementation staff to develop a model of the program theory and logic and an evaluation approach for GPY2 and GPY3. Navigant's key findings and recommendations from these tasks are presented here and primarily focus on ensuring that the program will appropriately track data necessary for successful GPY2 and GPY3 evaluation.

- **Data Necessary for Future Evaluation**
  - **Finding:** Navigant can test for program impacts in GPY2 and GPY3 *only if* the necessary data described in this report are available.
  - **Recommendation:** Nicor Gas and the BESP program implementers, WECC and CSG, should be sure to track the necessary data as it is described in this report. Doing so will allow Navigant to evaluate whether gas savings can be attributed to the BESP program in GPY2 and GPY3.
  - **Finding:** Navigant can investigate whether BESP participants signed up for other Nicor Gas programs after visiting the BESP web portals by reviewing data from other Nicor Gas programs. Information about customer motivation for enrolling in the other Nicor Gas programs will enhance this review.
  - **Recommendation:** Nicor Gas should ensure that customer motivation for enrolling in other Nicor Gas programs is captured during the enrollment process. In addition to GPY2 and GPY3 survey data, information captured during program enrollment will allow Navigant to identify whether the BESP program effectively channeled customers into other Nicor Gas programs.
  
- **Target Audience is Unclear**
  - **Finding:** The BESP program is open to all Nicor Gas residential customers with an online Nicor Gas account. The program marketing plan does not seem to incorporate insight from marketing segmentation or customer demographic data. It is unclear what type of customer the program intends to attract.
  - **Recommendation:** Nicor Gas and the BESP program implementers should consider studying participant demographics on an ongoing basis. Participant demographics could include housing characteristics and socio-economic data as well as participant levels of awareness, satisfaction, and energy use behaviors. Capturing and understanding this information will inform program design decisions, allow

implementers to optimize marketing to customers that have not yet signed up for the program, and enhance ongoing evaluation efforts.

## **4.7 Small Business Energy Savings**

### **4.7.1 Key Impact Findings and Recommendations**

The impact evaluation of the SBES program resulted in adjustments to the ex-ante gross savings for gas measures under conditions that will be described later in this report. The verified gross savings shown in Table 4-7 assumes that gas measures covered by the State of Illinois Technical Reference Manual (TRM) are deemed for evaluation purposes in GPY1.<sup>19</sup> An alternative estimate for the program as a whole is provided in the *Appendix, Evaluation Report: Small Business Energy Savings Evaluation GPY1*. The savings in the *Appendix, Evaluation Report: Small Business Energy Savings Evaluation GPY1* does not assume any deeming, but consists of research estimates for all measures, whether a measure is in the TRM or not.

As shown in Table 4-7, verified gross energy savings were nearly equal to the ex-ante gross savings reported in the Nicor Gas tracking system, resulting in a realization rate of 1.00 for gas savings (realization rate = verified gross / ex-ante gross from the tracking system).

Table 4-7 also provides the verified findings for net energy savings based on research conducted with first-year program participants and trade allies to estimate the NTGRs. The NTGR for Nicor Gas savings was 1.00. The NTGR for Nicor Gas reflects free-ridership at 2 percent offset by participant self-reported spillover of 2 percent. Trade allies reported no non-participant spillover for gas measures.

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<sup>19</sup> The September 14, 2012 final version of the first State of Illinois Energy Efficiency Technical Reference Manual (TRM) (effective as of June 1, 2012) was approved on January 9, 2013 by the Illinois Commerce Commission in Docket No. 12-0528. The verified gross savings shown in Table 4-7 recognizes that gas measures covered by the TRM are deemed for evaluation purposes in GPY1. Since the TRM was not final until after the end of GPY1, the TRM is applicable for evaluation purposes, but not GPY1 implementation. Evaluation research findings for gross savings in GPY1 are provided in *Appendix, Evaluation Report: Small Business Energy Savings Evaluation GPY1*.

**Table 4-7. Savings of the Small Business Energy Savings Program**

Savings Estimate	GPY1 Nicor Gas Natural Gas Energy Savings (Therms) <sup>20, 21</sup>	
	ICC-Approved TRM Algorithm	Corrected TRM Algorithm
Ex-Ante Gross*	104,483	109,353
Ex-Ante Net**	83,586	87,482
Verified Gross	104,483	109,353
Verified Net	104,483	109,353
GPY1 Program NTGR	1.00	1.00

\* Source: Nicor Gas ex-ante savings from an extract dated October 6, 2012.

\*\* Nicor Gas ex-ante net savings includes a NTGR of 0.80.

The primary impact findings and recommendations are as follows:

**Finding:** Evaluation research findings for customer participant self-reported free-ridership was 20 percent for Nicor Gas, very close to the ex-ante value of 20 percent assumed in program planning for both utilities. In contrast, trade ally feedback supported free-ridership estimates of 2% for gas.

While nearly all participants reported a high level of influence by the program, several indicated some level of intention to pursue efficiency projects had the program not been available, captured as a partial score of non-zero free-ridership, while still recognizing the influence of the program.

Given the program’s logic model and market structure, Navigant recognizes that a traditional participant self-report may overstate free-ridership. The program’s basic premise is that small businesses are hard to reach through other energy efficiency programs. In this circumstance, participant responses to the counter-factual (*What would you do in the absence of the program?*) are not a very reliable indicator because market barriers have limited to date, and would continue to limit, small business purchases and installations of qualifying equipment.

<sup>20</sup> The ex-ante gross savings for Nicor Gas shown in the column labeled “ICC-Approved TRM Algorithm” have not been adjusted for errata found in the approved September 14, 2012 TRM that are corrected by removing the GPM factor from the algorithm for aerators and showerheads. The ex-ante and verified gross and net savings that reflect the corrected algorithm are found in the column labeled “Corrected TRM Algorithm.” The TRM measure codes for aerators and showerheads in the ICC-approved TRM are CI-HW\_-LFFA-V01-120601 and CI-HW\_-LFSH-V01-120601, respectively. The TRM measure codes reflecting the corrected algorithms for aerators and showerheads are CI-HW\_-LFFA-V02-120601 and CI-HW\_-LFSH-V02-120601, respectively. See Illinois Statewide Technical Reference Manual for Energy Efficiency Version 2.0, June 7<sup>th</sup>, 2013, Effective June 1<sup>st</sup>, 2013, and p. 9 et seq.

<sup>21</sup> Verified gross and net savings match ex ante gross savings for Nicor Gas due to a verified gross realization rate of exactly 1.00, and a NTGR of 1.00 when rounded to two decimal places of precision.

Thus, trade allies comprise the best source of information about the market's structure (both before and after the introduction of the program). For this reason, Navigant conducted telephone interviews with participating contractors to determine how the sales to small businesses changed (both in content and quantity) as the program began to serve utility customers in the Chicago area.

Individual trade ally responses to free-ridership questions were weighted by their respective fuel-specific program savings contributions and combined for a fuel-specific overall free-ridership rate. This approach resulted in an evaluation estimate of 2 percent free-ridership for gas measures, and 5 percent free-ridership for electric measures. We used the trade ally estimate as a cap or maximum value for free-ridership, concluding that the trade allies used the program to overcome market barriers to serve a hard-to-reach audience. This is supported by self-reported customer participant free-ridership responses that recognized the program influenced them to act on their indefinite intentions and the program theory that the program was designed to serve an under-served market.

**Finding:** The per-unit savings values provided by Nicor Gas were reasonable first-year ex-ante savings estimates, given that participant equipment sizes and operating hours were assumed.

There are two areas of higher uncertainty that require attention in the second program year: heating equipment capacities, and programmable thermostat per-unit savings.

Nicor Gas based their boiler measure savings on fixed, assumed equipment sizes in the first year, whereas the Illinois TRM<sup>22</sup> estimates savings using heating equipment gas input size as a measure-level custom input to the algorithms. We did not observe project-specific heating equipment sizes in the tracking system or listed in the project documentation we sampled. Programmable thermostats are a high volume measure in the SBES program not covered by the Illinois TRM, and should be reviewed for addition.

- Recommendations for potential updates and revisions to the Illinois TRM are provided in *Appendix, Evaluation Report: Small Business Energy Savings Evaluation GPY1*.
- **Recommendation:** The program should collect boiler and furnace heating system capacities to enable the program to claim actual rather than default savings.<sup>23</sup>

We observed in the database that some instances of identical measures and building types used different per-unit savings (e.g., claimed savings matched different building types). We did not adjust for this finding, because it appeared that the claimed savings were reasonable selections for the businesses, even if the recorded building type was not consistent with the deemed savings. We suspect this is due to the ambiguity in assigning building types for some small businesses, and projects that may encompass a portion of the space in a business that may be different than the business as a whole. Possibly the business type is not updated to reflect the final project.

- **Recommendation:** Review database tracking and updating procedures to improve consistency between ex ante per-unit savings and recorded building type.

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<sup>22</sup> State of Illinois Energy Efficiency Technical Reference Manual, Final version, September 14, 2012, effective June 1, 2012.

<sup>23</sup> The implementation contractor indicated in draft comments that they are collecting heating system capacities in GPY2.

#### 4.7.2 Key Process Findings and Recommendations

The key process finding and recommendations are as follows:

**Finding:** With respect to savings goals, Nicor Gas did not reach their goal of 169,329 net therm savings in the first year, achieving 104,483 net therms, which is 62 percent of goal.

Nicor Gas program planners assumed that first-year participation would be much higher than achieved. For instance, the Nicor Gas efficiency plan for GPY1 assumed 169,329 net therms saved from 1,140 projects, about 149 therms per project. The actual number of participants was far lower, 272 participants for GPY1, saving 104,483 net therms or 384 therms per project. Although GPY1 projects were larger than planned, planners overestimated the number of projects that would be completed in the first year. The goals for Nicor Gas were too high for the number of active gas measure trade allies and their level of engagement.

- **Recommendation:** Lighting-only firms participated at twice the rate of HVAC-only firms in GPY1. Nexant has been actively recruiting more HVAC contractors and mechanical engineering firms for GPY2. The Evaluation Team advises Nexant to concentrate on HVAC firms that are willing to enter partnership relationships with lighting companies and that are in less-covered geographic areas.

**Finding:** The SBES Program may need more time than other programs to ‘ramp up’ to full speed. Small business customers are not educated about the savings potential of energy efficient equipment and are somewhat skeptical that the utilities are offering the program. They tend to be unaware of the surcharge and the other programs offered by the utilities.

**Finding:** The program appears to be changing the structure of the market. Trade allies are forming partnerships by purchasing other companies, and adding more staff to sell the program and install both lighting and HVAC equipment. Two trade allies, one lighting company and one mechanical engineering firm, purchased a company to be in a position to deliver the full set of program measures. Other firms hired more staff and one opened an additional office in the Chicago area. Structural changes such as these, purchasing companies and forming long-term partnerships, take time to fully impact the market.

- **Recommendation:** Nicor Gas should revisit the expected participation levels for the SBES Program. Small business customers are ‘low information’ customers and it will take time and resources for their knowledge base to catch up with that of larger customers. In addition, some of the trade allies have made significant investments to participate in this program; the utilities should respect their efforts to embrace the program.

**Finding:** Nexant staff and utility staff judged the success of the marketing of the SBES Program more favorably than trade allies. Trade allies thought more marketing was the way to raise awareness with customers. Radio was the most preferred channel among trade allies, along with direct mail.

- **Recommendation:** Nicor Gas needs to continue general advertising of the SBES Program to increase customer awareness and receptivity and promote the program.

**Finding:** During the Due Diligence review, Navigant understood that customers currently do not sign any documents if they change the scope of the project when the trade ally arrives at the

customers' facility. Alternatively, the customer signs but the customer approval and the scope of the approved project was not entered into the tracking system. In this situation, the invoice from the trade ally was used as the final determination of the number and type of measures installed.

- **Recommendation:** Customers should be required to sign a change-order (tracking) form if they change the scope of the project substantially to ensure that the changes to measure quantities are recorded in the tracking system for evaluation purposes.<sup>24</sup>

## 4.8 Business Energy Efficiency Rebates

### 4.8.1 Key Impact Findings and Recommendations

As shown in Table 4-8, savings verification of the GPY1 BEER program found that verified gross energy savings were consistent with the ex ante gross savings reported in the implementation contractor's (IC's) tracking system, resulting in a realization rate of 1.00 (realization rate = evaluation verified gross / ex-ante gross from the tracking system). Table 4-8 provides the evaluation research findings net energy savings based on a NTG ratio of 0.73 calculated from GPY1 evaluation research.

**Table 4-8. GPY1 Natural Gas Savings Estimates**

	Nicor Gas Energy Savings (Therms)
Ex Ante Gross Savings	1,742,478
Ex Ante Net Savings	1,400,675
Verified Gross Savings <sup>25</sup>	1,742,478
Verified Net Savings	1,272,009
Verified Net-to-Gross Ratio	0.73

*Navigant Analysis of Nicor Gas tracking database (10/06/2012 data extract)*

Comparing initial program planning net therm savings with evaluation estimated net therm savings, Navigant found that Nicor Gas BEER program achieved 128% (1,272,009 therms) of the initial planned net savings for the BEER program. The planned net energy savings goals for GPY1 were 991,607 net therms with a NTGR of 0.80.

The Navigant team also assessed the progress of the Nicor Gas BEER program by comparing impact results from the Rider 29 program to the Rider 30 GPY1 impact results. Although program

<sup>24</sup> In GPY2/EPY5 Nexant is requiring customers to sign/initial a revised Installation Agreement with the scope changes noted.

<sup>25</sup> The September 14, 2012 final version of the first State of Illinois Energy Efficiency Technical Reference Manual (TRM) (effective as of June 1, 2012) has been agreed to by Illinois Stakeholder Advisory Group (SAG) participants and has been approved by the Illinois Commerce Commission in Docket No. 12-0528 as of the date of this report. The verified gross savings shown in Table 4-8 assumes that gas measures covered by the TRM are deemed for implementation and evaluation purposes in GPY1, after the ICC approval of the TRM and TRM Policy Document for use in GPY1. For the BEER program, evaluation research findings for gross savings that do not assume deemed status of TRM measures in GPY1 were identical to verified gross savings with deeming.

participation in Rider 30 GPY1 was not significantly different from that of the Rider 29 pilot program, the Rider 30 GPY1 program achieved over 318% (1,742,478 therms) of Rider 29 gross savings (547,787 therms). Net savings increased by approximately 299% from 426,071 therms to 1,272,009 therms. Further, these gains were achieved by expending incentives equivalent to only 88% of Rider 29 incentives. The difference in savings and incentives was due to higher than projected installations of relatively low-incentive industrial high pressure steam traps.

The primary impact findings and recommendations are as follows:

**Finding:** Navigant found that steam trap measures represent approximately 85% of the total reported gross therm savings. Much of the program's ability to achieve its goal can be attributed solely to steam trap measures. Navigant acknowledges that new programs sometimes rely on just a few measures to achieve savings and then diversify over time.

**Recommendations:**

- The program should work to diversify the registered trade ally pool to include additional types of equipment/measures.
- Future evaluations should include secondary research on commercial and industrial steam trap measures to ensure prescribed savings are accurate.

**Finding:** Upon reviewing the program tracking database, Navigant found that certain key variables that aid in the evaluation process were not included in the tracking data provided for review, although it is the understanding of the evaluator that this data is tracked.. The Implementation Contractor (IC) provided unit measure savings estimates for program qualifying measures. Navigant performed a review and verification of the algorithms and assumptions. Our estimates from the TRM were in agreement with those provided in the IC's documentation. The IC's estimates were considered accurate for GPY1 application.

**Recommendations:**

- The IC should ensure that unique project identifiers are provided in the tracking system for review by the evaluator.
- The IC should ensure information provided in hardcopy or handwritten applications are accurately transferred into the tracking system. The IC should ensure the type of business or facility type indicated in the project application is provided in the tracking system.
- The IC should also ensure all relevant contact information for both program participants and trade allies is provided in the tracking database. At a minimum, contact name, telephone number, and participant address should be provided for all program participants. A primary contact name and telephone number should be provided for trade allies.

#### **4.8.2 Key Process Findings and Recommendations**

The primary process findings and recommendations are as follows:

**Finding**

Overall, customers appear to be very satisfied with the BEER program; 94% of the customers surveyed reported being satisfied with the program overall. Most customers (88%) reported being

satisfied with the incentive amount; while 84% reported being satisfied with the incentivized measures/equipment offered by the program.

**Finding**

Evidence from the program tracking system shows incomplete applications and denials are a challenge to the program implementation.

**Recommendation:**

- The program implementation team should work with the participating trade allies to streamline and simplify the application process; including providing additional information about qualifying units before the energy efficient projects are undertaken, in order to reduce the number of rejected applications.

**Finding**

Navigant found that during the Rider 29 evaluation, program participation and savings did not meet initial program planning goals. In GPY1 of Rider 30, program staff took steps to increase program marketing and outreach efforts and added new program measures (steam traps and commercial kitchen measures) to achieve program goals. Navigant found that the program made successful modifications to achieve the savings goals and at a lower than projected incentive cost.

**Finding:** Navigant found that significant efforts have been made to improve on the program marketing and outreach activities to trade allies since the beginning of Rider 30. The IC increased the total registered trade allies from 1,000 to 4,169. Only 41% of the survey respondents reported that they used a program-qualified trade ally.

This suggests that both the program and the trade allies may not be promoting the program-qualified trade ally status feature to the fullest extent possible.

**Recommendation:**

- Navigant recommends that the IC continue to train and recruit new trade allies to aid in the promotion of the BEER program. Because the participation of trade allies is vital to both program promotion and to facilitating the program application process, Navigant also suggests that the IC implement additional incentives for trade allies, such as rewarding higher trade ally volume through such means as listing on Nicor Gas website based on cumulative savings brought in.
- Although contractors are encouraged to participate in co-branding of their company's website and marketing material, it may also be effective to encourage trade allies to promote their program-qualified status to participating and potential customers. By informing customers of their status (either vocally or through marketing material) as a registered Trade Ally with Nicor Gas, customers may be more comfortable participating in future program offerings.

In January 2013, Nicor Gas implemented a web-based tool that allows customers to find Contractor Circle/registered trade allies that provide service to their county, customer segment (i.e. residential, large commercial, small commercial), and the type of service required (e.g. commercial boiler installation, central air conditioning installation, etc.). This tool should facilitate customers' ability to find program affiliated contractors.

**Finding:** Participation in the participant survey did not meet the designed sample size of 75 completes. Although Navigant contacted 146 participants, only 34 agreed to participate in the survey. Although there were few outright refusals to participate in the survey, many participants indicated that they did not have time and calling back at a later time would be better. Many of the later callbacks did not result in the customer's participation, but rather another refusal to participate. It should be noted that while the sample of 34 participants represented 13% of the population, it accounted for approximately 80% (or 1,392,269 therms) of the ex-ante gross savings claimed.

**Recommendations:**

- Improve the quality of the customer contact name and telephone number data in the tracking system so the correct survey contact can be targeted from the outset.
- Discuss the verification obligation with customer contacts at the time of project implementation activity – note that there is a requirement to participate in a brief survey, if contacted.
- Include a note of obligation to participate in verification, if contacted, with the rebate check payment letter.
- Send out a reminder note of the verification obligation in post-project follow-up communication with the customer
- On the application form Terms and Conditions, state that, if contacted, responding to verification interviews is a requirement of program participation. Navigant recommends changing the current wording from:

“Current C&I PY2 Application Forms Terms & Conditions: Verification: Any customer receiving a rebate check may be contacted by an evaluator to verify service/equipment installation or be asked to complete a customer survey.”

To

“Verification: Any customer receiving a rebate check may be contacted by an evaluator to verify service/equipment installation or be asked to complete a customer survey. If contacted, your participation is required.”

## **4.9 Business Custom**

### **4.9.1 Key Impact Findings and Recommendations**

As shown in Table 4-9, savings verification of the GPY1 Custom program found that research findings gross energy savings were approximately 7% lower than ex-ante gross savings reported in the implementation contractor's (IC's) tracking system, resulting in a realization rate of 0.93 (realization rate = evaluation research findings gross / ex-ante gross from the tracking system). Table 4-9 provides the evaluation research findings net energy savings based on a calculated net-to-gross ratio (NTGR) of 0.53.

**Table 4-9. GPY1 Natural Gas Savings Estimates**

Category	Nicor Gas Energy Savings (Therms)
Ex Ante Gross Savings	1,622,380
Ex Ante Net Savings	1,297,904
Research Findings Gross Savings	1,510,285
Research Findings Net Savings	800,451
Verified Net-to-Gross Ratio	0.53

*Navigant Analysis of Nicor Gas tracking database (10/06/2012 data extract)*

The primary impact findings and recommendations are as follows:

**Finding:** Navigant’s program tracking system review indicates that additional information is needed to support future program evaluations and possibly allow program managers to monitor key aspects of program performance at regular intervals.

**Recommendations:**

- The IC should consider updating the tracking system for the GPY2 evaluation to include participant business or facility type.
- The IC should consider including additional fields in the tracking system for information on baseline selection to indicate whether the implemented measure is a replace on burn-out (ROB) or early replacement/retrofit (RET) scenario.
- The tracking system should include measure information such as equipment cost, installation and incremental cost, equipment age or estimated equipment end of useful life. This information is useful for evaluating measure and program cost effectiveness.
- The IC tracks program forecast or pipeline projects separately and updates the main tracking system when projects are approved for incentives. The program tracking system should provide pipeline projects, including timelines.

**Finding:** Customers or their trade allies do not submit adequate information on the operating condition and input parameters for savings estimates, and measure specifications. During the on-site M&V and subsequent follow-up review, the evaluation team spent a significant amount of time reviewing and obtaining sufficient project information from the customer or IC to enable us to sufficiently establish the condition of installed equipment to develop savings estimations. Significant adjustments were applied to the operating conditions for some projects including; NG01-001, NG01-004, NG01-005, NG01-006, and NG01-015. The projects with the lowest relative realization rates were; NG01-061, NG01-012, and NG01-002, with realization rates of 0.64, 0.42, and 0.62 respectively.

**Recommendation:**

- Verification of net claimed savings is greatly aided when thorough documentation of baseline and baseline conditions are provided, including:

- a. Pre-existing equipment and operation description,
  - b. energy savings assumptions and methodologies,
  - c. estimated equipment remaining useful life from pre-approval application form, when applicable,
  - d. standard maintenance practices and history, and
  - e. Inspection results.
- While the IC is collecting this information to some extent, Navigant stresses the importance of sufficient project documentation to accurately portray the program's selection of baseline conditions for custom projects.
  - Nicor Gas should continue to encourage all customers receiving incentives through the Custom Program to participate in the CATI survey. Navigant will work with the IC in reaching out to program participants prior to initiating either participant or trade ally surveys.

**Finding:** A relatively lower overall weighted NTGR of 0.53 was achieved compared to initial program planning NTGR of 0.80. This is due to a lower rating by the majority of survey respondents when asked to assign a percentage to the Custom program's influence relative to all other factors regarding their decision to implement the measures/project.

**Recommendation:**

- The program should continue to assess the opportunities to reduce free ridership among the Custom program participants. Although high free ridership among custom project participants is not unusual, increasing awareness and the application screening process can help reduce free ridership.

#### 4.9.2 Key Process Findings and Recommendations

The primary process findings and recommendations summarized below:

**Finding:** The Custom program in the Rider 30 GPY1 period achieved significant progress in recruiting additional participants, with 28 projects participating in GPY1 compared to nine projects during the Rider 29. Although the Custom program did not meet its GPY1 participation target of 43 projects, the program in GPY1 exceeded its planning gross savings goal by 11%, and an increase of 415% of gross savings compared to the Rider 29 program.

**Finding:** Navigant found that significant effort has been made to improve on the program marketing and outreach activities to both trade allies and participants since the beginning of Rider 30. Notable among them is the continuous recruitment of contractors and organizing trade ally meetings and training.

During Rider 29, there were 1,000 registered trade allies. The IC did a commendable job in recruiting trade allies to the program, increasing the total registered trade allies to 4,169.

- **Finding:** Participating customers surveyed are highly satisfied with the program, with the majority planning to participate again in the future and the balance possibly participating in

the program again in the future. It should be noted that since a high level of free ridership was found in GPY1, these participants may or may not pose a risk of increasing free ridership in future program years if they decide to participate again.

**Recommendation**

- In an effort to reduce free ridership, the program could;
  - Promote the installation of technologies that are more emergent, and;
  - Continue to recruit trade allies to the program. Increasing trade ally participation may bring customers to the program that may otherwise have not known about the program and promote measures that the customer would be less likely to have installed in the absence of the program.
- The program should continue to work on simplifying the application process, including using more common terminology and the ability to submit program applications online.
- The IC should continue to follow up with those customers (pending participant authorization for Navigant to release their contact information) that indicated that they are interested in future participation to explore whether those customers have particular projects in mind.

**Finding:** All trade allies contacted were satisfied with the program and its role in their businesses. The majority would be interested in sharing with Nicor Gas their thoughts on equipment and energy saving methods that could be incorporated into the program as well as potential improvements to the equipment qualification process and the metering documentation required to achieve program approval.

**Recommendation:**

- Nicor Gas should continue conducting focused research to explore trade allies’ thoughts on beneficial program changes.

**Finding:** Customer referral is happening between the Custom program and the SBES and BEER programs. Referrals are reported to Nicor Gas on a weekly, monthly and quarterly basis.

**Recommendation**

- The Custom program in coordination with other Business programs should create a central database system where referral projects are stored and the status of which can tracked.

## **4.10 Retro-Commissioning**

### **4.10.1 Key Impact Findings and Recommendations**

Table 4-10 summarizes the savings from the Joint RCx program.

Among the 50 total participants, 7 in the program database were Nicor Gas participants. The gas utilities did not have a deemed NTG ratio; however, they all used 0.8 as a planning assumption, and Navigant applies this ratio to ex ante net savings. Since no NTG estimates were deemed for gas savings, Navigant applied the NTG ratio estimated by GPY1 research below to GPY1 gas savings.

**Table 4-10. GPY1 Evaluation Natural Gas Savings Estimates**

Research Category	Nicor Gas Savings (therms)
Ex Ante Gross	180,345
Ex Ante Net <sup>26</sup>	144,276
Research Findings Gross	147,838
Verified Net <sup>27</sup>	150,057
Research Findings NTGR	1.02

*Source: Utility tracking data and Navigant analysis.*

- **Program Savings Goals Attainment.**

**Finding.** Gas savings goals fell short for Nicor Gas (267,700 therms).

**Recommendation.** Savings is driven largely by participation and by effective trade allies. Increasing the number of active trade allies performing more projects will help gas goal achievement.

- **Gross Realization Rates**

**Finding.** The gas savings realization rate is 82.0% Nicor Gas. Divergent gas realization rates are a result of the small populations and savings. The overall gas realization rate is 103%. Energy savings estimates from the RSPs are generally well-supported and calculated with a high degree of rigor. Most RSPs continue to use their own estimation spreadsheets, rather than program-provided templates for common measures. This factor complicates program implementation and evaluation efforts as the variety of methods is time-consuming and open to more errors.

**Recommendation.** Explore ways to encourage use of existing program-standard savings calculators, when the common measures qualify for their use, e.g. less than 2,500 therms savings. Perhaps use incentives or fast-track program processes when standard savings calculators are used.

- **Net-to-Gross estimates:**

**Finding.** The gas NTG ratio estimate is 1.015. Program incentives to fund the studies and the expertise of RSPs rank very high in importance among participants. (9.6/10) According to participants, program influence to identify and implement measures is lower (7.4/10), a result similar to EPY3. There is only small indication of spillover among participants. Service providers credit the program with sustaining and creating a retro-commissioning market in Illinois, as a result spillover from the RSPs contributes to overall NTG estimates.

**Recommendation.** Update gas-specific NTG ratio for planning purposes, based on research

<sup>26</sup> The program-assumed net-to-gross ratio is 0.8 for Nicor Gas savings, Peoples Gas and North Shore Gas for planning purposes.

<sup>27</sup> Natural gas verified net savings is based on EPY4/GPY1 research that found a net-to-gross ratio of 1.015 for gas and 1.038 for electric savings.

presented in this report. Apply the gas NTG retrospectively to GPY1 savings since this is the first time NTG has been researched for the gas program.

- **Incomplete Savings Estimates.**

**Finding.** Some measures are low-risk and high-reward in terms of savings, and there is a temptation to apply less rigorous calculations to quantify savings, since the RSP is certain the customer will implement the measure. While this scenario expedites the retro-commissioning process and still benefits the customer, it short-changes the program's savings estimates.

**Recommendation.** During savings-calculation quality control steps, look specifically for interactive and concurrent savings with a checklist by measure type. For example, equipment scheduling saves gas for ventilation as well as fan energy; fan static pressure reduction decreases fan heating, and discharge air temperature resets can change mass-flow rates and fan power. Encouraging the use of program template calculators, which do include the concurrent and secondary effects, will improve the overall accuracy of estimates.

- **Incomplete Training Tracking.**

**Finding.** A condition of program participation is having at least one staff member complete Level 1 Building Operator Certification training. The program data base currently is not set up to track training participation for program compliance.

**Recommendation.** Add table(s) to the data base to track training for one or more individuals for each participating site. The table should link to project number for verification purposes.

#### 4.10.2 Key Process Findings and Recommendations

- **RSP Participation.**

**Finding.** The program has 23 registered RSPs. While only nine completed projects in GPY1 many of the others are working on projects for GPY2 completion. While the effort to increase the number of participating RSPs between GPY1 and GPY2 was a success, there is lost opportunity in having RSPs listed as part of the program but not completing projects in a program year.

**Recommendation.** Because RSPs are the primary conduit for program participation, The IC should stress the importance of completing a project during training and be sure all RSPs clearly understand inactivity and no projects will result in rebid or removal from the program. Conduct evaluation research with inactive RSPs in GPY2 to determine the conditions of inactivity.

- **Implementation Phase Support**

**Finding.** The Implementation Phase continues to be the primary source of challenges for the program. This phase is generally participant-led and the timely completion of projects is entirely dependent on the customer keeping the project moving. RSPs expressed a concern that while they are not involved in this phase, they are still held responsible, via the RSP review process for the timely completion of projects.

**Recommendation.** More effort is needed from Program Managers and the IC to engage the participants and keep the implementation phase moving along on a timely basis. Include

implementation milestone dates in the implementation phase that will status each recommendation periodically. The milestones could be simple written status updates via email to the RSP, if projects are progressing, or the status updates could be part of a conference call or on-site meeting with the customer, RSP and utility / program representatives if the recommendations seem stalled.

- **RSP review process.**

**Finding.** RSPs indicated that while they think the review process is important, the process could be more transparent. Essentially, RSPs believe there should be consideration in the scoring for those parts of the project that the RSPs feel they have little to no control over. For example, the timely completion of the implementation phase may negatively affect the score; yet, they have little to no control over this part of the project.

**Recommendation.** The RSP role in implementation should be emphasized and clarified. RSPs should be reminded to conduct more implementation follow-up to encourage timely project completion. If this fails to spur implementation, the RSP scoring system should be reviewed to ensure it is not penalizing RSPs for aspects of the program that they have less control over (e.g., implementation timing) or program approaches should be put in place that allow RSPs to guide the participants more actively through the customer-directed phases.

- **Project timing**

**Finding.** Timing improved in GPY1, but remains a challenge. In the current program year, many projects were unable to meet their originally planned completion timelines. Timing challenges include:

- The program year, which ends in May, limits the RSP's testing season for cooling measures, creating problems in finishing projects on time.
- Lack of customer urgency to complete the various stages of the project process.
- The amount of back and forth between the RSPs and IC during the review process.

Customer timing perception varied by customer type with:

- Large corporate participants indicating that the projects could have been completed more quickly; and,
- Smaller, non-profit, or more budget constrained participants indicating that being able to spread the implementation phase out of the course of more than one fiscal year would allow them to complete more projects through the program.

**Recommendation.** The utilities and Nexant should stay more engaged with participants and RSPs to clear obstacles to implementation and analysis review. Set up periodic meetings with each project team to learn of obstacles before they slow down the program processes.

## **4.11 Business New Construction**

### **4.11.1 Key Impact Findings and Recommendations**

The program garnered savings of only 11% of the therms savings goal. Customers are satisfied and find value from the program. Our research finds that the implementation team is running the

program well, although we do provide recommendations to improve their processes (detailed more below and in the report).

**Table 4-11. Program Gross and Net Savings**

Research Category	Nicor Gas Savings (therms)	Verified MBtu (ComEd and Nicor Gas)*	Research MBtu (ComEd and Nicor Gas)*
Ex Ante Gross	54,426	76,235	76,235
Ex Ante Net	32,656	45,742	45,742
Research Findings Gross	64,400	68,700	68,300
Verified Net	21,300	37,600	39,700
Research Findings NTGR	0.33	0.55	0.58

Source: ComEd PY4 Ex Ante Table, Program Tracking Data from Implementer, Nicor Gas Rider 30 Filing, evaluation team analysis.

\* MBtu values are calculated by applying conversion factors to the ex ante MWh and therm values. Verified MBtu were calculated using verified electric Systems Track parameters, Research MBtu were calculated using research results only.

The gas side of the program had a gross savings realization rate greater than 100% but a low net-to-gross ratio (Table 4-11). The NTGR was 0.33 for the program with a range of 0 to 0.80. In GPY1, there were only seven projects that received Nicor Gas incentives. Five projects comprised the evaluation sample, but one project personnel did not participate in the NTGR interview. When there are so few projects, the values shown in Table 4-11 often do not provide indications of what could occur in the future. The evaluation team also observed that since the gas incentives were new, many participants did not learn about them as early in the design process. This contributed to low NTGR values.

In Table 4-12, we break out the values presented in this section by program track, i.e., Systems or Comprehensive.

**Table 4-12. Program Gross and Net Savings – by Track**

	Metric	Systems Track	Comprehensive Track	Total*
Ex ante gross savings	therms	22,867	31,559	54,426
Ex ante net savings	therms	13,720	18,935	32,656
Evaluation adjusted gross savings	therms	27,000	37,300	64,400
Evaluation net savings	therms	8,900	12,400	21,300
Verified Gross Savings	MBtu	45,700	23,000	68,700
Verified Net Savings	MBtu	26,200	11,400	37,600
Researched Gross Savings	MBtu	47,300	21,000	68,300
Researched Net Savings**	MBtu	27,500	12,200	39,700

Source: Evaluation team analyses

\* Track sub totals do not always sum exactly to the total value due to rounding.

\*\* Due to the sample design, only the total researched net savings value meets the 90% confidence and 10% precision level. We show this value decomposed across Systems and Comprehensive Track projects for illustrative purposes only.

### Impact Recommendations

**Finding:** The evaluation team found that the gas savings from HVAC measures calculated using the Commercial Building Energy Consumption Survey (CBECS) data was somewhat inconsistent. Heat loads and the resulting savings were based on CBECS data averaged over the entire United States. This underestimated the heating for buildings in the Illinois climate zones. Additionally, an assumed peak load was used to cancel out the building area in the analysis. While this approach in itself is not incorrect, it is important to note that the savings are dramatically different than if simply using the actual building area to determine the savings.

- **Recommendation:** Use regionally appropriate data sources whenever possible. The Illinois technical reference manual (TRM) was not available for this program year, but should be used for prescriptive heating measures in future years.

**Finding:** While the team’s impact analysis did not reduce the gross ex ante energy savings much overall, the information in *Appendix, Evaluation Report: Business New Construction Evaluation GPY1* shows that NTGRs continue to significantly reduce the program’s net savings estimates. Based on the project sample, relatively few large projects with high free ridership had a significant impact on the overall NTGR. This was especially true for the gas analysis: interviews showed that low gas incentives and low awareness of gas incentives contributed to high free ridership.

- **Recommendation:** The implementation team should review, possibly further develop, and document its free-rider screening process for potential projects. The program’s operation

manual indicates that the program screens for free riders, but the evaluation results indicate that there are a few participating in the program. For projects that the program touches early, implementation staff should consider the customer's preexisting level of commitment to efficiency. If projects are undertaken after the original design is completed, implementation staff should consider asking how the program can leverage further efficiency out of the customer. Improving awareness of available gas measures earlier in the design process could help raise the gas NTGR.

### **Building Efficiency Baselines**

**Finding:** With the addition of process-related efficiency measures, the types of measures that receive incentives through the New Construction program are moving beyond building envelope, HVAC, and lighting systems. Expanding the measures that can be included in the program may be beneficial for the program and its participants. For identifying building efficiency baselines in GPY1, the program primarily used the International Energy Conservation Code (IECC) Illinois Energy Conservation Code for Commercial Buildings, which referenced IECC 2009 and allowed for American Society of Heating, Refrigerating, and Air-Conditioning Engineers 90.1 – 2007 as an alternate compliance method. Yet, in GPY1 the program had to reach outside of this framework to establish and document the baseline for some industrial process measures.

- **Recommendation:** The evaluation team recommends a careful consideration of the program's use of appropriate baselines, and the documentation of all related decisions as the program implements measures not covered by existing building codes. The implementation team should document changes to the rationale for alternative baselines selected to compensate new project types.

#### **4.11.2 Key Process Findings and Recommendations**

This section lists the main findings and recommendations resulting from the GPY1 evaluation. The evaluation team believes that these recommendations will prove the most useful to the implementation team in their efforts to continue to develop the program in GPY2.

### **Marketing and Outreach**

**Finding:** The program appears to be performing outreach effectively, but there may be some opportunities for improvement by increasing awareness of the joint program and targeting additional professional associations. Among program participants, many heard about the program through word of mouth within the industry or directly from program staff. Focus group participants knew about Nicor Gas efficiency programs in general, but they were less aware of the New Construction Service program in particular and could only list a few details. Among the focus group participants, only four of the ten knew that ComEd and Nicor Gas offered a joint program.

- **Recommendation:** Ensure that all marketing and program materials are prominently co-branded.
- **Recommendation:** The implementation team likely has a good understanding of its marketing effectiveness across the many professional organizations it already targets. Per its discretion, it should consider expanding outreach efforts to additional organizations such as the following:

- CoreNet—this is an association of corporate real estate professionals, workplace professionals, service providers and economic developers.
- Alliance for Environmental Sustainability (AES)—The program participant who suggested AES acknowledged that AES formerly had much more of a residential focus but in recent years has expanded its focus and, therefore, may be an appropriate outreach target for the program.

### **Barriers and Drivers to Participation**

**Finding:** The program implementation team has been focused on finding the best ways to work with project staff (i.e., participants and partners) given standard business and design practices and project time lines in the new construction industry. For program participants, it appears that the program is generally engaging project teams at the right time and in ways consistent with its design. Non-participants in the focus group, however, did express concerns about how participation in the program might adversely affect their projects. Concerns included impacts on tight project timelines, creating onerous application requirements similar to Leadership in Energy and Environmental Design (LEED), and receiving incentives for lighting power density reductions as opposed to kilowatt-hours saved through measures. The perception that the program competes with market actors who provide modeling does not appear to be a significant barrier.

- **Recommendation:** Better describe the program to potential participants by developing the program website. Overall, focus group participants indicated they need more clarity on program processes and one participant noted that the program website was not helpful in answering his immediate questions. Create a list of frequently asked questions to post on the website based on the questions, concerns, and misperceptions uncovered in the focus group with active non-participants (see *Appendix, Evaluation Report: Business New Construction Evaluation GPY1*).
- **Recommendation:** Clarify the program’s structure and benefits for potential participants by offering training on becoming a program ally. Focus group participants want more information about the program and want to understand how they can use the program to benefit their projects, create and use a webinar to train designers, increase their understanding of the program, and provide them a marketing tool.
- **Recommendation:** Better describe the program for potential participants by creating one-page, program-specific marketing sheets. Designers requested that they have a one-page marketing piece to pass out during early design meetings to introduce the possibility of participating in the program. Create one-page descriptions of the program aimed at specific target audiences. One marketing piece should be targeted to the owner/developer group but also be available to those in the design group. Another could be targeted to projects that are already intending to incorporate some high-efficiency design such as LEED.
- **Recommendation:** Better characterize the program for potential participants by continuing to develop case studies. Focus group participants suggested that case studies are a good way to describe the potential program benefits for projects similar to those they are working on. Given that point, continued development of case studies and disseminating them to the design community should occur.

## Gas Incentive Levels

**Finding:** There is some evidence that suggests the gas incentives may be low compared to other programs in the market. Program participants and focus group participants gave a strong, positive response to the inclusion of gas incentives.

- **Recommendation:** Promote the gas incentives and consider increasing them. The program should review the gas incentive rates and investigate whether they are high enough to increase participation.

## Program Impact on the Market

**Finding:** The program is likely helping to build energy efficiency knowledge in the market, especially among the market actors who participate in the program and among the market actors who attend trainings. However, it is not clear if the program is creating a sustained effect on energy-efficient new construction practices beyond the projects that are recruited into the program. Instead, participants and active non-participants have indicated that LEED and utility incentive programs in general are driving energy-efficient new construction practices more than the New Construction Service in particular. Given these other influences, it is difficult to parse out the effects of the New Construction Service.

- **Recommendation:** The program should take advantage of the prevalence of LEED projects by recruiting these projects into the program; however, the program needs to convince design teams that working with the program on these projects will be a smooth, non-onerous, valuable process. The main concern focus group participants had about program alignment with LEED is that participating in LEED requires many administrative hours for paperwork and they worry that working with the New Construction Service may require similar amounts of paperwork. Create LEED-specific, one-page fact sheets outlining the ways the program can enhance the efficiency of these projects. Create a message that highlights: 1) the design team can submit existing LEED design plans; 2) program incentives help decrease first costs to ensure that high-efficiency design and equipment are implemented; and 3) past design participants find the program's review of LEED design valuable for helping to find ways to realize LEED goals and for the "extra set of eyes" the service provides.

## *4.12 Building Performance with Energy Star*

### **4.12.1 Key Process Findings and Recommendations**

After reviewing the program materials and conducting interviews with program and implementation contractor staff, Navigant has the following key process findings and recommendations:

- **Finding.** The program currently does not have any key performance indicators (KPIs) outlined in program operations documents.
  - **Recommendation.** Establish clear key performance indicators and tracking plans to help track and determine program effectiveness and to identify potential avenues for enhancing program performance. This will also help provide future evaluation efforts with key data for evaluating program effectiveness.

- **Finding.** Though Nicor and ComEd share potential participants in their respective versions of the program, there is no official coordination of program efforts or co-branding between the two utilities.
  - **Recommendation.** The evaluation team recommends Nicor Gas assess the potential benefits and challenges of running this program jointly with ComEd since both utilities target many of the same clients with their respective versions of this program effort.<sup>28</sup> A joint utility effort could result in implementation cost savings and it could increase useful data sharing.
  
- **Finding.** Though the current implementation contractor is running the same program for ComEd for some of the same potential participants as Nicor, it does not share data between the two utilities in cases where they have mutual participants.
  - **Recommendation.** Whether utilizing a shared implementation contractor, running the program jointly, or through alternative agreed upon means, the evaluation team encourages data sharing between the utilities in cases where they share participants in their respective versions of this program. Both utilities may benefit from better understanding shared participants' proposals and projects on both the electric and gas sides. For instance, Nicor Gas may benefit from understanding whether potential participants considering both utility programs are more inclined to pursue electric measure projects rather than gas ones due to differences in electric and gas energy costs.
  
- **Finding.** Program marketing and outreach materials are currently limited to an informational leaflet. The evaluation team sees opportunity to develop additional materials to help promote the program and drive participation.
  - **Recommendation.** The evaluation team recommends looking into expanding program informational materials. This could include developing more informational materials and case studies, both online and print. Since the Nicor Gas program does not yet have customer experiences to profile, profiles of peer businesses in the hospitality and assisted living sectors that participated in other utilities' comparable programs could stand in until such are available. Concrete examples of these programs in action and details of related energy and non-energy benefits have proven to be very powerful in motivating participation.
  
- **Finding.** While ComEd's BPwES program is open to customers for whom the implementation contractor does not provide billing support, the Nicor Gas program is not, which potentially limits its outreach and growth potential.
  - **Recommendation.** The evaluation team recommends that Nicor Gas assess the potential of opening the program to clients to which the implementation contractor does not provide billing services. If Nicor Gas were to establish lead-generating processes to refer potential participants to the implementation contractor, program

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<sup>28</sup> ComEd treats its version of this pilot as a feeder program for its Prescriptive Program.

participation could potentially be increased. Furthermore, opening the program up to customers that the implementation contractor does not handle billing for could allow for trade ally involvement in promoting the program.

## 4.13 Economic Redevelopment

### 4.13.1 Key Impact Findings and Recommendations

**Finding:** The ER program began implementation in January 2012. In GPY1, the ER program recruited 27 projects, including 20 comprehensive projects. Many of the projects initially recruited by the ER program were still in progress at the end of GPY1, including 26 projects with estimated gross annual energy savings of 250,836 therms, amounting to 66 percent of the program’s GPY2 gross energy savings goals of 379,070 therms.

**Finding:** The program induced ex-ante gross savings of 893 therms from one systems project that qualified for completion incentives in GPY1, achieving 5 percent of its GPY1 gross energy savings goal of 17,117 therms. Navigant applied the program planned Net-to-Gross (NTG) ratio of 0.80 per the NTG Framework<sup>29</sup>, resulting in an Evaluation Research Findings Net Savings of 714 therms. Table 4-13 presents GPY1 program impacts.

**Table 4-13. Nicor Gas GPY1 Economic Redevelopment Program Impacts**

Savings Estimates	Energy Savings (Therms)
Ex-Ante Gross Savings	893
Ex-Ante Net Savings	893
Research Findings Gross Savings	893
Research Findings Net Savings	714
GPY1 Program NTGR	0.80

Source: Navigant analysis of program tracking system and file review

- **Recommendation:** No improvements needed.

**Finding:** The program Operations Manual doesn’t include guidance or definitions for when a site inspection should occur, other than when a project is “substantially complete.”

- **Recommendation:** Navigant recommends that program staff consider establishing criteria for conducting site inspections for projects during the construction process and incorporate the criteria into the Operations Manual. Examples of projects that might require multiple site visits to mark project milestones and document project compliance could include: 1) projects with a large amount of energy savings, 2) projects with a high level of uncertainty for construction-related measure implementation or 3) projects with a first-time participant.

**Finding:** The project file selected for engineering review was missing documentation for some factors that may influence energy savings estimates, including baseline efficiency, equipment load

<sup>29</sup> Nicor Monthly Report – PY1\_2012 May.xlsm

profile and schedule, equivalent full load hours of the operating climate zone, replacement specifications and proof of purchase of the equipment.

- **Recommendation:** Navigant recommends that the ER program develop a project file checklist with important documentation for each project file and add a data field to the program tracking database that indicates whether or not a project file checklist has been completed. The purpose of the project file checklist would be to include consistent documentation for participating projects, including important information relating to engineering assumptions and other factors that may influence energy savings estimates, as indicated in the finding above.

**Finding:** The ER program's Systems Project template uses a different algorithm for a water heating system replacement than a similar measure found in the Illinois TRM<sup>30</sup>.

- **Recommendation:** Navigant recommends that the ER program review TRM algorithms and assumptions for consistency in estimating annual energy savings. The ER program should conduct a periodic review of applicable Illinois TRM values and algorithms for compliance with standard engineering best practices.

#### 4.13.2 Key Process Findings and Recommendations

**Finding:** The ER program's implementation contractors appear to have a clear understanding of their roles and responsibilities and comprise a well-qualified team that understands their roles and responsibilities in order to successfully implement this program.

- **Recommendation:** No improvements needed.

**Finding:** The ER program reported marketing and outreach to 69 unique contacts within the program's target markets. Additionally, the program appeared in 12 unique marketing efforts with program partners.

- **Recommendation:** Consider including specific goals and metrics for ER program marketing and outreach efforts, such as number of attendees at workshops, number of unique contacts or other metrics.

**Finding:** The participating customer interviewed by Navigant for this evaluation report displayed a high level of customer satisfaction about the technical assistance services and customer service provided by the program. The customer reported that, in their opinion, the associated rebate with this measure did not justify the expenses incurred by the customer associated with implementing the measure and would like to see higher rebates for similar measures from the program in the future.

- **Recommendation:** Navigant recommends investigating customer satisfaction with systems project rebates in future evaluations and reviewing system projects rebate amounts accordingly.

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<sup>30</sup> State of Illinois Energy Efficiency Technical Reference Manual, Final version, September 14, 2012, effective June 1, 2012. Section 7.4.2: Gas Water Heaters.

## **4.14 Emerging Technologies**

### **4.14.1 Key Impact Findings and Recommendations**

This evaluation for GPY1 does not include an impact evaluation. The program is too early in its implementation to have measurable impacts.

### **4.15 Key Process Findings and Recommendations**

Although GPY1 ran from June 1, 2011 to May 31, 2012, the ET program however was not operational until December 2011. Therefore, the program was still in the early stages of the implementation process at the end of GPY1. Nonetheless, Nicor Gas and the ET program team together have effectively designed and implemented many of the important processes to build a successful program in this short period. The evaluation team recognizes that since the end of GPY1, the ET program has likely evolved further, and may have made progress to address some of the issues discussed in this evaluation. However, based on the research conducted at the time for this evaluation, the evaluation team has concerns about a few program areas, starting with insufficiently defined program objectives. With some focused effort to improve the objective, and to address the recommendations below, in particular those focused on technology transition to EEP, the evaluation team expects the ET program to perform well.

Navigant's key process findings and recommendations are as follows:

- **Program Objective is Limited** – The ET program's stated program objective is too limited to assure an effective program. GTI has taken steps beyond the stated objectives that will address this issue and help assure success; however, to be effective, the program objectives and goals should be expanded and more clearly defined. In particular, the objective does not address the actual transition to EEP, which is fundamental to a successful program. Navigant recommends that Nicor Gas and the ET program expand the objective to incorporate a successful technology transition to the EEP. Nicor Gas and the ET program may benefit from additionally defining the ET program's intentions with regards to either long-term or near-term technical and economic savings potential and overall portfolio energy efficiency or end-use therm savings.
- **Risk Mitigation in Technology Transfer/Deployment to EEP** – The current deployment process may be insufficiently well defined, potentially putting the success of each technology deployment in jeopardy; a more clearly defined, robust deployment process can help ensure that the technology deploys successfully and contributes expected levels of energy savings to the EEP portfolio. Navigant recommends clearly defining a set of deliverables, including a new market/business assessment and any relevant findings from the pilot, that will enable effective information transfer for the technology, and by assigning responsibility to specific personnel (both in ET program and EEP) to oversee the transition of each technology.
- **Comprehensive Central Tracking** - The ET program's technology tracking process does not currently extend beyond the program's 4S selection process to include information on pilot assessment testing or the transition to EEP. This process is an interim solution as they intend to transition to Nexant's TrakSmart software platform, which all EEP-programs plan to adopt. Navigant recommends that the ET program employ a central tracking system that extends from application submission to technology transfer to EEP (or rejection from further

analysis) that will enable comprehensive performance assessment. The monthly Project Scorecard and other deliverables should ideally be linked to such a system automatically. It is currently unclear whether TrakSmart will contain the necessary functionality to successfully track the ET program through each process.

- **Documentation and Re-Evaluation of Promising Technologies** – The ET program has not defined a process by which they can revisit promising technology applications which do not currently meet all the necessary criteria, but may be viable options in the future. Navigant recommends that the ET program consider recording the summary of reason(s) for not going further (with a date). For some ideas, the ET program may want to set a target date to revisit the status (e.g., in 6 months or two years), including a threshold for improvements which would trigger a re-evaluation.

## 5. Appendices

### 5.1 Glossary

#### ComEd and Nicor 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 5-1 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 5-1. 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<sup>D</sup>, HOU-Residential<sup>D</sup>).

**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<sup>E</sup>, HOU-Residential<sup>E</sup>).

**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<sup>DV</sup> (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<sup>AV</sup>

## Glossary Incorporated From the TRM

Below is the full Glossary section from the TRM Policy Document as of October 31, 2012<sup>31</sup>.

**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

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<sup>31</sup> IL-TRM\_Policy\_Document\_10-31-12\_Final.docx

(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.

## 5.2 *Multifamily Home Energy Savings*



**Energy Efficiency/Demand Response  
ComEd Plan Year 4  
Nicor Gas Plan Year 1  
(6/1/2011-5/31/2012)**

**Evaluation Report:  
Multi-Family Home Energy Savings  
Program**

**FINAL**

**Presented to:  
Commonwealth Edison Company  
Nicor Gas**

**June 5, 2013**

Presented by:  
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## E. Executive Summary

### E.1 Evaluation Objectives

Navigant's report includes impact and process evaluations for the Multi-Family Home Energy Savings (MFHES) Program in the first year of jointly implemented program delivery, which is electric program year 4 (EPY4) and gas program year 1 (GPY1).<sup>1</sup> The MFHES program provides natural gas energy efficiency measures to Nicor Gas, Peoples Gas, and North Shore Gas customers and electric energy efficiency measures to ComEd customers. Honeywell Smart Grid Solutions (Honeywell) delivers the program to customers of both ComEd and Nicor Gas. The Wisconsin Energy Conservation Corporation (WECC) provides program administration support to Nicor Gas. Franklin Energy Services, LLC (Franklin Energy) delivers the program to customers served by ComEd and Peoples Gas or North Shore Gas. This evaluation report covers total ComEd electric impacts from all of the gas service territories, the gas impacts for Nicor Gas, and the process evaluation for the ComEd/Nicor Gas program, delivered by Honeywell. A separate report includes the impact and process evaluation of the ComEd/Peoples Gas and North Shore Gas program, implemented by Franklin Energy.

The objectives of the MFHES Program evaluation are to: (1) to quantify gross and net savings impacts for the program, (2) to determine key process-related program strengths and weaknesses, and (3) to identify ways the program can potentially be improved.

The purpose of the impact evaluation is to determine the gross and net impacts of the program to review the reasonableness of the program's default (or ex-ante) values and to compare program accomplishments to planning estimates.

The process evaluation is designed to review the program's administration and delivery for the purpose of overall program improvement. Process evaluation tasks include reviewing program marketing and outreach materials, evaluating customer satisfaction (including tenants and decision-makers) with the program and identifying potential barriers to program participation.

### E.2 Evaluation Methods

Navigant coordinated the ComEd EPY4 program evaluation with the Nicor Gas GPY1 program evaluation where implementation activities overlapped between the utilities. Navigant interviewed the implementation contractor (Honeywell) to develop a complete understanding of this program. Impact evaluation methods included a review of the program's design, tracking system and measure savings estimates. Using this information, Navigant wrote a memorandum presenting the program's Program Theory and Logic Model, which can be found in Section 5.8. Navigant's initial tracking system and quality control procedure review findings were presented to the utilities in a memorandum on August 9, 2012, a copy of which is included in Section 5.6 of this report. Navigant used an extract from the program's tracking information to verify measure counts and conducted an engineering file review for a sample of program files to review the program's implementation records. Navigant conducted laboratory testing of program showerhead measures, and the complete results can be found in Section 5.7. Navigant conducted a telephone survey with participating tenants to research customer satisfaction and investigate measure persistence. Navigant interviewed participating decision-makers (e.g., property

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<sup>1</sup> ComEd has offered a multi-family program since EPY1. ComEd offered jointly implemented pilot programs with Nicor Gas and Peoples Gas in EPY3.

managers or program points of contact) to research customer satisfaction and collect information about potential free ridership and spillover. Navigant calculated free ridership for this evaluation using an algorithm approach based on survey participant self-report data. The analysis relied on interview results from participating multifamily decision-makers. The existence of participant spillover was examined using survey self-report data and follow up telephone interviews with respondents. The process evaluation for this assignment included reviewing program participation accomplishments, administration and delivery, marketing and outreach and customer satisfaction.

The ComEd EPY4 program design and delivery methods did not substantially change since EPY3 and so, according to the Net-to-Gross (NTG) Framework, we believe it is appropriate to use the NTG ratio calculated in the EPY2 evaluation research as a deemed value for EPY4. The ComEd EPY4 program falls under the following condition from the NTG Framework<sup>2</sup>: *“Where a program design and its delivery methods are relatively stable over time, and an Illinois evaluation of that program has estimated a NTG ratio, that ratio can be used prospectively until a new evaluation estimates a new NTG ratio.”*

The Nicor Gas GPY1 program has not been evaluated before and so according to the NTG Framework,<sup>3</sup> the NTG ratio is to be applied retroactively. The Nicor Gas GPY1 program falls under the following condition from the NTG Framework: *“For existing and new programs not yet evaluated, and previously evaluated programs undergoing significant changes — either in the program design or delivery, or changes in the market itself<sup>4</sup> — NTG ratios established through evaluations would be used retroactively, but could also then be used prospectively if the program does not undergo continued significant changes.”*

### **E.3 Key Impact Findings and Recommendations**

As shown in Table E-1, the GPY1 Nicor Gas GPY1 MFHES reported ex-ante gross energy savings of 986,438 therms. Evaluation adjustments resulted in verified gross energy savings<sup>5</sup> of 997,875 therms reflecting the program’s gross realization rate of 101.2 percent.<sup>6</sup> The program level NTGR for gas measures was 0.96 based on evaluation research findings, yielding net energy savings of 959,087 therms.

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<sup>2</sup> “Proposed Framework for Counting Net Savings in Illinois.” Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid. “An example of a market change might be where baselines have improved significantly and the likely free riders are growing substantially because of it.”

<sup>5</sup> The September 14, 2012 final version of the first State of Illinois Energy Efficiency Technical Reference Manual (TRM) (effective as of June 1, 2012) has been agreed to by Illinois Stakeholder Advisory Group (SAG) participants and was by the Illinois Commerce Commission in Docket No. 12-0528 on January 9, 2013. The verified gross savings shown in Table E-1 reflect that gas measures covered by the TRM are deemed for evaluation purposes in GPY1. Since the TRM was not final until after the end of GPY1, the TRM is applicable for evaluation purposes, but not GPY1 implementation.

<sup>6</sup> Realization rate = verified gross / ex-ante gross from the tracking system.

**Table E-1. Nicor Gas GPY1 Energy Savings**

Savings Estimates	Nicor Gas Energy Savings (therms)
Ex-Ante Gross	986,438
Ex-Ante Net	887,795
Verified Gross	997,875
Research Findings Net	959,087
GPY1 Program NTGR	0.96

Source: Navigant analysis

Table E-2 presents energy and demand savings induced through the ComEd EPY4 program. These results include energy and demand savings through installation of CFLs in all natural gas service territories. The program also installed water efficiency measures in dwelling units with electric water heat in all natural gas service territories. For water efficiency measures, Navigant noted that deemed savings from water efficiency measures were estimated by residence instead of by each individual measure. For example, the deemed energy impact would be the same whether the MFHES program installed one or two bathroom faucet aerators in a residence. For the verification report, Navigant applied the deemed unit savings to calculate verified gross energy savings. For ComEd, Navigant used deemed realization rates (96.0 percent for CFLs and 67.0 percent for water efficiency measures; resulting in a program-level realization rate of 90.7 percent for electric measures) to calculate verified gross savings. Using the NTG Framework<sup>7</sup>, Navigant applied deemed NTGR (0.81 NTGR CFLs and 0.93 NTGR for water efficiency measures). The program average electric NTGR (using net savings/verified gross savings) was 0.83 for energy savings and 0.82 for demand savings.

**Table E-2. ComEd EPY4 Ex-Ante & Verified Electric & Demand Savings**

Savings Estimates	Energy Savings (MWh)	Demand Savings (MW)
Ex-Ante Gross	12,618	1.1
Ex-Ante Net	9,373	1.0
Verified Gross	11,446	1.1
Verified Net	9,456	1.0
EPY4 Program NTGR	0.83	0.82

Source: Navigant analysis of ComEd Frontier database (9-25-12 extract) and program tracking data

Key impact evaluation findings and recommendations follow:

**Finding:** The Multi-Family Home Energy Savings Program recruited eligible properties and applications were backed with supporting documentation.

<sup>7</sup> "Proposed Framework for Counting Net Savings in Illinois." Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

**Finding:** For Nicor Gas, Navigant found some discrepancies between the program administrator’s measure savings values using TRM inputs and assumptions and those calculated by Navigant using the same inputs and assumptions. The TRM measure value for water temperature setbacks was correctly applied.

**Recommendation:**

- Navigant recommends updating the Nicor Gas program tracking system to match TRM savings values by making minor adjustments to measure savings for water efficient showerheads (from 26.00 therms/unit to 26.21 therms/unit), kitchen faucet aerators and bathroom faucet aerators (from 2.70 therms/unit each to 2.52 therms/unit and 3.02 therms/unit, respectively) and programmable thermostats (from 34.07 therms/unit to 34.21 therms/unit) based on algorithms and inputs found in the Illinois TRM.

**E.4 Key Process Findings and Recommendations**

The EPY4/GPY1 Multi-Family Home Energy Savings Program impacted 24,744 residential dwelling units, achieving 71 percent of its Nicor Gas planning estimate. The program installed measures at an additional 2,297 dwelling units with electric water heating for a total of 27,041 dwelling units, achieving 77 percent of ComEd’s EPY4 planning estimate (Table E-3).

**Table E-3. ComEd EPY4 and Nicor Gas GPY1 Program Participation Achievements**

Program	Participation Goal (Dwelling units)	Actual Participation (Dwelling units)	Percent of Planning Estimate
Nicor Gas Individually-Metered	8,750	4,700	54%
Nicor Gas Master-Metered	26,250	20,044	76%
<i>Sub-total Nicor Gas</i>	<i>35,000</i>	<i>24,744</i>	<i>71%</i>
Electric Units/ComEd	-	2,297	-
<b><i>ComEd sub-total</i></b>	<b><i>35,000</i></b>	<b><i>27,041</i></b>	<b><i>77%</i></b>

Source: Navigant analysis of program tracking data

The EPY4/GPY1 program year was efficiently delivered by Honeywell. On the electric side, the program met 155 percent of its energy savings planning estimate through direct installation activities at 77 percent of planned dwelling units. On the gas side, the program met 75 percent of its energy planning estimate through direct installation activities at 71 percent of planned dwelling units.

The program built on the previous year’s implementation efforts from the implementation contractor and ComEd and through the Rider 29 pilot program with Nicor Gas. The program’s continued success can be attributed to solid program design, program activities that were well aligned with anticipated outcomes and cooperation between the program’s utility sponsors and implementation contractor. This section addresses the following process evaluation questions, *in italics*, with findings and recommendations indicated as such.

**Research Topic:**

*What areas could the program improve to create a more effective program for customers and help increase the energy impacts?*

**Finding:** One of the upcoming challenges for this program is increasing program uptake by overcoming participation barriers in the multi-family marketplace, including the split-incentive barrier. While the implementation contractor has undertaken a number of activities to address these challenges, Navigant recommends exploring additional ideas.

**Recommendations:**

- The program may be able to share information or increase communication with other ComEd or Nicor Gas programs, to provide a single point of contact for multi-family decision-makers to implement common area improvements and direct install activity in residential dwelling units; and
- The program may consider designing a pilot program to target customers using a comprehensive whole-building approach, as is implemented in some other utility service areas, such as Con Edison (New York) and DTE (Detroit). The program is currently planning a program designed to provide energy and cost savings benefits to multi-family decision-makers as well as tenants scheduled for rollout during EPY5/GPY2.

**Finding:** About nine percent (2,376 dwelling units) of units at sites where field teams were performing direct installation activity did not receive any measures because the dwelling units were not available to the field teams.

**Recommendations:**

- The program should track and review reasons why a dwelling unit is not available for direct installation activity at a given multi-family site. If there are recurring reasons why dwelling units are unavailable to the program, the program may be able to develop communications or other mechanisms to reduce the number of unavailable units.

**Finding:** While the program currently tracks CFL installation rates, the program does not track installation rates for water efficiency measures.

**Recommendations:**

- The program should track water efficiency measure installation rates and review reasons why field technicians are unable to install energy efficiency measures in a given unit. In so doing, the program may find that it can achieve higher installations per dwelling unit by adding different types or styles of measures (e.g. faucet aerators or globe CFLs), such as it has in the past; and
- Emphasize to field teams the importance of installing the maximum number of eligible direct install measures in dwelling units.

**Research Topic:**

*Has the program effectively channeled customers to other programs sponsored by Nicor Gas or ComEd to implement common area efficiency measures as identified in common area assessments?*

**Findings:** The program reported that it conducted 285 central plant surveys to inspect central water heating or space heating equipment for Nicor Gas. The program reported that it conducted 31 common area lighting surveys for ComEd.

**Recommendations:**

- The program should place a greater emphasis on completing common area assessments;
- The implementation contractor should track common area referrals to other programs and participation rates from referrals and include a data point in the tracking system;
- Target common area energy efficiency opportunities through increased communication and/or co-marketing with other energy efficiency programs;
- Develop a script for follow up calls that could include ongoing customer satisfaction with direct installation measures, any action items from the property manager customer survey and to ask for referrals; and
- Follow up with property managers that have received common area recommendations using the script.

**Research Topic:**

*Is the program effectively coordinating with ComEd for electric measures and reporting?*

**Findings:** Overall, it appears that the parties responsible for jointly implementing the program continue to implement an effective process for coordination and reporting, primarily through regular coordination conference calls and frequent communication. However, at the end of the program year, the program tracking system had missing and/or misnamed data, with the implementation contractor working closely with the utilities and evaluators to identify the missing data and reconcile the program tracking systems once these issues were discovered.

**Recommendation:**

- As feasible, the program should consider adding fields, programming or other data points to streamline data transfer from the tracking system and facilitate program data review.

**Research Topic:**

*Are customers satisfied with participation in the program and customer service experiences?*

**Finding:** Overall, participants –both tenants and property managers - appear to be very satisfied with the direct install portion of the program. Navigant’s analysis indicated that 84 percent of tenants responded that they were satisfied or very satisfied with the program. Decision-makers were also satisfied with the program, with 90 percent of respondents indicating that they were satisfied or very satisfied with the program’s direct install measures and 95 percent indicating that they were satisfied or very satisfied with the program’s field team. When asked about common area recommendations and reporting, decision-makers indicated less satisfaction with the overall program (70 percent) or the summary report provided by the program. Almost half (45 percent) of those participants surveyed did not know if they received recommendations for energy efficiency improvements in common areas or central plants.

**Recommendations:**

- Participant responses to the decision-maker survey would indicate potential opportunities for the program to increase customer satisfaction through placing a greater emphasis on common area or central plant assessments and follow up recommendations to decision-makers.

## 1. Introduction to the Program

### 1.1 Program Description

The Multi-Family Home Energy Savings Program (MFHES) program provides natural gas energy efficiency measures to Nicor Gas, Peoples Gas, and North Shore Gas customers and electric energy efficiency measures to Commonwealth Edison Company (ComEd) customers. The lead utilities for this program are Nicor Gas and Peoples Gas and North Shore Gas. Honeywell Smart Grid Solutions (Honeywell) delivers the program to customers of served by ComEd and Nicor Gas. The Wisconsin Energy Conservation Corporation (WECC) provides program administration support to Nicor Gas. Franklin Energy Services, LLC (Franklin Energy) delivers the program to customers served by ComEd and Peoples Gas or North Shore Gas.

The program's primary objective is to secure energy savings through direct installation of low-cost efficiency measures, such as water efficiency measures and CFLs, at eligible multifamily residences. A secondary objective of this program is to identify energy saving opportunities in the common areas of multifamily buildings through a brief visual inspection of central water heating, space heating plants and common area lighting equipment to channel customers to other programs offered by the utilities. This program is targeted to building owners/property managers (collectively "decision-makers") of buildings with five or more residential dwelling units and to residential customers who live in these buildings. Multifamily buildings with individual heating systems and individual meters and buildings with central heat and central meters are both eligible to participate.

ComEd has offered a multi-family program since EPY1; including offering jointly implemented pilot programs with Nicor Gas and Peoples Gas in EPY3. Electric program year 4 (EPY4) and gas program year 1 (GPY1)<sup>8</sup> was the first full year of jointly implemented program delivery.

Key performance metrics for this program include the number of participating residential dwelling units that received direct installation measures, the measures installed and corresponding gross and net energy savings, and the levels of customer satisfaction with the program reported by participating tenants and decision-makers through program customer satisfaction surveys.

PJM Compliance: This evaluation report is intended to comply with the measurement and verification requirements of PJM Manual 18B (Revision 01, March 1, 2010), Section 7.1 Option A: Partially Measured Retrofit Isolation/Stipulated Measurement.

### 1.2 Evaluation Questions

Navigant's evaluation is designed to answer the following researchable questions. Navigant will address some research questions (*designated by italics*) in future evaluation efforts.

#### 1.2.1 Impact Questions

1. What were the evaluation-verified gross impacts from this program?
2. What were the evaluation-verified net impacts from this program?

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<sup>8</sup> The Peoples Gas and North Shore Gas program year 1 (GPY1) and ComEd's program year 4 (EPY4) both began June 1, 2011 and concluded May 31, 2012.

3. Did the program meet its energy saving goals?
4. Are the deemed savings values used by the program consistent with the Illinois TRM?

## 1.2.2 Process Questions

### *Administration and Delivery*

1. Are program administrative and delivery processes effective for delivering efficient scheduling and installation of measures?
2. What areas could the program improve to create a more effective program for customers and help increase the energy impacts?
3. Has the MFHES program effectively channeled customers to other programs sponsored by ComEd or Nicor Gas to implement common area efficiency measures as identified in common area audits?
4. What are the main barriers to and motivation for adopting recommended common area measures?
5. Does the application/enrollment process present any barriers to program participation?
6. Is the program implementation contractor effectively coordinating with ComEd for electric measures and reporting?

### *Customer Satisfaction*

1. Are customers satisfied with the aspects of program implementation in which they have been involved?
2. Are customer surveys completed and reviewed by the program?

### *Marketing and Participation*

1. How did customers become aware of the program? What marketing strategies could be used to boost program awareness?
2. Has the program effectively recruited professional organizations or trade associations to promote the program to customers? Is the program effectively leveraging its industry and trade networks to promote the program to customers?

## 2. Evaluation Methods

### 2.1 Primary Data Collection

Navigant collected data for the impact evaluation from the program tracking system, program documentation, and by reviewing deemed savings estimates used by the program. Navigant interviewed utility program staff, consultants, and implementation contractors and conducted telephone surveys with participating customers to inform the process evaluation.

Gross impact analysis included the following activities:

1. Engineering review of default savings assumptions and calculation of claimed savings as found in the program's tracking system.
2. Participating customer and decision-makers telephone surveys to verify participation and gather site-specific measure data, including measure installation persistence.
3. Engineering review for a sample of projects to verify participation, adequate documentation of program activities and compliance with default savings assumptions and calculations.

Navigant estimated program-level free ridership using an algorithm approach based on telephone survey self-report data from participating decision-makers. If a respondent indicated that they may have taken action that would result in spillover, Navigant conducted follow up telephone interviews to determine whether the reported action would qualify as spillover for evaluation purposes. Detailed NTG methods for calculating free ridership and participant spillover are included in Section 5.2.2.

Navigant's process evaluation included interviewing program managers, surveying participating decision-makers and participating tenants, and reviewing program documentation. The survey instruments and in-depth interview guide are included in Section 5.8.

Table 2-1 below includes a summary of data collection activities.

**Table 2-1. Primary Data Collection Efforts**

Collection Method	Subject Data	Sample Size	Gross Impacts	Net Impacts	Process
Measure Savings Review	Deemed savings estimates	All	X		
Program Tracking Data	Program participants	All	X		
Engineering Desk Review	Program files	3 properties – PG/NSG/ComEd 6 properties – Nicor Gas/ComEd	X		
Telephone Surveys	Participating decision-makers	41 total 21 – PG/NSG/ComEd 20 – Nicor Gas/ComEd	X	X	X
Telephone Surveys	Participating tenants	161 total 81 – PG/NSG/ComEd 80 -- Nicor Gas/ComEd	X		X
Documentation Review	Operations, marketing and administrative documents	All	X		X
In-Depth Telephone Interviews	Utility Program Staff and Consultants, Implementation Contractors	2 – PG/NSG/ComEd 3 – Nicor Gas/ComEd			X

Source: Navigant

### 2.1.1 Tracking Data

Navigant reviewed the program implementation contractor’s tracking data and the program tracking system extract provided by ComEd. The final data extract from ComEd’s program tracking system was dated September 25, 2012.

### 2.1.2 In-Depth Interviews with Utility Program Managers, Program Implementer Staff

In February 2012, Navigant conducted a conference call with ComEd program staff, the Nicor Gas program administrator and the implementation contractor together to get an overview of the program’s accomplishments and challenges. Navigant conducted follow-up telephone interviews individually with each of the participants on the initial conference call in June and July 2012. The purpose of these interviews was to discuss information about program operations and to request information about the program. Navigant developed interview guides using an open-ended format that allowed for a free-flowing discussion between interviewer and respondent, based on the respondents’ knowledge of and experience with the program. Interview topics included program staff roles and responsibilities, program goals, marketing and promotion, program participation and customer satisfaction, data tracking and quality assurance and quality control activities.

### 2.1.3 Telephone Surveys and Sampling Plan

Navigant implemented two Computer-Assisted Telephone Interviewing (CATI) surveys for this evaluation. One telephone survey was administered to residents of dwelling units where the MFHES program conducted direct install activity and included measure verification and persistence questions and customer satisfaction questions. The sampling strategy for this survey was a simple random selection of participating tenants from the program’s tracking database. The goal for this survey was to produce a  $\pm 10$  precision (at a 90 confidence level) for program-level savings estimates. Navigant completed tenant interviews with 81 participants in ComEd/Peoples Gas and North Shore Gas territory and 80 participants in ComEd/Nicor Gas territory, which represented a statistically significant number of completed interviews for this evaluation.

Additionally, Navigant implemented a CATI survey with program contacts and decision-makers, including property managers, onsite managers or maintenance staff, as applicable. This survey was designed to gauge customer satisfaction and to test for free-ridership and spillover. Navigant completed decision-maker interviews with 21 participants in ComEd/Peoples Gas and North Shore Gas territory and 20 participants in ComEd/Nicor Gas territory. The relative precision at a 90% confidence interval was  $\pm 2.5\%$  for Peoples Gas/North Shore Gas,  $\pm 2.1\%$  for Nicor Gas and  $\pm 3.9\%$  for ComEd.

### 2.1.4 Program Documentation Review

Navigant reviewed the Rider 30 program’s Operating Plan<sup>9</sup>, Program Implementation Scope of Work<sup>10</sup>, Nicor Gas Compliance Filling<sup>11</sup>, the program year end summary report, the Multi-Family program’s Operations Manual<sup>12</sup>, program tracking system, program outreach and marketing materials, and a sample extract from the program tracking system. discussed in Section 2.1.5. Other documents included property enrollment and service agreement forms, customer and property manager survey responses, resident reports and property summary reports.

### 2.1.5 Project File Review

Navigant reviewed documentation for six properties that received installations during the week ending March 10, 2012. This documentation included scanned copies of hand-written documentation such as individual building installation tally sheets, measure water flow rate testing sheets, installation notes from the field technicians as well as documentation of QA/QC steps taken during installation. Navigant reviewed information included in the project files and compared entries in the project files to corresponding entries in the program tracking database.

## 2.2 Impact Evaluation Methods

Navigant estimated program savings by comparing measure savings estimates for each program measure using impact algorithm sources found in the State of Illinois Energy Efficiency Technical Reference Manual (TRM)<sup>13</sup> with those used by the program’s implementation contractor, reviewing measure counts found in the program tracking system and applying verified savings estimates to

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<sup>9</sup> Nicor Gas Rider 30 EEP Program Portfolio Operating Plan (Version 1.1)

<sup>10</sup> ComEd Nicor MF SOW PY4\_6 FINAL REV 2E.pdf

<sup>11</sup> Nicor Gas EEP 2011-2014 Revised Plan Filed Pursuant to Order Docket No. 10-0562 (May 24, 2011)

<sup>12</sup> Honeywell Smart Grid Solutions, Multifamily Home Energy Savings Program Operations Manual (updated February, 2011).

<sup>13</sup> Illinois Statewide Energy Efficiency Technical Reference Manual (TRM), effective as of June 1, 2012 and dated September 14, 2012.

verified measure counts. Prior to estimating program savings, Navigant performed a verification and due diligence and tracking system review of the program’s operations and administration. This task included an analysis of the program’s operations, documentation and internal quality control and quality assurance procedures.

### **2.2.1 Verification and Due Diligence Procedure Review**

Navigant performed a verification and due diligence review for the MFHES Program, including a review of the program’s quality assurance, program tracking, and savings verification procedures. To conduct the best practices benchmarking assessment, Navigant compared the program administrator and implementation contractor’s practices with the Best Practices Self-Benchmarking Tool<sup>14</sup> for multifamily comprehensive programs from the National Energy Efficiency Best Practices Study. The benchmarking categories used were Quality Control and Verification and Reporting and Tracking. The complete Verification and Due Diligence Memo can be found in Section 5.6.

### **2.2.2 Tracking System Review**

Navigant reviewed the MFHES Program tracking system in its entirety. The primary purpose of the tracking system review was to determine:

- Whether project eligibility criteria have been properly adhered to and applications are backed with supporting documentation;
- Whether savings were calculated correctly and project information entered in an accurate and timely manner in the program tracking system; and
- If key quality assurance and verification activities were adequately implemented.

### **2.2.3 Defining Ex-Ante Measure Level Energy Savings**

For Nicor Gas, the Illinois TRM provides the per unit savings for natural gas direct installation measures, including water efficient showerheads, faucet aerators, programmable thermostats, and water temperature setback.

For ComEd, gross energy savings for CFLs were calculated from per-unit savings values defined by the document *Plan Year 4 Deemed Savings Values 31230.pdf*<sup>15</sup>. For electric water efficiency measures, such as faucet aerators and showerheads, gross per-unit energy savings were provided by the utility. Navigant used gross per-unit values to calculate verified gross energy savings for the verification report.

### **2.2.4 Verification Method**

Data collection for the impact analysis included an engineering review of measure unit savings assumptions and an examination of tracking system calculations of claimed savings. Measure counts were based on a tracking data extract from ComEd’s Frontier database dated September 25, 2012. Navigant reviewed the program implementation contractor’s tracking spreadsheets to inform our analysis where additional detail was needed to verify documentation in the Frontier database. Navigant interviewed a random sample of listed program participants to verify participation and measure installation. Navigant conducted an engineering review of project documentation for a sample of projects to verify that the program collected sufficient documentation of its activities.

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<sup>14</sup> Energy Efficiency Best Practices Project, Best Practices Self-Benchmarking Tool (Multifamily Program): <http://www.eebestpractices.com/benchmarking.asp>

<sup>15</sup> This document is on the ICC web site for docket 10-0570. (<http://www.icc.illinois.gov/docket/Documents.aspx?no=10-0570>)

## 2.2.5 Verified Gross Energy Savings Evaluation Methods – Natural Gas Measures

For natural gas measures, Navigant calculated verified gross energy savings (therms) using Illinois TRM methodology and algorithms. This section includes Navigant’s methodology, algorithms and impact parameters to derive verified gross savings values for each program measure.

### Verified Gross Savings Algorithm – Water Efficient Showerheads (Natural Gas)

Navigant used the algorithm<sup>16</sup> presented in Figure 2-1 to calculate verified gross savings for water efficient showerheads (natural gas).

**Figure 2-1. Verified Gross Savings Algorithm - Water Efficient Showerheads (Natural Gas)**

#### Gross Annual Therm Savings

$$\begin{aligned}
 &= \%FossilDHW \\
 &\times [(GPM_{base} \times L_{base} - GPM_{low} \times L_{low}) \times Household \times SPCD \times 365.25/SPH] \times EPG_{gas} \\
 &\times ISR \\
 &= 26.21 \text{ therms per unit}
 \end{aligned}$$

#### Where:

- %Fossil DHW = 100% of DHW is heated by natural gas
- GPM<sub>base</sub> = Baseline showerhead gallons per minute = 2.67
- L<sub>base</sub> = Shower length in minutes with baseline showerhead = 8.2
- GPM<sub>low</sub> = Water efficient showerhead gallons per minute = 1.5
- L<sub>low</sub> = Shower length in minutes with water efficient showerhead = 8.2
- Household = Average number of people per household = 2.1
- SPCD = Showers Per Capita Per Day = 0.75
- SPH = Showerheads Per Household = 1.3
- EPG<sub>gas</sub> = Energy per gallon of hot water supplied by gas = 0.0063 therms/gal
- ISR = In service rate of showerhead = 0.98

### Verified Gross Savings Algorithm – Water Efficient Kitchen and Bathroom Aerators (Natural Gas)

Navigant used the algorithm<sup>17</sup> presented in Figure 2-2 to calculate verified gross savings for water efficient kitchen and bathroom faucet aerators (natural gas).

<sup>16</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.5

<sup>17</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4

**Figure 2-2. Verified Gross Savings Algorithm - Water Efficient Aerators (Natural Gas)**

**Gross Annual Therm Savings**

$$\begin{aligned}
 &= \%FossilDHW \\
 &\times [(GPM_{base} \times L_{base} - GPM_{low} \times L_{low}) \times Household \times 365.25 \times DF / FPH] \times EPG_{gas} \times ISR \\
 &= 2.52 \text{ therms per unit (Kitchen)} \qquad = 3.02 \text{ therms per unit (Bathroom)}
 \end{aligned}$$

**Where:**

- %Fossil DHW = 100% of DHW is heated by natural gas
- GPM<sub>base</sub> = Average flow rate, in gallons per minute, of the baseline faucet “as-used” = 1.2
- L<sub>base</sub> = Average retrofit length faucet use per capita for all faucets in minutes = 9.85
- GPM<sub>low</sub> = Average flow rate, in gallons per minute, of retrofit faucet aerator “as-used” = 0.94
- L<sub>low</sub> = Average retrofit length faucet use per capita for all faucets in minutes = 9.85
- Household = Average number of people per household = 2.1
- DF = Drain Factor = 75% for Kitchen and 90% for Bathroom
- FPH = Faucets Per Household = 1 for Kitchen and 1.5 for Bathroom
- EPG<sub>gas</sub> = Energy per gallon of hot water supplied by gas = 0.0045 therms/gal
- ISR = In service rate of faucet aerators = 0.95

**Verified Gross Savings Algorithm – Hot Water Temperature Setback (Natural Gas)**

Navigant used the value<sup>18</sup> presented in Figure 2-3 to review verified gross savings for hot water temperature setback (natural gas).

**Figure 2-3. Verified Gross Savings Value – Hot Water Temperature Setback (Natural Gas)**

$$\begin{aligned}
 \text{Gross Annual Therm Savings} &= 6.40 \text{ therms per unit} \\
 &= 6.40 \text{ therms per unit}
 \end{aligned}$$

**Verified Gross Savings Algorithm – Programmable Thermostats (Natural Gas)**

Navigant used the algorithm<sup>19</sup> presented in Figure 2-4 to calculate verified gross savings for programmable thermostats (natural gas).

**Figure 2-4. Verified Gross Savings Algorithm – Programmable Thermostats (Natural Gas)**

$$\begin{aligned}
 \text{Verified Gross Annual Therm Savings} &= \\
 &\%FossilHeat \times Gas\_Heating\_Consumption \times Heating\_Reduction \times HF \times Eff\_ISR
 \end{aligned}$$

$$= 34.1 \text{ therms per 1000 sq. ft.}$$

**Where:**

- %FossilHeat = Percentage of heating savings assumed to be Natural Gas = 100%
- Heating\_Reduction = Assumed percentage reduction in heating energy consumption due to programmable thermostat = 6.2%
- HF = Household factor, to adjust heating consumption for non-single-family households = 65%
- EFF\_ISR = Effective In-Service Rate, the percentage of thermostats installed and programmed effectively = 100%<sup>20</sup>

<sup>18</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.6

<sup>19</sup> State of Illinois Energy Efficiency Technical Reference Manual, 5.3.10

- Gas\_Heating\_Consumption = Estimate of annual household consumption for gas heated single family homes (note that single family values are adjusted by the Household Factor for multi-family units). If location is unknown, use the average presented in Table 2-2 below.

**Table 2-2. TRM Gas Heating Consumption Values (Programmable Thermostats)**

Climate Zone (City based upon)	Gas Heating Consumption (therms)
1 (Rockford)	889
2 (Chicago)	849
3 (Springfield)	727
4 (Belleville)	561
5 (Marion)	571
Average	807

Source: State of Illinois Energy Efficiency Technical Reference Manual, 5.3.10

### 2.2.6 Verified Gross Energy Savings Evaluation Methods – Electric Measures

Navigant calculated verified gross energy savings (kWh) using deemed gross per-unit energy savings provided by ComEd. The deemed gross per-unit energy savings were applied to verified measure counts to calculate ex-ante gross energy savings. Navigant applied deemed realization rates for CFLs (96 percent) and water efficiency measures (67 percent) to calculate verified gross energy savings.

#### Verified Gross Savings – Compact Fluorescent Lamps

Navigant calculated verified gross energy savings for CFL measure values in Table 2-3 from per-unit savings defined by the document *Plan Year 4 Deemed Savings Values 31230.pdf*<sup>21</sup>.

**Table 2-3. CFLs Deemed Gross Measure Savings**

Measure	Unit	Delta Watts	kWh /unit
9W replacing 40W	lamp	31	29.1
14W replacing 60W	lamp	46	43.2
19W replacing 75W	lamp	56	52.5
23W replacing 100W	lamp	77	72.2

Source: ComEd Plan Year 4 Deemed Savings Values 31230.pdf

#### Verified Gross Savings – Water Efficiency Measures

Navigant calculated verified gross energy savings for water efficiency measures installed in dwelling units with electric water heating using gross per-unit energy savings provided by ComEd. For water efficiency measures in Table 2-4, Navigant noted that deemed savings from water efficiency measures

<sup>21</sup> This document is on the ICC web site for docket 10-0570. (<http://www.icc.illinois.gov/docket/Documents.aspx?no=10-0570>)

were estimated by residence instead of by each individual measure. For example, the deemed gross energy savings impact would be the same whether the program installed one or two bathroom faucet aerators in a residence. Using this approach, Navigant verified measure counts from ComEd’s Frontier tracking database and program records. Navigant applied gross measure savings to verified measure counts to obtain ex-ante gross energy savings. Navigant then applied the deemed realization rate (67 percent) for water efficiency measures to calculate verified gross energy savings in the verification report.

**Table 2-4. Electric Water Efficiency Gross Measure Savings**

Measure	Unit	kWh/ unit
1.5 gpm Showerhead	residence	592.3
1.5 gpm Kitchen Aerator	residence	117.0
1.0 gpm Bathroom Aerator	residence	214.0

Source: ComEd PY4 Gross Residential Direct Install Measure Savings

### 2.2.7 Net Savings Approach

The primary objective of the net savings analysis was to determine the MFHES program’s net effect on customers’ energy usage. After gross program impacts have been assessed, net program impacts are derived by estimating a NTGR that quantifies the percentage of the gross program impacts that can be reliably attributed to the program. This includes an adjustment for free ridership (the portion of impact that would have occurred even without the program) and spillover (the portion of impact that occurred outside of the program, but would not have occurred in the absence of the program).

Navigant calculated free ridership for this evaluation using an algorithm approach based on survey self-report data. The analysis relied on interview results from participating multifamily decision-makers. The existence of participant spillover was examined using survey self-report data and follow up telephone interviews with respondents. The relative precision at a 90% confidence interval was ± 2.5% for Peoples Gas/North Shore Gas, ± 2.1% for Nicor Gas and ± 3.9% for ComEd. The interview guide is included in Section 5.9.3.

The final NTGR for each measure is calculated using the following algorithm, presented in Figure 2-5.

**Figure 2-5. Net-to-Gross Ratio Algorithm**

$$NTGR = 1 - Free\ Ridership + Spillover$$

Where:

- *Free ridership* is the energy savings that would have occurred even in the absence of program activities and sponsorship, expressed as a percent of gross impact.
- *Spillover* is the energy savings that occurred as a result of program activities and sponsorships, but was not included in the gross impact accounting, expressed as a percent of gross impact.

## 2.2.8 Net Energy Savings Evaluation Methods – Natural Gas Measures

The Nicor Gas GPY1 MFHES program has not been evaluated before and so according to the NTG Framework,<sup>22</sup> the NTG ratio is to be applied retroactively. The Nicor Gas GPY1 program falls under the following condition from the NTG Framework: *“For existing and new programs not yet evaluated, and previously evaluated programs undergoing significant changes — either in the program design or delivery, or changes in the market itself<sup>23</sup> — NTG ratios established through evaluations would be used retroactively, but could also then be used prospectively if the program does not undergo continued significant changes.”*

## 2.2.9 Net Energy Savings Evaluation Methods – Electric Measures

The ComEd EPY4 MFHES program design and delivery methods did not substantially change from EPY3 and so, according to the Net-to-Gross (NTG) Framework, we believe it is appropriate to use the NTG ratio calculated in the PY2 MFHES evaluation research. The ComEd EPY4 MFHES program falls under the following condition from the NTG Framework<sup>24</sup>: *“Where a program design and its delivery methods are relatively stable over time, and an Illinois evaluation of that program has estimated a NTG ratio, that ratio can be used prospectively until a new evaluation estimates a new NTG ratio.”*

## 2.3 Process Evaluation Methods

Navigant’s process evaluation of the ComEd and Nicor Gas MFHES Program was organized around program participation accomplishments, administration and delivery, coordination and communication between utilities, and customer satisfaction. Navigant interviewed key personnel from ComEd utility program staff, representatives and consultants from Nicor Gas, the program administrator and the program implementation contractor to inform our process evaluation. Navigant implemented telephone surveys to gauge customer satisfaction, with participating tenants and participating decision-makers, and compared customer satisfaction responses from evaluation telephone surveys to those responses collected by the program’s implementation contractor through customer leave behind surveys distributed during direct install activities.

### 2.3.1 In-Depth Interviews with Utility Program Managers and Program Implementer Staff

Navigant conducted in-depth interviews with representatives from the MFHES program, including the ComEd program manager, representatives and consultants from Nicor Gas, the program administrator and the program implementation contractor. The purpose of these interviews was to discuss program operations and to request information about the program. Navigant developed interview guides using an open-ended format that allowed for a free-flowing discussion between interviewer and respondent, based on the respondents’ knowledge of and experience with the program. Interview topics included program staff roles and responsibilities, program goals, marketing and promotion, program participation and customer satisfaction, data tracking and quality assurance and quality control activities. The interview guide is included in Section 5.9.1.

### 2.3.2 Telephone Surveys with Participating Tenants

Navigant implemented a CATI telephone survey to residents of dwelling units where the MFHES program conducted direct install activity, which included customer satisfaction questions. Navigant

<sup>22</sup> Ibid.

<sup>23</sup> Ibid. “An example of a market change might be where baselines have improved significantly and the likely free riders are growing substantially because of it.”

<sup>24</sup> “Proposed Framework for Counting Net Savings in Illinois.” Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

completed tenant interviews with 80 participants, which represented a statistically significant number of completed interviews for this evaluation. The survey instrument is included in Section 5.9.2.

### 2.3.3 Telephone Surveys with Participating Decision-Makers

Navigant implemented a CATI telephone survey with program decision-makers, including property managers, onsite managers or maintenance staff, as applicable. This survey was designed to gauge customer satisfaction for this group of participants. Navigant completed decision-maker interviews with 41 participants (20 for ComEd/Nicor Gas and 21 for ComEd/Peoples Gas and North Shore Gas). The survey instrument is included in Section 5.9.3.

### 2.3.4 Reviewing Program Documentation and Activities

As indicated above, Navigant reviewed program documentation for impact and process evaluations. Navigant reviewed the following documents for this evaluation: Rider 30 program's Operating Plan<sup>25</sup>, Program Implementation Scope of Work<sup>26</sup>, Nicor Gas Compliance Filing<sup>27</sup>, the program year end summary report, Multi-Family program's Operations Manual<sup>28</sup>, program tracking system, program outreach and marketing materials, and the program weekly tracking database (including spreadsheets for the week ending March 10, 2012). Other documents included Property Enrollment and Service Agreement Forms, Customer and Property Manager Survey responses, Resident Reports and Property Summary Reports. Navigant reviewed program documents including printed and electronic program marketing and outreach materials, applications, direct installation notifications and program educational materials, as summarized in Table 2-5 below. Navigant collected data for this verification and due diligence task through interviews with program implementation staff and reviewing program documentation covering the period from January through June 2012. The program implementation contractor provided documentation to conduct the verification and due diligence review and for use in the evaluation report and provided a basis for Navigant's findings and recommendations included in this evaluation report.

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<sup>25</sup> Nicor Gas Rider 30 EEP Program Portfolio Operating Plan (Version 1.1)

<sup>26</sup> ComEd Nicor MF SOW PY4\_6 FINAL REV 2E.pdf

<sup>27</sup> Nicor Gas EEP 2011-2014 Revised Plan Filed Pursuant to Order Docket No. 10-0562 (May 24, 2011)

<sup>28</sup> Honeywell Smart Grid Solutions, Multifamily Home Energy Savings Program Operations Manual (updated February, 2011).

**Table 2-5. Multi-Family Home Energy Savings Program Documentation & Activities**

Document or Activity	Method	Information Source
In-depth Interviews	Telephone Interview	Representatives of ComEd, Nicor Gas, Honeywell, WECC
Compliance Filing	Document review	Nicor Gas EEP 2011-2014 Revised Plan Filed Pursuant to Order Docket No. 10-0562 (May 24, 2011)
Operations Manual	Document review	Honeywell Smart Grid Solutions, Multifamily Home Energy Savings Program Operations Manual (updated February, 2011).
Tracking System	Document review	ComEd; Honeywell
Marketing and Outreach	Interview	Honeywell
Application and Incentive Worksheets	Document review	Honeywell
Project File Review	Document review	Honeywell
Best Practices Comparison	Document review and analysis	Navigant

Source: Navigant

### 3. Evaluation Results

#### 3.1 *Impact Evaluation Results*

This section presents impact evaluation results from the GPY1/EPY4 MFHES Program evaluation. The section begins with a summary of key findings and recommendations from Navigant’s Verification, Due Diligence and Tracking System Review Memorandum for the Nicor Gas/ComEd program, provided to the utilities on August 9, 2012. Gross and net program impact parameter estimates and impact results follow.

##### 3.1.1 **Verification and Due Diligence Procedure Review**

The summary below details Navigant’s verification and due diligence review findings and recommendations for the Nicor Gas/ComEd program. The main components of this review included analysis of program documentation and procedures, laboratory testing of the program’s water efficient showerhead measure, and interviews with the program’s administrator, implementation contractor, consultants and utility program staff. Using this information, Navigant wrote a memorandum presenting the program’s Program Theory and Logic Model, which can be found in Section 5.8. The complete Verification and Due Diligence and Tracking System Review Memorandum can be found in Section 5.6. The Showerhead Test Memo can be found in Section 5.7. Navigant notes that the program has taken action on some of the recommendations.

The Nicor Gas/ComEd Multi-Family program’s quality assurance and verification procedures continue to provide a detailed quality control framework that meets many aspects of national best practices for multi-family programs. The program’s Operations Manual includes guidelines that generally meet or exceed expected quality assurance safeguards. The Operations Manual includes policies and procedures that meet or exceed minimum standards set forth in the program’s scope of work. The program is complying with the policies and procedures set forth in the Operations Manual, including criteria for project eligibility and collecting supporting documentation for projects. The water efficient showerhead used by the program tested to specifications in the laboratory report, the complete memorandum can be found in Section 5.7. The program’s quality assurance and verification activities appear to be functioning adequately and do not appear to require streamlining or simplification at this time, although our review suggests that QA/QC procedures provide an opportunity for improvement through peer review or random inspection conducted by other energy advisors or third-parties on a periodic basis. The program should consider whether implementing an additional level of QA/QC review would justify the associated costs with implementation.

Quality Control and Verification Benchmarking best practice outcomes are summarized in Table 3-1 below.

**Table 3-1. Quality Control and Verification Benchmarking**

ID	Best Practice	Score
1	Base quality control practices on a program’s vendor relationships, measure types, and project volume.	Meets best practice
2	Conduct quality assurance and verification inspections to improve the overall understanding of how multi-family buildings function.	Opportunity for improvement
3	Govern post-inspection levels by cost-effectiveness as well as quality assurance considerations.	Opportunity for improvement
4	Conduct inspections in a timely manner.	Meets best practice
5	Use product specifications in program requirements and guidelines.	Meets best practice

*Source: Best Practices Self-Benchmarking Tool and Navigant analysis*

### 3.1.2 Tracking System Review

The program’s tracking system uses spreadsheets to provide accurate and timely reports using program deemed savings values to report program savings. Although the tracking system includes sufficient information to track program performance, the program could improve its tracking system through adding data fields.

Reporting and Tracking Benchmarking best practice outcomes are summarized in Table 3-2 below.

**Table 3-2. Reporting and Tracking Benchmarking**

ID	Best Practice	Score
6	Base reporting and tracking system design on how information will be used and data needs unique to multi-family programs.	Opportunity for improvement
7	Assure that tracking systems are intuitive, straightforward, integrated and comprehensive.	Opportunity for improvement
8	Develop systems for long-term strategy and use.	Meets best practice
9	Track the key components of multi-family buildings and program participation.	Opportunity for improvement

*Source: Best Practices Self-Benchmarking Tool and Navigant analysis*

### 3.1.3 Gross Program Impact Parameter Estimates – Natural Gas Measures

Navigant applied measure savings values as calculated in Section 2.2.5 to verified measure quantities found in the program tracking systems to calculate verified gross savings impacts for natural gas measures. This section includes gross impact parameter estimates for each program natural gas measure.

For natural gas measures, the program administrator (WECC) used measure values from the program tracking system. When the Illinois TRM was released, the program administrator revised measure savings using Illinois TRM inputs and assumptions in a memorandum<sup>29</sup>. Navigant found some discrepancies between the program administrator’s measure savings values using TRM inputs and

<sup>29</sup> Wisconsin Energy Conservation Corporation, “Applying TRM Algorithms to Nicor PY1 – DRAFT” (dated October 1, 2012)

assumptions and those calculated by Navigant using the same inputs and assumptions and included recommendations to update measure values for water efficient showerheads, bathroom and kitchen faucet aerators and programmable thermostats. The measure value for water heater temperature setbacks was correctly applied. Table 3-3 below includes a comparison of the measure values in the memorandum and verified gross impact parameter values for natural gas measures.

**Table 3-3. Nicor Gas GPY1 Ex-Ante and Verified Gross Impact Parameters**

Measure	Ex-Ante Gross Therms/Unit	Verified Gross Therms/Unit	Method	Source
1.5 gpm Showerheads	26.00	26.21	Deemed	State of Illinois TRM
1.5 gpm Kitchen Aerators	2.70	2.52		
1.0 gpm Bathroom Aerators	2.70	3.02		
Programmable Thermostats	34.07	34.21		
Water Temperature Setback	6.40	6.40		

Source: Program documents, Navigant analysis of State of Illinois TRM

Navigant worked with the utilities and the program administrator to review and correct discrepancies found in the program tracking database and per-unit measure values. After reviewing final data extracts, Navigant made no additional adjustments to measure counts from the program tracking data. Table 3-4 below includes ex-ante and verified gross measure counts used in this evaluation report.

**Table 3-4. Nicor Gas GPY1 Ex-Ante and Verified Gross Impact Parameters**

Measure	Ex-Ante Measures Installed	Verified Measures Installed
1.5 gpm Showerheads	24,352	24,352
1.5 gpm Kitchen Aerators	20,422	20,422
1.0 gpm Bathroom Aerators	28,483	28,483
Programmable Thermostats	6,311	6,311
Water Temperature Setback	973	973
<b>Total</b>	<b>80,541</b>	<b>80,541</b>

Source: Navigant analysis of program tracking data (September 25, 2012 data extract)

### 3.1.4 Gross Program Impact Parameter Estimates – Electric Measures

Navigant applied measure savings values as calculated in Section 2 to verified measure quantities found in the program tracking systems to calculate verified gross savings impacts for electric measures. This section includes gross impact parameter estimates for each program electric measure.

The program’s CFL measure values were calculated from gross per-unit savings defined by the document *Plan Year 4 Deemed Savings Values 31230.pdf*<sup>30</sup>. Navigant applied the CFL measure values to verified measure counts to calculate ex-ante gross energy savings. Navigant then applied ComEd’s deemed realization rate of 96 percent to arrive at verified gross savings for CFL measures.

For water efficiency measures, per-unit savings were estimated by residence instead of by each individual measure. For example, the per-unit energy impact would be the same whether the program installed one or two bathroom faucet aerators in a residence. Using this approach for the verification report, Navigant verified residence counts from ComEd’s Frontier tracking database and program records. Navigant applied per-unit gross measure savings to verified residence counts to calculate ex-ante gross energy savings. Navigant applied ComEd’s deemed realization rate of 67 percent for water measures to calculate verified gross energy savings in the verification report. Table 3-5 below includes ComEd EPY4 gross unit values.

**Table 3-5. ComEd EPY4 Gross Unit Values**

Measure	unit	Ex-Ante Gross kWh/unit	Ex-Ante Gross kW/unit	Method	Source
9W CFL	lamp	29.1	.0029	Deemed	ComEd Plan Year 4 Deemed Savings Values 31230.pdf
14W CFL	lamp	43.2	.0044		
19W CFL	lamp	52.5	.0053		
23W CFL	lamp	72.2	.0073		
1.5 gpm Showerhead	residence	592.3	.0150	Non-Deemed	ComEd PY4 Gross Residential Direct Install Measure Savings (document)
1.5 gpm Kitchen Aerator	residence	117.0	.0120		
1.0 gpm Bathroom Aerator	residence	214.0	.0120		

Source: ComEd Plan Year 4 documents

The Multi-Family Home Energy Savings Program installed CFLs in eligible dwelling units with either natural gas or electric water heat. Navigant verified CFL measure counts and measure counts for electric water efficiency measures installed in dwelling units with electric water heat. Measure counts shown in Table 3-6 below includes all CFL measures installed by the MFHES program, including Nicor Gas, North Shore Gas and Peoples Gas service territories.<sup>31</sup>

<sup>30</sup> This document is on the ICC web site for docket 10-0570. (<http://www.icc.illinois.gov/docket/Documents.aspx?no=10-0570>)

<sup>31</sup> Itemized ComEd electric measure counts by natural gas service territory are included in Appendix 5.2.

**Table 3-6. ComEd EPY4 Ex-Ante and Verified Unit Counts (CFLs)**

Measure	Unit	Ex-Ante Units Installed	Verified Units Installed
9W CFL	lamp	59,740	59,740
14W CFL	lamp	164,459	164,459
19W CFL	lamp	25,876	25,876
23W CFL	lamp	1,566	1,566
<b>Total</b>		<b>251,641</b>	<b>251,641</b>

Source: Navigant analysis of ComEd program tracking data (September 25, 2012 data extract)

Table 3-7 includes all ComEd EPY4 water efficiency measures installed in dwelling units with electric water heat by the Multi-Family Home Energy Savings Program, including Nicor Gas, Peoples Gas and North Shore Gas service territories.<sup>32</sup> Navigant verified a total of 7,594 electric water efficiency measures (e.g. water efficiency measures installed in residential dwelling units with electric water heating) in 2,710 residential dwelling units. As noted in the table below, the per-unit measure for electric water savings measures is by residence.

**Table 3-7. ComEd EPY4 Ex-Ante and Verified Unit Counts (Water Efficiency Measures)**

Measure	Unit	Ex-Ante Units Installed	Verified Units Installed
1.5 gpm Showerhead	Residence	2,444	2,444
1.5 gpm Kitchen Aerator	residence	2,535	2,535
1.0 gpm Bathroom Aerator	residence	2,615	2,615
<b>Total</b>		<b>7,594</b>	<b>7,594</b>

Source: Navigant analysis of ComEd program tracking data (September 25, 2012 data extract)

Navigant applied gross measure savings to verified measure counts to calculate ex-ante gross savings. Realization rates were derived from previous evaluation research and included in ComEd program planning documents. Navigant applied ComEd’s deemed realization rates to calculate verified gross savings for the verification report, as illustrated in Table 3-8.

**Table 3-8. ComEd EPY4 Deemed Gross Impact Parameters**

Measure Type	Realization Rate	Method	Source
CFLs	96.0%	Deemed	ComEd EPY4 Gross Residential Direct Install Measure Savings (document)
Water efficiency measures	67.0%		

Source: ComEd PY4 planning documents

<sup>32</sup> Itemized ComEd electric measure counts by natural gas service territory are included in Appendix 5.2.

### 3.1.5 Gross Program Impact Results

The Nicor Gas GPY1 MFHES Program reported ex-ante gross energy savings of 986,438 therms. Evaluation adjustments described in the sections above resulted in verified gross energy savings of 997,875 therms. Table 3-9 illustrates that the overall program gross energy savings realization rate was 101.2 percent.

**Table 3-9. Nicor Gas GPY1 Ex-Ante and Verified Gross Savings**

Measure	Verified Unit Savings (therms)	Verified Measures Installed	Ex-Ante Gross Savings (therms)	Verified Gross Realization Rate	Verified Gross Savings (therms)
1.5 gpm Showerheads	26.21	24,352	633,152	100.8%	638,266
1.5 gpm Kitchen Aerators	2.52	20,422	55,139	93.3%	51,463
1.0 gpm Bathroom Aerators	3.02	28,483	76,904	111.9%	86,019
Programmable Thermostats	34.21	6,311	215,016	100.4%	215,899
Water Temperature Setback	6.40	973	6,227	100.0%	6,227
<b>Total</b>	<b>n/a</b>	<b>80,541</b>	<b>986,438</b>	<b>101.2%</b>	<b>997,875</b>

Source: Navigant analysis of program tracking data, Illinois TRM

The ComEd EPY4 MFHES Program reported ex-ante gross energy savings of 12,618,404 kWh (12,618 MWh) and ex-ante gross demand reduction of 1,142 kW (1.1 MW). Navigant applied ComEd’s EPY4 deemed realization rates to calculate verified gross energy savings of 11,445,570 kWh (11,446 MWh) and verified gross demand reduction of 1,068 kW (1.1 MW), as shown in Table 3-10 and Table 3-11.<sup>33</sup>

<sup>33</sup> Navigant included verified electric energy savings itemized by utility service territory in Section 5.5.

**Table 3-10. ComEd EPY4 Ex-Ante<sup>34</sup> and Verified Gross Savings Estimates**

Measure	Unit	Ex-Ante Unit Savings (kWh)	Verified Units Installed	Ex-Ante Gross Savings (kWh)	Ex-Ante Gross Realization Rate	Verified Gross Savings (kWh)
9W CFL	lamp	29.1	59,740	1,738,434	96.0%	1,668,897
14W CFL	lamp	43.2	164,459	7,104,629	96.0%	6,820,444
19W CFL	lamp	52.5	25,876	1,358,490	96.0%	1,304,150
23W CFL	lamp	72.2	1,566	113,065	96.0%	108,543
<i>sub-total CFL measures</i>	<i>n/a</i>	<i>n/a</i>	251,641	10,314,618	96.0%	9,902,033
Showerhead	residence	592.3	2,444	1,447,581	67.0%	969,879
Kitchen Aerator	residence	117.0	2,535	296,595	67.0%	198,719
Bathroom Aerator	residence	214.0	2,615	559,610	67.0%	374,939
<i>sub-total water measures</i>	<i>n/a</i>	<i>n/a</i>	7,594	2,303,786	67.0%	1,543,537
<b>Total</b>	<i>n/a</i>	<b>n/a</b>	<b>259,235</b>	<b>12,618,404</b>	<b>90.7%</b>	<b>11,445,570</b>

Source: Navigant analysis of program tracking data; ComEd EPY4 deemed savings estimates

**Table 3-11. ComEd EPY4 Ex-Ante<sup>35</sup> and Verified Gross Demand Reduction Estimates**

Measure	Unit	Ex-Ante Unit Savings (kW)	Verified Units Installed	Ex-Ante Gross Savings (kW)	Ex-Ante Gross Realization Rate	Verified Gross Reduction (kW)
9W CFL	lamp	.0029	59,740	176	96.0%	169
14W CFL	lamp	.0044	164,459	719	96.0%	690
19W CFL	lamp	.0053	25,876	138	96.0%	132
23W CFL	lamp	.0073	1,566	11	96.0%	11
<i>sub-total CFL measures</i>	<i>n/a</i>	<i>n/a</i>	251,641	1,044	96.0%	1,002
Showerhead	residence	.0150	2,444	37	67.0%	25
Kitchen Aerator	residence	.0120	2,535	30	67.0%	20
Bathroom Aerator	residence	.0120	2,615	31	67.0%	21
<i>sub-total water measures</i>	<i>n/a</i>	<i>n/a</i>	7,594	98	67.0%	66
<b>Total</b>	<b>n/a</b>	<b>n/a</b>	<b>259,235</b>	<b>1,142</b>	<b>93.5%</b>	<b>1,068</b>

Source: Navigant analysis of program tracking data; ComEd EPY4 deemed savings estimates

<sup>34</sup> EPY4 CFL measure values were deemed. Water efficiency measure values were estimated. Realization rates for CFLs and for water efficiency measures were deemed.

<sup>35</sup> EPY4 CFL measure values were deemed. Water efficiency measure values were estimated. Realization rates for CFLs and for water efficiency measures were deemed.

### 3.1.6 Net Program Impact Parameter Estimates

According to the NTG Framework<sup>36</sup>, Navigant used evaluation research to calculate NTGR values for Nicor Gas. The program level NTGR from evaluation research was 0.96. This ratio reflects the weighting of the individual natural gas measures to the program level NTGR indicated in Table 3-12. Navigant conducted an additional telephone interview with one participant who indicated potential spillover activity. However, after speaking with this participant, they reported that they had actually received a rebate for their activity.

**Table 3-12. Nicor Gas GPY1 Program Net-to-Gross Ratios**

Program-Level	Research Findings Net-to-Gross Ratio	Relative Precision at 90% Confidence (two-tailed)
GPY1 MFHES Program	0.96	± 2.1%

*Source: Navigant analysis of participating decision-maker survey self-report and tracking system data*

According to the NTG Framework<sup>37</sup>, Navigant used deemed Net-to-Gross Ratio values from evaluation research to calculate ComEd EPY4 verified net savings for electric measures (including CFLs and water efficiency measures installed in residential dwelling units with electric water heating) installed by the program, as found in Table 3-13.

**Table 3-13. ComEd EPY4 Program Deemed Net to Gross Ratios**

Measure	Net-to-Gross Ratio	Source
CFLs	0.81	<i>ComEd Plan Year 4 Deemed Savings Values 31230.pdf</i>
Water Efficiency Measures	0.93	

*Source: ComEd Plan Year 4 Deemed Savings Values 31230.pdf*

### 3.1.7 Net Program Impact Results

Navigant applied research findings NTGR values to verified gross savings to calculate research findings net savings for natural gas measures. Table 3-14 below presents ex-ante and evaluation research net savings.

<sup>36</sup> "Proposed Framework for Counting Net Savings in Illinois." Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

<sup>37</sup> Ibid.

**Table 3-14. Nicor Gas GPY1 Ex-Ante and Evaluation Research Net Savings**

Measure	Ex-Ante Net Savings (therms)	Evaluation Research Net Savings (therms)
1.5 gpm Showerheads	569,837	606,353
1.5 gpm Kitchen Aerators	49,625	48,890
1.0 gpm Bathroom Aerators	69,214	81,718
Programmable Thermostats	193,514	215,899
Water Temperature Setback	5,604	6,227
<b>Total</b>	<b>887,795</b>	<b>959,087</b>

Source: Navigant analysis of program tracking data; GPY1 program planning assumptions

Navigant applied ComEd’s EPY4 deemed NTG values of 0.81 for CFLs and 0.93 for water efficiency measures to verified gross savings to calculate verified net energy savings of 9,456,136 kWh (9,456 MWh) and verified net demand savings of 873 kW (0.9 MW) for electric measures. The program average NTG ratio (using net savings/verified gross savings) was 0.83 for energy savings and 0.82 for demand savings. Verified net energy and demand savings estimates are included in Table 3-15 below.

**Table 3-15. ComEd EPY4 Verified Net Savings**

Measure	Verified Net Savings (kWh)	Verified Net Savings (kW)
9W CFL	1,351,806	137
14W CFL	5,524,559	559
19W CFL	1,056,362	107
23W CFL	87,919	9
<i>sub-total CFL measures</i>	<i>8,020,647</i>	<i>812</i>
Showerhead	901,988	23
Kitchen Aerator	184,808	19
Bathroom Aerator	348,693	20
<i>sub-total water measures</i>	<i>1,435,489</i>	<i>61</i>
<b>Total</b>	<b>9,456,136</b>	<b>873</b>

Source: Navigant analysis of program tracking data; EPY4 program planning assumptions

### 3.1.8 Program Achievement Compared to Planning Estimates

The Nicor Gas GPY1 program induced evaluation research net energy savings equal to 75 percent of its net energy savings planning estimate. The direct installation portion of the program achieved greater average energy savings per dwelling unit than originally planned. The primary reason for higher average energy savings per unit was the introduction of new measures to the program, including programmable thermostats for Nicor Gas. Programmable thermostats in particular provided a boost in therm savings per unit, but were introduced gradually over a period of several months due to the complexity of installation and necessary training for the field teams. Table 3-16 illustrates Nicor Gas program planning estimates compared to evaluation research savings.

**Table 3-16. Nicor Gas GPY1 Evaluation Research Net Savings Compared to and Planning Estimates**

Program	Net Savings Planned (therms)	Evaluation Research Net Savings (therms)	Percent of Planning Estimate
Nicor Gas	1,275,075	959,087	75%

Source: Navigant analysis, Program Operations Manual

The ComEd EPY4 program achieved verified net energy savings equal to 155 percent of its net energy savings planning estimate, due in part to the introduction of globe CFL measures. Table 3-17 illustrates ComEd evaluation research savings compared to program planning estimates.

**Table 3-17. ComEd EPY4 Verified Net Savings Compared to Planning Estimates**

Program	Net Savings Planned (MWh)	Verified Net Savings (MWh)	Percent of Planning Estimate
ComEd EPY4	6,110	9,456	155%

Source: Navigant analysis, ComEd documents

## 3.2 Process Evaluation Results

Navigant’s evaluation confirmed that the multi-family program continues to be efficiently implemented and successful in its direct installation activities at eligible residential dwelling units. The program continues to build upon a strong foundation built from the Nicor Gas Rider 29 Pilot Program and previous years’ implementation by ComEd and Honeywell. Navigant’s process evaluation was organized around program participation accomplishments, administration and delivery, coordination and communication between utilities and customer satisfaction. Navigant will research additional program process questions, including program outreach and marketing activities, in future evaluation efforts.

### 3.2.1 Program Participation

The GPY1/EPY4 MFHES Program impacted 24,744 residential dwelling units, achieving 71 percent of its Nicor Gas planning estimate. The program installed measures at an additional 2,297 dwelling units with

electric water heating for a total of 27,041 dwelling units, achieving 77 percent of ComEd’s EPY4 planning estimate. Table 3-18 illustrates GPY1/EPY4 program participation rates.

**Table 3-18. Nicor Gas GPY1 and ComEd EPY4 Program Participation**

Program	Participation Goal (dwelling units)	Actual Participation (dwelling units)	Completion Rate
Nicor Gas Individually-Metered	8,750	4,700	54%
Nicor Gas Master-Metered	26,250	20,044	76%
<i>Sub-total Nicor Gas</i>	<i>35,000</i>	<i>24,744</i>	<i>71%</i>
Electric Units/ComEd	-	2,297	-
<b><i>ComEd sub-total</i></b>	<b><i>35,000</i></b>	<b><i>27,041</i></b>	<b><i>77%</i></b>

Source: Navigant analysis of program tracking data; compliance filing

### 3.2.2 Administration and Delivery

The EPY4/GPY1 program year was efficiently delivered by Honeywell. On the electric side, the program met 155 percent of its energy savings planning estimate through direct installation activities at 77 percent of planned dwelling units. On the gas side, the program met 75 of its energy planning estimate through direct installation activities at 71 percent of planned dwelling units. The program built on previous year’s implementation efforts from the implementation contractor and ComEd and through the Rider 29 pilot program with Nicor Gas. The program’s continued success can be attributed to solid program design, program activities that were well aligned with anticipated outcomes and cooperation between the program’s utility sponsors and implementation contractor. This section addresses the following process evaluation questions, *in italics*, with findings and recommendations indicated as such.

**Research Topic:** *Are program administrative and delivery processes effective for delivering efficient scheduling and installation of measures?*

**Findings:** Navigant found that the MFHES Program had implemented effective procedures to schedule and install measures, although there are opportunities for improvement. From a safety perspective, the program reported zero OSHA violations during the program year, achieving its safety goal. The program reported one vehicle property damage incident to ComEd and Nicor Gas during the week ending February 25, 2012. The program reported that the safety incident did not amount to an OSHA violation.

**Research Topic:**

*What areas could the program improve to create a more effective program for customers and help increase the energy impacts?*

**Finding:** One of the upcoming challenges for this program is increasing program uptake by overcoming participation barriers in the multi-family marketplace, including the split-incentive barrier. As a mature program, uptake is more challenging now that the program has been performing direct install activities in the marketplace for several years through ComEd. To counter these barriers to participation, the

program implemented a series of continuous improvement steps including reviewing and revising marketing collateral to more closely align with the program’s business case, implementing additional sales training and tracking steps for multi-family contacts and interviewing customers who have previously participated in the program to learn more about their perspectives on the benefits and costs of participating in the program.

**Findings:** Multifamily program effectiveness can be measured broadly by two key metrics, program participation rate (e.g. number of dwelling units at a site that receive measures divided by the total number of dwelling units at a site) and measure saturation (e.g. average number of measures installed per unit). Identifying and taking steps to address common participation and installation barriers will enable the program to increase its participation and installation rates, thereby creating a more effective program.

Although the program was generally successful during the past year, the multi-family program has some opportunities for improvement. For example, the program installed measures in 27,041 residential dwelling units and there were 2,376 dwelling units at sites where field teams were performing direct installation activity that did not receive measures because the dwelling units were not available to the field teams. The program’s participation rate was 91 percent.

The program currently tracks CFL installation rates, with the program tracking report indicating an average installation of 5.4 CFLs per dwelling unit. The addition of Globe CFLs successfully enabled the program to achieve greater lighting penetration in dwelling units. However, the program does not appear to track installation rates for water efficiency measures. Tracking this information with a greater emphasis on installing the maximum number of eligible measures in dwelling units may help the program increase the average number of measures installed and average savings per dwelling unit.

**Finding:** The program reports that a barrier to participation is a lack of choices among direct installation measures, specifically water efficient showerheads and CFLs. The Multi-Family program successfully introduced Globe-Shaped CFLs during EPY4, in part to address this barrier.

**Research Topic:**

*Has the program effectively channeled customers to other programs sponsored by Nicor Gas to implement common area efficiency measures as identified in common area audits?*

**Findings:** The program reported that it conducted 285 central plant surveys to inspect central water heating or space heating equipment for Nicor Gas. Navigant did not identify any multi-family properties that implemented common area energy efficiency measures in the program tracking database. During program staff interviews, program staff reported that direct installation activities were the top priority for the program and that common area audits, while performed, were not tracked after being referred to the applicable program(s).

Central plant surveys provide an excellent opportunity to follow up with property managers. The MFHES program could potentially collaborate more closely with other utility-sponsored programs to target common area efficiency opportunities in participating multifamily buildings, thereby potentially improving overall portfolio effectiveness.

**Research Topic:**

*What are the main barriers to and motivation for adopting recommended common area measures?*

**Finding:** This question will be further addressed in future evaluation efforts.

**Research Topic:**

*Are the program’s marketing plan and program promotional materials aligned with program benefits? Do they clearly communicate program benefits?*

**Findings:** Navigant reviewed program materials supplied by the implementation contractor. Navigant reviewed the program’s operations manual, marketing plan and promotional materials and found that the materials are aligned with program benefits. The program materials clearly communicate the program’s benefits. Navigant found that program activities were generally consistent with the program’s operations plan and marketing approach.

### 3.2.3 Coordination and Reporting Between Utilities

**Research Topic:**

*Is the program effectively coordinating with ComEd for electric measures and reporting?*

**Findings:** Overall, it appears that the parties responsible for jointly implementing the program continue to implement an effective process for coordination and reporting, primarily through regular coordination conference calls and frequent communication. The utility program staff and implementation contractors communicated frequently throughout the plan year, sharing ideas and experience to help enable this program’s ultimate success. The implementation contractor provided weekly activity updates to ComEd and other parties. Water efficiency measures installed at dwelling units with electric water heating were tracked separately by the implementation contractor and included in weekly activity updates submitted to ComEd.

At the end of the program year, the program tracking system had missing and/or misnamed data. However, the implementation contractor worked closely with the utilities and evaluators to identify the missing data and reconcile the program tracking systems once these issues were discovered.

**Research Topic:**

*Is information collected in the common area assessment sufficient to enable ComEd’s implementation contractors to follow up with common area lighting recommendations?*

**Findings:** The program reported that it conducted 31 common area lighting surveys for ComEd. Navigant did not find examples of a customer implementing common area lighting retrofits in the program tracking database.

### 3.2.4 Customer Satisfaction

Navigant reviewed customer survey results provided by the program from two different sources to gauge customer satisfaction with the program. The program implementation contractor included customer surveys as part of the program’s educational information provided to residents of dwelling units that received direct install measures. The survey included six brief questions on a self-addressed, postage metered postcard returned to the implementation contractor. The implementation contractor also provided customer satisfaction surveys to property managers as part of the final report for the building’s direct installation activities.

Navigant administered independent telephone surveys to participating tenants and to participating decision makers as part of our evaluation activities for this program. Telephone surveys were conducted via Computer Assisted Telephone Interview (CATI) technology from Navigant’s sub-contractor, the Blackstone Group. This section includes a summary of Navigant’s evaluation surveys. Navigant’s customer satisfaction findings and analysis, segmented by customer type and between the program delivery and direct install measures, are included below.

**Research Topic:**

*Are customers satisfied with participation in the program and customer service experiences?*

**Finding:** Overall, participants appear to be very satisfied with the program. Navigant’s analysis indicated that 84 percent of tenants responded that they were satisfied or very satisfied with the program. Decision-makers were also satisfied with the program, with 90 percent of respondents indicating that they were satisfied or very satisfied with the program’s direct install measures and 95 percent indicating that they were satisfied or very satisfied with the program’s field team. When asked about common area recommendations and reporting, decision-makers indicated less satisfaction with the overall program (70 percent) or the summary report provided by the program. Almost half (45 percent) of those participants surveyed did not know if they received recommendations for energy efficiency improvements in common areas or central plants. Of those who recalled receiving recommendations for energy efficiency improvements in common areas or central plants, only 55 percent indicated that they were satisfied with the report. However, the program staff reported that the main emphasis was implementing direct install activity, with a secondary priority on common area or central plant surveys and recommendations. Detailed findings from customer satisfaction evaluation interviews are included in Section 3.2.4.

**Research Topic:**

*Are customer surveys completed and reviewed by the program?*

**Findings:** The program distributed 8,274 tenant surveys to residents and received 455 in return, achieving a response rate of 5.5 percent. The target customer survey return rate is 10 percent. The program also received 293 legacy surveys (e.g. surveys distributed to previous program year participants.) The program’s customer satisfaction survey includes six statements, four of which ask for tenant feedback about the field technicians and one survey question asks tenants about “installed items.” The other question asks about overall program satisfaction. The average customer satisfaction score from the customer surveys was 4.9 on a scale of 5.0, indicating high levels of customer satisfaction and exceeding the program planning target of 4.5 on a scale of 5.0.

**Finding:** The program mailed 174 property manager customer satisfaction surveys and received 45 in return for a response rate of 26 percent. The average customer satisfaction score from the property manager surveys was 4.7 on a scale of 5.0, indicating high levels of customer satisfaction.

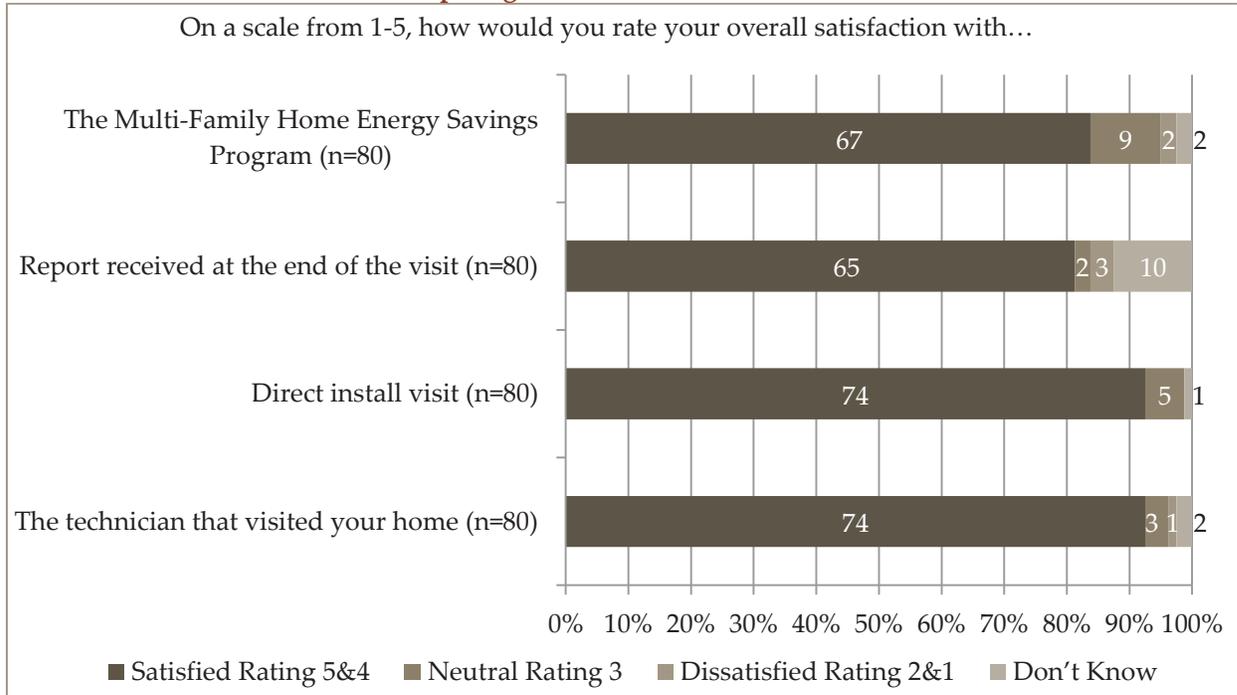
**Finding:** Navigant observed some participant responses in the implementation contractor tenant survey with ratings of three or lower without accompanying documentation on how, if at all, these complaints were reviewed and/or resolved by the implementation contractor.

***Tenant Customer Satisfaction with the Program***

The evaluation telephone survey asked respondents to rate their satisfaction with MFHES program, the report received, the direct install visit and the field technicians that performed direct install activity. The population was comprised of 80 respondents. When responding to the MFHES program overall, 84

percent of respondents gave the program a satisfaction rating of four or higher on a scale of one to five, where one means very dissatisfied and five means very satisfied. Responses from Navigant’s tenant survey are included in Figure 3-1 below.

**Figure 3-1. Nicor Gas-ComEd GPY1-EPY4 MFHES Program  
Participating Tenant Customer Satisfaction**



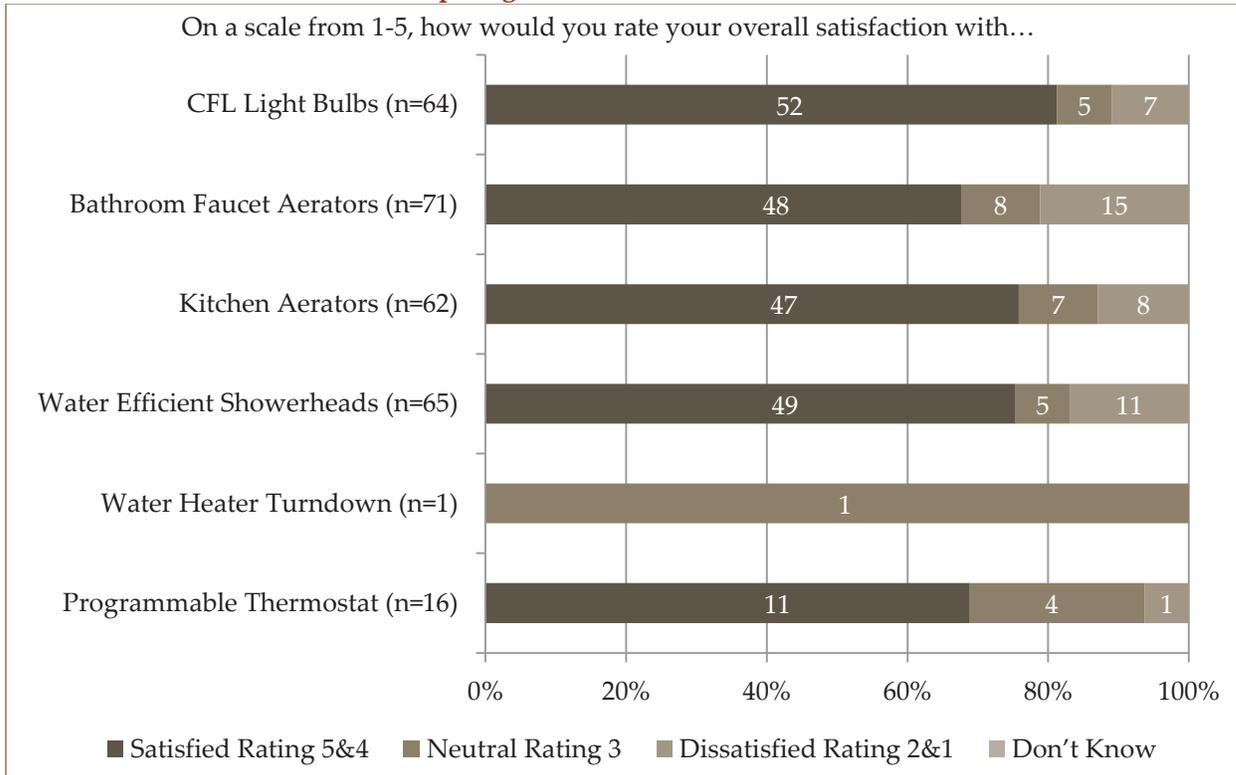
Source: Navigant analysis of participating tenant survey self-report data

**Participating Tenant Satisfaction with Individual Measures**

The evaluation telephone survey asked respondents about their satisfaction with each of the direct install measures, including CFLs, bathroom and kitchen aerators, water efficient showerheads, and water heater temperature turndown. Respondents were asked to rate their satisfaction with the measures installed on a scale of one to five, where one means very dissatisfied and five means very satisfied. Respondents reported satisfaction ratings of four or higher for direct install measures between a low of 68 percent to a high of 82 percent. Water efficiency measures, overall, averaged satisfaction ratings in the 70 percent range. Respondents who reported dissatisfaction with bathroom and kitchen aerators most frequently reported they didn’t like the water flow or that the aerator didn’t fit their faucet correctly. Similarly, respondents who reported dissatisfaction with water efficient showerheads most frequently reported that they were dissatisfied with the water flow or cited other personal preference reasons for removal. CFL measures received a satisfaction rating of four or higher from 82 percent of respondents. Programmable thermostats received a satisfaction rating of four or higher from 69 percent of respondents.

Responses from Navigant’s tenant survey are included in Figure 3-2 below.

**Figure 3-2. Nicor Gas-ComEd GPY1-EPY4 MFHES Program  
Participating Tenant Customer Satisfaction**



Source: Navigant analysis of participating tenant survey self-report data

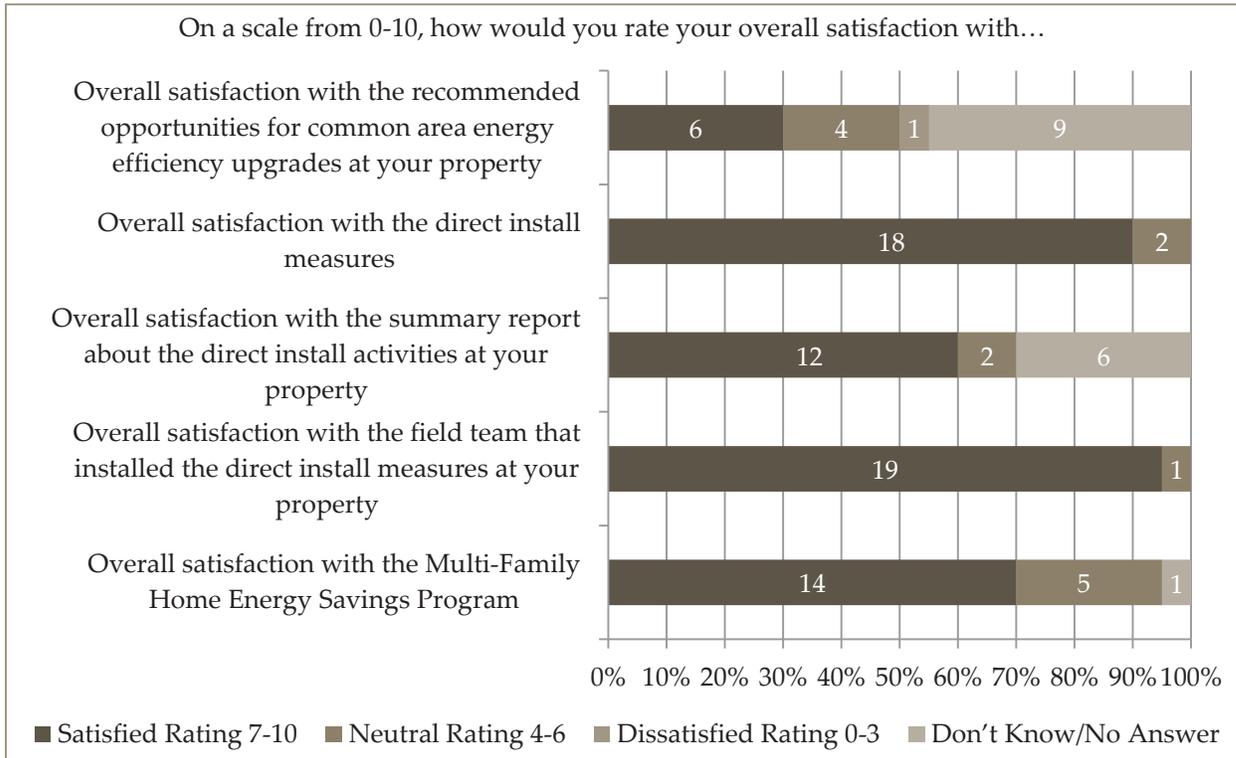
**Participating Decision-Maker Satisfaction with Program Participation & Measures**

Participating decision-makers reported mixed results for the program. In the evaluation telephone survey, participating decision-makers were asked to rate their satisfaction with several aspects of the MFHES Program using a scale of 0-10, with 0 being very dissatisfied and 10 being very satisfied. The evaluation survey population was made up of 41 respondents (20 in ComEd/Nicor Gas and 21 in ComEd/Peoples Gas and North Shore Gas).

Overall, decision-makers reported high levels of satisfaction with direct install measures (90 percent) and the field installation team (95 percent). Respondents were less satisfied with the overall program (70 percent) or the summary report provided by the program. Almost half (45 percent) of those participants surveyed did not know if they received recommendations for energy efficiency improvements in common areas or central plants. Of those who recalled receiving recommendations for energy efficiency improvements in common areas or central plants, only 55 percent indicated that they were satisfied with the report.

Although the evaluation survey included a small sample size, participant responses to the decision-maker survey would indicate potential opportunities for the program to increase customer satisfaction through reporting and through common area or central plant assessments and follow up recommendations to decision-makers. Responses from Navigant’s decision-maker survey are included in Figure 3-3 below.

**Figure 3-3. Nicor Gas-ComEd GPY1-EPY4 MFHES Program  
Participating Decision-Maker Customer Satisfaction**



Source: Navigant analysis of participating decision maker survey self-report data

**Residential Dwelling Unit Occupancy**

As indicated in Table 3-19 below, the evaluation telephone survey asked respondents to indicate how many people live in their household year round. The survey of the ComEd-Nicor participating tenant population included 80 households. There was an average of 1.7 occupants per household surveyed. The survey of the ComEd-PGL-NSG participating tenant population included 81 households. There was an average of 1.6 occupants per household surveyed.

**Table 3-19. Participating Tenant Survey Occupancy Responses**

Q: How many people live in your household year round? (n=161)	Nicor Gas Respondents (n=80)	PGL-NSG Respondents (n=81)
One Person	36	43
Two People	30	25
Three People	9	8
Four People	3	2
Five People	0	1
Don't Know	2	2
Average	1.7	1.6

*Source: Navigant analysis of participating tenant survey self-report data*

The evaluation survey asked respondents what the primary language spoken in their home. While 14 (8.7 percent) respondents indicated that English was not the primary language spoken in their home, none of the respondents were excluded from the surveys because the respondents were able to complete the survey in English. Results are presented in Table 3-20 below.

**Table 3-20. Participating Tenant Survey Primary Language in the Home**

Q: What is the primary language spoken in your home?	All Respondents (n=161)
English	147
Spanish	2
Telugu	1
Tagalog	1
Cambodian	1
Portuguese	1
“Language of God”	1
Hindi	1
English & Hindi	1
Malayalam	1
Yoruba	1
Chinese	1
Romanian	1
Not specified	1
Total	14

*Source: Navigant analysis of participating tenant survey self-report data*

## 4. Findings and Recommendations

### 4.1 Key Impact Findings and Recommendations

The Nicor Gas GPY1 MFHES Program reported ex-ante gross energy savings of 986,438 therms. Evaluation adjustments described in the sections above resulted in verified gross energy savings of 997,875 therms. The program’s GPY1 realization rate was 101.2 percent. Navigant calculated free ridership for this evaluation using an algorithm approach based on survey self-report data using the NTG Framework<sup>38</sup>. The analysis relied on interview results from participating multifamily decision-makers. The existence of participant spillover was examined using survey self-report data and follow up telephone interviews with respondents. Net energy savings were 959,087 therms. The program level NTGR for gas measures was 0.96 based on evaluation research findings. Nicor Gas energy savings are shown in Table 4-1.

**Table 4-1. GPY1 Nicor Gas Multi-Family Home Energy Savings  
Energy Savings (therms)**

Program	Ex-Ante Gross Energy Savings (therms)	Verified Gross Realization Rate	Verified Gross Energy Savings (therms)	Evaluation Research NTG Ratio	Evaluation Research Net Energy Savings (therms)
Nicor Gas	986,438	101.2%	997,875	0.96	959,087

Source: Navigant analysis

The ComEd EPY4 MFHES Program reported ex-ante gross energy savings of 12,618,404 kWh (12,618 MWh) and ex-ante gross demand reduction of 1,142 kW (1.1 MW). These results include energy and demand savings through installation of CFL measures and electric water efficiency measures (e.g. water efficiency measures in dwelling units with electric water heat) in Nicor Gas, Peoples Gas and North Shore Gas service territories. For water efficiency measures, Navigant noted that gross savings estimates from water efficiency measures were estimated by residence. For example, the gross energy impact would be the same whether the MFHES program installed one or two bathroom faucet aerators in a residence. Navigant applied the gross energy impacts to calculate verified gross energy savings found in this report<sup>39</sup>.

Navigant used deemed realization rates (96.0 percent for CFLs and 67.0 percent for water efficiency measures) to calculate verified gross savings of 11,445,570 kWh (11,446 MWh) and verified gross demand reduction of 1,068 kW (1.1 MW). Navigant used deemed NTGR according to the NTG Framework (0.81 NTG for CFLs and 0.93 NTG for water efficiency measures) to calculate verified net savings of 9,456 kWh (9,456 MWh) and 873 kW (0.9 MW). The program average NTGR (using net savings/verified gross savings) was 0.83 for energy savings and 0.82 for demand savings. Results are shown in Table 4-2 and Table 4-3.

<sup>38</sup> “Proposed Framework for Counting Net Savings in Illinois.” Memorandum March 12, 2010 from Philip Mosenthal, OEL, and Susan Hedman, OAG.

<sup>39</sup> Section 5.2.1 includes Navigant’s research report with impact findings from evaluation research.

**Table 4-2. ComEd EPY4 Multi-Family Home Energy Savings Program Energy Savings (kWh)**

Program	Ex-Ante Gross Energy Savings (kWh)	Gross Realization Rate <sup>40</sup>	Verified Gross Energy Savings (kWh)	NTG Ratio <sup>41</sup>	Verified Net Energy Savings (kWh)
CFLs	10,314,618	96.0%	9,902,033	0.81	8,020,647
Water Efficiency	2,303,786	67.0%	1,543,537	0.93	1,435,489
<b>Total</b>	<b>12,618,404</b>	<b>90.7%</b>	<b>11,445,570</b>	<b>0.83</b>	<b>9,456,136</b>

Source: Navigant analysis

**Table 4-3. ComEd EPY4 Multi-Family Home Energy Savings Program Demand Savings (kW)**

Program	Ex-Ante Gross Energy Savings (kW)	Gross Realization Rate <sup>42</sup>	Verified Gross Energy Savings (kW)	NTG Ratio <sup>43</sup>	Verified Net Energy Savings (kW)
CFLs	1,044	96.0%	1,002	0.81	812
Water Efficiency	98	67.0%	66	0.93	61
<b>Total</b>	<b>1,142</b>	<b>93.5%</b>	<b>1,068</b>	<b>0.82</b>	<b>873</b>

Source: Navigant analysis

Key impact evaluation findings and recommendations follow:

**Finding:** The MFHES Program recruited eligible properties and applications were backed with supporting documentation.

**Finding:** For Nicor Gas, Navigant found some discrepancies between the program administrator’s measure savings values using TRM inputs and assumptions and those calculated by Navigant using the same inputs and assumptions and included recommendations to update measure values for water efficient showerheads, bathroom and kitchen faucet aerators and programmable thermostats. The measure value for water temperature setbacks was correctly applied.

**Recommendation:**

- Navigant recommends updating the Nicor Gas program tracking system to match TRM savings values by making minor adjustments to measure savings estimates for water efficient showerheads (from 26.00 therms/unit to 26.21 therms/unit), kitchen faucet aerators and bathroom faucet aerators (from 2.70 therms/unit each to 2.52 therms/unit and 3.02 therms/unit, respectively) and programmable thermostats (from 34.07 therms/unit to 34.21 therms/unit) based on algorithms and inputs found in the Illinois TRM. The value for water temperature setback of 6.40 therms/unit is the same as identified in the Illinois TRM.

<sup>40</sup> Realization rate deemed in EPY4.

<sup>41</sup> NTGR deemed in EPY4.

<sup>42</sup> Realization rate deemed in EPY4.

<sup>43</sup> NTGR deemed in EPY4.

**Finding:** While the Nicor Gas tracking system is currently tracking necessary information to report the program’s participation and energy savings achievements, the program can make an incremental improvement to the program tracking system by adding data fields.

#### 4.2 Key Process Findings and Recommendations

The GPY1/EPY4 MFHES Program impacted 24,744 residential dwelling units, achieving 71 percent of its Nicor Gas planning estimate. The program installed measures at an additional 2,297 dwelling units with electric water heating for a total of 27,041 dwelling units, achieving 77 percent of ComEd’s EPY4 planning estimate. Table 4-4 presents this information.

**Table 4-4. GPY1/EPY4 Multi-Family Home Energy Savings Program Participation Achievements**

Program	Participation Goal (dwelling units)	Actual Participation (dwelling units)	Percent of Planning Estimate
Nicor Gas Individually-Metered	8,750	4,700	54%
Nicor Gas Master-Metered	26,250	20,044	76%
<i>Sub-total Nicor Gas</i>	<i>35,000</i>	<i>24,744</i>	<i>71%</i>
Electric Units/ComEd	-	2,297	-
<b><i>ComEd sub-total</i></b>	<b><i>35,000</i></b>	<b><i>27,041</i></b>	<b><i>77%</i></b>

Source: Navigant analysis of program tracking data

This section addresses the following process evaluation questions, *in italics*, with findings and recommendations indicated as such. Key process evaluation findings and recommendations follow:

**Findings:** The GPY1/EPY4 program year was efficiently delivered by Honeywell. On the electric side, the program met 155 percent of its energy savings planning estimate through direct installation activities at 77 percent of planned dwelling units. On the gas side, the program met 75 of its energy planning estimate through direct installation activities at 71 percent of planned dwelling units. The program built on previous year’s implementation efforts from the implementation contractor and ComEd and through the Rider 29 pilot program with Nicor Gas. The program’s continued success can be attributed to solid program design, program activities that were well aligned with anticipated outcomes and cooperation between the program’s utility sponsors and implementation contractor.

**Research Topic:** *Are program administrative and delivery processes effective for delivering efficient scheduling and installation of measures?*

**Findings:** Navigant found that the MFHES Program had implemented effective procedures to schedule and install measures, although there are opportunities for improvement.

**Recommendations:**

- The program should include information in program enrollment forms or other materials that notifies property managers/decision makers and participating tenants that they may be

- contacted by an independent third-party evaluator to verify installation and answer questions about their participation experience; and
- The program should consider translating program marketing materials into additional languages when used for purposes of notifying tenants of upcoming direct installation activity at their home.

**Research Topic:**

*What areas could the program improve to create a more effective program for customers and help increase the energy impacts?*

**Finding:** One of the upcoming challenges for this program is increasing program uptake by overcoming participation barriers in the multi-family marketplace, including the split-incentive barrier. As a mature program, uptake is more challenging now that the program has been performing direct install activities in the marketplace for several years through ComEd. To counter these barriers to participation, the program implemented a series of continuous improvement steps including reviewing and revising marketing collateral to more closely align with the program’s business case, implementing additional sales training and tracking steps for multi-family contacts and interviewing customers who have previously participated in the program to learn more about their perspectives on the benefits and costs of participating in the program.

**Recommendations:**

- The program may benefit from exploring additional opportunities to engage target customers. For example, the program may be able to attempt to overcome the split-incentives participation barrier through a comprehensive whole-building approach designed to provide energy and cost savings benefits to multi-family decision-makers as well as tenants. Such programs are implemented in areas such as Con Edison (New York) or DTE (Detroit);
- The program may be able to share information or increase communication with other ComEd or Nicor Gas programs, to provide a single point of contact for multi-family decision-makers to implement common area improvements and direct install activity in residential dwelling units; and
- The program may consider designing a pilot program to target customers who may be likely to participate, such as decision-makers who have participated in the program in previous years and who may own or manage a large portfolio of multifamily buildings.

**Findings:** Multifamily program effectiveness can be measured broadly by two key metrics, program participation rate (e.g. number of dwelling units at a site that receive measures divided by the total number of dwelling units at a site) and measure saturation (e.g. average number of measures installed per unit). Identifying and taking steps to address common participation and installation barriers will enable the program to increase its participation and installation rates, thereby creating a more effective program.

Although the program was generally successful during the past year, the multi-family program has some opportunities for improvement. For example, the program installed measures in 27,041 residential dwelling units and that there were 2,376 dwelling units at sites where field teams were performing direct installation activity that did not receive measures because the dwelling units were not available to the field teams. The program’s participation rate was 91 percent.

The program currently tracks CFL installation rates, with the program tracking report indicating an average installation of 5.4 CFLs per dwelling unit. The addition of Globe CFLs successfully enabled the program to achieve greater lighting penetration in dwelling units. However, the program does not appear to track installation rates for water efficiency measures. Tracking this information with a greater emphasis on installing the maximum number of eligible measures in dwelling units may help the program increase the average number of measures installed and average savings per dwelling unit.

**Recommendations:**

- The program should track and review reasons why a dwelling unit is not available for direct installation activity at a given multi-family site. If there are recurring reasons why dwelling units are unavailable to the program, the program may be able to develop communications or other mechanisms to reduce the number of unavailable units;
- Similarly, the program should track and review reasons why field technicians are unable to install energy efficiency measures in a given unit. In so doing, the program may find that it can achieve higher installations per dwelling unit by adding different types or styles of measures (e.g. faucet aerators or globe CFLs), such as it has in the past; and
- Emphasize to field teams the importance of installing the maximum number of eligible direct install measures in dwelling units.

**Finding:** The program reports that a barrier to participation is a lack of choices among direct install measures, specifically water efficient showerheads and CFLs. The Multi-Family program successfully introduced Globe-Shaped CFLs during PY1, in part to address this barrier.

**Recommendation:**

- The program should consider stocking different finishes (e.g. chrome or other options) for water efficient showerheads and additional shapes for CFLs to provide additional cost-effective choices for direct install measures.

**Research Topic:**

*Has the program effectively channeled customers to other programs sponsored by Nicor Gas to implement common area efficiency measures as identified in common area audits?*

**Findings:** The program reported that it conducted 285 central plant surveys to inspect central water heating or space heating equipment for Nicor Gas. Navigant did not identify any multi-family properties that implemented common area energy efficiency measures in the program tracking database. During program staff interviews, program staff reported that direct installation activities were the top priority for the program and that common area audits, while performed, were not tracked after being referred to the applicable program(s).

Central plant surveys provide an excellent opportunity to follow up with property managers. The MFHES program could potentially collaborate more closely with other utility-sponsored programs to target common area efficiency opportunities in participating multifamily buildings, thereby potentially improving overall portfolio effectiveness.

**Recommendations:**

- Place a greater emphasis on completing common area assessments;
- Track common area referrals to other programs and participation rates from referrals;
- Target common area energy efficiency opportunities through increased communication and/or co-marketing with other energy efficiency programs;

- Develop a script for follow up calls that could include ongoing customer satisfaction with direct install measures, any action items from the property manager customer survey and to ask for referrals; and
- Follow up with property managers that have received common area recommendations using the script.

**Research Topic:**

*What are the main barriers to and motivation for adopting recommended common area measures?*

**Finding:** This question will be further addressed in future evaluation efforts.

**Research Topic:**

*Are the program’s marketing plan and program promotional materials aligned with program benefits? Do they clearly communicate program benefits?*

**Findings:** Navigant reviewed program materials supplied by the implementation contractor. Navigant reviewed the program’s operations manual, marketing plan and promotional materials and found that the materials are aligned with program benefits. The program materials clearly communicate the program’s benefits. Navigant found that program activities were generally consistent with the program’s operations plan and marketing approach.

**Recommendation:**

- After reviewing program opportunities to increase participation rates and measure saturation, update program materials to reflect the highest priority opportunities.

**Research Topic:**

*Is the program effectively coordinating with ComEd for electric measures and reporting?*

**Findings:** Overall, it appears that the parties responsible for jointly implementing the program continues to implement an effective process for coordination and reporting, primarily through regular coordination conference calls and frequent communication. The utility program staff and implementation contractors communicated frequently throughout the plan year, sharing ideas and experience to help enable this program’s ultimate success. The implementation contractor provided weekly activity updates to ComEd and other parties. Water efficiency measures installed at dwelling units with electric water heating were tracked separately by the implementation contractor and included in weekly activity updates submitted to ComEd.

At the end of the program year, the program tracking system had missing and/or misnamed data. However, the implementation contractor worked closely with the utilities and evaluators to identify the missing data and reconcile the program tracking systems once these issues were discovered.

**Recommendation:**

- As feasible, the program should consider adding fields, programming or other data points to streamline data transfer from the tracking system and facilitate program data review.

**Research Topic:**

*Is information collected in the common area assessment sufficient to enable ComEd’s implementation contractors to follow up with common area lighting recommendations?*

**Findings:** The program reported that it conducted 31 common area lighting surveys for ComEd. Navigant did not find examples of a customer implementing common area lighting retrofits in the program tracking database.

**Recommendations:**

- Follow up with property managers that have received common area lighting recommendations;
- Place a greater emphasis on completing common area lighting assessments;
- Track common area referrals to other programs and participation rates from referrals and add a data point in the program tracking system;
- Target common area lighting and energy efficiency opportunities through increased communication and/or co-marketing with other energy efficiency programs;
- Develop a script for follow up calls that could include ongoing customer satisfaction with direct install measures, any action items from the property manager customer survey and to ask for referrals; and
- Follow up with property managers that have received common area lighting surveys using the script.

**Research Topic:**

*Are customers satisfied with participation in the program and customer service experiences?*

**Finding:** Overall, participants appear to be very satisfied with the program. Navigant’s analysis indicated that 84 percent of tenants responded that they were satisfied or very satisfied with the program. Decision-makers were also satisfied with the program, with 90 percent of respondents indicating that they were satisfied or very satisfied with the program’s direct install measures and 95 percent indicating that they were satisfied or very satisfied with the program’s field team. When asked about common area recommendations and reporting, decision-makers indicated less satisfaction with the overall program (70 percent) or the summary report provided by the program. Almost half (45 percent) of those participants surveyed did not know if they received recommendations for energy efficiency improvements in common areas or central plants. Of those who recalled receiving recommendations for energy efficiency improvements in common areas or central plants, only 55 percent indicated that they were satisfied with the report. However, the program reported that the main emphasis was implementing direct install activity, with a secondary priority on common area or central plant surveys and recommendations.

**Recommendation:**

- Participant responses to the decision-maker survey would indicate potential opportunities for the program to increase customer satisfaction through placing a greater emphasis on common area or central plant assessments and follow up recommendations to decision-makers.

**Research Topic:**

*Are customer surveys completed and reviewed by the program?*

**Findings:** The program distributed 8,274 tenant surveys to residents and received 455 in return, achieving a response rate of 5.5 percent. The target customer survey return rate is 10 percent. The program also received 293 legacy surveys (e.g. surveys distributed to previous program year participants.) The program’s customer satisfaction survey includes six statements, four of which ask for tenant feedback about the field technicians and one survey question asks tenants about “installed items.” The other question asks about overall program satisfaction. The average customer satisfaction score from

the customer surveys was 4.9 on a scale of 5.0, indicating high levels of customer satisfaction and exceeding the program planning target of 4.5 on a scale of 5.0.

**Recommendations:**

- The program should consider revising its tenant customer satisfaction survey to include more questions about customer satisfaction with direct install measures;
- The program should place a greater emphasis on encouraging tenants to return their implementation contractor customer satisfaction surveys; and
- The program should consider sending program customer satisfaction surveys to an independent third-party for collection and review to avoid potential bias or the appearance of potential bias in having the implementation contractor collect and report customer feedback.

**Finding:** The program mailed 174 property manager customer satisfaction surveys and received 45 in return for a response rate of 26 percent. The average customer satisfaction score from the property manager surveys was 4.7 on a scale of 5.0, indicating high levels of customer satisfaction.

**Recommendations:**

- Navigant recommends including additional emphasis to property managers to return their program customer surveys;
- Navigant recommends that the program consider following up with property managers that have received program customer satisfaction surveys about returning the surveys to the program. These touch points could also include brief questions about common area energy efficiency opportunities, reports of ongoing customer satisfaction and to ask for referrals; and
- The program should consider sending program customer satisfaction surveys to an independent third-party, such as Navigant or another third-party, for collection and review to avoid bias or the potential appearance of bias by having the implementation contractor collect and report customer feedback.

**Finding:** Navigant observed some participant responses in the implementation contractor tenant survey with ratings of three or lower without accompanying documentation on how, if at all, these complaints were reviewed and/or resolved by the implementation contractor.

**Recommendation:**

- The program should consider reviewing its customer complaint resolution process to ensure it is documenting responses by the implementation contractor to tenant and/or property manager surveys that require a response.

## 5. Appendix

### 5.1 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 5-1 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 5-1. 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<sup>D</sup>, HOU-Residential<sup>D</sup>).

**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<sup>E</sup>, HOU-Residential<sup>E</sup>).

**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<sup>DV</sup> (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<sup>AV</sup>

## Glossary Incorporated From the TRM

Below is the full Glossary section from the TRM Policy Document as of October 31, 2012<sup>44</sup>.

**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.

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<sup>44</sup> IL-TRM\_Policy\_Document\_10-31-12\_Final.docx

**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.

## 5.2 Detailed Impact Results

This section includes Navigant’s research report for non-deemed measures and program-level savings. For GPY1/EPY4, natural gas direct install measure savings were deemed. Subsection 5.2.1 includes Navigant’s methodology and references for non-deemed electric measures. The following subsection, Subsection 5.2.2 includes detailed Net-to-Gross calculations.

### 5.2.1 Research Report of Non-Deemed Electric Measures and Program-Level Savings

Navigant’s evaluation research was designed to review impacts for non-deemed electric measures using Illinois TRM algorithms and assumptions and from evaluation research conducted for this assignment, including survey self-report data from participants. Research findings for non-deemed electric measures are included in this sub-section.

#### Evaluation Research Gross Savings Algorithms

Navigant calculated research findings using Illinois TRM algorithms and assumptions for non-deemed measures presented in this section.

#### Evaluation Research Gross Savings Algorithm –Water Efficient Faucet Aerators

Navigant recommends using the algorithm<sup>45</sup> presented in Figure 5-1 to calculate gross savings for water efficient faucet aerators.

**Figure 5-1. TRM Gross Savings Algorithm – Water Efficient Faucet Aerators**

$$\begin{aligned} \Delta kWh &= \%ElectricDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) \\ &* Household * 365.25 * DF / FPH) * EPG\_electric * ISR \\ &= 125.1 kWh (kitchen) \qquad = 100.1 kWh (bathroom) \end{aligned}$$

#### Where:

- %ElectricDHW = Water heating supplied by electric resistance heating = 100%
- GPM\_base = Average flow rate, in gallons per minute, of the baseline faucet “as-used”= 1.2
- GPM\_low = Average flow rate, in gallons per minute, of the low-flow faucet aerator “as-used”= 0.94
- L\_base = Average baseline length faucet use per capita for all faucets in minutes
- = 9.85 min/person/day
- L\_low = Average retrofit length faucet use per capita for all faucets in minutes
- = 9.85 min/person/day
- Household = Average number of people per household = 2.1
- 365.25 = Days in a year, on average
- DF = Drain Factor (Kitchen = 75%) (Bath = 90%)
- FPH = Faucets Per Household = (Kitchen = 1) (Bath = 1.5)
- EPG\_electric = Energy per gallon of water used by faucet supplied by electric water heater = 0.0894 kWh/gal
- ISR = In service rate of faucet aerators = 0.95

<sup>45</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4

Navigant recommends using the algorithm<sup>46</sup> presented in Figure 5-2 to calculate gross demand reduction for water efficient faucet aerators.

**Figure 5-2. TRM Summer Coincident Peak Demand Savings - Water Efficient Faucet Aerators**

$$\Delta kW = \Delta kWh/Hours * CF$$

$$= 0.017 \text{ kW (kitchen)} \qquad = 0.014 \text{ kW (bathroom)}$$

**Where:**

- $\Delta kWh$  = calculated value
- Hours = Annual electric DHW recovery hours for faucet use =  $((GPM\_base * L\_base) * Household * 365.25 * DF) * 0.545 / GPH = 162$
- GPH = Gallons per hour recovery of electric water heater calculated for 65.9F temp rise (120-54.1), 98% recovery efficiency, and typical 4.5kW electric resistance storage tank = 27.51
- CF = Coincidence Factor for electric load reduction = 0.022

Navigant recommends using the algorithm<sup>47</sup> presented in Figure 5-3 to calculate gallons saved for water efficient faucet aerators.

**Figure 5-3. TRM Gallons Saved – Water Efficient Faucet Aerators**

$$\Delta gallons = ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * SPCD * 365.25 / SPH) * ISR$$

$$= 1,399.6 \text{ gallons saved (kitchen)} \qquad = 1,119.7 \text{ gallons saved (bathroom)}$$

**Where:**

- Inputs described above

**Evaluation Research Gross Savings Algorithm –Water Efficient Showerheads**

Navigant recommends using the algorithm<sup>48</sup> presented in Figure 5-4 to calculate gross savings for water efficient showerheads.

**Figure 5-4. TRM Gross Savings Algorithm – Water Efficient Showerheads**

$$\Delta kWh = \%ElectricDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * SPCD * 365.25 / SPH) * EPG\_electric * ISR$$

$$= 528.4 \text{ kWh}$$

**Where:**

- %ElectricDHW = Water heating supplied by electric resistance heating = 100%
- GPM\_base = Average flow rate, in gallons per minute, of the baseline showerhead = 2.67
- GPM\_low = Average flow rate, in gallons per minute, of the low-flow showerhead, as used = 1.5
- L\_base = Shower length in minutes with baseline showerhead = 8.2

<sup>46</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4

<sup>47</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4

<sup>48</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.5

- L\_low = Shower length in minutes with low-flow showerhead = 8.2
- Household = Average number of people per household = 2.1
- SPCD = Showers Per Capita Per Day = 0.75
- 365.25 = Days per year, on average
- SPH = Showerheads Per Household = 1.3
- EPG\_electric = Energy per gallon of water used by faucet supplied by electric water heater = 0.127 kWh/gal
- ISR = In service rate of showerhead = 0.98

Navigant recommends using the algorithm<sup>49</sup> presented in Figure 5-5 to calculate gross demand reduction for water efficient showerheads.

**Figure 5-5. TRM Summer Coincident Peak Demand Savings - Water Efficient Showerheads**

$$\Delta kW = \Delta kWh/Hours * CF$$

$$= 0.041 kW$$

**Where:**

- $\Delta kWh$  = calculated value
- Hours = Annual electric DHW recovery hours for showerhead use =  $((GPM\_base * L\_base) * Household * SPCD * 365.25) * 0.773 / GPH = 354$
- GPH = Gallons per hour recovery of electric water heater calculated for 65.9°F temp rise (120-54.1), 98% recovery efficiency, and typical 4.5kW electric resistance storage tank = 27.51
- CF = Coincidence Factor for electric load reduction = 0.0278

Navigant recommends using the algorithm<sup>50</sup> presented in Figure 5-6 to calculate gallons saved for water efficient showerheads.

**Figure 5-6. TRM Gallons Saved – Water Efficient Showerheads**

$$\Delta gallons = ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * SPCD * 365.25 / SPH) * ISR$$

$$= 4,160.6 \text{ gallons}$$

**Where:**

- Inputs described above

**Research Report Program-Level Electric Savings**

Table 5-2 and Table 5-3 below summarize evaluation research measure values for ComEd EPY4 electric measures. Navigant applied TRM methodology to calculate unit savings values based on algorithms and inputs presented above. Navigant applied in-service rates found in the TRM. Navigant applied measure-level NTG ratios based on evaluation survey self-report data to calculate research findings net savings. The evaluation research findings NTGR relative precision at a 90% confidence interval (two-tailed) was  $\pm 3.9\%$ .

<sup>49</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.5

<sup>50</sup> State of Illinois Energy Efficiency Technical Reference Manual, 7.4.5

**Table 5-2. Evaluation Research Findings – ComEd EPY4 Electric Measures (Energy)**

Measure	Unit	Research Findings Unit Savings (kWh)	Verified Units Installed	Research Findings Gross Savings (kWh)	Research Findings NTG Ratio	Research Findings Net Savings (kWh)
9W CFL	lamp	29.1	59,740	1,738,434	0.98	1,703,665
14W CFL	lamp	43.2	164,459	7,104,629	0.98	6,962,536
19W CFL	lamp	52.5	25,876	1,358,490	0.98	1,331,320
23W CFL	lamp	72.2	1,566	113,065	0.98	110,804
<i>sub-total CFL measures</i>	<i>n/a</i>	<i>n/a</i>	<i>251,641</i>	<i>10,314,618</i>	<i>0.98</i>	<i>10,108,326</i>
Showerhead	measure	528.4	2,444	1,291,410	0.92	1,188,097
Kitchen Aerator	measure	125.1	2,535	317,129	1.00	317,129
Bathroom Aerator	measure	100.1	2,615	261,762	0.94	246,056
<i>sub-total water measures</i>	<i>n/a</i>	<i>n/a</i>	<i>7,594</i>	<i>1,870,300</i>	<i>0.94</i>	<i>1,751,282</i>
<b>Total</b>	<i>n/a</i>	<b>n/a</b>	<b>259,235</b>	<b>12,184,918</b>	<b>0.97</b>	<b>11,859,608</b>

Source: Navigant analysis of evaluation survey self-report data, Illinois TRM  
 ComEd NTGR relative precision at a 90% confidence interval (two-tailed) was  $\pm 3.9\%$

**Table 5-3. Evaluation Research Findings – ComEd EPY4 Electric Measures (Demand)**

Measure	Unit	Research Findings Unit Savings (kW)	Verified Units Installed	Research Findings Gross Savings (kW)	Research Findings NTG Ratio	Research Findings Net Savings (kW)
9W CFL	lamp	.0031	59,740	182	0.98	179
14W CFL	lamp	.0045	164,459	745	0.98	730
19W CFL	lamp	.0055	25,876	143	0.98	140
23W CFL	lamp	.0076	1,566	12	0.98	12
<i>sub-total CFL measures</i>	<i>n/a</i>	<i>n/a</i>	<i>251,641</i>	<i>1,082</i>	<i>0.98</i>	<i>1,061</i>
Showerhead	measure	0.041	2,444	100	0.92	92
Kitchen Aerator	measure	0.017	2,535	43	1.00	43
Bathroom Aerator	measure	0.014	2,615	37	0.94	35
<i>sub-total water measures</i>	<i>n/a</i>	<i>n/a</i>	<i>7,594</i>	<i>180</i>	<i>0.94</i>	<i>169</i>
<b>Total</b>	<i>n/a</i>	<b>n/a</b>	<b>259,235</b>	<b>1,262</b>	<b>0.97</b>	<b>1,230</b>

Source: Navigant analysis of evaluation survey self-report data, Illinois TRM  
ComEd NTGR relative precision at a 90% confidence interval (two-tailed) was ± 3.9%

## 5.2.2 Research Report Natural Gas Savings

### Evaluation Research In-Service Rates Compared to TRM In-Service Rates

Navigant calculated measure in-service rates from participating tenant survey self-report data. Tenant data is similar to reported in-service rates found in the Illinois TRM (7.4.4 for aerators and 7.4.5 for showerheads). Table 5-6 below compares TRM and GPY1/EPY4 evaluation research in-service rates by each water efficiency measure.

**Table 5-4. Illinois TRM and Research Findings In-Service Rates**

Measure Type	TRM In-Service Rate	Source	Research Findings In-Service Rate	Method
1.5 gpm Kitchen Aerator	0.95	TRM 7.4.4	0.95	Navigant analysis of tenant participant survey self-report data
1.0 gpm Bathroom Aerator	0.95		0.95	
1.5 gpm Showerhead	0.98	TRM 7.4.5	0.95	

Source: Navigant research of participating tenant self-report data, Illinois TRM

### 5.2.3 Detailed NTG Calculations

#### Basic Rigor Free-Ridership Assessment

Free ridership cannot be measured directly due to the lack of empirical data regarding the counter-factual situation (i.e., what would have occurred in the hypothetical, “no program” alternate reality). 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.

Free ridership was assessed using a participating decision-maker self-report approach following a framework that was developed for evaluating net savings of California’s 2006-2008 non-residential energy efficiency programs. This method calculates free-ridership using data collected during participant telephone interviews concerning three items:

- A **Timing and Selection** score that reflects the influence of the most important of various program and program-related elements in the customer’s decision to select the specific program measure at this time.
- A **Program Influence** score that captures the perceived importance of the program (whether rebate, recommendation, or other program intervention) relative to non-program factors in the decision to implement the specific measure that was eventually adopted or installed. This score is cut in half if the participant learned about the program after having already decided to implement the measures.
- A **No-Program** score that captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available. This score accounts for deferred free ridership by incorporating the likelihood that the customer would have installed program-qualifying measures at a later date if the program had not been available.

Each of these scores represents the highest response or the average of several responses given to one or more questions about the decision to install a program measure. The rationale for using the maximum value is to capture the most important element in the participant’s decision making.

More specifically, for each measure, the following questions are posed to each decision-maker:

- FR1. At the time that the participant first heard about this program, had they already been thinking about purchasing the measure?
- FR4. Did the participant have specific plans to install the measure before learning about the program?<sup>51</sup>
- FR5/6. Did the program influence the participant to install the measures sooner than they otherwise would have, and if so, how much sooner?
- FR9. How likely was the participant to install the measure if they had not installed it through the program? (0-10 scale probability)
- FR10. How important was the program in the decision to install the measure? (0-10 scale)
- FR11. Would the participant have installed the same measure within a year of when they did if the program didn’t exist? (0-10 scale probability)

The free ridership data were assembled into a probability score in a step-by-step fashion, applying the following algorithm:

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<sup>51</sup> Questions FR2 and FR3 do not factor directly into the free ridership scoring, but are used to improve the accuracy of the response to question FR4 by asking the respondent to recall specific steps they may have taken toward implementing the measure prior to learning about the program.

1. If the customer had not considered the measure prior to participating in the program then the probability of free ridership is estimated to be zero (based on FR1 above).
2. Similarly, if the customer did not have specific plans to install the program measure prior to participation, and the self-reported probability of installing the measure was less than or equal to 3 (on a 0-10 scale) then the probability of free ridership is estimated to be zero (based on FR4 and FR9).
3. If the customer had plans to install the measures in the absence of the program, but indicated that the program accelerated installation by at least two years, then the probability of free ridership is estimated to be zero (based on FR6).

If none of the above 3 criteria holds, then the responses to questions FR9, FR10, and FR11 are used to calculate the probability of free ridership. The programs are primarily direct install programs, where the customer demonstrates very little initiative to install the measures, as the actual purchase and install activities were performed by program staff. For this reason, participant self-reported intentions to install these measures [FR9 and FR11] even without the program are discounted relative to the self-reported importance of the program to the installation [FR10], at a rate of 2 to 1. The corresponding formula for calculating free ridership is shown in Figure 5-7 below:

**Figure 5-7. Self-Report Free Ridership Algorithm**

$$\text{Free ridership} = [(FR9 + FR11)/2 * (1/3)] + (FR10) * (2/3)$$

A measure count weight is applied in calculating the overall result for free ridership.<sup>52</sup> Free ridership estimates were developed separately for each measure type installed.

The approach described above is largely consistent with the approach applied in the EPY3 Evaluation. There was one new adjustment made to this approach for EPY4, which was the addition of rule #3 above, in which free ridership was estimated to be zero if the participant indicated that the program accelerated their installation of the measure by more than two years.

**Participant Spillover**

Navigant included questions to identify spillover candidates, paraphrased below:

1. Since your participation in the MFHES program, did you implement any ADDITIONAL energy efficiency measures at this facility or at your other facilities within your utility’s service territory that did NOT receive incentives through any utility or government program?
2. On a scale of 0-10, where 0 means “no influence” and 10 means “greatly influenced,” how much did your experience with the MFHES program influence your decision to install high efficiency equipment on your own?
3. Why do you give the MFHES program this influence rating?

If the response to question 2 was given a score of 7 or higher, we judged the respondent to be a spillover candidate. Navigant asked additional questions of participant spillover candidates:

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<sup>52</sup> Each measure-level participant free ridership score is assigned a weight in accordance with the number of CFLs, showerheads, kitchen faucet aerators, or bathroom aerators installed in the home.

4. What was the first measure that you implemented?
  - a. Why did you purchase this equipment without the incentive available through the MFHES program?
5. What was the second measure that you implemented?
  - a. Why did you purchase this equipment without the incentive available through the MFHES program?

Navigant conducted brief follow-up telephone interviews with one respondent who indicated that they may have purchased and installed qualifying energy saving equipment without an incentive. The interview did not result in any spillover. After speaking with this participant, they reported that they had actually received a rebate for their activity. The telephone interview guide is included below.

### **Multi-Family Home Energy Savings Program Participant Spillover Callback Interview Guide**

#### **INTRODUCTION**

Hello, this is (name) from Navigant Consulting calling on behalf of (ComEd and Nicor Gas)/(ComEd and Peoples Gas or North Shore Gas) Program. This is not a sales call. May I please speak with <PROGRAM CONTACT>?

I am following-up on a recent telephone interview by the Blackstone Group where you described your experience participating in the Multi-Family Home Energy Savings Program, where your tenants at one or more of your properties received water efficient showerheads, faucet aerators and CFLs at no cost to you.

During that interview, you indicated that the energy efficient <SPILLOVER MEASURE DESCRIPTION> you installed that did NOT receive a rebate through a utility program. You indicated in the survey that you would be willing to have a brief follow up call about this energy efficiency project. I just have a few quick questions about the equipment you installed that did not receive a rebate. Your answers will provide very important information that will help (ComEd and Nicor Gas)/(ComEd and Peoples Gas or North Shore Gas) with their programs. This survey will take only about 5 minutes. Is now a good time? [If no, schedule call-back]

Are you the person most knowledgeable about this project? [IF NOT, ASK TO BE TRANSFERRED TO MOST KNOWLEDGABLE PERSON OR RECORD NAME & NUMBER.

#### **SPILLOVER ESTIMATION QUESTIONS**

I would like to gather some basic information about the FIRST <SPILLOVER MEASURE DESCRIPTION> that did not receive a rebate.

- Please describe the equipment that you installed (Confirm measure type, efficiency)
- Can you tell me the size or quantity? (number of fixtures, tons of AC, etc.)
- Can you tell me the type of equipment that was previously installed (e.g. the equipment that was replaced by the new equipment)?

(If necessary) You also mentioned a SECOND measure that did not receive a rebate: <SECOND SPILLOVER MEASURE DESCRIPTION>. I have the same questions for you

- Please describe the equipment that you installed (Confirm measure type, efficiency)
- Can you tell me the size or quantity? (number of fixtures, tons of AC, etc.)
- Can you tell me the type of equipment that was previously installed (e.g. the equipment that was replaced by the new equipment)?

Those are all of the questions that I have. Thank you very much for your time.

**END OF CALL**

### Evaluation Research Net-to-Gross Ratios

Navigant calculated measure-level research findings NTGR using participating decision-maker survey self-report data. Navigant calculated separate free-ridership values for direct install measures separately for ComEd/Peoples Gas and North Shore Gas measures and ComEd/Nicor Gas measures. Navigant investigated reported spillover from survey data but found no quantifiable results. Subsequently, Navigant calculated a weighted average across both programs for ComEd measures. Table 5-5 below compares evaluation research NTGR by measure.

**Table 5-5. Research Findings Net to Gross Ratios**

Measure	Peoples Gas/North Shore Gas	Nicor Gas	ComEd (Weighted Average)
CFL measures (all)	0.98	0.97	0.98
1.5 gpm Showerhead	0.89	0.95	0.92
1.5 gpm Kitchen Aerator	0.94	0.95	1.00
1.0 gpm Bathroom Aerator	0.94	0.95	0.94
Programmable Thermostat	n/a	n/a	n/a
Water Heater Setback	n/a	n/a	n/a
Pipe Wrap Insulation	n/a	n/a	n/a
Relative Precision at 90% CI (two-tailed)	90/ ± 2.5	90/ ± 2.1	90/ ± 3.9

*Sources: Navigant research of decision-maker self-report data  
n/a = respondent sample size too small to determine NTGR*

### 5.3 TRM Recommendations

Navigant included the following TRM recommendations for consideration:

#### State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4 Low Flow Faucet Aerators

The State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4 (pp. 410-416), refers to the direct install measure as “low flow faucet aerator” (in the heading) or energy efficient faucet aerator (in the text).

- Navigant recommends using a consistent term for this measure, replacing the term “low flow faucet aerator” with “water efficient faucet aerator” or “efficient faucet aerator” and updating the heading and text accordingly.
- Definition of Baseline Equipment (page 410)  
 Navigant recommends revising the definition of baseline equipment to read “The baseline condition is assumed to be a standard bathroom faucet aerator rated at 2.2 GPM or greater, or a standard kitchen faucet aerator rated at 2.5 GPM or greater.”
- Footnote 700 (page 410)  
 Navigant recommends revising this comment to note that, due to variations in the calendar, there are *frequently, but not always*, 65 days in the summer peak period. For example, during 2013, there are 64 days during the summer peak period. The calculation  $(0.18 \cdot 65 / 365)$  should be revised to  $(0.18 \cdot 65 / 365.25)$ , to reflect average number of days in the calendar year. The TRM may want to include a notation that a summer peak period measurement may need to be adjusted as an average of several year or by actual calendar year, as warranted.
- This comment is repeated:  
 Footnote 720, pages 414/415;  
 Footnote 726, pages 417/418; and  
 Footnote 745, page 421.
- Algorithm (page 411-412)  
 Navigant recommends replacing the named parameters “GPM\_low” and “L\_low” with “GPM\_eff” and “L\_eff,” respectively.
- Footnote 710 (page 412)  
 Navigant recommends updating this reference to “Navigant, ComEd PY3 Multi-Family Home Energy Savings Program Evaluation Report Final, May 16, 2012.”
- In-Service Rates (page 414)  
 Navigant recommends distinguishing ISRs between multi-family and single family direct install activities.
- Footnote 723 (page 415)  
 Navigant recommends updating this comment to “Water heating in multi-family buildings is often provided by a central boiler, with typical efficiency factors ranging from 0.59 to 0.75. This analysis uses an average efficiency factor of 0.67 as a default value for multi-family buildings.”
- This comment is repeated:  
 Footnote 748, page 422

**State of Illinois Energy Efficiency Technical Reference Manual, 7.4.5 Low Flow Showerheads**

The State of Illinois Energy Efficiency Technical Reference Manual, 7.4.5 (pp. 417-423), refers to the direct install measure as “low flow showerhead” (in the heading), “low-flow showerhead” in the text definitions (see, e.g. page 419) and “energy efficient showerhead” (page 417).

- Navigant recommends using a consistent term for this measure, replacing the term “low flow showerhead” with “water efficient showerhead” or “efficient showerhead” and updating the heading and text accordingly.
- Algorithm (page 418-419)  
 Navigant recommends replacing the named parameters “GPM\_low” and “L\_low” with “GPM\_eff” and “L\_eff,” respectively.
- Footnote 728 (page 418)  
 Navigant recommends revising the comment to read “...Program targets showerheads rated at 2.5 GPM or greater.”
- Footnote 735 (page 419)  
 Navigant recommends updating this reference to “Navigant, ComEd PY3 Multi-Family Home Energy Savings Program Evaluation Report Final, May 16, 2012.”
- In-Service Rates (page 420-421)  
 Navigant recommends distinguishing ISRs between multi-family and single family direct install activities.

**Evaluation Research In-Service Rates Compared to TRM In-Service Rates**

Navigant calculated measure in-service rates from participating tenant survey self-report data. Tenant data is similar to reported in-service rates found in the Illinois TRM (7.4.4 for aerators and 7.4.5 for showerheads). Table 5-6 below compares TRM and GPY1/EPY4 evaluation research in-service rates by each water efficiency measure.

**Table 5-6. Illinois TRM and Research Findings In-Service Rates**

Measure Type	TRM In-Service Rate	Source	Research Findings In-Service Rate	Method
1.5 gpm Kitchen Aerator	0.95	TRM 7.4.4	0.95	Navigant analysis of tenant participant survey self-report data
1.0 gpm Bathroom Aerator	0.95		0.95	
1.5 gpm Showerhead	0.98	TRM 7.4.5	0.95	

*Source: Navigant research of participating tenant self-report data, Illinois TRM*

## 5.4 Sampling Details

### 5.4.1 Participating Tenant Survey Data

Navigant surveyed 81 randomly selected tenant households from the EPY4/GPY1 ComEd, Peoples Gas and North Shore Gas program and 80 randomly selected tenant households from the EPY4/GPY1 ComEd and Nicor Gas program. The combined total participant survey reached 161 participating tenant households. Tenant survey responses are included in this section.

#### Evaluation Research Findings: Tenant Occupancy

Navigant asked participants how many people live their household year-round to measure occupancy. Based on respondent self-report data, the average occupancy was 1.7 persons per household. Table 5-7 below shows tenant responses to Navigant’s survey question.

**Table 5-7. Participating Tenant Survey Responses (Occupancy)**

Q: How many people live in your household year round?	Peoples Gas/North Shore Gas (n=81)	Nicor Gas (n=80)	Total (n=161)
One Person	43	36	79
Two People	25	30	55
Three People	8	9	17
Four People	2	3	5
Five People	1	0	1
Don't Know	2	2	4
Average	1.6	1.7	1.7

Source: Navigant tenant participant survey self-report data

#### Evaluation Research Findings: Rent v. Own

Navigant asked participants whether they own or rent their home. Ninety-four percent of respondents reported that they rent their home. Table 5-8 below shows tenant responses to Navigant’s survey question.

**Table 5-8. Survey Self-Report Demographics (Rent v. Own)**

Q: Do you own or rent your home?	Peoples Gas/North Shore Gas (n=81)	Nicor Gas (n=80)	Total (n=161)
Rent	98%	90%	94%
Own	2%	9%	6%
Don't Know	0%	≤1%	≤1%

Source: Navigant tenant participant survey self-report data

Navigant asked participants whether they were residing at their home when the products were installed by the program. One-hundred percent of respondents reported that they were the residents of their

home during the time that the products were installed. Table 5-9 below shows tenant responses to Navigant’s survey question.

**Table 5-9. Survey Self-Report Demographics (Residence)**

Q: Were you residing at your home when the products were installed?	Peoples Gas/North Shore Gas (n=81)	Nicor Gas (n=80)	Total (n=161)
Yes	100%	100%	100%
No	0%	0%	0%

*Source: Navigant tenant participant survey self-report data*

Navigant asked participants whether they were present when the products were installed by the program. Overall, 76 percent of respondents reported that they were present when the products were installed. Table 5-10 below shows tenant responses to Navigant’s survey question.

**Table 5-10. Survey Self-Report Demographics (Presence)**

Q: Were you present when the products were installed?	Peoples Gas/North Shore Gas (n=81)	Nicor Gas (n=80)	Total (n=161)
Yes	64%	88%	76%
No	36%	11%	24%
Don’t Know	0%	≤1%	≤1%

*Source: Navigant tenant participant survey self-report data*

**Evaluation Research Findings: Tenant Survey Disposition**

In the ComEd/Peoples Gas and North Shore Gas survey, 58 percent of respondents reported that their home was serviced by natural gas. Of those participants who responded that their home was serviced by natural gas, 43 percent reported that their home was serviced by Peoples Gas and 15 percent by North Shore Gas. In this survey, 28% of respondents reported that their homes were not serviced by natural gas and 14% reported that they didn’t know or weren’t sure about the question.

In the ComEd/Nicor Gas survey, 59 percent reported that their home was serviced by natural gas, all of whom have Nicor Gas as their service provider. In this survey, 35% of respondents reported that their homes were not serviced by natural gas and 6% reported that they didn’t know or weren’t sure about the question.

Both survey samples included a relative large percentage of respondents indicating that their home was not serviced by natural gas. Navigant’s sample was drawn from program participation records, so it is unlikely that the percentage of respondents indicated below were reporting from all-electric properties, which are homes that qualify for the program but are not serviced by natural gas. Navigant will review

responses to this survey question for future evaluation efforts and clarify the question if necessary. Table 5-11 below shows tenant responses to Navigant’s survey question.

**Table 5-11. Survey Self-Report Responses by Utility**

Q: Is your home serviced by natural gas?	Peoples Gas/North Shore Gas (n=81)	Nicor Gas (n=80)	Total (n=161)
Nicor Gas	n/a	59%	29%
Peoples Gas	43%	n/a	22%
North Shore Gas	15%	n/a	7%
Yes (sub-total)	58%	59%	58%
No	28%	35%	32%
Don’t Know/Not Sure	14%	6%	10%

Source: Navigant tenant participant survey self-report data

#### 5.4.2 Research Findings: Direct Install Measure In-Service Rates

Navigant surveyed 81 randomly selected tenant households from the EPY4/GPY1 ComEd, Peoples Gas and North Shore Gas program and 80 randomly selected tenant households from the EPY4/GPY1 ComEd and Nicor Gas program. The combined total participant survey reached 161 participating tenant households. This section includes Navigant’s evaluation research findings for direct measure in-service rates. Direct install measures are installed by program field teams as part of the MFHES program’s direct install activities and therefore, installed measure counts reported by the program and verified by the evaluators are included in gross energy impacts. Measure in-service rates account for the removal of direct install measures by occupants for various reasons, including measure malfunction, customer dissatisfaction with measure performance, or other reasons. Navigant calculated research findings in-service rates from participating tenant survey self-report data. For water efficiency measures, Navigant found in-service rates similar to those found in the Illinois TRM. A small number of participants who received programmable thermostats and water temperature setback responded to surveys, therefore additional research may be necessary to more accurately gauge in-service rates for these measures. Navigant did not calculate evaluation research findings natural gas program savings because evaluation research findings in-service rates were the same or very similar to Illinois TRM in-service rates for water efficiency measures.

##### Water Efficient Faucet Aerators (Bathroom)

Navigant asked participants whether water efficient bathroom faucet aerators installed by the program were still installed in the original location(s). Of those participants who responded to the question, 95 percent indicated that their bathroom aerators were still installed in the original location(s). The respondent that did not have the bathroom aerator still installed stated that the aerator was faulty during installation so the technician did not install it at all and the original equipment remained installed. Table 5-12 below shows tenant responses to Navigant’s survey question.

**Table 5-12. Water Efficient Faucet Aerators (Bathroom) Self-Report In-Service Rate**

Q: Are the bathroom aerators still installed in the original location?	Peoples Gas/North Shore Gas (n=20)	Nicor Gas (n=72)	Total (n=92)	Illinois TRM
Yes	19	68	87	n/a
No	1	4	5	n/a
In-Service Rate	95%	94%	95%	95%

Source: Navigant tenant participant survey self-report data

**Water Efficient Faucet Aerators (Kitchen)**

Navigant asked participants whether water efficient kitchen faucet aerators installed by the program were still installed in the original location(s). Of those participants who responded to the question, 91 percent indicated that kitchen aerators were still installed in the original location(s). The respondents that removed their kitchen aerator indicated that they removed it and threw it away because they found it to work improperly. Table 5-13 below shows tenant responses to Navigant’s survey question.

**Table 5-13. Water Efficient Faucet Aerators (Kitchen) Self-Report In-Service Rate**

Q: Are the kitchen aerators still installed in the original location?	Peoples Gas/North Shore Gas (n=24)	Nicor Gas (n=63)	Total (n=87)	Illinois TRM
Yes	23	56	79	n/a
No	1	7	8	n/a
In-Service Rate	96%	89%	91%	95%

Source: Navigant tenant participant survey self-report data

**Water Efficient Showerheads**

Navigant asked participants whether water efficient showerheads installed by the program were still installed in the original location(s). Of those participants who responded to the question, 93 percent indicated that their showerheads were still installed in the original location(s). The respondents that removed their showerhead reported they put it in storage because they did not find the flow rate to be satisfactory. They reported that they replaced the water efficient showerhead with a less efficient model. Table 5-14 below shows tenant responses to Navigant’s survey question.

**Table 5-14. Water Efficient Showerheads Self-Report In-Service Rate**

Q: Are the showerheads still installed in the original location?	Peoples Gas/North Shore Gas (n=24)	Nicor Gas (n=65)	Total (n=89)	Illinois TRM
Yes	23	60	83	n/a
No	1	5	6	n/a
In-Service Rate	96%	92%	93%	98%

Source: Navigant tenant participant survey self-report data

### Programmable Thermostats

Navigant asked participants whether the settings are the same as when the programmable thermostats were originally installed. Only seven participants responded to the question. Since the survey sample was very small, additional research is necessary to investigate measure in-service rates.

### Water Heater Temperature Setback

Navigant asked participants whether the settings for water heater temperature setback installed by the program were still in place. One respondent reported that they received a water heater temperature setback and that the settings installed by the program were still in place. Navigant was unable to calculate a research findings in-service rate for this measure from self-report data. For purposes of the research report, Navigant used previous evaluation research to estimate that 100 percent of water heater temperature setback installed by the program were still in place, which is consistent with the Illinois TRM in-service rate.

### Hot Water Pipe Wrap Insulation

Navigant asked participants whether hot water pipe wrap insulation installed by the program was still installed in the original location(s). No respondents reported that they received hot water pipe wrap insulation. Navigant was unable to calculate a research findings in-service rate for this measure from self-report data. For purposes of the research report, Navigant used previous evaluation research to estimate that 100 percent of hot water pipe wrap insulation installed by the program was still installed in the original location(s), which is consistent with the Illinois TRM in-service rate.

### CFL Measures

Navigant asked participants whether CFL measures installed by the program were still installed in the original location(s). Of those participants who responded to the question, 92 percent indicated that their CFL measures were still installed in the original location(s). The remaining respondents removed their CFL measures. The ex-ante estimate used a 96 percent in-service rate. Table 5-15 below shows tenant responses to Navigant’s survey question.

**Table 5-15. CFL Measures Self-Report In-Service Rate**

Q: Are CFL measures still installed in the original location?	Peoples Gas/North Shore Gas (n=70)	Nicor Gas (n=65)	Total (n=135)
Yes	64	60	124
No	6	5	11
In-Service Rate	91%	92%	92%

Source: Navigant tenant participant survey self-report data

**Location of CFL Measure Installations**

Navigant asked participants where CFL measures were installed by the program. Respondents indicated that bathrooms and kitchens were the most frequent places where CFLs were installed. The living room, bedroom and hallway were places reported frequently by respondents. Other places reported were the dining room and closet. Remaining places, such as office, spare room, outside, attic, garage, basement, family room, laundry or “other” received responses from three percent of respondents. Table 5-16 below shows tenant responses to Navigant’s survey question.

**Table 5-16. CFL Measures Self-Report Locations**

Q: Where was/were CFL measures installed?	Peoples Gas/North Shore Gas (n=64)	Nicor Gas (n=65)	Total (n=129)
Bathroom	73%	59%	66%
Kitchen	41%	59%	50%
Living Room	27%	20%	23%
Bedroom	22%	26%	24%
Hallway	22%	29%	26%
Dining Room	11%	22%	16%
Closet	6%	8%	7%
All others	≤2%	5%	3%

Source: Navigant tenant participant survey self-report data

## 5.5 Electric Impact Results Itemized by Gas Utility Service Territory

This section includes verified electric impacts for the ComEd EPY4 Multi-Family Home Energy Savings Program, including CFL measures and electric water efficiency measures, itemized by electric measures installed in Peoples Gas and North Shore Gas service territories and in Nicor Gas service territory. Savings values in this section were calculated using gross measure values and verified measure counts.

### 5.5.1 ComEd EPY4 Electric Impact Results –Peoples Gas and North Shore Gas Service Territories

The ComEd, Peoples Gas and North Shore Gas program reported ex-ante gross energy savings of 4,616,791 kWh (4,617 MWh) and ex-ante gross demand reduction of 447 kW (0.4 MW). Navigant applied gross measure unit savings estimates and deemed realization rates to verified measure counts to calculate verified gross energy savings of 4,331,878 kWh (4,332 MWh) and verified gross demand reduction of 425 kW (0.4 MW). Navigant applied deemed NTG ratios to calculate verified net energy savings of 3,536,610 kWh (3,537 MWh) and verified net demand reduction of 345.27 kW (0.3 MW). Results are shown in Table 5-17 and Table 5-18 below.

**Table 5-17. ComEd EPY4 Ex-Ante<sup>53</sup> & Verified Electric Savings (Peoples Gas & North Shore Gas Service Territories)**

Measure	Ex-Ante Gross Savings (kWh)	Gross Realization Rate	Verified Gross Savings (kWh)	NTG Ratio	Verified Net Savings (kWh)
9W CFL	1,159,781	96.0%	1,113,389	0.81	901,845
14W CFL	2,700,907	96.0%	2,592,871	0.81	2,100,225
19W CFL	345,030	96.0%	331,229	0.81	268,295
23W CFL	65,413	96.0%	62,797	0.81	50,865
<i>sub-total CFL measures</i>	<i>4,271,131</i>	<i>96.0%</i>	<i>4,100,286</i>	<i>0.81</i>	<i>3,321,230</i>
Showerhead	214,413	67.0%	143,656	0.93	133,600
Kitchen Aerator	44,577	67.0%	29,867	0.93	27,776
Bathroom Aerator	86,670	67.0%	58,069	0.93	54,004
<i>sub-total water measures</i>	<i>345,660</i>	<i>67.0%</i>	<i>231,592</i>	<i>0.93</i>	<i>215,380</i>
<b>Total</b>	<b>4,616,791</b>	<b>93.8%</b>	<b>4,331,878</b>	<b>0.81</b>	<b>3,536,610</b>

Source: Navigant analysis of program tracking data; ComEd EPY4 deemed savings estimates

<sup>53</sup> In EPY4, gross realization rates and NTGR were deemed.

**Table 5-18. ComEd EPY4 Ex-Ante<sup>54</sup> & Verified Demand Savings (Peoples Gas & North Shore Gas Service Territories)**

Measure	Ex-Ante Gross Savings (kW)	Gross Realization Rate	Verified Gross Savings (kW)	NTG Ratio	Verified Net Savings (kW)
9W CFL	116	96.0%	111	0.81	90
14W CFL	275	96.0%	264	0.81	214
19W CFL	35	96.0%	33	0.81	27
23W CFL	7	96.0%	6	0.81	5
<i>sub-total CFL measures</i>	433	96.0%	414	0.81	336
Showerhead	5	67.0%	4	0.93	3
Kitchen Aerator	5	67.0%	4	0.93	4
Bathroom Aerator	4	67.0%	3	0.93	3
<i>sub-total water measures</i>	14	67.0%	11	0.93	9
<b>Total</b>	<b>447</b>	<b>95.1%</b>	<b>425</b>	<b>0.81</b>	<b>345</b>

Source: Navigant analysis of program tracking data; ComEd EPY4 deemed savings estimates

Navigant verified a total of 109,854 CFLs installed by the ComEd, Peoples Gas and North Shore Gas program during EPY4/GPY1 as shown in Table 5-19.

**Table 5-19. ComEd EPY4 CFL Gross Impact Parameter Estimates (Peoples Gas & North Shore Gas Service Territories)**

Measure	Unit	Unit Savings (kWh)	Unit Savings (kW)	Verified Measures Installed
9W CFL	lamp	29.1	.0029	39,855
14W CFL	lamp	43.2	.0044	62,521
19W CFL	lamp	52.5	.0053	6,572
23W CFL	lamp	72.2	.0073	906
<b>Total</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>109,854</b>

Source: Navigant analysis of ComEd program tracking data (September 25, 2012 data extract)

Navigant verified a total of 1,148 electric water efficiency measures (e.g. water efficiency measures installed in residential dwelling units with electric water heating) in 413 residential dwelling units as shown in Table 5-20. Electric water savings measures are shown by residence.

<sup>54</sup> In EPY4, gross realization rates and NTGR were deemed.

**Table 5-20. ComEd EPY4 Water Efficiency Measures Gross Impact Parameter Estimates (Peoples Gas & North Shore Gas Service Territories)**

Measure	Unit n = 413	Unit Savings (kWh)	Unit Savings (kW)	Verified Measures Installed
1.5 gpm Showerhead	residence	592.3	.0150	457
1.5 gpm Kitchen Aerator	residence	117.0	.0120	382
1.0 gpm Bathroom Aerator	residence	214.0	.0120	534
<b>Total</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>1,148</b>

Source: Navigant analysis of ComEd program tracking data (September 25, 2012 data extract)

### 5.5.2 ComEd EPY4 Electric Impact Results – Nicor Gas Service Territory

The ComEd EPY4/Nicor Gas GPY1 Multi-Family Home Energy Savings Program reported ex-ante gross energy savings of 8,001,614 kWh (8,002 MWh) and gross demand savings of 697 kW (0.7 MW). Navigant applied gross measure savings estimates and deemed realization rates to verified measure counts to calculate verified gross savings of 7,113,693 kWh (7,114 MWh) and 645 kW (0.6 MW). Navigant used deemed NTG ratios to calculate verified net savings of 5,919,523 kWh (5,920 MWh) and 529 kW (0.5 MW). Electric water savings measures are shown by residence. Unit savings, measure counts and gross savings estimates are included in Table 5-21 and Table 5-22 below.

**Table 5-21. ComEd EPY4 Ex-Ante<sup>55</sup> & Verified Electric Savings (Nicor Gas Service Territory)**

Measure	Ex-Ante Gross Savings (kWh)	Gross Realizat ion Rate	Verified Gross Savings (kWh)	NTG Ratio	Verified Net Savings (kWh)
9W CFL	578,654	96.0%	555,507	0.81	449,961
14W CFL	4,403,722	96.0%	4,227,573	0.81	3,424,334
19W CFL	1,013,460	96.0%	972,922	0.81	788,066
23W CFL	47,652	96.0%	45,746	0.81	37,054
<i>sub-total CFL measures</i>	<i>6,043,487</i>	<i>96.0%</i>	<i>5,801,748</i>	<i>0.81</i>	<i>4,699,415</i>
Showerhead	1,233,169	67.0%	826,223	0.93	768,387
Kitchen Aerator	252,018	67.0%	168,852	0.93	157,032
Bathroom Aerator	472,940	67.0%	316,870	0.93	294,689
<i>sub-total water measures</i>	<i>1,958,127</i>	<i>67.0%</i>	<i>1,311,945</i>	<i>0.93</i>	<i>1,220,108</i>
<b>Total</b>	<b>8,001,614</b>	<b>88.9%</b>	<b>7,113,693</b>	<b>0.83</b>	<b>5,919,523</b>

Source: Navigant analysis of ComEd program tracking data (September 25, 2012 data extract)

<sup>55</sup> In EPY4, gross realization rates and NTGR were deemed.

**Table 5-22. ComEd EPY4 Ex-Ante<sup>56</sup> & Verified Demand Savings (Nicor Gas Service Territory)**

Measure	Ex-Ante Gross Savings (kW)	Gross Realization Rate	Evaluation Verified Savings (kW)	NTG Ratio	Verified Net Savings (kW)
9W CFL	58	96.0%	55	0.81	45
14W CFL	449	96.0%	431	0.81	349
19W CFL	102	96.0%	98	0.81	80
23W CFL	5	96.0%	5	0.81	4
<i>sub-total CFL measures</i>	<i>613</i>	<i>96.0%</i>	<i>589</i>	<i>0.81</i>	<i>477</i>
Showerhead	31	67.0%	21	0.93	19
Kitchen Aerator	26	67.0%	17	0.93	16
Bathroom Aerator	27	67.0%	18	0.93	17
<i>sub-total water measures</i>	<i>84</i>	<i>67.0%</i>	<i>56</i>	<i>0.93</i>	<i>52</i>
<b>Total</b>	<b>697</b>	<b>92.5%</b>	<b>645</b>	<b>0.81</b>	<b>529</b>

Source: Navigant analysis of ComEd program tracking data (September 25, 2012 data extract)

Navigant verified a total of 141,787 CFLs installed by the ComEd/Nicor Gas program during EPY4/GPY1 as shown in Table 5-23 below.

**Table 5-23. ComEd EPY4 CFLs Gross Impact Parameter Estimates (Nicor Gas Service Territory)**

Measure	Unit	Unit Savings (kWh)	Unit Savings (kW)	Verified Measures Installed
9W CFL	lamp	29.1	.0029	19,885
14W CFL	lamp	43.2	.0044	101,938
19W CFL	lamp	52.5	.0053	19,304
23W CFL	lamp	72.2	.0073	660
<b>Total</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>141,787</b>

Source: Navigant analysis of ComEd program tracking data (September 25, 2012 data extract)

Navigant verified a total of 1,148 electric water efficiency measures (e.g. water efficiency measures installed in residential dwelling units with electric water heating) in 2,297 residential dwelling units as shown in Table 5-24 below. Electric water savings measures are shown by residence.

<sup>56</sup> In EPY4, gross realization rates and NTGR were deemed.

**Table 5-24. ComEd EPY4 Water Efficiency Measure Gross Impact Parameter Estimates (Nicor Gas Service Territory)**

Measure	Unit n = 2,297	Unit Savings (kWh)	Unit Savings (kW)	Verified Measures Installed
Showerhead	residence	592.3	.0150	2,082
Kitchen Aerator	residence	117.0	.0120	2,154
Bathroom Aerator	residence	214.0	.0120	2,210
<b>Total</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>6,446</b>

*Source: Navigant analysis of ComEd program tracking data (September 25, 2012 data extract)*

## 5.6 *Verification, Due Diligence and Tracking System Review Memo (final)*

TO: James Jerozal, Dan Rourke; Nicor Gas  
Julie Hollensbe, David Nichols, Commonwealth Edison Company

CC: David Brightwell, Jennifer Hinman, Illinois Commerce Commission Staff  
Scott Dimetrosky, Apex Analytics LLC  
Randy Gunn, Julianne Meurice, Laura Agapay, Navigant

FR: Josh Arnold and Charles Among, Navigant

DA: August 9, 2012 (revised November 2, 2012; updated January 24, 2013)

RE: **Nicor Gas GPY1 & ComEd EPY4 Multi-Family Home Energy Savings Program**

### **Introduction**

The purpose of this document is to provide findings and recommendations of Navigant’s Verification, Due Diligence and Tracking System Review of the Nicor Gas Program Year One (PY1) Multi-Family Home Energy Savings Program (Multi-Family program). In PY1, the Multi-Family program was jointly implemented with Commonwealth Edison Company (ComEd). In PY1, Wisconsin Energy Conservation Corporation (WECC) was the program administrator and Honeywell Smart Grid Solutions was the program’s implementation contractor.

The primary purpose of this task was to determine:

- Whether project eligibility criteria have been properly adhered to and backed with supporting documentation;
- Whether savings were calculated correctly and project information entered in an accurate and timely manner in the program tracking system;
- If key quality assurance and verification activities were adequately implemented; and
- If any quality assurance and verification activities may be streamlined or simplified.

### **Overview of Findings**

#### *Verification and Due Diligence*

As Navigant indicated in our previous review of this program, the Multi-Family program’s quality assurance and verification procedures continue to provide a detailed quality control framework that meets many aspects of national best practices for multi-family programs. The program’s tracking system generally captures the requisite information necessary to accurately and completely track the program’s actions. The program’s Operations Manual includes guidelines for property eligibility, site assessment, CFL installation, pre- and post-installation inspections and water flow rate testing, and customer (property manager and tenants) satisfaction surveys that generally meet or exceed expected quality assurance safeguards. Navigant reviewed the Multi-Family program’s Operating Manual and other relevant program documents. The Operating Manual includes policies and procedures that meet or exceed minimum standards set forth in the program’s scope of work. The program is complying with the

policies and procedures set forth in the Operating Manual, including criteria for project eligibility and collecting supporting documentation for projects.

The program's quality assurance and verification activities appear to be functioning adequately and do not appear to require streamlining or simplification at this time. The program makes ongoing incremental improvements in its operating procedures based on experience gained from the field in collaboration with ComEd staff and the Nicor Gas program administrator.

#### *Reporting and Tracking*

Navigant reviewed the PY1 program tracking database in its entirety. Additionally, Navigant reviewed documentation for six properties that received installations during the week ending March 10, 2012. This documentation included scanned copies of hand-written documentation such as individual building installation tally sheets, measure water flow rate testing sheets, installation notes from the field technicians as well as documentation of QA/QC steps taken during installation. Navigant thoroughly reviewed the project documentation and compared corresponding entries in the program tracking database for accuracy and completeness and found no significant errors or problems with the program's reporting or tracking systems.

The program's tracking system uses spreadsheets to provide accurate and timely reports using program deemed savings values to report program savings. Although the tracking system includes sufficient information to track program performance, the program could improve its tracking system through adding data fields.

#### **Summary of Recommendations**

Navigant's summary recommendations are included in this section.

#### *Verification and Due Diligence*

Navigant recommends the following program verification and due diligence procedural changes:

- The program reports that a barrier to participation is a lack of choices among direct install measures, specifically water efficient showerheads and CFLs. The Multi-Family program successfully introduced Globe-Shaped CFLs during PY1, in part to address this barrier. Navigant would recommend investigating different finishes for water efficient showerheads and additional shapes for CFLs to provide additional cost-effective choices for direct install measures.
- The program should consider including additional guidelines in the Operations Manual for specific conditions about when the program should conduct post-installation inspections. Consider hiring an independent third-party to conduct post-installation inspections.
- Navigant recommends including information in program enrollment forms that notifies property managers/decision makers and participating tenants that they may be contacted by an independent third-party evaluator to verify installation and answer questions about their participation experience. Contact by the third-party evaluator could include email, telephone or site visits.

- Navigant recommends considering translating program marketing materials into additional languages when used for purposes of notifying tenants of upcoming direct installation activity at their home.

### *Reporting and Tracking*

Navigant recommends that the Multi-Family Home Energy Savings program consider the following items based on our review of the program’s operating procedures and tracking system.

- Based on the program’s Sales Funnel Report a report generated to highlight projects not yet scheduled for direct installation activity, it appears that the pipeline of potential participants remains strong. Navigant recommends using the Sales Funnel Report to track the length of time properties remain in the pipeline and take steps as needed to reduce the wait if it becomes a barrier to participation.
- Navigant recommends that the program consider merging its Sales Funnel Report with the program’s tracking system. Combining the two reports could give the program staff a clearer indication about the time required from first contact to direct install or the ability to track other participation milestones. If not done so already, consider including the Sales Funnel Report as part of the program’s weekly reporting to Nicor Gas and ComEd.
- In PY1, the program reported that 2,300 units (nine percent of total units installed in PY1) were “unavailable” during direct install activity. Currently, the program tracking system does not provide a reason for why the program was not able to install measures in a given unit. The program should consider including additional definitions or codes for the term “units unavailable” during a direct installation activity, as unavailable units represent a significant opportunity cost to the program. Including additional clarification about why the units were “unavailable” during the direct installation activity through the use of short codes could provide the program with greater insight into how to potentially reduce the number of unavailable units in properties selected for direct installation during the application or pre-installation inspections phases.
- Navigant recommends that the program include guidelines for common area customer referrals and a process for accessing reports from Common Area Assessments/Central Plant Surveys. A simple tracking tool (such as an Excel spreadsheet) could be developed to track common area measure types and referrals and provide a basis for communication and reporting among the Multi-Family program.
- The Multi-Family program should consider following up with customers who received a common area assessment as a means to further program participation. Following up with multi-family decision-makers about recommendations from their common area assessments is potentially a good opportunity for the Multi-Family program to re-engage decision-makers in the event that they did not previously participate in the direct installation activity. Follow up with common area assessment recommendations would also enable the program to check customer satisfaction and ask for referrals if the decision-maker has participated in the Multi-Family program.
- The program should consider modifications to the Operations Manual and Property Enrollment and Resident Report Forms regarding the baseline GPM of showerheads and aerators. The Operations Manual should identify the minimum rating for baseline GPM required to be eligible

for the direct installation of showerheads and aerators, and the Property Enrollment Form should indicate whether recorded GPM values are “rated” by the manufacturer or are results from water flow rate testing (“tested”).

- While the program’s current, spreadsheet-based tracking system is sufficient; it may be nearing its limits if the program wants to track additional information, such as that contained in CRM (Customer Resource Management) software. Information contained in the program’s paper applications that were not transferred into the tracking system included the names and contact addresses of participating property managers, post-installation inspection notes, the model and type some installed water efficiency devices, and findings from some of the properties’ Central Plant Survey. Navigant recommends investigating cost-effective opportunities to migrate the program’s current tracking system to minimize the amount of manual data entry in the field and to make more information about participating customers and potential customers accessible to the program’s stakeholders.
- Until such time as a new tracking system becomes feasible, Navigant recommends that the program consider including the following information in the current program tracking system:
  - Unique numeric property/unit identification numbers
  - Contact names and addresses for all participating property and dwelling units
  - Model and unit number of installed programmable thermostats
  - Model and type of efficient water devices and the baseline condition
  - Post-installation inspections findings
  - Central plant survey findings including measure type and referrals
- The program should consider reviewing its customer complaint resolution process to ensure it is documenting responses from post-installation tenant and property manager surveys in the program’s tracking system. Navigant observed some customer responses with ratings of 3 or lower without accompanying documentation on how, if at all, these complaints were reviewed and/or resolved by the implementation contractor.

## Data Collection

Navigant collected data about this program from the following activities:

- Interviews with Program Stakeholders
- Program Documentation and Materials Review
- Laboratory Testing of Water Efficiency Devices

### *Interviews with Program Stakeholders*

Navigant conducted a conference call with ComEd program staff, the Nicor Gas program administrator and the implementation contractor together to get an overview of the program’s accomplishments and challenges in February 2012. Navigant conducted follow-up telephone interviews individually with each of the participants on the initial conference call in June and July 2012. Telephone interviews included prepared questions and open discussion on topics such as program administration, program outreach and marketing, program delivery and customer satisfaction.

### *Program Documentation Review*

Navigant reviewed the Rider 30 program's Operating Plan<sup>57</sup>, Program Implementation Scope of Work<sup>58</sup>, Nicor Gas Compliance Filling<sup>59</sup>, the program year end summary report Multi-Family program's Operations Manual<sup>60</sup>, program tracking system, program outreach and marketing materials, and the program weekly tracking database (including spreadsheets for the week ending March 10, 2012). Other documents included Property Enrollment and Service Agreement Forms, Customer and Property Manager Survey responses, Resident Reports and Property Summary Reports.

### *Direct Installation Measure Testing*

Navigant contracted with CSA Group, a testing and certification lab, to test the flow rates of some of the water fixtures installed in Nicor Gas energy efficiency programs, including the Niagara showerhead used in the Multi-Family program.<sup>61</sup> The laboratory testing found that the Niagara showerhead met its specified flow rate at 80 psi in all tested samples and showed limited variability in flow at each of the tested pressure levels. Based on these results, Navigant recommended that no further testing be required of this measure.

### **Review of Program Operating Procedures and Tracking System**

The Multi-Family program has developed a simple, but sufficient tracking system for reporting key performance indicators. The program is adhering to eligibility criteria set forth in the program's Operating Manual, tracking direct installation activity accurately, calculating savings properly and reporting its activity to utilities in a timely fashion. The program appears to be conducting a sufficient amount of QA/QC activity, but should seek to document this activity in the program tracking spreadsheet. Navigant verified through telephone interviews that the program implementation contractor continued to follow the procedures in place during PY1. Although the program makes ongoing incremental improvements in its operating procedures based on experience gained from the field in collaboration with ComEd staff and the Nicor Gas program administrator, there were no major changes to the program's operating procedures or tracking system during PY1.

### *Application Review*

Navigant reviewed the Multi-family program Property Enrollment Form and the Resident Report Form. The Property Enrollment Form has sufficient input information necessary for a customer to submit the required enrollment documentation. Particularly, the form requires customers to specify utility type, contact information, type of water heating system and fuel source, buildings information including number of buildings and units, age, roof type and building material. The Enrollment Form also contains a property unit sampling checklist of existing devices and the baseline flow rate (GPM) for showerheads and aerators, and the potential for direct install energy-saving measures.

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<sup>57</sup> Nicor Gas Rider 30 EEP Program Portfolio Operating Plan (Version 1.1)

<sup>58</sup> ComEd Nicor MF SOW PY4\_6 FINAL REV 2E.pdf

<sup>59</sup> Nicor Gas EEP 2011-2014 Revised Plan Filed Pursuant to Order Docket No. 10-0562 (May 24, 2011)

<sup>60</sup> Honeywell Utility Solutions, Multifamily Home Energy Savings Program Operations Manual (updated February, 2011).

<sup>61</sup> Navigant, Final Results of Showerhead and Faucet Aerator Tests, Memorandum dated July 20, 2012.

*Project File Engineering Desk Review*

Navigant reviewed the project files of six properties (including two properties with all electric measures) which received installations in the week ending of 3/10/2012. The project files included signed Property Enrollment and Service Agreement Forms, completed Resident and Property Summary Reports, Water Flow Rate Testing Sheets, copies of filled post inspection QA/QC logging forms, and scanned copies of building installation tally sheets. We compared entries in the project files to corresponding entries in the program tracking database for accuracy and completeness. We verified for each individual property that the records in the Resident reports matches with the Property Summary Reports, and that the number of dwelling units, installed measures, claimed savings, customer and property manager survey responses, as reported in the project documentations are accurate and consistent with entries in the tracking database.

Navigant has included a summary table of our project file engineering desk review results in below.

**Project File Engineering Desk Review (Week Ending 3/10/2012)**

Multi-Family Property	Property Enrollment	Service Agreement	Central Plant	Common Area	Resident Reports	Property Summary	Fuel
1	Yes	No	Yes	No	Yes	Yes	Gas
2	Yes	Yes	Yes	No	Yes	Yes	Gas
3	No	No	No	No	Yes	Yes	Gas
4	Yes	Yes	Yes	No	Yes	Yes	Gas
5	Yes	Yes	N/A	No	Yes	Yes	Elec.
6	No	No	N/A	No	Yes	Yes	Elec.

*Source: Navigant analysis of Multi-Family Program project files*

Navigant observed that the program tracking system (currently in Excel spreadsheet form) is able to track most of the program’s key performance indicators. However, the manual transfer of data from paper applications to spreadsheets contains some inherent difficulty as the program seeks to track additional information. For example, Navigant’s review of the six project files (from the week of March 10, 2012) indicated that two projects were missing completed/filled Property Enrollment Forms, and three entries were missing signed and dated Service Agreement Forms.

In addition, Navigant observed from the 3/24/2012 weekly tracking report that 1,799 units on schedule for installation were labeled as “unavailable”. Navigant would recommend including additional information about why the units were “unavailable” during the direct installation activity and including relevant information in the program tracking system.

*Tracking System Review*

Navigant reviewed the Multi-family program tracking database developed by Honeywell (spreadsheet format). The program tracking database captures the essential information that enables accurate tracking of the program’s participation and claimed savings. The tracking database accurately records default savings and total savings estimated for installed water devices, CFLs, and programmable thermostats. It provides completed installations in master and individual-metered building units, results from QA/QC

activities, completed water flow rate testing, and completed central plant and common area surveys. Also included are responses from customer and property manager surveys.

The Multi-Family program’s weekly reporting tool is an Excel spreadsheet format with different worksheets and sections, including the Weekly Worksheet, Energy Savings Worksheet, Customer Satisfaction and PM Surveys Worksheets.

The worksheet titled “Weekly” has several sections that record the program’s schedules, installations, QA/QC activities, water flow rate testing results, common area/central surveys, satisfaction forms, and safety records. The “Schedules” section tracks total units completed.

The “Install” section separately tracks the type of installed devices in either Master-Metered buildings or Individually-Metered buildings, and also track installation of programmable thermostats and CFLs. The Install section is linked with the “Energy Savings” worksheet to automatically populate the total devices installed and calculate energy savings based on estimated savings by the program.

The “QA/QC” section tracks the number of units where QA/QC checks were performed in relation to the number of units completed. This section also tracks the number of warranty issues, emergency phone calls, and complaints received. From the 3/24/2012 weekly tracking report, the program has completed 5.2 percent post installation inspections (the goal is 5 to 10 percent), with only four warranty issues or emergency calls from customers. Technicians are sent out to resolve any warranty issues, and reports about the warranty issue and resolution are sent to Nicor Gas and ComEd.

The “Common Areas/Central Plants” section tracks the number of Common Area Lighting and Central Plant Surveys that the program completes. This section could be used as a basis to follow up with the Small Business program or other programs about common area or central plant recommendations.

The “Safety” section tracks the number of safety concerns (OSHA violations, vehicle damage or violations). Navigant observed one safety related incident in the tracking system related to a vehicle incident. The incident was reported to Nicor Gas and ComEd according to required procedures.

The “Satisfaction Forms” section tracks both the number and response rates of Customer Surveys (residents of dwelling units that receive direct install measures) and Property Manager Surveys. Navigant verified that the total number of surveys returned on the “Weekly” worksheet matches the total number received on each corresponding worksheet.

Overall, the Multi-family program tracking system captures the essential information that enables accurate tracking of the program’s participation and claimed savings. The tracking database accurately records default savings and total savings estimated for installed water efficiency devices, CFLs, and programmable thermostats.

#### *Tracking Unavailable Units*

In PY1, the program reported that 2,300 units (nine percent of total units installed in PY1) were “unavailable” during direct install activity. An unavailable unit is a dwelling unit within the property that the field team was not able to access to install energy efficiency measures. Currently, the program tracking system does not provide a reason for why the program was not able to install measures in a given unit.

*Common Area Assessments Tracking*

Navigant verified that the Multi-Family program was conducting common area assessments and forwarding them to the Small Business Energy Savings program or Business Energy Efficiency Rebate program, as outlined in the program’s Operating Manual.

**Benchmarking**

To conduct the best practices benchmarking assessments, we compared Implementation Contractor’s practices (shown as a bullet list) with the *Best Practices Self-Benchmarking Tool*<sup>62</sup> from the *National Energy Efficiency Best Practices Study* (numbered items in italic font). The Multi-Family program is using the same core operating procedures and tracking system, therefore, Navigant has re-iterated our best practices comparison from our Rider 29 assessment in this memorandum, with minor updates based on areas where the program has made changes in PY1. The program’s quality assurance and verification activities appear to be functioning adequately and do not appear to require streamlining or simplification at this time. The benchmarking categories used were Quality Control and Verification as found in Table 5-25, and Reporting and Tracking as found in Table 5-26. Primary research topics are included *in italics* below with corresponding findings and recommendations listed as such.

**Table 5-25. Quality Control and Verification Benchmarking**

ID	Best Practice	Score
1	<i>Base quality control practices on a program’s vendor relationships, measure types, and project volume.</i>	Meets best practice
2	<i>Conduct quality assurance and verification inspections to improve the overall understanding of how multi-family buildings function.</i>	Opportunity for improvement
3	<i>Govern post-inspection levels by cost-effectiveness as well as quality assurance considerations.</i>	Opportunity for improvement
4	<i>Conduct inspections in a timely manner.</i>	Meets best practice
5	<i>Use product specifications in program requirements and guidelines.</i>	Meets best practice

Source: *Best Practices Self-Benchmarking Tool and Navigant analysis*

**Research Topic ID 1:** *Base quality control practices on a program’s vendor relationships, measure types, and project volume.*

**Finding: Meets best practice.** The program’s Operations Manual set forth a goal of completing post-installation inspections for five to ten percent of direct install measures. The program meets these requirements.

<sup>62</sup> See the Best Practices Self-Benchmarking Tool developed for the Energy Efficiency Best Practices Project: <http://www.eebestpractices.com/benchmarking.asp>.

**Research Topic ID 2:** *Conduct quality assurance and verification inspections to improve the overall understanding of how multi-family buildings function.*

**Finding: Opportunity for improvement.** The program’s current quality assurance and verification inspections are designed to focus on residential direct installation measures. The program performs common area lighting and central plant surveys that are referred to other programs, but are not designed to address overall understanding of multi-family building functions.

**Recommendations:**

- The program should consider developing guidelines for common area customer referrals and a process for accessing reports from common area lighting assessments and central plant surveys;
- The program should consider following up with customers who received a common area assessment and/or a central plant survey as a means to further program participation. Following up with multi-family decision-makers about recommendations from their common area assessments provides a good opportunity for the Multi-Family program to re-engage decision-makers in the event that they did not previously participate in the direct installation activity;
- The program should include questions to check customer satisfaction and ask for referrals; and
- The program should use these guidelines as a basis for communicating and collaborating with ComEd or Nicor Gas programs that service common area measures for multi-family buildings.

**Research Topic ID 3:** *Govern post-inspection levels by cost-effectiveness as well as quality assurance considerations.*

**Finding: Opportunity for improvement.** Navigant found that the Multi-Family Home Energy Savings Program’s Operations Manual provides a very good quality control and quality assurance framework to direct program activities, but the program could benefit from additional post-installation QA/QC steps. For example, the Operations Manual could include additional guidance about when and where to conduct post-installation inspections. This process, although cost-effective, may overlook some quality controls and introduce bias or the potential appearance of bias, because the same installation team is reviewing its own work immediately after the work is performed.

**Recommendations:**

- To the extent feasible, the program should attempt to minimize hand-written data entry and the possibility of data entry errors from transposing hand-written information into the program tracking database. For example, using hand held tablets may facilitate on-site data collection and document customer satisfaction survey results;
- The program should consider implementing an additional level of post-installation QA/QC, such as a series of spot-checks by program staff at convenient times and places. For example, a program staff member who is not part of the installation team could select dwelling units for post-installation inspection on a periodic basis, such as when the program staff member is geographically proximate to a particular location; and
- The program should consider including any additional QA/QC activities and guidelines in the Operations Manual.

**Research Topic ID 4:** *Conduct inspections in a timely manner.*

**Finding: Meets best practice.** The program conducts direct installation measure inspections shortly after measures have been installed.

**Research Topic ID 5:** *Use product specifications in program requirements and guidelines.*

**Finding: Meets best practice.** The Operations Manual doesn't use specific product specifications, but includes direct install performance specifications in program requirements and guidelines, which is a suitable proxy.

*Reporting and Tracking*

The program's tracking system uses spreadsheets to provide accurate and timely reports using program deemed savings values to report program savings. Through reviewing the program's post-installation inspection reports, Navigant found that the program is conducting sufficient QA/QC activity. In order to evaluate the program's reporting and tracking procedures, Navigant compared program methods to best practices in the "Reporting and Tracking" section of the Self-Benchmarking Tool for Multifamily Comprehensive Programs.

**Table 5-26. Reporting and Tracking Benchmarking**

ID	Best Practice	Score
6	<i>Base reporting and tracking system design on how information will be used and data needs unique to multi-family programs.</i>	Opportunity for improvement
7	<i>Assure that tracking systems are intuitive, straightforward, integrated and comprehensive.</i>	Opportunity for improvement
8	<i>Develop systems for long-term strategy and use.</i>	Meets best practice
9	<i>Track the key components of multi-family buildings and program participation.</i>	Opportunity for improvement

Source: *Best Practices Self-Benchmarking Tool and Navigant analysis*

**Research Topic ID 6:** *Base reporting and tracking system design on how information will be used and data needs unique to multi-family programs.*

**Finding: Opportunity for Improvement.** While the program's current, spreadsheet-based tracking system is sufficient; it may be nearing its limits if the program wants to track additional information, such as that contained in CRM (Customer Resource Management) software.

**Recommendations:**

- Navigant recommends investigating cost-effective opportunities to migrate the program's current tracking system to minimize the amount of manual data entry in the field and to make more information about participating customers and potential customers accessible to the program's stakeholders; and
- Until such time as a new tracking system becomes feasible, Navigant recommends that the program consider including the following information in the current program tracking system:
  - Unique numeric property/unit identification numbers
  - Contact names and addresses for all participating property and dwelling units
  - Model and unit number of installed programmable thermostats
  - Model and type of efficient water devices and the baseline condition
  - Post-installation inspections findings
  - Central plant survey findings including measure type and referrals

**Research Topic ID 7:** *Assure that tracking systems are intuitive, straightforward, integrated and comprehensive.*

**Finding: Opportunity for Improvement.** While the program tracking system is currently tracking necessary information to report the program’s participation and energy savings achievements, the program can make an incremental improvement to the program tracking system by adding data fields.

**Recommendations:**

- The program should consider using the Sales Funnel Report to track the length of time properties remain in the pipeline and take steps as needed to reduce the wait if it becomes a barrier to participation;
- The program should consider merging its Sales Funnel Report with the program’s tracking system. Combining the two reports could give the program staff a clearer indication about the time required from first contact to direct install or the ability to track other participation milestones. If not done so already, consider including the Sales Funnel Report as part of the program’s weekly reporting to Nicor Gas and ComEd; and
- The program should consider including additional definitions or codes for the term “units unavailable” during a direct installation activity, as unavailable units represent a significant opportunity cost to the program. Including additional clarification about why the units were “unavailable” during the direct installation activity through the use of short codes could provide the program with greater insight into how to potentially reduce the number of unavailable units in properties selected for direct installation during the application or pre-installation inspections phases.

**Research Topic ID 8:** *Develop systems for long-term strategy and use.*

**Finding: Meets best practice.** The program implementation contractor makes ongoing incremental improvements in its operating procedures based on experience gained from the field in collaboration with ComEd staff and the Nicor Gas program administrator. The program reviews performance indicators for long-term strategy and use.

**Research Topic ID 9:** *Track the key components of multi-family buildings and program participation.*

**Finding: Opportunity for Improvement.** Although the program currently conducts customer satisfaction surveys, the program could include additional follow up with decision-makers to inquire about key components of multifamily program participation.

**Recommendations:**

- The program should consider developing and implementing a tracking tool (such as an Excel spreadsheet) to track common area measure types and referrals and provide a basis for communication and reporting with decision-makers; and
- The tracking tool should be used to promote communication with and channeling to other Nicor Gas or ComEd programs that service common area measures.

### 5.7 Showerhead Laboratory Test Memo (July 20, 2012)

Navigant contracted with CSA Group, a testing and certification lab, to test the flow rates of some of the water fixtures of Nicor Gas energy efficiency programs. The table below lists the devices tested, the programs they are a part of, the sample quantity, and the delivery path of the devices to CSA in Cleveland, Ohio:

Device	Qty	Program	Delivery Path to CSA
Oxygenic Showerhead w/permanent label "2.0 GPM"	3	Elementary Energy Education (EEE) Program	From Resource Action Programs (RWA), Sparks, NV to Navigant in Burlington, MA to CSA
Oxygenic Showerhead	3	EEE Program	In shrink-wrapped EEE program kits, from NEF in Salt Lake City, UT to Navigant in Chicago, IL. Removed from kits and sent to CSA
Kitchen Faucet Aerator	3	EEE Program	In shrink-wrapped EEE program kits, from NEF in Salt Lake City, UT Navigant in Chicago, IL. Removed from kits and sent to CSA
Niagara Showerhead	3	Multi-Family, HES, Small Business programs	From Honeywell Utility Solutions in Deer Park, IL to CSA.

The lab received the samples by May 4 and, by May 21, tested each sample at four inlet water pressures, 30 psi, 45 psi, 60 psi, and 80 psi, maintaining each pressure for one minute with a constant water temperature of 102°F.

The test results of these devices are listed in the table below. The key high-level findings include the following:

- For the Oxygenic showerhead, the results of the three samples from the shrink-wrapped EEE kits are very similar to the results of the samples sent from RWA (with the label "2.0 GPM").
- Every showerhead met its SOW-specified flow rate at 80 psi in all tested samples and showed limited variability in flow at each of the tested pressure levels.
- The kitchen faucet aerator exceeded its SOW-specified flow rate in every test sample at 80 psi.
- The kitchen faucet aerator showed the greatest variability in flow rate among the devices.

As the relative precision for the results of each of the four devices is good, less than 8% at 95% confidence, we do not recommend further testing of these devices.

We recommend Nicor Gas consider other kitchen faucet aerators for its EEE program.

Test Inlet Pressure PSI	Flow Rate Test Results, Gallons per Minute											
	EEE Oxygenic Showerhead w/Label "2.0 GPM" Flow Rate Specified in SOW: 2.0						EEE Oxygenic Showerhead from Shrink-Wrapped Kits Flow Rate Specified in SOW: 2.0					
	Sample			Std Dev	Avg	Co of Var	Sample			Std Dev	Avg	Co of Var
	1	2	3				1	2	3			
30	1.3	1.3	1.3	0.00	<b>1.3</b>	0.00	1.3	1.2	1.2	0.06	<b>1.2</b>	0.05
45	1.5	1.5	1.6	0.06	<b>1.5</b>	0.04	1.5	1.4	1.5	0.06	<b>1.5</b>	0.04
60	1.8	1.8	1.8	0.00	<b>1.8</b>	0.00	1.8	1.7	1.7	0.06	<b>1.7</b>	0.03
80	2.0	2.0	2.0	0.00	<b>2.0</b>	0.00	2.0	1.9	2.0	0.06	<b>2.0</b>	0.03
	<b>Average Coefficient of Variation</b>					<b>0.01</b>	<b>Average Coefficient of Variation</b>					<b>0.04</b>
	<b>Relative Precision at 95% Confidence</b>					<b>1.1%</b>	<b>Relative Precision at 95% Confidence</b>					<b>4.5%</b>

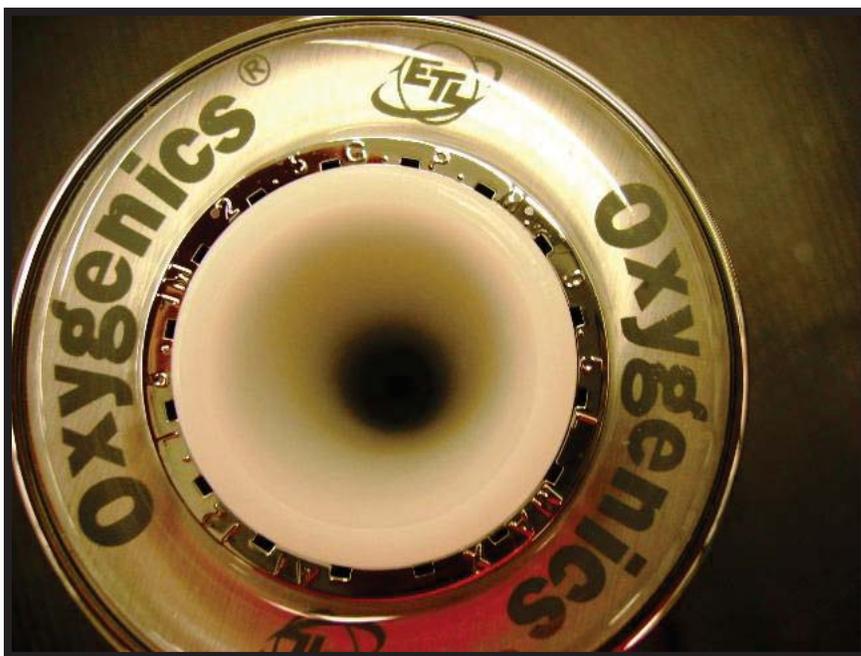
Test Inlet Pressure PSI	Flow Rate Test Results, Gallons per Minute											
	EEE Kitchen Faucet Aerator Flow Rate Specified in SOW: 1.5						Multi-Program Niagara Showerhead Flow Rate Specified in SOW: 1.5					
	Sample			Std Dev	Avg	Co of Var	Sample			Std Dev	Avg	Co of Var
	1	2	3				1	2	3			
30	1.3	1.2	1.4	0.10	<b>1.3</b>	0.08	1.1	1.1	1	0.06	<b>1.1</b>	0.05
45	1.5	1.4	1.6	0.10	<b>1.5</b>	0.07	1.2	1.3	1.3	0.06	<b>1.3</b>	0.05
60	1.7	1.5	1.8	0.15	<b>1.7</b>	0.09	1.4	1.4	1.4	0.00	<b>1.4</b>	0.00
80	1.9	1.7	1.9	0.12	<b>1.8</b>	0.06	1.4	1.5	1.5	0.06	<b>1.5</b>	0.04
	<b>Average Coefficient of Variation</b>					<b>0.07</b>	<b>Average Coefficient of Variation</b>					<b>0.03</b>
	<b>Relative Precision at 95% Confidence</b>					<b>7.9%</b>	<b>Relative Precision at 95% Confidence</b>					<b>3.4%</b>

For your reference, photographs of the devices are shown below, as recorded by CSA.

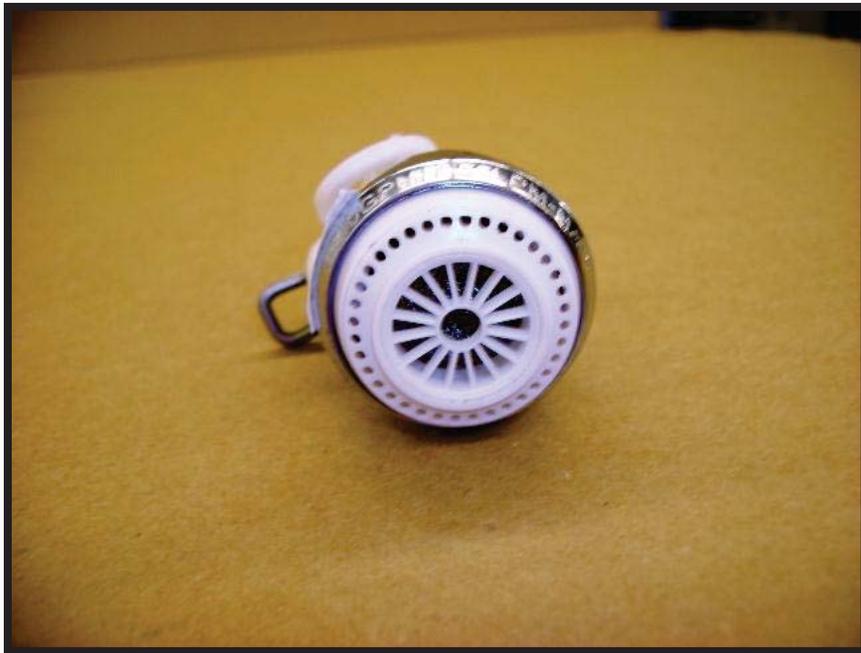
CSA Lab Photographs: Oxygenic Showerhead w/permanent label "2.0 GPM"



CSA Lab Photographs: Oxygenic Showerhead



CSA Lab Photographs: Kitchen Faucet Aerator



CSA Lab Photographs: Niagara Showerhead



## 5.8 Program Theory & Logic Model Memorandum

### Program Theory

Program theory is essentially a structured description of the various elements of a program’s design: goals, motivating conditions/barriers, target audience, desired actions/behaviors, strategies/rationale, and messages/communications vehicles. The following subsections describe the Multi-Family Home Energy Savings program in these terms.

### Program Goals

The primary goal of the Multifamily program is to achieve energy savings in the multi-family housing market segment through direct installation of low-cost energy efficiency measures and financial incentives for common area installations, such as lighting, space heating or water heating. The program works to increase awareness about the benefits of energy efficiency through education and referrals to other utility sponsored programs.

### Motivating Conditions/Barriers

The Multifamily program faces two primary barriers when recruiting participants to the program: program awareness and the “business case” barrier (in which the entity bearing the costs of participation (a multi-family property owner/manager) often does not reap the benefits of the utility cost savings (accrued to the resident of a dwelling unit). This barrier is also referred to as the “split incentives” barrier.

The multifamily market is a hard-to-reach market due the complexity of decision making processes at some multifamily properties and the number of potential decision makers. At some multifamily properties, a property management firm may be responsible for day to day maintenance operations while an owner or ownership group may take responsibility for capital investments at the property. Property management firms and/or owners may or may not be located in the same geographic area as the multifamily property. The complex nature of multifamily property management and ownership frequently makes multifamily property decision-makers a hard-to-reach market. As a result, the Multi-Family Home Energy Savings program faces an awareness barrier when attempting to reach multifamily decision makers.

The Multi-Family Home Energy Savings program also faces a business case or “split incentives” barrier when promoting its benefits to target participants. In many multi-family properties, residents are responsible for the costs of the energy consumption in their dwelling units and the property manager or building owner pays for the costs of energy consumption in the common areas of a multi-family property. Therefore, the resident (not the property manager or building owner) receives the associated benefit of lower energy consumption from energy efficiency measures installed in dwelling units. However, the property manager or building owner is the decision maker and frequently incurs some costs from participating in the program, including staff time to accommodate the program’s direct install activity and the obligation to field complaints from any tenants who are unsatisfied with direct install measures.

### Target Audience

The target audience for this program is property owners of residential gas heated multi-family buildings of eight or more units, both apartments and condominiums. More generally, the target audience not only includes “property owners,” but other decision-makers in the multi-family market sector, including property management firms, maintenance staff, and multi-family trade associations.

## **Desired Actions/Behaviors**

The program encourages multi-family property owners/managers to approve direct installation of low-cost, energy-efficient equipment in residential dwelling units under their management. During a pre-installation walk-through at a multi-family property, program staff demonstrates the performance of direct install measures to the owner or manager and conducts a brief assessment of a multi-family property's common areas. A common area assessment provides an incentive for the owner or manager by informing them of opportunities and refers a multi-family property owner/manager to other utility programs for which the property may be eligible to earn incentives by replacing common area equipment with more efficient equipment.

## **Strategies/Rationale**

The main strategies of the Multi-Family Home Energy Savings program are to target outreach to property owners and install energy efficiency measures in individual residential units.

These strategies will achieve direct energy and demand savings through direct installation of energy efficiency measures. The common area assessments are intended to educate decision makers about potential incentives for upgrading eligible equipment. Educational materials, including property reports, improve property managers' and residents' awareness of other Nicor Gas programs.

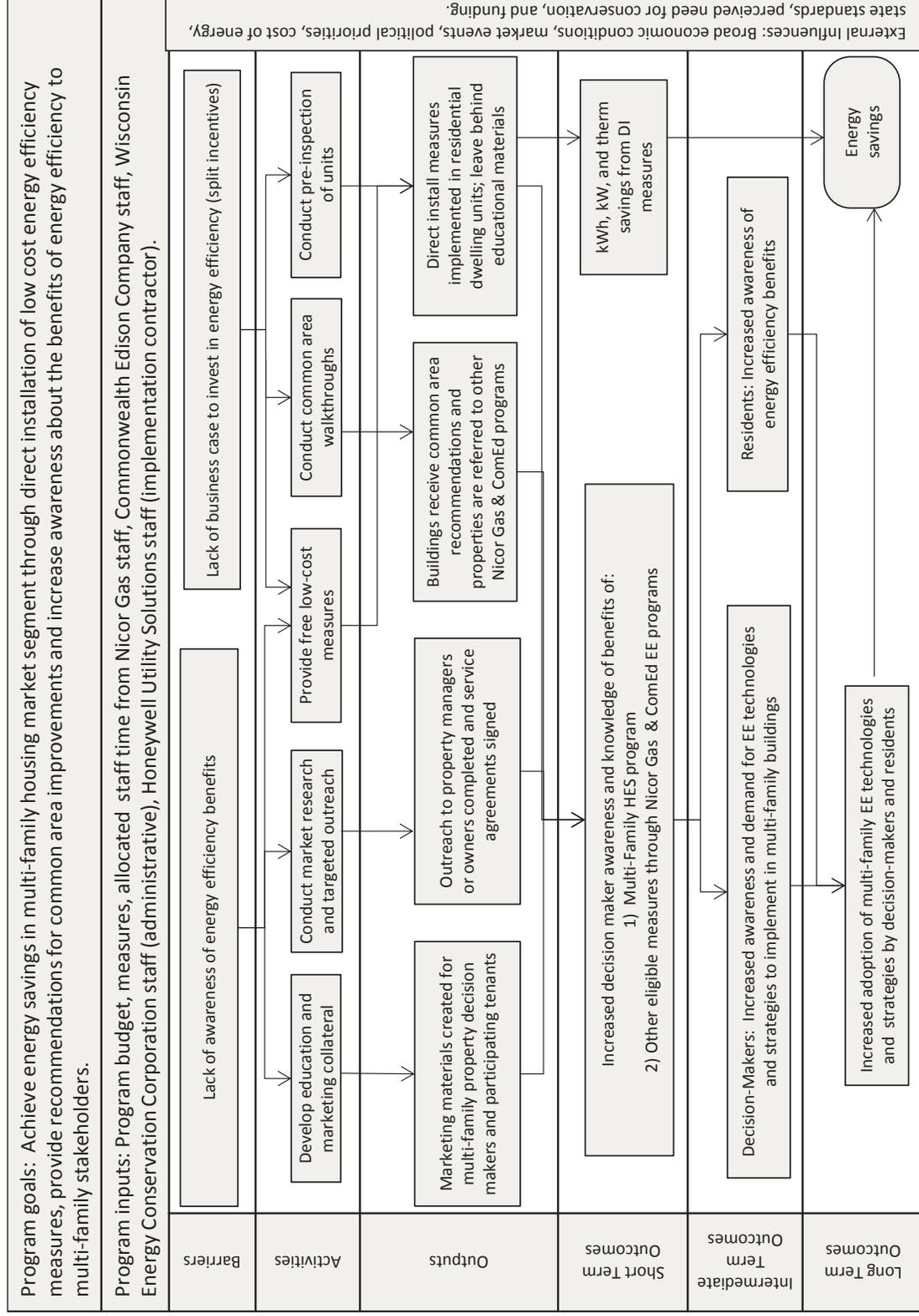
## **Messages/Communications Vehicles**

The Multi-Family Home Energy Savings program creates marketing materials and outreach tailored to the multi-family market to increase program participation by educating decision makers about the benefits of participating in the Multi-Family program. Communications vehicles can include marketing to large audiences, such as through trade shows or presentations at conferences to individualized marketing, including telephone calls to large property management firms.

## **Program Logic Model**

This section presents how the Multi-Family Home Energy Savings program activities logically lead to desired program outcomes. Figure 5-8 presents the Nicor Gas Multi-Family Home Energy Savings program logic model diagram showing the linkages between activities, outputs and outcomes, and identifying potential external influences. The diagram presents the key features of the program. Tables in the subsections below include detailed descriptions of the logic model components.

**Figure 5-8. Program Logic Model**



**Resources**

The ability of the Multi-Family program to generate the outputs and outcomes likely to result in the program reaching its goals depends in part on the level and quality/effectiveness of inputs (resources) that go into these efforts. There are also external influences that can help or hinder achieving anticipated outcomes. Key program inputs and potential external influences are shown in Table 5-27.

**Table 5-27. Program Inputs and Potential External Influences**

<b>Program Inputs</b>
Nicor Gas & Commonwealth Edison (ComEd) ratepayer funds
Nicor Gas & ComEd staff resources
Implementer staff resources and experience
Program knowledge of the target market
<b>External Influences and Other Factors</b>
Economic environment
Natural gas prices
Customer and trade ally awareness of energy efficiency options

**Activities**

The primary goal of the Multi-Family Home Energy Savings program is to obtain energy savings in multi-family residential buildings that heat domestic hot water with natural gas delivered by Nicor Gas or with electricity delivered by Commonwealth Edison Company. The program achieves energy savings for Nicor Gas through the direct installation of water-saving measures. The program installs CFLs through a separate contract with Commonwealth Edison Company. The program is designed to reach eligible property owners through activities intended to generate energy savings. The following activities are described in Table 5-28:

**Table 5-28. Program Activities**

<b>Develop education and marketing collateral</b>
Prepare marketing collateral such as posters for common areas to notify residents about free installations and instructions on how to use certain installed measures
Prepare program forms such as the Joint Marketing Letter, Property Enrollment Form, Service Agreement Form, Tenant Letter, Resident Report (of what was installed), and Surveys for decision makers and residents
<b>Conduct market research and targeted outreach</b>
Solicit the program to property owners and managers through multiple sources of information
Maintain positive business relationships with local multi-family housing associations and other organizations of the like within the appropriate industries
Initiate contact with potential property owners or managers
Set up an initial meeting with property owners or managers if they express interest
<b>Conduct common area assessments</b>
During the initial property assessment, complete the Nicor Gas Central Plant Survey and the ComEd Common Area Lighting Survey and transfer to appropriate implementation contractor for lead follow up
Schedule an initial meeting with property manager or owner, to review the common area assessment and/or central plant survey and provide information about the opportunities for direct installation and common area improvements at the location
<b>Conduct pre-inspection of units</b>

During the initial property assessment, a sample of units will be inspected to determine the heat source of hot water and the opportunity of direct installs and assessment of thermostat applicability for replacements

Meet with property manager or owner to explain common area assessment findings and discuss how the program works

Ask the decision maker to participate in the Multi-Family program and obtain necessary signed agreement Schedule direct installation activity at the location at the decision maker's earliest convenience

### Outputs, Outcomes and Associated Measurement Indicators

It is important to distinguish between outputs and outcomes. For the purposes of this logic document, outputs are defined as the immediate results from specific program activities. These results are typically easily identified and can often be counted by reviewing program records. Outcomes are distinguished from outputs by their less direct (and often harder to quantify) results from specific program activities. Outcomes represent anticipated impacts associated with Nicor Gas's program activities and will vary depending on the time period being assessed. An example would be energy and demand savings. On a continuum, program activities will lead to immediate outputs that, if successful, will collectively work toward achievement of anticipated short-, intermediate-, and long-term program outcomes.

The following tables list outputs (Table 5-29) and outcomes (Table 5-30) from the Multi-Family program's logic model, including proposed data sources and/or data collection approaches for each program output, outcome and performance indicator.

**Table 5-29. Program Outputs, Associated Indicators and Potential Data Sources**

Outputs	Performance Indicators	Data Sources and Potential Collection Approaches
Marketing materials created for multi-family property decision makers and participating tenants	Program brochures and leave-behind materials Website content	Program website and marketing materials Evaluation telephone interviews with decision makers Interviews with program staff
Service agreements signed	Number of signed service agreements	Program tracking system Project file review (sample) Evaluation telephone interviews with decision makers Interviews with program staff
Owners receive common area recommendations and properties are referred to other Nicor Gas & ComEd programs	Number of buildings that received common area recommendations	Common area assessment documentation in program tracking system Completed decision-maker surveys Evaluation telephone interviews with decision makers Interviews with program staff

Outputs	Performance Indicators	Data Sources and Potential Collection Approaches
Direct install measures implemented in residential dwelling units	Number of energy efficiency measures installed in residential dwelling units Number of surveys completed by multi-family tenants and property managers or owners. Post-installation inspections completed	Program tracking system Post-Installation Inspection notes from program staff in program tracking system Evaluation telephone surveys with residents Interviews with program staff

**Table 5-30. Program Outcomes, Associated Indicators, and Potential Data Sources**

Outcomes	Performance Indicators	Data Sources and Potential Collection Approaches
<b>Short-Term</b>		
Energy and demand savings from direct-install measures	kWh, kW, and therm savings	Program tracking system
Increased decision-maker awareness of the Multi-Family program and other programs	Number of marketing and outreach efforts to target markets Program participation (number of unique and repeat property management firms/property owners) Responses from participating customers indicating source of program awareness	Completed property manager satisfaction surveys Evaluation telephone surveys with decision-makers Program tracking system
<b>Intermediate-Term</b>		
Continued and/or Improved Customer Satisfaction	Responses from participating decision makers who report that they are either “satisfied” or “very satisfied” with their participation in the Multi-Family Home Energy Savings program	Completed property manager customer satisfaction surveys Evaluation telephone surveys with decision-makers Completed resident satisfaction surveys Evaluation telephone surveys with residents
<b>Longer-Term</b>		
Increased adoption of multi-family energy-efficient technologies and strategies by decision-makers	Number of participating units in multifamily program Number of unique participants Number of program participants implementing common area measures in multifamily buildings through other Nicor Gas or Commonwealth Edison programs Types of measures installed in multifamily buildings through other Nicor Gas or Commonwealth Edison programs	Completed customer satisfaction surveys Evaluation telephone surveys with decision-makers Program Tracking System Cross-checking program tracking system to include multi-family projects from other programs (e.g. Small Business or Business Rebate) in future years

## 5.9 Data Collection Instruments

### 5.9.1 Program Manager & Implementation Contractor Interview Guide

#### MULTI-FAMILY HOME ENERGY SAVINGS PROGRAM

#### GPY1/EPY4 Program Manager and Implementation Contractor Interview Guide July 20, 2012 FINAL

#### Purpose of this Survey Instrument (not to be read to Participants)

*[Note to Reviewer] The Interview Guide is a tool to guide process evaluation interviews with utility staff and implementation contractors. The guide helps to ensure the interviews include questions concerning the most important issues being investigated in this study. Follow-up questions are a normal part of these types of interviews. Therefore, there will be sets of questions that will be more fully explored with some individuals than with others. The depth of the exploration with any particular respondent will be guided by the role that individual played in the program's design and operation, i.e., where they have significant experiences for meaningful responses. Interview date/times will be arranged in advance.*

The table below outlines the sections, topics and questions of the tenant survey instrument to cross-reference them with the goals and objectives of the Multi-Family Home Energy Savings Program evaluation.

#### Survey Instrument: Topics and Corresponding Questions

Interview/Research Objectives	Corresponding Questions
Roles & Responsibilities	RR1 – RR7
Program Goals	G1 – G3
Marketing & Promotion	MP1 – MP2
Program Participation & Customer Satisfaction	CS1 – CS6
Data Tracking & Program Channeling	D1 – D2
Quality Assurance & Quality Control	QA1 – QA2
Information Request & Wrap Up	WU1 – WU3

#### Contact Information

Name of Interviewee: \_\_\_\_\_ Date: \_\_\_\_\_  
 Title: \_\_\_\_\_ Company: \_\_\_\_\_  
 Role in Program: \_\_\_\_\_

#### Introduction

Hello, may I please speak with [NAME]?

My name is \_\_\_ and I'm calling from Navigant Consulting, we are part of the team hired to conduct an evaluation of the Multi-Family Home Energy Savings Program. We're conducting interviews with program managers and key staff in order to improve our understanding of the program. At this time we are interested in asking you some questions about the Multi-Family program. The questions will take about an hour. Is this still a good time to talk?  
 [IF NOT, SCHEDULE A CALL BACK.]

Ok, great. Let's begin.

### **Roles and Responsibilities**

1. Can you briefly summarize your role in the Multi-Family Program: What are your main responsibilities? For how long have you carried these out, including the planning phase? Has your role changed over time?
2. Please explain key actors and roles in program delivery.
3. From your perspective, do key actors have an adequate understanding of their role in enabling the Multi-Family program to meet its goals?
4. What is the Multi-Family's strongest attribute? What attribute(s) (if any) do you think could be improved?
5. What are the formal and informal communication channels between program staff, program administrator and/or implementation contractor? In your opinion, is information shared in a timely manner?
6. What are the Multi-Family program's reporting requirements? Are the reporting requirements for this program appropriate from an administrative perspective? Do you have any suggestions about ways to improve or streamline the program's reporting requirements?
7. Are utility resources (e.g. program staff, account managers) available to provide customer referrals or introductions to any key customers associated with multifamily buildings or building management firms?

### **Program Goals and Objectives**

1. According to the most recent monthly report, you are [ahead/behind] on current year goals. Why do you think this is? Do you think next year's goals are realistic? Why or why not?
2. Outside of the quantitative goals (e.g., \$, \$/kWh, savings and participation rates), in your own words, what are the key goals and objectives of this program?
3. During the last year, how successfully did the program integrate new measures, such as programmable thermostats? Have you implemented or are you planning to implement any specific training, inspection or M&V activities for new measures? If so, please describe.

### **Marketing and Promotion**

1. What are the most common ways that properties are recruited into the Multi-Family program? From your perspective, are the program's current marketing efforts meeting your expectations? Is there any specific effort that is working particularly well? Any specific effort that could be improved?
2. Do you anticipate making any upcoming changes to program marketing efforts? If so, please describe these changes.

### **Program Participation and Customer Satisfaction**

1. Please briefly describe the Multi-Family program's participation process from the customer perspective:
  - a. Who drives participation: customer, field implementers, others?
  - b. What is a typical timeline for participation (from first contact to direct installation)? Is there a target timeframe? Are direct installations being scheduled within that timeframe? What, if anything, is slowing down the timeframe?
  - c. Is there a process in place for communicating the status of their application to customers?
  - d. Typically, how many contacts (e.g. property managers or building owners) do you have to contact to get participation?
  - e. How are participation rates tracked by the program?
2. Have you received any feedback from property managers/decision-makers on any aspects of the program? If so, please share it with us.
3. How have participants received common area recommendations? Do you find that property managers/decision makers are responsive to these recommendations? How does the program track these recommendations after they're provided to the participant?
4. Have you received any feedback from residents on any aspects of the program? Does program staff leave surveys for residents? About what percentage of surveys is returned? How are survey results tracked? How does the program respond to survey results? Are there any examples of specific action implemented by the program as a result of customer surveys?
5. What process is in place to field and address customer complaints or questions?
6. What impact, if any, do current economic conditions have on program participation?

### **Data Tracking and Program Channeling**

1. Can you briefly describe the process for tracking data for the program(s)? Who captures the data and how? What data is collected? Is it manually done? Who enters into database? What QA is in place? Who does QC on data collected? Data entered? Barriers? Improvements? Any planned changes to data collection? If so, what?

From your perspective, does the Multi-Family program encourage program participants (property managers or residents) to participate in other programs sponsored by the utility? What about behavioral changes? What processes are in place, if any, to identify larger improvements that are potential energy savers? What processes are in place to share referrals to other programs (e.g. common areas, rebates for large improvements)?

### **Quality Assurance and Quality Control**

1. Can you briefly describe your quality assurance and quality control procedures? What processes are in place to ensure property eligibility? Direct installation project completion?
2. Approximately what percentage of projects is post-inspected? By whom? How are the post-installation projects chosen? Do they use standardized data collection forms? How can we arrange to obtain these documents?

### **Information Request and Wrap Up**

1. We'd like to make sure that we have the most up to date program information, including the tracking system, marketing, operational documents. Would it be ok with you if we follow-up via email or phone if we have additional questions? Likewise, feel free to reach out to us if you have additional information or questions for us.
2. Are there any additional people with key roles that we should talk to?
3. Are there any other topics that you wish to discuss?

Thank you very much for sharing your time and insights with us.  
We appreciate your contribution to our evaluation research.

## 5.9.2 Participating Tenant Telephone Survey Instrument

### MULTI-FAMILY HOME ENERGY SAVINGS PROGRAM GPY1/EPY4 PARTICIPATING TENANT SURVEY August 21, 2012 FINAL

#### Purpose of this Survey Instrument (not to be read to Participants)

The table below outlines the sections, topics and questions of the tenant survey instrument to cross-reference them with the goals and objectives of the Multi-Family Home Energy Savings Program evaluation.

**Survey Instrument: Topics and Corresponding Questions**

Section	Topics	Questions
<b>Screening tenants</b>	Is the tenant served by Nicor Gas, North Shore Gas, Peoples Gas and/or Commonwealth Edison Company? Does the tenant have knowledge of the direct install of measures?	S0-S5
<b>CFL Verification</b>	Count, status, and location of the CFLs. Is/are the measure(s) still in place? Would the tenant have installed the same lights without the program? Tenant satisfaction?	CMV1-CMV23
<b>Bathroom Faucet Aerator Verification</b>	Count, status, and location of the bathroom faucet aerators. Is/are the measure(s) still in place? Tenant satisfaction?	BAMV1-BAMV17
<b>Kitchen Faucet Aerator Verification</b>	Count, status, and location of the kitchen faucet aerators. Is/are the measure(s) still in place? Tenant satisfaction?	KAMV1-KAMV16
<b>Water Efficient Showerhead Verification</b>	Count status, and location of the showerhead(s). Is/are the measure(s) still in place? Tenant satisfaction?	SMV1-SMV17
<b>Programmable Thermostat Verification (Nicor Gas &amp; ComEd Only)</b>	Thermostat verification and setting verification. Is/are the measure(s) still in place? Tenant use and satisfaction?	PMV1-PMV8a
<b>Tank Turndown Verification</b>	Status of turndown. Is/are the measure(s) still in place? Tenant satisfaction?	HMV1-HMV5a
<b>Hot Water Pipe Wrap Verification (Peoples Gas and North Shore Gas Only)</b>	Is/are the measure(s) still in place? Tenant satisfaction?	WMV1-WMV3a
<b>Customer Satisfaction</b>	How satisfied is the tenant with the direct install measures, the field technicians and the program?	SAT1-SAT5
<b>Tenant Demographics</b>	Occupancy, Primary Language, Ownership	D1-D3

#### INTRODUCTION AND SCREENER

Hello, this is [INTERVIEWER'S NAME] calling on behalf of your local natural gas and electric utilities. This is not a sales call. We are contacting customers who have participated in the Multi-Family Home Energy Savings Program, when a field technician came to your home and installed new energy efficient equipment.

Are you the person who is most familiar with the upgrades?

(IF NOT: May I please speak with the person who is most familiar with the upgrades?

**IF CUSTOMER NOT AVAILABLE: THANK AND TERMINATE)**

**CONTINUE WITH RIGHT PERSON:** We are conducting an independent study to evaluate the Multi-Family Home Energy Savings Program and would like to include your opinions. Your answers will be included with answers from

other program participants and used to help evaluate the effectiveness of the program and to design future programs. We would be grateful for your participation in our research.

**[If Customer asks for additional information about the study]** Your local natural gas and electric utilities sponsor the Multi-Family Home Energy Savings Program. Our firm has been hired to prepare an independent evaluation of their energy efficiency programs. The Illinois Commerce Commission (ICC) requires certain utilities to submit such a report each year. The information that we gather will help the ICC determine if existing programs should continue while assisting in the design of future programs.

**[If needed:** This program provided free installation of compact fluorescent light bulbs, faucet aerators, showerheads, programmable thermostats, hot water tank turndown, and pipe wrap.]

**(IF NEEDED:** It will take about 15-20 minutes.)

Throughout this survey I will refer to your apartment as your “home.”

### **SCREENING QUESTIONS**

S0. Is your home serviced by natural gas?

1. YES **[SKIP TO S1]**
2. NO **[SKIP TO S3]**
8. DON'T KNOW
9. REFUSED

S1. Our records indicate that **[INCLUDE UTILITY FROM CUSTOMER RECORD]** provides natural gas service to your home, is this correct? **(RECORD UTILITY ANSWER AND FOLLOW SKIP LOGIC ACCORDINGLY)**

NICOR GAS **[DURING SURVEY, SKIP SECTION WMV]**

NORTH SHORE GAS **[DURING SURVEY, SKIP SECTION PMV]**

PEOPLES GAS **[DURING SURVEY, SKIP SECTION PMV]**

ANOTHER UTILITY: **[SPECIFY \_\_\_\_\_, THANK & TERMINATE]**

DON'T KNOW

REFUSED

**[IF UTIL AND ANSWER IN S1 DO NOT MATCH, PLEASE RECATEGORIZE THE RESPONDENT IN THE QUOTAS AS ANSWER TO S1. IF S1=1, THEN TAG AS QUOTA=NICOR. IF S1=2 OR 3, THEN TAG AS QUOTA=INTEGRYS. IF S1=4, THEN TERMINATE. IF S1=8 OR 9, CONTINUE WITH Q'RE AND USE UTIL AS QUOTA]**

S2. **[OMITTED]**

To start, we have several questions regarding the equipment installed in your home. The answers to these questions are very important so that we can determine how much energy is being saved.

S3. Our records indicate that during the visit to your home, a field technician installed the following equipment. Please confirm that this is correct. Did you receive....**(READ ANSWERS FROM INSTALLATION LIST ON CUSTOMER RECORD) [1=YES, 2=NO, 7=NA, 8=DON'T KNOW, 9=REFUSED]**

- a. **[If CFL=1]** Compact Fluorescent Light Bulbs
- b. **[If AERA=1]** Faucet Aerators
- c. **[IF SHOW=1]** A Water Efficient Showerhead
- d. **[IF THER=1]** A Programmable Thermostat

- e. **[IF HOTWA=1]** Hot Water Tank Turndown
- f. **[IF PIPE=1]** Pipe Wrap

**[IF ANY S3a-f = 1 CONTINUE TO S4, ELSE THANK AND TERMINATE]**

S4. Were you residing at your current home when the energy efficient products were installed?

- 1. YES
- 2. NO **[THANK AND TERMINATE]**
- 8. DON'T KNOW **[THANK AND TERMINATE]**
- 9. REFUSED **[THANK AND TERMINATE]**

S5. Our records indicate that you were present when the energy efficient products were installed at your home, is this correct?

- 1. YES
- 2. NO
- 8. DON'T KNOW
- 9. REFUSED

Now I would like to ask you about the upgrades you received through the program.

## CFL VERIFICATION

CMV1. Our records indicate that **[INSERT CFL\_QTY FROM CUSTOMER RECORD]** CFL(s) were installed by the Multi-Family Home Energy Savings Program during a field technician's visit to your home. Is this correct?

- 1. YES, QUANTITY IS CORRECT **[SKIP TO CMV3]**
- 2. NO, QUANTITY IS INCORRECT **[CONTINUE TO CMV2]**
- 3. NO, I REMOVED THEM **[CONTINUE TO CMV2]**
- 8. DON'T KNOW **[SKIP TO BAMV1]**
- 9. REFUSED **[SKIP TO BAMV1]**

CMV2. How many CFLs were installed during the visit? **[NUMERIC OPEN END (UP TO 99), DK, REF] [USE AS CFL\_QTY FOR REMAINDER OF SURVEY UNLESS DK OR REF, IF DK OR REF THEN SKIP TO BAMV1]**

CMV3a. Where (was/were) the CFL(s) installed? **[MULTIPUNCH]**

- 1. BEDROOM
- 2. BATHROOM
- 3. FAMILY ROOM / DEN
- 4. GARAGE
- 5. HALLWAY, STAIRCASE, FOYER OR ENTRY
- 6. KITCHEN
- 7. LIVING ROOM
- 8. LAUNDRY ROOM
- 9. ATTIC
- 10. BASEMENT
- 11. DINING ROOM
- 12. OFFICE
- 13. OUTSIDE
- 14. SPARE ROOM
- 15. CLOSET
- 00. OTHER, SPECIFY
- 98. DON'T KNOW **[SKIP TO CMV4]**
- 99. REFUSED **[SKIP TO CMV4]**

CMV3. Do you generally use the CFL(s) installed [in each of those locations] at least two hours every day?

**[MULTIPUNCH]**

**[INTERVIEWER: IF THE RESPONDENT SAYS YES, ALL ARE USED AT LEAST TWO HOURS EVERYDAY, MARK THEM ALL INDIVIDUALLY. IF ONLY CERTAIN CFLS ARE USED, ONLY SELECT THE ROOMS THAT ARE USED AT LEAST TWO HOURS EVERYDAY]**

**[INSERT ANSWERS CHOSEN IN CMV4]**

- 97. NO/USE ALL LESS THAN TWO HOURS DAILY
- 98. DON'T KNOW
- 99. REFUSED

CMV4. What type of light bulbs did the CFLs replace? **(SELECT ALL THAT APPLY)**

- 01. Halogen
- 02. Incandescent
- 03. CFL
- 04. ADDED NEW LAMP/FIXTURE
- 00. OTHER, SPECIFY
- 98. DON'T KNOW
- 99. REFUSED

CMV5. Is (are) all the CFL(s) still installed in the original location?

- 1. YES **[SKIP TO CMV16]**
- 2. NO
- 8. DON'T KNOW
- 9. REFUSED

CMV6. Which of the following best describes what happened with the CFL(s) that are no longer in their original location? **(READ LIST) [MULTIPUNCH]**

- 1. It is installed at some other location in your home
- 2. It was thrown away
- 3. It is in storage
- 4. It was sold or given away
- 00. OTHER, SPECIFY
- 98. DON'T KNOW
- 99. REFUSED

**[IF CFL\_QTY=1, SKIP TO CMV13]**

CMV7. Now, I would like to understand what happened to the all **[INSERT CFL\_QTY]** CFLs. Just to let you know, we will need to account for all **[CFL\_QTY]** CFL(s). If you're not exactly sure where they all ended, please use your best guess so that your answers add up to **[CFL\_QTY]**.

First, how many CFLs are currently installed in their original location? **[NUMERIC OPEN END UP TO CFL\_QTY, DK, REF]**

CMV8. **[ASK IF CMV6=1]** How many are installed at some other location in your home? **[NUMERIC OPEN END UP TO CFL\_QTY, DK, REF]**

CMV9. **[ASK IF CMV6=2]** How many program bulbs have been thrown away? **[NUMERIC OPEN END UP TO CFL\_QTY, DK, REF]**

CMV10. **[ASK IF CMV6=3]** How many are in storage? **[NUMERIC OPEN END UP TO CFL\_QTY, DK, REF]**

CMV11. **[ASK IF CMV6=4]** How many were sold or given away? **[NUMERIC OPEN END UP TO CFL\_QTY, DK, REF]**

**[SHOW “CFL\_QTY CHECK” IF SUM OF CMV7 THROUGH CMV11 IS GREATER THAN CFL\_QTY. IF THE SUM OF CMV7 THROUGH CMV11 EQUALS CFL\_QTY, SKIP TO LOGIC BEFORE CMV13. IF THE SUM OF CMV7 THROUGH CMV11 IS LESS THAN CFL\_QTY, ASK CMV12. IF DK/REF IS MARKED FOR ANY OF CMV7 THROUGH CMV11, SKIP TO LOGIC BEFORE CMV13]**

“I must have made a mistake, those quantities add up to more than were installed through the program. Let me read through the last few questions again” **AND SKIP BACK TO CMV8.**

**[ASK IF SUM OF CMV7 THROUGH CMV11 IS LESS THAN CFL\_QTY]**

CMV12. What was done with the remaining **[CFL\_QTY MINUS SUM OF CMV7 THROUGH CMV11]** of CFLs?

**[OPEN END, DK, REF]**

**IF CMV6 = 4, ASK CMV13. ELSE SKIP TO CMV14**

CMV13. [Wording if CFL\_QTY=1 OR CMV11=1] Is (are) the CFL(s) you sold or gave away located in ComEd service territory?

1. YES
2. NO
8. DON'T KNOW
9. REFUSED

**IF CMV6= 1, 2 or 3; ASK CMV14. ELSE SKIP TO CMV15**

CMV14. Why [were the CFLs/was the CFL] moved from [their/its] original location? **(MULTIPLE RESPONSE UP TO 7 RESPONSES)**

01. EQUIPMENT FAILED
02. DIDN'T WORK PROPERLY
03. WRONG SIZE – TOO SMALL OR TOO LARGE
04. DIDN'T LIKE THE COLOR OF THE LIGHT OUTPUT
05. DIDN'T LIKE THE APPEARANCE OF THE LIGHT BULB
06. PERSONAL PREFERENCE--WANTED TO USE BULBS IN ANOTHER FIXTURE
00. OTHER, SPECIFY
98. DON'T KNOW
99. REFUSED

CMV15. What did you replace the CFL(s) with? **(MULTIPLE RESPONSE)**

01. With a new CFL
02. With an incandescent bulb
03. DID NOT REPLACE
00. OTHER, SPECIFY
98. DON'T KNOW
99. REFUSED

CMV16. Have you installed any more CFLs since you received the ones through the program?

1. YES **[CONTINUE TO CMV17]**
2. NO **[SKIP TO CMV20]**
8. DON'T KNOW **[SKIP TO CMV20]**
9. REFUSED **[SKIP TO CMV20]**

**IF CMV16 = 1, ASK CMV17. ELSE SKIP to CMV20**

CMV17. How many additional CFLs have you installed? **[NUMERIC OPEN END UP TO 999, DK, REF]**

CMV18-19a. **[OMITTED]**

CMV20. Before participating in the program, approximately how many of the screw-in light bulb fixtures in your home were already equipped with CFL bulbs?

- 0. NONE  
[NUMERIC OPEN END UP TO 95]
- 8. DON'T KNOW
- 9. REFUSED

CMV21. [OMITTED]

CMV22. On a scale of 1 to 5, how would you rate your satisfaction with the installed CFLs? (1=very dissatisfied; 5=very satisfied) [1-5, DK, REF]

IF CMV22 = 1 or 2, ASK CMV22a. ELSE SKIP to BAMV1

CMV22a. Why did you rate it that way? (OPEN END, RECORD VERBATIM, DK/REF) [IF DK OR REF, THEN SKIP TO BAMV1]

CMV23. [OMITTED]

## **BAMV. BATHROOM FAUCET AERATOR MEASURE VERIFICATION**

[ASK BAMV MODULE IF AERA1=1 OR 3, ELSE SKIP TO LOGIC BEFORE KAMV MODULE]

BAMV1. Our records indicate that [INSERT BAER\_QTY FROM CUSTOMER RECORD] bathroom faucet aerator(s) were installed by the Multi-Family Home Energy Savings Program during a technician's visit to your home. Is this correct?

- 1. YES, QUANTITY IS CORRECT [SKIP TO BAMV2A]
- 2. NO, QUANTITY IS INCORRECT [CONTINUE TO BAMV2]
- 8. DON'T KNOW [SKIP TO KAMV1]
- 9. REFUSED [SKIP TO KAMV1]

BAMV2. How many faucet aerators were installed in your bathroom(s)? (PROMPT FOR BEST GUESS.) [NUMERIC OPEN END UP TO 999, DK, REF] [IF DK OR REF, SKIP TO KAMV1][USE AS [BAER\_QTY] FOR REMAINDER OF SURVEY]

BAMV3. Is (are) the bathroom faucet aerator(s) still installed in the original location?

- 1. YES [SKIP TO BAMV15]
- 2. NO [CONTINUE TO BAMV3A]
- 8. DON'T KNOW [CONTINUE TO BAMV3A]
- 9. REFUSED [CONTINUE TO BAMV3A]

BAMV3a. Which of the following best describes what happened with the bathroom faucet aerator? (READ LIST) [MULTIPUNCH]

- 01. It is installed at some other location in your home
- 02. It was thrown away
- 03. It is in storage
- 04. It was given away
- 00. OTHER, SPECIFY
- 98. DON'T KNOW
- 99. REFUSED

BAMV3b-3g. [OMITTED]

BAMV4. [OMITTED]

**IF BAMV3a = 01, 02 or 03; ASK BAMV5. ELSE SKIP TO BAMV6**

BAMV5. Why [was/were] the bathroom faucet aerator(s) moved from [their/its] original locations? **(MULTIPLE RESPONSE UP TO 5 RESPONSES)**

- 01. EQUIPMENT FAILED
- 02. DIDN'T WORK PROPERLY
- 03. DIDN'T LIKE THE FLOW OF WATER WITH THE EFFICIENT AERATOR
- 04. DIDN'T LIKE THE APPEARANCE OF THE AERATOR
- 00. OTHER, SPECIFY
- 98. DON'T KNOW
- 99. REFUSED

BAMV6. What did you replace the bathroom faucet aerator(s) with? **(MULTIPLE RESPONSE)**

- 01. With a new high efficiency aerator
- 02. With a less efficient aerator
- 03. Re-installed old equipment
- 04. DID NOT REPLACE
- 00. OTHER, SPECIFY
- 98. DON'T KNOW
- 99. REFUSED

BAMV7-14. **[OMITTED]**

BAMV15. On a scale of 1 to 5, where 1 is very dissatisfied and 5 is very satisfied, how would you rate your satisfaction with your new bathroom faucet aerator(s)? **(1=VERY DISSATISFIED; 5=VERY SATISFIED) [1 THROUGH 5, 11=DK, 12=REF]**

**IF BAMV15 = 1 or 2, ASK BAMV15a. ELSE SKIP to BAMV17**

BAMV15a. Why did you rate it that way? [OPEN END, RECORD VERBATIM] **[IF DK OR REF, THEN SKIP TO BAMV17]**

BAMV16. **[OMITTED]**

BAMV17. How many total bathroom faucets do you have in your home? **[NUMERIC OPEN END up to 99, DK, REF]**

#### **KAMV. KITCHEN FAUCET AERATOR MEASURE VERIFICATION**

KAMV1. Our records indicate that **[INSERT KAER\_QTY FROM CUSTOMER RECORD]** faucet aerator(s) were installed by the Multi-Family Home Energy Savings Program during a technician's visit to your home. Is this correct?

- 1. YES, QUANTITY IS CORRECT **[SKIP TO KAMV3]**
- 2. NO, QUANTITY IS INCORRECT **[CONTINUE TO KAMV2]**
- 8. DON'T KNOW **[SKIP TO SMV1]**
- 9. REFUSED **[SKIP TO SMV1]**

KAMV2. How many faucet aerators were installed in your kitchen faucets? **[PROMPT FOR BEST GUESS.] [NUMERIC OPEN END UP TO 999, DK, REF] [IF DK OR REF, SKIP TO SMV1][USE AS [KAER\_QTY] FOR REMAINDER OF SURVEY]**

KAMV3. Is (are) the kitchen faucet aerator(s) still installed in the original location?

- 1. YES **[SKIP TO KAMV15]**
- 2. NO **[CONTINUE TO KAMV3A]**
- 8. DON'T KNOW **[CONTINUE TO KAMV3A]**
- 9. REFUSED **[CONTINUE TO KAMV3A]**

KAMV3a. Which of the following best describes what happened with the kitchen faucet aerator(s)? **(READ LIST) [MULTIPUNCH]**

- 01. It is installed at some other location in your home
- 02. It was thrown away
- 03. It is in storage
- 04. It was given away
- 00. OTHER, SPECIFY
- 98. DON'T KNOW
- 99. REFUSED

KAMV3b-4. [OMITTED]

**IF KAMV3a = 01, 02 or 03; ASK KAMV5. ELSE SKIP TO KAMV6**

KAMV5. Why [was/were] the kitchen faucet aerator(s) removed? **(MULTIPLE RESPONSE UP TO 5 RESPONSES)**

**[WORDING CHANGE BASED ON KAER\_QTY]**

- 01. EQUIPMENT FAILED
- 02. DIDN'T WORK PROPERLY
- 03. DIDN'T LIKE THE FLOW OF WATER WITH THE EFFICIENT AERATOR
- 04. DIDN'T LIKE THE APPEARANCE OF THE AERATOR
- 00. OTHER, SPECIFY
- 98. DON'T KNOW
- 99. REFUSED

KAMV6. What did you replace the kitchen faucet aerator(s) with? **(MULTIPLE RESPONSE)**

- 01. With a new high efficiency aerator
- 02. With a less efficient aerator
- 03. Re-installed old equipment
- 04. DID NOT REPLACE
- 00. OTHER, SPECIFY
- 98. DON'T KNOW
- 99. REFUSED

KAMV7-14. [OMITTED]

KAMV15. On a scale of 1 to 5, where 1 is very dissatisfied and 5 is very satisfied, how would you rate your satisfaction with your new kitchen faucet aerators? **(1=VERY DISSATISFIED; 5=VERY SATISFIED) [1 THROUGH 5, 11=DK, 12=REF]**

**IF KAMV15 = 1 or 2, ASK KAMV15a. ELSE SKIP to KAMV16**

KAMV15a. Why did you rate it that way? **[OPEN END, RECORD VERBATIM] [IF DK OR REF, THEN SKIP TO KAMV16]**

KAMV16. How many total kitchen faucets are there in your kitchen?

**[NUMERIC OPEN END UP TO 97, DK, REF]**

## **SMV. SHOWERHEAD MEASURE VERIFICATION**

SMV1. Our records indicate that **[INSERT S\_QTY FROM CUSTOMER RECORD]** water efficient showerhead(s) were installed by the Multi-Family Home Energy Savings Program during a technician's visit to your home. Is this correct? **(NOTE TO INTERVIEWER: THIS INCLUDES BOTH WATER EFFICIENT SHOWERHEADS AND HANDHELD SHOWERHEADS)**

- 1. YES, QUANTITY IS CORRECT **[SKIP TO SMV3]**
- 2. NO, QUANTITY IS INCORRECT **[CONTINUE TO SMV2]**
- 8. DON'T KNOW **[SKIP TO PMV1]**
- 9. REFUSED **[SKIP TO PMV1]**

SMV2. How many showerheads were installed? (**PROBE FOR BEST ESTIMATE**) [NUMERIC OPEN END UP TO 999, DK, REF] [IF DK OR REF, THEN SKIP TO PMV1] [USE AS S\_QTY FOR REMAINDER OF SURVEY]

SMV3. Is (are) the showerhead(s) still installed in the original location?

1. YES [SKIP TO SMV16]
2. NO [CONTINUE TO SMV3A]
8. DON'T KNOW [CONTINUE TO SMV3A]
9. REFUSED [CONTINUE TO SMV3A]

SMV3a. Which of the following best describes what happened with the showerhead? (**READ LIST**) [MULTIPUNCH]

1. It is installed at some other location in your home
2. It was thrown away
3. It is in storage
4. It was given away
00. OTHER, SPECIFY
98. DON'T KNOW
99. REFUSED

SMV4a-6. [OMITTED]

**IF SMV3a = 1, 2 or 3; ASK SMV7. ELSE SKIP TO SMV8**

SMV7. Why were the showerhead(s) moved from their original location? (**MULTIPLE RESPONSE UP TO 7 RESPONSES**)

01. EQUIPMENT FAILED
02. DIDN'T WORK PROPERLY
03. DIDN'T LIKE THE FLOW OF WATER WITH THE EFFICIENT SHOWERHEAD
04. DIDN'T LIKE THE APPEARANCE OF THE SHOWERHEAD
00. OTHER, SPECIFY
98. DON'T KNOW
99. REFUSED

SMV8. What did you replace the showerhead(s) you removed with? (**MULTIPLE RESPONSE**)

01. With a new high efficiency showerhead
02. With a less efficient showerhead
03. Re-installed old equipment
04. DID NOT REPLACE
00. OTHER, SPECIFY
98. DON'T KNOW
99. REFUSED

SMV9-15. [OMITTED]

SMV16. On a scale of 1 to 5, where 1 is very dissatisfied and 5 is very satisfied, how would you rate your satisfaction with your new water efficient showerhead(s)? (**1=VERY DISSATISFIED; 5=VERY SATISFIED**) [1 THROUGH 5, 11=DK, 12=REF]

**IF SMV16 = 1 OR 2, ASK SMV16A. ELSE SKIP TO SMV17**

SMV16a. Why did you rate it that way? [OPEN END, RECORD VERBATIM] [IF DK OR REF, THEN SKIP TO SMV17]

SMV17. In total, how many showers are in your home? [NUMERIC OPEN END UP TO 999, DK, REF]

## **PMV. PROGRAMMABLE THERMOSTAT VERIFICATION**

**IF S1 = 1, ASK PMV1-PMV6A. ELSE SKIP TO HMV1**

PMV1. Our records indicate that **[INSERT PRT\_QTY FROM CUSTOMER RECORD]** programmable thermostats(s) were installed by the Multi-Family Home Energy Savings Program during a technician’s visit to your home. Is this correct?

1. YES, QUANTITY IS CORRECT **[SKIP TO PMV3]**
2. NO, QUANTITY IS INCORRECT **[CONTINUE TO PMV2]**
3. NO, I DID NOT INSTALL **[CONTINUE TO PMV2]**
8. DON’T KNOW **[CONTINUE TO PMV2]**
9. REFUSED **[CONTINUE TO PMV2]**

PMV2. How many programmable thermostats were installed? **(PROBE FOR BEST ESTIMATE) [NUMERIC OPEN END UP TO 999, DK, REF] [IF DK OR REF, THEN SKIP H MV1] [USE AS S\_QTY FOR REMAINDER OF SURVEY]**

**IF S5 = 1, ASK PMV3. ELSE SKIP TO PMV3A**

PMV3. Did the field technician demonstrate how to operate the programmable thermostat while you were home?

1. YES **[CONTINUE TO PMV4]**
2. NO **[CONTINUE TO PMV3A]**
8. DON’T KNOW **[CONTINUE TO PMV4]**
9. REFUSED **[CONTINUE TO PMV4]**

PMV3a. Did the field technician leave a pamphlet that indicates how to operate the programmable thermostat?

1. YES **[CONTINUE TO PMV4]**
2. NO **[CONTINUE TO PMV4]**
8. DON’T KNOW **[CONTINUE TO PMV4]**
9. REFUSED **[CONTINUE TO PMV4]**

PMV4. Are the settings on the programmable thermostat the same now as when it was originally installed by the Multi-Family program?

1. YES **[SKIP TO PMV6]**
2. NO **[CONTINUE TO PMV4A]**
8. DON’T KNOW **[SKIP TO PMV6]**
9. REFUSED **[SKIP TO PMV6]**

**IF PMV4 = 2, ASK PMV4a-PMV4b. ELSE SKIP TO PMV6**

PMV4a. About how long after the programmable thermostat was installed did you change the settings?

1. Immediately
2. A few days
3. A week or two
4. A month or more
8. DON’T KNOW
9. REFUSED

PMV4b. What settings did you change on your programmable thermostat? **[MULTIPUNCH]**

1. Increased the temperature
2. Decreased the temperature
3. Changed the timing of the program
4. Switched to manual control (turned off programmed schedule)
8. DON’T KNOW
9. REFUSED

PMV5. **[OMITTED]**

PMV6. On a scale of 1 to 5, where 1 is very dissatisfied and 5 is very satisfied, how would you rate your satisfaction with your new programmable thermostat(s)? **(1=VERY DISSATISFIED; 5=VERY SATISFIED) [1 THROUGH 5, 11=DK, 12=REF]**

**IF PMV6 = 1 or 2, ASK PMV6a. ELSE SKIP TO HMV1**

PMV6a. Why did you rate it that way? **[MULTIPUNCH]**

1. PERSONAL COMFORT
2. THERMOSTAT NOT WORKING LIKE CUSTOMER EXPECTED
3. DIFFICULT TO READ SETTINGS
4. DIFFICULT TO OPERATE
5. OPEN END, RECORD VERBATIM
6. DK **[EXCLUSIVE]**
7. REF **[EXCLUSIVE]**

**[IF DK OR REF, THEN SKIP TO HMV1]**

PMV7-7a. **[OMITTED]**

PMV8-8a. **[OMITTED]**

## **HMV. HOT WATER TANK TURNDOWN VERIFICATION**

HMV1. **[OMITTED]**

HMV2. Our records indicate that during the Multi-Family Home Energy Savings Program technician's visit to your home, they adjusted the temperature settings on your hot water heater. Is this correct?

1. YES, CORRECT
2. NO, INCORRECT **[SKIP TO WMV1]**
8. DON'T KNOW **[SKIP TO WMV1]**
9. REFUSED **[SKIP TO WMV1]**

HMV3. Is your water heater still set to the settings by the Multi-Family program?

1. YES **[SKIP TO HMV4]**
2. NO **[CONTINUE TO HMV3A]**
8. DON'T KNOW **[SKIP TO HMV4]**
9. REFUSED **[SKIP TO HMV4]**

**IF HMV3 = 2, ASK HMV3a-b. ELSE SKIP TO HMV4**

HMV3a. About how long after the water heater temperature was adjusted by the Multi-Family program did you change the settings?

1. Immediately
2. A few days
3. A week or two
4. A month or more
8. DON'T KNOW
9. REFUSED

HMV3b. What settings did you change on your water heater?

1. Increased the temperature
2. Decreased the temperature
8. DON'T KNOW
9. REFUSED

HMV4. On a scale of 1 to 5, where 1 is very dissatisfied and 5 is very satisfied, how would you rate your satisfaction with the new temperature settings on your water heater? **(1=VERY DISSATISFIED; 5=VERY SATISFIED) [1 THROUGH 5, 11=DK, 12=REF]**

**IF H MV4 = 1 or 2, ASK H MV4a. ELSE SKIP TO W MV1**

H MV4a. Why did you rate it that way?

**[OPEN END, RECORD VERBATIM] [IF DK OR REF, THEN SKIP TO W MV1]**

H MV5. **[OMITTED]**

H MV5a. **[OMITTED]**

**W MV. PIPE WRAP VERIFICATION**

**IF S1 = 2 or 3, ASK W MV1-W MV3a. ELSE SKIP TO N A1**

W MV1. Our records indicate that during the Multi-Family Home Energy Savings Program technician’s visit to your home, your hot water pipes were wrapped for better insulation. Is this correct?

1. YES, CORRECT **[CONTINUE TO W MV2]**
2. NO, INCORRECT **[SKIP TO SAT1]**
8. DON’T KNOW **[SKIP TO SAT1]**
9. REFUSED **[SKIP TO SAT1]**

W MV2. Is the pipe wrap still present on your hot water pipes?

1. YES **[SKIP TO W MV3]**
2. NO **[CONTINUE TO W MV2A]**
8. DON’T KNOW **[SKIP TO W MV3]**
9. REFUSED **[SKIP TO W MV3]**

**IF W MV2 = 2, ASK W MV2a. ELSE SKIP TO W MV3**

W MV2a. What happened to the pipe wrap?

1. It was removed
2. It was thrown away
3. It is in storage
4. It was given away
00. OTHER, SPECIFY
98. DON’T KNOW
99. REFUSED

W MV3. On a scale of 1 to 5, with 1 being very dissatisfied and 5 being very satisfied, how would you rate your satisfaction with your new hot water pipe wrap? **(1=VERY DISSATISFIED; 5=VERY SATISFIED) [1 THROUGH 5, 11=DK, 12=REF]**

**IF W MV3 = 1 or 2, ASK W MV3a. ELSE SKIP TO SAT1**

W MV3a. Why did you rate it that way? **[OPEN END, RECORD VERBATIM] [IF DK OR REF, THEN SKIP TO SAT1]**

**SAT. CUSTOMER EXPERIENCE AND SATISFACTION**

SAT1. I now have a few questions regarding your overall experience with the Multi-Family Program visit to your home. On a scale of 1 to 5, with 1 being very dissatisfied and 5 being very satisfied, how would you rate... **(1 THROUGH 5, 11=DK) [ASK ON SEPARATE SCREENS] [ROTATE SCREENS]**

- a. ... your overall satisfaction with the report you received at the end of the visit
- b. ... your overall satisfaction with the visit
- c. ... your overall satisfaction with the technician that visited your home
- d. ... your overall satisfaction with the Multi-Family Home Energy Savings Program

**ASK SAT2a FOR ALL SAT1a-d RATED 1 OR 2 DIRECTLY AFTER IT WAS RATED**

SAT2a. Why did you rate it that way?

- 00. OPEN END**
98. DON’T KNOW

99. REFUSED

SAT3a. Did you experience any problems with the technicians that visited your home or the equipment installed?

1. YES, EXPERIENCED A PROBLEM WITH THE PROGRAM STAFF [CONTINUE TO SAT3B]
2. YES, EXPERIENCED A PROBLEM WITH THE INSTALLED EQUIPMENT [CONTINUE TO SAT3B]
3. YES, EXPERIENCED A PROBLEM WITH THE STAFF AND EQUIPMENT [CONTINUE TO SAT3B]
4. DID NOT EXPERIENCE ANY PROBLEMS [SKIP TO SAT5]
8. DON'T KNOW [SKIP TO SAT5]
9. REFUSED [SKIP TO SAT5]

SAT3b. Did you report the problem?

1. YES [CONTINUE TO SAT3C]
2. NO [SKIP TO SAT5]
8. DON'T KNOW [SKIP TO SAT5]
9. REFUSED [SKIP TO SAT5]

SAT3c. To whom did you report the problem? [MULTIPUNCH]

1. MY BUILDING MANAGER OR BUILDING OWNER
2. CALLED PHONE NUMBER ON PROGRAM INFORMATION
3. ON-SITE TECHNICIAN FROM THE PROGRAM
00. OTHER, SPECIFY
98. DON'T KNOW
99. REFUSED

SAT3d. Was the issue resolved to your satisfaction?

1. YES
2. NO
8. DON'T KNOW
9. REFUSED

SAT4. [OMITTED]

SAT4a-c. [OMITTED]

**IF S5 = 1, ASK SAT5-SAT5a. ELSE SKIP TO D1**

SAT5. Did you complete and mail the customer survey that the technician left with you?

1. YES [SKIP TO D1]
2. NO [CONTINUE TO SAT5A]
8. DON'T KNOW [SKIP TO D1]
9. REFUSED [SKIP TO D1]

**IF SAT5 = 2, ASK SAT5a. ELSE SKIP TO D1**

SAT5a. Why not? [MULTIPUNCH]

1. TAKES TOO MUCH TIME
2. CAN'T FIND IT
00. OTHER (SPECIFY)
98. DON'T KNOW
99. REFUSED

## **D. DEMOGRAPHICS/HOME CHARACTERISTICS**

I have just a few questions left for background purposes.

D1. How many people live in your household year-round?

**(NOTE TO INTERVIEWER: IF NEEDED, PLEASE CLARIFY THAT THEY SHOULD ONLY BE ANSWERING FOR THEIR OWN HOME/APARTMENT, NOT THE APARTMENT BUILDING OR COMPLEX)**

**[NUMERIC OPEN END]**

98. DON'T KNOW

99. REFUSED

D2. What is the primary language spoken in your home?

**00. OPEN END**

98. DON'T KNOW

99. REFUSED

D3. Do you own or rent your home?

1. Own

2. Rent/Lease

8. DON'T KNOW

9. REFUSED

Those are all the questions I have. On behalf of the Multi-Family Home Energy Savings Program, thank you very much for your time.

### 5.9.3 Participating Decision-Maker Telephone Survey Instrument

**MULTI-FAMILY HOME ENERGY SAVINGS PROGRAM  
GPY1/EPY4 PARTICIPATING DECISION MAKER SURVEY INSTRUMENT  
October 12, 2012 FINAL**

**Purpose of this Survey Guide (not to be read to Participants)**

*The purpose of this survey guide is to collect information from participating customers in the Multi-Family Home Energy Savings Program. Questions in this survey guide are designed to provide interviewers with prepared questions to ask participating multi-family property managers or other decision-makers about their experience with the program. The table below outlines the sections, topics and questions of the interview guide to cross-reference them with the goals and objectives of the Multi-Family Home Energy Savings Program.*

**Survey Guide: Topics and Corresponding Questions**

<b>Section</b>	<b>Topics</b>	<b>Questions</b>
<b>Screening Questions</b>	Is the property serviced by any of the following energy utilities: Nicor Gas, North Shore Gas, Peoples Gas and/or Commonwealth Edison Company?	S0-S2
<b>Sources of Program Awareness</b>	How did the property manager learn about the program? What were the primary motivations for participating?	SR2-SR4
<b>CFL Verification</b>	Verification of CFL installation. How significant was participating in the Multi-Family Program on the decision-maker's choice to install the CFLs?	CMV1-CMV11
<b>Programmable Thermostat Verification (Nicor Gas only)</b>	Verification of Programmable Thermostat Installation. How significant was participating in the Multi-Family Program on the decision-maker's choice to install the programmable thermostats?	PMV1-PMV11
<b>Water Efficiency Measures Verification</b>	Verification of Faucet Aerator Installation. How significant was participating in the Multi-Family Program on the decision-maker's choice to install the aerators?	WMV1-WMV11
<b>Hot Water Tank Turndown Service Verification</b>	Verification of Hot Water Tank Turndown Implementation. How significant was participating in the Multi-Family Program on the decision-maker's choice to implement the hot water tank turndown?	HMV1-HMV9
<b>Participant Spillover &amp; Other Properties</b>	Did the property manager implement energy efficiency measures in common areas that did not receive a rebate? Does the property manager recall receiving suggestions about energy efficiency improvements to common areas? Did the property manager/management company adopt new measures or practices at other properties under management (that did not receive a rebate) after participating in the Multi-Family program? How significant was participating in the Multi-Family Program on the decision-maker's choice to implement these measures or practices?	CA1-CA11
<b>Customer Satisfaction</b>	How satisfied was the customer with the common area and direct installation portions of the multifamily program? Did the customer make referrals to the program? What are potential barriers to additional participation? Does customer wish to share any additional information about the program?	CS9-CS14
<b>Firmographics</b>	Is subject property master metered or individually metered? Do residents own or rent?	F1-F2

**INTRODUCTION AND SCREEN**

**[NOTE TO INTERVIEWER: Cross-reference names from program tracking database to ensure you indicate the property utilities.]**

INT1. Hello, this is [INTERVIEWER'S NAME] calling from the Blackstone Group on behalf of your local natural gas and electric utilities. *This is not a sales call.* We are contacting people who have participated in the Multi-Family Home Energy Savings Program when a field technician came to your property and installed new energy efficient equipment in your tenants' homes.

**[IF NEEDED:** This program provided free installation of compact fluorescent light bulbs, faucet aerators, low flow showerheads, programmable thermostats, hot water tank turndown, and pipe wrap and recommendations for energy efficiency improvements to your common areas.]

INT2. The purpose of this call is to ask you about your satisfaction with the Multi-Family Home Energy Savings Program as it pertains to your property [PNAME] at [LOCAT]. We are conducting an independent study to evaluate the Multi-Family Home Energy Savings Program and would like to include your opinions. Your answers will be included with answers from other program participants and used to help evaluate the effectiveness of the program and to design future programs. *We would be grateful for your participation in our research.*

Are you the person who is most familiar with your participation in this program?

1. YES [GO TO INT5]
2. NO [GO TO INT3]
3. REQUESTS MORE INFORMATION [GO TO INT4]
4. DON'T KNOW [GO TO INT3]
5. REFUSED [GO TO INT3]

INT3. Is there someone who may be more knowledgeable about the upgrades that I could speak with?

1. YES AND AVAILABLE [GO BACK TO INT1]
2. YES AND BUSY [SCHEDULE CALLBACK]
3. YES AND BUSY [SCHEDULE GENERAL CALLBACK]
4. NO [TERMINATE – REFUSAL]
5. DON'T KNOW/REFUSED [TERMINATE]

INT4. Your local gas and electric utilities sponsor the Multi-Family Home Energy Savings Program. The Illinois Commerce Commission (ICC) requires certain utilities to submit such a report each year. These utilities hired our firm to prepare an independent evaluation of their energy efficiency programs. The information that we gather will help the ICC determine if existing programs should continue while assisting in the design of future programs.

1. SATISFIED WITH INFORMATION – CONTINUE [GO TO INT5]
2. WANTS TO VERIFY STUDY [SCHEDULE CALLBACK]
3. WANTS TO VERIFY STUDY [GENERAL CALLBACK]
4. REFUSED [TERMINATE]

INT5. In this survey, I will refer to the property that participated in the program as “property.”

**(IF NEEDED:** It will take about 30 minutes.)

## SCREENING QUESTIONS

S0. Is your property serviced by natural gas?

Yes [SKIP TO S1]

No [SKIP TO S2]

(DON'T KNOW)

(REFUSED)

S1. The program records indicate that [UTIL] provides natural gas service to your property, is this correct?

**(RECORD UTILITY ANSWER AND FOLLOW SKIP LOGIC ACCORDINGLY)**

1. NICOR GAS [DURING SURVEY, SKIP SECTION WMV]
2. NORTH SHORE GAS [DURING SURVEY, SKIP SECTION PMV]
3. PEOPLES GAS [DURING SURVEY, SKIP SECTION PMV]
4. ANOTHER UTILITY: [SPECIFY \_\_\_\_\_]
5. DON'T KNOW
6. REFUSED

**[IF UTIL AND ANSWER IN S1 DO NOT MATCH, PLEASE RECATEGORIZE THE RESPONDENT IN THE QUOTAS AS ANSWER TO S1. IF S1=1, THEN TAG AS QUOTA=NICOR. IF S1=2 OR 3, THEN TAG AS QUOTA=INTEGRYS. IF S1=4, THEN TERMINATE. IF S1=8 OR 9, CONTINUE WITH Q'RE AND USE UTIL AS QUOTA]**

S2. The program records show that during the visit to your property, a field technician installed the following equipment. Please confirm that this is correct. Did you receive....**(READ ANSWERS FROM INSTALLATION LIST ON CUSTOMER RECORD) [1=YES, 2=NO, 7=NA, 8=DON'T KNOW, 9=REFUSED]**

- g. [IF CFL=1] Compact fluorescent light (CFL) bulbs
- h. [IF KAERA=1] Kitchen faucet aerators
- i. [IF BAERA=1] Bathroom faucet aerators
- j. [IF SHOW=1] Low flow showerheads
- k. [IF POTHER=1] Programmable thermostats
- l. [IF HWTT=1] Hot water tank turndown
- m. [IF PWRAP=1] Pipe wrap for your water heater pipes
- n. [IF CAREC= 1] Recommendations to improve common area energy efficiency (e.g. upgrades to common area lighting or central heating system)

## SOURCES OF PROGRAM AWARENESS/REASONS FOR PARTICIPATING

[OMITTED]

SR1. How did you become aware of the Multi-Family Home Energy Savings program? (READ LIST)

**[RANDOMIZE, MULTIPUNCH]**

1. Field technician visit
2. Mass media (newspaper, internet, TV/Radio)
3. Phone call to property
4. Part of larger corporate decision
5. Trade organization and events
0. (OTHER, SPECIFY)
98. (DON'T KNOW)
99. (REFUSED)

SR2. What was your primary reason for participating in the program? (READ LIST) **[RANDOMIZE, MULTIPUNCH]**

1. Free energy efficiency products for dwelling units
2. Common area energy efficiency recommendations
3. Requests from tenants

- 4. Marketing
- 5. Corporate decision
- 0. (OTHER, SPECIFY)
- 98. (DON'T KNOW)
- 99. (REFUSED)

SR3. About how many months after you first became aware of the program was it that you decided to participate in the program?

- 1. Within six months
- 2. More than six months, but less than a year later
- 3. More than a year, but less than two years later
- 4. More than two years later
- 88. (Don't know)
- 99. (Refused)

SR4. [OMITTED]

### **CFLS [ASK IF CFL=1]**

CMV1. At the time that you first heard about this program, had you already been thinking about purchasing CFLs for this property?

- 1. (YES) [CONTINUE TO CMV2]
- 2. (NO) [SKIP TO NEXT SECTION]
- 8. (DON'T KNOW) [CONTINUE TO CMV2]
- 9. (REFUSED) [CONTINUE TO CMV2]

CMV2. Had you already begun researching or collecting information about CFLs to aid in your purchase decision?

- 1. (YES) [CONTINUE TO CMV3]
- 2. (NO) [SKIP TO CMV4]
- 8. (DON'T KNOW) [SKIP TO CMV4]
- 9. (REFUSED) [SKIP TO CMV4]

CMV3. Had you already selected which CFLs you were planning to purchase?

- 1. (YES)
- 2. (NO)
- 8. (DON'T KNOW)
- 9. (REFUSED)

CMV4. Just to be sure I understand, did you have specific plans to purchase and install CFLs before learning about the program?

- 1. YES [CONTINUE TO CMV5]
- 2. NO [SKIP TO CMV9]
- 8. (DON'T KNOW) [SKIP TO CMV9]
- 9. (REFUSED) [SKIP TO CMV9]

CMV5. Did the program influence you to purchase and install the CFLs **earlier** than you otherwise would have?

- 1. YES [CONTINUE TO CMV6]
- 2. NO [SKIP TO CMV7]
- 8. (DON'T KNOW) [SKIP TO CMV7]
- 9. (REFUSED) [SKIP TO CMV7]

CMV6. How much later would you have installed the <MEASURE>, if you hadn't participated in the program?

1. Within six months
2. More than six months, but less than a year later
3. More than a year, but less than two years later
4. More than two years later
88. (Don't know)
99. (Refused)

CMV7. Without the program, would you have installed the same number of CFLs, fewer CFLs, or more CFLs?

1. The same number **[SKIP TO CMV9]**
2. Would have installed **fewer** CFLs **[CONTINUE TO CMV8]**
3. Would have installed **more** CFLs **[CONTINUE TO CMV8]**
8. (DON'T KNOW) **[SKIP TO CMV9]**
9. (REFUSED) **[SKIP TO CMV9]**

CMV8. About how many CFLs would you have installed without the program?

**[NUMERIC OPEN END, DK, REF]**

CMV9. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have purchased and installed the same number of CFLs on your property if you had not received them through the program? **[0-10, DK, REF]**

**[IF CMV9 < 3 AND CMV4 = 2, 8, OR 9, SKIP TO LOGIC BEFORE PMV1] [SHOW CMV10 AND CMV11 ON SAME SCREEN WITH THE BELOW TEXT]**

I'm going to read several statements about the CFLs you received. On a scale of 0 to 10, where 0 is Strongly Disagree and 10 is Strongly Agree, how much do you agree with each statement:

CMV10. There may have been several reasons for my installation of CFLs, but the program was a critical factor in my decision to have the CFLs installed. **[0-10, DK, REF]**

CMV11. I would have purchased and installed the same CFLs within a year of when I did even if I had not received them from the program. **[0-10, DK, REF]**

**[ASK CMVC1 IF QUALIFY BASED ON SIX TERMS BELOW. ELSE SKIP TO LOGIC BEFORE PMV1]**

**Consistency Check & Resolution**

**NOTE TO PROGRAMMING: [CMVCC1 WILL BE ASKED ONLY FOR THOSE RESPONDENTS WHO HAVE A CLEAR INCONSISTENCY BETWEEN RESPONSES (I.E., ALL BUT ONE OF THE QUESTIONS ARE AT ONE END OF THE SPECTRUM FOR FREE RIDERSHIP WHILE ONE QUESTION IS AT THE OTHER SPECTRUM.)] THE QUESTION RESPONSES THAT WILL BE USED TO TRIGGER CMVCC1 ARE:**

- **CMV9 (HOW LIKELY IS IT THAT YOU WOULD HAVE INSTALLED THE SAME ITEM)**
- **CMV10 (PROGRAM WAS A CRITICAL FACTOR IN MY DECISION TO INSTALL ITEM)**
- **CMV11 (WOULD HAVE INSTALLED ITEM WITHIN A YEAR, WITHOUT THE PROGRAM)**

**{IF CMV9= 0,1, OR 2 AND CMV10= 0,1, OR 2 AND CMV11= 8,9, OR 10, ASK CMVC1. THEN INCONSISTENCY1= "you would likely not have installed the CFLs without the program but that differs from when you said the program was not a critical factor and you would install the CFLs within a year without the program"}**

**{IF CMV9= 8,9,10 AND CMV10= 8,9,10 AND CMV11= 0,1,2, ASK CMVC1. INCONSISTENCY1= 'you would likely have installed the CFLs without the program but that differs from your response that the program was a critical factor and you would not have installed the CFLs within the year without the program'}**

**{IF CMV9= 0,1,2 AND CMV10= 0,1,2 AND CMV11= 0,1,2, ASK CMVC1. INCONSISTENCY1='the program was not a critical factor in your decision to install the CFLs but that differs from your response that you would not have installed the CFLs within the year without the program'}**

{IF CMV9= 8,9,10 AND CMV10= 8,9,10 AND CMV11= 8,9,10, ASK CMVC1. INCONSISTENCY1='the program was a critical factor in your decision install the CFLs but that differs from your response that you would have installed the CFLs within the year without the program'}

{IF CMV9= 8,9,10 AND CMV10= 0,1,2 AND CMV11= 0,1,2, ASK CMVC1. INCONSISTENCY1= 'you would not have installed the CFLs within the year without the program but that differs from your response that the program was not a critical factor and you were likely to install the CFLs without the program'}

{IF CMV9= 0,1,2 AND CMV10= 8,9,10 AND CMV11=8,9,10, ASK CMVC1. INCONSISTENCY1='you would have installed the CFLs within the year without the program but that differs from your response that you were not likely to install the CFLs and the program was a critical factor'}

**CMVC1.** Let me make sure I understand you. Earlier, you said **[INCONSISTENCY1]**. Please tell me in your own words what influence, if any, the program had on your decision to install the CFLs at the time you did? **[OPEN END, DK, REF]**

**PROGRAMMABLE THERMOSTATS** [ASK IS P THER=1 AND UTIL=1]

[NOTE TO PROGRAMMING: PROGRAMMABLE THERMOSTATS QUESTIONS ARE TO BE ASKED OF COMED & NICOR GAS CUSTOMERS ONLY.]

PMV1. At the time that you first heard about this program, had you already been thinking about purchasing programmable thermostats for this property?

1. (YES) **[CONTINUE TO PMV2]**
2. (NO) **[SKIP TO NEXT SECTION]**
8. (DON'T KNOW) **[SKIP TO PMV2]**
9. (REFUSED) **[SKIP TO PMV2]**

PMV2. Had you already began researching or collecting information about programmable thermostats to aid in your purchase decision?

1. (YES) **[CONTINUE TO PMV3]**
2. (NO) **[SKIP TO PMV4]**
8. (DON'T KNOW) **[SKIP TO PMV4]**
9. (REFUSED) **[SKIP TO PMV4]**

PMV3. Had you already selected which programmable thermostats you were planning to purchase?

1. (YES)
2. (NO)
8. (DON'T KNOW)
9. (REFUSED)

PMV4. Just to be sure I understand, did you have any specific plans to purchase and install the same programmable thermostats at your property before learning about the program?

1. YES **[CONTINUE TO PMV5]**
2. NO **[SKIP TO PMV9]**
8. (DON'T KNOW) **[SKIP TO PMV9]**
9. (REFUSED) **[SKIP TO PMV9]**

PMV5. Did the program influence you to purchase and install the programmable thermostats **earlier** than you otherwise would have?

1. YES **[CONTINUE TO PMV6]**
2. NO **[SKIP TO PMV7]**
8. (DON'T KNOW) **[SKIP TO PMV7]**
9. (REFUSED) **[SKIP TO PMV7]**

PMV6. How much later would you have installed the thermostats, if you hadn't participated in the program?

1. Within six months
2. More than six months, but less than a year later
3. More than a year, but less than two years later
4. More than two years later
88. (Don't know)
99. (Refused)

PMV7. Without the program, would you have installed the same number of programmable thermostats, fewer thermostats, or more thermostats?

1. The same number **[SKIP TO CMV9]**
2. Would have installed **fewer** thermostats **[CONTINUE TO CMV8]**
3. Would have installed **more** thermostats **[CONTINUE TO CMV8]**
8. (Don't know) **[SKIP TO CMV9]**
9. (Refused) **[SKIP TO CMV9]**

PMV8. How many thermostats would you have installed without the program?

**[NUMERIC OPEN END, DK, REF]**

PMV9. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have purchased and installed the same programmable thermostats on your property if you had not received (it/them) through the program? **[0-10, DK, REF]**

**[IF PMV9 <=3 AND PMV4 = No/DK/REF, SKIP TO LOGIC BEFORE WMV1.] [SHOW PMV10 AND PMV11 ON SAME SCREEN WITH THE BELOW TEXT]**

I'm going to read two statements about the programmable thermostats you received. On a scale of 0 to 10, where 0 is strongly disagree and 10 is strongly agree, how much do you agree with each statement.

PMV10. There may have been several reasons for my installation of programmable thermostats, but the program was a critical factor in my decision to have the programmable thermostats installed. **[0-10, DK, REF]**

PMV11. I would have purchased and installed the same programmable thermostats within a year of when I did even if I had not received (it/them) from the program. **[0-10, DK, REF]**

**[ASK CMVC1 IF QUALIFY BASED ON SIX TERMS BELOW. ELSE SKIP TO LOGIC BEFORE WMV1]**

**Consistency Check & Resolution**

**[PMVCC1 WILL BE ASKED ONLY FOR THOSE RESPONDENTS WHO HAVE A CLEAR INCONSISTENCY BETWEEN RESPONSES (I.E., ALL BUT ONE OF THE QUESTIONS ARE AT ONE END OF THE SPECTRUM FOR FREE RIDERSHIP WHILE ONE QUESTION IS AT THE OTHER SPECTRUM.) THE QUESTION RESPONSES THAT WILL BE USED TO TRIGGER PMVCC1 ARE:**

- **PMV9 (HOW LIKELY IS IT THAT YOU WOULD HAVE INSTALLED THE SAME ITEM)**
- **PMV10 (PROGRAM WAS A CRITICAL FACTOR IN MY DECISION TO INSTALL ITEM)**
- **PMV11 (WOULD HAVE INSTALLED ITEM WITHIN A YEAR, WITHOUT THE PROGRAM)**

**{IF PMV9= 0,1,2 AND PMV10= 0,1,2 AND PMV11= 8,9,10, ASK PMVC1. INCONSISTENCY2='you would likely not have installed the programmable thermostats without the program but that differs from when you said the program was not a critical factor and you would install the programmable thermostats within a year without the program'}**

**{IF PMV9= 8,9,10 AND PMV10= 8,9,10 AND PMV11= 0,1,2, ASK PMVC1. INCONSISTENCY2= 'you would likely have installed the programmable thermostats without the program but that differs from your response that the program was a critical factor and you would not have installed the programmable thermostats within the year without the program'}**

{IF PMV9= 0,1,2 AND PMV10= 0,1,2 AND PMV11= 0,1,2, ASK PMVC1. INCONSISTENCY2='the program was not a critical factor in your decision to install the programmable thermostats but that differs from your response that you would not have installed the programmable thermostats within the year without the program'}

{IF PMV9= 8,9,10 AND PMV10= 8,9,10 AND PMV11= 8,9,10, ASK PMVC1. INCONSISTENCY2='the program was a critical factor in your decision to install the programmable thermostats but that differs from your response that you would have installed the programmable thermostats within the year without the program'}

{IF PMV9= 8,9,10 AND PMV10= 0,1,2 AND PMV11= 0,1,2, ASK PMVC1. INCONSISTENCY2= 'you would not have installed the programmable thermostats within the year without the program but that differs from your response that the program was not a critical factor and you were likely to install the programmable thermostats without the program'}

{IF PMV9= 0,1,2 AND PMV10= 8,9,10 AND PMV11=8,9,10, ASK PMVC1. INCONSISTENCY2='you would have installed the programmable thermostats within the year without the program but that differs from your response that you were not likely to install the programmable thermostats and the program was a critical factor'}}

PMVC1. Let me make sure I understand you. Earlier, you said **[INCONSISTENCY2]**. Please tell me in your own words what influence, if any, the program had on your decision to install the programmable thermostats at the time you did? **[OPEN END, DK, REF]**

## **WATER EFFICIENCY MEASURES [ASK IF SHOW=1]**

### **SHOWERHEADS:**

WMV1. At the time that you first heard about this program, had you already been thinking about purchasing Water Efficient Showerheads for this property?

1. (YES) **[CONTINUE TO WMV2]**
2. (NO) **[SKIP TO NEXT SECTION]**
8. (DON'T KNOW) **[SKIP TO WMV2]**
9. (REFUSED) **[SKIP TO WMV2]**

WMV2. Had you already began researching or collecting information about Water Efficient Showerheads to aid in your purchase decision?

1. (YES) **[CONTINUE TO WMV3]**
2. (NO) **[SKIP TO WMV4]**
8. (DON'T KNOW) **[SKIP TO WMV4]**
9. (REFUSED) **[SKIP TO WMV4]**

WMV3. Had you already selected which Water Efficient Showerheads you were planning to purchase?

1. (YES)
2. (NO)
8. (DON'T KNOW)
9. (REFUSED)

WMV4. Just to be sure I understand, did you have any specific plans to purchase and install Water Efficient Showerheads before learning about the program?

1. YES **[CONTINUE TO WMV5]**
2. NO **[SKIP TO WMV9]**
8. (DON'T KNOW) **[SKIP TO WMV9]**
9. (REFUSED) **[SKIP TO WMV9]**

WMV5. Did the program influence you to purchase and install the Water Efficient Showerheads **earlier** than you otherwise would have?

1. YES **[CONTINUE TO WMV6]**
2. NO **[SKIP TO WMV7]**
8. (DON'T KNOW) **[SKIP TO WMV7]**
9. (REFUSED) **[SKIP TO WMV7]**

WMV6. How much later would you have installed the Water Efficient Showerheads , if you hadn't participated in the program?

1. Within six months
2. More than six months, but less than a year later
3. More than a year, but less than two years later
4. More than two years later
88. (Don't know)
99. (Refused)

WMV7. Without the program, would you have installed the same number of Water Efficient Showerheads , fewer Water Efficient Showerheads , or more Water Efficient Showerheads ?

1. The same number [\[SKIP TO WMV9\]](#)
2. Would have installed **fewer** Water Efficient Showerheads [\[CONTINUE TO WMV8\]](#)
3. Would have installed **more** Water Efficient Showerheads [\[CONTINUE TO WMV8\]](#)
8. (Don't know) [\[SKIP TO WMV9\]](#)
9. (Refused) [\[SKIP TO WMV9\]](#)

WMV8. How many Water Efficient Showerheads would you have installed without the program?

[NUMERIC OPEN END, DK, REF]

WMV9. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have purchased and installed the same Water Efficient Showerheads on your property if you had not received them through the program?

[0-10, DK, REF]

[\[IF WMV9 =3 AND WMV4 = 2,8,9, SKIP TO WMV12\]](#) [\[SHOW WMV10 AND WMV11 ON SAME SCREEN WITH THE BELOW TEXT\]](#)

I'm going to read several statements about the Water Efficient Showerheads you received. On a scale of 0 to 10, where 0 is Strongly Disagree and 10 is Strongly Agree, how much do you agree with each statement:

WMV10. There may have been several reasons for my installation of Water Efficient Showerheads , but the program was a critical factor in my decision to have the Water Efficient Showerheads installed. [0-10, DK, REF]

WMV11. I would have purchased and installed the same Water Efficient Showerheads within a year of when I did even if I had not received them from the program. [0-10, DK, REF]

#### Consistency Check & Resolution

**NOTE TO PROGRAMMER: [WMVCC1 WILL BE ASKED ONLY FOR THOSE RESPONDENTS WHO HAVE A CLEAR INCONSISTENCY BETWEEN RESPONSES (I.E., ALL BUT ONE OF THE QUESTIONS ARE AT ONE END OF THE SPECTRUM FOR FREE RIDERSHIP WHILE ONE QUESTION IS AT THE OTHER SPECTRUM.) THE QUESTION RESPONSES THAT WILL BE USED TO TRIGGER WMVCC1 ARE:**

- **WMV9 (HOW LIKELY IS IT THAT YOU WOULD HAVE INSTALLED THE SAME ITEM)**
- **WMV10 (PROGRAM WAS A CRITICAL FACTOR IN MY DECISION TO INSTALL ITEM)**
- **WMV11 (WOULD HAVE INSTALLED ITEM WITHIN A YEAR, WITHOUT THE PROGRAM)**

**{IF WMV9= 0,1,2 AND WMV10= 0,1,2 AND WMV11= 8,9,10, ASK WMVC1. INCONSISTENCY3='you would likely not have installed the Water Efficient Showerheads without the program but that differs from when you said the program was not a critical factor and you would install the CFLs within a year without the program'}**

**{IF WMV9= 8,9,10 AND WMV10= 8,9,10 AND WMV11= 0,1,2, ASK WMVC1. INCONSISTENCY3= 'you would likely have installed the Water Efficient Showerheads without the program but that differs from your response that**

the program was a critical factor and you would not have installed the Water Efficient Showerheads within the year without the program’}

{IF WMV9= 0,1,2 AND WMV10= 0,1,2 AND WMV11= 0,1,2, ASK WMVC1. INCONSISTENCY3=‘the program was not a critical factor in your decision to install the Water Efficient Showerheads but that differs from your response that you would not have installed the Water Efficient Showerheads within the year without the program’}

{IF WMV9= 8,9,10 AND WMV10= 8,9,10 AND WMV11= 8,9,10, ASK WMVC1. INCONSISTENCY3=‘the program was a critical factor in your decision install the Water Efficient Showerheads but that differs from your response that you would have installed the Water Efficient Showerheads within the year without the program’}

{IF WMV9= 8,9,10 AND WMV10= 0,1,2 AND WMV11= 0,1,2, ASK WMVC1. INCONSISTENCY3= ‘you would not have installed the Water Efficient Showerheads within the year without the program but that differs from your response that the program was not a critical factor and you were likely to install the Water Efficient Showerheads without the program’}

{IF WMV9= 0,1,2 AND WMV10= 8,9,10 AND WMV11=8,9,10, ASK WMVC1. INCONSISTENCY3=‘you would have installed the Water Efficient Showerheads within the year without the program but that differs from your response that you were not likely to install the Water Efficient Showerheads and the program was a critical factor’}}

**WMVC1.** Let me make sure I understand you. Earlier, you said [INCONSISTENCY3]. Please tell me in your own words what influence, if any, the program had on your decision to install the Water Efficient Showerheads at the time you did? [OPEN END, DK, REF]

[Note to Interviewer: Repeat as necessary for all water efficiency measures. Hot Water Pipe Wrap for Peoples Gas and North Shore Gas customers only.]

**[IF WEM=1, SKIP TO LOGIC BEFORE HMV1]**

WMV12. The questions I just asked you focused on Water Efficient Showerheads, and our program records indicate that you also installed [SHOW IF KAERA=1 “Kitchen Aerators”] [SHOW IF KAERA=1 AND BAERA=1 “and”] [SHOW IF BAERA=1 “Bathroom Aerators”] [SHOW IF (KAERA=1 AND HWPW=1) OR IF (BAERA=1 AND HWPW=1) OR (KAERA=1 AND BAERA=1 AND HWPW=1) “and”] [SHOW IF HWPW=1 “Hot Water Pipe Wrap”]. Was the program as influential in your decision to install these other water efficiency measures as it was in your decision to install water efficient showerheads or would you say the program influenced some measures more than others? (READ LIST) [MULTIPUNCH]

1. The program was similarly influential for all measures installed [SKIP TO LOGIC BEFORE HMV1]
2. [SHOW IF KAERA=1] Kitchen aerators involved a unique decision making process
3. [SHOW IF BAERA=1] Bathroom aerators involved a unique decision making process
4. [SHOW IF PWRAP=1] Hot water pipe wrap involved a unique decision making process
5. [SHOW IF KAERA=1 AND BAERA=1] Both kitchen and bathroom aerators were the same process, but different from water efficient showerheads and hot water pipe wrap

**KITCHEN AERATORS [ASK IF (WMV12=2 OR 5) OR IF (KAERA=1 AND SHOW=0)]**

WKV1. At the time that you first heard about this program, had you already been thinking about purchasing kitchen aerators for this property?

1. (YES) [CONTINUE TO WKV2]
2. (NO) [SKIP TO NEXT SECTION]
8. (DON’T KNOW) [SKIP TO WKV2]
9. (REFUSED) [SKIP TO WKV2]

WKV2. Had you already began researching or collecting information about kitchen aerators to aid in your purchase decision?

1. (YES) [CONTINUE TO WKV3]
2. (NO) [SKIP TO WKV4]
8. (DON’T KNOW) [SKIP TO WKV4]
9. (REFUSED) [SKIP TO WKV4]

WKV3. Had you already selected which kitchen aerators you were planning to purchase?

1. (YES)
2. (NO)
8. (DON'T KNOW)
9. (REFUSED)

WKV4. Just to be sure I understand, did you have any specific plans to purchase and install kitchen aerators before learning about the program?

1. YES [CONTINUE TO WKV5]
2. NO [SKIP TO WKV9]
8. (DON'T KNOW) [SKIP TO WKV9]
9. (REFUSED) [SKIP TO WKV9]

WKV5. Did the program influence you to purchase and install the kitchen aerators **earlier** than you otherwise would have?

1. YES [CONTINUE TO WKV6]
2. NO [SKIP TO WKV7]
8. (DON'T KNOW) [SKIP TO WKV7]
9. (REFUSED) [SKIP TO WKV7]

WKV6. How much later would you have installed the kitchen aerators , if you hadn't participated in the program?

1. Within six months
2. More than six months, but less than a year later
3. More than a year, but less than two years later
4. More than two years later
88. (Don't know)
99. (Refused)

WKV7. Without the program, would you have installed the same number of kitchen aerators , fewer kitchen aerators , or more kitchen aerators ?

1. The same number [SKIP TO WKV9]
2. Would have installed **fewer** kitchen aerators [CONTINUE TO WKV8]
3. Would have installed **more** kitchen aerators [CONTINUE TO WKV8]
8. (Don't know) [SKIP TO WKV9]
9. (Refused) [SKIP TO WKV9]

WKV8. How many kitchen aerators would you have installed without the program?

[NUMERIC OPEN END, DK, REF]

WKV9. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have purchased and installed the same kitchen aerators on your property if you had not received them through the program?

[0-10, DK, REF]

**[IF WKV9 =3 AND WKV4 = 2,8 OR 9, SKIP TO LOGIC BEFORE WBV1] [SHOW WKV10 AND WKV11 ON SAME SCREEN WITH THE BELOW TEXT]**

I'm going to read several statements about the kitchen aerators you received. On a scale of 0 to 10, where 0 is Strongly Disagree and 10 is Strongly Agree, how much do you agree with each statement:

WKV10. There may have been several reasons for my installation of kitchen aerators , but the program was a critical factor in my decision to have the kitchen aerators installed. [0-10, DK, REF]

WKV11. I would have purchased and installed the same kitchen aerators within a year of when I did even if I had not received them from the program. [0-10, DK, REF]

**Consistency Check & Resolution**

**NOTE TO PROGRAMMER:** [WKVCC1 WILL BE ASKED ONLY FOR THOSE RESPONDENTS WHO HAVE A CLEAR INCONSISTENCY BETWEEN RESPONSES (I.E., ALL BUT ONE OF THE QUESTIONS ARE AT ONE END OF THE SPECTRUM FOR FREE RIDERSHIP WHILE ONE QUESTION IS AT THE OTHER SPECTRUM.) THE QUESTION RESPONSES THAT WILL BE USED TO TRIGGER WKVCC1 ARE:

- WKV9 (HOW LIKELY IS IT THAT YOU WOULD HAVE INSTALLED THE SAME ITEM)
- WKV10 (PROGRAM WAS A CRITICAL FACTOR IN MY DECISION TO INSTALL ITEM)
- WKV11 (WOULD HAVE INSTALLED ITEM WITHIN A YEAR, WITHOUT THE PROGRAM)

{IF WKV9= 0,1,2 AND WKV10= 0,1,2 AND WKV11= 8,9,10, ASK WKVC1. INCONSISTENCY4='you would likely not have installed the kitchen aerators without the program but that differs from when you said the program was not a critical factor and you would install the CFLs within a year without the program'}

{IF WKV9= 8,9,10 AND WKV10= 8,9,10 AND WKV11= 0,1,2, ASK WKVC1. INCONSISTENCY4= 'you would likely have installed the kitchen aerators without the program but that differs from your response that the program was a critical factor and you would not have installed the kitchen aerators within the year without the program'}

{IF WKV9= 0,1,2 AND WKV10= 0,1,2 AND WKV11= 0,1,2, ASK WKVC1. INCONSISTENCY4='the program was not a critical factor in your decision to install the kitchen aerators but that differs from your response that you would not have installed the kitchen aerators within the year without the program'}

{IF WKV9= 8,9,10 AND WKV10= 8,9,10 AND WKV11= 8,9,10, ASK WKVC1. INCONSISTENCY4='the program was a critical factor in your decision install the kitchen aerators but that differs from your response that you would have installed the kitchen aerators within the year without the program'}

{IF WKV9= 8,9,10 AND WKV10= 0,1,2 AND WKV11= 0,1,2, ASK WKVC1. INCONSISTENCY4= 'you would not have installed the kitchen aerators within the year without the program but that differs from your response that the program was not a critical factor and you were likely to install the kitchen aerators without the program'}

{IF WKV9= 0,1,2 AND WKV10= 8,9,10 AND WKV11=8,9,10, ASK WKVC1. INCONSISTENCY4='you would have installed the kitchen aerators within the year without the program but that differs from your response that you were not likely to install the kitchen aerators and the program was a critical factor'}

**WKVC1.** Let me make sure I understand you. Earlier, you said [INCONSISTENCY4]. Please tell me in your own words what influence, if any, the program had on your decision to install the kitchen aerators at the time you did? [OPEN END, DK, REF]

**[ASK IF KAERA=1 AND SHOW=0 AND BAERA=1]**

WMV12. The questions I just asked you focused on kitchen aerators, and our program records indicate that you also installed bathroom aerators. Was the program as influential in your decision to install the bathroom aerators as it was in your decision to install kitchen aerators or would you say the program influenced the bathroom aerators differently? (READ LIST) **[MULTIPUNCH]**

1. The program was similarly influential for all measures installed **[SKIP TO LOGIC BEFORE BHV1]**
2. Bathroom aerators involved a unique decision making process **[ASK WBV1]**

**BATHROOM AERATORS [ASK IF (WMV12=3) OR IF (BAERA=1 AND SHOW=0 AND WMV12<>1)]**

WBV1. At the time that you first heard about this program, had you already been thinking about purchasing bathroom aerators for this property?

1. (YES) **[CONTINUE TO WBV2]**
2. (NO) **[SKIP TO NEXT SECTION]**
8. (DON'T KNOW) **[SKIP TO WBV2]**
9. (REFUSED) **[SKIP TO WBV2]**

WBV2. Had you already began researching or collecting information about bathroom aerators to aid in your purchase decision?

1. (YES) **[CONTINUE TO WBV3]**
2. (NO) **[SKIP TO WBV4]**

- 8. (DON'T KNOW) [\[SKIP TO WBV4\]](#)
- 9. (REFUSED) [\[SKIP TO WBV4\]](#)

WBV3. Had you already selected which bathroom aerators you were planning to purchase?

- 1. (YES)
- 2. (NO)
- 8. (DON'T KNOW)
- 9. (REFUSED)

WBV4. Just to be sure I understand, did you have any specific plans to purchase and install bathroom aerators before learning about the program?

- 1. YES [\[CONTINUE TO WBV5\]](#)
- 2. NO [\[SKIP TO WBV9\]](#)
- 8. (DON'T KNOW) [\[SKIP TO WBV9\]](#)
- 9. (REFUSED) [\[SKIP TO WBV9\]](#)

WBV5. Did the program influence you to purchase and install the bathroom aerators **earlier** than you otherwise would have?

- 1. YES [\[CONTINUE TO WBV6\]](#)
- 2. NO [\[SKIP TO WBV7\]](#)
- 8. (DON'T KNOW) [\[SKIP TO WBV7\]](#)
- 9. (REFUSED) [\[SKIP TO WBV7\]](#)

WBV6. How much later would you have installed the bathroom aerators , if you hadn't participated in the program?

- 1. Within six months
- 2. More than six months, but less than a year later
- 3. More than a year, but less than two years later
- 4. More than two years later
- 88. (Don't know)
- 99. (Refused)

WBV7. Without the program, would you have installed the same number of bathroom aerators , fewer bathroom aerators , or more bathroom aerators ?

- 1. The same number [\[SKIP TO WBV9\]](#)
- 2. Would have installed **fewer** bathroom aerators [\[CONTINUE TO WBV8\]](#)
- 3. Would have installed **more** bathroom aerators [\[CONTINUE TO WBV8\]](#)
- 8. (Don't know) [\[SKIP TO WBV9\]](#)
- 9. (Refused) [\[SKIP TO WBV9\]](#)

WBV8. How many bathroom aerators would you have installed without the program?  
[NUMERIC OPEN END, DK, REF]

WBV9. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have purchased and installed the same bathroom aerators on your property if you had not received them through the program?

[0-10, DK, REF]

**[IF WBV9 =3 AND WBV4 = 2,8 OR 9, SKIP TO LOGIC BEFORE WHV1] [SHOW WBV10 AND WBV11 ON SAME SCREEN WITH THE BELOW TEXT]**

I'm going to read several statements about the bathroom aerators you received. On a scale of 0 to 10, where 0 is Strongly Disagree and 10 is Strongly Agree, how much do you agree with each statement:

WBV10. There may have been several reasons for my installation of bathroom aerators , but the program was a critical factor in my decision to have the bathroom aerators installed. [0-10, DK, REF]

WBV11. I would have purchased and installed the same bathroom aerators within a year of when I did even if I had not received them from the program. [0-10, DK, REF]

**Consistency Check & Resolution**

**NOTE TO PROGRAMMER: [WBVCC1 WILL BE ASKED ONLY FOR THOSE RESPONDENTS WHO HAVE A CLEAR INCONSISTENCY BETWEEN RESPONSES (I.E., ALL BUT ONE OF THE QUESTIONS ARE AT ONE END OF THE SPECTRUM FOR FREE RIDERSHIP WHILE ONE QUESTION IS AT THE OTHER SPECTRUM.) THE QUESTION RESPONSES THAT WILL BE USED TO TRIGGER WBVCC1 ARE:**

- **WBV9 (HOW LIKELY IS IT THAT YOU WOULD HAVE INSTALLED THE SAME ITEM)**
- **WBV10 (PROGRAM WAS A CRITICAL FACTOR IN MY DECISION TO INSTALL ITEM)**
- **WBV11 (WOULD HAVE INSTALLED ITEM WITHIN A YEAR, WITHOUT THE PROGRAM)**

{IF WBV9= 0,1,2 AND WBV10= 0,1,2 AND WBV11= 8,9,10, ASK WBVC1. INCONSISTENCY4='you would likely not have installed the bathroom aerators without the program but that differs from when you said the program was not a critical factor and you would install the CFLs within a year without the program'}

{IF WBV9= 8,9,10 AND WBV10= 8,9,10 AND WBV11= 0,1,2, ASK WBVC1. INCONSISTENCY4= 'you would likely have installed the bathroom aerators without the program but that differs from your response that the program was a critical factor and you would not have installed the bathroom aerators within the year without the program'}

{IF WBV9= 0,1,2 AND WBV10= 0,1,2 AND WBV11= 0,1,2, ASK WBVC1. INCONSISTENCY4='the program was not a critical factor in your decision to install the bathroom aerators but that differs from your response that you would not have installed the bathroom aerators within the year without the program'}

{IF WBV9= 8,9,10 AND WBV10= 8,9,10 AND WBV11= 8,9,10, ASK WBVC1. INCONSISTENCY4='the program was a critical factor in your decision install the bathroom aerators but that differs from your response that you would have installed the bathroom aerators within the year without the program'}

{IF WBV9= 8,9,10 AND WBV10= 0,1,2 AND WBV11= 0,1,2, ASK WBVC1. INCONSISTENCY4= 'you would not have installed the bathroom aerators within the year without the program but that differs from your response that the program was not a critical factor and you were likely to install the bathroom aerators without the program'}

{IF WBV9= 0,1,2 AND WBV10= 8,9,10 AND WBV11=8,9,10, ASK WBVC1. INCONSISTENCY4='you would have installed the bathroom aerators within the year without the program but that differs from your response that you were not likely to install the bathroom aerators and the program was a critical factor'}}

**WBVC1.** Let me make sure I understand you. Earlier, you said [insert appropriate inconsistency statement]. Please tell me in your own words what influence, if any, the program had on your decision to install the bathroom aerators at the time you did? [OPEN END, DK, REF]

**HOT WATER PIPE WRAP [ASK IF (WMV12=4 OR 5) OR IF (HWPW=1 AND SHOW=0)]**

WHV1. At the time that you first heard about this program, had you already been thinking about purchasing hot water pipe wrap for this property?

1. (YES) [CONTINUE TO WHV2]
2. (NO) [SKIP TO NEXT SECTION]
8. (DON'T KNOW) [SKIP TO WHV2]
9. (REFUSED) [SKIP TO WHV2]

WHV2. Had you already began researching or collecting information about hot water pipe wrap to aid in your purchase decision?

1. (YES) [CONTINUE TO WHV3]
2. (NO) [SKIP TO WHV4]
8. (DON'T KNOW) [SKIP TO WHV4]
9. (REFUSED) [SKIP TO WHV4]

WHV3. Had you already selected which hot water pipe wrap you were planning to purchase?

1. (YES)
2. (NO)
8. (DON'T KNOW)
9. (REFUSED)

WHV4. Just to be sure I understand, did you have any specific plans to purchase and install hot water pipe wrap before learning about the program?

1. YES [CONTINUE TO WHV5]
2. NO [SKIP TO WHV9]
8. (DON'T KNOW) [SKIP TO WHV9]
9. (REFUSED) [SKIP TO WHV9]

WHV5. Did the program influence you to purchase and install the hot water pipe wrap **earlier** than you otherwise would have?

1. YES [CONTINUE TO WHV6]
2. NO [SKIP TO WHV7]
8. (DON'T KNOW) [SKIP TO WHV7]
9. (REFUSED) [SKIP TO WHV7]

WHV6. How much later would you have installed the hot water pipe wrap , if you hadn't participated in the program?

1. Within six months
2. More than six months, but less than a year later
3. More than a year, but less than two years later
4. More than two years later
88. (Don't know)
99. (Refused)

WHV7. Without the program, would you have installed the same amount of hot water pipe wrap, less hot water pipe wrap, or more hot water pipe wrap?

1. The same number [SKIP TO WHV9]
2. Would have installed **fewer** hot water pipe wrap [CONTINUE TO WHV8]
3. Would have installed **more** hot water pipe wrap [CONTINUE TO WHV8]
8. (Don't know) [SKIP TO WHV9]
9. (Refused) [SKIP TO WHV9]

WHV8. How much hot water pipe wrap would you have installed without the program?

[NUMERIC OPEN END, DK, REF]

WHV9. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have purchased and installed the same amount of hot water pipe wrap on your property if you had not received them through the program?

[0-10, DK, REF]

**[IF WHV9 =3 AND WHV4 = 2,8 OR 9, SKIP TO LOGIC BEFORE WHV1] [SHOW WHV10 AND WHV11 ON SAME SCREEN WITH THE BELOW TEXT]**

I'm going to read several statements about the hot water pipe wrap you received. On a scale of 0 to 10, where 0 is Strongly Disagree and 10 is Strongly Agree, how much do you agree with each statement:

WHV10. There may have been several reasons for my installation of hot water pipe wrap, but the program was a critical factor in my decision to have the hot water pipe wrap installed. [0-10, DK, REF]

WHV11. I would have purchased and installed the same amount of hot water pipe wrap within a year of when I did even if I had not received them from the program. [0-10, DK, REF]

**Consistency Check & Resolution**

**NOTE TO PROGRAMMER: [WHVCC1 WILL BE ASKED ONLY FOR THOSE RESPONDENTS WHO HAVE A CLEAR INCONSISTENCY BETWEEN RESPONSES (I.E., ALL BUT ONE OF THE QUESTIONS ARE AT ONE END OF THE SPECTRUM FOR FREE RIDERSHIP WHILE ONE QUESTION IS AT THE OTHER SPECTRUM.) THE QUESTION RESPONSES THAT WILL BE USED TO TRIGGER WHVCC1 ARE:**

- **WHV9 (HOW LIKELY IS IT THAT YOU WOULD HAVE INSTALLED THE SAME ITEM)**
- **WHV10 (PROGRAM WAS A CRITICAL FACTOR IN MY DECISION TO INSTALL ITEM)**
- **WHV11 (WOULD HAVE INSTALLED ITEM WITHIN A YEAR, WITHOUT THE PROGRAM)**

{IF WHV9= 0,1,2 AND WHV10= 0,1,2 AND WHV11= 8,9,10, ASK WHVC1. INCONSISTENCY5='you would likely not have installed the hot water pipe wrap without the program but that differs from when you said the program was not a critical factor and you would install the CFLs within a year without the program'}

{IF WHV9= 8,9,10 AND WHV10= 8,9,10 AND WHV11= 0,1,2, ASK WHVC1. INCONSISTENCY5= 'you would likely have installed the hot water pipe wrap without the program but that differs from your response that the program was a critical factor and you would not have installed the hot water pipe wrap within the year without the program'}

{IF WHV9= 0,1,2 AND WHV10= 0,1,2 AND WHV11= 0,1,2, ASK WHVC1. INCONSISTENCY5='the program was not a critical factor in your decision to install the hot water pipe wrap but that differs from your response that you would not have installed the hot water pipe wrap within the year without the program'}

{IF WHV9= 8,9,10 AND WHV10= 8,9,10 AND WHV11= 8,9,10, ASK WHVC1. INCONSISTENCY5='the program was a critical factor in your decision install the hot water pipe wrap but that differs from your response that you would have installed the hot water pipe wrap within the year without the program'}

{IF WHV9= 8,9,10 AND WHV10= 0,1,2 AND WHV11= 0,1,2, ASK WHVC1. INCONSISTENCY5= 'you would not have installed the hot water pipe wrap within the year without the program but that differs from your response that the program was not a critical factor and you were likely to install the hot water pipe wrap without the program'}

{IF WHV9= 0,1,2 AND WHV10= 8,9,10 AND WHV11=8,9,10, ASK WHVC1. INCONSISTENCY5='you would have installed the hot water pipe wrap within the year without the program but that differs from your response that you were not likely to install the hot water pipe wrap and the program was a critical factor'}

**WHVC1.** Let me make sure I understand you. Earlier, you said [INCONSISTENCY5]. Please tell me in your own words what influence, if any, the program had on your decision to install the hot water pipe wrap at the time you did? [OPEN END, DK, REF]

**HOT WATER TANK TURNDOWN SERVICE [ASK IF HWTT=1]**

HMV1. At the time that you first heard about this program, had you already been thinking about implementing hot water turndown service for this property?

1. (YES) [CONTINUE TO HMV2]
2. (NO) [SKIP TO NEXT SECTION]
8. (DON'T KNOW) [SKIP TO HMV2]
9. (REFUSED) [SKIP TO HMV2]

HMV2. Had you already began researching or collecting information about implementing hot water turndown service to aid in your decision?

1. (YES) [CONTINUE TO HMV3]
2. (NO) [SKIP TO HMV4]
8. (DON'T KNOW) [SKIP TO HMV4]
9. (REFUSED) [SKIP TO HMV4]

HMV3. Had you already selected a contractor or technician to perform the hot water turndown service you were planning to purchase?

1. (YES)
2. (NO)
8. (DON'T KNOW)
9. (REFUSED)

HMV4. Just to be sure I understand, did you have any specific plans to implement hot water turndown service before learning about the program?

1. YES [CONTINUE TO HMV5]
2. NO [SKIP TO HMV9]
8. (DON'T KNOW) [SKIP TO HMV9]
9. (REFUSED) [SKIP TO HMV9]

HMV5. Did the program influence you to implement hot water turndown service **earlier** than you otherwise would have?

1. YES [CONTINUE TO HMV6]
2. NO [SKIP TO HMV7]
8. (DON'T KNOW) [SKIP TO HMV7]
9. (REFUSED) [SKIP TO HMV7]

HMV6. How much later would you have implemented the hot water turndown service, if you hadn't participated in the program?

1. Within six months
2. More than six months, but less than a year later
3. More than a year, but less than two years later
4. More than two years later
88. (Don't know)
99. (Refused)

HMV7. **OMITTED**

HMV8. **OMITTED**

HMV9. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have implemented the same hot water turndown service on your property if you had not received the service through the program? [0-10, DK, REF]

**[IF HMV7 <=3 AND HMV4 = 2,8, OR 9, SKIP TO LOGIC BEFORE CA1] [SHOW WHV10 AND WHV11 ON SAME SCREEN WITH THE BELOW TEXT]**

I'm going to read several statements about the hot water turndown service you received. On a scale of 0 to 10, where 0 is Strongly Disagree and 10 is Strongly Agree, how much do you agree with each statement:

HMV10. There may have been several reasons for my implementing the hot water turndown service, but the program was a critical factor in my decision to have the hot water turndown service performed. [0-10, DK, REF]

HMV11. I would have implemented the same hot water turndown service within a year of when I did even if I had not received it from the program. [0-10, DK, REF]

#### Consistency Check & Resolution

**NOTE TO PROGRAMMER: [HMVCC1 WILL BE ASKED ONLY FOR THOSE RESPONDENTS WHO HAVE A CLEAR INCONSISTENCY BETWEEN RESPONSES (I.E., ALL BUT ONE OF THE QUESTIONS ARE AT ONE END OF THE SPECTRUM FOR FREE RIDERSHIP WHILE ONE QUESTION IS AT THE OTHER SPECTRUM.) THE QUESTION RESPONSES THAT WILL BE USED TO TRIGGER HMVCC1 ARE:**

- HMV9 (HOW LIKELY IS IT THAT YOU WOULD HAVE INSTALLED THE SAME ITEM)
- HMV10 (PROGRAM WAS A CRITICAL FACTOR IN MY DECISION TO INSTALL ITEM)
- HMV11 (WOULD HAVE INSTALLED ITEM WITHIN A YEAR, WITHOUT THE PROGRAM)

{IF HMV9= 0,1,2 AND HMV10= 0,1,2 AND HMV11= 8,9,10, ASK HMVC1. INCONSISTENCY6='you would likely not have implemented the hot water turndown service without the program but that differs from when you said the program was not a critical factor and you would implement the hot water turndown service within a year without the program'}

{IF HMV9= 8,9,10 AND HMV10= 8,9,10 AND HMV11= 0,1,2, ASK HMVC1. INCONSISTENCY6= 'you would likely have implemented the hot water turndown service without the program but that differs from your response that the program was a critical factor and you would not have implemented the hot water turndown service within the year without the program'}

{IF HMV9= 0,1,2 AND HMV10= 0,1,2 AND HMV11= 0,1,2, ASK HMVC1. INCONSISTENCY6='the program was not a critical factor in your decision to implement the hot water turndown service but that differs from your response that you would not have implemented the hot water turndown service within the year without the program'}

{IF HMV9= 8,9,10 AND HMV10= 8,9,10 AND HMV11= 8,9,10, ASK HMVC1. INCONSISTENCY6='the program was a critical factor in your decision implement the hot water turndown service but that differs from your response that you would have implemented the hot water turndown service within the year without the program'}

{IF HMV9= 8,9,10 AND HMV10= 0,1,2 AND HMV11= 0,1,2, ASK HMVC1. INCONSISTENCY6= 'you would not have implemented the hot water turndown service within the year without the program but that differs from your response that the program was not a critical factor and you were likely to implement the hot water turndown service without the program'}

{IF HMV9= 0,1,2 AND HMV10= 8,9,10 AND HMV11=8,9,10, ASK HMVC1. INCONSISTENCY6='you would have implemented the hot water turndown service within the year without the program but that differs from your response that you were not likely to implement the hot water turndown service and the program was a critical factor'}}

HMVC1. Let me make sure I understand you. Earlier, you said [INCONSISTENCY6]. Please tell me in your own words what influence, if any, the program had on your decision to implement the hot water turndown service at the time you did? [OPEN END, DK, REF]

## **PARTICIPANT SPILLOVER**

CA1. Since participating in the Multi-Family Home Energy Savings Program, have you taken action to reduce the energy consumption of any of the following systems at your property...? **[RANDOMIZE 1-3] [MULTIPLE RESPONSE]**

1. Lighting
2. Space Heating
3. Water Heating
4. Appliances
5. Faucet Aerators
6. Water Efficient Showerheads
7. Programmable Thermostats
8. Hot Water Heater Tank Turndown Service
9. Hot Water Pipe Insulation Wrap
10. OTHER, SPECIFY
11. NO **(SKIP TO NEXT SECTION)**
88. (DON'T KNOW) **(SKIP TO NEXT SECTION)**
99. (REFUSED) **(SKIP TO NEXT SECTION)**

CA1a. **[ASK IF CA1=1-10]** Did you receive a utility rebate for this action?

1. Yes **(SKIP TO NEXT SECTION)**
2. No (continue to CA1b)
3. Project not yet complete (continue to CA1b)
8. (DON'T KNOW) (continue to CA1b)
9. (REFUSED) (continue to CA1b)

CA1b. Please describe the energy efficiency upgrades at your property. What type of equipment did you install? (NOTE TO INTERVIEWER: ASK FOR MAKE, MODEL AND EFFICIENCY RATING. IF RESPONSE IS GENERAL, E.G., "LIGHTING EQUIPMENT", PROBE FOR SPECIFIC MEASURE. PROBE FROM LIST, IF NECESSARY.)

### **[MULTIPLE RESPONSE]**

- 1 (Lighting: T8 lamps)
- 2 (Lighting: T5 lamps)
- 3 (Lighting: CFL fixtures)
- 4 (Lighting: LED lamps)
- 5 (Lighting: Controls / Occupancy sensors)
- 6 (Space Heating: Central Furnace or Boiler)
- 7 (Space Heating: Individual Furnace or Boiler)
- 8 (Space Heating: Variable Frequency Drives (VFD/VSD) on HVAC Motors)
- 9 (Water Heating: Central Boiler or Water Heater)
- 10 (Water Heating: Individual Water Heaters)
- 11 (Appliances: ENERGY STAR appliances in common area)
- 12 (Appliances: ENERGY STAR appliances in dwelling units)
- 13 (Faucet Aerators: Faucet Aerators in common area bathroom(s))
- 14 (Faucet Aerators: Faucet Aerators in common area kitchen(s))
- 15 (Water Efficient Showerheads: Water Efficient Showerheads in common area(s))
- 16 (Programmable Thermostats)
- 17 (Hot Water Heater Tank Turndown Service)
- 18 (Hot Water Pipe Insulation Wrap)
- 00 (Other, specify)
- 96 (Didn't implement any measures)
- 98 (Don't know)
- 99 (Refused)

CA1c. What was the quantity of the new equipment installed? [0-1000, DK, REF]

CA1d. **[ASK IF CA1=2-10]** What is the fuel source of the new equipment installed?

1. Electric
2. Natural Gas
3. Other (Specify)
4. Don't Know
5. Refused

CA1e. Thinking about the measure with the greatest potential for reducing energy consumption, why did you purchase this equipment without an incentive, if it was available? (If needed, read back measure: <CA1b RESPONSE>). [MULTIPLE RESPONSE, UP TO 3] [PROBE FROM LIST, IF NECESSARY]

- 1 (Takes too long to get approval)
- 2 (No time to participate, needed equipment immediately)
- 3 (The equipment did not qualify)
- 4 (The amount of the incentive wasn't large enough)
- 5 (Did not know the program was available)
- 6 (There was no program available)
- 7 (Had reached the maximum incentive amount)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

**[ASK CA1f IF CA1e=3, ELSE SKIP TO CA1e]**

CA1f. Why didn't the equipment qualify? [OPEN END]

CA1g. What type of equipment did you replace? (NOTE TO INTERVIEWER: Prompt if needed for the fuel source, make and model, or fuel source and approximate age of the old equipment at the location) [OPEN END, DK, REF]

CA2. Was the Multi-Family Home Energy Savings Program a significant influence in encouraging you to implement efficiency improvements in your property's [answer to CA1]? Please rate this on a 0-10 scale, where 0 means not at all significant and 10 means very significant. [0-10, DK, REF]

CA2a. **[ASK IF CA2>5]** In your own words, how was the program influential in encouraging you to implement efficiency improvements in your property's [answer to CA1]? [OPEN END, DK, REF]

CA2b. Was this action recommended to you by a representative of the Multi-Family Home Energy Savings Program? (note to interviewer: could include written or verbal recommendation, formal or informal)

1. Yes
2. No
8. (DON'T KNOW)
9. (REFUSED)

**OTHER PROPERTIES**

CA3. Since participating in the Multi-Family Home Energy Savings Program, have you taken action to reduce the energy consumption of any of the following systems at other properties under management [RANDOMIZE 1-3] [MULTIPUNCH]

1. Lighting
2. Space Heating
3. Water Heating
4. Appliances
5. Faucet Aerators
6. Water Efficient Showerheads
7. Programmable Thermostats
8. Hot Water Heater Tank Turndown Service
9. Hot Water Pipe Insulation Wrap
10. OTHER, SPECIFY
11. NO (SKIP TO NEXT SECTION)
88. (DON'T KNOW) (SKIP TO NEXT SECTION)
99. (REFUSED) (SKIP TO NEXT SECTION)

CA3a. Did you receive a utility rebate for this action?

1. Yes (SKIP TO next section)
2. No (continue to CA3b)
3. Project not yet complete (continue to CA3b)
8. (DON'T KNOW) (continue to CA3b)
9. (REFUSED) (continue to CA3b)

CA3b. Please describe the projects where you purchased and installed energy efficiency upgrades at other property(ies) under your management within the state of Illinois. What type of equipment did you install? (NOTE TO INTERVIEWER: ASK FOR MAKE, MODEL AND EFFICIENCY RATING. IF RESPONSE IS GENERAL, E.G., "LIGHTING EQUIPMENT", PROBE FOR SPECIFIC MEASURE. PROBE FROM LIST, IF NECESSARY.) [MULTIPLE RESPONSE]

- 1 (Lighting: T8 lamps)
- 2 (Lighting: T5 lamps)
- 3 (Lighting: CFL fixtures)
- 4 (Lighting: LED lamps)
- 5 (Lighting: Controls / Occupancy sensors)
- 6 (Space Heating: Central Furnace or Boiler)
- 7 (Space Heating: Individual Furnace or Boiler)
- 8 (Space Heating: Variable Frequency Drives (VFD/VSD) on HVAC Motors)
- 9 (Water Heating: Central Boiler or Water Heater)
- 10 (Water Heating: Individual Water Heaters)
- 11 (Appliances: ENERGY STAR appliances in common area)
- 12 (Appliances: ENERGY STAR appliances in dwelling units)
- 13 (Faucet Aerators: Faucet Aerators in common area bathroom(s))
- 14 (Faucet Aerators: Faucet Aerators in common area kitchen(s))
- 15 (Water Efficient Showerheads: Water Efficient Showerheads in common area(s))
- 16 (Programmable Thermostats)
- 17 (Hot Water Heater Tank Turndown Service)
- 18 (Hot Water Pipe Insulation Wrap)
- 00 (Other, specify)
- 96 (Didn't implement any measures)
- 98 (Don't know)
- 99 (Refused)

CA3c. What was the quantity of the new equipment installed? [0-1000, DK, REF]

CA3d. **[ASK IF CA3=2-10]** What was the fuel source of the new equipment installed?

1. Electric
2. Natural Gas
3. Other (specify)
4. Don't Know
5. Refused

CA4. Thinking about the measure with the greatest potential for reducing energy consumption, why did you purchase this equipment without an incentive, if it was available? (If needed, read back measure: <CA3b RESPONSE>). [MULTIPLE RESPONSE, UP TO 3] [PROBE FROM LIST, IF NECESSARY]

- 1 (Takes too long to get approval)
- 2 (No time to participate, needed equipment immediately)
- 3 (The equipment did not qualify)
- 4 (The amount of the incentive wasn't large enough)
- 5 (Did not know the program was available)
- 6 (There was no program available)
- 7 (Had reached the maximum incentive amount)
- 00 (Other, specify)
- 98 (Don't know)
- 99 (Refused)

**[ASK CA4a IF CA4=3, ELSE SKIP TO CA5]**

CA4a. Why didn't the equipment qualify? [OPEN END]

CA5. What type of equipment did you replace? (NOTE TO INTERVIEWER: prompt if needed the fuel source, make and model of old equipment, or fuel source and approximate age of the old equipment at the location) [OPEN END, DK, REF]

CA6. Where was the project located? (Prompt for: Name of property and address incl. street number, street name, city, state and zip code if possible)  
[OPEN END, DK, REF]

CA7 To your knowledge, what utility provides natural gas to this property?

- 1 Nicor Gas
- 2 North Shore Gas
- 3 Peoples Gas
- 4 Other
- 5 Don't Know
- 6 Refused

CA8 To your knowledge, what utility provides electricity to this property?

- 1 Commonwealth Edison (ComEd)
- 2 Other
- 3 Don't Know
- 4 Refused

CA9. Was the Multi-Family Home Energy Savings Program a significant influence in encouraging you to implement efficiency improvements in your property's [answer to CA3b]? Please rate this on a 0-10 scale, where 0 means not at all significant and 10 means very significant. [0-10, DK, REF]

CA9a. **[ASK IF CA9>5]** In your own words, how was the program influential in encouraging you to implement efficiency improvements in your property’s [answer to CA3b]? [OPEN END, DK, REF]

CA11. Thank you for sharing this information with us. We may have follow-up questions about the equipment you installed that didn’t receive a rebate. Would you be willing to schedule a brief follow-up conversation with a member of our program team to get more details?

- 1 (Yes)
- 2 (No)
- 98 (Don't know)
- 99 (Refused)

**OVERALL CUSTOMER SATISFACTION**

CS1 – CS8a. **[OMITTED]**

CSINT. I’ll now ask you to rate your experience with the on-site visit and the program in general on a scale from 0 to 10, where 10 is a high rating and 0 is a low rating. For example, if I ask about your level of satisfaction, 0 would mean “very dissatisfied” and 10 would mean “very satisfied.” If you are unsure about the meaning of the scale for any of the questions, just let me know.

CS9. On a scale of 0 to 10, how would you rate your overall satisfaction with... (PROMPT IF NECESSARY: Remember 0 means “very dissatisfied” and 10 means “very satisfied”) **[SHOW ON SEPARATE PAGES RANDOMIZED WITH QUESTION TEXT AND PROMPT ON EACH PAGE][SCALE 0-10, DK, REF] [RANDOMIZE]**

- e. ...the recommended opportunities for common area energy efficiency upgrades at your property
- f. ...the direct install measures
- g. ...the summary report about the direct install activities at your property
- h. ...the field team that installed the direct install measures at your property
- i. ...the Multi-Family Home Energy Savings Program

**[IF CS9a-e<3, ASK CS10a-e DIRECTLY AFTER IT IS RATED LOW]**

CS10a-e. Why did you rate it that way?

- 01. OPEN END
- 98. (DON'T KNOW)

CS11. On a scale from 0-10, with 10 being very influential, how influential has the Multi-Family Home Energy Savings Program been at helping your property...? **[GRID] [RANDOMIZE] [SCALE 0-10, DK, REF]**

- a. Retain tenants?
- b. Increase property appeal?
- c. Decrease property utility expenses?
- d. Decrease maintenance expenses?
- e. Decrease tenant utility bills?

C11f. Has the Multi-Family Home Energy Savings Program been helpful in any other way at your property?

- 0. YES **[OPEN END]**
- 1. NO
- 88. DON'T KNOW
- 99. REFUSED

CS12. Are there additional incentives or measures you would like to see included in the Multi-Family Home Energy Savings Program? (IF YES, ASK “Which?”)

- 1. COMMON AREA LIGHTING
- 2. COMMON AREA BATHROOM AERATORS OR SHOWERHEADS
- 3. PARKING LOT LIGHTING
- 4. HVAC UPGRADES
- 5. OTHER, SPECIFY

- 6. NO
- 88. (DON'T KNOW)
- 99. (REFUSED)

CS13. What barriers, if any, are there to referring other properties to the Multi-Family Home Energy Savings Program? [Select all that apply] **[RANDOMIZE 1-4]** **[MULTIPUNCH]**

- 1. I don't know any other property managers
- 2. I don't have time to refer the program to my colleagues
- 3. There is no incentive for me to refer the program to my colleagues
- 4. I'm not convinced that the program saves me money
- 5. OTHER (SPECIFY)
- 8. (DON'T KNOW)
- 7. (REFUSED)

CS14. Do you have any specific stories for potential program case studies that you wish to share with the program?

- 1. YES **[OPEN END]**
- 2. NO
- 8. (DON'T KNOW)
- 9. (REFUSED)

## **FIRMOGRAPHICS**

I have just a few questions left for background purposes.

F1. Is the property that we discussed master-metered (e.g. have a central water heating system) or individually metered (e.g. each apartment has its own water heating system)?

- 1. MASTER-METERED
- 2. INDIVIDUALLY METERED
- 3. OTHER (SPECIFY)
- 4. (DON'T KNOW)
- 5. (REFUSED)

F2. Do residents at your property own or rent their homes?

- 1. OWN
- 2. RENT
- 3. OTHER (SPECIFY)
- 4. (DON'T KNOW)
- 5. (REFUSED)

OUTRO. Those are all the questions I have. On behalf of the Multi-Family Home Energy Savings Program, thank you very much for your time.

### 5.3 *Elementary Energy Education*