NAVIGANT

Energy Efficiency / Demand Response Plan: Plan Year 4 (6/1/2011-5/31/2012)

Evaluation Report:
Northern Illinois Joint Utility Retro-Commissioning Program

FINAL

Presented to
Commonwealth Edison Company
Nicor Gas
Peoples Gas & North Shore Gas

January 14, 2013

Prepared by:
Randy Gunn
Managing Director
Navigant Consulting
30 S. Wacker Drive, Suite 3100
Chicago, IL 60606

Phone 312.583.5700
Fax 312.583.5701

www.navigant.com

© 2013 Navigant Consulting, Inc.

NAVIGANT

Submitted to:

ComEd Three Lincoln Centre Oakbrook Terrace, IL 60181	Nicor Gas 1844 Ferry Road Naperville, IL 60563	North Shore Gas / Peoples Gas 130 East Randolph Street Chicago, IL 60601

Submitted by:

Navigant Consulting, Inc.
30 S. Wacker Drive, Suite 3100
Chicago, IL 60606
Phone 312.583.5700
Fax 312.583.5701

Contact:

Randy Gunn, Managing Director
312.938.4242
randy.gunn@navigant.com
Julianne Meurice, Associate Director
312.583.5740
julianne.meurice@navigant.com

Jeff Erickson, Director
608.497.2322
jeff.erickson@navigant.com
Kevin Grabner, Associate Director
608.497.2323
kevin.grabner@navigant.com

Prepared by:

Roger Hill, Managing Consultant
Navigant Consulting
641.23.3848
rhill@navigant.com

Sara Van de Grift, Sr. Project Manager
Opinion Dynamics Corporation
608.819.8828
SVandeGrift@opiniondynamics.com

Disclaimer: This report was prepared by Navigant Consulting, Inc. ("Navigant") for ComEd based upon information provided by ComEd and from other sources. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Navigant nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

NAVIGANT

Table of Contents

E. Executive Summary 1
- E.1 Evaluation Objectives 1
- E.2 Evaluation Methods 2
- E.3 Key Impact Findings and Recommendations 2
- E.4 Key Process Findings and Recommendations 4

1. Introduction to the Program 6
- 1.1 Program Description 6
- 1.2 Evaluation Questions 8
  - 1.2.1 Impact Questions: 8
  - 1.2.2 Process questions: 8

2. Evaluation Methods 9
- 2.1 Primary Data Collection 9
  - 2.1.1 Gross Program Savings 9
  - 2.1.2 Net Program Savings 9
  - 2.1.3 Process Evaluation Data Sources 10
- 2.2 Sampling Plan 11
  - 2.2.1 Impact Sampling 11
  - 2.2.2 Process Sampling 12
- 2.3 Impact Evaluation Methods 12
- 2.4 Process Evaluation Methods 12

3. Evaluation Results 15
- 3.1 Impact Evaluation Results 15
  - 3.1.1 Verification and Due Diligence Procedure Review 15
  - 3.1.2 Tracking System Review 16
  - 3.1.3 Gross Program Impact Parameter Estimates 17
  - 3.1.4 Gross Program Impact Results 17
  - 3.1.5 Net Program Impact Parameter Estimates 20
- 3.2 Process Evaluation Results 22
  - 3.2.1 Program Participation 23
  - 3.2.2 Program Changes from EPY3 23
  - 3.2.3 Program Processes 23
  - 3.2.4 Retro-Commissioning Service Providers 25
  - 3.2.5 Marketing and Outreach 25
  - 3.2.6 Customer Satisfaction 26
  - 3.2.7 Barriers to Participation 26

4. Findings and Recommendations 28
- 4.1 Key Impact Findings and Recommendations 28
- 4.2 Key Process Findings and Recommendations 30

5. Appendix 32
5.1 Glossary 32
5.2 Detailed impact results 36
5.2.1 Net Program Impact Results 39
5.2.2 Measure-level NTG Estimates 41
5.2.3 Channeling 43
5.3 Detailed process results 43
5.3.1 Participation Process 44
5.3.2 Program Timelines 45
5.3.3 Data Tracking 46
5.3.4 Retro-Commissioning Service Providers 46
5.3.5 RSP Performance Reviews 46
5.3.6 Training 47
5.3.7 RSP Satisfaction 48
5.3.8 Effects of Program on RSP Business Practices 48
5.3.9 Marketing and Outreach 48
5.3.10 Marketing Materials 49
5.3.11 Customer Satisfaction 49
5.3.12 Barriers to Participation 50
5.4 Data Collection Instruments 52
5.4.1 RSP Interview Guide 52
5.4.2 Participant Survey 60
5.5 VDDTSR Memo-Final version 72
5.6 Program Theory Logic Model Review 80

NAVIGANT

List of Figures and Tables

Figures:

Figure 5.1. Ex Ante Electric Savings (kWh) Project Savings Histogram 37
Figure 5.2. *Ex Ante* Gas Savings (Therm) Project Savings Histogram 37
Figure 5.3. *Ex Ante* Electric Savings (kWh) by End-Use Category 38
Figure 5.4. *Ex Ante* Electric Savings (kWh) by Measure Type 39
Figure 5-5. Program Logic Model 83

Tables:

Table E-1. EPY4 Evaluation Electric Savings Estimates 2
Table E-2. GPY1 Evaluation Natural Gas Savings Estimates 3
Table 2-1. Evaluation Data Sources 10
Table 2-2. Impact Evaluation Samples Engineering Review by Utility 11
Table 2-3. Impact Evaluation Samples 11
Table 2-4. Process Data Collection Summary 13
Table 2-5. Program Materials Reviewed for EPY4/GPY1 Process Evaluation 14
Table 3-1. *Ex ante* Savings Estimates 17
Table 3-2. Savings and Realization Rates by Sampled Site 18
Table 3-3. GPY1 Evaluation Natural Gas Savings Estimates 20
Table 3-4. Net-of- Free-Ridership (1-FR), Spillover and NTG Estimates 21
Table 3-5. EPY4 Evaluation Electric Savings Estimates 22
Table 3-6. GPY1 Evaluation Natural Gas Savings Estimates 22
Table 3-7. Level of Satisfaction with Program Elements 26
Table 4-1. EPY4 Evaluation Electric Savings Estimates 28
Table 4-2. GPY1 Evaluation Natural Gas Savings Estimates 29
Table 5-1. PY4 Evaluation Savings Estimates 41
Table 5-2 *Ex ante* Net-to-Gross Estimates 42
Table 5-3 Research Findings for Participant and Service Provider Free-ridership 43
Table 5-4 Research Findings for Non-Participant Spillover and NTG Ratio 43
Table 5-5. Preferred Method of Reaching Customers about Energy Efficiency Opportunities (Multiple Response) 49
Table 5-6. Level of Satisfaction with Program Elements 50
Table 5-7. Quality Control and Verification Benchmarking Scores 76
Table 5-8. Reporting and Tracking Benchmarking Scores 78
Table 5-9. Program Inputs and Potential External Influences 82
Table 5-10. Business Retro-Commissioning Program Activities 84
Table 5-11. Program Outputs, Associated Indicators and Potential Data Sources 85
Table 5-12. Program Outcomes, Associated Indicators and Potential Data Sources 86

E. Executive Summary

This report presents a summary of the findings and results from the Impact and Process Evaluation of the 2011-12 (EPY4/GPY1) [1] ComEd Smart Ideas for your Business ® Retro-Commissioning Program offered in partnership with Nicor Gas Energy Efficiency Program and Peoples Gas and North Shore Gas. The Northern Illinois Utilities Joint Retro-Commissioning Program (Retro-Commissioning Program) helps commercial and industrial customers improve the performance and reduce energy consumption of their facilities through the systematic evaluation of existing building systems. Low- and no-cost measures are targeted and implemented to improve system operation, reduce energy use and demand, and, in many cases, improve occupant comfort. The Retro-Commissioning Program aims to streamline the typical retro-commissioning process in order to facilitate implementation of projects that yield savings in the program year they are initiated.

Significant changes in the program have increased its scope and market for services. Other changes have facilitated participation and the ability of participants to complete improvements before the end of the program year:

- Natural gas savings is now addressed in the program through the joint offering with Nicor Gas and Peoples Gas and North Shore Gas. The change accompanies an increased customer spending commitment of $5,000 or $10,000, depending on project size.
- The Retro-Commissioning Program has "spun-off" Compressed Air and Data-Center retro-commissioning into stand-alone programs more focused on the needs of these segments.
- Multiple-building projects can now be aggregated to reach the 500 peak kW participation requirement. This change enables campuses to include smaller buildings in the program.
- Guidelines were established to allow buildings served by district energy plants to participate.
- The number of eligible commercial building Retro-commissioning Service Providers (RSPs) expanded from eight to 23 commercial building RSPs compared to EPY3.
- Efforts to standardize deliverables were established: reporting templates and standard calculators for ten common, but lower-savings (less than 75,000 kWh) measures
- Updated guidelines to verify low-savings measures.
- A new database was introduced to manage projects
- Large projects could be split over program years to facilitate timely implementation.

E.1 Evaluation Objectives

The primary objectives of the Impact Evaluation are to review reported savings for installed measures, to recommend general improvements to the savings estimation process, and to quantify gross and net savings impacts from review of the program tracking database and engineering calculations. The Process Evaluation addresses key process-related program strengths and weaknesses and identifies ways in which the program can be improved.

[1] The 2011-12 program year began June 1, 2011 and ended May 31, 2012.

E.2 Evaluation Methods

Impact evaluation activities focused on analyzing reports and data submitted in participant files, as well as on-site verification, data collection and interviews. The primary data collection activities for the process evaluation were in-depth interviews with program management and implementation staff, participating RSPs and program participants.

E.3 Key Impact Findings and Recommendations

Table E-1. and Table E-2. summarize the savings from the Joint Retro-Commissioning Program. *Ex Ante* estimates for electric savings assume a deemed Net-to-Gross (NTG) ratio of 0.916. There were 50 participants in the EPY4/GPY1 program representing 41 unique customer decision makers.[2] Three projects were participants in EPY3 with select measures completed and verified in EPY4/GPY1.

Table E-1. EPY4 Evaluation Electric Savings Estimates

Research Category	Energy Savings (MWh)	Peak Demand Savings (kW)
Ex Ante Gross	29,908	800.2
Ex Ante Net[3]	27,395	733.0
Research Findings Gross	27,315	384.3
Verified Net	25,021	352.0

Source: Utility tracking data and Navigant analysis.

Among the 50 participants, 21 in the program database were also gas utility participants. Evaluation research identified one additional Peoples Gas participant for a total of 22 gas participants. The gas utilities did not have a deemed NTG ratio; however, they all used 0.8 as a planning assumption, and Navigant applies this ratio to ex ante net savings. Since no NTG estimates were deemed for gas savings, Navigant applied the NTG ratio estimated by EPY4/GPY1 research below to GPY1 gas savings

[2] Three projects were completed at a private university and one corporation completed projects at eight properties in the ComEd service territory.
[3] The program-assumed net-to-gross ratio is 0.916 for electricity savings.

Table E-2. GPY1 Evaluation Natural Gas Savings Estimates

Research Category	Peoples Gas Savings (therms)	North Shore Gas Savings (therms)	Nicor Gas Savings (therms)	Total Gas Savings (therms)
Participants	14	1	7	22
Ex Ante Gross	858,657	56,775	180,345	1,095,777
Ex Ante Net[4]	686,926	45,420	144,276	876,622
Research Findings Gross	913,820	67,908	147,838	1,129,566
Verified Net[5]	927,535	68,927	150,057	1,146,519

Source: Utility tracking data and Navigant analysis.

- **Program Savings Goals Attainment**.
  Finding. The program achieved goals for electric energy savings (26,880 MWh) and fell short of participation (63) and demand savings goals (3.8 MW). Gas savings goals were met for Peoples Gas (528,800 therms) but fell short for North Shore Gas (145,600 therms) and Nicor Gas (267,700 therms).
  Recommendation. Savings is driven largely by participation and by effective trade allies. Increasing the number of active trade allies performing more projects will help gas goal achievement. Demand savings is not a contractual goal for the implementation contractor (IC), thus non-attainment is not concern. .

- **Gross Realization Rates**
  Finding. The realization rate for electric energy is 91.3%. Gas savings realization rates are 106.4%, 119.6% and 82.0%, for Peoples Gas, North Shore Gas and Nicor Gas, respectively. Divergent gas realization rates are a result of the small populations and savings for the latter two utilities. The overall gas realization rate is 103%. Energy savings estimates from the RSPs are generally well-supported and calculated with a high degree of rigor. Most RSPs continue to use their own estimation spreadsheets, rather than program–provided templates for common measures. This factor complicates program implementation and evaluation efforts as the variety of methods is time-consuming and open to more errors.
  Recommendation. Explore ways to encourage use of existing program-standard savings calculators, when the common measures qualify for their use, e.g. less than 75,000 kWh savings. Perhaps use incentives or fast-track program processes when standard savings calculators are used.

- **Net-to-Gross estimates:**
  Finding. The research estimate for the electric NTG ratio is 1.038. The gas NTG ratio estimate is 1.015. Program incentives to fund the studies and the expertise of RSPs rank very high in importance among participants. (9.6/10) According to participants, program

[4] The program-assumed net-to-gross ratio is 0.8for Nicor Gas savings, Peoples Gas and North Shore Gas for planning purposes.
[5] Natural gas verified net savings is based on EPY4/GPY1 research that found a net-to-gross ratio of 1.015 for gas and 1.038 for electric savings.

influence to identify and implement measures is lower (7.4/10), a result similar to EPY3. There is only small indication of spillover among participants. Service providers credit the program with sustaining and creating a retro-commissioning market in Illinois, as a result spillover from the RSPs contributes to overall NTG estimates.
Recommendation. Update electric and gas-specific NTG ratios for planning purposes, based on research presented in this report. Apply the gas NTG retrospectively to GPY1 savings since this is the first time NTG has been researched for the gas program. .

- **Demand Savings Estimates.**
  Finding. The RSPs continue to have different or no approaches for estimating peak demand savings.
  Recommendation. Accurate accounting for demand savings does contribute to measure payback at the customer level and contributes to the program's success. The program needs to establish a standard methodology for demand savings estimates and those methods must be enforced during quality assurance steps.

- **Incomplete Savings Estimates.**
  Finding. Some measures are low-risk and high-reward in terms of savings, and there is a temptation to apply less rigorous calculations to quantify savings, since the RSP is certain the customer will implement the measure. While this scenario expedites the retro-commissioning process and still benefits the customer, it short-changes the program's savings estimates.
  Recommendation. During savings-calculation quality control steps, look specifically for interactive and concurrent savings with a checklist by measure type. For example, equipment scheduling saves gas for ventilation as well as fan energy; fan static pressure reduction decreases fan heating, and discharge air temperature resets can change mass-flow rates and fan power. Encouraging the use of program template calculators, which do include the concurrent and secondary effects, will improve the overall accuracy of estimates.

- **Incomplete Training Tracking.**
  Finding. A condition of program participation is having at least on staff member complete Level 1 Building Operator Certification training. The program data base currently is not set up to track training participation for program compliance.
  Recommendation. Add table(s) to the data base to track training for one or more individuals for each participating site. The table should link to project number for verification purposes.

E.4 Key Process Findings and Recommendations

- **RSP Participation.**
  Finding. The program has 23 registered RSPs. While only nine completed projects in EPY4/GPY1 many of the others are working on projects for PY5 completion. While the effort to increase the number of participating RSPs between EPY3 and EPY4 was a success, there is lost opportunity in having RSPs listed as part of the program but not completing projects in a program year.
  Recommendation. Because RSPs are the primary conduit for program participation, The IC should stress the importance of completing a project during training and be sure all RSPs clearly understand inactivity and no projects will result in rebid or removal from the program. Conduct evaluation research with inactive RSPs in EPY5/GPY2 to determine the conditions of inactivity.

- **Implementation Phase Support**
  Finding. The Implementation Phase continues to be the primary source of challenges for the program. This phase is generally participant-led and the timely completion of projects is entirely dependent on the customer keeping the project moving. RSPs expressed a concern that while they are not involved in this phase, they are still held responsible, via the RSP review process for the timely completion of projects.
  Recommendation. More effort is needed from Program Managers and the IC to engage the participants and keep the implementation phase moving along on a timely basis. Include implementation milestone dates in the implementation phase that will status each recommendation periodically. The milestones could be simple written status updates via email to the RSP, if projects are progressing, or the status updates could be part of a conference call or on-site meeting with the customer, RSP and utility / program representatives if the recommendations seem stalled.

- **RSP review process.**
  Finding. RSPs indicated that while they think the review process is important, the process could be more transparent. Essentially, RSPs believe there should be consideration in the scoring for those parts of the project that the RSPs feel they have little to no control over. For example, the timely completion of the implementation phase may negatively affect the score; yet, they have little to no control over this part of the project.
  Recommendation. The RSP role in implementation should be emphasized and clarified. RSPs should be reminded to conduct more implementation follow-up to encourage timely project completion. If this fails to spur implementation, the RSP scoring system should be reviewed to ensure it is not penalizing RSPs for aspects of the program that they have less control over (e.g., implementation timing) or program approaches should be put in place that allow RSPs to guide the participants more actively through the customer-directed phases.

- **Project timing**
  Finding. Timing improved in EPY4/GPY1, but remains a challenge. In the current program year, many projects were unable to meet their originally planned completion timelines. Timing challenges include:
    - The program year, which ends in May, limits the RSP's testing season for cooling measures, creating problems in finishing projects on time.
    - Lack of customer urgency to complete the various stages of the project process.
    - The amount of back and forth between the RSPs and IC during the review process.

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

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

1. Introduction to the Program

1.1 Program Description

The ComEd Retro-Commissioning Program has been offered each of the four electric program years. Electric Program Year 4 (EPY4) also marked the first year, GPY1, where the program was offered as a joint utility program with the gas utilities with service areas overlapping ComEd's: Nicor Gas, Peoples Gas and North Shore Gas. The Retro-Commissioning Program offering is a natural fit due to the intensive investigation and analysis of heating, ventilation and air-conditioning (HVAC) systems. Individual measures frequently save both electricity and gas and analyzing one while neglecting the other would be a lost opportunity.

The program helps commercial and industrial customers improve the performance and reduce energy consumption of their facilities through the systematic evaluation of existing building systems. In general, the program pays for 100% of a detailed retro-commissioning study contingent upon a participant's commitment to spend a certain amount of their own money implementing recommendations in the study that have a payback of 18 months or fewer. Retro-commissioning recommendations typically include low-cost or no-cost HVAC measures like (1) scheduling equipment with occupancy, (2) optimizing temperature setpoints and controls to operate equipment efficiently and (3) repairing worn-out or failed components[6] that manifest themselves as energy waste rather than affecting the ability of the whole system to maintain comfort. The measures can usually be implemented in the course of normal maintenance or through improvements to sensors or control programs with existing building automation systems, BAS.

The program is supervised by ComEd for all three utilities with a single IC, Nexant Inc. Nexant manages the day-to-day operation of the program including marketing, interacting with customers, working with program-approved retro-commissioning service providers (RSPs), and reporting progress and savings to the utilities. Gas utility ICs, WECC and Franklin Energy, monitor the program for their clients (Nicor Gas and Peoples/North Shore Gas, respectively), but do not participate in program operations.

The program is open to all customers who meet the eligibility requirements:

- Facilities must receive electricity delivery service from ComEd (regardless of energy supplier), and if participating in gas retro-commissioning, receive gas delivery from Peoples Gas, North Shore Gas or Nicor Gas.
- Have a peak demand of 500 kW or greater[7].
- Be served under eligible ComEd rate schedules[8]
- Applicants must be part of a non-public organization[9].

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

[7] Peak demand requirement may be met by combining several smaller buildings in close proximity, for example a college campus

[8] ComEd Rate schedules: A75, A76, A77, B75, B78, B95, B98, H75, H76, H77, H78, R75, R76, R77, R78.

- Facility owners must commit to spend between $15,000 and $30,000, (depending on the RSP fees) to implement retro-commissioning measures that result in a bundled estimated project simple payback of 18 months or fewer, based upon electric and natural gas savings.
- Applicants must agree to use a pre-approved Retro-Commissioning Service Provider.
- The facility owner must send one staff member to Building Operator Certification™ (BOC) training. Staff members must receive BOC Level I Certification.
- The facility owner must provide access to the facility and time for the facility personnel to interface with the retro-commissioning service provider (RSP) as well as assist with the reporting and collection of information pertaining to the operation of the facility during all phases of the project; and,
- The facility owner must implement Recommended Conservation Measures (RCMs) according to the scope and outlined procedures within six months of being accepted into the program.

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

Application Phase: Customers establish the proposed project meets the following indicators for a successful project:

- The facility should have no planned major system renovations or retrofits.
- The facility should be at least 5 years old and exceed 150,000 ft^2 in air-conditioned floor space[10].
- The facility should have an existing and functional building or system energy management system (EMS) with direct digital control (DDC).
- The facility should be free of major problems requiring capital repairs or replacements and have no planned major system renovations or retrofits.
- The facility should have accessible and up-to-date building documentation and records.
- The facility should have a relatively high Energy Use Index (EUI) compared to the average EUIs of buildings of the same class and/or have a low "Energy Performance Rating" from Portfolio Manager, the Department of Energy's rating tool for Energy Star Buildings.
- The facility owner and O&M staff should express a commitment to be actively involved in the retro-commissioning process.
    - Providing access to the facility
    - Providing time for facility personnel to interface with the Retro-Commissioning Service Provider – 60 to 100 hours over the project duration
    - Providing and assisting with the reporting, and collection of, information pertaining to the retro-commissioning of the facility

Planning Phase: The project planning activities include a kick-off meeting with the IC, ComEd representatives, and the RSP with the customer team during which expectations are described and

[9] Public buildings such as government, municipal, and public schools are eligible for similar retro-commissioning incentives through the Illinois Department of Commerce and Economic Opportunity (DCEO).
[10] Exception for groups of smaller buildings constituting an overall adequate opportunity, e.g. campuses.

roles and responsibilities are defined. The RSP completes a site assessment and data acquisition plan during this phase. The findings of this assessment are used to generate the Retro-Commissioning Plan for the project and estimate potential measures and project economics. At the completion of the Planning Phase, the facility owner enters into the formal Program Agreement, including the customer's spending commitment and project schedule.

Investigation Phase: The RSP works with the customer to research, analyze and select promising retro-commissioning measures to implement. Measures may be added or removed from the retro-commissioning plan at this time depending on research findings. The customer agrees to implement measures meeting their financial commitment and savings goals.

Implementation Phase: The Customer works with internal staff or their contractors to implement agreed upon measures. Measures can be amended, dropped or added at this time due to feasibility constraints or if implementation cost estimates from the investigation phase prove inaccurate.

Verification Phase: The RSP returns to assess implementation of planned measures. Final saving estimates are developed based on actual implementation and monitored results. Final payments for the study are made to the RSP based on completion of measures and the verification report.

1.2 Evaluation Questions

The Evaluation Team identified the following key researchable questions for EPY4 and GPY1

1.2.1 Impact Questions:

1. What is the level of gross and net annual energy (kWh) and peak demand (kW) and natural gas (therm) savings achieved by the program?

2. What is the level of free ridership associated with this program? How can it be reduced? Is spillover measureable for this program?

3. Did the program achieve its goals? Why and why not?

1.2.2 Process questions:

The process evaluation questions focused on four key areas:

1. Effectiveness of program implementation

2. Effectiveness of program design and processes

3. Has program satisfaction changed over time as program adjustments have been made to address satisfaction issues?

4. What areas could the program improve to create a more effective program for customers and/or RSPs and help increase the energy and demand impacts?

2. Evaluation Methods

This evaluation of the Retro-Commissioning Program reflects the third full-scale year[11] of program operation. During EPY4/GPY1, 50 facilities participated in the Retro-Commissioning Program including 41 unique commercial entities. Among the 50 sites, more than 240 retro-commissioning measures (RCMs) were implemented and verified, thus qualifying the sites for waiver of retro-commissioning service costs. The participants were shepherded through the program by nine different retro-commissioning service providers (RSPs).

2.1 Primary Data Collection

2.1.1 Gross Program Savings

The primary data for the impact evaluation came from the program administrator, Nexant, Inc. Among the data reviewed for the impact analysis:

- Program guidelines[12] that described expected savings estimation techniques and assumptions when site-specific data were not available;
- Template for standard savings calculators for common, but lower-impact measures;
- Exports from Nexant's program tracking system in spreadsheet format including project-level and measure-level descriptions and savings; and
- Electronic versions of reports, invoices, submittals and savings calculations.

Navigant supplemented these data with on-site inspections at a sample of sites and requests for supplemental data from participants and/or RSPs, as needed, to fully understand the implemented measures.

2.1.2 Net Program Savings

NTG research methods in EPY4/GPY1 combine participant and service provider survey results. Research for both groups uses a self-report method where participants and RSPs answer questions about the program. The participant survey instrument asks about awareness of the measures identified and their inclination to pursue corrective actions for those measures absent the program. The RSP survey instrument asks about the retro-commissioning market prior to and since the program and the likelihood of measure implementation without the program and as a result of the program. Navigant also explored spillover effects through the participant and service provider surveys.

2.1.2.1 Free-Ridership

The method looks at three elements of free-ridership for participants: Program Influence, Timing and Selection and No Program Score. RSPs can only speak to program influence and the no program elements of free-ridership. The program influence element considers the importance of program

[11] A small pilot program was conducted in EPY1 with Nexant serving as RSP and program implementer

[12] Smart Ideas for Your Business Commercial Retro-Commissioning Calculation and M&V Guidelines.

factors for the decision to undertake retro-commissioning at this time. The timing and selection element considers when the participant learned of the program, relative to the decision to retro-commission the facility and the impetus to implement measures. The no program score is self-reported estimates of what measures or savings would have been implemented without the program. The three (or two) elements of free-ridership are weighted equally for estimates for participant and RSP free-ridership, respectively. Navigant subsequently calculated savings-weighted free-ridership from individual participant and RSP values to determine overall participant and RSP free-ridership. Navigant averaged the participant and RSP estimates for fuel specific Net-of-Free-rider[13] estimates.

2.1.2.2 Spillover

Navigant also asked participants and RSPs about the effect the program has on the Illinois retro-commissioning market outside of the program – or spillover. For participants spillover might include projects at the same facility or a facility under the same ownership or management which implemented energy savings projects as a direct result of Retro-commissioning Program, without receiving an incentive to do so. For RSPs spillover consists of additional projects completed and measures implemented, through increased awareness, marketing materials or staff capacity, as a direct result of the program. Participant and RSP spillover are considered additive, to the extent the same projects are not the basis of both estimates.

2.1.3 Process Evaluation Data Sources

The Process Evaluation included in-depth interviews with key actors in the program including ComEd, WECC (Nicor Gas) and Franklin Energy (Integrys) Program Managers; the IC, Nexant, program-approved retro-commissioning providers (RSPs) and telephone surveys of program participants. These interviews dealt with overarching satisfaction with the program and details about program operations, marketing, training, and market potential for retro-commissioning services. The process evaluation also reviewed documents related to the program such as program application forms.

Table 2-1. Evaluation Data Sources

Collection Method	Subject Data	Quantity	Gross Impact	Net Impact	Process
Telephone Interviews	Program participants	25		X	X
	Program Service Providers	8		X	X
In-Depth Interviews	Program admin.& IC staff	3			X
Engineering review	EPY4/GPY1 Participants	24 electric, 14 gas	X		
On-site Verification	EPY4/GPY1 Participants	11 electric, 5 gas	X		

Source: Navigant analysis.

[13] Net-of-Free-rider = 1 – Free-ridership

2.2 *Sampling Plan*

2.2.1 Impact Sampling

Impact sampling had two stages. Since all participants are ComEd customers, we first sampled for electric program participants to ensure we had an un-biased sample. We then examined the sample with respect to the gas utilities and *supplemented* the initial sample with randomly sampled gas customers to ensure an adequate sample for each of the gas utilities and achieve our confidence and precision targets. In this manner we ended up over-sampling the ComEd projects. Table 2-2 shows the sample sizes for each utility.

Navigant used the stratified ratio estimation method for choosing the impact sample for each utility. This method is based on the anticipated realization rate, and we stratified the population based on project *ex ante* savings to ensure that our 90/10 (confidence/precision) strategy also captures a significant proportion of program savings. The ratio estimation method tends to create a sample with a census of the largest savings customer stratum and a balanced sample between the remaining strata to achieve the desired precision. Within each stratum Navigant selected projects randomly. In our final sample, the precision is 8.5% at the 90% confidence level for electricity, and Navigant reviewed 69% of program kWh and 75% of program gas savings.

Table 2-2. Impact Evaluation Samples Engineering Review by Utility

	Program Population	Sample Required for 90/10	Final Sample Size	Precision at 90% confidence
ComEd	50	22	24	8.5%
Peoples Gas	14	8	8	8.7%
North Shore Gas	1	1	1	Certainty
Nicor Gas	7	5	5	7.0%
Overall	50	22	24	NA

Source: Utility tracking data and Navigant analysis.

Table 2-3. Impact Evaluation Samples

	Program Population	Population kWh savings	Sample Size	Sample kWh Savings
Stratum 1	7	12,065,680	7	12,065,680
Stratum 2	14	9,849,967	9	6,197,309
Stratum 3	29	7,991,951	8	2,464,437
Total	50	29,907,598	24	20,727,426

Source: Utility tracking data and Navigant analysis.

2.2.2 Process Sampling

The process evaluation team attempted interviews with a census of the nine active RSPs and the 41 customer contacts[14] in the EPY4/GPY1 program. Statistical confidence and precision is based on the sample size relative to the population. For the process analysis, all participants were included in the sample, thus the sampling approach was a census attempt. Given that this is a census attempt, there is no sampling error and the error bounds are zero; therefore, there is no need for estimating precision levels for the sampling effort. However, it should be noted that there is a potential for non-response bias.

2.3 Impact Evaluation Methods

Navigant examined measure-level impacts for the sampled program participants. The IC, Nexant, submitted detailed data and engineering calculations for each measure for Navigant review. Navigant also conducted on-site inspections and verification of measure installations at 11 sites as well as reviewed operating parameters and some trend data from the summer of 2012.

Navigant reviewed each implemented measure and many proposed[15] measures at the sampled projects for accuracy and completeness. The evaluation verified that appropriate algorithms, methods, and data sets were used. During the review Navigant compared calculation parameters to assumptions and applied prescribed parameter defaults as needed when measure calculations deviated from expected norms. Measure savings were confirmed or adjusted, as needed, for each implemented measure for each participant. Navigant analyzed gross savings at the participant level, measure end-use level, and measure-type level. Aggregate savings of the individual measures comprise project gross savings.

Within each sample strata Navigant developed realization rates for kWh, kW and therm savings from the sampled projects. Stratum-specific realization rates were applied to un-sampled projects in the strata to determine overall realization rates for the program.

2.4 Process Evaluation Methods

The process evaluation utilized interviews with key personnel at ComEd and Nexant, Inc., the program implementer. We also interviewed ICs for the joint gas utilities to determine their level of involvement with the program. The evaluation team performed interviews with program RSPs and fielded a survey of participating customers. Program design, implementation, training, and marketing materials were also reviewed.

[14] Two participants had multiple project sites enrolled in EPY4.

[15] Even measures that were not implemented contain key information about facility operations, setpoints and interactive effects among energy end-uses.

Table 2-4. Process Data Collection Summary

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Actual Sample Achieved	Timing
In-depth Telephone Interview	ComEd RCx Program Staff	Contact from ComEd	ComEd RCx Program Manager	1	April 2012
	Implementation Staff – RCx	Contacts from Utilities	Nexant Program Manager Franklin Energy and WECC Contacts	3	February and May 2012
	Retro-commissioning Service Providers	Program database	Attempted census (9)	8	October 2012
In-Depth Survey	PY4 Participants	Program database	Attempted census (50)	25	September/ October 2012

Source: Navigant analysis.

Program and Implementer Staff Interviews

We conducted two key in-depth interviews to support the process evaluation, one with the ComEd Retro-Commissioning Program Manager and one with the Nexant implementation staff. The interviews focused on program processes to better understand the goals of the program, how the program was implemented, the perceived effectiveness of the program, and the changes from PY3. The team also conducted brief interviews with ICs, WECC and Franklin Energy, supporting the program for their respective gas utility clients. Since the program is run by ComEd and Nexant, the gas utility IC interviews focused on the interaction between the program implementers and the gas utility contacts.

Review of Program Materials

As part of the evaluation process, the evaluation team reviewed program materials developed by ComEd and Nexant. These are summarized in Table 2-5 below.

Table 2-5. Program Materials Reviewed for EPY4/GPY1 Process Evaluation

Category	Materials Reviewed
Program design and implementation	Program design document EPY4/GPY1 application form EPY4/GPY1 participant manual EPY4/GPY1 RSP manual RCx presentation (s) List of RCx service providers Examples of planning, implementation and verification reports
Program marketing	ComEd RCx strategic marketing Plan Overview brochure RCx business fact sheet
RSP training and outreach	RSP RCx brochure example RSP Workshop PowerPoint EPY4/GPY1 RSP manual RSP Scoring review materials RSP Training materials RSP Newsletters

Source: Utility tracking data and Navigant analysis.

Interviews with RSPs

The evaluation team conducted in-depth interviews with eight of the nine active PY4 RSPs. These eight RSPs implemented 47 of the 50 EPY4 projects and all GPY1 projects. Our questions focused on program awareness, program processes, the effects of the program on business practices, free-ridership and spillover, marketing and outreach, training, RSP performance review, barriers to participation, and general feedback and recommendations. The guide used for these interviews is included in Section 5.4.

Interviews with Participants

The evaluation team also completed in-depth-interviews with 25 of the 39 EPY4/GPY1 program participants (representing 29 projects) who completed all of the program phases. Our questions focused on program awareness, program participation, marketing and outreach, free-ridership and spillover, benefits and barriers to participation. The survey instrument used for these interviews is included in Section 5.

3. Evaluation Results

3.1 Impact Evaluation Results

3.1.1 Verification and Due Diligence Procedure Review

Verification and Due Diligence review for the Retro-Commissioning Program addresses several topics, among them: eligibility criteria, quality assurance and verification.

Navigant found that eligibility criteria were adhered to in most cases.

- Three projects fell below the size criterion, though they were all part of a group of projects from a single large corporate participant. The criterion is in place to ensure projects are worth the effort of contracting. Since one corporate entity supervised the contract of these many sites, the spirit of the criterion was satisfied. Furthermore, the energy use index (EUI = Btu/ft^2) for these smaller sites was very high, indicating higher potential savings.
- All participants agreed to the spending commitment for measure implementation. In several cases the final spending was less than this commitment amount. Navigant reviewed files and found that lower-spending sites either implemented all no-cost and low-cost measures, as required and fulfilling the commitment, or estimated implementation costs were higher than the actual costs.
- Documentation of Building Operator Certification training is lacking. On-site verification identified two sites, of the eleven inspected, where personnel were not aware of the BOC requirement and could not name a member of the staff who attended. The IC had not tracked a complete list of trainees for program compliance.

Quality assurance and installation verification for the Retro-Commissioning Program are iterative processes that involve the customer, RSP, the IC (IC) and finally the evaluator. The customer must implement sufficient measures to gain the incentive which waives the retro-commissioning study costs. The RSP must guide the customer through implementation and check that measures are installed to get paid for services performed, and the IC reviews and approves savings estimate calculations, attends wrap-up meetings for all projects and conducts their own verification for a sample of projects. Reports follow an organized template that includes sufficient information for the participant, the utility (utilities), and the evaluators. RSP calculations show evidence of feedback from the IC to clarify inputs and calculations. The IC reports its own on-site verification efforts for six of 50 projects installed in EPY4/GPY1. In general, Navigant found that the quality assurance steps outlined in the Program Manuals[16] were being implemented as intended. Navigant did identify occasional lapses in the execution of the information presented in reports:

- Building area is not consistently reported among projects. Rentable, conditioned or gross floor area might be reported for different projects.
- Annual energy consumption (gas and/or electric) and EUI is not consistently reported.

[16] Smart Ideas for Your Business Commercial Retro-Commissioning *Participant Program Manual*, November 2010 and Smart Ideas for Your Business Commercial Retro-Commissioning *Retro-Commissioning Service Provider Manual*, July 2010

- Useful equipment lists are not always included. Flow rate and drive power data are not uniformly included.

Navigant's due diligence work for savings estimates focused on quality control of data entering the tracking spreadsheets and the savings calculations for each measure. Navigant found the savings estimate calculations were accurately constructed, based on clearly measured data rather than rules-of-thumb and transparent in spreadsheet form. Data were accurately entered from reports into the tracking database. In rare instances, we found calculation errors due to erroneous inputs and omissions of relevant parameters and inconsistencies in assumptions from measure to measure on the same system. Given the number of unique and complex calculations managed in the program, Navigant does not view these few errors as systematic problems.

Finally, the Retro-Commissioning Program has a procedure for evaluating each of the participating RSPs each year. The evaluation rubric includes: project completion, savings, customer satisfaction, timely submittals and interaction with the IC.

3.1.2 Tracking System Review

In prior program years, Nexant tracked program participation and results in spreadsheets with project information and measures installed at project sites sharing a common project identification number. In EPY4/GPY1 Nexant moved to upgrade the tracking system to a relational database to better manage the increasing number of projects, measures, reporting criteria and program actors. The new relational database is called TrakSmart. At the time of the data tracking system review for this evaluation, the TrakSmart database was not ready for review. ComEd and Nexant provided Navigant with a list of fields included in the database and Navigant reviewed that list for any deficiencies.

Navigant's review identified a logical structure for the database. In general, we find the database adequate for both managing the program and supporting evaluation activities. The few exceptions to this database's adequacy reflect recent changes to the program:

- **Finding**. Building Operator Certification training cannot be tracked with the database fields provided. Navigant identified a cluster of fields are used for tracking customer eligibility criteria. Capacity to track Building Operator Certification (BOC) training for one or more site individuals is not supported.
  Recommendation. Navigant recommends a new table in the database that can track multiple individuals from each project. Table fields should include: trainee name, title, trainee contact information, attendance records and final completion sigh-off. The training table should be capable of linking to projects with project ID and the property with the premise ID. The contact information can be used to easily identify the individual class data tracked by the BOC provider.
- **Finding**. Purchased steam and chilled water (annual) cannot be tracked in the provided data fields.
  Recommendation. The program recently began accommodating participants with purchased thermal services and reliable annual consumption comparison metrics should include these sources of energy, in addition to electricity and natural gas.

Early in EPY5/GPY2 Navigant will review the populated TrakSmart database to see how it is being implemented.

3.1.3 Gross Program Impact Parameter Estimates

Savings estimates are made at three different stages (planning, implementation and verification) of the retro-commissioning program process as more data are available and the scope of implemented measures become known. RSPs develop the final savings estimates during the Verification Phase based on performance data acquired after implementation. These savings estimates comprise the *ex ante* savings for the program. The participants in EPY4/GPY1 represent two aspects of the evolving retro-commissioning program.

Table 3-1. *Ex ante* Savings Estimates

Research Category	Energy Savings (MWh)	Peak Demand Savings (kW)	Natural Gas Savings (thermsx1,000)
Ex Ante Gross	29,908	800.2	1,095.8
Ex Ante Net[17]	27,395	733.0	876.6

Source: Utility tracking data

- Forty-nine participants are traditional commercial retro-commissioning projects with a study followed by implementation and verification. These participants represent commercial office space, high-density residential, healthcare and institutional buildings.
- One is a campus retro-commissioning project where smaller buildings that might not qualify for the program individually but are aggregated due to proximity.

3.1.4 Gross Program Impact Results

The following table presents information about the sampled sites and retro-commissioning measure impacts. Navigant examined all calculations and reviewed data submitted as part of the verification of savings from the RSPs. Our evaluation of the calculations determined that the estimates are, generally, well-developed and defensible, with some exceptions – both increasing and decreasing gross savings.

[17] The program-assumed net-to-gross ratio is 0.916 for electricity savings and program planning 0.80 for natural gas savings.

Table 3-2. Savings and Realization Rates by Sampled Site

		Program Verification Phase		Research Findings Gross		Realization Rates	
	Project ft²	kWh	therms	kWh	therms	kWh	Therms
Commercial 1	1,054,000	417,125	-	327,239	-	78%	
Commercial 2	521,000	98,550	3,476	52,357	4,048	53%	116%
Commercial 3	699,000	696,014	-	417,164	-	60%	
Hospital 1	1,673,000	906,565	40,956	901,932	40,956	99%	100%
Commercial 4	394,000	307,434	27,735	291,588	24,474	95%	88%
Commercial 5	920,000	592,681	32,960	515,172	28,356	87%	86%
Commercial 6	125,000	573,763	17,066	328,655	17,066	57%	100%
Commercial 7	56,000	334,221	-	334,260	-	100%	
Commercial 8	157,000	514,628	5,225	513,519	5,225	100%	100%
Hospital 2	411,000	880,990	62,750	597,649	32,442	68%	52%
University 1	464,000	442,864	4,221	442,864	4,221	100%	100%
Commercial 9	382,000	540,870	-	565,341	-	105%	
Hospital 3	1,204,000	378,688	43,905	369,409	43,905	98%	100%
Commercial 10	1,491,000	1,613,526	-	1,587,897	-	98%	
Commercial 11	1,130,000	1,153,046	-	1,202,178	-	104%	
Commercial 12	848,000	613,085	-	353,655	-	58%	
Hospital 4	2,200,000	2,364,467	68,779	2,364,467	66,143	100%	96%
Commercial 13	716,000	878,713	-	862,681	-	98%	
Commercial 14	821,000	1,038,439	-	842,801	-	81%	
Commercial 15	1,200,000	1,193,097	-	836,413	-	70%	
University 2	549,000	270,526	56,775	290,666	67,908	107%	120%
University 3	1,300,000	215,029	25,405	210,415	24,830	98%	98%
Museum 1	585,000	1,805,601	145,891	1,834,806	144,792	102%	99%
University 4	538,000	2,897,504	290,825	3,090,948	351,473	107%	121%

		Program Verification Phase		Research Findings Gross		Realization Rates	
	Project ft²	kWh	therms	kWh	therms	kWh	Therms
Total	**19,438,000**	**20,727,426**	**825,969**	**19,107,493**	**853,540**	**92%**	**103%**

Source: Navigant analysis.

Realization rates on a participant-level are reasonably close to 100% with a few notable exceptions.

- Commercial 2 savings equations mapped incorrectly in a calculation.
- Commercial 3 savings for a fan measure were based on duct pressure differences rather than fan pressure differences.
- Commercial 6 experienced a computer system crash between RSP verification and evaluator on-site verification. Several optimization sequences were not restored following the failure and savings were lost. Site personnel reported that the building owner did not plan to restore optimization sequences.
- The Hospital 2 project over-estimated saving from cycling air-handling units under mild weather conditions using rated equipment power rather than measured values.
- Commercial 12 included a night set-back measure that uses unsubstantiated rules-of-thumb to estimate savings. Navigant calculated engineering-based estimates for savings.
- Commercial 15 savings calculations are correct in assuming local controls, but global controls limit heating savings during hours when the calculation estimates savings, and heating savings from resets is claimed in some zones without heating capacity.

Similar measures recommended by the same and other RSPs did not repeat these error types, thus Navigant characterizes the overall *ex ante* savings methodology as sound. Continued IC diligence is required during review, because each RSP usually generates similar but, nonetheless, different calculation tools for each measure. Program-provided calculation templates are not widely used, thus as the number of participants and RSPs increase, the variety of calculation tools will increase.

Under-estimates of savings are a result of similar sorts of errors and include: omitting boiler or motor efficiency in the savings calculation or neglecting interactive effects among equipment. The latter type of error might be a result of occasional RSP approaches to low-cost measures. For example when turning off un-necessary equipment, the savings can be relatively high the costs are low, so the risk to the participant is low; therefore, there is no need to "sell" the idea to the customer. The RSP might not estimate every kWh or therm of savings, especially when the study budget is running low.

Demand savings is not reported by the program, but it is tracked in projects and in spreadsheets. Demand savings can contribute to measure payback; therefore it should not be ignored. Total *ex ante* savings in the verification reports is about 800 kW. Navigant's analysis of 634 kW in the evaluation sample found a 51% realization rate for peak demand savings. Key reasons for low realization rates included demand savings claimed for winter and off-peak hours, measures that were implemented without program influence[18], and scheduling measures that have uncertain impact during peak

[18] A large chiller sequencing savings opportunity for a new chiller was noted in the investigation report. Site personnel reported to evaluators that the chiller operations were already being addressed through start-up commissioning on the equipment, and the savings was not a result of the program.

hours. Program adjusted gross savings are presented in Table 3-5 and Table 3-6 alongside Adjusted Net Savings.

Realization rates did vary among the gas utilities, though the small number of sample points gives undue weight to individual projects at the utility level. Measure types do not vary among the utilities. The North Shore Gas realization rate is based on a census of one participant and the Nicor Gas realization rate is driven by one of five sampled projects with a low realization rate.

Table 3-3. GPY1 Evaluation Natural Gas Savings Estimates

Research Category	Peoples Gas Savings	North Shore Gas Savings	Nicor Gas Savings	Total Savings
Participants	14	1	7	22
Ex Ante Gross (Therms)	858,657	56,775	180,345	1,085,777
Impact Evaluation Sample - % of total	68%	100%	70%	75%
Research Realization Rate	106.4%	119.6%	82.0%	103.4%

3.1.5 Net Program Impact Parameter Estimates

As noted in Section 2.1.2.1 free-ridership was explored in participant and RSP surveys. Navigant calculated net-of free-ridership[19] for each interview and then savings-weighted participant and RSP net-of-free-ridership for the program. Navigant tracked natural gas and electricity factors separately. The results are in Table 3-4 below. As might be expected, some participants felt they might have implemented some retro-commissioning measures absent the program and studies. Service providers with long experience in the market are highly skeptical that studies would be performed and measures implemented without the funded studies, commitments and, by extension, the program. Most of the RSP observations, though, are based on their experience with poorly-performing buildings. Overall program net-of-free-ridership is the straight average of the participant and RSP estimates. Spillover from both participants and RSPs is additive to the overall net-of-free-ridership to derive NTG.

[19] Net-of-free rider = (1 - free-riders). Addition of spillover to the term comprises the full NTG ratio.

Table 3-4. Net-of- Free-Ridership (1-FR), Spillover and NTG Estimates

	Participant		Service Provider		Overall	
	Electricity	Gas	Electricity	Gas	Electricity	Gas
Program effects	0.923	0.840	0.984	0.983		
Timing & Selection	0.762	0.782	NA	NA		
No-Program Effects	0.783	0.843	0.980	0.993		
Net-of-Free-riders[19]	0.823	0.822	0.982	0.988	0.903	0.905
Spillover	<0.01	<0.01	0.136	0.110	0.136	0.110
Overall NTG	**0.823**	**0.822**	**1.118**	**1.098**	**1.038**	**1.015**

Source: Navigant analysis.

Sample sizes for gas net-of-free-ridership are very small and individual responses can greatly sway results. For example, overall participant net-of-free-ridership varies between 0.76 and 0.92, depending on the utility with 0.822 being the savings-weighted average for all gas participants. Service provider-derived values were more consistent. Overall the participant interviews included 46% and 53% of program electric and gas savings, respectively. RSP interviews included 91% and 100% of electric and gas savings, respectively.

Spillover was a noticeable aspect of the program for service providers, but much less so for participants. Three of 25 interviewed participants reported implementing some retro-commissioning measures at the project site or other locations in Illinois, but only one credited the program with significant influence (7 on a scale of 0 to 10). Most of the RSPs report they are growing their retro-commissioning service, partially as a result of the program. All but two RSPs say growth is only with utility programs at this point. For these two RSPs their answers to follow-up questions indicated significant spillover effects from the RSP perspective. One RSP was working with similar sized facilities, and the other was working with those that were borderline too small for the program. Spillover is shown in Table 3-4.

Service providers credit the joint utility program with driving the market throughout the ComEd service territory, creating a new service offering for them to promote and providing a nice base load of work to build from. One RSP noted hiring additional staff and two said staff had shifted to retro-commissioning from slower parts of the company.

Table 3-5. EPY4 Evaluation Electric Savings Estimates

Research Category	Energy Savings (MWh)	Peak Demand Savings (kW)
Ex Ante Gross	29,908	800.2
Ex Ante Net[20]	27,395	733.0
Research Findings Gross	27,315	384.3
Verified Net	25,021	352.0

Source: Utility tracking data and Navigant analysis.

Table 3-6. GPY1 Evaluation Natural Gas Savings Estimates

Research Category	Peoples Gas Savings (therms)	North Shore Gas Savings (therms)	Nicor Gas Savings (therms)
Participants	14	1	7
Ex Ante Gross	858,657	56,775	180,345
Ex Ante Net[21]	686,926	45,420	144,276
Research Findings Gross[22]	913,820	67,908	147,838
Verified Net[23]	925,412	68,769	149,713

Source: Utility tracking data and Navigant analysis.

3.2 *Process Evaluation Results*

The process component of the Retro-Commissioning Program evaluation focused on program design and implementation, program processes, marketing and outreach, RSPs, and participant satisfaction. The primary data sources for the process evaluation were review of program materials and interviews with program and implementation staff and RSPs, as well as a survey of participating customers.

[20] The program-assumed net-to-gross ratio is 0.916 for electricity savings.
[21] All gas utilities assumed a net-to-gross ratio of 0.8 for planning purposes in ex ante estimates.
[22] Natural gas research findings gross realization rates were 106%, 120% and 82% for Peoples Gas, North Shore Gas and Nicor Gas respectively. The weighted average among all gas projects is 103%.
[23] Natural gas verified net savings is based on GPY1 research that found a net-to-gross ratio of 1.05 for gas and 1.01 for electric savings. Due to the small sample (n=12) of gas participants interviewed for NTG versus the electric sample (n=25) and the identical program and market factors affecting both electric only and electric and gas participants, Navigant applies the electric savings NTG to gas savings as well.

3.2.1 Program Participation

In EPY4, the Retro-Commissioning program completed projects at 50 facilities. The average *ex ante electric* savings per project was 598 MWh per year, with individual projects ranging from 67 MWh to 2,897 MWh out of annual consumption between 1,097 to 47,083 MWh. Twenty-two GPY1 gas participants saved between 1,300 and 290,800 therms, averaging 49,800 therm savings. Participants represented a range of building types: office buildings, hospitals, retail, higher education properties, data centers, housing facilities, and hotels. The facility floor area ranged from 54,343 to 2,200,000 square feet.

3.2.2 Program Changes from EPY3

Changes made between EPY3 and EPY4, included ComEd's continued emphasis on improving the timeliness of project completions. The program also recruited additional RSPs, although only one of the new RSPs completed projects in EPY4.

Key changes include:

- **Coordinated Delivery with the Natural Gas Utilities.** The program coordinated with the natural gas distribution companies, Peoples Gas and North Shore Gas and Nicor Gas, to co-deliver the Retro-Commissioning Program, allowing customers to address measures in a fuel neutral manner decreasing barriers to participation.
- **Development of a New Tracking System.** The implementation tracking was moved to a new tracking system in EPY4/GPY1. Previously the program was tracked via a detailed spreadsheet managed by the program implementer; the new TrakSmart system allows better more real time control over program tracking and allows multiple users to access the data at any given time without risking compromise to the data
- **Emphasis on timely completion of projects.** Processes were put in place to better encourage RSPs to complete projects in the program year they were started. The program administrator used the RSP scoring system which remained in place from EPY3 as one avenue to encourage timely completion and added an incentive for some customers, those at most risk of missing deadline to finish their portion of the project before the end of the program year.
- **Updated the M&V guidelines.** M&V guidelines were developed in EPY4/GPY1. These guidelines were developed to adjust the measurement requirements for smaller measures and to reduce some of the workload for RSPs for more common small measures. The guidelines also aim to address measures where the M&V might be affected by seasonal delays.
- **Discontinuation of the Performance payment pilot tested in EPY3**. In EPY3 the program piloted a performance based payment structure with a few contractors, this approach provided a reliable acquisition rate, but the program ended up spending more per kWh saved than they did for the other projects in the program.

3.2.3 Program Processes

3.2.3.1 Participation Process

RSPs were very satisfied with the participation process. Only one RSP interviewed had not previously participated in the program, but this individual and returning RSPs noted that the

participation processes were highly structured and organized making it easy to work with Nexant and customers. One RSP indicated that they participate in retro-commissioning programs all over the country including in California and Texas and this Retro-Commissioning Program is by far their favorite and *"the best run"*.

RSPs tended to hold varying opinions regarding the program's planning phase. Two RSPs felt that the planning phase was too rigorous and time consuming, while another felt that putting extra effort into planning eased the selling and marketing process for their business. One RSP stated that he would prefer to bypass the planning phase or combine it with the implementation phase to shorten the entire process timeline. In this case, the RSP argued that for some customers, capital budgeting problems can arise when projects are not completed in a 12 month period of time or within a single budget year.

Most RSPs felt that the program stages are well structured without much duplication of effort among program phases. However, a few RSPs called for reduced documentation efforts and shortened turn-around times for project approvals. Another RSP urged a merging of the electric and gas components of the program into a single process to reduce paperwork and confusion among RSPs[24]. Overall, participants were very positive about the program, with energy savings and reduced energy bills being seen as the primary benefit for participating (64%) followed by the program's support in helping participants find fixable measures or improvements that they would not have been able to find or did not know could be fixed (both at 16%). Three of the participants noted that the independent, third-party review was a significant benefit and that the unbiased review helped them in securing internal approval for the investment in the project.

3.2.3.2 Program Timelines

The Participant Manual lists target timelines for each phase. According to the Program Manager, the emphasis placed on meeting these deadlines in EPY3 and built upon in EPY4 led to significant improvements although timing still remains an issue. Only three projects risked missing the EPY4/GPY1 completion deadline. Those three projects were offered an incentive designed to encourage timely completion (a bonus for completing the implementation phase in time for verification to occur before the close of the program year). All three projects were completed on time.

One RSP said that the program year ending in May limits the RSP's testing season, thus creating problems in finishing projects on time. Another reason for missed timelines pertains to a lack of customer urgency to complete the various stages of the project process.

3.2.3.3 Data Tracking

The ComEd Program Manager indicated that he is satisfied with the timeliness and quality of the data he receives from the implementer. The Program Manager receives a weekly status report, which includes information on project status and identified kWh savings. The Program Manager noted that he has enough information to run any sort of analysis needed.

---

[24] Most of the program forms already appear to integrate gas and electric participation criteria, though some project files include what seem to be older forms that are solely electric-focused.

3.2.4 Retro-Commissioning Service Providers

The program had nine RSPs that completed projects in EPY4/GPY1, eight were returning and one was new from EPY3. Of these, seven completed more than one project with one completing 15 projects. Both program staff and RSPs indicated that in the fourth year the program really hit its stride, and providers fully understood the program's processes and requirements. Three RSPs worked exclusively in all-electric buildings and did not identify gas savings for the gas utilities.

3.2.4.4 RSP Performance Reviews

At the end of EPY4/GPY1, Nexant again conducted a performance review of the nine active RSPs and rated them on a series of metrics. If an RSP scores low, they may be required to re-apply in the next program year. In EPY3, six of the nine RSPs with completed projects scored high enough to continue. Of the three providers that scored low, one was removed from the program.

RSPs found the performance review to be useful, but a couple felt that the review process could be more transparent, so that the rating structure could be more easily understood by RSPs. Overall, RSPs stated that it is always beneficial to have their work reviewed by a respected third party such as Nexant. In one case, an RSP argued that an outside party provided credibility to his firm's work, especially through verifying firms' strengths and weaknesses.

Program participants were very satisfied with their RSPs. All 25 interviewed participants provided a rating of 8 or more on a scale of 0 to 10, with 0 meaning very dissatisfied with the RSP and 10 meaning very satisfied.

3.2.4.5 RSP Satisfaction

Despite their criticism of some aspects of the program, RSPs were very satisfied with the program overall in EPY4/GPY1 and found that it met or exceeded their expectations. RSPs were very satisfied with the support from ComEd and Nexant and the expansion of the program into gas measures, but less satisfied with certain elements of the program such as the amount of documentation required and the lengthy review process. Overall, RSPs found that the benefits of participating in the program outweighed the drawbacks, and their satisfaction was high.

3.2.4.6 Effects of Program on RSP Business Practices

Five of the eight interviewed RSPs stated that the ComEd retro-commissioning program had an effect on their business practices. Of the group, five are either planning or have added additional staff as a result of their participation in the retro-commissioning program. All of those interviewed felt that the program was highly important (8-10 on a scale of 0-10) to how frequently RSPs recommend and perform retro-commissioning services for their customers in northern Illinois. Most RSPs felt that the addition of gas measures did not influence the frequency of recommending the program to customers. Nevertheless, RSPs seemed to think that the expansion of the program into gas measures increased customer interest.

3.2.5 Marketing and Outreach

RSPs remain the primary promoters of the retro-commissioning program and are expected to generate leads. Participants learned about the retro-commissioning program in a variety of ways. The

program implementer and the RSPs themselves believe that the RSPs are the primary informer of the program, which is consistent with the responses of program participants. Among the 25 interviewed participants, all claim to have also heard about the program via an email from ComEd.

3.2.6 Customer Satisfaction

Overall, participants gave very high ratings to their satisfaction with all program aspects about which they were asked, including the level of financial commitment required to receive the free study, the information provided in the retro-commissioning study, the program administrator (Nexant), the Smart Ideas for Your Business Program staff, the Retro-Commissioning Program overall, and ComEd overall. The highest satisfaction among participants was with the RSPs (100%) while satisfaction with ComEd overall and program staff ranged from 75% to 79%. All but one participant rated the program a 7 to 10 on a scale of 1 – 10 where 1 is highly dissatisfied and 10 is highly satisfied (96%). Just one participant was neutral (4%).

Table 3-7. Level of Satisfaction with Program Elements

	Dissatisfied (1-3)	Neutral (4-6)	Satisfied (7-10)
The level of financial commitment required to receive the free study (n=25)	0%	4%	96%
The information provided in the retro-commissioning study (n=25)	0%	4%	96%
Nexant (n=25)	0%	4%	96%
The Smart Ideas for Your Business Staff (n=19)	0%	21%	79%
Retro-commissioning Service Provider (RSP) (n=25)	0%	0%	100%
Retro-commissioning Program overall (n=25)	0%	4%	96%
ComEd overall (n=24)	8%	17%	75%

Source: Navigant research and analysis.

Participants cited many benefits of participating in the Retro-Commissioning program. The most cited benefit was the detailed retro-commissioning study.

3.2.7 Barriers to Participation

According to RSPs, the primary barrier preventing customers from performing retro-commissioning at their facilities is awareness of the program. One RSP thought that a lack of knowledge of program service and benefits kept more customers from participating in the program. Other RSPs argued that the upfront cost of the study was the biggest barrier because any potential energy savings are unknown. The lack of definite savings before the study is especially troublesome for businesses that require a certain return on investment or payback period before funding can be approved.

Another barrier to customer participation pertains to the timing of the project. One RSP said that attempting to align capital planning budgets with the program year can be very difficult, keeping

some projects from going forward, especially for larger customers with multiple locations vying for the same line of funding.

Several RSPs felt that the main barriers preventing customers from participating in the program stemmed from the size of their business. Many felt that smaller customers have more flexibility in fitting into the program's timeline, but may not have the capital to launch a project. Alternately, larger customers have the capital to complete various projects, but because of timing constraints they may not be able to align their internal budget planning with the program's timelines. Provided that a firm can find a way to overcome these obstacles, participating RSPs believe there are no major barriers to participation.

4. Findings and Recommendations

4.1 Key Impact Findings and Recommendations

The following tables summarize the electric and gas savings from the Retro-Commissioning Program.

Table 4-1. EPY4 Evaluation Electric Savings Estimates

Research Category	Energy Savings (MWh)	Peak Demand Savings (kW)
Ex Ante Gross	29,908	800.2
Ex Ante Net[25]	27,395	733.0
Research Findings Gross	27,315	384.3
Verified Net	25,021	352.0

Source: Utility tracking data and Navigant analysis.

Among the 50 participants, 21 in the program database were also gas utility participants. Evaluation research identified one additional Peoples Gas participant for a total of 22 gas participants. The gas utilities did not have a deemed NTG ratio; however, they all used 0.8 as a planning assumption, and Navigant applies this ratio to ex ante net savings. Since no NTG estimates were deemed for gas savings, Navigant applied the NTG ratio estimated by EPY4/GPY1 research below to GPY1 gas savings retrospectively, in accordance with the NTG Framework.[26]

[25] The program-assumed net-to-gross ratio is 0.916 for ex ante net and verified net electricity savings.

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

Table 4-2. GPY1 Evaluation Natural Gas Savings Estimates

Research Category	Peoples Gas Savings (therms)	North Shore Gas Savings (therms)	Nicor Gas Savings (therms)
Participants	14	1	7
Ex Ante Gross	858,657	56,775	180,345
Ex Ante Net[27]	686,926	45,420	144,276
Research Findings Gross	913,820	67,908	147,838
Verified Net[28]	925,412	68,769	149,713

Source: Utility tracking data and Navigant analysis.

- **Program Savings Goals Attainment**.
  Finding. The program achieved goals for electric energy savings (26,880 MWh) and fell short of participation (63) and demand savings goals (3.8 MW). Gas savings goals were met for Peoples Gas (528,800 therms) but fell short for North Shore Gas (145,600 therms) and Nicor Gas (267,700 therms)
  Recommendation. Savings is driven largely by participation; thus increasing program participation is the best route to achieve program savings goals. Motivating inactive RSPs will further savings goals and market transformation for retro-commissioning services. Demand savings is difficult to predict and track with retro-commissioning and perhaps the prominence of this metric should be reduced.

- **Gross Realization Rates.**
  Finding. The realization rate for electric energy is 92%. Gas savings realization rates are 106%, 120% and 82%, for Peoples Gas, North Shore Gas and Nicor Gas, respectively. Divergent gas realization rates are a result of the small populations and savings for the latter two utilities. The overall gas realization rate is 103%. Energy savings estimates from the RSPs are generally well-supported and calculated with a high degree of rigor. Most RSPs continue to use their own estimation spreadsheets, rather than program–provided templates for common measures. This factor complicates program implementation and evaluation efforts as the variety of methods is time-consuming and open to more errors.
  Recommendation. Explore ways to encourage use of program-standard savings calculators – perhaps by using incentives or by fast-tracking program processes when standard savings calculators are used.

- **Net-to-Gross estimates:**
  Finding. EPY4/GPY1 NTG research estimates an electric NTG ratio of 1.01. The weighted average gas NTG ratio estimate among all participating utilities is only slightly higher (1.05) than the electric NTG. Program incentives to fund the studies and the expertise of RSPs rank

[27] All gas utilities assumed a net-to-gross ratio of 0.8 for planning purposes in ex ante estimates.
[28] Natural gas verified net savings is based on GPY1 research that found a net-to-gross ratio of 1.01 for gas and electric savings. Due to the small sample (n=12) of gas participants interviewed for NTG versus the electric sample (n=25) and the identical program and market factors affecting both electric only and electric and gas participants, Navigant applies the electric savings NTG to gas as well.

very high importance among participants. (9.6/10) According to participants, program influence to identify and implement measures is lower (7.4/10), a result similar to EPY3. There is only slight indication of spillover among participants. Service providers credit the program with sustaining and creating a retro-commissioning market in Illinois.
Recommendation. Utilize a single common NTG ratio for gas and electric measures. The factors affecting NTG for gas and electric measures are mostly the same. RSPs treat both equally, participant decision-makers are the same and most measures are concurrent with the same action, i.e. changing setpoints or operating schedules.

- **Demand Savings Estimates.**
  Finding. The RSPs continue to have different or no approach for estimating peak demand savings.
  Recommendation. Accurate accounting for demand savings does contribute to measure payback at the customer level and contributes to the program's success. The program needs to establish a standard methodology for demand savings estimates and those methods must be enforced during quality assurance steps.

- **Incomplete Savings Estimates.**
  Finding. Some measures are low-risk and high-reward in terms of savings, and there is a temptation to apply less rigorous calculations to quantify savings, since the RSP is certain the customer will implement the measure. While this scenario expedites the retro-commissioning process, it short-changes the program's savings estimates. The addition of gas savings adds another dimension to this problem– if electric savings alone motivate implementation, concurrent gas savings estimates might be incomplete, or *vice versa*.
  Recommendation. During savings calculation quality control steps, look specifically for interactive and concurrent savings with a checklist by measure type. For example, equipment scheduling saves gas for ventilation as well as fan energy; fan static pressure reduction decreases fan heating, and discharge air temperature resets can change mass-flow rates and fan power.

4.2 Key Process Findings and Recommendations

Overall, participants and RSPs were very positive about the program and the participation process. Participants were satisfied with the energy savings and reduced energy bills and by the program's support in helping them find fixable measures or improvements that they would not have been able to find or did not know could be fixed. Participants also noted that the independent, third-party review was a significant benefit and it helped them in securing internal approval for the investment in the project.

Participants gave very high ratings to their satisfaction with all program aspects, including the level of financial commitment required to receive the free study, the information provided in the retro-commissioning study, the program administrator (Nexant), the Smart Ideas for Your Business Program staff, the Retro-Commissioning Program overall, ComEd, and their gas utilities.

RSPs reported satisfaction with the program and noted that it met or exceeded their expectations. RSPs were very satisfied with the support from ComEd and Nexant and the expansion of the program into gas measures. Moreover, five of the eight interviewed RSPs stated that the joint utility retro-commissioning program had a positive effect on their business and business practices.

While there was general satisfaction with the program, there are four areas where there is opportunity for continued improvement as the program moves into PY5. These are:

- **RSP Participation.**
  Finding. The program has 23 registered RSPs. While only nine completed projects in EPY4/GPY1, many of the others have projects in process for EPY5/GPY2 completion. The effort to increase the number of participating RSPs between EPY3 and EPY4 was a success; however there is lost opportunity in having RSPs listed as part of the program but not completing projects.
  Recommendation. Because RSPs are the primary conduit for program participation, attention should be paid to getting all registered RSPs to complete at least one project within the program year.

- **Implementation Phase Support**.
  Finding. The Implementation Phase continues to be the primary source of challenges for the program. This phase is generally participant-led and the timely completion of projects is entirely dependent on the customer keeping the project moving. RSPs expressed a concern that while they are not involved in this phase, they are still held responsible, via the RSP review process for the timely completion of projects.
  Recommendation. More effort is needed from Program Managers and the IC to engage the participants and keep the implementation phase moving along on a timely basis.

- **RSP review process.**
  Finding. RSPs indicated that while they think the review process is important, the process could be more transparent. Essentially, RSPs believe there should be consideration in the scoring for those parts of the project that the RSPs have little to no control over. For example, the timely completion of the implementation phase may negatively affect the score; yet, they have little to no control over this part of the project.
  Recommendation. The RSP scoring system should be reviewed to ensure it is not penalizing RSPs for aspects of the program that they have no control over (e.g., implementation timing) or, program approaches should be put in place that allow RSPs to guide the participants more actively through the customer directed phases.

- **Project timing.**
  Finding. Timing improved in EPY4/GPY1, but remains a challenge. In EPY4/GPY1, many projects were unable to meet their originally planned completion timelines. Timing challenges are the result of multiple issues including participant delays in the implementation phase, the bounds of the program year itself, and how customer budgeting and approval processes fit into the program year timing.
  Recommendation. While it may not be feasible to allow projects to cross multiple program years, this option may increase the breadth of projects completed through the program. Further, the "carrot and stick" approach seems to be helping with project timing, increasing the carrot for participants who complete their implementation phase in a timely manner and/or offering more assistance for those who need it during the customer driven phases can help get more projects done on time and can help decrease penalties on RSPs for phases they have less control over.

5. Appendix

5.1 Glossary

ComEd, Nicor, Peoples Gas, and North Shore Gas EM&V Reporting Glossary. January 10, 2013

High Level Concepts

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.

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 came 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, Retro-commissioning), 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, Retro-commissioning), the Research

Findings are to be in the body of the report as the only impact findings. (However, impact findings may be summarized in the body of the report and more detailed findings put in an appendix to make the body of the report more concise.)

Program-Level Savings Estimates Terms

N	Term Category	Term to Be Used in Reports‡	Application†	Definition	Otherwise Known As (terms formerly used for this concept)§
1	Gross Savings	Ex-ante gross savings	Verification and Research	Savings as recorded by the program tracking system, unadjusted by realization rates, free ridership, or spillover.	Tracking system gross
2	Gross Savings	Verified gross savings	Verification	Gross program savings after applying adjustments based on evaluation findings for only those items subject to verification review for the Verification Savings analysis	Ex post gross, Evaluation adjusted gross
3	Gross Savings	Verified gross realization rate	Verification	Verified gross / tracking system gross	Realization rate
4	Gross Savings	Research Findings gross savings	Research	Gross program savings after applying adjustments based on all evaluation findings	Evaluation-adjusted ex post gross savings
5	Gross Savings	Research Findings gross realization rate	Research	Research findings gross / ex-ante gross	Realization rate
6	Gross Savings	Evaluation-Adjusted gross savings	Non-Deemed	Gross program savings after applying adjustments based on all evaluation findings	Evaluation-adjusted ex post gross savings
7	Gross Savings	Gross realization rate	Non-Deemed	Evaluation-Adjusted gross / ex-ante gross	Realization rate
1	Net Savings	Net-to-Gross Ratio (NTGR)	Verification and Research	1 – Free Ridership + Spillover	NTG, Attribution
2	Net Savings	Verified net savings	Verification	Verified gross savings times NTGR	Ex post net
3	Net Savings	Research Findings net savings	Research	Research findings gross savings times 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[29].

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

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

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

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

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

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

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

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

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

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

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

Customized basis: Measures where a prescriptive algorithm exists in the TRM but a Program Administrator chooses to use a customized basis in lieu of the partially or

fully deemed inputs. These measures reflect more customized, site-specific calculations (e.g., through a simulation model) to estimate savings, consistent with Section 3.2.

5.2 *Detailed impact results*

Program impacts are tracked through the several phases of the program with the IC giving feedback and requiring changes along the way. Thus, the evaluator's task is to check a sample of measures verified by the RSPs and IC and ensure that measures are indeed complete and savings are accurately estimated.

The evaluators conclude that the Verification Reports and supporting data and calculations provided sufficient confirmation that the measures were installed as described. Navigant identified 11 projects within the impact sample for on-site verification.[30] Evaluators visited all 11 of these sites in September 2012 and verified implementation and observed actual operation of measures. In most cases measure implementation persists. In a couple cases, setpoints and schedules were modified due to comfort or occupancy requirements of the buildings. In one case the automation system used to implement measures failed and when the software was re-installed, several measures were lost from the system. The site does not plan to re-implement these measures.

For all 24 sites in the sample, Navigant reviewed measure implementation plans, assumptions and calculations in detail. In general, Navigant found the calculations accurately constructed, based on clearly measured data rather than rules-of-thumb and transparent in spreadsheet form. In rare instances, we found calculation errors due to spreadsheet equation errors, erroneous inputs, omissions of relevant impacts and inconsistencies in assumptions from measure to measure on the same system.

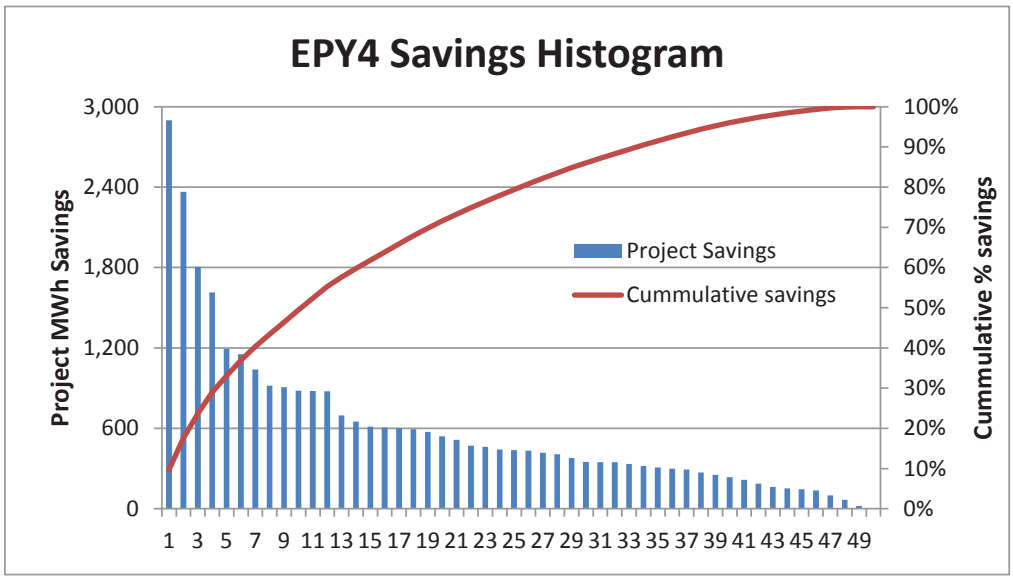
Savings estimation approaches among RSPs were mostly consistent. Most calculation spreadsheets were comprehensive, though some were excessively complex and others overly simple. Despite the range of approaches in EPY4/GPY1, there were very few lapses in engineering methods. When faced with the need to make engineering assumptions, RSPs are often more conservative than the program guidelines. A conservative approach, such as this, is common to retro-commissioning analysis. Some measures are so simple to implement and the primary effects generate sufficient savings that there is no inclination to analyze secondary and tertiary effects of an action. From the RSPs' and customer's perspectives this approach makes sense. Less time spent on analysis of simple cost-effective measures frees resources for analyzing more complex measures. From the perspective of the sponsoring utility, however, these additional savings are real and should be counted. Where there was no further justification for overly conservative estimates, the evaluation team restored guideline defaults and/or

[30] On-site verification projects were selected based on project savings size, measure type and facility type. Large projects were selected because of their impact on program goals. Projects with chilled water and cooling tower measures were selected because their full functionality would not necessarily have been verifiable before May 31. Diverse facility types were selected to capture a range of operating strategies and participant requirements (for example year-round cooling for equipment intensive sites or 24 hour operation for hospitals).

supplemented estimated savings with secondary effects of the measures as could be determined with available data.

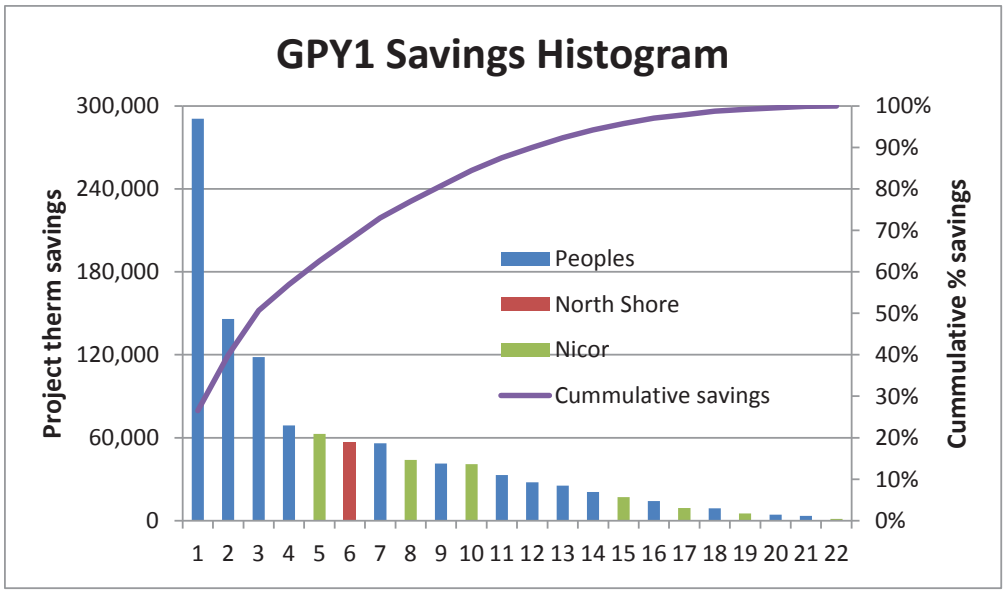
The distribution of electric and gas savings are somewhat different, as shown in Figure 5.1 and Figure 5.2. While there were a few very large electric savings projects there is a large mid-range of savings in the distribution and eleven of 50 projects comprise 50% of program savings. For the gas utilities three projects comprise more than 50% of program savings

Figure 5.1. Ex Ante Electric Savings (kWh) Project Savings Histogram



Source: Utility tracking data.

Figure 5.2. *Ex Ante* Gas Savings (Therm) Project Savings Histogram

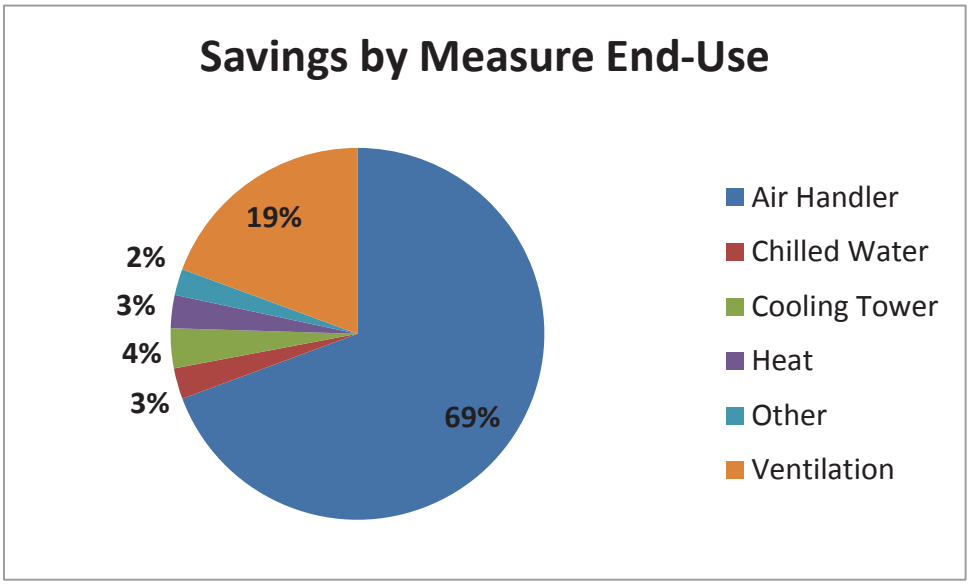


Source: Utility tracking data.

As part of the impact analysis, Navigant grouped the retro-commissioning measures into six broad end-use categories that include most types of measures included in retro-commissioning. Figure 5.3 shows the distribution of *ex ante* savings among measure end-uses. Secondary effects, such as heating savings from reduced ventilation when an air-handler is turned off, count in the primary end-use category.

- **Air-handler** includes measures that change the schedule of fan operation and fan control setpoints such as air temperatures, minimum airflows and/or static pressure setpoints.
- **Chiller** includes such measures as chilled water temperature reset, compressor staging, and water-side economizers.
- **Cooling tower** includes fan and cell staging and condenser water temperature control.
- **Heating** includes measures like boiler pumps or terminal box setpoints and/or control.
- **Other** measures include pumping, lighting, and domestic hot water measures.
- **Economizer and Ventilation Controls** include economizer repair and optimization and ventilation control based on CO_2 levels in return air.

Figure 5.3. *Ex Ante* Electric Savings (kWh) by End-Use Category



Source: Utility tracking data and Navigant analysis.

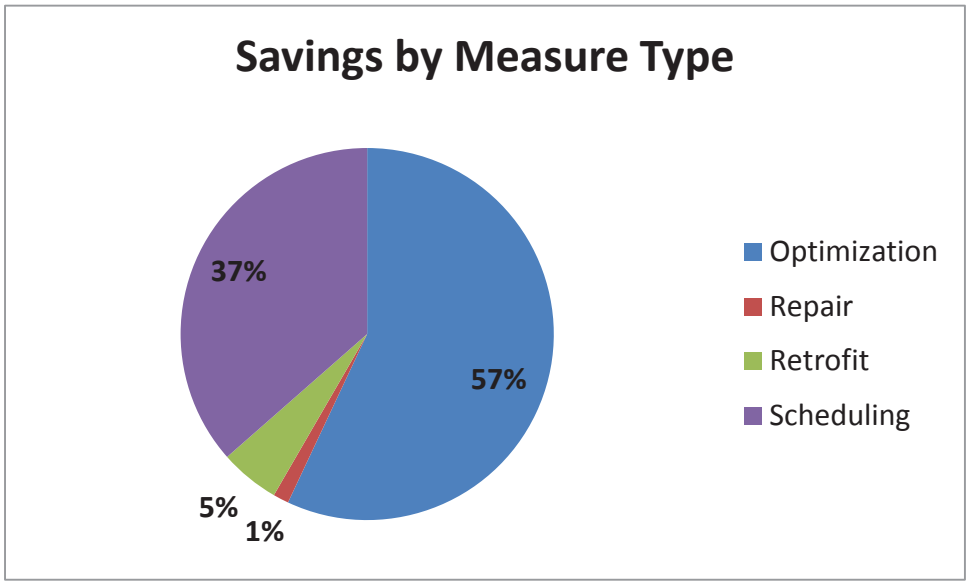
In addition to thinking of measures by end-use, Navigant grouped the measures according to their upgrade type. Figure 5.4 shows the distribution of *ex ante* savings among measure types.

- **Scheduling** measures are those that merely turn off equipment (HVAC and lighting) when their service is not required for occupants.
- **Optimization** includes measures that improve control algorithms, or setpoints.

- **Repairs** are measures that address broken equipment such as failed actuators or sensors.
- **Retrofit** measures in retro-commissioning are relatively few and generally fairly inexpensive for retrofit measures. In EPY4/GPY1 equipment retrofit measures included new filter media, added sensors for CO or CO2 ventilation control or wet-bulb temperature sensors for cooling tower controls.

Among the RCMs implemented at the EPY4/GPY1 sites, air handlers and economizers are the largest electric energy savers by end-use. Optimization measures dominate the savings by measure type, and most of the optimization measures involve air-handler control algorithms and set-point optimization. A relatively small portion of the identified savings relates to the cooling systems. This observation might be a result of the program timeline that makes cooling system measures difficult to investigate and observe while operating.

Figure 5.4. *Ex Ante* Electric Savings (kWh) by Measure Type



Source: Utility tracking data and Navigant analysis.

5.2.1 Net Program Impact Results

Once gross program impacts have been estimated, net program impacts are calculated by multiplying the Research Findings gross impact estimate by the deemed NTG ratio for ComEd, which combine free-ridership (FR) and spillover (SO). Navigant included equally weighted participant and service provider NTG estimates in the final program NTG ratio

Site NTG = $NTG_{site} = 1 - FR_{site} + SO_{site}$

RSP NTG = $NTG_{RSP} = 1 - FR_{RSP} + SO_{RSP}$

Among participants interviewed for the process evaluation, the Navigant Team determined site-level and RSP-weighted NTG. The overall program NTG is a saved kWh-weighted average of the NTG of the sites and RSPs interviewed.

$$NTG_{overall} = \left(\sum NTG_{site} \times kWh_{site} / \sum kWh_{site} + NTG_{RSP} \times kWh_{RSP} / \sum kWh_{RSP}\right)/2$$

5.2.1.1 Free-Ridership

Free-ridership determination is a combination of three attributes investigated during the participant survey, combined with two parallel aspects investigated with the service provider survey. The service provider survey does not address the timing question, since that is solely participant-driven.

1. The influence of various program factors in the customer's decision to conduct the study and commit the funding to perform retro-commissioning activities;
2. What would have been the timing for addressing those issues, absent the program ; and
3. Whether the participant would have addressed the issues identified in the retro-commissioning study of which they were aware, absent the program.

The evaluation completed interviews with 25 participants of an attempted census (39). The free-ridership questions established a participant free ridership rate of zero for ten of the projects, and a rate between 0.03 and 0.63 for the others. The sites that had the highest indications of free-ridership all had equipment deficiencies known to the appropriate people in the company. The companies stated that they would have conducted the study and implemented measures within one to two years even if the program had not been available.

Conversely, RSP estimates of free-ridership is very low – 0.05. RSPs universally estimated that participants would not have performed studies and they are relatively un-aware of savings opportunities. Participants interviewed account for 46% of electric savings and 53% of gas savings. Interviewed RSPs thought that the program played a large part in the decision making process of participants. Without the program's study, RSPs believe that few of the participants would have implemented the retro-commissioning measures on their own`. Interviewed RSPs account for 91% of electric savings and 100% of gas savings. The final PY4 free-ridership ratio is an equally weighted average of savings-weighted participant and RSP free-ridership. Overall free-ridership is 0.10 for both electric and gas savings.

5.2.1.2 Spillover

The Evaluation Team also researched the question of program spillover. Our EPY4/GPY1 participant survey asked about spillover, including any energy efficient equipment and additional retro-commissioning measures implemented at the facility that did not receive incentives through any utility or government program.

Eight interviewed participants reported that they installed energy efficient equipment that did not receive incentives, and five performed additional retro-commissioning without an incentive. However, only three of these participants cited significant influence from the ComEd Retro-Commissioning program in taking these additional actions. Follow-up revealed few quantifiable details on these actions. Given the low attribution to the program for retro-commissioning measures and other energy efficiency measures we conclude that spillover is not a major factor for participants.

RSPs were also asked about spillover, both their own activities and observations of the regional retro-commissioning market. Two RSPs reported they completed more projects without incentives than

they would have without the program. The projects were generally smaller, with one RSP saying their work was for facilities that fell below the program size guideline. Nonetheless, the *additional* retro-commissioning work was attributed to capacity and awareness built by the program. RSP spillover is calculated for each instance as the product of number *additional* projects, percent of identified savings implemented, relative size of the projects to other studies performed by the RSP. The RSP results are weighted by their projects contribution to the overall program savings. The additional savings contribute a spillover factor of 0.11. Thus,

NTG = 1 – Free-rider + Spillover NTG = 1 - 0.10 + 0.11 = 1.01

Among gas savings the NTG is only slightly higher, with a smaller participant survey sample. Due to the same market drivers, regardless of energy type or service territory, Navigant recommends a single NTG = 1.01 for both energy sources for all utilities partnering in the Retro-Commissioning Program. Net Program savings, are reported in Table 5-1.

Table 5-1. PY4 Evaluation Savings Estimates

Research Category	Energy Savings (MWh)	Peak Demand Savings (kW)	Natural Gas Savings (thermsx1,000)
Ex Ante Gross	29,908	800.2	1,096
Ex Ante Net[31]	27,395	733.0	1,096
Research Findings Gross	27,315	384.3	1,133
Verified Net	25,020	352.0	1,147

Source: Navigant research and analysis.

5.2.2 Measure-level NTG Estimates

The Illinois Commerce Commission requested further detail on net-to-gross estimates, including prior NTG documentation and NTG at the measure-level in addition to program-level NTG, where possible. This appendix addresses this supplemental request for the EPY4/GPY1Northern Illinois Joint Utilities Retro-Commissioning Program.

For ex ante savings estimates, the Retro-Commissioning Program utilized deemed NTG values for electric energy savings. The gas utilities assumed a NTG ratio for planning purposes only. Table 5-2 presents these data. Revised NTG ratios were determined by research in EPY4/GPY1 discussed in section 3.1.5. The gas NTG was applied for net verified savings retrospectively in GPY1.

[31] The program deemed net-to-gross ratio for PY4 is 0.916.

Table 5-2 *Ex ante* Net-to-Gross Estimates

	Electricity	Natural Gas
NTG value	0.916	0.8
Assumption Type	Deemed	Planning
Source	EPY2 Evaluation[32]	Unknown[33]
Methodology	Self Report	Unknown
Observations	5	Unknown

Source: Navigant Analysis

The body of the report focuses on the program-level NTG for natural gas and electricity. Retro-commissioning measures are diverse in description, implementation and magnitude. To aggregate measures meaningfully, Navigant categorized each of the more than 330 implemented measures into four broad categories – Control Optimization, Equipment Scheduling, Low-Cost Retrofits and Repairs – as shown in Figure 5.4. Optimization and scheduling account for more than 93% of all kWh savings and 96% of all therm savings; therefore our measure-level analysis only represents these two measure types.

Participant surveys with 25 of 39 unique contacts, examined measure-level participant knowledge and likely implementation of the three measures with the greatest savings at each surveyed site. Among the 25 surveyed participants, eleven had gas savings discussed for net-to-gross. These questions served to modify the no-program score for the participant portion of the net-to-gross estimate. Measure-level results indicate slightly lower free-ridership among participants for measure types as compared to program-level results.

Service Provider surveys with eight of nine active service providers asked whether the service providers would have identified and recommended the same measures absent the program, i.e. did the program influence the deliverable to the client. Service providers indicated no changes in the no-program effects based on measure type. Spillover was not researched on the measure level, thus the spillover effects do not change from the overall program – 0.11 for natural gas and 0.136 for electricity

[32] Plan Year 2 (6/1/2009-5/31/2010), Evaluation Report: Retro-Commissioning Program, November 2010, Page 29 Table 4.4. The NTG from the EPY3 retro-commissioning evaluation report was 0.713.
[33] Ex ante savings spreadsheets

Table 5-3 Research Findings for Participant and Service Provider Free-ridership

	Free-Ridership- Participant Self-Response				Free-Ridership- Service Provider Feedback			
Program Overall	0.177	*25*	0.178	*12*	*0.018*	*8; 94% of program projects*	*0.012*	*5; 100% of program projects*
Optimization Measures	0.144	*22*	0.126	*9*				
Scheduling Measures	0.153	*14*	0.164	*6*				

Source: Navigant Analysis

Table 5-4 Research Findings for Non-Participant Spillover and NTG Ratio

	Non-Participant Spillover			*NTG*	
Program Overall	*0.136*	*0.110*	*8; 94% of program projects*	1.038	1.015
Optimization Measures				1.055	1.041
Scheduling Measures				1.050	1.022

Source: Navigant Analysis

5.2.3 Channeling

As part of the retro-commissioning study process, RSPs identify potential energy efficient equipment upgrades and list them in the study. Additionally, all RSPs promote ComEd, Nicor Gas, Peoples Gas and North Shore Gas Commercial and Industrial Prescriptive and Custom programs to participants as an opportunity to receive incentives for qualifying measures. RSPs often also continue to encourage participants to implement these measures after the retro-commissioning project concludes, although this appears to be stronger for RSPs with existing relationships with their clients. Six of the 25 interviewed participants installed additional energy efficient equipment at their facility that received incentives from ComEd or the gas utilities.

5.3 Detailed process results

Twenty-five participant and eight RSP interviews generated lots of feedback on the program processes.

5.3.1 Participation Process

RSPs were very satisfied with the participation process. Only one RSP interviewed had not previously participated in the program, but this individual and returning RSPs noted that the participation processes were highly structured and organized making it easy to work with Nexant and customers. One RSP indicated that they participate in retro-commissioning programs all over the country including in California and Texas and the ComEd program is by far their favorite and *"the best run"*.

RSPs tended to hold varying opinions regarding the program's planning phase. Two RSPs felt that the planning phase was too rigorous and time consuming, while another felt that putting extra effort into planning eased the selling and marketing process for their business. One RSP stated that he would prefer to bypass the planning phase or combine it with the implementation phase to shorten the entire process timeline. In this case, the RSP argued that for some customers, capital budgeting problems can arise when projects are not completed in a 12 month period of time or within a single budget year.

Most RSPs felt that the program stages are well structured without much duplication of effort among program phases. However, a few RSPs called for reduced documentation efforts and shortened turn-around times for project approvals. Another RSP urged a merging of the electric and gas components of the program into a single process to reduce paperwork and confusion among RSPs. For several, the implementation phase or their lack of control during the customer guided phases provided concern especially as it often affected their scoring during the RSP assessment.

In EPY4/GPY1, the program was expanded to include gas measures. From an RSP perspective, nearly all felt that the program change positively affected program participation. RSPs noted an expansion in their customer base allowing RSPs to work with customers that had already completed electrical work and were interested in gas-related services or were interested in completing a variety of retro-commissioning projects in one program year. Some RSPs said:

"I think people thought it was weird that we'd walk by a boiler room and see that it is "leaking" gas [energy] and say to the customer, we can't look at that. It was embarrassing, so it was big [for savings]."

"A lot of customers were confused why we weren't focusing on gas in the first place. It seemed like we were overlooking opportunities."

RSPs pointed out a number of different strengths arising from the participation process. One of the most commonly cited benefits pertained to the generation of sales opportunities for RSPs, in addition to providing customers with support in conducting retro-commissioning efforts. One RSP noted the value in program workshops as an opportunity to network with other RSPs.

Interviewed participants reported a high level of satisfaction with the program participation process overall with 96% of interviewed participants giving the program a rating of 7-10 on a 10 point scale.

When asked why they provided these ratings 30% of participants indicated a general overall satisfaction and 26% indicated that it was a "great program." Only one participant provided the program a neutral rating and none indicated any level of dissatisfaction with the program. A few respondents were particularly satisfied with the program saying:

"It was a completely positive experience for us."

"I think it is a great program. As an internal facilities team, it gave us some credibility. It was a great partnership from our perspective."

"I thought it was very valuable. I thought it was well done and again it confirmed that we ran a relatively efficient building."

Overall, participants were very positive about the program, with energy savings and reduced energy bills being seen as the primary benefit for participating (64%) followed by the program's support in helping participants find fixable measures or improvements that they would not have been able to find or did not know could be fixed (both at 16%). Three of the participants noted that the independent, third-party review was a significant benefit and that the unbiased review helped them in securing internal approval for the investment in the project. As noted by the responses below:

"I think looking at a facility from the outside and not allowing us to say that we have always done it that way [is important]. They are bringing that extra tease to say well, other organizations have done this with these types of results and we think it will work for you."

"You get an independent, third party to come in and look at your operations, because sometimes you are too close to how things have always been done, or your engineer has been there for 100 years. You think you are operating a good building and sometimes it is hard to see those things. Sometimes it is hard for an outsider to come in and give you ideas to do better. It is not necessarily criticism; it just might be something you hadn't thought about yet. [Having] a relatively independent, third party looking at this was extremely helpful."

5.3.2 Program Timelines

The Retro-Commissioning Program breaks the participation process into five phases: the application phase, the planning phase, the investigation phase, the implementation phase, and the verification phase. The Participant Manual lists target timelines for each phase. According to the Program Manager, the emphasis placed on meeting these deadlines in EPY3 and built upon in EPY4 lead to significant improvements although timing still remains an issue. Only three projects risked missing the EPY4/GPY1 completion deadline. Those three projects were offered an incentive designed to encourage timely completion (a bonus for completing the implementation phase in time for verification to occur before the close of the program year). All three projects were completed on time.

According to RSPs, projects completed in EPY4/GPY1 were unable to meet their originally planned completion timelines. One RSP said that the program year ending in May limits the RSP's testing season, thus creating problems in finishing projects on time. Another reason for missed timelines pertains to a lack of customer urgency to complete the various stages of the project process. In particular, one RSP claimed that customers failing to continue working through aspects of the project created delays in reaching the verification phase of the project resulting in a performance penalty for the RSP. One RSP said:

"Right now, in this commercial program, the customer is completely in charge of the implementation phase and we're charged with the verification portion of that and I know in the industrial program, the RSP has a choice on whether they want to do the verification and measure or whether they want to do the implementation. There

isn't that choice in the commercial program. Considering some of the delays and some of the issues that we've encountered after supposedly the projects have been implemented, it sure seems like we might be better off doing the implementation ourselves and letting the customer handling the M&V part of it." In fact, RSPs can provide implementation services for their projects, but they must waive the verification scope to avoid conflicts of interest.

Since EPY3, one RSP reported a more streamlined process for working with both Nexant and ComEd to complete projects, which allowed for a greater ability on the part of the RSP to meet project timelines. However, another RSP argued that the "back and forth" of the review process with the IC added unnecessarily to the project timeline.

Participants were generally satisfied with the project timing, although the type of organization seemed to influence whether they thought the program timing was too long or too short. Large corporate participants indicated that the projects could have been completed more quickly and that the many phases caused the program to take longer than they would like. Smaller, non-profit or more budget constrained participants indicated that being able to spread the implementation phase out of the course of more than one fiscal year would allow them to complete more projects through the program. This feedback was most notable in facilities where annual budgets were hard set and there was limited opportunity to go back and ask for more investment in capital improvements within the fiscal year.

"It takes way too long. There are far too many reviews by Nexant, and I understand why those are, but I mean it really slowed us done quite a bit. I have to deal with getting internal buy-ins from other staff, which is my own issue, but that also, slows things down."

"We had an issue only because when I came in, I stopped the program for a bit of time, so we could get the appropriate approvals [internally]. Then, we got really pushed hard to meet all of the deadlines."

5.3.3 Data Tracking

The ComEd Program Manager indicated that he is satisfied with the timeliness and quality of the data he receives from the implementer. The Program Manager receives a weekly status report, which includes information on project status and identified kWh savings. The Program Manager noted that he has enough information to run any sort of analysis needed.

5.3.4 Retro-Commissioning Service Providers

The program had nine RSPs that completed projects in EPY4/GPY1, eight were returning and one was new from EPY3. Of these, one completed 15 projects while two completed only one project. Both program staff and RSPs indicated that in the fourth year the program really hit its stride, and providers fully understood the program's processes and requirements. Three RSPs worked exclusively in all-electric buildings and did not identify gas savings for the gas utilities.

5.3.5 RSP Performance Reviews

At the end of EPY4/GPY1, Nexant again conducted a performance review of the nine active RSPs and rated them on a series of metrics. The ranking system is based on a 60-point scale, and the RSPs are ranked by total score. If an RSP scores fewer than 36 points, they may be required to re-apply in the next program year cycle. The performance metrics are: number of projects accepted, quality of

reports, improvements in quality of deliverables over time, meeting of deadlines, project value (dollar savings per kWh, harvest rate, energy savings per project), and customer satisfaction. RSPs that do not complete a project will receive no points in the performance review and will have to re-apply for the next program year, unless they already have an active project on track for completion in the following program year. In EPY4/GPY1, six of the nine RSPs with completed projects scored above 40. Of the three providers that scored below 40, one would have scored much higher had they completed more than one project, one was allowed to continue under a performance management plan and one, who received the lowest score of all providers in 7 of 8 categories, was removed from the program.

The Program Manager stated that RSPs are very receptive to the performance metrics. The review allows them to see how their work compares to their competition and to receive feedback on their performance.

RSPs found the performance review to be useful, but a couple felt that the review process could be more transparent, so that the rating structure could be more easily understood by RSPs. One RSP said:

"We're being grading on a scale and when these lengthy delays come… that adds to the whole number of days in the project and that reflects poorly on us in the end and it look like it took longer than it did and we had absolutely no power to move it along more quickly. We feel like the scoring system needs to be changed as it scores the timeline."

Overall, RSPs stated that it is always beneficial to have their work reviewed by a respected third party such as Nexant. In one case, an RSP argued that an outside party provided credibility to his firm's work, especially through verifying firm strengthens and weaknesses. Several RSPs noted that the review's metrics may unduly penalize some firms. For example, one RSP stated that his firm was penalized for missing project timelines, which he claimed resulted from the program year not lining up with the customer's budget year. Another indicated they were penalized because of slow downs during the customer directed Implementation Phase, a portion of the program they have little or no control over.

Program participants were very satisfied with their RSPs. All 25 interviewed participants provided a rating of 8 or more on a scale of 0 to 10, with 0 meaning very dissatisfied with the RSP and 10 meaning very satisfied.

5.3.6 Training

RSPs are required to complete up to eight hours of annual training to participate in the retro-commissioning program. Two in-person trainings took place inEPY4/GPY1. Additionally, trainings are conducted by Nexant through a webinar every two to three months. Trainings were offered on an *ad hoc* basis and included safety awareness training and several trainings aimed at preparing RPSs for EPY4/GPY1. RSPs that scored well at the end of EPY3 were not required to attend the program overview training offered at the beginning of the program year.

RSPs interviewed by the evaluation team claimed that the trainings were helpful but noted that they often just reinforced existing knowledge, especially relating to safety. Some RSPs found that the trainings provided opportunities to hear the experiences of other RSPs working in the field, which

proved to be helpful in navigating similar issues. For the most part, the RSPs did not identify any technical issues or barriers experienced in their participation in the program that could not be overcome with more specific training from Nexant. Yet, one RSP noted a need for more training regarding the document review process with particular emphasis on the types of information and data needed for project submission materials.

5.3.7 RSP Satisfaction

Despite their criticism of some aspects of the program, RSPs were very satisfied with the program overall in EPY4 and found that it met or exceeded their expectations. RSPs were very satisfied with the support from ComEd and Nexant and the expansion of the program into gas measures, but less satisfied with certain elements of the program such as the amount of documentation required and the lengthy review process. Overall, RSPs found that the benefits of participating in the program outweighed the drawbacks, and their satisfaction was high.

5.3.8 Effects of Program on RSP Business Practices

Five of the eight interviewed RSPs stated that the Retro-Commissioning Program had an effect on their business practices. Of the group, five are either planning or have added additional staff as a result of their participation in the retro-commissioning program. All of those interviewed felt that the program was highly important (8-10 on a scale of 0-10) to how frequently RSPs recommend and perform retro-commissioning services for their northern Illinois customers. Most RSPs felt that the addition of gas measures did not influence the frequency of recommending the program to customers. Nevertheless, RSPs seemed to think that the expansion of the program into gas measures increased customer interest.

5.3.9 Marketing and Outreach

RSPs remain the primary promoters of the retro-commissioning program and are expected to generate leads. Participants learned about the retro-commissioning program in a variety of ways. The program implementer and the RSPs themselves believe that the RSPs are the primary informer of the program, which is consistent with the responses of program participants. Among the 25 interviewed participants, all claim to have also heard about the program via an email from ComEd.

A majority of the participants (52%) stated that email is the best way to reach them about energy efficiency programs. This was followed by their account representative, the RSP, and face-to-face meetings.

Table 5-5. Preferred Method of Reaching Customers about Energy Efficiency Opportunities (Multiple Response)

Method	Percent of Cases
E-mail	52%
Account Manager/Representative	32%
Retro-Commissioning Service Provider	16%
Trade Organizations	16%
Direct Contact with Customer (Face-to-face)	12%
Telephone	4%

Source: Navigant research and analysis.

5.3.10 Marketing Materials

The interviewed RSPs find the program's marketing materials (case studies, sell sheet, and brochure) to be moderately effective. These materials give an overview of the program as well as specific examples in the case studies. Only one RSP noted that they did not use any materials from the program. Others found the case studies and fact sheets to be particularly helpful. Two RSPs noted that they develop internal case studies for each of their completed projects, which are deemed to be more valuable than the ComEd case studies. Several RSPs called for more advertising and marketing efforts from ComEd to promote the program, in addition to the inclusion of co-branded marketing materials.

5.3.11 Customer Satisfaction

Overall, participants gave very high ratings to their satisfaction with all program aspects about which they were asked, including the level of financial commitment required to receive the free study, the information provided in the retro-commissioning study, the program administrator (Nexant), the Smart Ideas for Your Business Program staff, the retro-commissioning program overall, and ComEd overall. The highest satisfaction among participants was with the RSPs (100%) while satisfaction with ComEd overall and program staff ranged from 75% to 79%. All but one participant rated the program a 7 to 10 on a scale of 1 – 10 where 1 is highly dissatisfied and 10 is highly satisfied (96%). Just one participant was neutral (4%).

Table 5-6. Level of Satisfaction with Program Elements

	Dissatisfied (1-3)	Neutral (4-6)	Satisfied (7-10)
The level of financial commitment required to receive the free study (n=25)	0%	4%	96%
The information provided in the retro-commissioning study (n=25)	0%	4%	96%
Nexant (n=25)	0%	4%	96%
The Smart Ideas for Your Business Staff (n=19)	0%	21%	79%
Retro-commissioning Service Provider (RSP) (n=25)	0%	0%	100%
Retro-commissioning Program overall (n=25)	0%	4%	96%
ComEd overall (n=24)	8%	17%	75%

Source: Navigant research analysis.

Participants cited many benefits of participating in the Retro-Commissioning Program. The most cited benefit was the detailed retro-commissioning study.

"They did a good job of presenting information and then when we asked lots of questions trying to shoot it down and fill it with holes; they stuck to their guns and said we won't let you hang."

"[It was] very informative and very detailed."

"The basics were there. It was what we needed to truly understand it, but there was a lot of extra information."

Unprompted, 36% of the participants noted they were happy with the payback

"The main strengths for the program… the energy savings is a good thing, a very good thing."

"The main strengths of the program would certainly be the energy savings and cost savings and their methods of determining that… they are obviously more versed and knowledgeable in those areas than we are as building managers and engineers, so they're very helpful."

5.3.12 Barriers to Participation

According to RSPs, the primary barrier preventing customers from performing retro-commissioning at their facilities is awareness of the program. One RSP thought that a lack of knowledge of program service and benefits kept more customers from participating in the program. Other RSPs argued that the upfront cost of the study was the biggest barrier because any potential energy savings are unknown. The program covers the cost of the study, but some of the initial barriers remain as participants are required to commit to at least $15,000 without full knowledge of the resulting savings. The lack of definite savings before the study is especially troublesome for businesses that require a certain return on investment or payback period before funding can be approved.

Another barrier to customer participation pertains to the timing of the project. One RSP said that attempting to align capital planning budgets with the program year can be very difficult, keeping some projects from going forward, especially for larger customers with multiple locations vying for the same line of funding.

Several RSPs felt that the main barriers preventing customers from participating in the program stemmed from the size of their business. Many felt that smaller customers have more flexibility in fitting into the program's timeline, but may not have the capital to launch a project. Alternately, larger customers have the capital to complete various projects, but because of timing constraints they may not be able to align their internal budget planning with the program's timelines. Provided that a firm can find a way to overcome these obstacles, participating RSPs believe there are no major barriers to participation.

Over half of the participants indicated they saw no concerns with the program (56%), the balance of participants indicated their primary concern was that not enough measures were covered through the program (16%) followed by the timing of the program, too long, and that they wanted a more detailed understanding of upfront costs and operating savings (12% each).

5.4 Data Collection Instruments

5.4.1 RSP Interview Guide

NAVIGANT And ODC OPINION DYNAMICS CORPORATION

ComEd C&I Retro-Commissioning Program –RSP Interview Guide
October 1, 2012

Continuing RSPs PY4

Name of Interviewee: _____ Date: _____

Title: _____ Company: _____

[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 interviews will be audio taped.

Introduction

Hi, may I please speak with [name from list]?

My name is ___ and I'm calling from Navigant Consulting, an independent research firm, on behalf of ComEd and Nicor Gas and Peoples and North Shore Gas. We're talking to **contractors who are currently service providers** in ComEd's Smart Ideas for your Business Retro-Commissioning Program that is offered jointly by Nicor Gas and Peoples and North Shore Gas. **We may have spoken with you or someone from your firm last year as a part of the process evaluation** completed at that time.

We are interested in any feedback you may have regarding your firm's continuing involvement in this program and any feedback you have received about the program from your customers. ComEd [and *insert gas utility name if appropriate here*] plans to use this information to continue to improve the energy efficiency programs and services it offers to its business customers.

Would you be willing to speak with me for about 30 minutes? Your responses will be kept strictly confidential.

I. Program Processes

1. In general how satisfied have you been with the participation process? *[PROBE FOR: Application phase, planning phase, investigation phase, implementation phase, verification phase]* Are there aspects of the program that you think work particularly well? Please explain. Are there aspects of the program that could be improved? Please explain.

2. What are the strengths of the Service Provider participation process? [PROBE FOR: Training, calculation templates, support with customers, RSP review process]

3. The program was expanded to include gas measures in 2011. From your perspective, did this have any affect the program participation process? If yes what?

4. Did you have any difficulty meeting the required deliverables for each phase *(probe for timeline, required information)*? If so, please explain.

II. Effects of Program on Business Practices

4. Of the [XX] customers for whom you have performed RSP services in Program Year 4 (June 2011 to May 2012), how many did you have a prior working relationship with?

5. On a scale of 0 to 10 where 10 is very important, how important, would you say, has the program been on how frequently you recommend and perform RCx services for customers in ComEd's [and *insert gas utilities name if appropriate here*] service territory?

   Did the inclusion of the gas measures affect how often you recommended the program?

6. Have you made any changes to your business as a result of your continuing participation in the RCx program? *[PROBE: hired more staff, opened up new offices, changed marketing, changed approach to retro-commissioning investigations.]*

III. Net-To-Gross

A1. Thinking about the [XX] studies that you conducted as part of the Retro-Commissioning Program in PY4, did the projects' participation in the Retro-Commissioning Program in any way influence the type, quantity or efficiency level of the measures that you recommended to customers at those sites? [Expect a Y/N response]

A2. Please briefly describe the most significant ways in which the Retro-Commissioning Program influenced the decision to incorporate efficient designs/practices/measures at your customer sites. **[Record verbatim]**

A3. On a scale of 0 to 10 where 0 is NOT AT ALL IMPORTANT and 10 is EXTREMELY IMPORTANT, how important was the Retro-Commissioning Program, including program services and the customer spending commitment, in influencing your decision to work with the commercial customers to pursue retro-commissioning projects?
[SCALE 0-10]

Measure-Specific Naturally Occurring Baseline and Free Ridership Questions

[Ask the following questions for each measure category below. Prior to calling, review records for the contractor in terms of the number of projects that made recommendations for each measure category, and the total expected savings for those measures. Use that to guide questions and focus interview. If respondent is only responsible for some of firm's studies, attempt to use only those studies for these questions.]

Navigant has looked at all measures recommended and installed through the Retro-Commissioning Program and we have identified four main measure types: repairs, schedule changes, optimizations, and lower-cost retrofits that we would like to ask you some more detailed questions about.

1. **Repairs** are items that affect existing equipment that has failed in some way that needs *maintenance* to restore proper operation, for example, stuck or broken damper actuators or faulty sensors.
2. **Scheduling** items are recommendations based on *time-of-day* occupancy or operations, for example scheduling run-time with occupancy rather than 24x7 operations or programming the controls system with night-setback mode or optimal start/stop routines.
3. **Optimization** items are recommendations *utilizing existing sensors and control system* to improve system efficiency, for example chilled water or discharge air temperature reset, economizer or condenser water set-point optimization.
4. **Retrofit** measures might include new filter systems or added sensors to implement more efficient controls. [If necessary – "Retro-commissioning retrofits are generally lower-cost and less-intrusive than more traditional equipment retrofits like lighting and variable frequency drives."]

[LOOP <MEASURE TYPE> for top 80% of savings]

B1. Prior to your involvement with the Retro-Commissioning Program, did you recommend that customers implement <MEASURE TYPE> measures as part of energy studies, when appropriate for their sites?

1. (Yes)
2. (No) – SKIP TO B6
3. (Did not conduct retro-commissioning studies prior to program participation) – SKIP TO B6

888. (Don't Know) – SKIP TO B6
999. (Refused) – SKIP TO B6

[IF B1= "Yes"]
B2. Again, thinking about energy studies completed prior to your involvement with the program, about what percent of the time did customers choose to implement the recommended <MEASURE TYPE> measures?

RECORD PERCENTAGE
888. Don't Know
999. Refused

[IF B1= "Yes"]
B3. Now that you are participating in the Retro-Commissioning Program, have you changed what <MEASURE TYPE> measures you recommend to customers?

1. (Yes) [CONTINUE TO B4]
2. (No) [SKIP TO B6]

888. Don't Know [SKIP TO B6]
999. Refused [SKIP TO B6]

[IF B3= "Yes"]

B4. Please describe the changes that you've made to your <MEASURE TYPE> recommendations. [Probe for changes in types of measures recommended as well as frequency with which measures are recommended.]

[RECORD VERBATIM]
888. Don't Know
999. Refused

[IF B3= "Yes"]
B5. On a scale of 0 to 10, with 10 being the most influential, how much influence did the Retro-Commissioning Program have on your decision to change your <MEASURE TYPE> measure recommendations?

ENTER RATING 0 - 10
888. Don't Know
999. Refused

B6. [IF B1= "Yes", preface question with "Since your involvement with the program,"] How often do you *recommend* that customers implement <MEASURE TYPE> measures, when appropriate for the site? Would you say that you recommend these measures always, often, sometimes, rarely, or never? Please think about all your customers, *including but not limited to* the participants in the Retro-Commissioning Program.

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never/Only in response to direct customer inquiries

000. Other: (verbatim)
888. Don't Know
999. Refused

B7. Since your involvement in the program, about what percent of your customers actually choose to *implement* the recommended <MEASURE TYPE> measures? Please think about all your customers, *including but not limited to* the participants in the Retro-Commissioning Program.

RECORD PERCENTAGE
888. Don't Know
999. Refused

B8. About what percent of your customers *who are participating in the Retro-Commissioning Program* implement the recommended <MEASURE TYPE> measures?

RECORD PERCENTAGE
888. Don't Know
999. Refused

B9. Using a 0 to 10 likelihood scale where 0 is NOT AT ALL LIKELY and 10 is EXTREMELY LIKELY, *if the program had not been available*, what is the likelihood that you would have been recommending the same <MEASURE TYPE> measures?

ENTER RATING 0 - 10
888. Don't Know
999. Refused

B10. Using that same 0 to 10 likelihood scale where 0 is NOT AT ALL LIKELY and 10 is EXTREMELY LIKELY, if the program had not been available, what is the likelihood that your customers would have chosen to implement the same <MEASURE TYPE> measures?

ENTER RATING 0 - 10
888. Don't Know
999. Refused

[Only ask of people with multiple measure categories; IF <MEASURE TYPE 2 or 3> is blank, skip to N15]
B11. The questions I just asked focused on <MEASURE TYPE> measures, but our records indicate that you have also worked on projects involving many <MEASURE TYPE X> measures for the Retro-Commissioning Program.

[LOOP for <Measure TYPE>]

[End Loop]

Project Level Free Ridership

C1. On a scale of 0 to 10, with 10 being the most influential, how much influence do you think *your recommendation and technical assistance* have on your customers' decision to select which retro-commissioning measures to implement?

ENTER RATING 0 - 10
888. Don't Know
999. Refused

C2. On a scale of 0 to 10, with 10 being the most influential, how much influence do you think *utility retro-commissioning program incentives and implementation commitment* have on your customers' decision to implement retro-commissioning measures?

ENTER RATING 0 - 10
888. Don't Know
999. Refused

C3. Now I'd like to ask you about the total energy savings achieved in all of your projects which participated in the Retro-Commissioning Program during the most recent program year. I recognize that this is difficult to estimate, but try to think about what share of those energy savings would have been achieved in these projects even if the program and your technical assistance and required customer spending commitment did not exist. What is your best estimate of the percent of energy savings that would have been achieved, even without the program? (Enter %)

[If needed for clarification] For example, 50% means that half of the savings from the retro-commissioning measure would have been achieved anyway, even if the program did not exist.

D. OUTSIDE SPILLOVER

D1. Did your experience with the Retro-Commissioning Program in any way influence you to perform similar studies *at other facilities in Illinois that did NOT participate in the Joint Utility Retro-Commissioning Program* or the Ameren or DCEO Public Sector Retro-Commissioning Programs beyond what you would have done otherwise? I'm asking here strictly about facilities that did not receive any technical assistance or funding from any of these programs.

[If D1 = "no", SKIP to E1]

D2. **[If D1 = "yes"]**

Approximately how many of these additional retro-commissioning projects have been completed in the past year? [Enter #]
started? [Enter #]

What types of efficiency measures have you recommended as part of these projects? [Verbatim responses]

Were the measures installed, or only recommended through other retro-commissioning studies? **[Probe for knowledge of those that were recommended and installed and those that were recommended but not installed]**

D3. Please briefly describe how the Retro-Commissioning Program has influenced you to retro-commission other facilities in Illinois that did NOT participate in the Retro-Commissioning Programs.

Why did these projects NOT participate in the Illinois programs? Was it something about the program processes or program offerings?

D4. On average, would you estimate the energy savings from these other non-program facilities to be less than, similar to, or more than the energy savings from the retro-commissioning measures incorporated through the average Joint Utilities Retro-Commissioning Program projects you conducted? **[Confirm percentages are based on all installed, not recommended, measures]**

[If possible review the total estimated savings from installed measures]
[*e.g.*, if the same measures/designs were implemented in a facility twice as big, then savings would be 200%. Be sure to emphasize that this is savings "on average" not in aggregate across the many buildings that might be affected]

E. NON-PARTICIPANT SPILLOVER

E1. Do you believe that other engineering firms that are not participating in the Retro-Commissioning Program are increasing the number of implemented retro-commissioning projects and measures because of the influence of the Retro-Commissioning Program? In other words, are they doing more with retro-commissioning than they would have if the Program did not exist?

E2. [If E1 = "yes"] Please briefly describe how the Retro-Commissioning Program is influencing the market for retro-commissioning measures in Illinois.
[Probe for availability, A&E market, type of equipment, timing, quantity, and efficiency]

IV. Marketing and Outreach

11. How do customers typically learn about the Retro-Commissioning Program? *[Probe with: Do you tell them about it? Colleagues? Marketing materials from ComEd or gas utilities? Are they already aware of the program?]*

12. Do you feel the program provides sufficient support to RSPs to help them promote the program? Do you use the fact sheets and case studies that the utilities provide? If so, how effective do you think they are? How valuable is the co-branding the utilities offer?

    Is there anything that the program administrator (Nexant) or the utilities could do to help you promote this program to your customers?

V. Channeling into Other C&I Programs

13. How aware are you of the requirements and offerings of ComEd's and the gas utilities' other programs for business customers (e.g., prescriptive incentives, custom incentives)? When screening potential measures for the Retro-Commissioning program, do you identify opportunities for equipment upgrades that might be eligible for incentives through these other programs? If no, why not?

14. Is your firm currently registered as a service provider or trade ally for other C&I program offerings from ComEd or the Gas utilities?

VI. RSP Training

15. Did you participate in any of the RSP training offered by the program this past year? What training did you participate in? *[Probe for implementation training, safety training.]* Was the training helpful? *[Probe by class.]* Please explain.

16. Did you make any changes in your practices as a result of the training? Did the training provide ways or resources to help you market or deliver the Retro-Commissioning program to customers? If yes, Explain.

17. Are there any technical issues or barriers that you have experienced in your participation in the program that could be overcome with more training or guidance from the program?

18. Overall, how would you rank the value of training on a scale of 0 to 10 where 0 is not at all valuable and 10 is highly valuable?

VII. RSP Performance Review/Ranking

19. This past year the RCx program continued its annual performance review of RSPs that participated in the program.
    i. Did you find the feedback you received through the review helpful?
    ii. Did the report identify any areas for improvement of which you were not aware?
    iii. Did you make any changes in your business practice as a result of the review? Please explain.
    iv. Do you have any comments about the review process?

VIII. Participation Barriers

20. What do you view as the main barriers to retro-commissioning, as a service, for your customers? Does this vary by customer type or size? Anything else? What could be done to overcome these barriers?

21. What do you view as the main barriers to customer participation in the Retro-Commissioning Program? What could be done to overcome these barriers? What do you perceive to be the demand for the services provided by the program?

IX. Program Feedback and Recommendations

22. Have you received any other feedback from customers on the participation process? If so can you please share?

23. In general, how satisfied are you with the Retro-Commissioning program? Has it met your expectations? Please explain.

24. [For prior participants] How did your experience in program year 4 compare to that in prior program years? The main differences in the program were the inclusion of gas measures and broader availability of calculation templates.

25. Has the inclusion of gas measures in the program affected customer satisfaction in the program? If yes, How?

26. Do you have any additional recommendations or feedback for the evaluation?

Thank you for taking the time to discuss the RCx program. Your insights have been very helpful.

5.4.2 Participant Survey

ComEd / Joint Utility C&I Retro-Commissioning Program

RCx Participant Survey

July 10, 2012

Introduction

Hello, this is _____ from Opinion Dynamics calling on behalf of ComEd [if natural gas = 1 "and <gas utility>] regarding your company's participation in the Retro-Commissioning Program. May I please speak with <CONTACTNAME>?

Our records show that <COMPANY> participated in Smart Ideas for Your Business Retro-Commissioning Program run by ComEd [if natural gas = 1 "and <gas utility>] , and we are calling to conduct a follow-up study about your firm's participation in this program. I was told you're the person most knowledgeable and the most involved with the decision to participate in the program. Is this correct? [IF NOT, ASK TO BE TRANSFERRED TO DECISION MAKER OR SOMEONE FAMILIAR WITH THE BASIS FOR THE DECISION TO PARTICIPATE. RECORD NAME & NUMBER.]

[IF NEITHER DECISION MAKER OR SOMEONE FAMILIAR WITH THE BASIS FOR THE DECISION TO PARTICIPATE, TERMINATE AND CALL REFERRAL

This survey will take about 20 minutes. Is now a good time? [If no, schedule call-back]

(IF NEEDED: Is it possible that someone else dealt with the retro-commissioning project?)

IF TYPE=I
Just to clarify, when I ask about the retro-commissioning work you have performed, this also includes leak detection audits and related repairs.

Retro-Commissioning NTG

I would like to ask you a few questions about your company's decision to perform retro-commissioning at your facility.

M1 First Measure
- M1a. Cost
- M1b. Savings kWh
- M1c. Savings Therms

M2 Second Measure
- M2a. Cost
- M2b. Savings kWh
- M2c. Savings Therms

M3 Third Measure

M3a. Cost
M3b. Savings kWh
M3c. Savings Therms

A1 First, according to our records, you participated in the Smart Ideas for Your Business Retro-Commissioning Program run by ComEd [if natural gas = 1 “and <gas utility>] between June 1, 2011 and May 31, 2012. [READ: the Smart Ideas for Your Business Retro-Commissioning Program, run by ComEd [if natural gas = 1 “and <gas utility>], promotes energy efficiency improvements in commercial/industrial facilities. The program offers technical assessments to help identify applicable measures, feasibility studies to analyze the energy and cost savings of recommended measures, and incentives to help cover a portion of the cost of purchasing and installing energy efficient measures.] Do you recall participating in the Smart Ideas for Your Business Retro-Commissioning Program?
1 Yes
2 No [Thank & terminate]
88 (Don't know) [Thank & terminate]
99 (Refused) [Thank & terminate]

[ASK IF A1=1]
A2 Next, I'd like to confirm the following information regarding your participation in the RCx Program. I understand that you retro-commissioned &FACILITY. The RCx study was completed in about &DATE by &CXAGENT and you implemented &NO OF MEASURES measures, including &MEASURE1, &MEASURE2, &MEASURE3.) Does that sound right?
1 Yes
2 No Thank & terminate
88 (Don't know) Thank & terminate
99 (Refused) Thank & terminate

Project Background

B1. Before I ask you specific questions about your decision, please tell me in your own words why you decided to retro-commission this facility? Were there any other reasons?
00. (RECORD VERBATIM)
98. (Don’t know)
99. (Refused)

B2A. Before learning about the ComEd [if natural gas = 1 “and <gas utility>] Retro-commissioning Program, had you ever conducted retro-commissioning at this facility or any of your other facilities in Illinois?
1. Yes, at this facility
2. Yes, at another facility
3. Yes, at both this and another facility
4. No
8. (Don’t know)
9. (Refused)

[SKIP TO B2BB IF B2A=4. SKIP to B5 if B2A= 98, 99]
B2B. Did you receive an incentive or another form of utility or government financial support for performing this previous retro-commissioning work?
1. Yes
2. No
8. (Don’t know)
9. (Refused)

IF B2A=4, THEN ASK. ELSE B5.

B2BB. What were the main factors that kept you from performing retro-commissioning in prior years? [DO NOT READ]

1. (Was not aware of retro-commissioning)
2. (Did not understand the procedures and benefits of retro-commissioning)
3. (The cost of having a retro-commissioning audit and report done was too high)
4. (Had insufficient in-house staffing to carry out recommendations made in retro-commissioning report)
5. (Had inadequate in-house expertise to carry out recommendations made in retro-commissioning report)
6. (Not aware of qualified providers)
7. (Management was against having retro-commissioning done)

00. (Other, specify)
98. (Don't know)
99. (Refused)

B5. My next questions are about your awareness of the equipment performance issues identified through your retro-commissioning study PRIOR to conducting it. Would you say you were aware of all, some, or none of the issues before the study?

1. All
2. Some
3. None
8. (Don't know)
9. (Refused)

[SKIP TO B6ab IF B5=1, 3, 8, 9].

B6. Which of the following issues were you previously aware of? Were you aware of the issues with your… (1=Yes, 2=No, 8=Don't know, 9=Refused)

a. Air handler [ASK IF AIRHAND=1]
b. Boiler [ASK IF BOILER=1]
c. Chiller [ASK IF CHILL=1]
e. Cooling tower [ASK IF CTOWER=1]
f. Economizer [ASK IF ECON=1]
g. Fans [ASK IF FAN=1]
h. Heating system [ASK IF HEAT=1]
i. Lighting system [ASK IF LIGHT=1]
j. Pumps [ASK IF PUMP=1]
k. [Ask if Natural Gas = 1] Other Gas-related issues can we have a list of the most common? Or will you document verbatim?

B6ab What were the main factors that kept you from addressing the issue(s) in prior years? [DO NOT READ]

1. (Was not aware of the issue)
2. (Did not understand the procedures and benefits of fixing the issue)
3. (The cost of fixing the issue was too high)
4. (Had insufficient in-house staffing to fix the issue)
5. (Had inadequate in-house expertise to fix the issue)
6. (Not aware of qualified contractors)
7. (Management was against having the issue fixed)

00. (Other, specify)
98. (Don't know)
99. (Refused)

B6A. Before participating in the utility Retro-Commissioning program, did you undertake specific activities or studies in order to identify the issues you just mentioned?

1. Yes
2. No
8. (Refused)
9. (Don't know)

[SKIP TO B6b IF B6A=2, 8, 9]

B6AA. What specific activities or studies did you do?

00. RECORD VERBATIM
8. (Refused)
9. (Don't know)

B6B. In the past, have you hired any third parties to perform an energy audit or to perform extensive data trending in any of your buildings?

1. Yes
2. No
8. (Refused)
9. (Don't know)

[SKIP TO N2 IF B6B=3, 8, 9]

B6BB. What were these studies and when were they done?

00. RECORD VERBATIM
8. Refused
9. Don't know

Decision Influences

N2 Did you learn about your organization's eligibility for the Retro-Commissioning Program BEFORE or AFTER you decided to complete retro-commissioning at this facility

1 Before
2 After
88 (Don't know)
99 (Refused)

N4. Now I'm going to ask you to rate the importance of several factors that might have influenced your decision to conduct the study and commit the funding to perform retro-commissioning at your facility. On a scale from 0 to 10, where 0 means 'not at all important' and 10 means 'extremely important', how important were the following in your decision to conduct the study and commit the funding to perform the utility-sponsored retro-commissioning. [FOR N4a-e, RECORD 0 to 10; 96=Not Applicable; 98=Don't Know; 99=Refused][If needed: How important in your DECISION to conduct the study and commit the funding to perform the ComEd [if natural gas = 1 "and <gas utility>"] sponsored retro-commissioning was…]

[ROTATE N4A-N4E]

N4A. The free retro-commissioning study
N4B. The recommendation from the retro-commissioning service provider
N4C. The information from the Retro-Commissioning Program
N4D. The recommendation from your ComEd [if natural gas = 1 "or <gas utility>"] Account Manager [ASK IF ACCTM=1]
N4E. The continued technical assistance provided by the RSP after the study phase {IF NEEDED EXPLAIN THE RSP IS THE FIRM THEY WORKED WITH ON THE RETRO-COMMISSIONING STUDY]

N4F. Were there any other factors that we haven't discussed that were influential in your decision to perform retro-commissioning? [OPEN END; 96=Nothing else influential, 98=Don't know, 99=Refused]

[SKIP TO N9a IF N4F=96, 98, 99]
N4FF. Using the same 0 to 10 scale, how would you rate the influence of this factor? [RECORD 0 to 10, 96=Not Applicable; 98=Don't Know; 99=Refused]

Actions Without the Program

Now we would like you to think about the action you would have taken with regard to the retro-commissioning actions you would have taken if the Program had not been available.

N9a. If you had not received the utility sponsored Retro-commissioning study, would you have undertaken it on your own?
1. Yes
2. No
8. (Don't know)
9. (Refused)

IF N9a=1, THEN ASK.
N9aa. Without the program, when do you think you would have conducted the Retro-commissioning study on your own?
1. At the same time
2. Later
97. Other (RECORD VERBATIM)
98. (Don't know)
99. (Refused)

[ASK IF N9a=2]
N9ab. Would you say…
1. 1 to 3 months later
2. 4 to 6 months later
3. 7 to 12 months later
4. 13 to 24 months later
5. More than 2 years later
8. (Don't know)
9. (Refused)

IF N9a=1, THEN ASK.
N9b. If the ComEd [if natural gas = 1 "and <gas utility>"] Retro-commissioning program had NOT been available, would you have taken all, some, or none of the retro-commissioning actions that were implemented as the result of the utility-sponsored study?
1. All
2. Some
3. None
98. (Don't know)
99. (Refused)

IF N9b=2, THEN ASK.

N10. Which measures or actions would you have implemented? Would you have implemented the measures or actions related to the… (1=Yes, 2=No, 8=Don't know, 9=Refused)
- aa. MEASURE1
- bb. MEASURE2
- cc. MEASURE3
- a. Air handler <AIRHAND2> [ASK IF AIRHAND=1 AND (N8a=1 OR N7=1)]
- b. Boiler <BOILER2> [ASK IF BOIL=1 AND (N8b=1 OR N7=1)]
- c. Chiller <CHILL2>[ASK IF CHILL=1 AND (N8c=1 OR N7=1)]
- e. Cooling tower <CTOWER2> [ASK IF CTOWER=1 AND (N8e=1 OR N7=1)]
- f. Economizer <ECON2> [ASK IF ECON=1 AND (N8f=1 OR N7=1)]
- g. Fans <FAN2> [ASK IF FAN=1 AND (N8g=1 OR N7=1)]
- h. Heating system <HEAT2> [ASK IF HEAT=1 AND (N8h=1 OR N7=1)]
- i. Lighting system <LIGHT2>[ASK IF LIGHT=1 AND (N8i=1 OR N7=1)]
- j. Pumps <PUMP2>[ASK IF PUMP=1 AND (N8j=1 OR N7=1)]
- k. [Ask if natural gas = 1] Gas-related measures same comment as above

BEGIN MEASURE NTG LOOP

Thinking specifically about the three measures with the greatest savings mentioned earlier, How likely would you have identified AND implemented these measures

N10a. Now thinking about <Measure X> and using a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely", if ComEd [if natural gas = 1 "and <gas utility>"] Retro-commissioning program had NOT been available, what is the likelihood that you would have performed <Measure X>? [RECORD 0 to 10; 96=Not Applicable; 98=Don't Know; 99=Refused]

[SKIP IF N9b= 3, 98, 99]

N11. Without the program, when do you think you would have performed <Measure X>? Would you say… [If necessary repeat the kWh Savings, therm Savings and implementation costs from above.]
- 1. At the same time
- 2. Earlier
- 3. Later
- 4. (Never)
- 8. (Don't know)
- 9. (Refused)

[ASK IF N11=3]

N12. Would you say…
- 1. 1 to 3 months later
- 2. 4 to 6 months later
- 3. 7 to 12 months later
- 4. 13 to 24 months later
- 5. More than 2 years later 8. (Don't know)
- 9. (Refused)

[REPEAT NTG LOOP FOR MEASURES 2, 3 IF APPLICABLE]

Spillover and Channeling

CH1. Since your participation in the Retro-Commissioning program, have you done any of the following? [1=Yes, 2=No, 8=Don't know, 9=Refused] [Multiple response]

a. Installed any additional energy efficient equipment at this facility that were suggested in the Retro-Commissioning study and received incentives from ComEd [if natural gas = 1 “or <gas utility>”]
aa. Installed any additional energy efficient equipment at this facility that were **not** suggested in the Retro-Commissioning study and received incentives from ComEd [if natural gas = 1 “or <gas utility>”]
b. Installed any additional energy efficient equipment at this facility that were suggested in the Retro-Commissioning study and did NOT receive incentives through any utility or government program
bb. Installed any additional energy efficient equipment at this facility that were not suggested in the Retro-Commissioning study and did NOT receive incentives through any utility or government program
c. Implemented any additional retro-commissioning measures at this facility that did not receive incentives through any utility or government program
cc. Implemented any additional retro-commissioning measures at other facilities served by [UTILITY] that did not receive incentives through any utility or government program

[ASK IF CH1a=1, ELSE SKIP TO CH5]
CH2. What type of energy efficient equipment did you install that received incentives from ComEd [if natural gas = 1 “or <gas utility>”]? Did you install… [1=Yes, 2=No, 8=Don’t know, 9=Refused]
a. Lighting
b. Cooling
c. Motors
d. Refrigeration
e. Compressed Air
f. Fans
g. Controls
h. Heating
i. Something else (specify)

[SKIP TO CH5 IF ALL CH2a-f=2, 8, 9]

CH3. On a scale of 0 to 10, where 0 means “no influence” and 10 means “greatly influenced,” how much influence did your participation in the Retro-Commissioning Program have on your decision to install additional energy efficiency measures through other utility programs? [SCALE 0-10; 98=Don’t know, 99=Refused]

[ASK IF CH3=8,9 or 10; ELSE SKIP TO CH5]
CH4. How did the Retro-Commissioning Program influence your decision to make these additional changes? [OPEN END; 98=Don’t Know; 99=Refused]

[ASK IF CH1b=1, ELSE SKIP TO CH8]

CH5. What type of energy efficient equipment did you install that did NOT receive any incentives from utilities or government programs? Did you install… [1=Yes, 2=No, 8=Don't know, 9=Refused]

a. Lighting
b. Cooling
c. Motors
d. Refrigeration
e. Compressed Air
f. Fans
g. Controls
h. Heating
i. Natural gas-fired equipment (specify)
j Something else (specify)

[SKIP TO CH8 IF ALL CH5a-f=2, 8, 9]

CH6. On a scale of 0 to 10, where 0 means "no influence" and 10 means "greatly influenced," how much influence did your participation in the Retro-Commissioning Program have on your decision to install additional energy efficiency measures without an incentive? [SCALE 0-10; 98=Don't know, 99=Refused]

[ASK IF CH7=8,9 or 10; ELSE SKIP TO CH8]

CH7. How did the Retro-Commissioning Program influence your decision to make these additional changes? [OPEN END; 98=Don't Know; 99=Refused]

[ASK IF CH1c=1, ELSE SKIP TO B1]

CH8. What additional retro-commissioning measures did you implement? Did you perform… [1=Yes, 2=No, 8=Don't know, 9=Refused]

a. Optimization
b. Repairs
c. New maintenance activities
d. Schedule changes
e. Something else (specify) Do we want to know about any behavior changes they implemented?

[SKIP TO B1 IF ALL CH8a-f=2, 8, 9]

CH9. On a scale of 0 to 10, where 0 means "no influence" and 10 means "greatly influenced," how much influence did your participation in the Retro-Commissioning Program have on your decision to implement the additional retro-commissioning measures without an incentive? [SCALE 0-10; 98=Don't know, 99=Refused]

[ASK IF CH6=8,9 or 10; ELSE SKIP TO B1]

CH7. How did the Retro-Commissioning Program influence your decision to make these additional changes? [OPEN END; 98=Don't Know; 99=Refused]

Process Module

S1. How did you first hear about the Retro-Commissioning Program?
1. (Retro-commissioning service provider, “RSP”)
2. (ComEd program representative)
3. ([if natural gas = 1] <gas utility> “program representative”)
4. (ComEd Account manager)
5. ([if natural gas = 1] <gas utility> “Account Manager”)
6. (ComEd Website)
7. ([if natural gas = 1] <gas utility> “Website”)
8. (Friend/colleague/word of mouth)
9. (Contractor)
10. (Utility marketing material – case studies)
11. (Nexant – the program administrator)
00. (Other, specify)
98. (Don’t know)
99. (Refused)

Marketing and Outreach

MK1. Do you recall seeing or receiving any marketing materials or other information for the Retro-Commissioning Program?
1. Yes, ComEd materials
2. [if natural gas = 1] “Yes, <gas utility> materials”
3. Yes, both ComEd and <gas utility> materials
2. No
8. (Don’t know)
9 (Refused)

[ASK IF MK1=1, 2, 3 ELSE SKIP TO MK4]
MK1A. What types of materials do you remember? [MULTIPLE RESPONSE, UP TO 4]
1. (Presentation/workshop)
2. (Brochure)
3. (Case Study)
4. (Utility website(s))
5. (Direct Mail)
6. (Fact sheets)
7. (Program Forms)
00. (Other, please specify)
98. (Don't know)
99. (Refused)

MK2. How useful were these materials in providing information about the program? Would you say they were…?
1. Very useful
2. Somewhat useful
3. Not very useful
4. Not at all useful
8. (Don't know)
9. (Refused)

[ASK IF MK2=1, 2]
MK3. What materials were the most useful to you? [MULTIPLE RESPONSE, UP TO 3]
1. (Presentation/workshop)
2. (Brochure)

3. (Case Study)
4. (Utility website(s))
5. (Direct Mail)
6. (Fact Sheets)
7. (Program Forms)
00. (Other, specify)
98. (Don't know)
99. (Refused)

MK5. What are the best ways of reaching companies like yours to provide information about energy efficiency opportunities? [MULTIPLE RESPONSE, UP TO 3]
1. (Bill inserts)
2. (Flyers/ads/mailings)
3. (E-mail)
4. (Telephone)
5. (Key Account Executive)
00. (Other, specify)
98. (Don't know)
99. (Refused)

Program Satisfaction

PS3. On a scale of 0 to 10, where 0 is very dissatisfied and 10 is very satisfied, how would you rate your satisfaction with…? [SCALE 0-10; 96=not applicable, 98=Don't know, 99=Refused]
a. The level of financial commitment required to receive the free study (if needed, note the required commitment was $10,000 - $30,000 depending on the project)
b. The information provided in the retro-commissioning study
c. Nexant (the program administrator)
d. The Smart Ideas for Your Business Program (ComEd) staff
e. [if natural gas = 1], <gas utility> program representative/staff
f. Your Retro-Commissioning Service Provider
g. The Retro-Commissioning program overall
h. ComEd overall
i. [if natural gas = 1], <gas utility> overall

[ASK IF PS3a, b, c, d, e, f, g ,h, i<4 or PS3a, b, c, d, e, f, g ,h, i >7]
PS4a. Why did you rate it this way? [OPEN END; 98=DK; 99=REF]

Benefits and Barriers

B1. What do you see as the main strengths of the Retro-Commissioning Program? [MULTIPLE RESPONSE, UP TO 3]
1. (Helps reduce the company's energy bills/save energy)
2. (Free study)
3. (Improves the performance of equipment)
4. (Trains facility staff on building operations)
00. (Other, specify)
98. (Don't know)
99. (Refused)

B2. What concerns do you have about the program? [MULTIPLE RESPONSE, UP TO 3]
1. (Paperwork too burdensome)
2. (Incentives/free study not worth the effort or required commitment to implement)
3. (Program is too complicated)
00. (Other, specify)

96. (No drawbacks)
98. (Don't know)
99. (Refused)

Feedback and Recommendations

R1. Based on your experience, would you recommend the Retro-Commissioning program to your peers inside or outside of your organization?
1. Yes
2. No
3. (Maybe)
8. (Don't know)
9. (Refused)

R2. Do you have any suggestions for ways to improve the program, and if so, what are they? [MULTIPLE RESPONSE, UP TO 4]
1. (Higher limits on study costs)
2. (Reduce the required financial commitment to implement measures)
3. (Greater publicity)
4. (Advance payment)
5. (Longer engagement with RSP to implement more measures)
6. (Key Account Executives provide more information)
96. (No recommendations)
00. (Other, specify)
98. (Don't know)
99. (Refused)

Firmographics

I only have a few general questions left.

F1 What is the business type of this facility? (PROBE, IF NECESSARY)
1. (College/university)
2. (Heavy industry)
3. (Hotel/Motel)
4. (K-12 School)
5. (Light industry)
6. (Medical)
7. (Office)
8. (Retail/Service)
9. (Warehouse/Distribution)
00. (Other, specify)
98. (Don't know)
99. (Refused)

F2 Does your company own or rent this facility?
1 (Own)
2 (Rent)
00 (Other, specify)
98 (Don't know)
99 (Refused)

F3. How old is this facility? (INTERVIEWER: IN YEARS) [NUMERIC OPEN END, 0 TO 150; 998=Don't know, 999=Refused]

F4. How many employees, full plus part-time, work at this facility? [NUMERIC OPEN END, 0 TO 2000; 9998=Don't know, 9999=Refused]

F5. Which of the following best describes your facility? This facility is…
1. my company's only location
2. one of several locations owned by my company
3. the headquarters location of a company with several locations
8. (Don't know)
9. (Refused)

F6. In comparison to other companies in your industry, would you describe your company as…
1. A small company
2. A medium-sized company
3. A large company
4. (Not applicable)
8. (Don't know)
9. (Refused)

Those are all of the questions I have. Thank you very much for your participation!

5.5 VDDTSR Memo-Final version

Introduction

This document provides the results from Navigant's due diligence review of the program tracking, quality assurance and savings verification procedures of Joint Utilities C&I Retro-Commissioning Program during the EPY4/GPY1[34] program period. The main components of this task included interviews with program staff, documentation review and benchmarking to national best practices.

For the gas utilities the C&I Retro-Commissioning Program is unique among the commercial programs in that the program is managed and implemented entirely by others. The program is managed by the local *electric utility*, Commonwealth Edison (ComEd), and their implementation contractor, Nexant. Nicor Gas and/or WECC and Integrys and/or Franklin Energy representatives attend bi-weekly conference calls on the program status. The ComEd Retro-Commissioning program is in its fourth year of implementation. In prior years natural gas savings were not estimated or tracked, but in the current program year, EPY4/G PY1 (gas utilities), ComEd and gas utilities have begun cooperating to deliver the program as a single, integrated building retro-commissioning program to customers in common. Since ComEd is managing the program, much of the gas utility program information is derivative from ComEd reporting, and the relevant Operations Manual is that of Nexant working with ComEd.

Overview of Findings

Overall, the quality assurance and verification procedures in place for the Retro-Commissioning program, as outlined in the Nexant Operations Manual[35] and the Energy Efficiency Program Plan[36] document, provide a quality control framework that meets many aspects of national best practices. Specifically, the program guidelines for project eligibility, interim review of projects-in-progress and verification of completed projects generally meet or exceed expected quality assurance expectations.

The program tracking system generally captures the requisite information necessary to accurately track the program's actions at the project level. Supplemental written reports provided necessary context and supporting information for measure savings estimates.

Purpose of the Verification and Due Diligence Review

The primary purpose of Verification and Due Diligence task is 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.

---

[34] GPY1 for the gas utilities runs from June 1, 2011 through May 31, 2012. GPY1 is the same as EPY4 for ComEd.

[35] ComEd Smart Ideas for your Business, Nicor Gas Energy Efficiency Program and Integrys Chicagoland Energy Efficiency Program: Retro-Commissioning Service and Compressed Air Program, Nexant Operations Manual, v.4.0 June 1, 2011.

[36] Compliance Filing: Energy Efficiency Program Plan, tk.

At this point not all documentation is available to support review of each of these points. Eligibility criteria for EPY4/GPY1 projects are not completely documented. A key eligibility criterion is prospective: completion of Building Operator Certification prior to program year-end, and the EM&V team has not yet received details on that aspect of the program. The tracking system shows 50 projects completed for ComEd in EPY4 among which seven projects were completed for the Nicor Gas; fourteen were completed for Peoples Gas and one for North Shore Gas in GPY1. The reports and supporting documentation for savings estimates are complete and have been provided to the EM&V team.

Data Collection

The Navigant evaluation, measurement and verification (EM&V) team collected data for this verification and due diligence task through interviews with key program staff (ComEd, WECC, Franklin Energy and Nexant) and a review of program documentation. Subsequently, the EM&V team compared the results of these actions to national best practices. Navigant also received information from Nexant and ComEd regarding the Nexant TrakSmart database, extracts from TrakSmart, and reports and calculation templates.

Interviews with Program Stakeholders

The EM&V team conducted telephone discussions with the key people involved in the program's day-to-day operations, including representatives from Franklin Energy, WECC, the lead program administrator (ComEd), and the implementation contractor (Nexant). The Nexant and ComEd discussions were conducted in common during a program update call. Telephone discussions included prepared question topics such as program administration, program outreach and marketing, program delivery and customer satisfaction. At the conclusion of each call, the EM&V team provided an opportunity for an open-ended discussion of any questions or additional topics.

Program Documentation Review & Benchmarking

At the request of the EM&V team, the program implementation contractor, Nexant, provided program documentation to conduct the verification and due diligence review. Reviewed documentation includes: the Nexant Operations Manual[37], project and measure tracking spreadsheets, the TrakSmart database structure, and project reports and measure savings calculations. The tracking database export contains the number of each measure invoiced, sum of gross and net therms savings, as well as the measure status. The calculation templates contain the assumptions and algorithms used to estimate savings for the qualifying measures. The gas company implementation contractors produce monthly Program Summary Reports or dashboards from the Nexant data system to convey realized and pipeline savings by program to the gas utilities.

The TrakSmart database, managed by Nexant, is the primary program tracking system. The EM&V team has reviewed exports from TrakSmart, but we have not reviewed the database itself. ComEd and Nexant provided documents showing that the TrakSmart database structure for managing myriad aspects of the program implementation at the project-level and measure-level. The data exports match the planned structure for the database, and Navigant concludes that all planned data

[37] ComEd Smart Ideas for your Business, Nicor Gas Energy Efficiency Program and Peoples and North Shore Gas Chicagoland Energy Efficiency Program: Retro-Commissioning Service and Compressed Air Program, Nexant Operations Manual, v.4.0 June 1, 2011.

are being adequately collected. At this point the gas utilities, like Navigant, do not have direct access to the TrakSmart system, though Nicor Gas will be adopting the TrakSmart platform for all programs, including retro-commissioning.

Underpinning the databases are completed applications, written reports (Planning, Investigation, Implementation and Verification) and detailed calculations describing the measure savings estimates. The applications are scanned and posted electronically. Nexant collects and reviews all savings calculations and reports and has posted them for evaluator review. Complete documentation for all 50 completed EPY4/GPY1 projects has been posted for evaluator review.

In general, Navigant has found the savings calculations well-constructed and documented. Furthermore, Nexant has developed calculation templates for common retro-commissioning measures that facilitate accuracy and review.

Review of Program Operating Procedures

The EM&V team examined the operating procedures as outlined in the *Retro-Commissioning Service: Nexant Operations Manual*. Information was verified in discussions with Franklin Energy, WECC; the Program Manager, ComEd; and the implementation contractor, Nexant. The Operations Manual includes detailed procedures and flow diagrams for the following steps in the application and participation process, summarized below.

- Application Submittal and Pre-Review
- Application Approval
- Planning Phase
- Investigation Phase
- Implementation Phase
- Verification Phase

Application Submittal and Pre-Review

Participants in the Retro-Commissioning program are generally solicited by approved, independent, retro-commissioning service providers (RSPs), marketing the program on behalf of ComEd and partner gas utilities, Nicor and Peoples and North Shore Gas. The RSP works with the customer to submit a completed application and supporting documentation to Nexant for review. Nexant staff review the application to determine customer eligibility for both the electric and natural gas portions of the program. Customer eligibility for the gas company programs is determined by verifying gas service by respective gas companies and satisfying criteria for sufficient customer size, preliminary estimates for savings potential and systems control capabilities. Program staff then check the application for completeness by verifying the customer's contact information and technical information.

Application Approval

Customers applying for gas retro-commissioning funding must complete the Gas Application Addendum to the ComEd retro-commissioning program contract. Once complete and accepted, the application is entered into the program tracking system.

Planning Phase

Following application approval, the customer and RSP establish a scope and timeline for the project. The planning phase deliverable is a retro-commissioning plan for the site that identifies preliminary retro-commissioning measures (RCMs). Nexant reviews and approves the Retro-commissioning Plan and supporting savings estimates. The customer then completes a Customer Selection Form that moves the project to the investigation phase.

Investigation Phase

The RSP works with the customer to research, analyze and select promising retro-commissioning measures to implement. Measures may be added or removed from the retro-commissioning plan at this time depending on research findings. The customer agrees to implement measures meeting their financial commitment and savings goals.

Implementation Phase

The Customer works with internal staff or their contractors to implement agreed upon measures. Measures can be amended, dropped or added at this time due to feasibility constraints or if implementation cost estimates from the investigation phase prove inaccurate. Nexant reviews and approves the Implementation Plan and supporting savings estimates. The customer is responsible for implementing the RCMs identified and agreed to during the Implementation Phase. RSPs may provide implementation services, though doing so causes them to forego the verification phase scope of work. Upon completion of the project and selected measures, the customer notifies their RSP and Nexant.

Verification Phase

During the Verification Phase the RSP revisits the site to verify the proper installation of all measures on the Customer Selection Form. Verification can include functional testing and documentation of all measures. The RSP documents actual measures installed and confirms or modifies energy savings estimates in the Verification Report. The customer submits invoices used to install measures as installation verification, and Nexant and the RSP meet with the customer to review completed work. Following completion of the Verification Report, Nexant may also conduct an inspection of installed measures. Nexant conducts project completion meeting at all project sites with involved personnel and confirms measure implementation. Upon verification of measures and customer financial expenditures, the program Administrator fulfills the obligation to fund the retro-commissioning study, in full.

Quality Control and Verification Best Practices

To conduct the best practices benchmarking assessment, we compared the Retro-Commissioning program's practices with the *Best Practices Self-Benchmarking Tool* from the *National Energy Efficiency Best Practices Study*[38]. While no benchmark tool is provided for a retro-commissioning program, specifically, we compare the Joint Utilities Retro-Commissioning program to criteria for best practices for a Non-Residential Comprehensive Program. Table 5-7 summarizes the scores as determined by the Self-Benchmarking Tool criteria in the "Quality Control and Verification" section. Best practice topics are followed by bullets of program practices.

Table 5-7. Quality Control and Verification Benchmarking Scores

ID	Best Practice	Score*
1	Require *post*-inspections and commissioning for all large projects and projects with highly uncertain savings	Meets best practice.
2	Require *pre*-inspections for large projects with highly uncertain baseline conditions that significantly affect project savings	Meets best practice
3	Conduct either in-program measurement or measurement through an impact evaluation on the very largest projects and those that contribute most to uncertainty in overall program savings	Meets best practice.
4	Tailor measurement rigor, including the use of sampling, to each project's contribution to the cumulative uncertainty in estimated savings for the program overall	Needs some improvement
5	Limit the use of multi-year, in-program measurement of savings	Needs some improvement
6	Carefully consider tradeoffs associated with in-program M&V versus ex post impact evaluation	Meets best practices
7	If in-program M&V is utilized exclusively (as opposed to independent impact evaluation), results should be periodically aggregated and summarized to produce realization rates and lessons learned	NA
8	Consider using third-party M&V contractors to oversee or conduct M&V	NA
9	Tie staff performance to independently verified results	Meets best practices

* Scores are based on the metric definitions contained in the tool.

Source: Program operations manuals and Navigant analysis.

1. Require *post*-inspections and commissioning for all large projects and projects with highly uncertain savings
   - Meets best practices
   - The Joint Utilities require service providers to conduct post-implementation inspections (verification) of all measures implemented at project sites.

[38] http://www.eebestpractices.com/

- The implementation contractor conducts its own post-implementation inspections of a sample of sites – six in EPY4/GPY1.

2. Require *pre*-inspections for large projects with highly uncertain baseline conditions that significantly affect project savings
   - Meets best practices
   - The program extensively documents the baseline as part of the program processes in the planning and investigation phases.

3. Conduct either in-program measurement or measurement through an impact evaluation on the very largest projects and those that contribute most to uncertainty in overall program savings
   - Meets best practices
   - The retro-commissioning program conducts both in-program measurement for measures recommended and the program evaluation collects additional data on measures with uncertain impacts – mostly due to under-monitoring of chilled water measures.

4. Tailor measurement rigor, including the use of sampling, to each project's contribution to the cumulative uncertainty in estimated savings for the program overall
   - Needs some improvement
   - The Implementation Contractor has produced calculation templates of appropriate rigor for high-volume – lower-impact (<75,000 kWh) measures. These templates are designed to reduce the burden on the service providers.
   - Service providers measurement rigor varies somewhat. The implementation contractor has guidelines for measurement rigor, but the service providers will over- and under-monitor and analyze measures
   - Sampling criteria are generally not laid out since analysis usually covers a census of affected equipment.

5. Limit the use of multi-year, in-program measurement of savings
   - Needs some improvement
   - The program does not use multi-year measurement of savings. Prior evaluations have surveyed prior participants about measure persistence but no measurements have been coordinated

6. Carefully consider tradeoffs associated with in-program M&V versus ex post impact evaluation
   - Meets best practices
   - The program balances in-program and ex post impact evaluation M&V. RSPs perform self-M&V on all projects with oversight by the implementation contractor. The impact evaluation samples projects and verifies M&V veracity with checks on engineering and on-site inspections.

8. Consider using third-party M&V contractors to oversee or conduct M&V
   - NA
   - The current level of M&V with three entities involved is adequate

9. Tie staff performance to independently verified results

- Meets best practices
- Implementation contractor contracts are performance based.

Our findings from the verification and due diligence review process are summarized below, followed by benchmarking the Retro-Commissioning program with program best practices:

- Based on the documents reviewed, it appears that the program implementer is performing well at screening projects for program eligibility.
- The EM&V team vetted the Retro-Commissioning Program's default parameter assumptions and calculation templates, determined RSP calculations are within generally accepted engineering standards and that program work paper references are accurate and reliable.

Reporting and Tracking System Best Practices

Table 5-8 summarizes the scores as determined by the Self-Benchmarking Tool criteria in the "Reporting & Tracking" section. Best practice topics are followed by bullets of program practices. The database was not ready for evaluation at the time of this research. Some benchmark items should be revisited in subsequent evaluations.

Table 5-8. Reporting and Tracking Benchmarking Scores

ID	Best Practice	Score*
1	Integrate all program data, including measure-level data, into a single database	Needs some improvement
2	Integrate or link with other appropriate systems such as cross-program databases, customer information systems (CIS) and marketing or customer relationship management (CRM) systems	Needs some improvement
3	Use automated or otherwise regularly scheduled notification to achieve close monitoring and management of project progress	Not evaluated at this time
4	Utilize electronic workflow management and web-based communications	Not evaluated at this time
5	For programs with proactive marketing efforts, track program prospects early and drive program intervention around major equipment-related events	Needs some improvement
6	Balance the level of tracking against resource availability	Meets best practices

* Scores are based on the metric definitions contained in the tool.

Source: Program operations manuals and Navigant analysis.

1. Integrate all program data, including measure-level data, into a single database
   - Needs some improvement
   - The TrakSmart database was not available for review in its final form, though reported plans for the database would comply with this criterion.

2. Integrate or link with other appropriate systems such as cross-program databases, customer information systems (CIS) and marketing or customer relationship management (CRM) systems
   - Needs significant improvement
   - Program and CIS databases are not dynamically linked, though site identifier fields are common to both. Given the number of customer participants it is not clear that this practice is necessary for the Retro-Commissioning Program, at this time

3. Use automated or otherwise regularly scheduled notification to achieve close monitoring and management of project progress
   - Not evaluated at this time

4. Utilize electronic workflow management and web-based communications
   - Not evaluated at this time

5. For programs with proactive marketing efforts, track program prospects early and drive program intervention around major equipment-related events
   - Needs some improvement
   - The database is set up to track prospects, but not other fields pertaining to decision making and timing.

6. Balance the level of tracking against resource availability
   - Meets best practices
   - Database design appears to meet the needs of the program without being too burdensome.

Recommendations

The EM&V team has the following recommendations based on our review of the Retro-Commissioning program's documentation and interviews with the program's stakeholders.

- Each Utility should press to have the TrakSmart database available for all aspects of the retro-commissioning program rather than relying on exports in order to comprehensively monitor program progress.
- The Implementation Contractor should perform more on-site M&V of a sample of projects to put a check on any conflicts of interest. Inspections of projects from new RSPs should be a priority and would help to align expectations of the program with the need to verify savings.

Conclusion

In general, the Joint Utility Retro-Commissioning Program is effectively designed, managed and implemented. The Retro-Commissioning program's engineering algorithms and assumptions defining savings estimates and QA/QC procedures are consistent with current industry best practices

5.6 *Program Theory Logic Model Review*

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 joint Utility Retro-Commissioning program in these terms.

Program Goals

The main goal of the Nicor Gas Retro-Commissioning program is to achieve therm savings through the retro-commissioning at qualifying existing commercial buildings. This program is a jointly offered with ComEd, and thus also has the goal of achieving electric energy and demand savings. Beyond energy savings, the program aims to increase the market and capacity to perform retro-commissioning services in the ComEd and Nicor Gas service territories.

Motivating Conditions/Barriers

Retro-commissioning identifies low or no cost opportunities for energy and cost savings that can be implemented without expenditure or budget approval for capital funds. The program has identified the following barriers to program success:

- Lack of awareness of retro-commissioning;
- Lack of demand for retro-commissioning services in commercial buildings; and
- Challenges with measure implementation:
  - Aligning the retro-commissioning project with budget cycles,
  - Addressing time constraints of the building staff to implement measures, and
  - Coordinating the controls contractor, customer, and service provider to achieve successful measure implementation.

Target Audience

This program targets a wide range of market actors, including: building owners and managers, facilities staff and service providers with the know-how to provide the service to utility customers.

Desired Actions/Behaviors

The program aims to increase adoption of retro-commissioning as a standard practice for successfully operating and managing the energy operating costs of commercial buildings in the ComEd and Nicor Gas service territory.

Strategies/Rationale

The joint Retro-commissioning program leverages relationships that service providers have with the commercial real estate market segment to recruit potential participants. The program works to provide service providers with training and marketing material to enhance their retro-commissioning capabilities and market reach. The program coordinates qualified technical assistance and pays for costly research and study that is used to identify and validate savings opportunities.

In addition to paying for the study and training technical assistance, the program requires building operator training for participants. This training has the goal of savings persistence and potential spillover to additional energy savings measures at participating and affiliated buildings.

Messages/Communications Vehicles
Pre-qualified service providers perform a majority of the program marketing. The program also reaches out to professional organizations such as BOMA to promote the program. The program implementation staff meets often with participants and service providers to ensure that projects stay on track for completion.

Program Logic Model
This section presents how the Business Retro-Commissioning program activities logically lead to desired program outcomes. Figure 5-5 presents the Nicor Gas, Peoples Gas, North Shore Gas and ComEd Joint Business Retro-Commissioning Program model diagram showing the linkages between activities, outputs and outcomes, and identifying potential external influences. The diagram presents the key features of the program.

The remainder of this chapter presents the resources, activities, outputs, outcomes and associated measurement indicators associated with the Business Retro-Commissioning Program.

Resources
The ability of the Business Retro-Commissioning 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 5-9.

Activities
The purpose of the Business Retro-Commissioning program is to educate and assist target decision makers with making their existing buildings more efficient through the retro-commissioning process. Existing building projects in the Joint Utilities service territories are eligible for the program. They must be sufficiently large (greater than 500 kW peak demand) and possess a capable automation system for monitoring equipment and implementing improved operations. The facility owner must be prepared to assume costs and expenses of at least $15,000 or $30,000 (depending on project size) to implement agreed-upon retro-commissioning measures (RCMs) that result in a bundle with an estimated total project simple payback of one-and-a-half years or less, based upon energy savings. The program will reach potential participants through activities designed to over the longer term generate energy savings (see Table 5-10). These activities are as follows:

- Recruit and train trade allies (retro-commissioning service providers, RSPs) in the program procedures and expectations.
- Coordinate among gas and electricity utilities to present an integrated program to serve customers served by both gas and electric utilities.
- Generate marketing materials and train utility staff.
- Promote retro-commissioning through publications and presentations at conferences
- Work with and support professional organizations promoting program message
- Provide financial resources to pay for technical studies for program participants

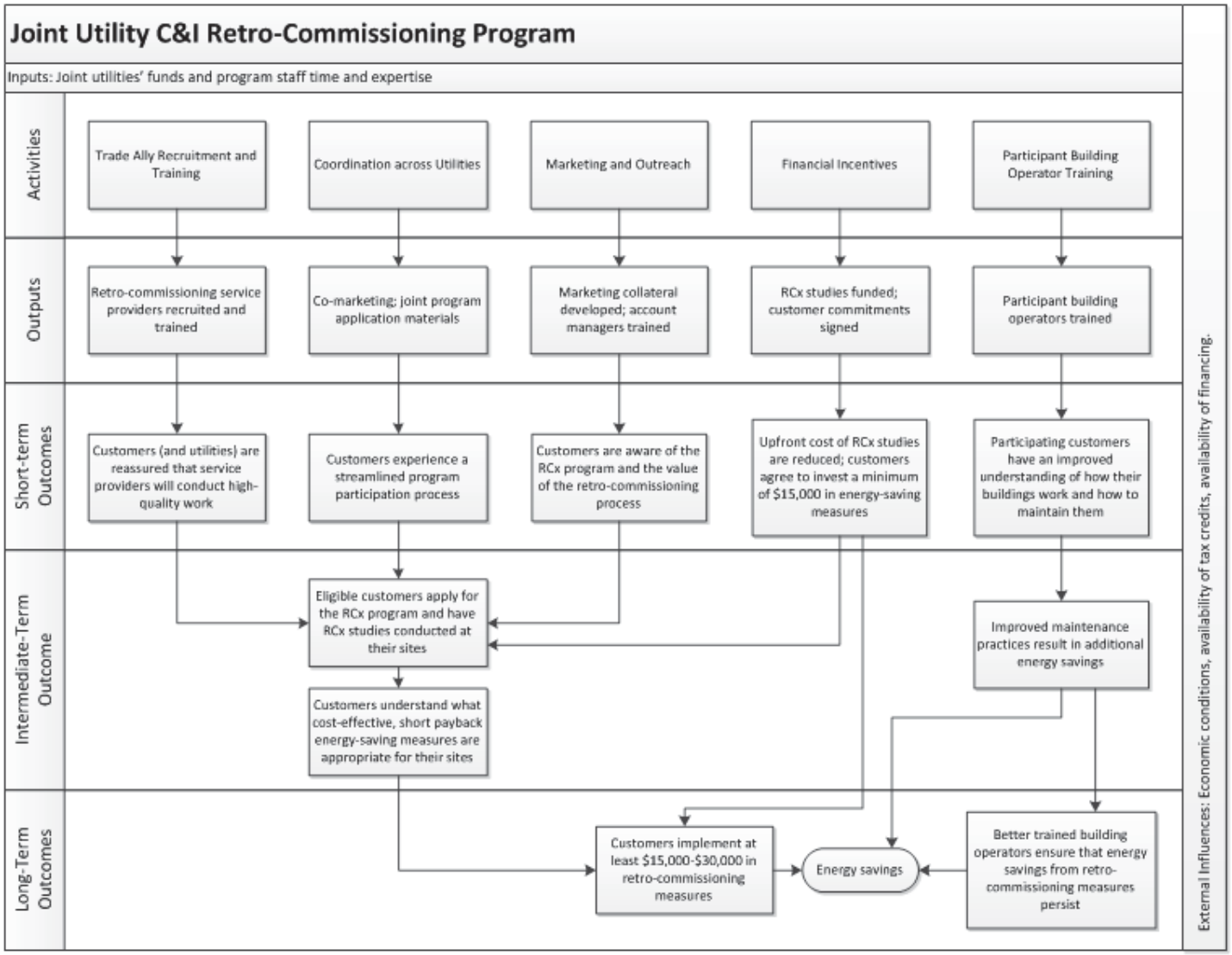
- Ensure that participant operating staff are trained to ensure savings persist and perhaps spill over to other projects and buildings

Table 5-9. Program Inputs and Potential External Influences

Program Inputs
• Nicor Gas, Peoples Gas, North Shore Gas and ComEd ratepayer funds • Nicor Gas, Peoples Gas, North Shore Gas and ComEd staff resources • Nexant (implementation contractor) staff resources and experiences • Utility and service provider knowledge of the target market
External Influences and Other Factors
• Economic conditions • Energy prices • Funding available to participants

Source: Navigant analysis.

Figure 5-5. Program Logic Model



Source: Program operations manuals.

Table 5-10. Business Retro-Commissioning Program Activities

Conduct training sessions for Service Providers
• Nexant recruits retro-commissioning service providers, RSPs, with expertise in commercial building systems, including design and maintenance professionals • Nexant conducts training sessions for RSPs
Coordination with ComEd
• Gas Utilities and ComEd, coordinate to deliver a joint program that serves customers with a streamlined participation process • A single Implementation Contractor, Nexant, runs the program for both utilities. • ComEd provides leadership oversight.
Promote retro-commissioning through publications and presentations at conferences
• Nexant, ComEd and gas utilities make presentations at key conferences and other events • Nexant publishes marketing materials with utility co-branding.
Provide financial incentives to participants
• Program pays for the retro-commissioning study, average cost of more than $60,000, if the participant owner commits to funding implementation of measures with an aggregate simple payback of less than 1.5 years, up to $15,000 or $30,000 depending on the size of the project.
Participant training sessions
• At least one representative from participants must complete Building Operator Certification Level 1 training in the calendar year that the project is completed •

Source: Program operations manuals.

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. An example for the Business Retro-commissioning program would be the number of projects completed in the program or the number of training session attendees. 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 the joint utilities' program activities and will vary depending on the time period being assessed. An example would be energy savings. On a continuum, program activities will lead to immediate outputs that, if successful, will collectively work toward achievement of anticipated immediate, intermediate and ultimate program outcomes.

The following tables list outputs (Table 5-11) and outcomes (Table 5-12), taken directly from the logic model and associated measurement indicators. For each indicator, a proposed data source or collection approach is presented.

Table 5-11. Program Outputs, Associated Indicators and Potential Data Sources

Outputs	Key Performance Indicators	Data Sources and Potential Collection Approaches
RSP training attendees learn about the program and retro-commissioning	Number of attendees at relevant training sessions Number of RSPs recruited	Interviews with program staff, program records of training attendance
Customers interface with a single program contact and submit a single application for both electricity and gas projects	Participant satisfaction with program processes	Participant process interviews. Utility program manager interviews.
Marketing collateral	Number of presentations given and publications released	Program records, interviews with program staff
Participants sign project contracts and complete participation	Program participation	Program tracking data, interviews with program staff
Participant Building operators trained	Certifications earned	Program tracking data, training program records

Source: Program operations manuals and Navigant analysis.

Table 5-12. Program Outcomes, Associated Indicators and Potential Data Sources

Outcomes	Key Performance Indicators	Data Sources and Potential Collection Approaches
Immediate Outcomes		
Quality retro-commissioning studies are performed and measures identified	Thoroughness of reports and operations research	Impact evaluation engineering review. Utility re-qualifications results
Streamlined program delivery and participation	Participant and RSP satisfaction	Participant and RSP process interviews.
Increased number of design firms bringing new projects to program	Number of firms worked with and number of projects submitted per firm	Program tracking data
Increased program awareness	Level of awareness in non-participants	Participant process interviews
Trained operations staff	Level of awareness of improved operations opportunities	Participant process and net-to-gross interviews
Intermediate Outcomes		
Eligible Customers apply and participate in the retro-commissioning program	Participation rates.	Market data, program tracking data
Implementing of cost-effective measures	Number of measures implemented and participant implementation costs	Program tracking data
Improved maintenance practices and savings persistence	Spillover savings, channeling in other programs	Participant and RSP process and NTG interviews
Ultimate Outcomes		
Program achieves long term savings goals	Electric and gas savings achieved by program	Program tracking data

Source: Program operations manuals and Navigant analysis.

5.12 Business New Construction

NAVIGANT

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

Evaluation Report:
Business New Construction Service

FINAL

Presented to
Commonwealth Edison Company and
Nicor Gas Company

August 9, 2013

Prepared by:
Randy Gunn
Managing Director
Navigant Consulting
30 S. Wacker Drive, Suite 3100
Chicago, IL 60606

Phone 312.583.5700
Fax 312.583.5701

www.navigant.com

© 2013 Navigant Consulting, Inc.

NAVIGANT

Submitted to:
ComEd
Three Lincoln Centre
Oakbrook Terrace, IL 60181

Nicor Gas
1844 Ferry Road
Naperville, IL 60563

Submitted by:
Navigant Consulting, Inc.
30 S. Wacker Drive, Suite 3100
Chicago, IL 60606
Phone 312.583.5700
Fax 312.583.5701

Contact:
Randy Gunn, Managing Director
312.938.4242
randy.gunn@navigant.com

Jeff Erickson, Director
608.497.2322
jeff.erickson@navigant.com

Julianne Meurice, Associate Director
312.583.5740
julianne.meurice@navigant.com

Prepared by:
Mary Sutter, Vice President of Energy Evaluation
510.444.5050 x 104

msutter@opiniondynamics.com

Adam Burke, Senior Project Manager
617.492.1400 x 230
aburke@opiniondynamics.com

Laura Tabor, Senior Consultant
303.728.2470
laura.tabor@navigant.com

Garrick Wahlstrand, Senior Analyst
510.444.5050 x 108
gwahlstrand@opiniondynamics.com

Ryan Kroll, Senior Engineer
608.785.3320
RWK@MichaelsEngineering.com

Disclaimer: This report was prepared by Navigant Consulting, Inc. ("Navigant") for ComEd and Nicor based upon information provided by ComEd, Nicor and from other sources. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Navigant nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

NAVIGANT

Table of Contents

E. Executive Summary 1

E.1 Evaluation Objectives 3
E.2 Evaluation Methods 3
E.3 Key Impact Findings and Recommendations 3
E.4 Key Process Findings and Recommendations 9

1. Introduction to the Program 12

1.1 Program Description 12
1.2 Evaluation Questions 12
1.2.1 Impact Questions 12
1.2.2 Process Questions 13
1.3 Implementation Strategy 13
1.3.1 Roles of the Implementation Contractor 13
1.3.2 Program Timeline 14
1.3.3 Program Delivery Mechanisms and Marketing Strategy 14
1.3.4 Measures and Incentives 15
1.3.5 Training 17

2. Evaluation Methods 18

2.1 Primary Data Collection 18
2.2 Additional Research 19
2.3 Impact Evaluation Methods 19
2.3.1 Gross Savings Analysis 22
2.3.2 Net Savings Analysis 22

3. Evaluation Results 23

3.1 Impact Evaluation Results 23
3.1.1 Verification and Due Diligence Procedure Review 23
3.1.2 Tracking System Review 24
3.1.3 Gross Program Impact Parameter Estimates 25
3.1.4 What are the Gross Annual Energy and Demand Savings Induced by the Program? ... 28
3.1.5 Net Program Impact Parameter Estimates 29
3.1.6 What are the Net Impacts from the Program? What is the Level of Free Ridership Associated with This Program? What is the Level of Spillover Associated with This Program? 32
3.1.7 Did the Program Meet Its Energy and Demand Savings Goals? If not, Why Not? 42
3.2 Process Evaluation Results 42
3.2.1 Value of the Program 43
3.2.2 What Design or Implementation Changes Occurred in EPY4/GPY1? 43
3.2.3 Is Program Awareness High? 43
3.2.4 What are the Characteristics of the Customers and Program "Partners" (E.g., Design Professionals, Trade Allies, and Construction Companies) Participating in the Programs and What are Their Drivers and Barriers to Participation? 44

3.2.5 In What Ways Could More Projects Be Recruited into the Program Earlier in the Design Process? ... 45
3.2.6 How Well Does the Program Design Integrate with Participants' Existing New Construction Processes? ... 45
3.2.7 How is the Program Preparing for the Adoption of IECC 2012 As the New Commercial Energy Code in Illinois? ... 46
3.2.8 Are There Potential Market Effects from the Program? ... 46
3.2.9 Program Theory ... 46

4. Findings and Recommendations ... 47
4.1 Key Impact Findings and Recommendations ... 47
4.1.1 General Findings and Recommendations ... 47
4.1.2 Electric Savings ... 48
4.1.3 Gas Savings ... 50
4.2 Key Process Findings and Recommendations ... 52
4.2.1 Implementation ... 52
4.2.2 LEED Projects ... 52
4.2.3 Clarify Program to Potential Participants ... 53
4.2.4 Case Studies ... 54
4.2.5 One-Page Program Descriptions Targeted to Different Audiences ... 54
4.2.6 Outreach to New Market Actors ... 55
4.2.7 Outreach to Additional Organizations ... 55
4.2.8 Provide Evidence for Measures in Trainings ... 55
4.2.9 Promote Gas Incentives ... 56
4.2.10 Consider Increasing Gas Incentives ... 56
4.2.11 Review and Document Expanded Program Design ... 56

5. Appendix ... 57
5.1 Glossary ... 57
5.2 Detailed Process Results ... 62
5.2.1 Value of the Program ... 62
5.2.2 EPY4/GPY1 Implementation Changes ... 63
5.2.3 Program Awareness ... 66
5.2.4 Partner and Participant Characteristics ... 68
5.2.5 Recruitment of Projects Earlier in the Design Process ... 73
5.2.6 Program Integration with Participant New Construction Practices ... 74
5.2.7 IECC 2012 ... 77
5.2.8 Potential Market Effects of the Program ... 78
5.3 Research Impact Results ... 79
5.4 Detailed Evaluation Methodology ... 85
5.4.1 Sampling ... 85
5.4.2 Net Program Savings ... 86
5.4.3 Process Evaluation Methods ... 88
5.5 Data Collection Instruments ... 88
5.5.1 Participant In-Depth Interview Guide ... 88
5.5.2 Net-to-Gross Analysis Plan (Free Rider Question Concept Map) ... 100

5.5.3 Focus Group Guide 102
5.6 Verification, Due Diligence and Tracking System Memo 114
5.6.1 Memo Appendix A: Project File Setup 127
5.7 Program Theory Logic Model Review 128
5.7.1 Program Theory 128
5.7.2 Program Logic Model 129
5.8 Summary of New Construction Service Focus Group with Building Industry Active Non-participants 137
5.8.1 Focus Group Objectives 137
5.8.2 Focus Group Setting and Participant Background 137
5.8.3 Findings 138
5.8.4 Recommendations 147

NAVIGANT

List of Figures and Tables

Figures:

Figure 5-1. Program Logic Model 131

Tables:

Table E-1. GPY1/EPY4 Savings Estimates 2
Table E-2. GPY1/EPY4 Verified Interactive Savings in Comprehensive Track, Joint Projects 3
Table E-3. New Construction Service Program Net Savings 4
Table E-4. Program Gross and Net Savings 5
Table E-5. Program Gross and Net Savings – EPY2 through EPY4 – ComEd 6
Table 1-1. Systems Track Natural Gas Energy Efficiency Measures 16
Table 2-1. Surveys, Interviews, and Other Primary Data Sources 18
Table 2-2. Additional Resources 19
Table 2-3. Completed ComEd PY4 Projects and Nicor Gas PY1 Projects 20
Table 2-4. Completed ComEd EPY4 Projects and Nicor Gas GPY1 Projects 20
Table 2-5. Realization Rate and NTGR Values by Track and Utility 21
Table 3-1 Gross Impacts by Fuel Type 29
Table 3-2. LEED NTGR Adjustments 31
Table 3-3. Net Impacts 33
Table 3-4. NTGR Values by Track Type and LEED Status 35
Table 4-1. Program Gross and Net Impacts 48
Table 4-2. Program Net Impacts Compared to Target - ComEd 49
Table 4-3 . Program Net Impacts Compared to Target - Nicor Gas 50
Table 5-1. Program-Level Savings Estimates Terms 58
Table 5-2. Participant Types 69
Table 5-3. Ex Ante kWh Savings per Project 69
Table 5-4. Research Net and Gross Results by Utility 79
Table 5-5. Sample Research Gross and Net Energy Savings by Track – Program Level (n = 19) 80
Table 5-6. Research Gross Savings for Sampled Projects 81
Table 5-7. On-Site M&V Error and Precision 85
Table 5-8. NTGR Error and Precision 86
Table 5-9. Combined On-Site M&V and NTGR Precision Levels 86
Table 5-10. SharePoint Tracking System Extract Field Names 121
Table 5-11: Tracking System Review Observations 122
Table 5-12: Discrepancies Observed Between Tracking System and Project Files 123
Table 5-13: Quality Control and Verification Benchmarking Scores 124
Table 5-14: Reporting and Tracking Benchmarking Scores 125
Table 5-15. Program Inputs and Potential External Influences 130
Table 5-16. Business New Construction Program Activities 132
Table 5-17. Program Outputs, Associated Indicators, and Potential Data Sources 134
Table 5-18. Program Outcomes, Associated Indicators, and Potential Data Sources 135
Table 5-19. Focus Group Participants 138
Table 5-20. Potential Program Benefits Scored by Participants 145

E. Executive Summary

This document provides the results of the Commonwealth Edison's (ComEd) fourth electric plan year (EPY4) and Nicor Gas' first gas plan year (GPY1) evaluation of the New Construction Service program for non-residential customers. The program joined the ComEd portfolio of programs in EPY2 to bring about energy savings as well as help bring about changes in knowledge of energy-efficient commercial building practices. In the fall of 2011, this program became jointly offered by ComEd and Nicor Gas. The Energy Center of Wisconsin implements the program for ComEd as a turn-key program. Wisconsin Energy Conservation Corporation administrates the program for Nicor Gas.

In EPY4/GYP1, the program maintained three "tracks" for projects: Comprehensive, Systems, and Small Buildings. For customers building facilities greater than 50,000 square feet, ComEd and Nicor Gas offered Comprehensive Track incentives for whole-building electric and gas therm savings. In the Comprehensive Track, implementers are highly involved in the design of the building to help bring about savings by combining all building components into a holistic, integrated and efficient design. Through the Systems Track, ComEd and Nicor Gas offered prescriptive incentives for select window, roof insulation, boiler, lighting, and heating, ventilating, and air-conditioning (HVAC) systems measures to customers with facilities greater than 20,000 square feet. The Small Building Track contained challenging lighting and daylighting requirements for buildings under 20,000 square feet and is only available to ComEd customers. In EPY4/GPY1 the program had a mix of Systems Track (44) projects and Comprehensive Track (6) projects.[1] There were no projects processed through the Small Buildings Track in EPY4/GPY1. The program structure is changing in the EPY5/GPY2 program year to focus more on comprehensive projects.

Table E-1 below provides reported ex ante and evaluation-adjusted gross and net savings impacts for the EPY4/GPY1 New Construction Service program. Verified electric systems track impacts in Table E-1 are based on the deemed realization rate (RR) and net-to-gross ratio (NTGR) filed by ComEd and Nicor Gas; research-based values for both RR and NTGR may be found in Appendix 5.3 0. The team did not apply any realization rate or net-to-gross factor to the interactive effects.

[1] Counts of projects paid or with payment requested by end of EPY4/GPY1. Projects still in verification process at this time will be included in EPY5/GPY2 evaluation. Program database records show that there were 43 Systems Track projects and 7 Comprehensive Track projects. However, according to other program records and as clarified by the implementer, two of the projects recorded as Comprehensive Track projects finished as Systems Track projects, and one of the projects recorded as a Systems Track project finished as a Comprehensive Track project.

Table E-1. GPY1/EPY4 Savings Estimates

Savings	ComEd			Nicor Gas		Program Total	
	Peak Demand Savings (MW)	Energy Savings (MWh)	Energy Savings with Interactive Effects (MWh)	Energy Savings (therms)	Energy Savings with Interactive Effects (therms)[2]	Verified Energy Savings (MBtu)**	Research Energy Savings (MBtu)
Ex ante gross savings*	3.409	20,748	20,748	54,426 §	54,426 §	76,235	76,235
Ex ante net savings‡	N/A	12,449	12,449	32,656	32,656	45,742	45,742
Evaluation-adjusted gross savings †	2.93	18,200	18,200	64,400	63,600	68,700	68,300
Evaluation net savings	1.61	10,400	10,400	21,300	20,500	37,600	39,700

** Source: Ex ante savings from program tracking spreadsheet "nc project dump.rdl", July 10, 2012. Nicor Gas submitted a revised filing of 51,293 ex ante therms due to the removal of one project during final reconciliation review; since the evaluation team had already drawn the sample for GPY1/EPY4, the values in this report reflect the original ex ante therms of 54,426.*

‡ Source: ComEd PY4 Ex Ante Table; implies a net-to-gross ratio of 0.60

§ Although program records indicate 85,806 gross therms, we only list therm savings for which Nicor Gas paid incentives. Program tracking data includes interactive therms for projects which paid gas incentives.

†Research gross savings for all Comprehensive Track projects and gas Systems Track projects; Verified gross savings for electric Systems Track projects. See the Glossary (Appendix 5.1) for definitions.

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

Table E-2 shows the interactive savings that the evaluation team calculated for each utility. This analysis only included comprehensive projects, and attributes interactive savings and penalties from each fuel type to the utility associated with the measure creating the interactive effects. We include all interactive effects for projects the program database indicates are joint projects (i.e., the project receives natural gas service from Nicor Gas and electric service from ComEd, but may or may not have received a Nicor Gas incentive). The evaluation team did not apply a realization rate to these savings.

[2] The difference between the ex post gross therms with and without interactive savings does not match the total interactive effects shown in Table E-2 because one project's interactive savings were already included in the ex ante tracking system therm totals.

Table E-2. GPY1/EPY4 Verified Interactive Savings in Comprehensive Track, Joint Projects

Primary Utility	Interactive Therms Caused	Interactive kWh Caused
ComEd	-1,645	-
Nicor Gas	-	0

Source: Evaluation analysis

E.1 Evaluation Objectives

While all of the evaluation objectives are common to both utilities, some of the objectives have a larger focus for one or the other utility evaluations. The evaluation objectives are as follows:

1. Perform verification, due diligence, and tracking system reviews.
2. Quantify net energy savings and demand impacts from buildings completed during the program year (June 2011 to May 2012). Include any spillover among participants. Additionally, focus groups with active non-participants[3] provide some qualitative insight into spillover that may have been engendered through training activities. The ComEd evaluation focuses on megawatt-hour (MWh) and MW savings and the Nicor Gas evaluation focuses on therm savings.
3. Determine key process-related program strengths and weaknesses and provide recommendations to improve the program.
4. Conduct research among active non-participants to better understand the drivers and barriers to participation and to determine the best approaches, including target audiences, messages, and timing.
5. Identify ways to increase recruitment into the program during or before the project design phase.

E.2 Evaluation Methods

The evaluation team used in-depth interviews of program implementers and participants as well as a focus group discussion to reach conclusions in the process analysis. We used engineering desk reviews and on-site metering and verification of a sample of 22 of the 50 completed projects to assess gross impacts and calculated net impacts using self-reported data from participants.

E.3 Key Impact Findings and Recommendations

The program garnered savings of nearly twice the overall net electricity savings goal (Table E-1), but only 11% of the therms savings goal (Table E-4). Additionally, the program garnered 1.61 MW of peak demand savings (Table E-3); however, demand savings are not a specific goal of the program. Customers are satisfied and find value from the program. Our research finds that the implementation team is

[3] "Active non-participants" are those market actors (e.g., architects, designers, contractors, and owners) who participated in program training events, but who have not yet participated in the program.

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

Table E-3. New Construction Service Program Net Savings

Net Savings Estimates	MWh (ComEd)	MW (ComEd)	Therms (Nicor Gas)	Verified MBtu (ComEd and Nicor Gas)*	Research MBtu (ComEd and Nicor Gas)*
Plan Target	5,502	N/A	151,200	N/A	N/A
Reported for EPY4	12,449	N/A	32,656	45,742	45,742
Total EPY4 Evaluation Net Savings	10,400	1.61	21,300	39,600	39,700

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

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

When comparing the ex ante electric gross savings results (i.e., the results expected by the program from the 49[4] projects before any adjustments) to the evaluation-adjusted gross savings, the evaluation analysis lowered the gross impacts by relatively small amounts (Table E-5). The NTGR for the program energy savings was calculated to be 0.57 (compared to the ex ante assumption of 0.60) using a deemed NTGR of 0.59 for Systems Track projects and a research-based value of 0.54 for Comprehensive Track projects.

[4] While there were 50 projects completed in EPY4/GPY1, only 49 of these included electric savings.

Table E-4. Program Gross and Net Savings

	Ex Ante Gross	Evaluation-Adjusted Gross	Gross Realization Rate	Evaluation Net Savings	Net-to-Gross Ratio
MWh ComEd: N = 49	20,748	18,200	87.9%	10,400	0.57
MW ComEd: N = 49	3.41	2.93	85.9%	1.61	0.55
Therms Nicor Gas: N = 7	54,426	64,400	118.3%	21,300	0.33
MBtu (verified) All Projects: N = 50	76,235	68,700	90.1%	37,600	0.55
MBtu* (research) All Projects: N = 50	76,235	68,300	89.6%	39,700	0.58

Source: ComEd PY4 Ex Ante Table, evaluation team analysis
** MBtu values are calculated by applying conversion factors to the ex ante MWh and therm values. Verified MBtu were calculated using verified electric Systems Track parameters, Research MBtu were calculated using research results only.*

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

Reviewing the NTGR separately by the two tracks, the Systems Track projects' electric energy NTGR is deemed at 0.59[5], and the Comprehensive Track projects' electric energy research NTGR was evaluated as 0.54. Three Comprehensive Track project representatives indicated that the program had only some influence (i.e., NTGR scores between 0.20 and 0.51) on the energy efficiency of their buildings. Representatives of the other two projects scored a NTGR of 0.58 or higher.[6] This NTGR is the same as the EPY3 value (0.54) for electric energy savings NTGR. More details on electric and gas project-level NTGR for both Comprehensive Track projects and the evaluated sample of Systems Track projects are provided in Appendix 5.3.

[5] See the description of impact evaluation methods in Section 2.3 .
[6] This is a total of five Comprehensive track projects for which NTGR interviews were completed. For the sixth Comprehensive project, we were unable to complete a NTGR interview but were able to complete the site visit.

Combining the Comprehensive and Systems Tracks, the gross electric energy realization rate (MWh) for EPY4 was 89.7% and the EPY4 NTGR was 0.57. As shown in Table E-5, these values are similar to those of years past.

Table E-5. Program Gross and Net Savings – EPY2 through EPY4 – ComEd

	Population (N)	Sample for Impacts (n)	Ex Ante Gross (MWh)	Gross Realization Rate (MWh)	Evaluation-Adjusted Gross (MWh)	NTGR (MWh)
PY2	16	14	1,615	85.0%	1,370	0.59
PY3	37	15	9,203	99.7%	9,170	0.65
PY4	49	5*	20,748	87.9%	18,200	0.57

Source: ComEd PY2-PY4 Ex Ante Tables, evaluation team analyses
** Net savings based on deemed RR and NTGR parameters for Systems Track projects and research RR and NTGR for Comprehensive Track projects.*

In Table E-5, we break out the values presented in this section by program track, i.e., Systems or Comprehensive.

Table E-6. Program Gross and Net Savings – by Track

	Metric	Systems Track	Comprehensive Track	Total*
Ex ante gross savings	MW	2.052	1.357	3.409
	MWh	14,810	5,938	20,748
	therms	22,867	31,559	54,426
Ex ante net savings	MW	N/A	N/A	N/A
	MWh	8,886	3,563	12,449
	therms	13,720	18,935	32,656
Evaluation-adjusted gross savings	MW	1.74	1.18	2.93
	MWh	12,600	5,700	18,200
	therms	27,000	37,300	64,400
Evaluation net savings	MW	1.03	0.58	1.61
	MWh	7,400	3,000	10,400
	therms	8,900	12,400	21,300

Verified Gross Savings	MBtu	45,700	23,000	68,700
Verified Net Savings	MBtu	26,200	11,400	37,600
Researched Gross Savings	MBtu	47,300	21,000	68,300
Researched Net Savings**	MBtu	27,500	12,200	39,700

Source: Evaluation team analyses
** Track sub totals do not always sum exactly to the total value due to rounding.*
*** Due to the sample design, only the total researched net savings value meets the 90% confidence and 10% precision level. We show this value decomposed across Systems and Comprehensive Track projects for illustrative purposes only.*

Impact Recommendations

Finding: Lighting operating hours are difficult parameters to establish, as self-reported operating hours are often estimated before a facility's final operating hours are established. Self-reported numbers may not account for a number of factors: time for start-up and closing time, holidays, lights that customers have turned off, spaces that operate on a different schedule than the majority of the building, and other factors that would influence the overall hours. This was particularly apparent in retail stores and hospitals. Both building types were found to contain several different lighting schedules. Deli and liquor areas of grocery stores had different lighting schedules than the overall business hours of the grocery store. Also, these buildings often had overnight operation to stock shelves and/or clean. Similarly, hospitals and other medical facilities that operate 8,760 hours a year often have lab and office space that is significantly less utilized than is assumed using the building operating hours.

- **Recommendation:** Ensure that the hours of operation are representative of the lighting hours of operation and not the facility business hours.
- **Recommendation:** If a building includes space types with dramatically differing schedules, input these spaces individually into the workbook in order to more accurately reflect overall facility lighting operation and savings.

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

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

Finding: Although the general approach for the compressed air projects was found to be reasonable, both compressed air projects had the savings levels reduced due to calculation errors in the original analysis. Specifically, for both projects, the calculations did not accurately reflect the information on the provided compressor Compressed Air and Gas Institute sheets for either the baseline or installed compressors.

- **Recommendation:** If compressed air projects and other custom projects are to be included in the New Construction program, continue to develop standard templates and other tools to reflect the behaviors of these types of equipment to minimize errors.
- **Recommendation:** Develop a more formal protocol for reaching out to the evaluation team when the implementation team encounters large projects with uncertain baselines or projects where low attribution seems likely. This could reduce the number of projects with very low or high RRs as well as projects with low net-to-gross ratios.

Finding: While the team's impact analysis did not reduce the gross ex ante energy savings much overall, the information in Table E-4 show that NTGRs continue to significantly reduce the program's net savings estimates. Based on the project sample, relatively few large projects with high free ridership had a significant impact on the overall NTGR. This was especially true for the gas analysis: interviews showed that low gas incentives and low awareness of gas incentives contributed to high free ridership.

- **Recommendation:** The implementation team should review, possibly further develop, and document its free-rider screening process for potential projects. The program's operation manual indicates that the program screens for free riders, but the evaluation results indicate that there are a few participating in the program. For projects that the program touches early, implementation staff should consider the customer's preexisting level of commitment to efficiency. If projects are undertaken after the original design is completed, implementation staff should consider asking how the program can leverage further efficiency out of the customer. Improving awareness of available gas measures earlier in the design process could help raise the gas NTGR.

Building Efficiency Baselines

Finding: With the addition of process-related efficiency measures, the types of measures that receive incentives through the New Construction program are moving beyond building envelope, HVAC, and lighting systems. Expanding the measures that can be included in the program may be beneficial for the program and its participants. For identifying building efficiency baselines in EPY4/GPY1, the program primarily used the International Energy Conservation Code (IECC) Illinois Energy Conservation Code for Commercial Buildings, which referenced IECC 2009 and allowed for American Society of Heating, Refrigerating, and Air-Conditioning Engineers 90.1 – 2007 as an alternate compliance method. Yet, in EPY4/GPY1 the program had to reach outside of this framework to establish and document the baseline for some industrial process measures.

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

E.4 Key Process Findings and Recommendations

This section lists the main findings and recommendations resulting from the EPY4/GPY1 evaluation. The evaluation team believes that these recommendations will prove the most useful to the implementation team in their efforts to continue to develop the program in EPY5/GPY2. However, several more recommendations are included in section 5.

Marketing and Outreach

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

- **Recommendation:** Ensure that all marketing and program materials are prominently co-branded.
- **Recommendation:** The implementation team likely has a good understanding of its marketing effectiveness across the many professional organizations it already targets. Per its discretion, it should consider expanding outreach efforts to additional organizations such as the following:
    - CoreNet—this is an association of corporate real estate professionals, workplace professionals, service providers and economic developers.
    - Alliance for Environmental Sustainability (AES)—The program participant who suggested AES acknowledged that AES formerly had much more of a residential focus but in recent years has expanded its focus and, therefore, may be an appropriate outreach target for the program.

Barriers and Drivers to Participation

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

- **Recommendation:** Better describe the program to potential participants by developing the program website. Overall, focus group participants indicated they need more clarity on program processes and one participant noted that the program website was not helpful in answering his immediate questions. Create a list of frequently asked questions to post on the

website based on the questions, concerns, and misperceptions uncovered in the focus group with active non-participants (see 0).

- **Recommendation:** Clarify the program's structure and benefits for potential participants by offering training on becoming a program ally. Focus group participants want more information about the program and want to understand how they can use the program to benefit their projects, create and use a webinar to train designers, increase their understanding of the program, and provide them a marketing tool.
- **Recommendation:** Better describe the program for potential participants by creating one-page, program-specific marketing sheets. Designers requested that they have a one-page marketing piece to pass out during early design meetings to introduce the possibility of participating in the program. Create one-page descriptions of the program aimed at specific target audiences. One marketing piece should be targeted to the owner/developer group but also be available to those in the design group. Another could be targeted to projects that are already intending to incorporate some high-efficiency design such as LEED.
- **Recommendation:** Better characterize the program for potential participants by continuing to develop case studies. Focus group participants suggested that case studies are a good way to describe the potential program benefits for projects similar to those they are working on. Given that point, continued development of case studies and disseminating them to the design community should occur.

Gas Incentive Levels

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

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

Program Impact on the Market

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

- **Recommendation:** The program should take advantage of the prevalence of LEED projects by recruiting these projects into the program; however, the program needs to convince design teams that working with the program on these projects will be a smooth, non-onerous, valuable process. The main concern focus group participants had about program alignment with LEED is that participating in LEED requires many administrative hours for paperwork

and they worry that working with the New Construction Service may require similar amounts of paperwork. Create LEED-specific, one-page fact sheets outlining the ways the program can enhance the efficiency of these projects. Create a message that highlights: 1) the design team can submit existing LEED design plans; 2) program incentives help decrease first costs to ensure that high-efficiency design and equipment are implemented; and 3) past design participants find the program's review of LEED design valuable for helping to find ways to realize LEED goals and for the "extra set of eyes" the service provides.

1. Introduction to the Program

1.1 Program Description

The New Construction Service program aims to capture immediate and long-term energy efficiency opportunities that are available during the design and construction of new buildings, additions, and renovations in the non-residential market. In electric plan year 4 (EPY4)/ gas plan year 1 (GPY1), the program provided incentives to improve the efficiency of building systems (e.g., lighting, heating, ventilating, and air-conditioning [HVAC], and/or building envelope) in new construction (Systems Track), to improve lighting/daylighting systems beyond the systems track level of efficiency (through the Small Buildings Track) as well as through integrated whole-building design (through the Comprehensive Track). While the program Tracks being offered have changed in EPY5/GPY2, projects in EPY4/GPY1 were expected to come from a mix of System, Small Buildings, and Comprehensive Tracks.

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

1.2 Evaluation Questions

As described in our evaluation plan, the evaluation of the New Construction Service for EPY4/GPY1 seeks to answer several questions related to the program's energy savings impacts and the process for implementing the program.

1.2.1 Impact Questions

The impact research questions for both utilities are as follows:

1. What are the gross annual energy and demand savings induced by the program?
2. What are the net impacts from the program? What is the level of free ridership associated with this program? What is the level of spillover associated with this program?
3. Did the program meet its energy and demand savings goals? If not, why not?
4. Are the assumptions and calculations in compliance with the statewide TRM, where applicable? If not, what changes will be required?

For EPY4/GPY1, the New Construction Service's electric savings measures were not evaluated against the statewide TRM. However, for Nicor Gas the eligible gas savings measures were evaluated against the TRM. Both utilities expect to be required to use the Illinois TRM for appropriate prescriptive measures in EPY5/GPY2.

1.2.2 Process Questions

The following process research questions were undertaken during EPY4/GPY1:

1. What design or implementation changes occurred in EPY4/GPY1?
2. How did the program respond to EPY4/GPY1 challenges?
3. What are the characteristics of the customers and program "partners" (e.g., design professionals, trade allies, and construction companies) participating in the programs and what are their drivers and barriers to participation?
    a. Who should be more involved but is not, and how can the program increase their involvement?
    b. What are the barriers to participation among active non-participants?
    c. With respect to barriers and drivers, what messaging would be most effective to reach active non-participants?
    d. What program features and/or benefits could mitigate the barriers to participation by active non-participants?
4. How well does the program design integrate with participants' existing new construction processes?
    a. What components of the process work best for participants?
    b. What components of the process are perceived by participants to offer the most value?
    c. Does participation in the New Construction program impact the project design delivery process and timeliness?
    d. How do participants perceive that the New Construction Service integrates with (or is complementary to) their standard new construction design processes?
5. In what ways could more projects be recruited into the program earlier in the design process?
    a. How could the program more effectively engage customers and/or program partners during the pre-design phase?
6. Is program awareness high? Are there potential market effects from the program?
7. How is the program preparing for the adoption of International Energy Conservation Code (IECC) 2012 as the new commercial energy code in Illinois?

1.3 Implementation Strategy

1.3.1 Roles of the Implementation Contractor

The New Construction Service program is a turn-key approach provided by the Energy Center of Wisconsin (ECW). To implement the program, the program manager at ECW works with the Commonwealth Edison (ComEd) program manager, the Nicor Gas program manager, and Nicor Gas' administrator, Wisconsin Energy Conservation Corporation.

1.3.2 Program Timeline

The New Construction Service program was launched in June 2009 as a ComEd program in the second program year (EPY2) of the ComEd portfolio of demand-side programs. It became a ComEd and Nicor Gas joint program in the fall of 2011. Program year 4 (EPY4), therefore, is the third year of the program and the first year the program has been a ComEd and Nicor Gas Joint program (given that this is Nicor Gas' first program year (GPY1).

1.3.3 Program Delivery Mechanisms and Marketing Strategy

According to the New Construction Service Operations Manual, the program has four primary offerings designed to achieve its energy-saving and market preparation objectives:

1. Targeted Education and Training, Information, and Outreach on integrated design practices and technologies and benefits were provided directly to customers through the program and to the broader market.
2. Technical Assistance Services provide education and assistance with implementing energy efficiency designs or measures that the market has not yet fully adopted. Services included facilitating the design process, reviewing plans and construction documents, assisting with research and product selections, and analyzing energy savings.
3. Design Incentives **for** the design team to help offset the costs of developing designs that provide as-built performance that is more energy efficient than their standard practice designs.
4. Measure Incentives **for** owners and developers to help reduce cost barriers to adopting electric and gas energy-saving designs and measures that have not yet been accepted as standard practice for construction.

The program channeled projects through one of three participation approaches[7]:

- Comprehensive Track offers the highest level of project ("technical") assistance and financial incentives for custom design solutions. This approach allows the design team the greatest flexibility to meet energy performance goals by adopting integrated design solutions analyzed through whole-building energy simulations. This approach is chosen when project size, schedule, complexity, and interest level justify a significant investment of program resources to achieve the full benefits of integrated building design. Design incentives are offered at 10% of the measure incentive total. Six of the 50 projects completed in EPY4/GPY1 fell within the Comprehensive Track.

[7] Although these were the three approaches used in EPY4/GYP1, the program began a transition in EPY5/GYP2 toward a performance-based, single-track model, which is essentially the Comprehensive Track from EPY4/GPY1. This change will only affect new projects initiated in EPY5/GPY2. Systems Track projects initiated earlier will still be completed in that track. The Small Building Track that was added during EPY2 contained challenging lighting and daylighting requirements for buildings under 20,000 square foot. Since its inception, there were no participants in this track and it has been discontinued in EPY5/GPY2.

- Systems Track is a lower-assistance participation approach that offers a limited menu of financial incentives. This track provides measure incentives to meet performance criteria for improvements in lighting power density, lighting controls, envelope, and mechanical equipment. Design incentives are not offered. This approach is chosen for projects where there is limited opportunity for integrated design and for those later in the design process. Forty-four of the 50 EPY4/GPY1 projects fell within the systems track.
- Small Buildings Track offers an opportunity for buildings less than 20,000 square feet to receive incentives for lighting and daylighting. The track provides a combined measure incentive to meet performance criteria for improvements in lighting power density and the incorporation of daylighting strategies and controls. This approach is chosen for any project less than 20,000 square feet that can meet the minimum performance requirements. Design incentives are not offered. There were no projects processed through the Small Buildings Track in EPY4/GPY1.

The primary targets of program marketing activities are design professionals such as architects and engineers as well as construction firms. Trainings, monthly presentations, and emails are also main approaches to reaching this group. Secondary targets include customers and developers who are marketed to mainly through newsletters and bill inserts as the main approach. Across all primary and secondary targets, the ECW's full-time marketing manager generates leads, develops relationships, and serves as a point of contact for the program within the new construction community.

1.3.4 Measures and Incentives

Projects must meet several requirements to earn incentives. The incentive information presented here is based upon various EPY4/GPY1 program documents (e.g., "Systems Track Overview") that outline the overall program approach and each of the three tracks. In EPY4/GPY1 several gas measures were added, but program staff confirmed that all other measures and incentives were unchanged from EPY3. As there were only systems and Comprehensive Track projects in EPY4/GPY1, only the measure and incentive information is provided for these tracks and only in those instances where there were changes from EPY3 to EPY4/GPY1.

1.3.4.1 Systems Track Incentives

Participants must submit a Measure Incentives Agreement to the program for approval prior to purchase or installation of energy-saving measures. Equipment invoices must have been dated after June 1, 2011, to qualify for EPY4/GPY1 incentives. In EPY4/GPY1 there were no changes in the incentives offered for efficient lighting power density (LPD) reduction or for those offered for efficient, electricity-saving equipment. However, since becoming a joint program in EPY4/GPY1, incentives for various natural gas-saving measures were added, as shown in Table 1-1.

Table 1-1. Systems Track Natural Gas Energy Efficiency Measures

Measure	Specifications	Incentive
Energy Recovery Ventilation (ERV)	• Outdoor air must be heated using natural gas. • Must be more efficient than 2009 IECC • Must be Air-Conditioning, Heating, and Refrigeration Institute certified or independently tested and reported per American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standard 84-2008 • ERV net sensible effectiveness at 100% airflow heating must be ≤ 50%. • ERV return and outdoor airflow (cubic feet per meter [cfm]) must not differ by more than 20%.	$0.30 per cfm ERV outdoor airflow
Demand Controlled Ventilation (DCV)	• Outdoor air must be heated using natural gas. • Must be more efficient than 2009 IECC	$0.15 per cfm design outdoor airflow
Condensing Boilers	• Must be natural gas-fired and greater than 300 MBtu/hr input capacity • Must have a steady-state efficiency ≥ 90% • Hydronic heating system must produce return water temperatures within boiler condensing range. • Boilers installed for complete redundancy are not eligible. • If not certified then must be independently tested and reported per American National Standards Institute-Z21.13 or Bureau of Transportation Statistics 2000	$1.00 per MBtu/hr input capacity
Infrared Heaters	• Must be natural gas-fired • Restricted to interior comfort heating applications • Must use electronic ignition	$1.50 per MBtu/hr input capacity
Unit Heaters	• Must be natural gas-fired • Combustion efficiency must be ≥ 90%	$1.00 per MBtu/hr input capacity
Windows	• Must be metal-framed with U-factor ≤ 0.35 • Must enclose interior spaces heated using natural gas as source fuel	$0.10 per square foot window area
Roof Insulation	• Must be above-deck • Must be continuous and have a minimum R-value equal to 30, or the maximum roof assembly U-factor must be ≤ 0.032 • Must enclose interior spaces heated using natural gas as source fuel	$1.50 per 100 square feet of roof area

1.3.4.2 Comprehensive Track Incentives

For Comprehensive Track projects the design must produce at least 10% in energy savings beyond the IECC 2009 baseline. Once this level is achieved, incentives are calculated at $0.10 per kWh saved and $0.50 per therm saved. Measure incentives are limited to $200,000 per facility per program year (June 1 to May 31), which is a change from the PY3 $150,000 limit.

1.3.5 Training

The program offers several full-day training sessions throughout the year that give an overview of how to participate in the program and touch on different aspects of designing a highly efficient building. The training primarily targets architects, designers, and engineers (e.g., mechanical, electrical). In EPY4/GPY1 the program sponsored five training sessions reaching 221 attendees and covering the following topics:

- June 2011 Lighting and Daylighting Design Beyond Footcandles – 43 attendees
- October 2011 Commissioning and Ongoing Commissioning – 37 attendees
- December 2011 The 'V' in HVAC: Design and Control of Ventilation Systems – 56 attendees
- February 2012 eQUEST Energy Modeling Series – 48 attendees
- May 2012 IECC Impacts and Implementation: Baseline and Beyond – 37 attendees

2. Evaluation Methods

2.1 Primary Data Collection

Table 2-1 summarizes the desk reviews, on-site measurement and verification (M&V), interviews, and other primary data sources that the team used to answer impact and process questions for both the ComEd and Nicor Gas evaluations.

Table 2-1. Surveys, Interviews, and Other Primary Data Sources

Collection Method	Subject Data	Quantity	Date	Gross Impact	Net Impact	Process
In-Depth Telephone Interviews	Program Managers, Implementation Contractor	4	April–May 2012			X
Focus Group	Active Non-participants	1 (10 participants)	September 2012			X
In-Depth Telephone Interviews	Program Participants	4 of 7 Nicor Gas Customers; 19 ComEd Customers*	August–October 2012		X	X
Engineering File Review	Project Files	5 of 7 Nicor Gas Customers; 22 ComEd Customers*	September–October 2012	X	X	
On-Site M&V	Physical Verification of Rebated Measures	5 Nicor Gas Customers; 22 ComEd Customers*	September–October 2012	X	X	

**Nicor Gas participants were included in the ComEd participant survey and on-site M&V. For Nicor Gas participants receiving on-site visits, gas measures were visually inspected but not metered. A census of EPY4/GPY1 Comprehensive Track projects was conducted and a sample of Systems Track projects was taken.*

2.2 *Additional Research*

Table 2-2 summarizes additional resources that were reviewed to further inform the impact and process evaluation questions.

Table 2-2. Additional Resources

Reference Source	Author	Application	Gross Impacts	Process
Program Tracking Database	Program Implementer	Impact and Process Evaluations	X	X
Program Operations Manuals	Program Implementer	Process Evaluation; Verification and Due Diligence Review		X
Program Marketing and Outreach Materials	Program Implementer	Process Evaluation		X
Program Training and Education Materials	Program Implementer	Process Evaluation		X
Commercial Building Energy Consumption Survey	U.S. Energy Information Administration	Impact Evaluation: Gross Savings Estimates	X	
Illinois Technical Reference Manual	Vermont Energy Investment Corporation	Impact Evaluation: Gross Savings Estimates	X	
International Energy Conservation Code 2009	International Code Council	Impact Evaluation: Baseline Determination	X	

2.3 *Impact Evaluation Methods*

The impact evaluation focused on 50 completed projects. Thirty of these projects were completed as ComEd-only projects and 20 projects were completed as joint ComEd/Nicor Gas projects. Of the 20 joint projects, 7 had therm savings eligible for incentives paid by Nicor Gas. The remaining projects did not claim any gas savings. Since the joint portion of the program just began this program year and new construction projects often have long lead times, several projects in the Nicor Gas service territory were too far along in the design process to incorporate gas measures. Table 2-3 shows the numbers of ComEd and Nicor Gas projects for which each utility claims savings among the 50 projects.

Table 2-3. Completed ComEd PY4 Projects and Nicor Gas PY1 Projects

Project Description	Savings Claims by ComEd PY4	Savings Claims by Nicor Gas PY1	Number of Completed Projects
ComEd Only	Yes	No	30
Joint - with Therm Savings	Yes*	Yes	7
Joint - without Therm Savings	Yes	No	13
Total	-	-	50

**One joint project has only therm savings. Source: Program tracking data*

Impact findings throughout this report are broken out by fuel type so that each utility only claims the savings paid for by the utility's incentives. The evaluation team evaluated the realization rate (RR) from a sample of EPY4/GPY1 ComEd/Nicor Gas Systems Track projects and a census of Comprehensive projects, which were used to develop the gas savings RR and can be used to adjust electric demand savings for bidding into the PJM forward capacity market. A deemed RR parameter was used to estimate PY4 electric savings from Systems Track projects. Table 2-4 shows the number of projects receiving each utility's incentives and the numbers included in the impacts evaluation activities. Details on the sampling methods used are provided in Appendix 5.4.

Table 2-4. Completed ComEd EPY4 Projects and Nicor Gas GPY1 Projects

Project Description	Number of Projects Evaluated	Number of Projects in the Population
Received ComEd incentives only	17*	43*
Received both ComEd and Nicor Gas incentives	4	6
Received Nicor Gas incentives only	1	1
Total	22	50

**Program records mistakenly showed an incentive of $25 paid for a ComEd project with no therms savings, so this project is included in this category. Source: Program tracking data.*

The evaluation team conducted a rigorous impact evaluation including engineering analysis, computer simulations, and on-site M&V visits for 22 projects. The goals for the on-site M&V were to: 1) verify the installation of energy-efficient equipment installed under the program, and 2) collect detailed information regarding the specific project for which the building received incentives through the program to analyze the impacts of the project. The data collected on-site ensured that the evaluation team could verify the installation of the incented measures and systems, understand the characteristics of these installed measures and systems and, in the case of comprehensive projects, enable a thorough review of the building in a computer simulation or engineering model.

This sample size also ensured that Nicor Gas projects were well represented. For joint Nicor Gas and ComEd projects, the evaluation team collected information on gas measures along with data for electric measures. While some electric projects were metered, gas measure on-site activities were limited to verification only for this program year. Five of the seven Nicor Gas joint projects with therm savings were selected as part of this sample.

The team used different combinations of inputs to calculate net-to-gross ratio (NTGR) and RR, depending on the utility (i.e., ComEd or Nicor Gas) and the project track (i.e., System or Comprehensive). These inputs are shown in Table 2-5.

Table 2-5. Realization Rate and NTGR Values by Track and Utility

Utility	Systems Track Savings Inputs (Deemed or Research)	Comprehensive Track Savings Inputs (Deemed or Research)	Total Savings
ComEd (MW and MWh)	Deemed (NTGR = 0.59 RR = 0.85)	Research (for NTGR, 5 of 6 interviewed; for RR, 6 of 6 sites visited)	Savings were combined based on the population (N = 49) ex ante savings.
Nicor Gas (therms)	Research (for NTGR, 3 of 5 interviewed; for RR, 3 of 5 sites visited)	Research (for NTGR, 1 of 2 interviewed; for RR, 2 of 2 sites visited)	Savings were combined based on the population (N = 7) ex ante savings.
Program-wide: Verified (MWh, therms, MBtu)	Combination of Deemed (Electric) and Research (Gas)	Research (for NTGR, 5 of 6 interviewed; for RR, 6 of 6 sites visited)	Savings were combined based on the population (N = 50) ex ante savings.
Program-wide: Research (MWh, therms, MBtu)	Research (for NTGR, 14 of 44 interviewed; for RR, 3 of 5 site visited)	Research (for NTGR, 5 of 6 interviewed; for RR, 6 of 6 sites visited)	Savings were combined based on the population (N = 50) ex ante savings.

Source: Navigant analysis

We used deemed RR and NTGRs parameters from the PY2 evaluation to estimate PY4 electric savings from Systems Track projects. Since there are not deemed RR or NTGR values for Comprehensive Track projects or gas Systems Track projects, the team used evaluation research values for these parameters. The evaluation team also calculated a research RR and NTGR for electric Systems Track projects: these values are presented in Appendix 0 and were used to calculate the program-wide research MBtu savings estimates. To obtain overall RR and NTGR values for each track and utility, we combined results across subsets within each population.

To obtain joint program research NTGR values for EPY4/GPY1 Systems Track and Comprehensive Track projects, we evaluated the NTGR and RR from a sample of EPY4/GPY1 ComEd/Nicor Gas Systems Track projects and a census of Comprehensive projects. The research NTGRs developed for EPY4/GPY1 are used to calculate net savings wherever the deemed values are not being used: EPY4 electric savings from Comprehensive Track projects, and GPY1 therm savings from both Systems Track and Comprehensive Track projects. These EPY4/GPY1 NTGR research results can also be used for deeming future program year NTGRs as appropriate. In addition, while the EPY4 research NTGR for Systems Track projects is not used to report net savings in EPY4, we anticipate the implementation team using the research results for

these projects to better understand the issues surrounding program attribution and realization rates for the New Construction Service overall.

The research results can also be used for adjusting electric demand savings estimates for bidding into the PJM forward capacity market.

Details on the sampling methods used are provided in Appendix 5.4.

2.3.1 Gross Savings Analysis

For Comprehensive Track projects, the engineering analysis used existing computer models to: 1) adjust the model inputs to match the as-built conditions determined through an on-site audit or project files; and 2) determine impacts through comparing two simulations representing the current building and the baseline building. The baseline for both Comprehensive and systems projects was based on the 2009 Illinois Energy Conservation Code for Commercial Buildings or the program-chosen baseline, if different and more stringent than the Illinois code.

The purpose of the on-site visits was two-fold. First, the on-sites were used to verify the installation of the efficiency measures as claimed in the original project documentation. Second, the on-sites were used to collect information regarding the operation of the equipment installed. For example, the team used lighting on/off loggers to verify lighting operating schedules and operating profiles.

The evaluation team collected equipment specifications and operating schedules to modify the original computer models when appropriate. For example, based on information collected on-site, the installed lighting wattage, in the efficient case building model, could be adjusted to be consistent with the observed installed lighting. Care was taken to ensure that design features, such as light shelves, occupancy sensors (not required by code), or other efficient design features that affect lighting operation were accounted for in the analysis.

Finally, the evaluation team reviewed gas systems-track measures to determine whether compliance with the statewide TRM was required, and where required, identified the changes necessary to meet TRM compliance. The team documented how the deemed measures differ from Nicor Gas' existing planning or ex ante tracking estimates and provide guidance as to how these differences will impact Nicor Gas' programs.

2.3.2 Net Savings Analysis

The evaluation team evaluated the NTGR from the same sample of EPY4/GPY1 ComEd/Nicor Gas Systems Track projects and a census of Comprehensive projects used in the impacts analysis described above. The evaluation team conducted one to two in-depth interviews for each project, depending on the number of decision makers and the level of insight a respondent had into the decision making. Results of these interviews were used to develop the gas savings NTGR. A deemed RR parameter was used to estimate PY4 electric savings from Systems Track projects. Details on the sampling and net savings analysis methods used are provided in Appendix 5.4.

3. Evaluation Results

Throughout the remaining sections of this report, findings from the Systems and Comprehensive Tracks are usually combined. Findings are presented by program track where it is believed the results may offer program design staff insight into program development. Additionally, savings by fuel type are separated such that each utility may understand its impacts.

3.1 Impact Evaluation Results

3.1.1 Verification and Due Diligence Procedure Review

ECW's verification and due diligence procedures meet nearly all aspects of national best practices. The program implementers organize project documentation well and employ well-qualified technical staff to conduct project analysis and inspections. For the full verification and due diligence review, please see Appendix 5.6 .

The evaluation team offers the following observations regarding ECW's quality assurance and verification procedures for the joint New Construction Service program:

- Current verification practice is to complete a site visit for all projects if possible. If a physical inspection cannot be completed, ECW uses invoices and construction documents to verify projects. However, this system may be inefficient for smaller projects and may not adequately serve for large and complex projects. ECW may also want to consider using performance verification for large projects with high uncertainty. While the cost of this approach is too high to utilize on a regular basis, it could be a valuable tool for select projects.
- Although ECW has designated a folder structure for organizing project files, the location and labeling of final savings calculation files is inconsistent. This makes it difficult to identify what the "final" savings for a given project should be.

The evaluation team offers the following recommendations in relation to the quality assurance and verification procedures for the joint Business New Construction Service program:

- The evaluation team recommends revising inspection protocols to allow smaller projects to automatically be inspected through document review while requiring larger projects to be physically inspected. This will cut costs for small, simple projects and ensure that large and complex projects receive greater attention.
- It is also recommended that protocols are revised so to consider using performance verification for large and complex projects where the uncertainty of savings is high. This would give ECW the opportunity to tie project simulation models to actual consumption data and improve ex ante estimates. While cost prohibitive for the majority of projects, this method could be justified for select projects. As the energy code becomes more stringent and building owners pursue newer and more complicated technologies, this will become an important tool.
- The team recommends formalizing a naming convention and designated location for final savings calculations files. If changes are made to a project's calculations after verification, a new file should be saved to highlight these changes.

3.1.2 Tracking System Review

ECW's reporting and tracking system meets many aspects of national best practices. The program tracks detailed information on all projects at all stages and also records all program outreach. However, the current SharePoint tracking system for the program is not a relational database and thus has some limitations. For this reason, ECW and ComEd have been developing a more sophisticated Frontier database which will be able to send and receive data to and from the CiviCRM system, which has recently begun tracking project outreach and contact information. The evaluation team has focused the review on the SharePoint system used for ComEd PY4 and Nicor Gas PY1. It is acknowledged that some observations may be resolved with the new system. For the full tracking system review, please see Appendix 5.6 .

The evaluation team offers the following observations regarding ECW's data tracking system for the New Construction Service program:

- The current tracking system has multiple fields for project identification that are not used consistently across old and new projects. The "Project ID Legacy" field, which is a manually generated identifier, is not unique and contains three sets of duplicates.
- The tracking system captures all key data necessary for processing rebates. Contact information is also tracked but cannot be directly linked to project-level data in the SharePoint system. This will be remedied with the new system. The system also does not include measure level or end-use level data, or estimations of incremental or total project cost.
- Although interactive gas effects are calculated for some projects, they are not consistently reported through the tracking system. This data should be tracked for all projects to facilitate benefit-cost analysis.
- ECW confirmed that data validation is used in several fields and that the program uses checklists to verify final tracking values at project closeout. However, the evaluation team observed a few instances of savings and incentives which did not match program documentation. None of these errors would significantly impact the program, but they illustrate a need for closer adherence to quality control procedures.
- There is very little documentation of the tracking system beyond the brief description in the program manual. The program should create a data dictionary for the new tracking system to define each field and any links between fields, tables, and systems. This not only facilitates evaluation but also enables new staff working on the program to learn the system more quickly.

Summary of Recommendations

The evaluation team offers the following recommendations in relation to the tracking system for the New Construction Service program:

- The evaluation team recommends adding the following information to the tracking system for all projects:
    - Measure or end-use level data. It is understood that the program's intent is to consider holistic savings as much as possible. However, the evaluation team believes that at least

indicating which measures or end uses saw efficiency improvements in the project would give users more insight into a project "at a glance."

  - Cost data. Incremental cost is very difficult to estimate for new construction programs. Because ECW works very closely with design firms on many projects, they have a unique opportunity to seek out more accurate incremental cost estimates as projects go through the design process and make decisions about which measures to include. The evaluation team recommends exploring this opportunity to improve incremental cost estimates and if successful, tracking incremental cost data at the project or measure level.
  - Interactive savings. While interactive effects do not always affect rebates, they are important for benefit-cost analysis and should be tracked whenever they are calculated.

- The evaluation team also recommends investing in documentation for the new Frontier and CiviCRM tracking systems, including a data dictionary which defines tracking system fields and the links between them.

3.1.3 Gross Program Impact Parameter Estimates

The gross impact engineering review included several adjustments to the program level algorithms and assumptions. EPY4/GPY1 included only Systems Track projects and Comprehensive Track projects. No Small Business Track projects were completed. While only energy (kilowatt-hour [kWh] and therm) savings are necessary for reporting, the program does track peak coincident demand (kW) savings at the request of ComEd.

3.1.3.1 Systems Track Projects

<u>Lighting Measures</u>

Lighting measures comprise the majority (nearly 85%) of the electric savings evaluated. For the Systems Track lighting calculations, there are relatively few inputs to the ex ante savings algorithms. For lighting energy, the program uses a code minimum baseline LPD based on building occupancy type. The algorithm multiplies this LPD by the building floor area and by operating hours to calculate the annual energy savings. The program bases the default occupancy types on code, which is appropriate. The program bases the floor area and annual operating hours on participant reported data and plans.

Finding: Lighting operating hours are a difficult parameter to establish, as self-reported operating hours are often estimated **before** a facility's final operating hours are established. Self-reported numbers may not account for time for start-up and closing time, holidays, lights that customers have turned off, spaces that operate on a different schedule than the majority of the building, and other factors that would influence the overall hours. This was particularly apparent in retail stores and hospitals. Both building types were found to contain several different lighting schedules. Deli and liquor areas of grocery stores had different lighting schedules than the overall business hours of the grocery store. Also, these buildings often had overnight operation to stock shelves and/or clean. Similarly, hospitals and other medical facilities that operate 8,760 hours a year often have lab and office space that is significantly less utilized than is assumed using the building operating hours.

- **Recommendation:** Ensure that the hours of operation are representative of the lighting hours of operation and not the facility business hours.
- **Recommendation:** If a building includes space types with dramatically differing schedules, input these spaces individually into the workbook in order to more accurately reflect overall facility lighting operation and savings.

In some cases, the evaluation team deployed lighting loggers to determine the lighting schedules for the participant buildings. When this was not feasible due to space and environmental constraints, the evaluation team used customer interviews to verify the lighting hours of operation. The interview included overall hours of operation for the facility as well as typical operating characteristics (schedules, hours of specific spaces, and control method) for significant spaces within the facility.

Finding: Occupancy and daylighting controls were found to be in place at several facilities that had not received rebates for these measures. In these cases, the metered lighting hours of use were below the level that would have occurred absent of the daylighting and occupancy controls. In these cases, evaluated savings were based on what the hours of use would have been in the absence of the controls.

HVAC Electric Savings Measures

The implementation team estimated ComEd commercial and industrial (C&I) New Construction HVAC savings using predetermined program defaults for different size categories and qualifying tiers. The defaults do not fully reflect the actual installed efficiencies, but rather a simplified estimate based on program assumptions.

The evaluation team used the ComEd C&I Prescriptive program default savings algorithms and factors, and included Equivalent Full Load Hours defaults based on occupancy type and size of equipment. The savings algorithms include Coincidence Factors for calculating Peak Demand Savings, and a Redundancy Factor to account for system oversizing.

Finding: Since much of the HVAC equipment was not operating at a significant load condition at the time of the evaluation, the evaluation team used customer interviews to verify the HVAC operation. The evaluation team used the interviews to verify that the customers operated and controlled the equipment in a manner typical of the type of facility. Based on the customer interview, one site had the operation of several of the HVAC units set to zero. The facility was a medical facility and was required to have redundant HVAC systems. In addition, the customer had installed significantly more chiller capacity than would be required for the existing building, due to planned future expansion.

Finding: The systems track chiller project was completed using a custom calculation rather than using the workbook template. This project used eQuest to determine the chiller operating hours for the facility. This was then multiplied by the chiller capacity and the kW/ton savings. This dramatically overestimated the savings, as the chiller is not expected to operate at full load during all hours of operation. The evaluation team used the model provided to determine the effective full load hours.

Gas Measures

Four systems track projects evaluated included gas savings. All of these projects were completed using the systems track template for determining savings from gas measures. The systems track template uses two methodologies to determine savings. For ERV units, DCV, window, and insulation measures, the savings are calculated using an 8,760 hour analysis, where the heat transfers and loads are calculated using typical meteorological year 3 (TMY3)[8] data. For condensing boilers, infrared heaters, and unit heaters, the savings are calculated using Commercial Building Energy Consumption Survey (CBECS) data to determine a typical load for the heating equipment.

Finding: The evaluation team found the 8,760 hour analysis to be reasonable and appropriate; however, the team did adjust some inputs to the analyses. Specifically, for windows, some projects assumed a balance point of 50°F or lower for the shell zones. This may be an appropriate balance point for the building as a whole in some cases; however, if the facility has external zones, such as offices, these spaces will require heat at much higher temperatures. The low assumed balance point resulted in gas savings being underestimated.

Similarly, for projects with ERVs or DCVs, the economizer was assumed to be operating to an outdoor air temperature of 35°F in many cases. This resulted in no savings being claimed for hours above that temperature. This appeared excessively low, as many facilities require heating at much higher temperatures than 35°F. Again, this low temperature setting resulted in savings being underestimated.

- **Recommendation:** Review balance temperature assumptions and ensure that they reflect building characteristics on a project-by-project basis. If a building has an abnormal balance temperature, clearly document justification for the change.

Finding: The evaluation team found that the gas savings from HVAC measures calculated using the CBECS data were somewhat inconsistent. Heat loads and the resulting savings were based on CBECS data averaged over the entire United States. This underestimated the heating for buildings in the Illinois climate zones. While this approach in itself is not incorrect, it is important to note that the savings are dramatically different than if simply using the actual building area to determine the savings.

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

Finding: One project included the installation of a condensing boiler. Upon inspection, it was determined that the boiler did not serve HVAC loads, but instead was only used for ice-melting. A custom calculation would have been more appropriate for this project.

- **Recommendation:** Carefully review applications to ensure that custom calculations are used for systems that are not used for typical heating purposes.

[8] TMY3 is data from the National Renewable Energy Laboratory using data supplied by the National Climatic Data Center.

3.1.3.2 Comprehensive Track Projects

The evaluation team assessed six Comprehensive Track projects. Four projects utilized a building simulation model to determine the savings, one project determined savings using a custom calculation, and one project used both a building simulation and custom calculations to determine the savings.

The evaluation team assessed the lighting and HVAC projects using the same method as described above in the Systems Track section. The team also interviewed the customer to verify hours of operation and deployed data loggers as needed to determine operating conditions.

For the building simulation projects, the evaluation team reviewed the models to ensure consistency with all provided documentation. This included reviewing the shell characteristics, lighting power densities, and operating schedules. The evaluation team verified the operating characteristics, such as lighting hours of operation, through customer interviews and metering.

Three projects included systems or equipment not governed by IECC 2009. Measure types not governed by code include two projects with efficient air compressors, one with a free cooling option for a refrigeration system, one included a process chilled water system, and one involved injection molding equipment. Projects with equipment not governed by IECC 2009 were evaluated in a manner consistent with the Custom Program. Baselines were reviewed and compared to industry standard practice and in all cases found to be reasonable.

Finding: Although the general approach for the compressed air projects was found to be reasonable, both compressed air projects had the savings levels reduced due to calculation errors in the original analysis. Specifically, for both projects, the calculations did not accurately reflect the information on the provided compressor Compressed Air and Gas Institute (CAGI) sheets for either the baseline or installed compressors.

- **Recommendation:** If compressed air projects and other custom projects are to be included in the New Construction program, continue to develop templates and other tools to reflect the behaviors of these types of equipment to minimize errors.
- **Recommendation:** Develop a more formal protocol for reaching out to the evaluation team when the implementation team encounters large projects with uncertain baselines or projects where low attribution seems likely. This could reduce the number of projects with very low or high realization rates as well as projects with low net-to-gross ratios.

3.1.4 What are the Gross Annual Energy and Demand Savings Induced by the Program?

In EPY4/GPY1, there were 50 total projects for which incentives were paid out and ex ante savings reported. The breakdown of projects includes 44 Systems Track projects and six Comprehensive Track projects.[9]. As stated earlier, 22 projects were assessed, 16 that were systems track projects and six that were Comprehensive Track projects. A summary table (see Table 5-6) in the Appendix shows the gross

[9] The program tracking database originally showed seven comprehensive projects, but we later found one to have been incented as a systems project and report it as such here.

ex ante gross savings and evaluation-adjusted gross savings by project, including individual project realization rates, for the sampled projects.

Combining the deemed electric RR for Systems Track (0.85) and the research Comprehensive Track RRs for electric energy savings (1.02) and electric demand (0.876), the overall program gross realization rate for electric energy savings is 0.90 and for demand savings is 0.86. The gross realization rate for natural gas energy is 1.18. The point estimates were applied back to the population to obtain the evaluation-adjusted gross savings shown in Table 3-1.

Table 3-1 Gross Impacts by Fuel Type

Utility	Metric	Ex Ante Gross Savings	Gross Realization Rate	Evaluation-Adjusted Gross Savings
ComEd	kWh	20,747,678	0.88	18,200,000[a]
ComEd	kW	3,409	0.86	2,930
Nicor Gas	Therm	54,426	1.18	64,400[a]
ComEd & Nicor Gas	MBtu* (verified)	76,235	0.90	68,700
ComEd & Nicor Gas	MBtu* (research)	76,235	0.90	68,300

[a]Value does not multiply out exactly as shown using shown realization rate due to rounding.
** MBtu values are calculated by applying conversion factors to the ex ante MWh and therm values. Verified MBtu were calculated using verified electric Systems Track parameters, Research MBtu were calculated using research results only.*

3.1.5 Net Program Impact Parameter Estimates

After carefully reviewing the NTGR responses of each interview, the evaluation team adjusted the NTGR algorithm and ratio for 11 of the 19 projects. Adjustments fell into three main categories: 1) inconsistent responses among individual respondents; 2) responses indicating the program helped projects realize Leadership in Energy and Environmental Design (LEED) efficiency goals; and 3) national customer (retail chain) projects. Where adjustments were made to Systems Track projects, the adjustments would not affect the RR and NTGR for electric savings, as the deemed parameters were applied to these projects.

3.1.5.1 Adjustment Stemming from Inconsistent Responses

In one participant interview, the respondent did not appear to be consistent with information provided elsewhere in the interview in one or more questions in the NTGR battery. Thus, the scoring was adjusted to reflect how the respondent should have answered the NTGR question to be consistent with the other information provided.

Adjustment #1: The respondent mentioned the training and knowledge gained as a program ally and how the program helped inform his knowledge of energy efficiency design and measures. This training included courses taken through the New Construction Service. He rated the training as highly influential in the decision to include the energy-efficient measures (9 on a scale of 0-10), yet he did not seem to include this experience in reporting out on the overall program influence score or the program timing and efficiency score. Thus, the program attribution was increased in both of these sub- scores by adding in an additional 25% to make them more consistent with the respondent's description of the training. This increased the project-level NTGR from 0.48 to 0.65.

3.1.5.2 Adjustments Stemming from LEED Projects

Quantifying the New Construction Service program's attribution to savings for projects involved with LEED certification poses a particular challenge. Therefore, the team asked additional questions of respondents associated with projects seeking LEED certification to better understand the role of the program in support of the LEED objectives. Specifically, the team asked the following:

While the project was intended to meet LEED standards, we are interested in knowing how the program may have helped support or enhance the LEED goal. Please answer yes or no to the following questions.

i. Was the program important in helping to refine an existing energy model?
ii. Was the program's staff or technical assistance important in highlighting ways to achieve LEED design plans?
iii. Were program incentives or technical assistance important in improving energy efficiency levels to meet a higher level of LEED?

For each question topic that respondents agreed with, the evaluation team added 0.05 NTGR points to the overall project-level NTGR score. Thus, the LEED adjustment could have resulted in as much as a 0.15 increase to the overall score. The decision of how many points to add was based on the following:

As in the prior year's evaluation findings, EPY4/GPY1 participants report that the program was instrumental in realizing the projects' goals of meeting LEED requirements. This effect of the New Construction Service on LEED projects is not captured well by typical NTGR question batteries. Thus, in the case of LEED projects, these effects must be captured and credit given to the program.

The evaluation team chose units of 0.05 to reflect the value of the program for each question topic by considering the context of the other NTGR battery items. For comparison, respondents reporting full influence of either the program incentives or technical assistance increase NTGR scores by up to 0.33 points. In this context, potential LEED adjustment ranging from 0.00 to 0.15 seemed balanced.

Eight projects in the sample were designed for LEED certification. Participants for six of these projects indicated the New Construction Service helped them realize the project's LEED objectives. The six NTGR adjustments are summarized in Table 3-2 below.

Table 3-2. LEED NTGR Adjustments

Adjustment	LEED Adjustment	NTGR Before Adjustment was Applied (MBtu)	Final NTGR (MBtu)
1	0.10	0.57	0.67
2	0.05	0.95	1.00
3	0.05	0.33	0.38
4	0.15	0.43	0.58
5	0.15	0.57	0.72
6	0.05	0.15	0.20

Source: Evaluation analysis

3.1.5.3 Adjustments Stemming from National Customer Projects

Two respondents were interviewed that represent four national retailer customer projects. One respondent was a third-party "rebate agent" working on the behalf of national customers to ensure their new stores take full advantage of available utility rebates. National chain stores typically use standard "prototypical" building designs nationwide, as did these four projects. Therefore, there are fundamental differences in the decision-making process for incorporating energy efficiency into their newly constructed buildings as compared to non-prototypical buildings as well as the ability of the evaluation team to talk about these choices with those closest to the decisions. The evaluation team is tasked with presenting what would have occurred absent the program to the best of its ability, given the available data. For this year's analysis these differences were more pronounced than in previous years and necessitated adjustments to our approach to NTGR for such projects.

More clearly than in previous years, the two respondents interviewed reported that the energy efficiency measures incorporated into the standard store designs are in part influenced by the availability of rebates from many utility efficiency programs across the nation. Questions aimed at discerning program attribution that assume solely a direct influence by the local utility programs are inappropriate. Therefore, the team also asked program participants about the level of indirect influence, (i.e., any influence all such national utility incentive programs have in influencing prototypical new store design). This year, more than in prior evaluation periods, program participants were less willing or able to answer attribution questions related to the direct influence of the ComEd/Nicor Gas program on the individual participating projects. Instead, they focused their responses on the indirect influence of such programs nationally.

The evaluation team carefully considered what the responses meant and concluded that the question of program attribution in the case of these national standard designs comes down to program contribution versus program attribution. Together, programs like the ComEd/Nicor Gas joint New Construction Service have a synergistic effect encouraging energy efficiency in standard store designs more than a single program could hope to affect. In the short term, projects using a standard design would not have been greatly different in the absence of the ComEd/Nicor Gas joint program because these standard

designs are already in use. However, over time, as more utilities deploy energy efficiency programs, the combined effect of those programs is to influence the standard store design. The presence of each utility's program contributes to this national influence. Further, the absence of one or more of these programs would weaken the combined impact of these programs nationwide.

Therefore, the team based the NTGR for these chain stores on the question aimed at the indirect influence of the New Construction programs. This approach more accurately reflects how the national chains interact with the local ComEd/Nicor Gas program and is a better choice for what would have occurred absent the program given the available data.

While the evaluation team also developed NTGR scores based on participant responses provided to questions aimed at the direct influence of the ComEd and Nicor Gas joint program on project designs, the team did not use the direct influence NTGR scores, because these program participants had difficulty answering the direct influence questions. When they did provide an answer, the context they provided for their answers suggested that the premise of these questions was based upon irrelevant assumptions. For example, questions based on what would have occurred absent the program did not seem to apply to these projects, which are affected by all utility new construction programs nationwide. The direct influence scores for these projects were calculated only from those questions for which they could provide answers and not on the full battery of NTGR questions.

How these four sites are analyzed influences the program-level NTGR overall. If the recommended analysis and the indirect influences are used, the program-level NTGR (MBtu) is 0.58. If the more typical, and not recommended, analytical approach of direct influences is applied, the program-level NTGR (MBtu) is 0.53. While this difference is not insignificant, we believe our approach is the best approach, given our available data and the known issues of collecting data from rebate agents regarding national retail chains who use prototypical store designs.

3.1.6 What are the Net Impacts from the Program? What is the Level of Free Ridership Associated with This Program? What is the Level of Spillover Associated with This Program?

Deemed NTGR parameters are used to estimate PY4 electric savings from Systems Track projects. EPY4/GPY1 gas savings and electric savings from Comprehensive Track projects were estimated from the EPY4/GPY1 impacts evaluation activities described in this section. The evaluation team evaluated the NTGR from a sample of EPY4/GPY1 ComEd/Nicor Gas Systems Track projects and a census of Comprehensive projects, which were used to develop the gas savings NTGR. The NTGR (MBtu) varied across the Comprehensive Track projects, from 0.2 to 0.97. The final NTGR is not a simple average of the six Comprehensive projects. Instead, the project-level NTGR values are weighted by project savings and sample strata case weights to produce utility-specific NTGR ratios.

One Systems Track participant indicated that they completed an energy efficiency project that would qualify as spillover. However, since this was for a Systems Track project for which deemed NTGR values were applied, spillover (or any other participant NTGR response) for this project was not included in the net verified savings calculation. The participant stated that the program influenced eco-friendly elevators that used a magnetic system to alleviate electrical load. By reviewing the manufacturer's literature and interviewing the participant, we estimated a spillover value for the elevators which was

included in the research net energy savings (See section 5.3). We identified no spillover on any of the Comprehensive Track projects.

The NTGR ratios were applied to the population of projects. When applied to the total evaluation-adjusted gross savings, this calculation yields the final evaluation net savings shown in Table 3-3.

Table 3-3. Net Impacts

Utility	Metric	Evaluation-Adjusted Gross Savings	NTGR	Free-Ridership (FR)	Evaluation Net Savings
ComEd	MWh	18,200	0.57	0.43	10,400
ComEd	MW	2.93	0.55	0.45	1.61
Nicor Gas	Therms	64,400	0.33	0.67	21,300
ComEd & Nicor Gas	MBtu (verified)	68,700	0.55	0.45	37,600
ComEd & Nicor Gas	MBtu* (research)	68,300	0.58	0.42	39,700

Source: Evaluation analysis

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

As discussed in previous sections, the therm NTGR is notably lower than the rest of the program. The gas participants interviewed indicated that relative to other gas programs and the electric incentives, the gas incentives in the New Construction Service program are low. Some participants also indicated that they were already planning to install their gas measures before they began working with the program, and not all were aware that gas incentives were available before participating.

3.1.6.1 Evaluator Recommendation on Use of NTGRs

The program design and delivery methods for Systems Track electric projects did not substantially change for PY4 and so, in accord with the NTG Framework, [10] we believe it is appropriate to use the NTG rate calculated in the PY2 evaluation research for electric savings on Systems Track projects (0.59). Thus, the electric savings under Systems Track projects falls under the following condition from the NTG Framework: *"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 NTG Framework calls for retroactively applying the NTG ratio for *"existing and new programs not yet evaluated, and previously evaluated programs undergoing significant changes — either in the program design or*

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

delivery, or changes in the market itself". The electric savings from projects covered under the Comprehensive Track and all gas savings meet these criteria and so the evaluation uses the NTG ratio calculated from our EPY4 research for these projects. As gas measures were added to the program during the evaluation period, the Nicor Gas program falls under the condition of a new program. Projects taking place under the Comprehensive Track program with electric savings qualify for undergoing significant changes because the addition of gas savings measures would likely influence the measure selection and overall decision-making process.

The evaluation team recommends using the research EPY4/GPY1 NTGR values presented in Appendix 5.3 prospectively as the current evaluation updated the NTGR instrument to capture important data around the program's support of LEED projects. Since LEED projects are increasingly a significant source of participation, the program's influence on these projects should be captured.

3.1.6.2 NTGR by Systems and Comprehensive Tracks

Reviewing the NTGR separately by the two tracks, the Systems Track projects' electric energy NTGR is deemed at 0.59[11], and the Comprehensive Track projects' electric energy research NTGR was evaluated as 0.54. Three Comprehensive Track project representatives indicated that the program had only some influence (i.e., NTGR scores between 0.20 and 0.51) on the energy efficiency of their buildings. Representatives of the other two projects scored an NTGR of 0.58 or higher. More details on the combined electric and gas program NTGR for both the Comprehensive Track projects and the evaluated sample of Systems Track projects are provided in Appendix 5.3.

3.1.6.3 Participant Rationale for NTGR Responses

Participants provided reasons for both the low and high NTGRs they produced. For example, some participants noted that they had strong preexisting intentions to meet high efficiency levels. This was often the case with LEED projects in which the LEED certification is highly valuable to the participants for marketing purposes. While these participants usually gave the program some credit for helping them realize their LEED intentions, it might be smaller in the context of meeting LEED certification. In Table 3-4, projects are listed for which the evaluation team completed NTGR interviews along with participant responses as to how the program influenced the project's efficiency.

[11] While the deemed NTGR and RR for ComEd Systems Track projects are used in developing the evaluation net savings presented here, the evaluation team also evaluated the NTGR and RR from a sample of EPY4/GPY1 ComEd/Nicor Gas Systems Track projects and a census of Comprehensive projects, which are used in the gas savings NTGR and RR. These results can also be used for gas and electric program planning purposes and/or for adjusting savings prospectively, as well as for adjusting electric demand savings estimates for PJM.

Table 3-4. NTGR Values by Track Type and LEED Status

Track	LEED Project (Yes/ No)	NTGR (all measures*)	NTGR (gas measures only)	Data Supporting Low Free Ridership	Data Supporting High Free Ridership
Systems	Y	1.00	-	The incentives assisted financially with the upgrades for the LEED project. The program helped refine an existing energy model.	None
Systems	N	1.00	-	The program mainly influenced the project through available incentive dollars.	None
Comprehensive	N	0.97	-	The program influence was very high. The program created a model and the incentives kept the equipment in the project.	Before anyone on the team knew about the program, the architect suggested the owner consider some efficiency measures.
Systems	N	0.80	-	Incentive programs have a general effect on prototypical design. The rebate agent scored the program 8 out of 10 for indirect influence.	In absence of the program, the same efficiency measures would have been implemented.
Systems	N	0.80	0.80	Incentive programs have a general effect on prototypical design. The rebate agent scored the program 8 out of 10 for indirect influence.	In absence of the program, the same efficiency measures would have been implemented.
Systems	N	0.80	-	Incentive programs have a general effect on prototypical design. The rebate agent scored the program 8 out of 10 for indirect influence.	In absence of the program, the same efficiency measures would have been implemented.

Track	LEED Project (Yes/ No)	NTGR (all measures*)	NTGR (gas measures only)	Data Supporting Low Free Ridership	Data Supporting High Free Ridership
Systems	Y	0.72	-	The program helped realize the LEED intention and reach a higher level of LEED; Several program-related items (e.g., incentive, information) had a 10 out of 10 level of influence on the program.	The new construction design was already finalized and we had a LEED Silver goal for the building before we started working with the program. The owner had a mandate to go "green" and wanted to save money and energy. Given these aims, the primary contact stated that there was an 8 in 10 likelihood that the project would have included the same level of energy efficiency in absence of the program.
Systems	N	0.70	-	Incentive programs have a general effect on prototypical design. The rebate agent scored the program 7 out of 10 for indirect influence.	In absence of the program, the same efficiency measures would have been implemented.
Systems	Y	0.67	-	The incentive "allowed the project go further" generally and helped the lighting design specifically. Helped realize LEED intention. The program was important in improving energy efficiency levels to meet a higher level of LEED.	The architects and engineers were responsible for the design and had intentions to make it become a LEED Silver project. Given these aims, there was a 7 in 10 likelihood that the project would have included the same level of energy efficiency in absence of the program.

Track	LEED Project (Yes/ No)	NTGR (all measures*)	NTGR (gas measures only)	Data Supporting Low Free Ridership	Data Supporting High Free Ridership
Systems	N	0.65	-	"We are aware that ComEd has these incentives so we are specifying from the beginning that efficient lighting has to be part of the projects." "The training and the availability of the incentives is what drives the efficient lighting."	The project was focused on a low-maintenance system and long-term cost – efficiency, which also drove the decision. Given these aims, there was an 8 in 10 likelihood that the project would have included the same level of energy efficiency in absence of the program.
Comprehensive	Y	0.58	-	"The incentives were an indicator that we had picked the right equipment and it made the project more cost effective…It clarifies for the owner that they are going to save money long term."	Owners had the intention to reach LEED; they wanted low-maintenance lighting and a low utility bill.

Track	LEED Project (Yes/ No)	NTGR (all measures*)	NTGR (gas measures only)	Data Supporting Low Free Ridership	Data Supporting High Free Ridership
Systems	N	0.52	0.07	We wanted to save energy costs "…and then when we saw that we could get some rebates on it, that made the decision a lot easier to spend the money to do it." The incentives helped keep most of the measures on the table. The overall design was influenced mostly by the electric rebate as opposed to the gas rebate since there were comparatively fewer gas incentive dollars. But gas incentives did encourage a "step up" in efficiency for one of the gas measures. The lighting measures "would not have happened without the (program)... When money is tight, the last thing you want to do is spend it on efficient lighting."	"To be really honest with you (the remaining gas measures) were in there from the beginning (of the project)... there was no big (gas) dollars for them."

Track	LEED Project (Yes/ No)	NTGR (all measures*)	NTGR (gas measures only)	Data Supporting Low Free Ridership	Data Supporting High Free Ridership
Comprehensive	Y	0.51	0.48	The owner had a goal of LEED Silver, but it lingered due to unknown feasibility. ECW provided good verification and validation of the models that were being developed and helped the project team understand feasibility with respect to cost. ECW influenced the selection of some measures; helped realize LEED intention; was important in improving energy efficiency levels to meet a higher level of LEED.	"The fact was we were already going down an efficiency path that aligned nicely with the program." "We were going to do it anyway, but the fact of the matter was... we looked at this program and receiving this nice check as an opportunity to allow us to do more things in the building for the employees." Given these aims, there was a 10 in 10 likelihood that the project would have included the same level of energy efficiency in absence of the program. The technical assistance was welcomed but mainly confirmed what was known.
Comprehensive	Y	0.38	-	The incentives were helpful and the extra set of eyes on the energy model was very important for validation and confirmation. The owner had a goal to meet a certain LEED level but the program helped the project figure out how to realize the goal.	There was a 10 in 10 likelihood that the project would have included the same level of energy efficiency in absence of the program.

Track	LEED Project (Yes/ No)	NTGR (all measures*)	NTGR (gas measures only)	Data Supporting Low Free Ridership	Data Supporting High Free Ridership
Comprehensive	Y	0.20	-	We had several meetings with ECW. Generally, ECW did not inform the (preexisting model) but they helped us evaluate and refine it. "ECW validated and supported our findings that we presented to our client."	Not much program influence --the engineering team brought in ComEd after the efficiency measure decisions had been made. "The money was a great feature but we were already onboard to be as efficient as we could so that the money was just an added perk from the program…" It did not keep things on the table… " They validated and supported our findings that we presented to our client…This was an unusual project because the owner was very motivated to demonstrate they could obtain LEED (level) and they tasked us with the best way to get there." There was a 10 in 10 and a 7 in 10 likelihood (two contacts were interviewed for this project) that the project would have included the same level of energy efficiency in absence of the program.
Systems	N	0.17	-	The incentives had a 5 of 10 level of influence on the project.	There was a 10 in 10 likelihood of having the same level of project efficiency in absence of the program.
Systems	N	0.02	-	The program influenced the overall project efficiency at a level of 5%.	Owner wanted the building to be as efficient as possible. There was a 10 in 10 likelihood that the project would have included the same level of energy efficiency in absence of the program.

Track	LEED Project (Yes/ No)	NTGR (all measures*)	NTGR (gas measures only)	Data Supporting Low Free Ridership	Data Supporting High Free Ridership
Systems	Y	0.01	0.01	The program influenced the overall project efficiency at a level of 2%.	There was very little influence of the program…the design was done, the LEED was all done, (participating in the program) was sort of an afterthought of looking for rebates to see what was out there." There was a 10 in 10 likelihood that the project would have included the same level of energy efficiency in absence of the program.
Systems	N	0.00	-	None	"We had had our plans more or less finalized and we were just hoping that we would get an award for the equipment we had designed in. …The speed of the construction project was such that we did not have the opportunity to go back and change anything; we saw (the incentive) as a reward for being a good corporate citizen…Whether the program existed or not, we would have had the same lighting fixtures."

**NTGR for all measures include both kWh and therm savings, calculated on an MBtu basis.*
Participant responses are paraphrased except where otherwise indicated by quotation marks.
As shown in Appendix 5.5.2 , the algorithm for calculating the NTGR consisted of several, mostly quantitative, responses. We selected the FR2 responses shown here since they provide a good overview of the general level of program influence on the decision-making around the measure selection.

Lower NTGR scores may be the result of program managers' long-term strategy for program growth. By working with some first-time participants who represent projects in which there is not much room for program influence, the program may rely on their future participation earlier in the design stage in which the program might have more influence.

3.1.7 Did the Program Meet Its Energy and Demand Savings Goals? If not, Why Not?

The program met its electric energy savings goals but not its therm goals. The program had no demand savings goals. A primary reason the program did not meet its therm goals is that there were far fewer ex ante gross therms (54,426 therms) than the GPY1 goal (189,000 therms). This could be due to the fact that the joint program is in its first year, and new construction projects tend to have longer lead times. One program manager indicated that the pipeline for GPY2 and GPY3 is already promising. Another reason the program did not meet therm goals is that free ridership was high among those projects with therm savings paid for by Nicor Gas incentives. For two of the four Nicor Gas projects for which the evaluation team completed NTGR interviews, the NTGRs for the gas measures were less than 0.10. In one case the participant stated that there were comparatively fewer gas incentive dollars available. In the second case, the participant was nearly a full free rider, having committed to the design prior to looking for available incentive dollars in the market. It is difficult to make conclusions about the therm NTGRs beyond these findings since there are so few data points to draw upon. Finally, there is some evidence (see section 3.2.3) that customer awareness of the gas incentives is low.

3.2 Process Evaluation Results

There are many themes to explore during a process evaluation. In this section, the evaluation team answers the six questions found in the evaluation plan[12] (see section 1.2.2) and makes associated recommendations. Additionally, the evaluation team reported on the perceived value of the program and participant satisfaction.

The findings throughout this section are based on in-depth interviews with three program managers, in-depth interviews with 20 program participants, and a focus group discussion with 10 active non-participants who have attended program trainings in the past, but had yet to be represented in a project submitted to the program at the time of the focus group recruitment. Since the evaluation team draws upon three sources and since the number of in-depth interviews with participants is small, the team does not provide statistics such as percentages or means. Instead, the team brings the three sources to bear on each topic and uses relevant quotes to illustrate the finding or to provide context. Further, when citing the participant interviews, we indicate the number of responses that are consistent with the finding and the total number of valid responses.[13]

---

[12] ComEd Nicor Gas New Construction Program Eval Plan 20120905.

[13] Although the evaluation team interviewed 20 respondents, the number of valid responses (i.e., excluding non-applicable and don't know responses) rarely reaches this number, mainly due to time constraints or topic applicability. Additionally, the number of responses is calculated at the project level. Thus, in some cases, when the same respondent represented multiple projects, his/her response could be counted more than once.

The topics presented in this section consist of high-level summaries and associated recommendations. The evaluation team provides in-depth discussion of these findings in section 5.2 . For more background on the recommendations, see the Appendix sections referenced in the parentheses within each recommendation. For a list of key process findings and recommendations, see section 4.2 .

3.2.1 Value of the Program

Finding: Participant feedback reveals that their experience with the program's administrative (i.e., application, verification, and incentive payment) and the technical assistance processes was very positive and satisfying. Participants find participating in the program valuable, mainly citing program incentives (9 of 15) and technical assistance (8 of 15) Focus group participants, who have not been on a project submitted to the program but who have attended program training, value the trainings, and find the program potentially valuable enough to warrant future exploration of it.

3.2.2 What Design or Implementation Changes Occurred in EPY4/GPY1?

Finding: During EPY4/GPY1, the implementation team continued to respond to challenges with timely and appropriate changes that support program development and success. In most ways the program was implemented as in prior years. However, there were two main changes: 1) creating the ComEd and Nicor Gas Joint Program; and 2) transferring industrial baseline analysis to ECW. Both EPY4/GPY1 changes have been implemented smoothly and effectively. The program is currently undergoing a major change in EPY5/GPY2 as it transitions to a single, performance-based track.[14]

- **Recommendation:** Because the program is changing to a single, performance-based track design and since the program has and will likely continue to claim savings for measures outside the scope detailed in the program operations manual, the evaluation team recommends careful consideration of program scope, use of appropriate baselines, and the documentation of all related decisions (see 5.2.2.3).

3.2.3 Is Program Awareness High?

Finding: The program appears to be performing outreach effectively. However, there is some evidence that customers are aware of utility incentive programs generally, but not aware of the New Construction Service program in particular. Also, customer awareness of the gas incentives is low. There may be some opportunities for improved targeting, especially among some professional associations. Among program participants, many (7 of 20) heard about the program through word of mouth within the industry, directly from program staff (6 of 20) or knew about the program as past participants, or rebate agents (7 of 20). Focus group participants knew about ComEd and Nicor Gas efficiency programs in general, but they were less aware of the New Construction Service program in

[14] In the current EPY5/GPY2, the program began to move towards a performance-based, single-track model, which is essentially the Comprehensive Track from EPY4/GPY1. This change will only affect new projects initiated in EPY5/GPY2. Systems Track projects in progress will still be completed in that track. The small business track that was added during EPY2PY2 contains challenging lighting and daylighting requirements for buildings under 20,000 square feet. Since its inception, there have been no participants in this track and it does not exist in EPY5/GPY2.

particular and could only list a few details. Interviews with program participants indicate that no one knew about the availability of incentives for gas savings when they first heard about the program. Among the focus group participants, only four of ten knew that ComEd and Nicor Gas offered a joint program. Over half of the program participants (9 of 15) knew about program training events from email and newsletters. All focus group participants have attended one or more of the trainings and generally value them. However, some believe it is important that the program offer more evidence for the quality and reliability of incented measures.

- **Recommendation:** Several recommendations are included to increase program understanding by adding to the program's website and developing program materials (see and 5.2.4).
- **Recommendation:** Promote the gas incentives and ensure that all marketing and program materials are prominently co-branded (see 5.2.3.2). Also, consider increasing the gas incentives since there is some evidence that they may be too low (see 5.2.2.1).
- **Recommendation:** Interviews with program participants and the focus group discussion indicate that the program should consider expanding its outreach efforts to include CoreNet and the Alliance for Environmental Sustainability (AES) and presenting case studies at monthly regional Illuminating Engineering Society (IES) meetings, which often look for guest speakers (see 5.2.3.3).

3.2.4 What are the Characteristics of the Customers and Program "Partners" (E.g., Design Professionals, Trade Allies, and Construction Companies) Participating in the Programs and What are Their Drivers and Barriers to Participation?

Finding: EPY4/GPY1 records show a continued increase in participant variety from earlier years. The program also derived more kilowatt-hour (kWh) savings per project than in EPY3. Most (9 of 15) program participants could not identify any drawbacks or barriers to participating in the program, citing a smooth process. Incentives were the primary motivator for their participation (15 of 17), while technical assistance was a secondary motivation (2 of 17). However, some participants came to value the technical assistance more once they gained program experience and fully understood the value the technical assistance offered. Focus group participants identified several key barriers and drivers that underscore the need for partner and customer understanding of the program. The focus group discussion also explored how to reach more potential participants. Generally, focus group participants agreed that there are some myths that keep many in the industry from participating in energy efficiency programs. They also cited instances of inertia within the professions and concerns for professional liability. Participants mentioned three sets of project types for which it is particularly difficult to integrate efficiency: "build and flips" and multifamily projects; restaurants, hotels, and any other project in which "the experience matters"; and small projects. They also identified three compelling marketing messages that mainly address understanding the financial benefits of participating in the program, understanding the program well enough to know whether it is applicable to their projects, and to be able to sell participation to owners and design team leaders.

- **Recommendation:** The focus group discussion uncovered many potential barriers and drivers for potential program participants in the design community (see 5.2.4). It also uncovered many concerns (see 5.2.6.3) and misperceptions (see 5.2.6.4 , 5.2.7 , and 5.2.4.4)

among the participants. To the extent possible, these should be addressed in the development of the program's website and materials. They can also be addressed in other ways. The evaluation team recommends that the program continue to focus on case studies that will inform and inspire the design community and one-pagers that designers can use for marketing to their clients. Additionally, developing a training webinar and program certification may also be a good strategy to inform designers and provide them a way to market themselves.

3.2.5 In What Ways Could More Projects Be Recruited into the Program Earlier in the Design Process?

Finding: Interviews with program participants and discussions with focus group participants indicate that the program appears to be performing outreach effectively and finding some ways to recruit projects earlier in the design process. Per program design, it is important for the program to reach projects as early in the design process as possible when the likelihood to have a high degree of influence on the projects is greatest. In order to build a pipeline of such projects for the future, program managers will sometimes accept projects that are in the later stages of design, believing that their investment in these projects with participants and partners will pay off as repeat participation at earlier points in the design process. There is some evidence that this strategy is working. When asked about a hypothetical instance of future participation, most participants state they would work with the program as early as possible (11 of 16[15]). All focus group participants also saw the value of working with the program early in the design process (see 5.2.5).

- **Recommendation:** LEED projects appear to be a good potential participant source for the program given their prevalence in the market and the potential for the program to help increase their efficiency. Yet focus group participants expressed apprehension that working with the program on these projects would amount to another set of onerous paperwork and administrative requirements (see 5.2.6.3). The program should address this concern on the program website, in program materials, and through the training webinar.

3.2.6 How Well Does the Program Design Integrate with Participants' Existing New Construction Processes?

Finding: The program implementation team has been focused on finding the best ways to work with project staff (i.e., participants and partners) given standard business and design practices and project timelines in the new construction industry. For program participants, it appears that the program is generally engaging project teams at the right time and in ways consistent with its design. Focus group participants, however, did express many concerns about how participation in the program might adversely affect their projects, including: impacting tight project timelines; creating onerous application requirements similar to LEED; and receiving incentives for LPD reductions as opposed to kWh saved through measures. The perception that the program competes with market actors who provide modeling does not appear to be a significant barrier.

[15] Four of those who did not state that they would work for the program as early as possible represented national customer projects.

- **Recommendation:** Focus group participants described cultural inertia within the industry that keeps some from embracing energy efficiency. They suggested that the program be marketed to groups of emerging professional groups, and to students as a way to help overcome the cultural inertia (see 5.2.4.6). Additionally, case studies, discussed elsewhere, are also likely to be a good way to overcome negative perceptions (see and 5.8.4).

3.2.7 How is the Program Preparing for the Adoption of IECC 2012 As the New Commercial Energy Code in Illinois?

Finding: As indicated above, the program is transitioning to a single, performance-based track in EPY5/GPY2, partially in response to the implementation of IECC 2012 in January 2013. The new code will create a more stringent baseline that raises the level of mandated efficiency above what is practical for the program to support through the current systems track measures. Instead, the program will focus solely on what has been the Comprehensive Track, replacing the baseline in the new calendar year. Since these changes do not amount to additions to program design, in EPY4/GPY1 the program team mainly prepared by honing the marketing and outreach messaging they will use in EPY5/GPY2. Some focus group participants believe that IECC 2012 codes will require a level of efficiency that will be impossible to surpass significantly.

- **Recommendation:** Several recommendations are included to increase program understanding by adding to the program's website and developing program materials (see and 5.2.4).

3.2.8 Are There Potential Market Effects from the Program?

Finding: The program is likely building energy efficiency knowledge in the market, especially among the market actors who participate in the program and among the market actors who attend trainings. However, it is less certain that the program is having a sustained effect on energy-efficient new construction practices beyond the projects that are recruited into the program. Instead, LEED and utility incentive programs in general are likely most responsible for affecting energy-efficient new construction practices. With these other influences, it would be difficult to parse the effects of the New Construction Service.

3.2.9 Program Theory

The evaluation team created a simplified logic model and program theory description based on ECW's more extensive logic model provided in EPY3. PY3. The program theory description and logic model were provided in a memorandum to the utilities in June 2012. This memo can be found in Appendix 5.7 .

4. Findings and Recommendations

This section highlights the findings and recommendations from the evaluation of the EPY4/GPY1 Non-Residential New Construction Service. Our research finds that the implementation team is running the program well. The implementation team continued to handle challenges well, mainly through refining program focus and taking timely, appropriate steps to support the program. Customers are satisfied and find value in the program. Below are the key conclusions and recommendations.

4.1 Key Impact Findings and Recommendations

The key impact findings and recommendations relevant to electric and gas savings are presented separately below. In addition, overarching impact findings and recommendations are presented at the beginning of this section.

4.1.1 General Findings and Recommendations

Finding: In EPY4/GPY1, there were 50 total projects for which incentives were paid out and ex ante savings reported. The breakdown of projects includes 44 systems track projects and six Comprehensive Track projects.[16] Twenty-two projects were assessed, 16 systems track projects and six Comprehensive Track projects. A comprehensive table in the Appendix (see Table 5-6) shows the ex ante gross savings and evaluation-adjusted gross savings by project, including individual project realization rates, for the sampled projects.

Total evaluation-adjusted gross and net savings are shown in Table 4-1. While our impact analysis did not reduce the program's gross energy savings much overall, the NTGRs continue to significantly reduce the program's net savings estimates. Based on our evaluation of individual projects, relatively few projects with high free ridership had a significant impact on the overall NTGR.

[16] The program tracking database originally showed seven comprehensive projects, but we later found one to have been incented as a systems projects and report it as such here.

Table 4-1. Program Gross and Net Impacts

	Ex Ante Gross	Evaluation-Adjusted Gross	Gross Realization Rate	Evaluation Net Savings	Net-to-Gross Ratio (applied to evaluation-adjusted gross savings)
MWh	20,748	18,200	87.9%	10,400	0.57
MW	3.409	2.93	85.9%	1.61	0.55
Therms	54,426	64,400	118.3%	21,300	0.33
MBtu (verified)	76,235	68,700	90.1%	37,600	0.55
MBtu* (researched)	76,235	68,300	89.6%	39,700	0.58

Source: ComEd PY4 Ex Ante Table, evaluation team analysis
** MBtu values are calculated by applying conversion factors to the ex ante MWh and therm values. Verified MBtu were calculated using verified electric Systems Track parameters, Research MBtu were calculated using research results only.*

- **Recommendation:** Given the instances of free ridership identified, the implementation team should review, possibly further develop, and document its free-rider screening process for potential projects. The program's operations manual indicates that the program screens for free riders but the evaluation results indicate that there are a few free riders participating in the program. For projects that the program touches early, implementation staff should consider customers' preexisting level of commitment to efficiency. If commitment is high, it is unlikely to score a high NTGR unless the participant is able to identify the ways the final efficiency would be different in absence of the program. If the program becomes involved with projects after design is complete, implementation staff should ask how the program can leverage further efficiency. If participants indicate that the design is set, the NTGR is likely to be low. Even if the design includes high-efficiency equipment, the participant may just be looking for an "award" for what will be done anyway.

4.1.2 Electric Savings

Finding: As shown in Table 4-2, the EPY4 program garnered nearly twice their original net electricity energy savings goals of 5,502 MWh. While there were no specified demand savings goals, the program also realized 1.61 kW of peak demand savings.

Table 4-2. Program Net Impacts Compared to Target - ComEd

Net Savings Estimates	MWh	MW
ComEd Plan Target	5,502	0
ComEd Reported for EPY4	12,449	0
Total EPY4 Evaluation-Adjusted Net Savings	10,400	1.61
Net Savings as Percent of Target	189%	NA

Source: ComEd PY4 Ex Ante Table, evaluation team analysis

Finding: When comparing the ex ante electric savings (i.e., the results expected by the program from the 49 projects before any adjustments) to the evaluation-adjusted gross savings, the evaluation analysis reduced the gross impacts by 11.7% followed by a reduction from the NTGR (Table 4-1).

Finding: Differences in lighting operating hours is the primary reason for the evaluation reduction in estimated ex ante gross savings. Lighting operating hours are a difficult parameter to establish, as self-reported operating hours are often estimated before a facility's final operating hours are established. Self-reported numbers may not account for time for start-up and closing time, holidays, lights that customers have turned off, spaces that operate on a different schedule than the majority of the building, and other factors that would influence the overall hours. This was particularly apparent in retail stores and hospitals. Both building types were found to contain several different lighting schedules. Deli and liquor areas of grocery stores had different lighting schedules than the overall business hours of the grocery store. Also, these buildings often had overnight operation to stock shelves and/or clean. Similarly, hospitals and other medical facilities that operate 8,760 often have lab and office space that is significantly less utilized than is assumed using the building operating hours.

- **Recommendation:** Ensure that the hours of operation are representative of the lighting hours of operation and not the facility business hours.
- **Recommendation:** If a building includes space types with dramatically differing schedules, input these spaces individually into the workbook in order to more accurately reflect overall facility lighting operation and savings.

Finding: Occupancy and daylighting controls were found to be in place at several facilities that had not received rebates for these measures. In these cases, the metered lighting hours of use were below the level that would have occurred absent of the daylighting and occupancy controls. In these cases, savings were based on what the hours of use would have been in the absence of the controls.

Finding: Due to much of the HVAC equipment not operating at a significant load condition at the time of the evaluation, the evaluation team used customer interviews to verify the HVAC operation. Interviews were used to verify that the customers operated and controlled the equipment in a manner typical of the type of facility. Based on the customer interview, one site had the operation of several of the HVAC units set to zero. The facility was a medical facility and was required to have

redundant HVAC systems. In addition, the customer had installed significantly more chiller capacity than would be required for the existing building, due to planned future expansion.

Finding: A systems track chiller project was completed using a custom calculation rather than using the workbook template. This project used eQuest to determine the chiller operating hours for the facility. This was then multiplied by the chiller capacity and the kW/ton savings. This dramatically overestimated the savings, as the chiller is not expected to operate at full load during all hours of operation. The evaluation team used the model provided to determine the effective full load hours.

Finding: Although the general approach for the compressed air projects was found to be reasonable, both compressed air projects had the savings levels reduced due to calculation errors in the original analysis. Specifically, for both projects, the calculations did not accurately reflect the information on the provided compressor CAGI sheets for either the baseline or installed compressors.

- **Recommendation:** If compressed air projects and other custom projects are to be included in the New Construction Service program, continue to develop templates and other tools to reflect the behaviors of these types of equipment to minimize error.
- **Recommendation:** Develop a more formal protocol for reaching out to the evaluation team when the implementation team encounters large projects with uncertain baselines or projects where low attribution seems likely. This could reduce the number of projects with very low or high realization rates as well as projects with low net-to-gross ratios.

4.1.3 Gas Savings

Finding: The program garnered nearly 15% of the therms savings goal for GPY1.[17]

Table 4-3 . Program Net Impacts Compared to Target - Nicor Gas

Net Savings Estimates	Therms
Nicor Gas Plan Target	151,200
Nicor Gas Reported for GPY1	32,656
Total GPY1 Evaluation-Adjusted Net Savings	21,300
Net Savings as Percent of Target	14%

Source: Nicor Gas Ex Ante Table, evaluation team analysis

Finding: The gas side of the program had a gross savings realization rate greater than 100% but a low net-to-gross ratio. The NTGR was 0.33 for the program with a range of 0 to 0.80. In GPY1, there were only seven projects that received Nicor Gas incentives. Five projects comprised the evaluation sample, but one project personnel did not participate in the NTGR interview. When there are so few projects, the values shown in Table 4-1 often do not provide indications of what could occur in the

[17] Gas portfolio goals are established on a three-year basis.

future. The evaluation team also observed that since the gas incentives were new, many participants did not learn about them as early in the design process. This contributed to low NTGR values.

- **Recommendation:** Continue to aggressively promote gas incentives so that participants in Nicor Gas' service territory are aware of them early in the design process.
- **Recommendation:** Consider increasing gas incentives so that the incentive per MBtu is more equal across electric and gas measures.

Finding: For ERVs, DCV, window, and insulation measures, the gas savings are calculated using an 8,760 analysis, where the heat transfers and loads are calculated using TMY3 data. The evaluation team found the 8,760 analysis to be reasonable and appropriate; however, the team adjusted some inputs to the analysis. Specifically, for windows, some projects assumed a balance point of 50°F or lower for the shell zones. This may be an appropriate balance point for the building as a whole, in some cases; however, if the facility has external zones, such as offices, these spaces will require heat at much higher temperatures. The low assumed balance point resulted in gas savings being underestimated.

Finding: For projects with ERVs or DCVs, the economizer was assumed to be operating to an outdoor air temperature of 35°F in many cases. This resulted in no savings being claimed for hours above that temperature. This appeared excessively low, as many facilities require heating at much higher temperatures than 35°F. Again, this low temperature setting resulted in savings being underestimated.

- **Recommendation:** Review balance temperature and economizer operation assumptions and ensure that they reflect building characteristics. If a building has an abnormal balance temperature, clearly document justification for the change.

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

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

Finding: One project included the installation of a condensing boiler. Upon inspection, it was determined that the boiler did not serve HVAC loads, but instead was only used for ice-melting. A custom calculation would have been more appropriate for this project.

- **Recommendation:** Carefully review applications to ensure that custom calculations are used for systems that are not used for typical heating purposes.

4.2 *Key Process Findings and Recommendations*

The key process findings and recommendations presented in this section are relevant to both gas and electric program activities and are organized by topic.

4.2.1 Implementation

Finding: Program managers have been successful in meeting EPY4 energy goals, but not GPY1 energy goals.[18] They have responded to implementation challenges in an appropriate and timely manner and have continued to recruit a wider variety of participant types into the program.

- **Recommendation:** To increase likelihood of achieving gas savings goals, continue to promote gas incentives to raise awareness and recruit more gas participants. The program should also consider increasing gas incentives, as discussed in below.

Finding: Participants are generally satisfied or very satisfied with the program and find it valuable, both for the available financial incentives and the technical assistance received through ECW. Even though LEED participants generally had existing intentions to meet increased, above-code efficiency levels, all benefited from working in collaboration with ECW staff to meet their goals.

4.2.2 LEED Projects

Finding: A relatively high proportion of projects in our EPY4/GPY1 sample are LEED projects (8 of 19 projects). This is consistent with focus group participant statements about the prevalence of LEED projects in the new construction market. Focus group participants state that projects in the non- profit and education sectors are much more likely to be built to LEED standards. These participants stated that about 85% of their projects are focused on LEED certification or otherwise focused on designing to the standard. Projects occurring outside of these sectors are less likely to focus on LEED. The main concern participants have about program alignment with LEED is that participating in LEED requires many administrative hours for paperwork and they worry that working with the New Construction Service may require similar amounts of paperwork. To this end, participants wanted to know if they would be able to submit the energy model they used for LEED to the program.

The program should take advantage of the prevalence of LEED projects by recruiting these projects into the program, but also needs to be careful when considering possible NTGR scores for these projects. Here several recommendations are listed for LEED projects, some of which also appear under other recommendation entries:

- **Recommendation:** Create LEED–specific, one-page fact sheets outlining the ways the program can enhance the efficiency on these projects (see 4.2.5).

[18] Some of this year's shortfall may be due to the fact that gas incentives were a new offering: given the long lead time of new construction projects, many pipeline projects completed in GPY1/EPY4 may have been past the point of adding new measures and many new projects with gas measures were not completed by the end of the first year.

- **Recommendation:** Create a message that highlights: 1) the design team can submit existing LEED design plans; 2) program incentives help decrease first costs to ensure that high-efficiency design and equipment are implemented; and 3) past design participants find the program's review of LEED design valuable for helping to find ways to realize LEED goals and for the "extra set of eyes" the service provides.
- **Recommendation**: Look for ways to increase building envelope efficiency. Focus group participants noted that LEED does not have rigorous building envelope requirements. This suggests that this is one area where the program can particularly influence building efficiency in LEED projects.
- **Recommendation:** To maintain a high NTGR score, understand the efficiency intention in the project. Will the incentives or the TA actually increase or maintain high levels of efficiency? Or is design set and there is little or nothing that will be changed? Ask the design team what role the incentives will play on the project. Will they support efficiency? Or will they act as an award for an existing plan? (see 4.1.1)

4.2.3 Clarify Program to Potential Participants

Finding: Overall, participants indicated they need more clarity on program processes and one mentioned that the program website was not helpful in answering his immediate questions. Although the program consistently encourages potential participants to contact ECW staff immediately, it is clear that some potential participants may be more likely to do so if they first determine the program applies to them.

- **Recommendation:** Create frequently asked questions (FAQs) to post on the website. The following is one example of a question and answer that would likely encourage visitors to the website to consider participating in the program more seriously. A list of several others is included in Appendix 5.8.4 .
    - Isn't there a learning curve to this program, such that participating in it and learning how to benefit from it, will only be worth it if I participate across several projects?
        - No, you can still benefit greatly from this program by submitting just one project. This is because the program team becomes your collaborator and uses its extensive knowledge of past projects successes to see how your project can be supported. While you may have participated in 0 projects, ECW staff has nearly 100 completed projects to draw on when giving you advice as to how to best use the program.

Finding: Focus group participants want more information about the program and want to understand how they can use the program to benefit their projects. They need the information before they start working on a particular project so that they can offer concrete ideas to the project team during the early design. Further, some participants suggested that with a program certification (e.g. "design ally") they could promote themselves and the program in the market.

- **Recommendation:** Create and use a webinar to train designers, increase their understanding of the program, and provide them a marketing tool. The webinar should address the many concerns (see 5.2.6.3) and misperceptions (see 5.2.6.4 , 5.2.7 , and 5.2.4.4) the focus group

participants described. The program should also consider clarifying the LPD requirements and their relationship to kWh in program training efforts.

4.2.4 Case Studies

Finding: Focus group participants suggested that case studies are a good way to describe the potential program benefits for projects similar to those they are working on.

- **Recommendation:** Strengthen efforts to promote existing case studies and develop new case studies. Continue developing case studies and disseminating them to the design community. Participants mentioned that actual examples of projects describing the capital costs, rebates, and energy cost savings associated with the efficiency measures would be especially effective. To alleviate concerns about liability and poor performance, case studies should include quotes from leading designers to help motivate designers to participate in the program and show them that their peers accept energy-efficient measures (EEMs) and design. They could also include quotes from past participating designers—derived from evaluation in-depth interviews— explaining that it was valuable to have "an extra set of eyes on/sanity check for the energy model I had already developed for a project."
- **Recommendation:** Expand upon the completed project types as found in the program overview sheet found at https://www.comed.com/Documents/business-savings/NC_Overview.pdf. Case studies of projects in which the "experience counts" such as restaurants and hotels will likely be necessary to persuade some lighting designers of the feasibility and proven nature of efficient lighting design.
- **Recommendation:** Consider presenting case studies at monthly regional IES meetings, which often look for guest speakers. In the focus group discussion, a lighting designer suggested that the program present case studies at monthly, regional IES meetings, which look for guest speakers.

4.2.5 One-Page Program Descriptions Targeted to Different Audiences

Finding: In the focus group discussion, designers requested that they have a one-pager to pass out at early design meetings to introduce the possibility of program participation.

- **Recommendation:** Create one-page descriptions of the program aimed at specific target audiences. One should be primarily targeted to the owner/developer group but also be available to those in the design group. It should offer a basic description of the program, benefits, and an outline of a past project. Another could be targeted to projects that are already intending to incorporate some high-efficiency design (e.g., some LEED projects). The sheet should cover some key points participants noted in the discussion: 1) the program aligns with and supports high-efficiency project design; 2) program incentives help ensure that high-efficiency design and equipment are implemented; 3) participating in the program does not require a lot of paperwork, and 4) the program encourages the submission of existing models and documentation. To maintain a high level of program attribution, the sheet should also make clear that the purpose of the program is to help projects maintain plans for or incorporate levels of energy efficiency over code through incentives and design

assistance, but not award projects monetarily for pro-efficiency decisions that have already been incorporated.

4.2.6 Outreach to New Market Actors

Finding: Focus group participants cited various forms of resistance to increased efficiency within the non-residential new construction industry. As a way to help overcome the cultural inertia, some participants suggested that the program be marketed to groups of emerging professional groups, and to students.

- **Recommendation:** Reach out to newer professionals and students in the industry to help introduce the program to more market actors. The influx of newer designers who are aware of efficiency opportunities could help change some of the conventional inertia in the industry that overlooks, undervalues or does not understand building efficiency.

4.2.7 Outreach to Additional Organizations

Finding: Program participants and focus group participants identified additional organizations for outreach.

- **Recommendation:** The implementation team likely has a good understanding of its marketing effectiveness across the many professional organizations it already targets. Per its discretion, it should consider expanding outreach efforts to the following organizations:
  - CoreNet—This is an association of corporate real estate professionals, workplace professionals, service providers, and economic developers.
  - Alliance for Environmental Sustainability—The program participant who suggested AES acknowledged that AES formerly had much more of a residential focus but has now expanded its focus in recent years and therefore may be an appropriate outreach target for the program.

4.2.8 Provide Evidence for Measures in Trainings

Finding: Focus group participants expressed concern about high-risk and untested technologies, which they partially associate with the program since they may have encountered them in the program's training. For example, some lighting designers are concerned that efficient lighting design could make them liable for building user injury and that efficient lighting design might undermine aesthetic quality to which these designers are professionally committed. Similarly, participants from the HVAC industry noted that if CO_2 sensors for efficient demand control ventilation were to fail, they could become liable for the resulting lack of fresh air and uncomfortable space for the inhabitants.

- **Recommendation:** Incorporate evidence into trainings and program materials that support the feasibility of efficiency measures or designs. New Construction Services training materials and trainers should cite professional associations' literature where possible. Webinar trainings and the FAQ on the program's website should also address these concerns.

4.2.9 Promote Gas Incentives

Finding: Both focus group participants and program participants gave strong, positive responses to the program's inclusion of gas incentives, but gas participation this year was low.

- **Recommendation:** Ensure that all marketing and program materials are prominently co-branded to increase awareness of gas incentives. This will help attract more participants who are considering high-efficiency gas equipment.

4.2.10 Consider Increasing Gas Incentives

Finding: One program participant described the gas incentives as "pretty minimal" when compared to the electric incentives. Also, one program manager agrees that the perception of the gas incentives is that they may be low compared to other gas measure incentives that are about twice that of those in the New Construction Service. The evaluation team confirmed that gas incentives in neighboring utility territory were substantially higher.

- **Recommendation:** The program should review the gas incentive rate and investigate whether they are high enough to maintain participation and achieve program goals.

4.2.11 Review and Document Expanded Program Design

Finding: The program's move toward a single track may increase the kinds of measures that are eligible for incentives as a result of project-specific modeling that is a part of this track.

- **Recommendation:** While expanding the measures that can be included in the program may be good for both the program and its participants, the team recommends careful consideration of program scope, use of appropriate baselines, and the documentation of all related decisions. The program's operations manual, section 4.5 "Project Eligibility Requirements and Acceptance Guidelines", focuses the program's scope on changes made to the building envelope, HVAC, and lighting systems, without mentioning industrial process equipment. For identifying building efficiency baselines in EPY4/GPY1, the program used IECC Illinois Energy Conservation Code for Commercial Buildings, which referenced 2009 International Energy Conservation Code (IECC 2009) and allowed for ASHRAE 90.1 – 2007 as an alternate compliance method. Yet, in EPY4/GPY1 the program had to reach outside of this framework to establish and document the baseline for some industrial process measures. If the program continues to grow outside the scope described in the operations manual, the evaluation team recommends that the implementation team document the changes and the rationale for them, including noting changes to scope and providing the rationale for alternative baselines selected to compensate new project types.

5. Appendix

5.1 Glossary

High-Level Concepts

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.

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 Interstate Commerce Commission (ICC). The gas utilities agreed to use the parameters defined in the technical reference manual (TRM), which came 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	Verification and Research	1 – Free Ridership + Spillover	NTG, Attribution
2	Net Savings	Verified net savings	Verification	Verified gross savings times NTGR	Ex post net

N	Term Category	Term to Be Used in Reports‡	Application†	Definition	Otherwise Known As (terms formerly used for this concept)§
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 Commonwealth Edison's (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.[19]

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

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

> **Measure Level Research**: An evaluation process that takes a deeper look into measure level savings achieved through program activities driven by the goal of providing Illinois-specific research to facilitate updating measure-specific TRM input values or algorithms. The focus of this process will primarily be driven by measures with high savings within Program Administrator portfolios, measures with high uncertainty in TRM input values or algorithms (typically informed by previous savings verification activities or program-level research), or measures where the TRM is lacking Illinois-specific, current or relevant data.
>
> **Program-Level Research**: An evaluation process that takes an alternate look into achieved program-level savings across multiple measures. This type of research may or may not be 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

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

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 Process Results

The detailed process results presented in this section are primarily based upon our focus group with active non-participants and upon our in-depth telephone interviews with the program manager, implementation contractor, and program participants.

5.2.1 Value of the Program

5.2.1.1 Participant Feedback

As in previous years, EPY4/GPY1 participants had a very positive experience with the program. Every aspect participants identified as valuable in EPY3, they also identified as valuable in EPY4/GPY1. These include the program incentives (9 of 15), technical assistance (8 of 15), and, to a lesser extent, training (2 of 14, since very few participants had attended any program training). Participant feedback reveals that their experience with the program's administrative processes (i.e., application, verification, and incentive payment), was very positive. Many participants also stated that Energy Center of Wisconsin (ECW) staff were extremely helpful throughout the participation process (14 of 15) and were knowledgeable about energy-efficient design (12 of 12). Finally, nearly all participants (15 of 17) rated the program very highly in overall satisfaction,[20] which program managers indicated helps encourage past participants to participate again.

The following are quotes from participants reflecting their positive experience across the major aspects of participation.

Application:

They did a good job of educating me on the program. –Program Participant

From an administrative process perspective, the program is doing as well as it can. –Program Participant

(The program application was) actually pretty easy and the guys that I worked with at (ECW) were very helpful. –Program Participant

Technical Assistance:

(The technical assistance was) fantastic. –Program Participant

I know our engineers interacted with the ECW representative and that was really helpful. They were appreciative of being able to talk through decisions. That relationship worked really well. –Program Participant

(The technical assistance was) good for verification and validation of (our project's) energy model. –Program Participant

[20] i.e., participants scored the program a 9 or 10 on an overall satisfaction scale where 0 is 'not satisfied at all' and 10 is 'extremely satisfied'.

We got an extensive report showing other energy efficiency opportunities and passed these along to the owner who is considering implementation for the future. It was good PR for both ComEd and (us) the designer. (paraphrased) –Program Participant

(ECW staff) were very knowledgeable… (they) supported us because we were going out on a limb with some of (the energy-efficient design). –Program Participant

Incentives:

The incentives were an indicator that we had picked the right equipment and it made the project more cost effective… It clarifies for the owner that they are going to save money long term. –Program Participant

The money was helpful… it kept designs on the table. –Program Participant

5.2.1.2 Non-Participants

Focus group participants had not participated in the program at the time of recruitment but had attended trainings. Participants value the trainings, with one stating that they were "well worth the time and money." Overall, the focus group participants found the program potentially valuable enough to warrant future exploration, yet they also identified several concerns explored below. Three of the ten participants had discussed projects with ECW but so far have not participated in the program. All three indicated that they had an overall positive experience with ECW and that the staff was helpful. One participant extrapolated from the assistance they had received to date to state that the program would likely provide program participants with what they need:

If you go to ECW, then they'll teach you ([how to participate in the program and how to design in efficiency]) as you go through the project. –Focus Group Participant

5.2.2 EPY4/GPY1 Implementation Changes

5.2.2.1 ComEd and Nicor Gas Joint Program

In the fall of 2011, ComEd and Nicor Gas began the joint form of the New Construction Service program. The rationale included: 1) the extensive overlap of the utilities' service territories[21]; 2) minimizing possible confusion in the marketplace by maintaining one New Construction Service program that could offer incentives for both fuel type measures instead of two separate programs; and 3) taking advantage of the design and implementation successes the ComEd-only New Construction Service had established in prior years. In the joint version of the program, incentives became available for various natural gas measures in the System and Comprehensive Tracks. Additionally, the implementation team modified the marketing and outreach materials to incorporate

[21] One program manager indicated that about 70% of ComEd's service territory overlapped with Nicor Gas'.

Nicor Gas and announced the joint program through various outreach activities. Finally, the implementers chose to keep a single application to minimize the burden on participants.

All program managers interviewed believe the transition to the joint program was smooth and the program is being implemented well. ECW provides weekly update reports to ComEd and the Wisconsin Energy Conservation Corporation (WECC)—the Nicor Gas administrator—which helps to keep all parties up to date. Most importantly, program managers believe that expanding the set of measures and incentives is a good way to attract customers and is consistent with the holistic approach of the program. Summarizing the transition, one program manager stated:

I think it has gone very well overall… I think it helps having a joint program; it reduces confusion. It is one message. I think it makes it easier on the design team and ultimately the building owner. Process wise, I don't think it's been a challenge… –Program Manager

Based on interviews with program participants and focus group discussions with active non-participants, customers believe that offering gas incentives alongside electric ones in one program will benefit them and their projects. Focus group participants believe the joint program will prevent skewing toward electricity savings. One focus group participant stated that it would give designers "more options," that they "would not be pushed into a corner," and that it "opens it up for designers".

Participants interviewed appreciated the addition of gas incentives to the program as well. They found participating in the joint form of the program simple and valuable. However, one participant described the gas incentives as "pretty minimal" when compared to the electric incentives. One program manager agrees with the perception that gas incentives may be low compared to other gas measure incentives, which are about twice that of the New Construction Service. There was one example of a higher rate for gas replacement boilers in Ameren Illinois Company's (AIC's) Business Program: at 90% efficiency or better and at 300 kBtuh size or more, the incentive starts at $1,200,[22] compared to the New Construction Service starting incentive of $300. Further, the AIC Custom Business program offers $1.20 per therm saved[23] compared to the $0.50 per therm saved in the New Construction Service. Nicor Gas' own Business Custom program offers therm incentives of $0.75 per therm saved to $1.00 per therm saved. The program manager points to the cost of the technical assistance as one reason that the New Construction Service does not offer higher gas incentives, but as this does not appear to be reflected in the electric incentives,[24] there may be other factors.

---

[22] See page 10 of the "Standard HVAC/Water Heaters Application" retrieved from http://www.actonenergy.com/portals/0/business/forms/PY5-hvac.pdf on 11/10/2012.
[23] See page 1 of the "Custom Application" retrieved from http://www.actonenergy.com/portals/0/business/forms/PY5-custom.pdf on 11/10/2012.
[24] Comparing electricity incentives across the New Construction program and the AIC Custom program shows that the incentives are roughly comparable. AIC Custom lighting project incentives are $0.06/kWh saved/year and non-lighting project incentives are $0.08/kWh saved/year. Since the higher New Construction $0.10/kWh incentive for all kWh-saving projects is not triggered until the project exceeds the IECC code by 10%, the two programs may be incenting their markets at comparable levels for total kWh/$.

The benefits of a holistically focused, joint gas/electric program also present a challenge for the program in the form of interactive effects resulting from energy-saving design. For example, efficient lighting can reduce the amount of waste heat in a conditioned space such that more natural gas may need to be used to heat the space. Program managers report that the utilities understand this approach is beneficial to their customers and that it is consistent with the program design.

The program has been designed to assess these interactive effects through energy modeling afforded the Comprehensive Track projects. The energy models allow the interactive effects to be properly quantified and documented. Because energy models are not typically used in System Track projects, the interactive effects are not documented. One program manager explained the program team's awareness of this issue and how they expect it will be resolved in PY5:

(Some) times you will see certain measures reduce the savings from gas or gas measures reduce the savings for electricity. So keeping that interactivity plugged in has been a focus this year…. This year we are in quick start mode and recognized a lot of these issues but because the way the program was set up into a Systems Track and a Comprehensive Track made it a little difficult to get all those interactivity things documented … And really only the comprehensive approach was capturing that interactivity. So we are moving toward that model next year for all projects. –Program Manager

5.2.2.2 Transfer of Industrial Baseline Analysis to ECW

In previous program years, ComEd had performed the baseline analysis for industrial projects in the New Construction Service program. ComEd had developed a methodology for estimating industrial project baselines for their Custom Incentives program. This approach caused confusion and additional work for industrial participants, who had to work with both ComEd and ECW in their application process. In EPY4/GPY1, ECW engineers began using ComEd's industrial baseline approach in-house, eliminating the need for customers to work with both entities. Consistent with this rationale, program managers confirmed that the change has eased participation and allows for more efficient implementation.

It has been easier… Having one engineer in ECW do the analysis for the whole facility has been awesome. There is no explaining or back and forth between customer you have to provide this, this and this for Custom and this and this for New Construction. They just provide one set of documents to one person. So process wise it has been great. – Program Manager

5.2.2.3 Single, Performance-Based Track in EPY5/GPY2

In the current EPY5/GPY2, the program began to move towards a performance-based, single-track model, which is essentially the Comprehensive Track from EPY4/GPY1. This change will only affect new projects initiated in EPY5/GPY2: Systems Track projects in progress will still be completed in

that track.[25] Program managers provided several reasons for this change including: 1) responding to the much more stringent International Energy Conservation Code (IECC) 2012, which would otherwise have eliminated a large portion of savings produced through the Systems Track; 2) reducing customer confusion and limiting paperwork by offering a seamless approach; and, 3) allowing ECW to provide the amount of technical assistance appropriate for a project instead of setting out track-based rules for levels of technical assistance. As the program moves into EPY5/GPY2 and focuses on a single-track approach, it is becoming increasingly selective of projects to favor those earlier in the design process—a strategy detailed in more depth in 5.2.5 .

The move toward a single track may increase the kinds of measures that are eligible for incentives as a result of project-specific modeling. One program manager explained this outcome as follows:

By taking a comprehensive approach, i.e. doing an energy model, we have a lot more opportunities to pursue different custom measures depending on the project…– Program Manager

This outcome is relevant to what two participants expressed should change about program design: the program incentives should cover more types of equipment (e.g., high-efficiency refrigeration). Notably, these participants represented Systems Track projects for which measure-type selection is more limited than for those projects receiving incentives through the Comprehensive Track. When the program transitions to a single-track program, this issue may diminish substantially. While expanding the measures that can be included in the program may be good for both the program and its participants, the evaluation team recommends careful consideration of program scope, use of appropriate baselines, and the documentation of all related decisions.

5.2.3 Program Awareness

5.2.3.1 Means and Degree of General Program Awareness

Program participants cited three main ways they heard about the program: 1) some heard about the program from other market actors in the industry such as the engineers or contractors working on the project with them (7 of 20); 2) some also heard about it from program staff (e.g., lunch and learns, trainings, and presentations) (6 of 20); and 3) some knew about the program as past participants, or rebate agents (7 of 20).

Focus group participants knew about ComEd and Nicor Gas efficiency programs in general; however, they were less aware of the New Construction Service program in particular and could only list a few details, even though they had attended New Construction Service program trainings in the past. Generally, they knew that rebates/incentives are available for lighting and HVAC efficiency improvements, and a few also knew that there is technical assistance available. But overall, most

[25] The small business track that was added during PY2 contains challenging lighting and daylighting requirements for buildings under 20,000 square feet. Since its inception, there have been no participants in this track. This track does not exist in EPY5/GPY2.

participants could not distinguish the program from other "ComEd's Smart Ideas" business programs.

5.2.3.2 Awareness of Incentives Available for Gas Savings

Interviews with program participants indicate that no one knew about the availability of incentives for gas savings when they first heard about the program. Instead, participants described a gradual awareness of this program offering either as a result of participating in a project that also qualified for gas incentives or as a result of outreach by ECW staff informing them of gas incentives. Among the focus group participants, only four of the ten knew that ComEd and Nicor Gas offered a joint program. One person had heard about the joint program from ECW staff.

One gas and electric participant also noted that ECW pointed out measures that they already had in the building plans which would qualify for gas savings. While this approach will be useful in making participants aware of gas incentive opportunities, if such measures are already in participants' plans there may be high free ridership associated with these savings.

5.2.3.3 Outreach Methods

Interviews with program participants and discussions with focus group participants indicate that the program appears to be performing outreach effectively, but there may be some opportunities for improved targeting, especially among some professional associations.

The evaluation team asked focus group participants to discuss the best media for getting the attention of individuals in the building design and development industry. As past training attendees, all participants should be receiving periodic email from the program. When asked if they have seen any email coming from ECW and the program, most responded they had. In a follow-up question as to how many open and read the program email, four of the ten replied in the positive, with one calling them "absolutely worthwhile" and "good for me".

The evaluation team asked the focus group participants to review a list of owner- and designer-oriented professional associations whose members the New Construction Service program has contacted for outreach purposes. All participants were members of at least one association but were able to suggest one additional association that the program should contact to possibly reach their colleagues and peers:

- CoreNet - This is an association of corporate real estate professionals, workplace professionals, service providers, and economic developers.
- Among the program participants interviewed, many identified increasing awareness of the program as a way to either improve the program or as a way to engage industry peers earlier in the pre-design phase. However, only a few offered any specific suggestions.
- Alliance for Environmental Sustainability - The participant making this suggestion acknowledged that AES formerly had much more of a residential focus but has expanded in recent years.

- American Institute of Architects (AIA; the program already targets)
- American Society for Healthcare Engineering (ASHE; the program already targets)

5.2.3.4 Awareness of Training

Over half the program participants (9 of 15) knew about program training events from email and newsletters. Only a few of the participants (3 of 17) have ever attended any program training sessions. The main reasons for not attending trainings included being too busy or being located too far away.

All focus group participants had attended one or more of the trainings and valued them. One of these active non-participants stated they were "well worth the time and money." The response among those who attended an eQuest software training was particularly positive.

A few of the lighting professionals who attended the lighting trainings, however, characterized the tone of the information as "unproven but exciting." These participants stated that the evidence presented at these trainings for the lighting measures and design was not sufficient, especially in regard to color temperature and visual acuity. They doubted that the technology or the design could be implemented as well as described at the training and they are not sure if the technologies are widely accepted by others in the market.

There were two further points of concern for these participants. First, they are concerned that they would be held liable for an unproven but recommended technology (e.g., changing light conditions in a lobby, possibly causing people to trip and injure themselves). Second, they are concerned that the other program training events might also include "unproven but exciting" information. One participant explained:

If trainers provide cutting edge information, then it should be presented as theory as opposed to established fact. –Focus Group Participant

When participants were asked what evidence could be presented to convince them that the design or technology presented at trainings was sound, participants were at first uncharacteristically quiet, suggesting that they might be generally slow to adopt new, efficient technologies. A lighting designer stated that a good source of confirmation would be validation by the Illuminating Engineering Society (IES). Another participant suggested that ideally ECW would teach participants about quality efficiency measures and design in the course of collaborating on a project.

5.2.4 Partner and Participant Characteristics

5.2.4.1 Participant Types

EPY4/GPY1 records show a continued increase in participant variety from earlier years. In EPY2, all 17 projects were classified as retail/service building types while in EPY3, only 57% of the 37 projects

were retail/service building types. As shown in Table 5-2, EPY4/GPY1 the program continues to attract a variety of projects.

Table 5-2. Participant Types

Building Type	EPY2 (n = 17)	EPY3 (n = 37)	EPY4/GPY1 (n = 50)
Retail/Service	100%	57%	58%
Industrial	-	14%	10%
Office	-	14%	6%
Warehouse	-	8%	8%
School	-	5%	8%
Medical	-	3%	8%
Other	-	-	2%

Source: Program tracking data

Among EPY4/GPY1 successes, project managers highlighted being able to affect both the office and the manufacturing space designs within industrial projects, indicating that the program was getting more savings out of fewer projects. As shown in Table 5-3, across all project types, the program increased the number of ex ante gross kWh savings it derived per project in EPY4/GPY1 compared to the previous year, even as the average square foot per project was similar across the two years (see Table 5-3). This is an important trend for the program to continue because the program was designed to recruit these types of larger projects in order to maximize savings and minimize administrative costs.

Table 5-3. Ex Ante kWh Savings per Project

	EPY3 (n=37)	EPY4/GPY1 (n=49)
Average Ex Ante Gross Savings per Project	248,717 kWh	414,954 kWh
Average Square Feet per Project	129,320 sq. ft.	123,487 sq. ft.

Source: program tracking data

5.2.4.2 Barriers and Drivers among Program Participants

Program participants were asked if they perceived any drawbacks to participating in the program or if they could identify potential barriers to other customers who might participate in it. Most participants (9 of 15) could not identify any drawbacks or barriers. Among those who could, half stated that the program does not offer high enough incentives (3 of 6), and a few stated that there was not enough awareness of the program in the marketplace (2 of 6).

Among the program participants, incentives were the primary motivator for participating (15 of 17). Technical assistance was a secondary motivation (2 of 17). However, there is some evidence that participants came to value the technical assistance more once they gained program experience and fully understood the value the technical assistance offered. For example, one participating architect expected only incentives, but found the technical assistance "very valuable in showing savings and making a case to the owner." Thus, it is likely that technical assistance will be a stronger motivating

factor for a greater portion of repeat participants in the future. Some program participants also noted the program provided an especially smooth or efficient experience in that the program "align(ed) well with the design process" and "was very timely and responsive during the design phases."

5.2.4.3 Barriers and Drivers among Focus Group Participants

The evaluation team also asked focus group participants—customers who had attended training but had not participated in the program—to identify barriers and drivers to participation. They identified several, each of which is described in the Focus Group Memo (see Appendix 0). The team selected three key barriers and drivers that underscore the need for partner and customer understanding of the program.

1. **Program awareness and understanding.** Many of the focus group participants believe they do not know enough about the program to sell it to their clients. They are hesitant to introduce the program as a potential collaborator or a possible source of revenue since they cannot offer any clear details necessary for planning. One design participant explained that his lack of program understanding kept him from introducing the program to his client:

   > *We're always trying to get our clients to take more efficiency steps. So if we can bring money back that's a plus for us… What's stopped us (from participating) in the past is that we just did not know enough about (the program). We hadn't gone through it. We couldn't sell it to the client. - Focus Group Participant*

   Participants noted that their owner and developer clients also appear to have low levels of program awareness or knowledge, which means that their clients do not consider or initiate program participation.

   Participants stated that the more knowledge they had of the program, the more likely they would be to participate in it. Additionally, they stated that if their clients knew more about the program, then they would be more inclined to submit projects to the program. One participant explained that a well-produced program fact sheet passed out at initial meetings would be useful to introduce clients to the program.

2. **Reluctance to learn about the program without knowing how well the program will benefit them on future projects.** While participants believe that participating in the program may produce a range of efficiency and incentive benefits for individual projects, they are reluctant to invest the time in working with the program because they believe the learning curve is steep and they are not sure that future benefits justify their investment. Further, they are worried that the program might change requirements, which could undermine current progress toward understanding the program.

   Participants suggested that ECW create a training webinar that gives them more information about the program and how to participate in it. They also suggested that the program consider certifying those who have completed the webinar as program partners, which they could use to market themselves to clients and owners.

3. **Convincing clients that investigating and participating in the program is justified.** Project budgets are always tight. For many projects, "the bottom line" is the final arbiter of not only

the inclusion of any efficiency design and measures, but also whether there is budget available to warrant the time needed to investigate utility efficiency programs. Participants need information early on during the project to support payback period and return-on-investment (ROI) calculations. Some designers fear that any time they spend working with the program may not be supported by the budget.

One focus group participant's suggestion for a program training and certification process in item #2 above also reflects a program manager's interest in exploring a possible recognition program for active program partners. One manager stated:

I would like to see this happen:… to start to develop some kind of recognition program for designers that are active (as a way of driving partner participation). – Program Manager

5.2.4.4 Building Energy Performance Myths

The New Construction Service program has identified a number of myths, or non-fact-based ideas about energy efficiency held by the industry, that limit program participation and pose challenges to the program's marketing efforts. In addition to fact-based barriers to program participation probed throughout the focus group, focus group participants were asked to discuss these myths and to assess how important they feel each is in terms of keeping them from participating in the New Construction Service program. Generally, participants agreed that the following myths do keep many in the industry from participating in energy efficiency programs:

- Energy enhancements do not make as much sense today as in years past.
- Energy costs pass through to a tenant, so there is no business case for a developer to invest in high performance.
- Any energy efficiency enhancements in the design must pay for themselves in energy savings within two years to be worthwhile.
- While most agreed with this statement, most also thought that the period is five years not two.
- It is much riskier to design or build a high-performance building.
    - One HVAC designer explained:

      "The more efficiency you get, the less resiliency you usually get. The less redundancy you have, the chances are that your people are uncomfortable when something gets out of whack." –Focus Group Participant
- High performance is not feasible on smaller projects.
- Energy efficiency is LEED—and LEED costs too much.

Participants nuanced their response to this statement by stating that the first part is false and the second part true. Thus, they do not necessarily equate energy efficiency with LEED, but they do believe that LEED costs too much.

5.2.4.5 Existing Inertia Within the Industry

Participants described three main kinds of resistance to increased efficiency within the non-residential new construction industry. First, some have had bad experience with poorly designed buildings billed as "efficient buildings" in the past. Second, some designers believe that designing to code already produces high-efficiency buildings. Third, participants pointed to the unwillingness among some owner representatives and facilities managers to learn new control systems. As a way to help overcome the cultural inertia, some participants suggested that the program be marketed to groups of emerging professional groups, and to students.

5.2.4.6 Concerns for Professional Liability

Focus group participants had some concern that unproven, efficient lighting design could make designers liable for building user injury and that efficient lighting design might undermine aesthetic quality to which these designers are professionally committed. These participants associated the program with advanced lighting technologies highlighted by program training events, and perceived these technologies as high risk and untested. Similarly, participants from the HVAC industry noted that if CO_2 sensors for efficient demand control ventilation were to fail, they could become liable for the resulting lack of fresh air and uncomfortable space for the inhabitants.

5.2.4.7 Project- and Measure-Specific Barriers

Through the course of the focus group, participants mentioned several project types for which it is particularly difficult to integrate efficiency.

- "Build and flips" and multifamily projects - Participants thought these projects pose a challenge to incorporating high-performance measures due to the split-incentive problem (i.e., those who could decide to include efficiency do not think they will profit from the long-term savings and so do not include it).
- Restaurants, hotels, and any other project in which "the experience matters"- Participants thought these projects pose a challenge to energy efficiency because clients and designers believe efficient design may be less aesthetically pleasing or may increase the likelihood of failures in comfort (i.e., HVAC) or functionality, which are very important in these buildings.
- Small projects - Some participants think that integrating efficiency into small projects may not be "worth the effort." For example, churches usually operate for limited number of hours per week and, therefore, there is less of a financial incentive for energy-efficient design. Yet, another participant thought that "comfort" as an efficiency outcome might still be "sellable" in these projects.

5.2.4.8 Messaging

The evaluation team tested several statements in the focus group to see which were the most compelling to the active non-participants. The top three were:

- The program provides potential financial results to participants.

- Participating in the program results in saving money and increasing net operating income.
- The program has a long set of successful case studies, some of which are likely to be similar to your project.

These top three benefits are consistent with earlier focus group participant statements about the importance of understanding the financial benefits of participating in the program, as well as understanding the program well enough to know whether it is applicable to their projects.

Notably, the first message reflects one program participant's suggestion for overall program improvement:

I know it's kind of difficult to do, but somebody to perform a ROI/cost analysis of the suggested equipment or incentive measures... (to show) 'What is the premium on first cost to do (the incented measures)?' If there was a cost estimating service offered by the program... (it might help out a lot). –Program Participant

The first message also reflects one program manager's interest in offering more financial analysis by developing a calculator using standard or customized inputs:

We do a fair amount of financial modeling, but I think we could do more… Finding ways to give them good information that's relevant to their project is a challenge. Whether (we use) more of a calculator approach so people have the chance to explore these things on their own with some pretty standard inputs or if they are more advanced users, put in their own information and run it again, I think that would benefit the program a lot. – Program Manager

However, the program manager listed several challenges for such a calculator, including the need for a cost consultant, and the political issues stemming from deriving first costs.

(What this financial analysis) really requires is an actively involved cost consultant… We can provide the incentives and the energy saving, (but) what's really kind of missing from the equation is the first cost. We can provide that…We have several means of doing that – RSMeans costing data, previous project information… But there's a big risk to doing that as a program. Really the cost is controlled by the contractor on a project and when you tell somebody how much it's going to cost, you're really telling them their business, which is a good way not to get on a project team the next time. So you have to kind of dance around that issue and hopefully you know request that information and plug it into the model so you're giving the owner and the design team the full picture. But we're early in the process; so a contractor is not even hired a lot of the times. – Program Manager

5.2.5 Recruitment of Projects Earlier in the Design Process

Interviews with program participants and discussions with focus group participants indicate that the program appears to be performing outreach effectively and finding some ways to recruit projects earlier in the design process. In interviews, program managers stressed the importance of recruiting projects into the program as early in the design process as possible when the program has the most influence on projects. They also identify a "continuous conversation" they have with some in the local design community that encourages repeat participation at increasing levels of efficiency. To

some extent, program managers accept first-time projects that are further along in the design process and over which they might have less influence because they believe that the same participants and partners will begin participating in the program earlier the next time, which will allow for increased efficient design. One manager explained this strategy:

First we (say) 'O.k., well we really want you to do design documents sooner but we understand that maybe you haven't heard of us yet. So let's take this chance to educate you. But the next time you have a project you will know that you need to get it in earlier.' So it is a continual conversation. We are going from that to 'OK, now we have a requirement that you have to get (design documents) into us sooner. So it's an educational process. - Program Manager

In EPY4/GPY1, the implementation team saw its strategy working. One manager explained:

We are getting a lot of designers that once they have been through the process they understand it. They bring us additional projects but earlier in design… PY4 is definitely where we are seeing more repeat. Where big design firms are bringing us projects that are earlier in design. – Program Manager

In-depth interviews with program participants also indicate that this strategy is working. As noted above, satisfaction is high and participants find the program valuable. About half the participants (10 of 17) are, or plan to be, repeat participants in the program. Finally, when asked if they plan to contact the program earlier in the design process if they were to participate again, most participants (11 of 16), stated they would work with the program as early as possible both to leverage the incentives into more energy efficiency and to consult with ECW staff through the technical assistance offering.

Focus group participants also saw the value of contacting the program early. As more of the program design was introduced throughout the focus group discussion, all focus group participants saw the value of working with the program early in the design process. However, this was countered by their need to know as clearly as possible how they might be working with the program and what it could offer their projects.

5.2.6 Program Integration with Participant New Construction Practices

5.2.6.1 Program Manager Focus

Interviews and meetings with program managers revealed that the program implementation team has been focused on finding the best ways to work with project staff (i.e., participants and partners) given standard business and design practices and project timelines in the new construction industry. Program managers stated that in EPY4/GPY1, it took about two weeks to complete an initial technical assistance review for Systems Track projects and about a month to complete one for Comprehensive Track projects.

5.2.6.2 Program Participant Experience

Interviews with program participants indicated that the program is generally engaging project teams at the right time and in ways consistent with its design. Notably, all program participants who commented on the timing of their participation stated that participating in the program did not impact the project's design delivery process or timeliness. One participant, however, reported that the project timing was tight, and although the project was accepted into the program, the project team would not have been able to change design had the program required it because construction moved too fast.

Participants reported that many project partners consider energy efficiency or participating in utility programs as part of their standard design and business practices (14 of 14), yet this is often affected by the client. Clients' particular needs often dictate the design approach and whether they will seek utility program participation. For example, one designer who worked on a project as a LEED consultant explained that the evaluation of energy efficiency is always a component of their standard new construction design process on LEED projects, but otherwise it depends on the client.

This program participant also adds support to the finding that most participants evaluate energy efficiency as a component of their standard new construction design process, and these efforts are driven by clients' needs and are likely to result in relatively small energy savings compared to the potential savings available through the program.

When asked at what point in their standard new construction design process they consider participating in energy efficiency programs, participants answered mainly by their typical role on the project. Thus, most architects, engineers, and designers stated that they consider participation early in the design process, while most contractors stated that they are more likely to consider participation in the construction phases.

5.2.6.3 Focus Group Participant Concerns

Interviews with focus group participants (i.e., 'active non-participants') indicate how they perceive the program might align with their design and business practices.

Tight Project Timelines
Participants expressed concern about how participating in the program might impact tight project timelines. Some believe that program participation might represent another set of "program requirements" to meet and that it would require careful attention to "getting subs involved at the proper time." Notably, participants concluded that, given potential project timelines and scheduling issues, working with the program as early as possible was important.

Alignment with LEED
Participation in the program may be perceived by some focus group participants as being as onerous as participation in LEED. One participant explained that his "fear of the LEED experience" had kept him from fully investigating the New Construction Services. Many participants find that participating in LEED consumes many administrative hours on paperwork. They are concerned that

the New Construction Services may require similar amounts of paperwork. Tight project budgets and experience with LEED paperwork caused one participant to summarize his apprehension to participate in the program:

'How much of my time is (participating in the New Construction program) going to take and am I going to get paid for it?' That's the question I need to get answered. -Focus Group Participant

While program design is not officially informed by the LEED system, a substantial proportion of the projects submitted to the program are LEED projects. The program, therefore, must take into consideration how market actors are working with LEED and what their concerns are for submitting LEED projects to the New Construction Service program. Participants who work in the non-profit and education sectors are much more likely to build LEED-certified buildings. These participants stated that about 85% of their projects are focused on LEED certification or otherwise focused on designing to the standard. Projects occurring outside of these sectors are less likely to focus on LEED.

The main concern participants have about program alignment with LEED is that participating in LEED requires many administrative hours for paperwork and they worry that working with the New Construction Service may require similar amounts of paperwork. To this end, participants wanted to know if they would be able to submit the energy model they used for LEED to the program. Finally, participants noted that LEED does not have rigorous building envelope requirements. This suggests that this is one area where the program can particularly influence building efficiency in LEED projects.

kWh Savings in Lighting Design

One lighting designer thought that the current program design focuses more on promoting reductions in LPD as opposed to kWh. The designer explained that this was a conservative approach and as a result a lighting design might not be recognized for all the efficiency incorporated into the project. While this issue may not be a factor for the comprehensive projects, which will be the focus in future program years, the program should consider clarifying the LPD requirements and their relationship to kWh in program outreach and training efforts.

5.2.6.4 Perception that Program Competes with Market Actors Who Provide Modeling

Program managers stated that in marketing and outreach activities, the program is careful to stress that it supports the project's design vision and team as opposed to supplanting it. Yet one program manager interviewed was concerned that the program may be creating antagonism in the market among engineers since it offers free energy modeling—a service for which engineers in the market charge. The program manager explained:

… I have heard more from engineering firms than architects that there is a perception that the program is taking away their opportunities….the program was never designed to do that. But I have heard that perception from a couple of people… engineering firms saying 'Well we do modeling too, why is the ECW coming in and doing our job?' -Program Manager

The evaluation team found limited evidence for this perception: in the focus group, one design participant, with a basic understanding of the program, described the program as a "competitor" since it offers technical assistance—a service that the designer also offers. Yet, in the in-depth interviews of program participants, when we asked, "Based on your standard new construction design processes, which aspects of the program did you find especially valuable?", one design participant explained that because his design group was expensive, owners who have energy efficiency intentions but who do not "have the pockets to support the energy modeling and analysis could offset (the) costs by having (the designer) work with ECW." This response suggests that some in the design community see ECW as a practical ally because it offers the energy modeling for free. The evaluation team recommends further supporting this perception by addressing it in an FAQ section on the program website.

5.2.7 IECC 2012

As indicated above, the program is transitioning to a single, performance-based track in EPY5/GPY2, partially in response to the implementation of IECC 2012 in January 2013. The new code will create a more stringent baseline that raises the level of mandated efficiency above what is practical for the program to support through the current systems track measures. Instead, the program will focus solely on what has been the Comprehensive Track, replacing the baseline in the new calendar year. Since these changes do not amount to additions to program design, in EPY4/GPY1 the program team mainly prepared by honing the marketing and outreach messaging they will use in EPY5/GPY2. One program manager explained the transition:

In (EPY2) and (EPY3) we marketed the program as a track: a Comprehensive Track, Small Buildings Track (etc.)… that did not change from (EPY3) to (EPY4/GPY1). Going into (EPY5/GPY2) we will still determine the level of technical assistance, either comprehensive whole-building modeling, or some other prescriptive or more spreadsheet calculations for standard. But the way the program is marketed (will be) just 'New Construction Service.' …over the course of (EPY4/GPY1) we were planning for what the program would look like in (EPY5/GPY2). And IECC helped precipitate that conversation… (The new message will be) 'We offer New Construction Services and early in design', which is something we have been saying in the beginning but now we really are pushing it. … Even though we have always been saying it, you will hopefully see in the (EPY5/GPY2) materials that those are the two messages. -Program Manager

The evaluation team asked focus group participants how they think IECC code relates to energy efficiency. Many participants believe that meeting IECC 2009 code (and, to some extent, other city and state and professional association codes) means they already incorporate high efficiency into their projects. One designer explained:

I know that if I'm designing to code, I'm way ahead of all these buildings that are wasting enormous amounts of energy. – Focus group participant

Additionally, some participants believe that it is already difficult to incorporate higher levels of efficiency beyond code. One participant explained:

Codes have become so rigorous that it is difficult to eke out more than 10% savings. – Focus group participant

As a result, some participants believe that IECC 2012 codes will require a level of efficiency that will be impossible to surpass significantly. One designer stated:

I am not sure that in two years we'll be able to beat the codes by 20%. – Focus group participant

5.2.8 Potential Market Effects of the Program

Interviews with program participants indicate that the program clearly increases some participants' knowledge of energy-efficient new construction and also increases the energy efficiency of many of the projects recruited into the program. While the increases in knowledge among these participants likely persist after participation, there is no strong evidence for permanent changes in energy-efficient new construction practices among participants once outside the program. Instead, to the program's credit, participants report that they intend to contact the program as early in the project design phases as possible for any subsequent projects given their overall positive experience with the program. This is consistent with their motivation to receive utility program incentive dollars where possible for energy-efficient design and implementation. Thus, overall, the program appears to be affecting knowledge among participants but has not changed practices to the extent that participants would not draw on the program for financial support in the future. Participant interview findings suggest that market actors need utility program incentive dollars or directives to meet LEED levels to incorporate high-efficiency design.

In the focus group, in which all participants had attended program training, there was strong evidence that the program increases market actor knowledge through the training since participants reported that the training was valuable (see 5.2.3.4). However, it is not likely that the program has affected these actors' new construction practices, primarily because their awareness of the program was low (see 5.2.3.1). Instead, these participants indicated that their practices are affected by projects demands—especially when there is intention to meet LEED levels—and also utility incentive programs in general.

It would be difficult to parse the effects of the New Construction Service, considering the influences of LEED and other utility programs on market actor energy-efficient construction practices. More extensive research would be required to understand any discrete or interactive effects of the program among the other factors in the market.

5.3 Research Impact Results

The detailed impact results presented in this section are primarily based upon our interviews with program participants, engineering file review, and on-site M&V. While the deemed NTGR and RR for Systems Track projects are used in developing the electric energy net savings presented in the main body of this report, the evaluation team also evaluated the NTGR and RR from a sample of EPY4/GPY1 ComEd/Nicor Gas Systems Track projects and a census of Comprehensive projects, which are used in the gas savings NTGR and RR. These results can also be used for gas and electric program planning purposes and/or for adjusting savings prospectively, as well as for adjusting electric demand savings estimates for bidding into the PJM forward capacity market.

In developing the sample of projects, the team used MBtu savings instead of only each project's therm or MWh savings since the program is designed to take a holistic approach to savings. Table 5-4 shows the net and gross program savings based on EPY4/GPY1 evaluation research at both the utility and program levels.

Table 5-4. Research Net and Gross Results by Utility

	Ex Ante Gross Savings	Research Gross Savings	Gross Realization Rate	Research Net Savings	Net-to-Gross Ratio (NTGR)
MWh ComEd: N = 49	20,748	18,300	88.3%	10,800	0.59
MW ComEd: N = 49	3.409	3.226	94.6%	1.846	0.57
Therms Nicor Gas: N = 7	54,426	64,400	118.3%	21,300	0.33
MBtu* All Projects: N = 50	76,235	68,300	89.6%	39,700	0.58

Source: Program tracking data and evaluation analysis

When the MBtu-based NTGR is broken into the two tracks, it is found that the NTGR for systems (n = 14) was 0.58, and for comprehensive (n = 5) was 0.52. The comprehensive NTGR is lower because representatives from three projects indicated that the program had only some influence (i.e., NTGR scores between 0.20 and 0.51) on the energy efficiency of their building. Representatives of the other two projects scored at 0.58 or higher. While this analysis combines gas and electric savings into MBtu, the NTGR for the five comprehensive projects is similar to last year (EPY3; 0.54) when the value was calculated only on electric savings. Table 5-5 shows the program results at the track level.

Table 5-5. Sample Research Gross and Net Energy Savings by Track – Program Level (n = 19)

Track	Ex Ante Gross (MBtu)	Gross Realization Rate[a]	Evaluation-Adjusted Gross (MBtu)	NTGR	Evaluation Net Savings (MBtu)
Comprehensive (n = 5)	20,838	0.896	18,700	0.52	9,700
Systems (n = 14)	34,125	0.896	30,600	0.58	17,600
Total (n= 19)[b]	54,963	0.896	49,300	0.55	27,300

[a] *Realization rate based on sample design at the population level, not at the track level*
[b]*While there were 22 projects in the sample, the evaluation team was not able to interview representatives for 3 projects.*

The research gross program savings for sampled projects are presented in Table 5-6 below. Realization rates below 100% indicate that energy savings were adjusted downward; those above 100% indicate that the energy savings were adjusted upward; and, those equal to 100% indicate that no changes were made.

Table 5-6. Research Gross Savings for Sampled Projects

Project ID	Ex Ante kW	Ex Post kW	Realiza -tion Rate	Ex Ante kWh	Ex Post kWh	Realiza -tion Rate	Ex Ante therms	Ex Post therms	Realiza- tion Rate	Findings
1010	45.3	45.3	100%	471,762	301,194	64%	-	-	N/A	• The ex ante calculations assumed that all of the lights installed operated 7,709 hours per year, which assumes that most lights were on most of the time. This value was found to be higher than the actual lighting hours of operation at the site. Only a small percentage of the total building area was lit around the clock. This led to a reduction in the assumed hours of use and total energy savings.
1110	233.0	112.0	48%	461,670	325,718	71%	-	-	N/A	• The ex ante model was found to be correct with the exception of the energy consumption due to the condenser water pumps, chilled water pumps, and cooling tower fans. • The baseline cooling system was direct expansion rooftop units, but the model still included the chilled and condenser water pumps along with the cooling tower fans with the RTU, which is not accurate.
1111	538.0	515.1	96%	2,944,317	2,805,330	95%	17,183	18,030	105%	• There was no significant factor that contributed to the change in savings.
1710	366.0	357.5	98%	4,334,597	2,805,231	65%	-	-	N/A	• The ex post savings are less than the ex ante savings because the ex ante savings assumed every light in the facility operated 8,760 hrs/year. The actual weighted annual hours of use was found to be 5,669 from the customer interview and project documentation.
1711	163.5	181.9	111%	883,599	1,052,358	119%	-	-	N/A	• The high realization rate is due to metered data that indicated greater annual operating hours than were used in the ex ante calculations. The ex ante calculations assumed 4,539 average annual operating hours while the metered data that was used in the ex post calculations indicates 5,406 annual operating hours.

Project ID	Ex Ante kW	Ex Post kW	Realiza -tion Rate	Ex Ante kWh	Ex Post kWh	Realiza -tion Rate	Ex Ante therms	Ex Post therms	Realiza- tion Rate	Findings
2011	91.6	101.3	111%	730,315	730,368	100%	-	-	N/A	• The ex ante calculations assumed a deemed savings value for the demand savings for this project. The site visit revealed that the demand savings were higher because the lights were on at all times during peak demand periods.
2311	212.6	134.2	63%	459,450	417,466	91%	12,179	23,999	197%	• The ex ante analysis assumed a different compressor configuration than was actually installed, which led to a significant reduction in the ex post kW savings. • Also, the ex ante calculations did not account for all of the installed gas-fired RTUs, which led to a significant increase in the therm savings from HVAC.
2410	12.2	13.1	108%	57,177	99,950	175%	14,376	8,363	58%	• The ex ante analysis assumed that the building lighting operated 4,320 hours per year. However, the lighting controls were not functioning properly and the meter data showed that the lighting operated substantially more than that, which increased the demand savings and total electric savings associated with reducing the lighting power density. • The decrease in the gas savings primarily is driven by the energy recovery system installed in the building. The building installed a 75 percent efficient energy recovery system. The ex ante calculations assumed that no energy recovery system was present in the base case. For this building, code requires a 50 percent efficiency energy recovery system. In the ex post case, the base case was taken to be a code minimum compliant building with a 50 percent efficiency energy recovery system in place.
11111	41.4	38.5	93%	173,560	170,805	98%	-	-	N/A	• The site visit revealed that slightly less lighting was installed than assumed in the ex ante case, and the hours of operation were found to be less than assumed in the ex ante case.
3311	-	-	N/A	-	-	N/A	895	641	72%	• In the ex ante calculations the boiler was assumed to be used for building heating; however, the boiler is actually used as part of a snow-melt system. The difference in operation caused the decrease in the annual therm savings.

Project ID	Ex Ante kW	Ex Post kW	Realiza -tion Rate	Ex Ante kWh	Ex Post kWh	Realiza -tion Rate	Ex Ante therms	Ex Post therms	Realiza- tion Rate	Findings
3410	5.9	5.6	94%	20,876	15,280	73%	-	-	N/A	• The ex ante analysis assumed that the building contained primarily retail space and a small amount of automotive repair space. The on-site survey revealed that most of the building was used as a repair and construction area, with a small office retail area. The baseline lighting density was therefore reduced in the ex post case. There was a small difference in operating hours as well, which made the decrease in demand savings relatively less than the overall decrease in total energy savings.
3710	148.8	148.8	100%	525,696	334,259	64%	-	-	N/A	• The reduction in annual kWh savings is due to reduced run hours of the chiller system in the ex post case. The ex ante calculations assumed that all of the operating hours were at full load, and in the ex post calculations equivalent full load hours were used to calculate the savings.
3811	100.7	113.2	112%	961,151	819,881	85%	-	-	N/A	• The reduction in annual kWh savings is due to a decrease in the annual operating hours in the ex ante case taken from metered data. • The increase in peak kW demand savings is due to an increase in the coincidence factor in the ex post case taken from metered data.
4509	163.0	131.2	81%	261,462	255,326	98%	31,056	31,147	100%	• The eQuest model used to calculate the savings for the HVAC system did not include pump power consumption associated with the DX unit in the proposed case. This was corrected in the ex post analysis.
4910	297.0	295.0	99%	1,744,016	1,744,133	100%	-	-	N/A	• These values are in very close agreement with the previous calculations.
5011	23.9	25.1	105%	76,173	81,190	107%	-	-	N/A	• The site visit revealed that the hours of use were higher than the values used in the ex ante calculations, increasing the demand and total energy savings from this project.
5510	90.4	94.2	104%	358,792	358,792	100%	-	-	N/A	• These values are in very close agreement with the previous calculations.

Project ID	Ex Ante kW	Ex Post kW	Realiza -tion Rate	Ex Ante kWh	Ex Post kWh	Realiza -tion Rate	Ex Ante therms	Ex Post therms	Realiza- tion Rate	Findings
5611	15.5	15.9	102%	54,182	52,790	97%	-	-	N/A	• These values are in very close agreement with the previous calculations.
6810	48.3	54.3	112%	338,803	382,771	113%	-	-	N/A	• The site visit revealed that the hours of use were higher than the values used in the ex ante calculations, increasing the demand and total energy savings from this project.
7910	42.0	45.2	108%	202,233	245,577	121%	-	-	N/A	• The site visit revealed that the hours of use were higher than the values used in the ex ante calculations, increasing the demand and total energy savings from this project.
4511	36.6	36.6	100%	167,292	167,292	100%	-	-	N/A	• These values are in very close agreement with the previous calculations.
14612	13.0	14.8	114%	66,593	83,384	125%	2,067	3,531	171%	• The ex ante analysis underestimated the lighting hours of use found on-site, increasing the energy savings associated with the lighting measure. • The ex ante calculations assumed 35 degrees for the minimum outside air temperature for the heat recovery unit. After conducting the on-site survey, it was determined that 60 degrees was a more realistic setting for the minimum outdoor temperature. This increased the gas savings associated with this measure.

Source: Program tracking data and evaluation analysis

5.4 Detailed Evaluation Methodology

5.4.1 Sampling

As resources would not allow data collection for all 50 New Construction Service projects, a sample was chosen from the population of projects for our data collection. For the telephone survey and on-site M&V, the evaluation team used a stratified random sample design based on each project's total MBtu savings. The sampling used the Delanius-Hodges approach, which maximizes precision while decreasing the number of interviews necessary to achieve that precision. The MBtu savings were used instead of only each project's therm or MWh savings since the program is designed to take a holistic approach to savings. While the sample was designed to reach 90% confidence and 10% precision at the MBtu level, it also met these criteria at the therm, MWh, and MW levels. All 50 projects were grouped into three strata based on the ex ante energy savings per project and then a prescribed number of projects was randomly selected from each stratum. This process yielded a sample size of 22 projects.

The evaluation team was able to conduct on-site M&V for all 22 projects and the final sample points are shown, along with the standard error and relative precision, in Table 5-7.

Table 5-7. On-Site M&V Error and Precision

Utility	Savings	Sample Points (n)	Gross Realization Rate	Standard Error	Relative Precision*
ComEd	Electric	21	0.883	0.04	0.08
ComEd	Demand (MW)	21	0.946	0.01	0.02
Nicor Gas	Gas	5	1.18	0.03	0.05
Total	-	22	-	-	-

** Calculated at the 90% confidence level*

However, the evaluation team was unable to contact and interview three participants for the NTGR interviews. Therefore, the final sample size for the NTGR data collection efforts was 19. The final sample points are shown along with the standard error and relative precision in Table 5-8.

Table 5-8. NTGR Error and Precision

Utility	Savings	Sample Points (n)	NTGR	Standard Error	Relative Precision*
ComEd	Electric	19	0.59	0.03	0.05
ComEd	Demand (MW)	19	0.57	0.03	0.05
Nicor Gas	Gas	4	0.33	-**	-**
Total	-	19	-	-	-

** Calculated at the 90% confidence level*

*** These values cannot be calculated: in one sample stratum. Only one project was sampled (error and precision unknown), and the team interviewed a census of the other strata (error and precision = 0).*

Combining (i.e., "chaining" or pooling") the precision of the on-site M&V and the NTGR evaluation tasks yields the precision level found in Table 5-9.

Table 5-9. Combined On-Site M&V and NTGR Precision Levels

Utility	Savings	Relative Precision*
ComEd	Electric	0.10
ComEd	Demand (MW)	0.05
Nicor Gas	Gas	0.05

** Calculated at the 90% confidence level*

5.4.2 Net Program Savings

Our net-to-gross interviews reached participants representing 19 projects and 96% of the ex ante gross kWh impacts, 94% of the ex ante gross kW impacts, and 98% of the ex ante gross therm impacts. Sampling for the net-to-gross analysis used the same stratification as the impact analysis.

The net analysis creates a ratio to account for attribution of the program activities in the gross savings results. That is, it identifies how much of the gross savings are due to program activities. Our NTGR analysis of the program's energy impacts progressed through three stages.

In the first stage, the team designed an analysis approach based on the self-report approach for determining NTGR, which is calculated using free-ridership and participant spillover (see Equation 1). The free-ridership factor is based on three main concepts (see Equation 2), while the spillover factor captures any savings attributable to the program not appearing in the records.

Equation 1

$$NTGR = 1 - FR + SO$$

Where: *NTGR = net-to-gross ratio*
FR = free-ridership factor
SO = participant spillover factor

Equation 2

FR = average of three concepts (PC + PI + CF)

Where: PC = program components influence
PI = program influence
CF = counterfactual[26]

During the first stage, the evaluation team also reviewed our EPY3 approach and how well the previous survey instrument measured attribution. The evaluation team worked with the program implementer to improve the instrument where necessary, making a few small changes mainly reflecting the addition of gas measures. The final, reworked EPY4/GPY1 participant in-depth interview guide is provided in Appendix 5.5.1 and the analysis plan for calculating the final NTGR ratio is provided in 5.5.2 , with the main algorithms shown in Equations 1 and 2.

The second stage of NTGR analysis consisted of the interviews with the main decision-makers, or those individuals associated with the projects that were most able to give us insight into project design decision-making. The evaluation team conducted one to two in-depth interviews for each project sampled, depending on the number of decision-makers and the level of insight a respondent had into the decision-making. As in years past, ECW supplied the evaluation team with the main contacts for projects. These contacts were often project managers who were usually not the decision-makers, yet they usually had insight into the decision-making and could report on it. If the main project contacts could not report on decision-making, then the team conducted additional interviews with the main decision-makers (e.g., owners, developers, architects, or designers).

During the third stage of our NTGR analysis, the evaluation team carefully reviewed the NTGR responses from each of our interviewees and adjusted the NTGR algorithm and ratio. Upon review, and once consensus was reached across the evaluation team, several adjustments were made, which are detailed in 3.1.5 .

To obtain overall FR, the project-level FR values were weighted by evaluation-adjusted gross savings and by the sample strata case weights. Next, the evaluation team calculated spillover based on one participant who stated the program was influential on the installation of eco-friendly elevators that use a magnetic system to alleviate electrical load. By reviewing the manufacturer's literature and interviewing the participant, we estimated that each of the ten elevators saved 1,800 kWh, for a total of 18,000 kWh . However, the 18,000 kWh was such a small fraction of the Research Findings gross savings in the sample that it made no difference in the final NTGR.

This final NTGR was calculated as 1-FR+SO and was applied to the population of projects to produce the total evaluation net savings.

[26] The counterfactual is what would have occurred in the absence of the program.

5.4.3 Process Evaluation Methods

The process evaluation consisted of qualitative analysis from the in-depth interviews of the program managers and customer/market actors. Our data collection instrument followed the process plan and was created to research specific areas within the program that entailed creation of themes found in the interviewer responses. The final version of the guide can be found in Appendix 5.5.1 . The process questions were informed by in-depth interviews with program managers, as well as past evaluations with market actors (e.g., design contractors, lighting engineers, and rebate agents[27]) and customer program participants.

5.5 Data Collection Instruments

5.5.1 Participant In-Depth Interview Guide

ComEd & Nicor Gas Joint New Construction Program In-Depth Interview Guide

Final

Purpose

This in-depth interview (IDI) guide will be used to attribute the effects of the New Construction Program on the projects under the purview of the respondent. It will also support the process analysis for this program. They will be performed by Navigant and ODC analytical staff via the telephone. We will call the primary contact person as provided by ECW, but it may be necessary to expand our calls to include other individuals within the project if it appears that others were highly involved in the decision-making process. The numbered questions in this depth interview guide will definitely be asked, while non-numbered questions are prompts for the analyst to help ensure a complete response that adequately addresses the purpose of the numbered question. As such, not all questions in this guide will be asked as written.

Respondent name:	
Respondent phone number:	
Respondent title:	
Respondent type: (circle one:)	**Developer/owner, A&E Design Professional, Other**

[27] Market actors whose job includes finding rebates and incentives for their clients, mainly retail chains.

Company name:	
Project (in sample)	
Utility	**ComEd only ComEd/Nicor Gas Joint**
In Nicor Gas Service Territory	**Yes No Don't Know**
Project Type (circle one:)	**System Comprehensive**
Incentive Amount	
EE Equipment incented	
Interviewer:	
Date:	
Time Start:	

Introduction

Thank you for taking the time to talk with me today. The Opinion Dynamics [If joint participant, "and "Navigant"] evaluation team is currently conducting a study for ComEd [If joint participant, "and Nicor Gas"]. There are two aims of this interview: first, we'd like to get your perspective on the New Construction Program and find ways to improve it as much as possible; and second we'd like to understand the decision-making around the energy efficient design and equipment that went into the [PROJECT NAME] project. We'd like to get your insight by asking you some questions that should not take any longer than about 20 minutes.

Role on Program Projects

Throughout this interview when I ask about the "program" or "New Construction program" please consider your experience with the Energy Center of Wisconsin —"ECW", ComEd, [If joint participant, "Nicor Gas"], or any combination of these as they relate to the [PROJECT NAME].

1. Please tell me about your involvement in the New Construction program. Specifically:

   - How long did you work with the program around the [PROJECT NAME] project?

   - What was your role on the project and what were you responsible for?

   - Could you give me a brief overview of the [PROJECT NAME] project?

- Was it a new construction or a major renovation project? Or something else?

2. Are you involved now or were you involved in other projects in this program?

   - Please give me a brief overview of those project(s).

3. We know there were several people involved in the project, but who was the main decision-maker for choices regarding the energy efficiency of the building design and equipment?

   - [IF NOT THE INTERVIEWEE, TAKE NAME AND CONTACT INFORMATION OF MAIN DECISION-MAKER.]

   - [IF NOT THE INTERVIEWEE, CONFIRM INTERVIEWEE HAS GOOD PERSPECTIVE ON THE DECISION_MAKING.] Although you were not the main decision maker, do you think you can still provide a lot of the rationale for choices regarding the energy efficiency of the building design and equipment?

   - [IF THE INTERVIEWEE LACKS GOOD PERSPECTIVE ON THE DECISION_MAKING, EXPLORE PROCESS QUESTIONS TO THE EXTENT POSSIBLE.]

Project Background

4. Program records show that the program paid [INSERT INCENTIVE AMOUNT] in incentives for [INSERT PROJECT NAME] project. Does this sound about right?

[ASK IF ENERGY MODEL WAS DEVELOPED] Program records also show that the program provided energy modeling for the project. Is that true? (If necessary, “This would have been a computerized whole-building energy model ECW used to represent the building energy consumption for a baseline design scenario and the energy efficient design scenario in order to highlight potential savings through system interactions.”)

5. Was this project ever intended to be a LEED project?

6. Were items cut from the project to control up-front project costs? (i.e. value engineering)?

   (If no, follow up with, “Were design items ever cut due to budget shortfalls?”)

NET-TO-GROSS (Attribution) SECTION

Free Ridership Factor (FR)

Now I’d like to ask a few questions about the design process that resulted in the energy efficient design or installations (i.e., HVAC, envelope, and lighting) that were incented by the program. We need to understand how you (and your client) thought about energy efficiency

and what influenced you (and your client) to incorporate energy efficient design or installations into this project.

FR1. So first could you give me an overview of how the energy efficient design or installations incented by the program were initiated? What were the main reasons they became or stayed a part of this project?

FR1a. What was the role of natural gas and electricity prices in the decision-making around energy efficient design or equipment if any?

FR2. Now could you give me an overview of the influence, if any, of the program on the implementation of the energy efficient design or installations?
- What were the main ways that the program helped you bring energy efficiency into the project, if any?
- [If nothing specific described, then ask] Can you provide me with specific examples of the ways the program helped bring energy efficiency into the project?
- How would the energy efficiency of the project be different if it had not been submitted to the program?

FR3. Would you say you worked with the program staff more around changes to design or changes to specific equipment? We know that design changes often mean equipment changes, but simple equipment changes do not tend to have extensive changes in design (if any).

[NOTE: we need to then ask the attribution questions in line with the answer to this question, i.e., a design change or equipment changes (by Measure #1, Measure #2).]

[For systems projects, flip a coin to determine which equipment changes to ask about first]

[ASK FR3a IF LEED PROJECT]

FR3a. While the project was intended to meet LEED standards, we are interested in knowing how the program may have helped support or enhance the LEED goal. Please answer yes or no to the following questions.
i. Was the program important in helping to refine an existing energy model?
ii. Was the program's staff or technical assistance important in highlighting ways to achieve LEED design plans?
iii. Were program incentives or technical assistance important in improving energy efficiency levels to meet a higher level of LEED?

[ASK FR4 IF NATIONAL RETAILER]

FR4. Does [NATIONAL RETAILER] typically follow existing, proto-typical store design during new construction, gut rehab, or extensive remodeling projects?

1. Yes (IDENTIFY AS PROTO-TYPICAL DESIGN AND GO TO FR5)
2. No (NOT PROTO-TYPICAL DESIGN AND GO TO FR7)

[ASK FR5 AND FR6 IF PROTO-TYPICAL DESIGN]
For the next two questions, I will ask you about the direct and indirect influence of the ComEd [if joint participant, "and Nicor Gas"] program on the energy efficiency of this [*per FR3*: design/Measure #1]. By direct influence I mean any way the ComEd [if joint participant, "and Nicor Gas"] program in particular may have influenced this project. This may have included program incentives, ECW technical assistance, or other recommendations coming from the program.

FR5. Overall, how influential was program directly on the energy efficiency of this [*per FR3*: energy design/Measure #1] using a 0 to 10 scale, where 0 is "no influence at all" and 10 is "extremely influential".

By indirect influence I mean any influence the ComEd [if joint participant, "and Nicor Gas"] program may have had as one of many national utility incentive programs that might have influenced prototypical new construction design at [RETAILER].

FR6. And overall, how influential was the program indirectly on the energy efficiency of this [*per FR3*: design/Measure #1] using a 0 to 10 scale, where 0 is "no influence at all" and 10 is "extremely influential".

FR7. Now I am going to ask you some questions that may sound similar but I have to ask them in order to have consistency across many interviews. When did you first learn about the New Construction Program and the incentives available for energy efficient installation and design? Was it during the…
1. pre-design?
2. schematic design?
3. design development?
4. construction documentation? (If Comprehensive Project, SKIP TO SO1)
5. construction phase? (If Comprehensive or Systems Project, SKIP TO SO1)
8. Don't know

FR8. Next, I'm going to ask you to rate the influence of the program as well as other factors that might have influenced the decision to include the [*per FR3*: energy efficient design/Measure #1] that was incented by the program for your project. Please think of a scale from 0 to 10, where 0 means 'no influence at all' and 10 means 'extremely influential'. If something did not pertain to your project please let me know. [FOR FR8a-g, RECORD 0 to 10; 96=Not Applicable; 98=Don't Know; 99=Refused]

(If needed: "How influential was/were _____ in the DECISION to include the energy efficient design/Measure #1 in the project(s)?)

Q	Question	Response

FR8a	[ASK IF PARTICIPANT ATTENDED TRAINING] Training sponsored by the program	
FR8b	The availability of the program incentive	
FR8c	The program's technical assistance and building performance modeling	
FR8d	Recommendations from a ECW /ComEd/Nicor Gas staff person	
FR8e	Program information	
FR8f	Program outreach including Lunch & Learns, press releases, email or phone calls from ECW	

FR8g. Were there any other program factors we haven't discussed that were influential in the decision to [*per FR3*: use this design/install Measure #1]?
1. Yes; "please specify": _____
96. Nothing else influential
98. Don't Know

[ASK IF FR8g = YES]
FR8gg. Using the same zero to 10 scale, how would you rate the influence of this factor on the decision to [*per FR3*: use this design/install Measure #1]? [RECORD 0 to 10; 98=Don't Know]

[SKIP FR9 IF NATIONAL RETAILER]
FR9. Thinking about this differently, I would like you to compare the level of program influence with that of other factors on the decision to include the [*per FR3*: energy efficient design/specific equipment] in the project(s).
If you were given a total of 100 influence points to divide between the influence of the New Construction program and the influence of all other factors on the decision to include [*per FR3*: energy efficient design/ Measure #1] in the project, how many points would you give to the influence of the New Construction program?
Points given to program: [RECORD 0 to 100; 998=Don't Know] Points given to program: [RECORD 0 to 100; 998=Don't Know]

[ASK IF VALUE ENGINEERING OCCURRED]

FR10. How influential, if at all, was the program (i.e., incentives, ComEd [if joint participant, "and Nicor Gas"] or ECW recommendations) in keeping [*per FR3*: energy efficient design/Measure#1] on the table when aspects of the original design were being cut to control costs? Please use a 0 to 10 scale where, where 0 is "Not at all influential" and 10 is "Extremely influential." [RECORD 0 to 10; 98=Don't know, 99=N/A]

Now I want to ask you a few questions about how this project may have been different if the program had not existed.

FR11. Using a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely", if the program had not existed, what is the likelihood that the

project would have included the same level of energy efficiency in the [*per FR3*: design/ Measure #1]? [RECORD 0 to 10; 98=Don't know]

FR12. Using the same scale from 0 to 10, where 0 is “Not at all likely” and 10 is “Extremely likely”, if the program had not existed, what is the likelihood that the project would have included [[*per FR3*: the same number of energy efficient design features in the final project/ the same number of energy efficient (Measure #1)]? [RECORD 0 to 10; 98=Don't know]

[ASK IF COMPREHENSIVE PROJECT]

FR13. Using the same scale from 0 to 10, where 0 is “Not at all likely” and 10 is “Extremely likely”, if the program had not existed, what is the likelihood that the energy model would have been used as a design tool? [RECORD 0 to 10; 98=Don't know]

FR14. And using the same scale from 0 to 10, where 0 is “Not at all likely” and 10 is “Extremely likely”, what is the likelihood that independent, third party data supporting the design vision would have been available if the program had not been involved in this project? [RECORD 0 to 10; 98=Don't know; NOTE: This could include financial and energy data]

[For systems projects with multiple measures ask:]

FR15. Now I’d like to ask you about [Measure #2]. In terms of how the program or other factors influenced its selection or installation, would you say that this measure reflected the same or nearly the same decision-making as [Measure #1]?
1. Yes (Continue to SO1)
2. No (Ask FR16)

FR16. [If measure 1 and 2 are different fuels] Did the fuel type (electricity or natural gas) of [Measure #2] affect the decision-making at all?
1. Yes (Ask FR5 to FR14 for Measure #2)
   - [If so] How?

2... No (Ask FR5 to FR14 for Measure #2)

SPILLOVER MODULE

SO1. Was there any other energy efficient design or equipment installation that took place on this project that was influenced by the program but did not receive incentives? [IF YES, “COULD YOU PLEASE DESCRIBE IT?”]

SO2. Since participating in the New Construction program, have you (or your client) incorporated any energy efficient systems or equipment you into other new construction projects in ComEd or Nicor Gas territory?

[ASK IF SO2=YES]

SO3. [Has it or will it/ Have they or will they] receive incentives through the program?

[ASK IF SO3=NO]

SO4. Why not?

[ASK IF SO3=NO]

SO5. How influential was the program in incorporating energy efficient systems or equipment into these other new construction projects? Please use a 0 to 10 scale where 0 is 'not influential at all' and 10 is 'extremely influential'.

[ASK IF SO3=NO AND PARTICIPANT ATTENDED TRAINING]

SO6. How influential was the training in incorporating energy efficient systems or equipment into these other new construction projects? Please use a 0 to 10 scale where 0 is 'not influential at all' and 10 is 'extremely influential'.

Process Section

Awareness of Program

7. How did you first hear about the program?

8. [If joint project] When you first heard about the program, did you know that the program also offered natural gas incentives?

   - [If no] When did you first hear about the natural gas incentives?

9. [If ComEd-only project and in Nicor Gas service territory] Did the project also apply for natural gas incentives? Why or why not?

Motivation to Participate

10. Why did you or your team decide to participate in the program?

    - [If necessary] Who on your team first decided to participate in the program?

11. What was your team's initial perception of the program?

    - What did they believe to be valuable about participating in the program?

12. Did your team's perception of the program change as you participated in it?

    - [If so] How?

13. [If joint project] How did the availability of natural gas incentives influence your decision to participate in the program, if at all?

Satisfaction

14. Overall, how satisfied are you with the program? Please use a scale where 0 is 'not satisfied at all' and 10 is 'extremely satisfied'.

    - [If <7, ask] Why are you not more satisfied with the program?

Training

15. Have you or any of your team members attended any program-related training events?

[ASK IF THEY HAVE NOT ATTENDED]

16. Are you aware of any training events available through the program?

[ASK IF AWARE OF, BUT NOT ATTENDED A TRAINING EVENT]

17. Why have you or any of your team members not attended any training events? Under what conditions might you or any of your team members attend one in the future?

[ASK IF ATTENDED]

18. How did you hear about the event?

19. Did you attend the first training before or after you had submitted a project to the program?

20. Did you learn anything in the training that helped you design or build energy efficiency into the building? If so, please describe.

    - [If interviewee is connected with other program projects, ask] "How about for other projects?" Did you share anything you learned with your workplace colleagues?

Program Processes

21. Have the program requirements been clearly explained to you?

    - Are there any ways you think the program can explain requirements or participation more clearly to participants in the future?

22. Do you think there are any requirements the program should adjust or change?

- If so, which ones and how?

23. Did you fill out the program application for the project? If so, what do you think of it?

    - Do you have any suggestions for how to improve it?

24. How would you describe the technical assistance component of the program? [If necessary, (for Systems projects) "Technical assistance refers to the range of analysis, advice and support ECW provided and may have included recommendations for equipment or system upgrades; identification or savings from equipment or system upgrades; and an analysis of preliminary savings estimates and incentive levels." (for Comprehensive projects) "Technical assistance refers to the range of analysis, advice and support ECW provided and may have included energy modeling; design assistance; technology and system recommendations; and an analysis of preliminary savings estimates and incentive levels."

    - Do you have any suggestions for how to improve it?

25. Could you describe the program staff's knowledge of energy efficient design?

[ASK IF COMPREHENSIVE PROJECT]

26. Could you describe the role the program's whole building energy modeling (simulation) played in your project?

[ASK ALL]

27. How would you describe the verification process (post-installation on-site inspection or document review) of the program?

    - Do you have any suggestions for how to improve it?

28. Following the project verification, did the program provide the incentive in a timely manner? [If no,] When did the incentive arrive. ?

    - Do you have any suggestions for how to improve it?

29. Throughout your involvement with the program, was your communication with program staff what you wanted?

    - What were your expectations for communication with program staff?

    - When you called or emailed staff, did they get back with you quickly?

    - Were they able to communicate with you effectively?

Alignment of Program Design with Participant New Construction Practices

30. Based on how you normally conduct your business in the new construction industry, which aspects of the program did you find:

    - Especially valuable? Why?
    - Especially efficient or smooth? Why?
    - Especially difficult or tedious? Why?

31. Based on your standard new construction design processes, which aspects of the program did you find:

    - Especially valuable? Why?
    - Especially efficient or smooth? Why?
    - Especially difficult or tedious? Why?

32. Is the evaluation of energy efficiency a component of your standard new construction design process? If so, how?

33. At what point in your standard new construction design process do you consider participating in energy efficiency programs?

34. If you were to participate in the program again, do you think you or your project team would contact the program earlier in the design process? Why or why not?

35. Considering future projects, how could the program engage you or your peers in the new construction industry earlier during the project's pre-design phase?

Barriers

36. What are the main drawbacks of the program, if any?

    - What do you think others like you may find to be barriers to participating in the program?
    - Is it a challenge to meet the 10%-against-baseline level of savings?
    - What might prevent others from participating?

37. Has participating in the New Construction Program impacted your project's design delivery process or timeliness?

    - If so, how?

38. Can you think of any ways the program could improve?

- Do you see any ways that the program could help realize greater potential energy saving in the market?
- Are the program incentives appropriate?
- If you could change one thing about the program what would it be?

CLOSING SECTION

39. Is there anything else that you would like to let us know based on the topics we covered today, including any ways to improve the program if possible or how the program has affected your use of energy efficient measures or design in projects?

40. As part of this study, the evaluation team may seek to inspect the facilities and equipment for which the program incentives were received. Is there a site-level staff person you can refer me to who might be able to work with the evaluation site lead? This might be a facilities manager or a site engineer?

Name _____

Role _____

Contact Information _____

On behalf of ComEd (If joint project, “and Nicor Gas”), we thank you for your time today. If in reviewing my notes, I discover a point I need to clarify, is it all right if I follow-up with you by phone or email?

Time End _____

5.5.2 Net-to-Gross Analysis Plan (Free Rider Question Concept Map)

NTGR=1 – FR, where FR = 1-((PI+PC+PT)/3)[28]

Concept	Question	Systems Track		Comprehensive Track		Algorithm Notes
		Local Customer	National Customer	Local Customer	National Customer	
Program Influence (PI score)	FR7	☑	☑	☑	☑	• Comprehensive customers who learned about the program after construction documentation or during construction phase are full Free Riders. All others PI scores are based on FR5 or FR9. • Systems customers who learned about the program late in the construction phase are full Free Riders. All others PI scores are based on FR5 or FR9. • If data collected through the IDI contradicts the assumptions regarding the phases made above, the PI scores are based on FR5 or FR9.
	FR5		☑		☑	• This item is used for the PI score when FR7 score does not denote a free-rider.
	FR9	☑		☑		• This item is used for the PI score when FR7 score does not denote a free-rider. The score is divided by 10 to stay consistent with the other concepts.
Program Components (PC score)	FR8 a-gg	☑	☑	☑	☑	• The max influence score is taken from across these items and counts as the PC score.

[28] Note the additional adjustments and rationale described in Section 3.1.5 .

Concept	Question	Systems Track		Comprehensive Track		Algorithm Notes
		Local Customer	National Customer	Local Customer	National Customer	
Program Timing and Efficiency (PT score)	FR11	☑	☑	☑	☑	• For Systems projects, the PT score will be the max of these three items. • For the Comprehensive projects, the max of these three will become the base PT score which may be increased by the additive items (FR13 and FR14) below. • In all cases the final PT score will be reversed to keep it aligned with the other concepts.
	FR12	☑	☑	☑	☑	
	FR10	☑	☑	☑	☑	
	FR13			☑	☑	• These items each add either 10% or 20% to the base PT score for a possible additive range of 0 to 40%. If the respondent states that the counterfactual was "not at all likely" (score of 0-2) then the additive is 20%; if the score is 3-5, then the additive is 10%.
	FR14			☑	☑	

5.5.3 Focus Group Guide

Focus Group Objectives

To assess the barriers to participation and how the program can better integrate itself into the decision-making process, the focus group will identify the following:

- ✓ *What are the barriers to participation among active non-participants?*
- ✓ *How do focus group participants perceive that the New Construction Service integrates with (or is complementary to) their standard new construction design processes?*
- ✓ *How do focus group participants perceive the New Construction program might impact the project design delivery process and timeliness?*
- ✓ *Who should be more involved but is not, and how can the program increase their involvement?*
- ✓ *With respect to barriers and drivers, what messaging would be most effective to reach active non-participants?*
- ✓ *What program features and/or benefits could mitigate the barriers to participation by active non-participants?*
- ✓ *In what ways could more projects be recruited into the program earlier in the design process?*

Estimated Timeline and Topic Organization

- *Introduction and Attendee Background (10 min)*
- *Program Awareness (5 min)*
- *Value of the Training (5 min)*
- *Barriers to Program Participation (25 min)*
- *Awareness of Gas Incentive (5 min)*
- *Perception of Program Alignment with Standard Practices (10 min)*
- *Potential Impact of Program on Project Timing (10 min)*
- *Effective Messaging (20 min)*
- *Drivers to Participation (10 min)*
- *Recruiting Projects Earlier in the Design Process (5 min)*
- *Effective Outreach (10 min)*
- *IECC 2012 Impact on Participation (5 minutes)*

I. Introduction and Attendee Background (10 min)

Thank you all for coming this evening. My name is Adam and I'm with Opinion Dynamics Corporation, an independent research firm that has been hired to conduct this group discussion. We're going to be talking about the ComEd and Nicor Gas Joint New Construction Service Program. As you may know, this program

encourages the building development and design communities to surpass standard building practices through financial incentives and technical assistance.

This session is being recorded so that I will have an accurate record of what is said after the session. Also, some of my colleagues are observing this group to help me with my analysis. However, all of your comments will be held in the strictest confidence, so please feel free to express your views fully.

How many of you have participated in a discussion like this before? Just a few ground rules.

- Turn off cell phones
- Recording for analysis purposes
- 2 hours – get you out by 8:00.

Please stick to the topic at hand. Please try not to interrupt others. If the conversation drifts off a topic, I may jump in to get the discussion back on track. Please don't consider that rudeness on my part, I'm simply trying to cover all the issues in a limited amount of time.

Also, I have a few notes on terminology:

- When I say “new construction” please consider new construction, addition or major renovation projects.
- The Energy Center of Wisconsin implements the New Construction Service program for ComEd and Nicor Gas. Throughout today’s discussion, I will refer to them as “ECW” or the New Construction Service Team. They put on the trainings you attended and are who you would work with if you were to participate in the program.

Finally, there is a good mix of people here tonight from across the commercial new construction industry and we value all these different perspectives. There are no right or wrong answers to the questions we will be asking tonight, but some may not apply to you. If that is the case, just sit back and listen as the discussion may lead to a topic that is applicable to you.

I'd like to begin by going around the room, and asking each of you to tell us your name, what your professional role is in the new construction industry, and how you first heard about the New Construction Services Program.

II. Program Awareness (5 minutes)

Now, I’d like you to write down on the pad of paper in front of you the one or two things you know about the ComEd and Nicor Gas Joint New Construction Program.

Please don't show your answers to your neighbors. We'll take a minute or two and then go around the room and have each person read their answers. OK, let's start.

[After a minute or two, the attendees read their answers out loud]

1. I want you to think about what we heard:
    a. Is there anything that surprised you about what is known about the program?
    b. Was there anything that wasn't said that you thought might be said?
2. What else have you heard about the program that you are maybe less sure of?
3. OK, now, by show of hands, who has ever contacted or met with New Construction Services or ECW staff to discuss a project that might be eligible for the program?
4. By show of hands, who knows someone who has participated in the program before?
    a. [Ask those who raised hands] What did you hear about their experience?

III. Value of Training (5 minutes)

Let's talk for a minute about the program trainings….

5. What is valuable about the program trainings for you? Why do you attend trainings?
    a. Have you applied anything you've learned at the trainings to your new construction projects? How about any other projects?
        i. If
    b. [If respondents mention networking] Have you worked with any professionals since connecting with them at training events?

IV. Barriers to Program Participation (25 minutes)

6. Across all the types of new construction project personnel, such as owners, architects, engineers, contractors, etc., which types are most likely to determine whether a project might collaborate with the New Construction Services team and go through the program? Why and how?
7. Typically, who on the project teams might be the most likely to prevent a collaboration with program staff? Why and how?

I'd like to hand out a sheet with one description of the program [See Appendix A]: Please read it over and we'll talk about it.

8. What are the most interesting or compelling aspect of this description? What makes them interesting or compelling?
9. Which aspects cause you the most concern or hesitation? Why?
    a. [Probe for the following barriers]:
        i. Standard practice is already energy efficient
        ii. Extra costs upfront make a high performance building unattractive
        iii. Design teams do not have the experience for a high performance project
        iv. Design teams are unable to articulate the financial and non-energy benefits of energy efficiency to owners/developers
        v. Design teams need to provide more information regarding building performance goals and strategies to achieve efficiency goals
        vi. Owners/developers are unwilling to increase first costs to gain long term savings
        vii. Owners/developers lack an understanding as to how to retain a design or construction firm with proper experience and background in designing high performance buildings
        viii. Design teams do not want to share modeling tools due to confidentiality issues
    b. [Probe for the following myths]:

i. Energy enhancements do not make as much sense today as in years past

ii. Energy costs pass through to a tenant, so there is no business case for a developer to invest in high performance

iii. Any energy efficiency enhancements in the design must pay for themselves in energy savings within two years to be worthwhile

iv. It is much riskier to design or build a high performance building

v. High performance is not feasible on smaller projects

vi. Energy efficiency is LEED – and LEED costs too much

10. What do you think has kept you from investigating the program further or contacting ECW staff?

    a. [Probe for the same myths and barriers listed above.]

11. What else would you have to know about this program before considering meeting with New Construction Services team staff to determine whether participation would benefit a project? Is there any ***specific*** thing the New Construction Services team can do to make you feel better about possibly participating?

12. Are you concerned that working with the New Construction Services team during the design process could possibly be more of a burden than a benefit? If so, what are some of the possible reasons for this?

V. Awareness of Gas Incentive (5 minutes)

13. By show of hands, who knew, before today that ComEd and Nicor Gas had teamed up to provide an integrated, joint approach to the New Construction Program?

    a. [Ask those who knew] Where did you hear about this?

14. What does this mean for you? Does it make the program any more compelling?

VI. Perception of Program Alignment with Standard Practices (10 minutes)

15. Based on your typical design processes, which aspects of the program do you think might be:
    a. Especially valuable? Why?
    b. Especially efficient or smooth? Why?
    c. Especially difficult or tedious? Why?
16. The next question is aimed more at those who are designers, architects and engineers. The program offers a design performance incentive that helps offset the additional cost of integrated and advanced system design. It also rewards design teams for retaining energy saving measures through value engineering and the bidding process. The incentive is an additional 10% of the incentive paid to the owner and is only available through the "Comprehensive Track" of the program—the track that is most appropriate for projects that are introduced to the ECW staff early in the design process. Were you aware of this incentive? What do you think of it?
17. [Ask owners, developers, etc.] Based on how you normally conduct your business in the new construction industry, which aspects of the program did you think might be:
    a. Especially valuable? Why?
    b. Especially efficient or smooth? Why?
    c. Especially difficult or tedious? Why?

VII. Potential Impact of Program on Project Timing (10 min)

18. I know we have many different types of professions in this group that might have different perspectives on how the program can impact project timing. In general, though, do you think participating in the program might affect a project's design delivery process and final completion?
    a. Specifically, why is that? [Ask each attendee around the room]
19. In what ways might participation in the program actually speed up design development or overall project completion?
20. In what ways might participation in the program actually slow down design development or overall project completion?

VIII. Effective Messaging (20 min)

I am going to pass out a list of potential benefits to participating in the program.

[Pass out Program Benefits Lists, Appendix B]

21. Please circle the top four potential benefits you find to be the most compelling considering your professional role in building new construction and renovation.
    a. [After attendees have circled the items] What did you circle and why is it compelling to you?
22. Please place and "X" by any of benefits that you perceive to be irrelevant to you or are actually a non-benefit?
    a. [After attendees have placed an "X" by the items] What did you place an "X" by and why did you select these?
23. The findings I am about to read were derived from research with past program participants. Please think about what these statements mean to you:
    a. 'Past program participants have been very satisfied with the program.'
    b. 'Many past participants plan to start working with the program much earlier in the design process next time they have a potentially eligible project.'

    What do you think of these findings? Do they make you more likely to contact the program the next time you have a potentially eligible project?

IX. Drivers to Participation (10 min)

24. Do any of the potential program benefits or past findings we have presented so far, address things that have kept you from further engagement with this program? What were they?
25. What else could the program offer to cause you to want to investigate it further or participate in it?

X. Recruiting Projects Earlier in the Design Process (5 min)

26. Much of the value of the program comes from collaborating with the program early in the design process. This results in larger incentives, more extensive technical assistance, more energy savings, and more net income.
    a. What do you think would make the program even more attractive to architects, designers, or engineers early in the design process?
    b. What do you think would make the program even more attractive to property owners, developers, or contractors early in the design process?

XI. Effective Outreach (10 minutes)

I am going to pass out a list of some of the ways the program tries to reach those in the new construction industry. We've divided the list into two groups based on general representation in the market. One set will likely be more appropriate to you, but please take a moment to look across both sets of organizations on the list. Meanwhile I am going to check in with my assistant to see if there is anything else that I need to ask you.

[Pass out Contact Lists, See Appendix C; Check in with Garrick who will have collected the 1 or 2 follow-up questions that the observers really want to see explored in the remaining minutes.]

27. By show of hands, does anyone not subscribe to newsletters or updates from at least one of these groups?
28. Are there any other groups or associations you think the program should contact to let your peers or colleagues know about the program?
29. The program reaches out to architects, designers, and engineers on the one hand, and property owners, developers, and contractors on the other. Is there anyone else that you think should be involved
30. The program regularly reaches out by email to those who have attended trainings in the past. By show of hands who has noticed one in their inbox in the past three months or so?
    a. What do you think of these emails?

b. Have you opened or read them?

31. What are the best ways to reach out to past workshop attendees like you?

    a. Probe for

        i. Direct phone calls?

        ii. Other methods?

XII. IECC Impacts on Participation (5 minutes)

32. IECC[29] 2012 comes into effect in January 2013. How do you think this will this affect your work?

    a. How will it affect energy efficiency in design and final construction on your new construction projects?

    b. Do the upcoming changes in the code make you more or less likely to participate in the program? Why?

    c. How best could the program support you in realizing increased efficiency over IECC 2012?

[29] Illinois Energy Conservation Code

Appendix A: Program Description

The New Construction Program is for businesses or design firms who are in the early design stages of a new construction, addition or major renovation project to be built in ComEd or Nicor Gas territory. The program provides cash incentives and technical assistance to encourage building owners, designers and architects to surpass standard practices. The program supports your project's goals while offering the opportunity to explore energy-saving ideas and strategies which offer long-term energy and cost savings for your project. Services include:

- Free access to technical experts to identify ways to save energy and lower operating expenses;
- Energy modeling or whole-building energy simulations to optimize the building design for energy performance;
- And identification of energy-efficiency measures such as lighting and HVAC equipment

Financial incentives include:

- Up to $200,000 in cash incentives per project to the owner or developer: for installing energy-efficient equipment; and
- Up to an additional award of 10% of owner's incentive to the design team lead for coordinating with the program.

Appendix B: List of Program Benefits

1. Program participation is easy
2. In addition to energy savings, program participation results in a variety of non-energy benefits
3. The program has a long set of successful case studies some of which are likely to be similar to your project
4. The program provides potential financial results to participating
5. The program offers several clear explanations of participation including face-to-face meetings, fact sheets, etc.
6. The program provides ways for you to use non-energy benefits to discuss energy efficiency with your clients
7. The program assists you in creating higher quality spaces for clients
8. Program staff understands that it takes more effort to do high performance and so the program exists to assist you when and where you need it
9. Participating in the program results in saving money and increasing net operating income
10. Participating in the program results in increasing property value
11. Participating in the program results in reduced maintenance and risk
12. Participating in the program results in a better work environment
13. Participating in the program results in increased tenant appeal
14. Participating in the program results in reduced environmental impacts
15. Participating in the program results in greater community appeal
16. Participating in the program can result in marketing, project profiling, public relations benefits, etc.

Appendix C: List of Key Allies

Design Team Oriented:

- American Institute of Architects (AIA)
- American Society of Heating Refrigeration and Air-Conditioning Engineers – (ASHRAE)
- American Society for Healthcare Engineering (ASHE)
- Design Build Institute of America (DBIA)
- Illuminating Engineering Society (IES)
- International Association of Lighting Designers (IALD)
- U.S. Green Building Council (USGBC)

Owner, Developer, Contractor Oriented:

- Associated General Contractors
- Building Owners and Managers Association (BOMA)
- Design Build Institute of America (DBIA)
- International Facility Managers Association (IFMA)
- Chicago Center of Green Technology
- National Association of Real Estate Investment Managers (NAREIM)
- National Association of Real Estate Investment Trusts (NAREIT)
- National Association of Industrial and Office Properties (NAIOP)
- ComEd Account Managers

5.6 Verification, Due Diligence and Tracking System Memo

To: Zach Obert, WECC; Sandra Henry, ComEd; Tate Walker, ECW

Copy: Eddie Deckert, WECC; David Nichols, ComEd; Scott Dimetrosky; Jennifer Hinman, David Brightwell, ICC

From: Laura Tabor, Julianne Meurice, Randy Gunn, Navigant
Adam Burke, Garrick Wahlstrand, Opinion Dynamics Corporation

Date: September 21, 2012

Re: Verification, Due Diligence and Tracking System Review of Nicor Gas and ComEd Joint Business New Construction Program

This document provides the results from our due diligence review of the quality assurance, program tracking, and savings verification procedures of the Nicor Gas and ComEd Joint Business New Construction program. The Verification and Due Diligence recommendations are based on findings from the in-depth interviews with the program staff and the implementation team, as well as review of program documentation. For the Tracking System recommendations, the evaluation team reviewed the program operations manual and compared a sample of projects to the tracking system extract. The primary areas of inquiry were to determine:

- Whether appropriate eligibility criteria have been properly adhered to and applications are appropriately completed and backed with supporting documentation
- Whether the QA/QC activities are adequate and unbiased (e.g., are samples statistical, is there incorrect sampling that may skew results, etc.)
- Whether project information is entered in an accurate and timely manner in the tracking system and savings were calculated correctly.

This memo is based on information disclosed by Energy Center of Wisconsin to the evaluation team that is confidential.

Overview of Findings

This section presents the observations and recommendations the evaluation team reached after completing the review.

Verification and Due Diligence

ECW's verification and due diligence procedures meet nearly all aspects of national best practices. The program organizes project documentation well and employs well-qualified technical staff to conduct project analysis and inspections.

The evaluation team offers the following observations regarding ECW's quality assurance and verification procedures for the joint Business New Construction program:

- Current verification practice is to complete an on-site visit for all projects if possible. If a physical inspection cannot be completed, ECW uses invoices and construction documents to verify projects. However, this system may be inefficient for smaller projects and may not adequately serve for large and complex projects. ECW may also want to consider using performance verification for large projects with high uncertainty. While the cost of this approach is too high to utilize on a regular basis, it could be a valuable tool for select projects.
- Although ECW has designated a folder structure for organizing project files, the location and labeling of final savings calculation files is inconsistent. This makes it difficult to identify what the "final" savings for a given project should be.

Reporting and Tracking

ECW's reporting and tracking system meets many aspects of national best practices. The program tracks detailed information on all projects at all stages and also records all program outreach. However, the current SharePoint tracking system for the program is not a relational database and thus has some limitations. For this reason, ECW and ComEd have been developing a more sophisticated Frontier database which will be able to send and receive data to and from the CiviCRM system, which has recently begun tracking project outreach and contact information. The evaluation team has focused the review on the SharePoint system used for ComEd PY4 and Nicor Gas PY1. We acknowledge that some observations may be resolved with the new system.

The evaluation team offers the following observations regarding ECW's data tracking system for the joint Business New Construction program:

- The current tracking system has multiple fields for project identification that are not used consistently across old and new projects. The "Project ID Legacy" field, which is a manually generated identifier, is not unique and contains three sets of duplicates.
- The tracking system captures all key data necessary for processing rebates. Contact information is also tracked but cannot be directly linked to project-level data in the SharePoint system. This will be remedied with the new system. The system also does not include measure level or end-use level data, or estimations of incremental or total project cost.
- Although interactive gas effects are calculated for some projects, they are not consistently reported through the tracking system. This data should be tracked for all projects to facilitate benefit-cost analysis.
- ECW confirmed that data validation is used in several fields and that the program uses checklists to verify final tracking values at project closeout. However, we observed a few instances of savings and incentives which did not match program documentation. None of these errors would significantly impact the program, but they illustrate a need for closer adherence to quality control procedures.
- There is very little documentation of the tracking system beyond the brief description in the program manual. The program should create a data dictionary for the new tracking system to define each field and any links between fields, tables, and systems. This not only facilitates

evaluation but also enables new staff working on the program to learn the system more quickly.

Summary of Recommendations

The evaluation team offers the following recommendations in relation to the quality assurance and verification procedures as well as the tracking system for the joint Business New Construction Program:

- The evaluation team recommends revising inspection protocols to allow smaller projects to automatically be inspected through document review while requiring larger projects to be physically inspected. This will cut costs for small, simple projects and ensure that large and complex projects receive greater attention.
- We also recommend revising protocols to consider using performance verification for large and complex projects where the uncertainty of savings is high. This would give ECW the opportunity to tie project simulation models to actual consumption data and improve *ex ante* estimates. While cost prohibitive for the majority of projects, this method could be justified for select projects. As the energy code becomes more stringent and building owners pursue newer and more complicated technologies this will become an important tool.
- The team recommends formalizing a naming convention and designated location for final savings calculations files. If changes are made to a project's calculations after verification, a new file should be saved to highlight these changes.
- We recommend adding the following information to the tracking system for all projects:
    - Measure or end-use level data. We understand the program's effort to consider holistic savings as much as possible. However, we feel that at least indicating which measures or end uses saw efficiency improvements in the project would give users more insight into a project "at a glance."
    - Cost data. Incremental cost is very difficult to estimate for new construction programs. Because ECW works very closely with design firms on many projects, they have a unique opportunity to seek out more accurate incremental cost estimates as projects go through the design process and make decisions about which measures to include. We recommend exploring this opportunity to improve incremental cost estimates and if successful, tracking incremental cost data at the project or measure level.
    - Interactive savings. While interactive effects do not always affect rebates, they are important for benefit-cost analysis and should be tracked whenever they are calculated.
- We recommend investing in documentation of the new Frontier and CiviCRM tracking systems, including a data dictionary which defines tracking system fields and the links between them.

Data Collection

This assessment relied on in-depth interviews with program and implementation staff and descriptions of program processes, such as those documented in the program manual. We also reviewed project documentation for a sample of 22 completed projects from ComEd PY4/Nicor Gas PY1. To conduct the best practices benchmarking assessment, we consulted the *Best Practices Self-Benchmarking Tool* from the *National Energy Efficiency Best Practices Study*.[30]

The results of these tasks are presented below. This is followed by the results of the benchmarking assessment.

Review of Program Operating Procedures and Tracking System

We examined the operating procedures and tracking system used by Nicor Gas and ComEd's program implementer, ECW, to process applications for the New Construction program. ECW's program operations manual provides detailed process diagrams for each of the seven stages of participation described below:

- Outreach
- Application
- Technical Assistance
- Reservation
- Verification
- Payment Request
- Payment Paid

ECW tracks projects through each phase of the participation process.

Below is our assessment of the participation process and data tracking system. The evaluation team referenced the program operations manual to compile these descriptions.[31]

Outreach
ECW staff contact project leads via phone or email within 24 hours of receiving a lead. Leads may come from program education and outreach efforts, other utility programs, account managers, or trade/professional allies. ECW logs the date each lead is received.

---

[30] "BP Self Benchmarking Tool_Final 110707_with Scoring Sheets.xls" from the National Energy Efficiency Best Practices Study. Pacific Gas and Electric Company, 2007.

[31] "12-1-11 FINAL DRAFT NC Operations Manual Vol 2.pdf," provided to the evaluation team via SharePoint on March 29, 2012.

Once in contact with project leads, ECW requests additional information as needed and makes a recommendation to ComEd and Nicor Gas to either:

1. Refer project to (an)other Nicor Gas or ComEd program(s) as appropriate
2. Accept project into New Construction program
3. Deny project

Within 48 hours the utilities must approve or deny ECW's recommendation. Once utility confirmation is received, ECW communicates the decision to project lead as well as the lead generator via email. If the project is accepted, ECW requests that the participant fill out the New Construction application.

Application
The application phase begins when the participant submits an initial application. ECW tracks the date this application is received and acknowledges receipt. The application review covers the following areas:

- Building Size
- Phase of design
- Completion date
- Confirm located in ComEd and/or Nicor Gas service territory
- Whether project is public or private sector
- Potential savings
- If project represents a key customer or market demonstration
- Commitment of the owner
- Likelihood of construction

Once ECW has collected all information necessary to perform this review, staff make a recommendation to ComEd and Nicor Gas to accept the project in one of the three tracks, refer the project to another program, or deny the project. The three project tracks are as follows:

- Systems Track (gas and electric)
- Comprehensive Track (gas and electric)
- Small Buildings Track (electric only)

Again, the utilities respond to ECW within 48 hours and ECW in turn communicated the decision from the utilities within 48 hours of its receipt.

Technical Assistance
Once ECW accepts the project application into one of the program tracks, staff arrange a meeting with the lead contact from the project. This meeting serves to familiarize ECW with the project as

well as introduce program offerings to the client. ECW works with the client to finalize the program track and set project expectations. ECW then conducts analysis for the project.

For Systems track projects, this analysis (technical assistance) may include:

- Recommendations for measure upgrades
- Identification of multiple system savings resulting from upgrades
- Preliminary estimates of savings and incentive levels.

For Comprehensive Track projects, technical assistance may consist of:

- Complete energy modeling using industry software, illustrating interactive effects
- Scaled energy modeling using spreadsheet analysis
- Providing energy model outputs listing baseline and measure assumptions as well as energy and cost savings estimates
- Providing measure recommendations to owner and/or design team
- Participation in project meetings with owner and/or design team
- Presentation and explanation of model results to owner and/or design team
- Design assistance
- Preliminary estimates of savings and incentive levels

ECW does not provide technical assistance to projects in the Small Buildings Track.

ECW will present analysis results to the client and reiterate analysis as necessary until the client agrees to a measure package.

Reservation

Once the client and ECW agree on a measure package, ECW creates a Measure Incentive Agreement (MIA) to send to the client. A Design Incentive Agreement (DIA) is also included for Comprehensive Track projects. ECW reserves the project savings if the client returns the signed MIA and DIA, if included, within 60 days.

ECW will call to verify that construction is in progress within 30 days of scheduled start date.

Verification

Once construction is near completion, ECW will schedule an inspection to verify that the client has installed program measures. It is the client's responsibility to notify the program when the building is substantially complete. ECW notifies the utility representative(s), design team, and owner of the site visit scheduling.

Site visits must verify the following using a standardized site visit report:

- Verification of technologies
- Spot check and calculation of LPD for lighting savings
- HVAC model numbers
- Confirm occupancy
- Confirm hours of operation
- Confirm tax ID number
- Confirm square footage
- Confirm owner information
- Record meter number

In addition, ECW takes verification photos and seeks to review on-site plans if available.

ECW compares the verification findings to the MIA and DIA, design and product information provided by the client, and energy analysis assumptions and results. If the reviewer identifies any discrepancies, the analysis must be updated to calculate final savings and incentives. Once all discrepancies have been resolved, ECW notifies the owner of the final incentive amount and change the project savings status to installed.

Payment Request and Payment Paid
ECW notifies ComEd and Nicor Gas of payment requests and the utilities review payment lists during bi-weekly meetings. Once the utilities approve the payments, ECW forwards the check list to their accounting office for distribution. ComEd and Nicor Gas may request hand delivery of checks for key customers.

Once checks have been issued ECW uploads all archived project files to a central FTP site for evaluation.

Tracking System
Data tracking for this program has two components: first, ECW creates a folder for each project where project files are meant to be stored in a defined system (See Appendix A, "Project File Setup"). The defined structure existed for all projects we reviewed. However, we did not observe consistent use of archives for old files and the naming convention for final files was not consistent. For example, some projects changed after the verification visits had separate calculation files in the "Verification" folder, while others simply noted or made changes directly in the original calculations. In addition, some calculation files were still titled as templates and the file name did not reference the project name.

The second component is the SharePoint tracking system which contains key summary data for all projects. The evaluation team was not able to access this site but reviewed extracts from it. The

program is shifting to a Frontier system which is expected to launch by the end of 2012. The SharePoint system currently tracks basic project information, including project name and unique ID, savings and incentives, and milestone dates for each project. ECW confirmed that contact information is also tracked but cannot be directly linked to project data in the current system.

Tracking System Extract Review

In the tracking data extract ECW submitted we found 28 fields, listed in Table 5-10.

Table 5-10. SharePoint Tracking System Extract Field Names

Project	Annual Therm Savings
Building Type	Elec Measure Incentive
Current Stage	Gas Measure Incent
Activity Type	Design Incentive
Project Track	Annual kW Savings
Nicor Joint?	Application Date
Accepted into Program	Estimated Completion Date
Program Year	Incentive Paid Date
Proj ID	Outreach Date
Project ID Legacy	Analysis Delivered Date
Building Area ft2	Analysis Start Date
Number of Stories	Incentive Reservation Agreement Date
Tech Assistance Cost	Verification Site Visit Date
Annual kWh Savings	Incentive Payment Request Date

The evaluation team reviewed these fields for the 50 completed PY4/PY1 projects and found that while most of the fields are tracked consistently, some have incomplete information. This may be due to the addition of fields after projects were completed or other changes to the tracking system. A summary of these observations is compiled in Table 5-11.

Table 5-11: Tracking System Review Observations

Data Observation	Possible Explanations
22 projects with blanks in "Number of Stories"	Number of stories unknown
42 projects with blanks in "Tech Assistance Cost"	Field added later or technical assistance not significant
28 projects with blanks in "Annual Therm Savings"	No therm savings, not Nicor Gas Joint, field added with start of joint program
1 project with blank in "Elec Measure Incentive"	Gas-only project
34 projects with blanks in "Gas Measure Incent"	Electric-only projects, field added with start of joint program
10 projects with blanks in "Incentive Paid Date"	All of these projects are still in the "Payment Requested" phase
1 project with blank in "Outreach Date"	Project may have contacted program without any outreach
1 project with blank in "Analysis Delivered Date"	Unclear
1 project with blank in "Analysis Start Date"	Unclear
4 projects with blanks in "Incentive Reservation Agreement Date"	Unclear

In addition to these issues, the evaluation team observed that there are two fields for project identification—"Proj ID" and "Project ID Legacy." All of the PY4/PY1 completed projects have identical entries for "Proj ID," but it appears to have been used as a unique identifier for previous program years. ECW confirmed that "Proj ID" is automatically generated by SharePoint, but is not unique, and that "Project ID Legacy" is a manually generated unique identifier. However, the evaluation team observed three duplicate "Project ID Legacy" entries. In one case, the two projects with the same "Project ID Legacy" also had identical values for "Proj ID." We strongly recommend enabling automatic generation of a unique identifier. ComEd confirmed that this will be a feature of the new Frontier system.

Review of Project Files

The evaluation reviewed the sample of 22 projects selected for the impact evaluation to ensure that the correct savings and incentives were entered in the tracking system. We checked the following fields:

- Elec Measure Incentive
- Gas Measure Incent
- Design Incentive
- Annual k W Savings
- Annual k Wh Savings
- Annual Therm Savings

For the incentives, we ensured that the sum of the gas and electric incentives matched the amount displayed in the "Payment Letter" for each project. We used the design incentive payment letter to verify the design incentives.

For the gas and electric savings, we compared the tracking system values to the savings calculations found in the project files. At times it was difficult to identify the correct final calculations because they are not always stored in the same place and are inconsistently labeled.

Overall the results of the review showed that ECW is transferring data to the tracking system with reasonable accuracy. There were a few minor exceptions, described in Table 5-12.

Table 5-12: Discrepancies Observed Between Tracking System and Project Files

Project ID Legacy	Comment
001110	Therm interactive savings not updated after verification (only affects benefit-cost as project is not in Nicor Gas territory).
001111	Demand savings in tracking system are 1 kW higher.
003410	Gas incentive of $25 is listed in the tracking system although project is not joint; this amount was not included in the payment letter to the customer.
003410	The calculations show interactive gas savings of 810 therms which were not reported in the tracking system (again only affects benefit-cost).
005510	Demand savings in tracking system are 3.8 kW lower than in project file.
005510	The calculations show interactive gas penalty of -798 therms which were not reported in the tracking system (again only affects benefit-cost).

Another issue observed in this review is that all of the joint Nicor Gas participants received payment letters on ComEd letterhead with no reference to Nicor Gas or their therm savings. This included a project with only gas savings.

Benchmarking

To conduct the best practices benchmarking assessments, we compared ECW's practices (shown as a bullet list) with the *Best Practices Self-Benchmarking Tool*[32] from the *National Energy Efficiency Best Practices Study (numbered items in italic font)*. The benchmarking categories used were Quality Control and Verification and Reporting and Tracking.

Quality Control and Verification
Table 5-13 summarizes the scores as determined by the Self-Benchmarking Tool criteria in the "Quality Control and Verification" section. The bulleted list below provides additional descriptions of the chosen rating.

Table 5-13: Quality Control and Verification Benchmarking Scores

ID	Best Practice	Score
1	At the project outset, clearly identify qualifying measures to be included in the project, along with their expected impacts	Meets best practice
2	Clearly define post-inspection policies and procedures	Needs some improvement
3	Track every project at every phase	Meets best practice
4	Make sure that project inspectors are equipped with the training and experience required for the task	Meets best practice
5	For complex projects, especially those involving controls, consider requiring performance verification	Needs some improvement
6	Tie verification to full building occupancy	Meets best practice

1. *At the project outset, clearly identify qualifying measures to be included in the project, along with their expected impacts*
    - Meets best practice. ECW uses the MIA to define the scope of each project after working with the customer to reach a decision on which measures will be rebated.
2. *Clearly define post-inspection policies and procedures*
    - Almost meets best practice. ECW performs on-site inspections for all projects if possible. If for some reason a physical inspection is not possible, verification review is performed using construction documents, invoices, and specification sheets.

[32] See the Best Practices Self-Benchmarking Tool developed for the Energy Efficiency Best Practices Project: http://www.eebestpractices.com/benchmarking.asp.

3. *Track every project at every phase*
    - Meets best practice. ECW tracks each project at every phase from outreach to payment using both the SharePoint system and CiviCRM, which is used to track outreach and program communications with potential and actual participants.
4. *Make sure that project inspectors are equipped with the training and experience required for the task*
    - Meets best practice. ECW maintains a small staff for this program and all employees have professional training in engineering or architecture. This makes them well-qualified to complete inspections.
5. *For complex projects, especially those involving controls, consider requiring performance verification*
    - Needs some improvement. The program does not have formal requirements for considering performance verification and to date has not used this method as it is cost prohibitive given the size of the program relative to the utilities' overall portfolios.
6. *Tie verification to full building occupancy*
    - Meets best practice. ECW will not pay a project until the occupancy certificate has been verified or occupancy is verified through a site visit.

Reporting and Tracking Benchmarking

Table 5-14 summarizes the scores as determined by the Self-Benchmarking Tool criteria in the "Reporting and Tracking" section. The bulleted list below provides additional descriptions of the chosen rating.

Table 5-14: Reporting and Tracking Benchmarking Scores

ID	Best Practice	Score
1	Define and identify the key information needed to track and report early in the program development process	Needs some improvement
2	Minimize duplicative data entry	Needs some improvement
3	Develop accurate algorithms and assumptions on which to base estimates of savings	Not rated
4	Design databases to be scalable to accommodate changes on program scope	Meets best practice
5	Use the internet to facilitate data entry and reporting for private-sector market actors	Meets best practice
6	Automate routine functions such as monthly reports	Needs some improvement
7	Include rigorous quality control screens for data entry	Needs some improvement
8	Carefully document the tracking system	Needs significant improvement

1. *Define and identify the key information needed to track and report early in the program development process*

- Almost meets best practice. ECW tracks key project metrics such as stage in the application process, savings and incentives. However, all tracking is at the project level and does not include any measure or end-use specific data.

2. *Minimize duplicative data entry*

    - Needs some improvement. The current system requires manual data entry. However, the new Frontier system in conjunction with the CiviCRM will eventually be able to directly upload project data from application forms. Furthermore, the Frontier and CiviCRM systems are designed to avoid duplicating data efforts. We expect that the new system will meet best practices for this area.

3. *Develop accurate algorithms and assumptions on which to base estimates of savings*

    - Not rated. We will evaluate this through the impact evaluation.

4. *Design databases to be scalable to accommodate changes on program scope*

    - Meets best practice. The program's initiative to move to a more sophisticated tracking system shows that program staff is committed to maintaining tracking systems that will best serve the program. ComEd and ECW confirmed that minor changes to the new system can be made in two to four days and major additions can be made in about six weeks.

5. *Use the internet to facilitate data entry and reporting for private-sector market actors*

    - Meets best practice. Both the current and new system utilize online platforms for data entry and reporting. As discussed below, the reporting capabilities of the Frontier system will exceed the current SharePoint functions.

6. *Automate routine functions such as monthly reports*

    - Needs some improvement. The current SharePoint system has limited reporting capabilities. The new Frontier system will maintain the existing system's reporting functionality and will allow more extensive automated reporting. We expect that the new system will meet best practices for this area.

7. *Include rigorous quality control screens for data entry*

    - Almost meets best practice. ECW confirmed that the SharePoint system uses data validation to limit entries in several fields. ECW also uses checklists to ensure that program staff correctly enter final project data. However, the evaluation team observed some discrepancies between project files and the tracking system.

8. *Carefully document the tracking system*

    - Needs significant improvement. The only documentation of the tracking system is in the program operations manual and is not very detailed.

5.6.1 Memo Appendix A: Project File Setup

Received in data request from ECW August 22, 2012.

Project File Setup
ComEd New Construction Program, 6/1/09

Please set up all project folders the following way. This will allow multiple people to work on/follow the same file, fast location of flies, prevent divergent file evolution by making sure all are working on the latest version, and ease project close out. In general, files and folders should be set up in the following order:

Program Forms
Application
Acceptance Letter/Email
MIA
DIA
Site Visit Report
Payment Request
Project Closeout

Project Correspondence
Emails
Meeting notes
Phone Notes
Contact information

Project Plans and Specifications
All files received from design team

Tech Assistance
Energy Model Results
Archived files and reports
HVAC and Lighting calculations
Energy model (or archive file, shortcut, etc.)
Archive folder for previous iterations**

Verification
Site visit photos
Notes

**Date and initial files when possible, and put old versions in an archive file under the appropriate folder.

Thanks, Tate

5.7 Program Theory Logic Model Review

5.7.1 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 Business New Construction program in these terms.

5.7.1.1 Program Goals

The main goal of the Nicor Gas Business New Construction program is to achieve therm savings through the construction of high-efficiency new commercial buildings. New construction participants may choose between the Comprehensive or Systems Track. This program is a joint program with ComEd, and thus also has the goal of achieving electric energy and demand savings. Beyond energy savings, the program aims to increase the market share of high-performance C&I buildings in the ComEd and Nicor Gas service territories.

5.7.1.2 Motivating Conditions/Barriers

The program has identified the following barriers to program success:

- Lack of awareness of high-performance building design
- Misconceptions about high-performance buildings, including perceived risk of energy-efficient equipment, perceived difficulty of design, and concerns about high first costs
- Lack of demand for high-performance buildings

The program will also soon face a challenge in the upcoming energy code change. Although the current code is IECC 2009, Illinois is expected to adopt IECC 2012 by January 2013. The program plans to shift all projects to a single Comprehensive Track in upcoming years to enable all participants to find savings beyond the new code standards.

5.7.1.3 Target Audience

This program targets a wide range of market actors. The most significant are architecture and engineering design firms and their clients, namely building developers and occupants. In addition to these direct participants, the program also aims to influence state agencies and organizations, code committee members, as well as building operators and facilities managers.

5.7.1.4 Desired Actions/Behaviors

The program aims to increase the prevalence of high-performance buildings in the ComEd and Nicor Gas service territory.

5.7.1.5 Strategies/Rationale

The joint Business New Construction program leverages aggressive outreach and numerous training opportunities in recruiting potential participants. The program works to develop close relationships with design firms, namely in architecture and engineering. The marketing team actively seeks out new construction projects and uses direct outreach to engage with key decision-makers for large projects. The program offers both cash incentives and in-depth technical assistance, which includes full energy models for comprehensive projects and continuous communication with the design team. Program staff work hard to help customers find as many energy efficiency opportunities as possible.

In addition to incentives and technical assistance, the program offers several training opportunities for both participants and non-participants. In addition to in-depth sessions on specific topics, ECW, the program implementation contractor, holds "lunch and learn" sessions. By offering training sessions, the program engages the building community and increases awareness and knowledge of high-performance design strategies.

5.7.1.6 Messages/Communications Vehicles

The majority of program marketing is done through the direct outreach and training sessions described above. The program also uses email blasts to advertise training sessions and program updates. ECW often meets in person with design teams throughout participation to develop connections with participants and help them with their efficient design work.

5.7.2 Program Logic Model

This section presents how the Business New Construction program activities logically lead to desired program outcomes. Figure 5-1 presents the Nicor Gas and ComEd Joint Business New Construction Program model diagram showing the linkages between activities, outputs, and outcomes, and identifying potential external influences. The diagram presents the key features of the program. The logic diagram presented here is at a slightly higher level than the tables in the report, aggregating some of the outcomes in order to provide an easier-to-read logic model.

The remainder of this chapter presents the resources, activities, outputs, outcomes, and associated measurement indicators associated with the Business New Construction program.

5.7.2.1 Resources

The ability of the Business New Construction 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 5-15.

5.7.2.2 Activities

The purpose of the Business New Construction program is to educate and assist eligible target decision-makers with making their new non-residential buildings more efficient. New building projects in the Nicor Gas and ComEd service territories are eligible for the program. The program will reach potential participants through activities designed to generate energy savings over the longer term (Table 5-16). These activities are as follows:

- Conduct training sessions on high-performance building design
- Use current research to highlight benefits of high-performance buildings in fact sheets and case studies
- Promote efficient design through publications and presentations at conferences
- Work with and support professional organizations promoting program message
- Provide technical assistance to participants
- Use email to advertise program offering, including training sessions
- Actively seek new projects and meet with participants in person

Table 5-15. Program Inputs and Potential External Influences

Program Inputs
Nicor Gas and ComEd ratepayer funds
Nicor Gas and ComEd staff resources
ECW staff resources and experiences
Utility and implementer knowledge of the target market
External Influences and Other Factors
Economic environment
Energy prices
Federal and state standards
Perceived need for conservation
Funding available to participants

Figure 5-1. Program Logic Model

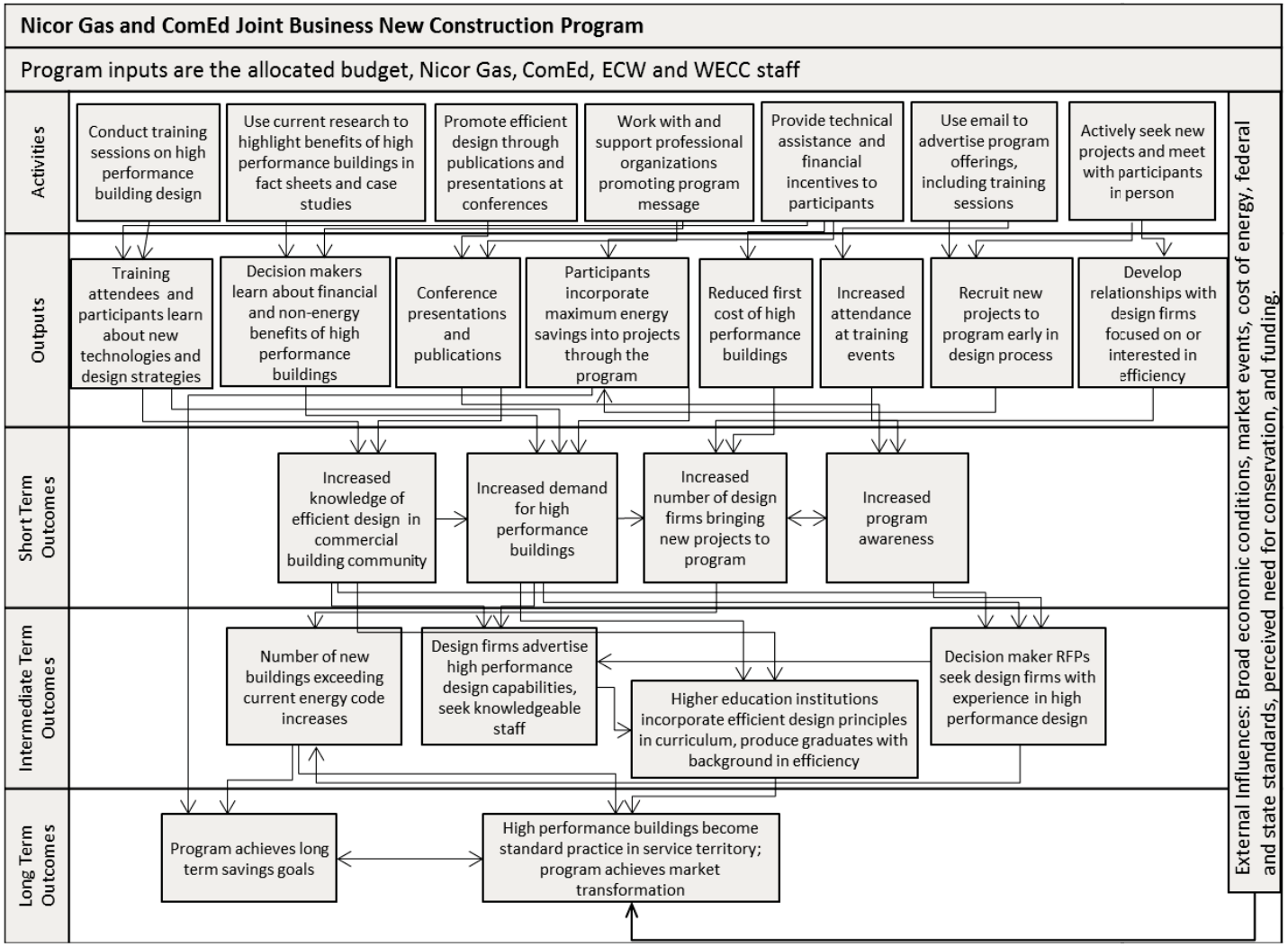


Table 5-16. Business New Construction Program Activities

Conduct training sessions on high-performance building design
ECW hosts training sessions and webinars conducted by program staff and regional technical experts. ECW offers "lunch and learn" trainings. Training sessions are open to both participants and non-participants.
Use current research to highlight benefits of high-performance buildings in fact sheets and case studies
ECW conducts its own research on best practices and new technologies. This research is compiled into fact sheets and case studies to help educate potential participants. ECW also compiles collections of useful references to pass on to potential participants.
Promote efficient design through publications and presentations at conferences
ECW makes presentations at key conferences and other events. ECW publishes research findings in publications.
Work with and support professional organizations promoting program message
ECW networks with professional organizations such as ASHRAE to promote program message. Supports professional organizations that promote the same message of efficiency ECW also reaches out to state agencies to promote increases in energy code and energy requirements for state buildings.
Provide technical assistance and financial incentives to participants
ECW provides detailed technical assistance for most projects and all comprehensive projects, including building simulation models. Program offers rebates of $0.10 per kWh and $0.50 per therm saved up to $200,000 per facility (gas incentives for joint Nicor Gas participants only).
Use email to advertise program offering, including training sessions
Regular "email blasts" to participants and training attendees keep community aware of program. "Email blasts" also advertise training sessions offered.
Actively seek new projects and meet with participants in person
Marketing team stays abreast of new projects in service territory and contacts key decision-makers directly to encourage participation. Once engaged, participants may meet with ECW in person to review technical assistance and project options.

5.7.2.3 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. An example for the Business New Construction program would be the number of projects completed in

the program or the number of training session attendees. 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' and ComEd's program activities and will vary depending on the time period being assessed. An example would be energy 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 5-17) and outcomes (Table 5-18), taken directly from the logic model and associated measurement indicators. For each indicator, a proposed data source or collection approach is presented.

Table 5-17. Program Outputs, Associated Indicators, and Potential Data Sources

Outputs	Key Performance Indicators	Data Sources and Potential Collection Approaches
Training attendees and participants learn about new technologies and design strategies.	Number of attendees at relevant training sessions	Interviews with program staff, program records of training attendance
Decision-makers learn about financial and non-energy benefits of high-performance buildings.	Quantitative: number of case studies and fact sheets developed Qualitative: Level of knowledge observed by program staff in participants	Program records and case study/fact sheet examples, interviews with program staff
Conference presentations and publications	Number of presentations given and publications released	Program records, interviews with program staff
Participants garner maximum energy savings on projects through program.	Percent above code baseline saved by participants; gross savings achieved	Program tracking data, interviews with program staff
Reduced first cost of high-performance buildings	Incentive amounts relative to project costs and incremental costs	Program tracking data, decision-maker surveys (includes design firms)
Increased attendance at training events	Change in number of attendees at relevant training sessions: since program launch, year to year	Interviews with program staff, program records of training attendance
Recruit new projects to program early in design process	Number of participants at each stage in design/construction process	Program tracking data, decision-maker surveys
Develop relationships with design firms focused on or interested in efficiency	Number of design firms submitting at least one project, percent that have more than one project in program	Program tracking data, interviews with program staff

Table 5-18. Program Outcomes, Associated Indicators, and Potential Data Sources

Outcomes	Key Performance Indicators	Data Sources and Potential Collection Approaches
Immediate-Term		
Increased knowledge of efficient design in commercial building community	Percent of design professionals with energy efficiency certifications, e.g., LEED	Market research, data from certification programs, non-participant focus groups
Increased demand for high-performance buildings	Level of demand perceived by design firms; market data as available	Decision-maker surveys (including design firms), interviews with program staff, non-participant focus groups
Increased number of design firms bringing new projects to program	Number of firms worked with and number of projects submitted per firm	Program tracking data
Increased program awareness	Level of awareness in non-participants	Non-participant focus groups
Intermediate-Term		
Number of new buildings exceeding current energy code increases	Market share of buildings exceeding IECC 2012	Market data, program tracking data
Design firms advertise high-performance design capabilities, seek knowledgeable staff	Number of firms in service territory employing professionals with energy credentials	Decision-maker surveys, non-participant focus groups, market research
Decision-maker RFPs seek design firms with experience in high-performance design	Percent of RFPs in service territories requiring firms with energy efficiency experience	Decision-maker surveys
Higher education institutions incorporate efficient design principles in curriculum, produce graduates with background in efficiency	Percent of higher education institutions offering energy efficiency-related courses	Design firm feedback, possible survey of higher education curricula in region

Outcomes	Key Performance Indicators	Data Sources and Potential Collection Approaches
Ultimate		
Program achieves long-term savings goals.	Electric and gas savings achieved by program relative to goals	Program tracking data
High-performance buildings become standard practice in service territory; program achieves market transformation.	Percent of new buildings reaching efficiency levels well above code, state considering raising code	Market research, state energy code status

5.8 Summary of New Construction Service Focus Group with Building Industry Active Non-participants

The following summarizes findings from the focus group held in support of the ComEd and Nicor Gas Joint New Construction Service evaluation.

5.8.1 Focus Group Objectives

To assess the barriers to participation and how the program can better integrate itself into the decision-making process, the focus group research sought to answer the following questions:

- What are the barriers to participation among active non-participants?
- How do focus group participants perceive that the New Construction Service integrates with (or is complementary to) their standard new construction design processes?
- How do focus group participants perceive the New Construction Service might impact the project design delivery process and timeliness?
- Who should be more involved but is not, and how can the program increase their involvement?
- With respect to barriers and drivers, what messaging would be most effective to reach active non-participants?
- What program features and/or benefits could mitigate the barriers to participation by active non-participants?
- In what ways could more projects be recruited into the program earlier in the design process?

5.8.2 Focus Group Setting and Participant Background

Opinion Dynamics Corporation conducted one focus group on the evening of September 10, 2012, in downtown Chicago. Adam Burke of Opinion Dynamics facilitated the focus group.

We recruited the focus group participants from those who had attended program-sponsored training events but who were not yet associated with a project submitted to the program—so-called "active non-participants." We offered focus group participants an incentive of $150.

We aimed to recruit building industry professionals involved in both the earlier stages of new construction projects, which we categorized as the "design community," and those involved somewhat later in the process, or throughout the process, which we categorized as the "build community." For the "design community," we sought to recruit architects, engineers, and designers. For the "build community," we sought to recruit contractors, energy consultants, owners, and developers. Initially, we aimed to conduct two focus groups—one each with design and build communities; however, the number of qualifying active non-participants agreeing to participate allowed only a single combined focus group.

Seven professionals from the "design community" and three from the "build community" participated in the focus group. Table 5-19 lists their professional roles in the new construction market. As shown in the table, participants were a diverse group. Additionally, participant experience in the industry ranged from about one to four decades. While a few participants were from the "build community," there were no participants who could be described as owners or developers.

Table 5-19. Focus Group Participants

Job Title	Actor Type	Community
Project Engineer	Energy Consultant	Build
Energy Consultant - HVAC expert	Energy Consultant	Build
Service Division Manager	Contractor	Build
Mechanical Engineer	Engineer	Design
Director Design Integration	Architect/Engineer	Design
Entry-Level Lighting Designer	Designer	Design
Manager of Architecture	Architect	Design
Lighting Designer	Designer	Design
Senior Lighting Designer	Designer	Design
Project Manager	Engineer	Design

5.8.3 Findings

We have organized the focus group findings into the following topic areas, each of which we discuss in detail below:

- Program Awareness
- Value of Training
- Perceptions of Risk to Project Success
- Early Involvement with the Program
- Designer Team Performance Incentive
- Awareness of Gas Incentives
- Alignment with LEED
- Project- and Measurement-specific Barriers
- Building Energy Performance Myths
- Effective Messaging and Outreach
- IECC Impacts on Participation

We provide our recommendations for the New Construction program resulting from these findings in the Recommendations section at the end of this memo.

5.8.3.1 Program Awareness

While focus group participants knew about ComEd and Nicor Gas efficiency programs in general, they were less aware of the New Construction program specifically and could only list a few details. Generally, they knew that rebates/incentives are available for lighting and HVAC efficiency improvements, and a few were also aware that technical assistance is available. Overall, however, most participants could not distinguish the program from other "ComEd's Smart Ideas" business programs.

Three participants stated that they had been confused by the program name since they were not sure if it also includes new build-outs and relocations. As one remarked, "New construction does not sound like an interior build out." Notably, one participant believes that this type of job constitutes a significant proportion of the work in the current new construction market.

Three of the participants have discussed projects with ECW but have so far not participated in the program. All three indicated they had an overall positive experience with ECW and that the staff was helpful. One participant extrapolated from the assistance they had received to date to state that the program would likely provide program participants with what they need:

> *If you go to ECW, then they'll teach you [how to participate in the program and how to design in efficiency] as you go through the project.*

None of the participants knew of other firms or individuals in the new construction industry who had participated in the program.

A few participants asked questions about program design throughout the discussion, suggesting an interest in understanding opportunities available through the program. For example, one asked about whether the program has a minimum savings threshold that must be realized by the project. Based on the content of their questions, it is likely that many of the participants' questions might have been answered had they spent time investigating the program (i.e., had reviewed current materials available on the program website or called ECW).

Several of the focus group participants indicated that they do not know enough about the program to sell it to their clients. They are hesitant to introduce the program as a potential collaborator or a possible source of revenue since they cannot offer any clear details necessary for planning. One design participant explained that his lack of program understanding kept him from introducing the program to his client:

> *We're always trying to get our clients to take more efficiency steps. So if we can bring money back that's a plus for us… What's stopped us (from participating) in the past is that we just did not know enough about (the program). We hadn't gone through it. We couldn't sell it to the client.*

Participants noted that their owner and developer clients also appear to have low levels of program awareness or knowledge, which means that their clients do not consider or initiate program participation.

Participants stated that the more knowledge they had of the program, the more they would be likely to participate in it. Additionally, they stated that if their clients were to learn more about the program, then they would be more likely to submit projects to the program. One participant explained that a targeted program fact sheet that could be passed out at initial meetings would be useful to introduce clients to the program.

5.8.3.2 Awareness of Gas Incentives

Only a few of the participants knew that ComEd and Nicor Gas offered a joint program. One person had heard about the joint program from ECW staff. Across the participants, the response to the joint program was positive. Participants believe the joint program will prevent skewing toward electricity savings. Another participant stated that it would give designers "more options," that they "would not be pushed into a corner," and that it "opens it up for designers."

5.8.3.3 Value of Training

Participants valued the trainings, with one stating that they were "well worth the time and money." The response among those who had attended the eQuest software training was particularly positive.

A few of the lighting professionals who attended the lighting trainings, however, characterized the tone of the information as "unproven but exciting." These participants stated that the evidence presented at these trainings for the lighting measures and design was not sufficient, especially in regard to color temperature and visual acuity. They doubted that the technology or the design could be implemented as well as described at the training and they are not sure if the technologies are widely accepted by others in the market.

There were two further points of concern for these participants. First, they are concerned that they would be held liable for an unproven but recommended technology (e.g., changing light conditions in a lobby, possibly causing people to trip and injure themselves). Second, they are concerned that the other program training events might also include "unproven but exciting" information. One participant explained:

> *If trainers provide cutting edge information, then it should be presented as theory as opposed to established fact.*

When participants were asked what evidence could be presented to convince them that the design or technology presented at trainings was sound, participants were at first uncharacteristically quiet, suggesting that they might be generally slow to adopt new, efficient technologies. A lighting designer stated that a good source would be the Illuminating Engineering Society (IES). Another participant suggested that ideally ECW would teach participants about quality efficiency measures and design in the course of collaborating on a project.

5.8.3.4 Perceptions of Risks to Project Success

The focus group explored the active non-participants' perceptions of risks to project schedules, budgets, and overall success. Participants discussed several barriers to program participation associated with these perceived risks.

Reluctance to invest time in the program without knowing how well the program will benefit them on future projects. While participants believe that participating in the program may produce a range of efficiency and incentive benefits for individual projects, they are reluctant to invest the time learning about the program because they believe the learning curve is steep and they are not sure that future benefits will justify their investment. Further, they are worried that the program requirements might change, which could render their time investment useless in the future. Participants suggested that ECW create a training webinar that would reduce the uncertainty by giving them more information about the program and how to participate in it.

Concerns that the program will compete with their own client services. One design participant with a basic understanding of the program described the program as a "competitor" since it offers technical assistance—a service that the designer also offers. In this light, the designer may be unwilling to promote the program to peers or clients.

Convincing clients that investigating and participating in the program is justified. Project budgets are always tight. For many projects, "the bottom line" is the final arbiter of not only the inclusion of any efficiency design and measures, but also whether there is budget available to warrant the time needed to investigate utility efficiency programs. Participants need information early on during the project to support payback period and ROI calculations. Some designers fear that any time they spend working with the program may not be supported by the budget. Participants also expressed concern for how participating in the program might impact tight project timelines. Some believe that program participation might represent another set of "program requirements" to meet and that it would require careful attention to "getting subs involved at the proper time." Notably, participants concluded that, given potential project timelines and scheduling issues, working with the program as early as possible was important. Participants suggested that the program consider certifying those who have completed the webinar; they could then use the certification to market themselves to clients and owners.

Concerns for professional liability. Focus group participants had some concern that unproved, efficient lighting design could make designers liable for building user injury and that efficient lighting design might undermine aesthetic quality to which these designers are professionally beholden. Similarly, participants from the HVAC industry noted that if CO_2 sensors for efficient demand control ventilation were to fail, they could become liable for the resulting lack of fresh air and uncomfortable space for the inhabitants.

Existing inertia within the industry. Participants described three main kinds of resistance to increased efficiency within the non-residential new construction industry. First, some have had bad experience with poorly designed, efficient buildings in the past. Second, some designers believe that

designing to code already produces high-efficiency buildings. Third, participants pointed to the unwillingness among some owner representatives and facilities managers to learn new control systems. As a way to help overcome some of the cultural inertia, some participants suggested that the program be marketed to groups of emerging professional groups and to students.

Perceptions of participation in New Construction Service being as onerous as participation in LEED. One participant explained that his "fear of the LEED experience" had kept him from fully investigating the New Construction Service. Many participants find that participating in LEED consumes many administrative hours of paperwork. They are concerned that the New Construction Service may require similar amounts of paperwork. Tight project budgets and experience with LEED paperwork caused one participant to summarize his apprehension about participating in the program:

> *'How much of my time is (participating in the New Construction program) going to take and am I going to get paid for it?' That's the question I need to get answered.*

5.8.3.5 Early Involvement with the Program

As more of the program design was introduced throughout the focus group discussions, participants generally saw the value of working with the program early in the design process. This was countered, however, by participants' need to know as clearly as possible what is involved with working with the New Construction Service and what the program could offer their projects. Some participants suggested that to get involved very early in the process, the building owners and designers need to already be aware of the program and recognize its value. Some suggested that marketing materials that architects could leave with building owners or include with proposals could be helpful in raising the awareness of building owners.

5.8.3.6 Design Team Performance Incentive

We asked focus group participants about the program's design team performance incentive, which helps offset the additional cost of integrated and advanced system design and rewards design teams for retaining energy savings measures. Participants were split as to the usefulness and benefit of the design incentive. Some designers highlighted it as a compelling aspect of the program and were pleased that the program offers awards for efficient design efforts. Others, however, were less inclined to see it as beneficial and noted potential drawbacks. One main concern was that clients or owners may require the designers to participate in the program without compensating them for their time, viewing the design incentive as compensation enough. Some thought that the incentive might present "ethical issues" if designers were to integrate efficiency based on the incentive and not what was best for their clients. As a result, one designer concluded:

> *To tell you the truth, it makes me mildly uncomfortable. It would be cleaner if it went directly to the owner.*

5.8.3.7 Alignment with LEED

Because program design is not determined by the LEED system, a substantial proportion of the projects submitted to the program are LEED projects. The program, therefore, must take into consideration how market actors are working with LEED and what their concerns are for submitting LEED projects to the New Construction program.

Participants who work in the non-profit and education sectors are much more likely to build LEED-certified buildings. These participants stated that about 85% of their projects are focused on LEED certification or otherwise focused on designing to the standard. Projects occurring outside of these sectors are less likely to focus on LEED.

The main concern participants have about program alignment with LEED is that participating in LEED requires many administrative hours for paperwork and they worry that working with the New Construction Service may require similar amounts of paperwork. To this end, participants wanted to know if they would be able to submit the energy model they used for LEED to the program.

Finally, participants noted that LEED does not have rigorous building envelope requirements. This suggests that this is one area where the program can particularly influence building efficiency in LEED projects.

5.8.3.8 Project- and Measure-specific Barriers

Through the course of the focus group, participants mentioned several project types for which it is particularly difficult to integrate efficiency.

"Build and flips" and multifamily projects. Participants find that these projects pose a challenge to incorporating high-performance measures due to the split-incentive problem (i.e., those who could decide to include efficiency do not think they will profit from the long-term savings and so do not include it).

Restaurants, hotels, and any other project in which "the experience matters. Participants thought these projects pose a challenge to energy efficiency because clients and designers believe efficient design may be less aesthetically pleasing or may increase the likelihood of failures in comfort (i.e., HVAC) and functionality, which are very important in these buildings.

Small projects. Some participants think that integrating efficiency into small projects may not be "worth the effort." For example, churches usually operate for a limited number of hours per week and, therefore, there is less of a financial incentive for energy-efficient design. Yet, another participant thought that "comfort" as an efficiency outcome might still be "sellable" in these projects.

5.8.3.9 kWh Savings in Lighting Design

One lighting designer thought that the current program design focuses more on promoting reductions in LPD as opposed to kilowatt-hours (kWh). The designer explained that this was a

conservative approach and as a result, a lighting design might not be recognized for all the efficiency incorporated into the project. The program should consider clarifying the LPD requirements and their relationship to kWh in program outreach and training efforts.

5.8.3.10 Building Energy Performance Myths

The New Construction Service has identified a number of myths, or non-fact-based ideas about energy efficiency held by the industry, that pose challenges to the program's marketing efforts. In addition to fact-based barriers to program participation probed throughout the focus group, we asked participants to discuss these myths and to assess how important they feel each is in terms of keeping them from participating in the New Construction Service. Generally, participants agreed that the following myths do keep many in the industry from participating in energy efficiency programs:

Energy enhancements do not make as much sense today as in years past.

Energy costs pass through to a tenant, so there is no business case for a developer to invest in high performance.

Any energy efficiency enhancements in the design must pay for themselves in energy savings within two years to be worthwhile.

- While most agreed with this statement, most also thought that the period is five years, not two.

It is much riskier to design or build a high-performance building.

- One HVAC designer explained:

> *The more efficiency you get, the less resiliency you usually get. The less redundancy you have, the chances are that your people are uncomfortable when something gets out of whack.*

High performance is not feasible on smaller projects.

Energy efficiency is LEED—and LEED costs too much.

- Participants nuanced their response to this statement by stating that the first part is false and the second part true. Thus, they do not necessarily equate energy efficiency with LEED, but they do believe that [LEED] costs too much.

5.8.3.11 Effective Messaging and Outreach

The focus group participants spent some time discussing how the New Construction program could best promote itself within the building development and design communities. To help identify priorities for marketing the program, we gave participants a list of program benefits and asked them to circle the three or four they found the most compelling. After a short discussion, we then asked participants to identify those they found irrelevant or actually non-beneficial. The table below lists

these potential benefits and participant reactions to them, with those benefits deemed most compelling by participants appearing at the top.

The top three rated benefits are consistent with participant statements about the importance of understanding the costs and financial benefits of participating in the program, as well as understanding the program well enough to know whether it is applicable to their projects. Only half the participants noted any of the options as irrelevant or not beneficial and these generally addressed non-energy benefits and community approval.

Table 5-20. Potential Program Benefits Scored by Participants

Potential Benefit	Number of Participants Who Found it Compelling	Number of Participants Who Found it Irrelevant or Non-beneficial
The program provides potential financial results to participants.	8	0
Participating in the program results in saving money and increasing net operating income.	8	0
The program has a long set of successful case studies, some of which are likely to be similar to your project.	5	1
Program staff understands that it takes more effort to do high performance and so the program exists to assist you when and where you need it.	4	0
The program assists you in creating higher quality spaces for clients.	3	1
Participating in the program results in increasing property value.	3	1
Participating in the program can result in marketing, project profiling, public relations benefits, etc.	3	2
The program offers several clear explanations of participation including face-to-face meetings, fact sheets, etc.	2	0
Participating in the program results in reduced maintenance and risk.	2	0
Program participation is easy	1	0

Potential Benefit	Number of Participants Who Found it Compelling	Number of Participants Who Found it Irrelevant or Non-beneficial
In addition to energy savings, program participation results in a variety of non-energy benefits.	1	2
Participating in the program results in a better work environment.	1	1
Participating in the program results in increased tenant appeal.	1	1
Participating in the program results in reduced environmental impacts.	1	1
The program provides ways for you to use non-energy benefits to discuss energy efficiency with your clients.	0	3
Participating in the program results in greater community appeal.	0	4

Note: Although there were 10 focus group participants, we only received responses from nine of the participants who are represented in the table above. Only five participants identified any of the potential program benefits as non-beneficial.

We also asked participants to discuss the best mediums for getting the attention of individuals in the building design and development industry. Based upon their discussions, the program appears to be performing outreach effectively, but there may be some opportunities for improved targeting.

Email. As past training attendees, all participants should be receiving periodic email from the program. When asked if they have seen any email coming from ECW and the program, about six or seven responded they had. In a follow-up question as to how many open and read the program email, four replied in the positive, with one calling them "absolutely worthwhile" and "good for me."

Professional Associations. We asked the participants to review a list of owner- and designer-oriented professional associations whose members the New Construction program has contacted for outreach purposes. All participants were members of at least one association but were able to suggest two additional associations that the program should contact to possibly reach their colleagues and peers. CoreNet is an association of corporate real estate professionals, workplace professionals, service providers, and economic developers. A lighting designer also suggested that the program present case studies at monthly, regional IES meetings, which look for guest speakers.

5.8.3.12 IECC Impacts on Participation

Many participants believe that meeting IECC 2009 code (and, to some extent, other city and state and professional association codes) means they already incorporate high efficiency into their projects. One designer explained:

> *I know that if I'm designing to code, I'm way ahead of all these buildings that are wasting enormous amounts of energy.*

Additionally, some participants believe that it is already difficult to incorporate higher levels of efficiency beyond code. One participant explained:

> *Codes have become so rigorous that it is difficult to eke out more than 10% savings.*

As a result, some participants believe that IECC 2012 codes will require a level of efficiency that will be very difficult to surpass significantly. One designer stated:

> *I am not sure that in two years we'll be able to beat the codes by 20%.*

5.8.4 Recommendations

Based on this discussion with participants and based on current program design, we make several recommendations to the New Construction program. These recommendations are consistent with the focus group summary findings described in this memo and 1) highlight opportunities for clarifying the program to potential participants; 2) offer them training in how to participate in and take advantage of the program; and 3) offer ways to market the program. Participants suggested case studies, webinars, and fact sheets to accomplish these objectives.

Create an FAQ to post on the website. Overall, participants indicated they need more clarity on program processes, and one mentioned that the program website was not helpful in answering his immediate questions. Although the program consistently encourages potential participants to contact ECW staff immediately, it is clear that some potential participants may be more likely to do so if they first determine that the program applies to them. The following are examples of questions and answers that would likely encourage visitors to the website to consider participating in the program more seriously.

> Isn't there a learning curve to this program, such that participating in it and learning how to benefit from it, will only be worth it if I participate across several projects?
>
> > No, you can still benefit greatly from this program by submitting just one project. This is because the program team becomes your collaborator and uses its extensive knowledge of past projects successes to see how your project can be supported. While you may have participated in 0 projects, ECW staff has nearly 100 completed projects to draw on when giving you advice as to how to best use the program.
>
> How soon will I know how much incentive money my project will be awarded?

On average, once you or your team contacts ECW staff and provides them with some basic project information, the program can give incentive estimates within a week and formalize the agreement within a month. For more information on incentives, see [link to incentive structure] and [link to past project profiles/case studies].

What is the application process like? Is it easy or tedious?

Generally, participants find the application process easy. In a third-party study, evaluators found that past participant satisfaction with the application process was high. Past participants have called the application process "smooth," "painless," and "minimal for a program like this."

Can I submit LEED materials? Can I submit COM*check*™ materials?

Yes. [How the materials are used]

How do I know if the project is in ComEd or Nicor Gas territory?

Please check the following map [link to map]

Will participating in the program impact project timelines?

Generally, participants find that collaborating with the program is an easy and smooth process that does not impact project timelines. In a third-party study, evaluators concluded that past participants find that the value of the program incentives and design assistance vastly outweighed any inconveniences associated with participation.

I am a designer. Doesn't the technical assistance the program offers compete with the services I offer my clients?

No. While the program offers technical assistance, its fundamental role is to assist the project's design team in leveraging available incentives into incorporating and maintaining high efficiency on the project. In a third-party study, evaluators concluded that past design participants found the technical assistance valuable in offering a "second set of eyes" and "validating decisions made by the design team."

How can I be sure that the recommended energy-efficient measures have been adequately proven to perform well?

[ECW-supplied answer]

Create and use a webinar to train designers, increase their understanding of the program, and provide them with a marketing tool. Focus group participants want more information about the program and want to understand how they can use the program to benefit their projects. They need the information before they start working on a particular project so that they can

offer concrete ideas to the project team during the early design. Further, some participants suggested that with a program certification (e.g., "design ally") they could promote themselves and the program in the market.

Strengthen efforts to promote existing case studies and develop new case studies. Continue developing case studies and disseminating them to the design community. Participants suggested that case studies are a good way to describe the potential program benefits for projects similar to those they are working on. Participants also mentioned that actual examples of projects describing the capital costs, rebates, and energy cost savings associated with the efficiency measures would be especially effective. Also, to alleviate concerns about liability and poor performance, case studies should include quotes from leading designers to help motivate designers to participate in the program and show them that their peers accept energy-efficient measures and designs. Case studies could include quotes from past participating designers—derived from evaluation in-depth interviews—explaining that it was valuable to have "an extra set of eyes on/sanity check for the energy model I had already developed for a project."

Expand upon the completed project types as found in the program overview sheet found at https://www.comed.com/Documents/business-savings/NC_Overview.pdf. Case studies of projects in which the "experience counts" such as restaurants and hotels will likely be necessary to persuade some lighting designers of the feasibility and proven nature of efficient lighting design.

Create one-page descriptions of the program aimed at specific target audiences. One of these descriptions should be primarily targeted to the owner/developer group but also be available to those in the design group. It should offer a basic description of the program, benefits, and an outline of a past project. Designers requested that they have something like this to pass out at early design meetings to introduce the possibility of program participation.

Another description could be targeted to projects that are already intending to incorporate some high-efficiency design such as LEED. The description should cover some key points participants noted in the discussion: 1) the program aligns with and supports high-efficiency project design; 2) program incentives help ensure that high-efficiency design and equipment are implemented; and 3) participating in the program does not require a lot of paperwork; and 4) the program encourages the submission of existing models and documentation. To help ensure high levels of program attribution, the one-pager should also make it clear that the purpose of the program is to help projects incorporate or maintain levels of energy efficiency over code, and not to award projects monetarily for pro-efficiency decisions that would have ended up in the new construction project without the program.

Reach out to newer professionals and students in the industry. Reaching out to newer professionals and students in the industry could help introduce the program to more market actors. The influx of newer designers who are aware of efficiency opportunities could help change some of the conventional inertia in the industry that overlooks, undervalues, or does not understand building efficiency.

Incorporate evidence in trainings that proves the feasibility of efficiency measures or designs. New Construction Service training materials and trainers should cite professional associations' literature where possible.

Leverage interest in building energy modeling training. Given the positive response to the building modeling trainings and the all comprehensive-track direction of the program, consider providing additional building energy modeling trainings. Target participants in these trainings and past modeling training attendees more directly with the aim of strategically promoting the New Construction Service.

Promote Gas Incentives. Given the strong, positive response to the inclusion of gas incentives, ensure that all marketing and program materials are prominently co-branded.

5.13 Building Performance with Energy Star