NAVIGANT

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

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Commonwealth Edison Company
Nicor Gas

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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).[1] 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

[1] 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[2]: *"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,[3] 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[4] — 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[5] of 997,875 therms reflecting the program's gross realization rate of 101.2 percent.[6] The program level NTGR for gas measures was 0.96 based on evaluation research findings, yielding net energy savings of 959,087 therms.

[2] "Proposed Framework for Counting Net Savings in Illinois." Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.

[3] Ibid.

[4] 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."

[5] 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.

[6] 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[7], 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.

[7] "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%
Sub-total Nicor Gas	*35,000*	*24,744*	*71%*
Electric Units/ComEd	-	2,297	-
ComEd sub-total	***35,000***	***27,041***	***77%***

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:
A*re 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)[8] 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?

[8] 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 ±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 ± 2.5% for Peoples Gas/North Shore Gas, ± 2.1% for Nicor Gas and ± 3.9% for ComEd.

2.1.4 Program Documentation Review

Navigant reviewed the Rider 30 program's Operating Plan[9], Program Implementation Scope of Work[10], Nicor Gas Compliance Filling[11], the program year end summary report, the Multi-Family program's Operations Manual[12], 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)[13] with those used by the program's implementation contractor, reviewing measure counts found in the program tracking system and applying verified savings estimates to

[9] Nicor Gas Rider 30 EEP Program Portfolio Operating Plan (Version 1.1)

[10] ComEd Nicor MF SOW PY4_6 FINAL REV 2E.pdf

[11] Nicor Gas EEP 2011-2014 Revised Plan Filed Pursuant to Order Docket No. 10-0562 (May 24, 2011)

[12] Honeywell Smart Grid Solutions, Multifamily Home Energy Savings Program Operations Manual (updated February, 2011).

[13] 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[14] 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*[15]. 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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[14] Energy Efficiency Best Practices Project, Best Practices Self-Benchmarking Tool (Multifamily Program): http://www.eebestpractices.com/benchmarking.asp

[15] 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[16] 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)

$$\boldsymbol{Gross\ Annual\ Therm\ Savings} = \%FossilDHW \times [(GPM_{base} \times L_{base} - GPM_{low} \times L_{low}) \times Household \times SPCD \times 365.25/SPH] \times EPG_{gas} \times ISR$$

$$= 26.21 \text{ therms per unit}$$

Where:

- %Fossil DHW = 100% of DHW is heated by natural gas
- GPM_{base} = Baseline showerhead gallons per minute = 2.67
- L_{base} = Shower length in minutes with baseline showerhead = 8.2
- GPM_{low} = Water efficient showerhead gallons per minute = 1.5
- L_{low} = 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_{gas} = 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[17] presented in Figure 2-2 to calculate verified gross savings for water efficient kitchen and bathroom faucet aerators (natural gas).

[16] State of Illinois Energy Efficiency Technical Reference Manual, 7.4.5
[17] State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4

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

$$\boldsymbol{Gross\ Annual\ Therm\ Savings} = \%FossilDHW \times [(GPM_{base} \times L_{base} - GPM_{low} \times L_{low}) \times Household \times 365.25 \times DF/FPH] \times EPG_{gas} \times ISR$$

= 2.52 therms per unit (Kitchen) = 3.02 therms per unit (Bathroom)

Where:

- %Fossil DHW = 100% of DHW is heated by natural gas
- GPM_{base} = Average flow rate, in gallons per minute, of the baseline faucet "as-used" = 1.2
- L_{base} = Average retrofit length faucet use per capita for all faucets in minutes = 9.85
- GPM_{low} = Average flow rate, in gallons per minute, of retrofit faucet aerator "as-used"= 0.94
- L_{low} = 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_{gas} = 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[18] 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)

$$\boldsymbol{Gross\ Annual\ Therm\ Savings} = 6.40 \text{ therms per unit}$$

= 6.40 therms per unit

Verified Gross Savings Algorithm – Programmable Thermostats (Natural Gas)

Navigant used the algorithm[19] 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)

$$Verified\ Gross\ Annual\ Therm\ Savings = \%FossilHeat \times Gas_Heating_Consumption \times Heating_Reduction \times HF \times Eff_ISR$$

=34.1 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%[20]

[18] State of Illinois Energy Efficiency Technical Reference Manual, 7.4.6

[19] 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*[21].

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

[21] 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,[22] 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[23] — 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[24]: *"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

[22] Ibid.
[23] 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."
[24] "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[25], Program Implementation Scope of Work[26], Nicor Gas Compliance Filling[27], the program year end summary report, Multi-Family program's Operations Manual[28], 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.

[25] Nicor Gas Rider 30 EEP Program Portfolio Operating Plan (Version 1.1)

[26] ComEd Nicor MF SOW PY4_6 FINAL REV 2E.pdf

[27] Nicor Gas EEP 2011-2014 Revised Plan Filed Pursuant to Order Docket No. 10-0562 (May 24, 2011)

[28] 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[29]. Navigant found some discrepancies between the program administrator's measure savings values using TRM inputs and

[29] 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
Total	**80,541**	**80,541**

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*[30]. 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.[31]

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

[31] 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
Total		**251,641**	**251,641**

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.[32] 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
Total		**7,594**	**7,594**

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

[32] 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
Total	**n/a**	**80,541**	**986,438**	**101.2%**	**997,875**

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.[33]

[33] Navigant included verified electric energy savings itemized by utility service territory in Section 5.5.

Table 3-10. ComEd EPY4 Ex-Ante[34] 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
sub-total CFL measures	*n/a*	*n/a*	*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
sub-total water measures	*n/a*	*n/a*	*7,594*	*2,303,786*	*67.0%*	*1,543,537*
Total	*n/a*	**n/a**	**259,235**	**12,618,404**	**90.7%**	**11,445,570**

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

Table 3-11. ComEd EPY4 Ex-Ante[35] 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
sub-total CFL measures	*n/a*	*n/a*	*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
sub-total water measures	*n/a*	*n/a*	*7,594*	*98*	*67.0%*	*66*
Total	**n/a**	**n/a**	**259,235**	**1,142**	**93.5%**	**1,068**

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

[34] EPY4 CFL measure values were deemed. Water efficiency measure values were estimated. Realization rates for CFLs and for water efficiency measures were deemed.

[35] 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[36], 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[37], 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	*ComEd Plan Year 4 Deemed Savings Values 31230.pdf*
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.

[36] "Proposed Framework for Counting Net Savings in Illinois." Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.
[37] 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
Total	**887,795**	**959,087**

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
sub-total CFL measures	*8,020,647*	*812*
Showerhead	901,988	23
Kitchen Aerator	184,808	19
Bathroom Aerator	348,693	20
sub-total water measures	*1,435,489*	*61*
Total	**9,456,136**	**873**

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%
Sub-total Nicor Gas	*35,000*	*24,744*	*71%*
Electric Units/ComEd	-	2,297	-
ComEd sub-total	***35,000***	***27,041***	***77%***

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.

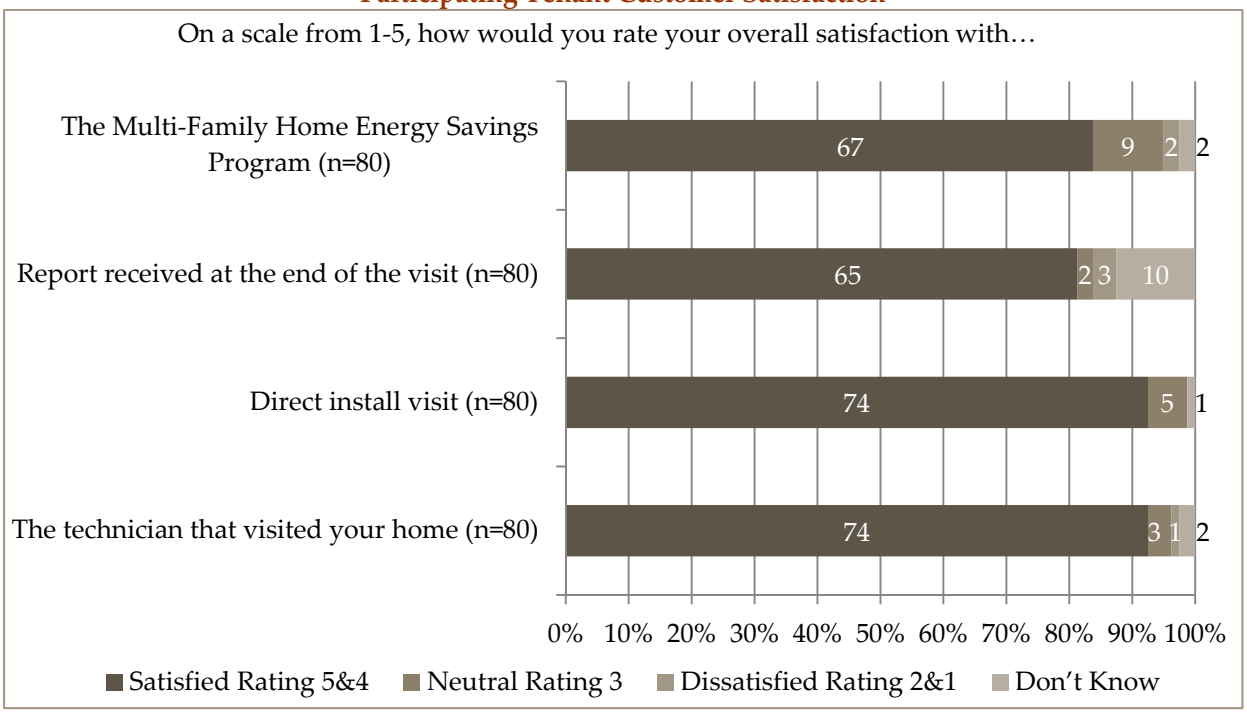
Finding: The program mailed 174 property manager customer satisfaction surveys and received 45 in return for a response rate of 26 percent. The average customer satisfaction score from the property manager surveys was 4.7 on a scale of 5.0, indicating high levels of customer satisfaction.

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



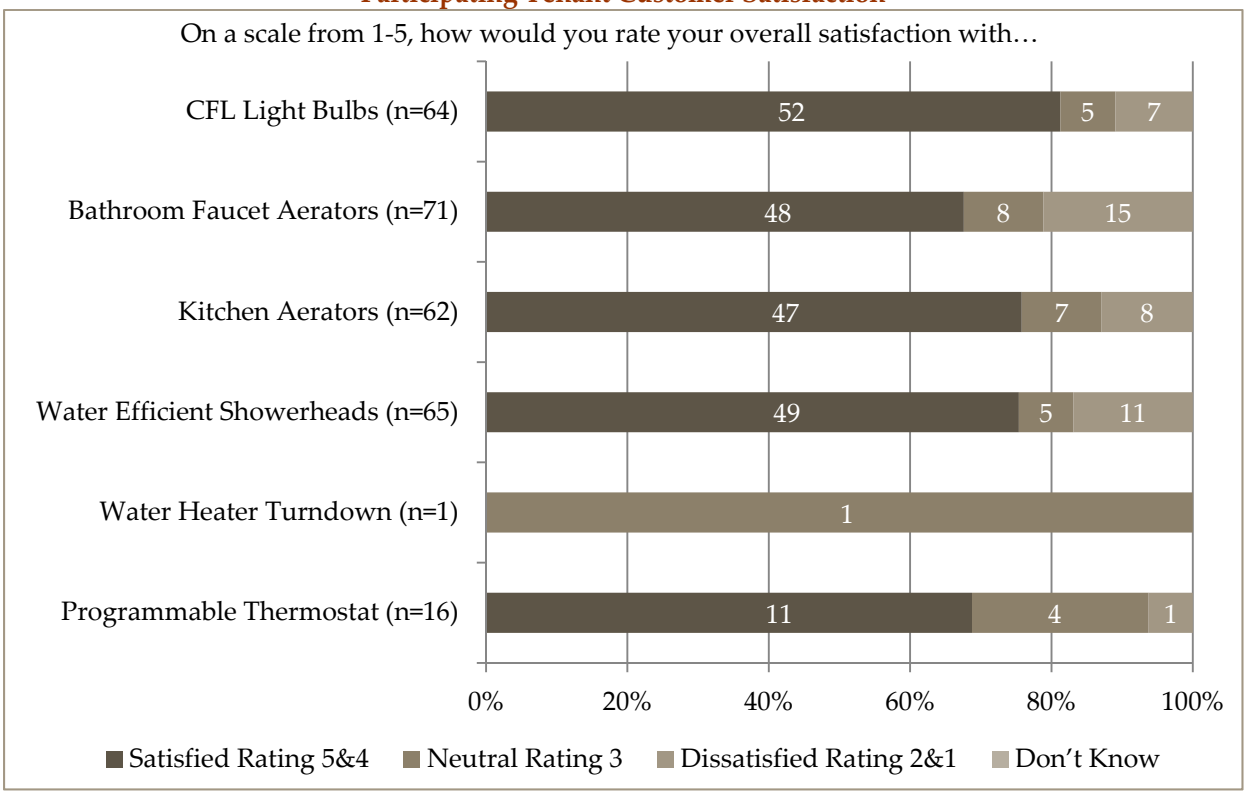
Source: Navigant analysis of participating tenant survey self-report data

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

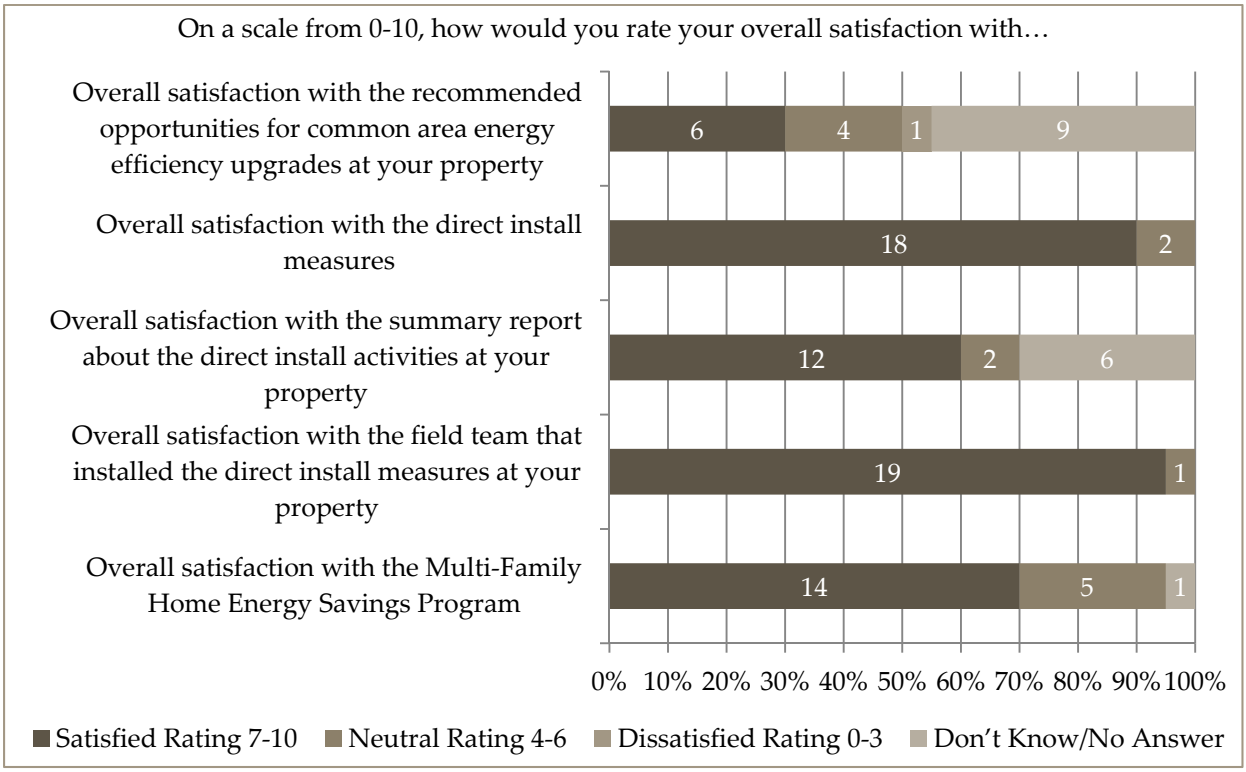
Participating Decision-Maker Satisfaction with Program Participation & Measures

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[38]. 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[39].

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.

[38] "Proposed Framework for Counting Net Savings in Illinois." Memorandum March 12, 2010 from Philip Mosenthal, OEI, and Susan Hedman, OAG.
[39] 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[40]	Verified Gross Energy Savings (kWh)	NTG Ratio[41]	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*
Total	**12,618,404**	**90.7%**	**11,445,570**	**0.83**	**9,456,136**

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[42]	Verified Gross Energy Savings (kW)	NTG Ratio[43]	Verified Net Energy Savings (kW)
CFLs	1,044	96.0%	1,002	0.81	812
Water Efficiency	98	67.0%	66	0.93	61
Total	**1,142**	**93.5%**	**1,068**	**0.82**	**873**

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.

[40] Realization rate deemed in EPY4.

[41] NTGR deemed in EPY4.

[42] Realization rate deemed in EPY4.

[43] 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%
Sub-total Nicor Gas	*35,000*	*24,744*	*71%*
Electric Units/ComEd	-	2,297	-
ComEd sub-total	***35,000***	***27,041***	***77%***

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^{D}, HOU-Residential^{D}).

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

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

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

Glossary Incorporated From the TRM

Below is the full Glossary section from the TRM Policy Document as of October 31, 2012[44].

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.

[44] 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[45] 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

$$\boldsymbol{\Delta kWh} = \%ElectricDHW * ((GPM_base * L_base - GPM_low * L_low) * Household * 365.25 * DF / FPH) * EPG_electric * ISR$$

= 125.1 kWh (kitchen) = 100.1 kWh (bathroom)

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

[45] State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4

Navigant recommends using the algorithm[46] 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

$$\boldsymbol{\Delta kW} = \Delta kWh/Hours * CF$$

= 0.017 kW (kitchen) = 0.014 kW (bathroom)

Where:

- ΔkWh = 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[47] presented in Figure 5-3 to calculate gallons saved for water efficient faucet aerators.

Figure 5-3. TRM Gallons Saved – Water Efficient Faucet Aerators

$$\boldsymbol{\Delta gallons} = ((GPM_base * L_base - GPM_low * L_low) * Household * SPCD * 365.25 / SPH) * ISR$$

= 1,399.6 gallons saved (kitchen) = 1,119.7 gallons saved (bathroom)

Where:

- Inputs described above

Evaluation Research Gross Savings Algorithm –Water Efficient Showerheads

Navigant recommends using the algorithm[48] presented in Figure 5-4 to calculate gross savings for water efficient showerheads.

Figure 5-4. TRM Gross Savings Algorithm – Water Efficient Showerheads

$$\boldsymbol{\Delta kWh} = \%ElectricDHW * ((GPM_base * L_base - GPM_low * L_low) * Household * SPCD * 365.25 / SPH) * EPG_electric * ISR$$

= 528.4 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

[46] State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4

[47] State of Illinois Energy Efficiency Technical Reference Manual, 7.4.4

[48] 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[49] 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

$$\boldsymbol{\Delta kW} = \Delta kWh/Hours * CF$$

$$= 0.041\ kW$$

Where:

- ΔkWh = 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[50] presented in Figure 5-6 to calculate gallons saved for water efficient showerheads.

Figure 5-6. TRM Gallons Saved – Water Efficient Showerheads

$$\boldsymbol{\Delta gallons} = ((GPM_base * L_base - GPM_low * L_low) * Household * SPCD * 365.25 / SPH) * ISR$$

= 4,160.6 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 ± 3.9%.

[49] State of Illinois Energy Efficiency Technical Reference Manual, 7.4.5

[50] 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
sub-total CFL measures	*n/a*	*n/a*	*251,641*	*10,314,618*	*0.98*	10,108,326
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
sub-total water measures	*n/a*	*n/a*	*7,594*	*1,870,300*	*0.94*	*1,751,282*
Total	*n/a*	**n/a**	**259,235**	**12,184,918**	**0.97**	**11,859,608**

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%

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
sub-total CFL measures	*n/a*	*n/a*	*251,641*	*1,082*	*0.98*	*1,061*
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
sub-total water measures	*n/a*	*n/a*	*7,594*	*180*	*0.94*	*169*
Total	*n/a*	**n/a**	**259,235**	**1,262**	**0.97**	**1,230**

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?[51]

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:

[51] 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

$$\boldsymbol{Free\ ridership} = [(FR9 + FR11)/2 * (1/3)] + (FR10) * (2/3)$$

A measure count weight is applied in calculating the overall result for free ridership.[52] 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:

[52] 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 <u>previously</u> 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 <u>previously</u> 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*65/365) should be revised to (0.18*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[53] & 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
sub-total CFL measures	*4,271,131*	*96.0%*	*4,100,286*	*0.81*	*3,321,230*
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
sub-total water measures	*345,660*	*67.0%*	*231,592*	*0.93*	*215,380*
Total	**4,616,791**	**93.8%**	**4,331,878**	**0.81**	**3,536,610**

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

[53] In EPY4, gross realization rates and NTGR were deemed.

Table 5-18. ComEd EPY4 Ex-Ante[54] & 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
sub-total CFL measures	*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
sub-total water measures	*14*	*67.0%*	*11*	*0.93*	*9*
Total	**447**	**95.1%**	**425**	**0.81**	**345**

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
Total	**n/a**	**n/a**	**n/a**	**109,854**

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.

[54] 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
Total	**n/a**	**n/a**	**n/a**	**1,148**

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[55] & Verified Electric Savings (Nicor Gas Service Territory)

Measure	Ex-Ante Gross Savings (kWh)	Gross Realization 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
sub-total CFL measures	*6,043,487*	*96.0%*	*5,801,748*	*0.81*	*4,699,415*
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
sub-total water measures	*1,958,127*	*67.0%*	*1,311,945*	*0.93*	*1,220,108*
Total	**8,001,614**	**88.9%**	**7,113,693**	**0.83**	**5,919,523**

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

[55] In EPY4, gross realization rates and NTGR were deemed.

Table 5-22. ComEd EPY4 Ex-Ante[56] & 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
sub-total CFL measures	*613*	*96.0%*	*589*	*0.81*	*477*
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
sub-total water measures	*84*	*67.0%*	*56*	*0.93*	*52*
Total	**697**	**92.5%**	**645**	**0.81**	**529**

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
Total	**n/a**	**n/a**	**n/a**	**141,787**

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.

[56] 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
Total	**n/a**	**n/a**	**n/a**	**6,446**

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 Ampong, 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[57], Program Implementation Scope of Work[58], Nicor Gas Compliance Filling[59], the program year end summary report Multi-Family program's Operations Manual[60], 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.[61] 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.

[57] Nicor Gas Rider 30 EEP Program Portfolio Operating Plan (Version 1.1)

[58] ComEd Nicor MF SOW PY4_6 FINAL REV 2E.pdf

[59] Nicor Gas EEP 2011-2014 Revised Plan Filed Pursuant to Order Docket No. 10-0562 (May 24, 2011)

[60] Honeywell Utility Solutions, Multifamily Home Energy Savings Program Operations Manual (updated February, 2011).

[61] 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*[62] 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	*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

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.

[62] 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	*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

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	**1.3**	0.00	1.3	1.2	1.2	0.06	**1.2**	0.05
45	1.5	1.5	1.6	0.06	**1.5**	0.04	1.5	1.4	1.5	0.06	**1.5**	0.04
60	1.8	1.8	1.8	0.00	**1.8**	0.00	1.8	1.7	1.7	0.06	**1.7**	0.03
80	2.0	2.0	2.0	0.00	**2.0**	0.00	2.0	1.9	2.0	0.06	**2.0**	0.03
	Average Coefficient of Variation					**0.01**	**Average Coefficient of Variation**					**0.04**
	Relative Precision at 95% Confidence					**1.1%**	**Relative Precision at 95% Confidence**					**4.5%**

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	**1.3**	0.08	1.1	1.1	1	0.06	**1.1**	0.05
45	1.5	1.4	1.6	0.10	**1.5**	0.07	1.2	1.3	1.3	0.06	**1.3**	0.05
60	1.7	1.5	1.8	0.15	**1.7**	0.09	1.4	1.4	1.4	0.00	**1.4**	0.00
80	1.9	1.7	1.9	0.12	**1.8**	0.06	1.4	1.5	1.5	0.06	**1.5**	0.04
	Average Coefficient of Variation					**0.07**	**Average Coefficient of Variation**					**0.03**
	Relative Precision at 95% Confidence					**7.9%**	**Relative Precision at 95% Confidence**					**3.4%**

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"

2.0 GPM

Oxygenics
Oxygenics

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.

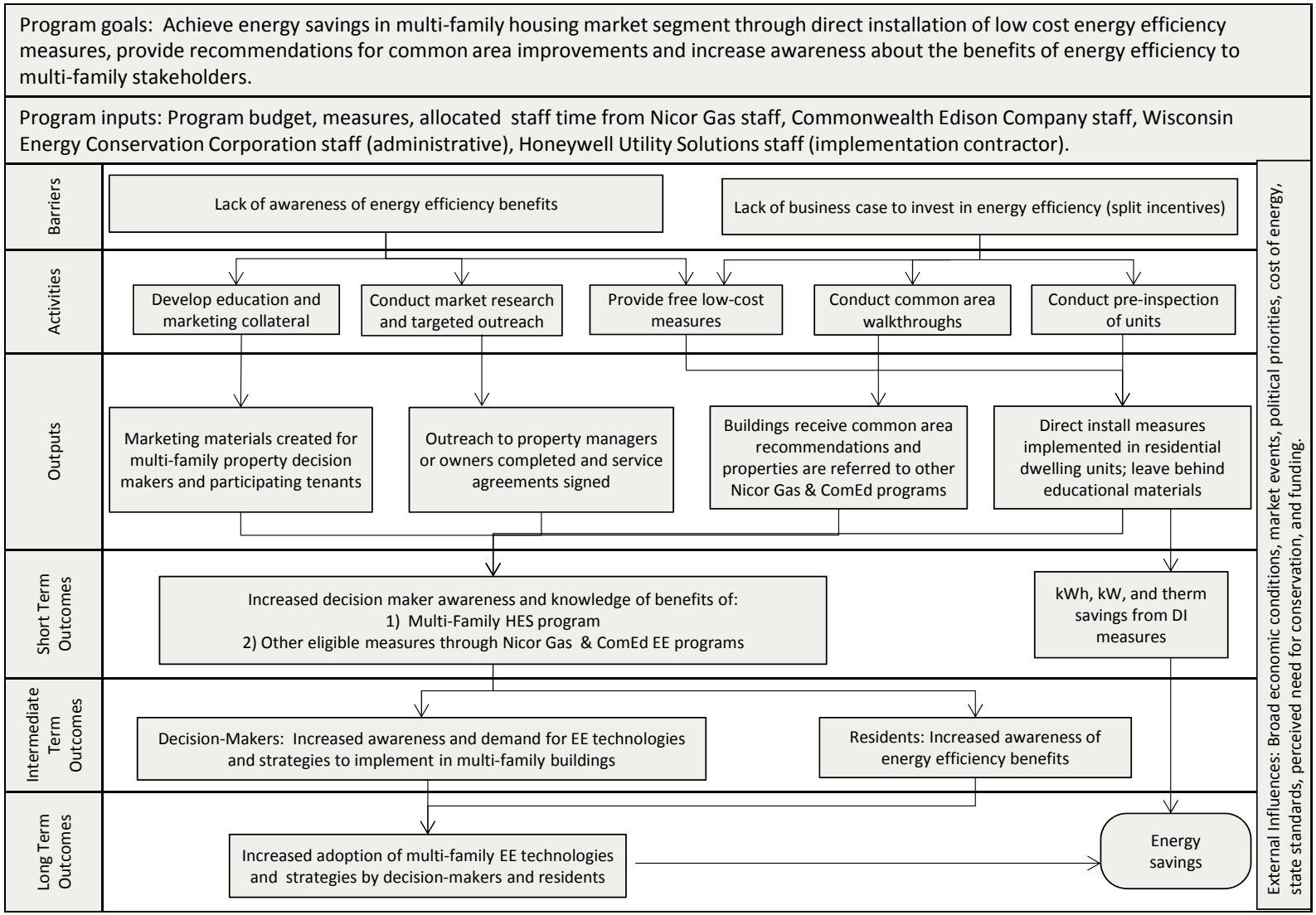
Messages/Communications Vehicles

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

Program Inputs
Nicor Gas & Commonwealth Edison (ComEd) ratepayer funds
Nicor Gas & ComEd staff resources
Implementer staff resources and experience
Program knowledge of the target market
External Influences and Other Factors
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

Develop education and marketing collateral
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
Conduct market research and targeted outreach
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
Conduct common area assessments
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
Conduct pre-inspection of units

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
Short-Term		
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
Intermediate-Term		
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
Longer-Term		
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
Screening tenants	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
CFL Verification	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
Bathroom Faucet Aerator Verification	Count, status, and location of the bathroom faucet aerators. Is/are the measure(s) still in place? Tenant satisfaction?	BAMV1-BAMV17
Kitchen Faucet Aerator Verification	Count, status, and location of the kitchen faucet aerators. Is/are the measure(s) still in place? Tenant satisfaction?	KAMV1-KAMV16
Water Efficient Showerhead Verification	Count status, and location of the showerhead(s). Is/are the measure(s) still in place? Tenant satisfaction?	SMV1-SMV17
Programmable Thermostat Verification (Nicor Gas & ComEd Only)	Thermostat verification and setting verification. Is/are the measure(s) still in place? Tenant use and satisfaction?	PMV1-PMV8a
Tank Turndown Verification	Status of turndown. Is/are the measure(s) still in place? Tenant satisfaction?	HMV1-HMV5a
Hot Water Pipe Wrap Verification (Peoples Gas and North Shore Gas Only)	Is/are the measure(s) still in place? Tenant satisfaction?	WMV1-WMV3a
Customer Satisfaction	How satisfied is the tenant with the direct install measures, the field technicians and the program?	SAT1-SAT5
Tenant Demographics	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 HMV1] [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 u 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 HMV4 = 1 or 2, ASK HMV4a. ELSE SKIP TO WMV1
HMV4a. Why did you rate it that way?
[OPEN END, RECORD VERBATIM] [IF DK OR REF, THEN SKIP TO WMV1]

HMV5. **[OMITTED]**
HMV5a. **[OMITTED]**

WMV. PIPE WRAP VERIFICATION
IF S1 = 2 or 3, ASK WMV1-WMV3a. ELSE SKIP TO NA1

WMV1. 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 WMV2]**
2. NO, INCORRECT **[SKIP TO SAT1]**
8. DON'T KNOW **[SKIP TO SAT1]**
9. REFUSED **[SKIP TO SAT1]**

WMV2. Is the pipe wrap still present on your hot water pipes?

1. YES **[SKIP TO WMV3]**
2. NO **[CONTINUE TO WMV2A]**
8. DON'T KNOW **[SKIP TO WMV3]**
9. REFUSED **[SKIP TO WMV3]**

IF WMV2 = 2, ASK WMV2a. ELSE SKIP TO WMV3
WMV2a. 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

WMV3. 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 WMV3 = 1 or 2, ASK WMV3a. ELSE SKIP TO SAT1
WMV3a. 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

Section	Topics	Questions
Screening Questions	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
Sources of Program Awareness	How did the property manager learn about the program? What were the primary motivations for participating?	SR2-SR4
CFL Verification	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
Programmable Thermostat Verification (Nicor Gas only)	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
Water Efficiency Measures Verification	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
Hot Water Tank Turndown Service Verification	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
Participant Spillover & Other Properties	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
Customer Satisfaction	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
Firmographics	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 PTHER=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 began 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 PTHER=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 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.