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Ameren Illinois Company's
Response to ICC Staff Data Requests
Docket No. 13-0498
Approval of the Energy Efficiency and Demand-Response Plan Pursuant to 220 ILCS 5/8-103 and
220 ILCS 5/8-104
Data Request Response Date: 11/19/2013

ST 1.01

Referring to Ameren Ex. 9.0, page 6, the Company has proposed the addition of the following language to Rider GER concerning the definition of Projected Costs:

Such Projected Costs to be recovered during the Program Year may include adjustments for (a) costs incurred related to the planning and development of plans approved by the ICC for energy efficiency programs amortized over a period of three years or other such costs related to annual reporting requirements.

If Staff agrees to the Company's proposed language change above, would the Company agree to the following additional language to remain consistent with Rider EDR?

Such Projected Costs to be recovered during the Program Year may include adjustments for (a) costs incurred related to the planning and development of plans approved by the ICC for energy efficiency programs amortized over a period of three years or other such costs related to annual reporting requirements and (b) ICC approved adjustments to Incremental Costs, if any.

RESPONSE

Prepared By: Matthew E. Noonan
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Ameren Illinois does not oppose the recommended modification.

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**Ameren Illinois Company's
Response to ELPC Data Requests
Docket No. 13-0498
Approval of the Energy Efficiency and Demand-Response Plan Pursuant to
220 ILCS 5/8-103 and 220 ILCS 5/8-104
Data Request Response Date: 10/8/2013**

ELPC 1.24

Please provide copies of all email and other communications with the evaluators/EMV contractors in the last 12 months.

RESPONSE

**Prepared By: Keith E. Goerss
Title: Assistant Manager, Energy Efficiency
Phone Number: 309-677-5708**

See ELPC 1.24 Attach 1 thru 16.



PY5 EVALUATION PLAN FOR THE AMEREN ILLINOIS COMPANY ELECTRIC & GAS RESIDENTIAL AND COMMERCIAL PORTFOLIOS

Final

Prepared for:

AMEREN ILLINOIS COMPANY

Prepared by:

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June 2013

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1. INTRODUCTION

This document contains the Program Year 5 (PY5) evaluation plan for the Ameren Illinois Company (AIC) portfolio of commercial and industrial (C&I), and residential energy efficiency resources. Opinion Dynamics, along with its subcontractors, The Cadmus Group, Navigant Consulting, and Michael's Energy (the Opinion Dynamics team or the team), have been contracted by AIC to provide an independent evaluation of the 2011-2014 electric and natural gas energy efficiency programs. Specifically, the evaluation team will assess the following programs in PY5:

- Residential Lighting
- Residential HVAC
- Residential Behavioral Modification
- Residential Home Energy Performance and Electric Space Heat Pilot Program
- Residential Appliance Recycling
- Residential Multifamily
- Residential Moderate Income
- Residential Energy Efficient Products
- Residential ENERGY STAR® New Homes
- C&I Standard
- C&I Custom
- C&I Retro-Commissioning

This document provides the detailed PY5 evaluation plan for each program. Note that this document supplements the Three-Year Evaluation Plan.

2. RESIDENTIAL LIGHTING

2.1 PROGRAM DESCRIPTION

AIC has designed the Residential Lighting Program to increase awareness and sales of ENERGY STAR (ES) lighting among residential customers. The program provides discounts through a variety of retail channels to reduce the cost of compact fluorescent light bulbs (CFLs) and fixtures, high intensity discharge (HID) lamps, and occupancy sensors. The program is available throughout the entire AIC service territory through retail stores and an online store.

The program seeks to increase awareness of energy efficient lighting and its benefits through marketing and outreach efforts at participating retailers, the AIC website, and the mass media. The program partners with retailers and lighting manufacturers to sell ES lighting at a discount to bring the cost closer to that of traditional incandescent lighting. The discounts encourage customers who are reluctant to pay full price for ES lighting to choose energy efficient over standard lighting.

The expected savings from this program is 25% of the overall portfolio of electric savings and 0% of portfolio therm savings (including both residential and commercial).¹

2.2 RESEARCH OBJECTIVES

The results of our PY4 evaluation confirmed that the market for residential lighting products is changing. CFL penetration and saturation has increased in AIC territory over the past few years and more consumers are aware of the variety of technologies available to meet their lighting needs.

The implementation of the Energy Independence Security Act (EISA) is also changing the marketplace. However, many AIC customers are unaware of the regulation. In the summer of 2012, only 55% had heard of the legislation making it difficult to predict future purchase behaviors after EISA implementation.

In this environment, evaluators need to be forward looking. When designing an evaluation plan for a single program year, evaluators must consider market changes and their implications for future evaluation needs. As such, it is important to note that the research tasks presented below are part of a larger three-year evaluation plan. We selected them for PY5 because they provide the most accurate and cost-effective information for this program year considering the changes taking place in the market. Information could become outdated quickly. Therefore, when selecting research tasks, we considered the value of the information they would provide this year, how we could build on information collected in past years, and how we could build on that information in future years.

Further, not all tasks are appropriate each year. The Opinion Dynamics team feels the best evaluation approach in this environment is one that changes with the market. This approach will allow our team to obtain valid and cost-effective impact results and allow AIC to adapt more quickly and provide the guidance its customers will need when selecting from a variety of lighting products.

¹ Note that the percentage of expected savings here and through the plan is calculated based on the AIC Filing dated January 20, 2011, which includes Non-Residential New Construction.

Below we describe the details and logic behind our PY5 evaluation tasks. The tasks are designed to answer the following impact-related research questions:

1. What are program gross energy and demand savings?
2. What are program net energy and demand savings?
3. Did the program meet its energy and demand goals? If not, why not?
4. What has been the program's impact on the residential lighting market in terms of CFL penetration and saturation? What is the penetration and saturation by bulb type and room type? How has CFL usage changed since 2010 when the previous lighting audit was conducted for AIC? (Data was collected and initial analyses were done in PY4; more in-depth analyses will be conducted in PY5)

We will also answer the following process-related research questions:

1. Did the program change its design in PY5? If so, how, why, and were those changes advantageous?
2. Was program implementation effective and smooth? Was the participation process and program requirements (such as providing sales information to the program, allowing point-of-purchase (POP) materials, and training of employees) clearly explained to participating retailers?
3. Are customers satisfied with the program, the products, and the process for participation?
4. What is the format of customer outreach? How often does the outreach occur?
5. What is the profile of AIC customers whose homes have high CFL saturation rates compared to those who do not? Has that profile changed in the past few years? Is the program reaching new users of energy efficient lighting products?
6. Are customers aware of EISA? What is the likely impact of EISA on future lighting purchases?
7. What areas could the program improve to increase its overall effectiveness? What could the program do to further assist customers in understanding energy efficient lighting options and how to achieve higher energy savings?

2.3 ***METHODOLOGY***

2.3.1 **DATA SOURCES**

The evaluation team will use the following data sources to evaluate the AIC PY5 Residential Lighting Program:

- Program tracking data
- Program goals tracker (i.e., sales data collected by implementer)
- Program marketing materials and marketing plans
- In-home lighting inventories of AIC customers (i.e., in-home visits)

2.3.2 SAMPLING PLAN

We will conduct in-store interviews with customers purchasing lighting at top-selling retailers that participate in the AIC Residential Lighting Program. We intend to conduct interviews at 10 retail locations. Our goal is to complete 300 interviews with customers purchasing program-discounted lighting. To gain entry into the store for this research, we will conduct the first day of interviews at each retail store at the same time that an AIC lighting demonstration is being held. The store environment during lighting demonstration days is not typical of what customers usually face when making a lighting purchase. We will analyze the interviews completed during demonstration hours and compare them to non-demonstration hours, but it is unlikely that they can be included in the final program free ridership estimate. We expect to have to complete a total of 400 interviews to have 300 that can be used to estimate program free ridership.

In PY4, 21 retailers participated in the AIC lighting program but the majority of bulbs were sold by a small number of retailers. To ensure that the interviews reflect the majority of program purchases, we will conduct interviews at the top-five retailers based on bulbs sold in PY4. These retailers accounted for 95% of PY4 program sales. Our understanding is that the mix of stores for PY5 has not changed sufficiently and in a manner that would alter our retailer selection if it were made using PY5 sales to date. For each of these five retailers, we will go to the top-selling retail locations where we can obtain permission to conduct the interviews. AIC has a large service territory, and budget considerations may impact our ability to conduct intercepts across the full range of AIC territory.

2.3.3 ANALYSIS PLAN

Gross Savings

For PY5, the baseline wattages for gross energy and demand savings are set by the 2012 Statewide Technical Reference Manual (TRM) and shown in Table 1. The evaluation team will use these values and data from the program tracking database to calculate gross program savings.

Table 1. Baseline Wattages for Calculation of Gross Savings after EISA

Minimum Lumens	Maximum Lumens	Incandescent Equivalent Pre-EISA 2007 (Watts _{Base})	Incandescent Equivalent Post-EISA 2007 (Watts _{Base})	Effective date from which Post – EISA 2007 assumption should be used
1490	2600	100	72	June 2012
1050	1489	75	53	June 2013
750	1049	60	43	June 2014
310	749	40	29	June 2014

Net Savings

We have already conducted in-store interviews (January 2013) and analyzed the in-home visit data to obtain an early PY5 NTG value (0.44). Due to known issues with the intercept method, we also plan to perform a second analysis using the Revenue Neutral Sales Model. We will make a determination about the PY5 NTG value and how the newly researched value will be applied in consultation with AIC and ICC staff based on SAG discussions.

Market Trends and Installation Rates

We completed in-home lighting inventories in 226 AIC homes between May and June 2012. The primary focus of the visits was to gather information on the number, type, and location of residential lighting products in each home. For PY4, we conducted initial analyses and compared penetration and saturation rates from 2010 and 2012. For PY5, we will dig deeper into the collected data and examine room-by-room results, program spillover, and CFL installation rates.

We will also look more closely at the results of the in-home survey that contained questions on EISA awareness and future lighting purchase intentions. The in-store interviews also contain questions about awareness of Energy Independence and Security Act (EISA), different lighting technologies available, and likelihood to purchase these technologies. We will present these results as well for a more complete picture of the impact of EISA.

To estimate spillover, we will compare the number of CFLs found in AIC territory in PY2 to those found in PY4/PY5 and adjust for program sales during that same period. CFLs found that are in excess of program sales represents the maximum amount of spillover.

We will also use the in-home visits to estimate a new CFL installation rate for AIC. The installation rate will be the number of CFLs found to be installed during the visit versus those found in storage. The statewide TRM in-service rate method assumes that it takes three years from purchase for 98% of CFLs to be installed. For each resident, we will designate the installation rate as a first-year, second-year, or third-year rate based on when the homeowner most recently purchased CFLs. Though we cannot guarantee that the CFLs we are counting are all program bulbs, we have no reason to expect that customers would install program bulbs at different rates than non-program bulbs.

Process Findings

We will present process-related findings based on our analysis of the program materials, databases, and survey research.

2.4 TASKS

To answer the research questions outlined above, we will complete the following tasks as part of the PY5 evaluation.

2.4.1 IN-DEPTH INTERVIEWS WITH PROGRAM STAFF

The evaluation team will conduct up to four in-depth phone interviews with program and implementation staff involved in the design and administration of the efficient lighting program (i.e., AIC, CSG, APT and EFI staff). These interviews will allow us to fully explore the details of the program

design and implementation and examine the perspective of the people who are in direct contact with participating retailers. We will schedule these in-depth interviews towards the end of the program year and will conduct them over the telephone using experienced Opinion Dynamics analysts. We will record and transcribe all interviews to facilitate analysis.

Deliverable: Draft and final interview guide

Deliverable Date: May 2013

2.4.2 PROGRAM DATABASE VERIFICATION AND SAVINGS ANALYSIS

The evaluation team will review the program database. We will check to ensure that the correct savings value has been applied for each product type to verify that the database is providing correct information. We will also assess the database to ensure that project data has been recorded sufficiently and correctly. We will resolve any discrepancies found in the database and report on findings.

To calculate gross savings, we will use the energy and demand savings formulas outlined in the 2012 Statewide TRM.

Deliverable: Data request

Deliverable Date: July 2013

2.4.3 REQUEST AND REVIEW PROGRAM MATERIALS FROM UTILITY

The evaluation team will conduct a comprehensive review of all program materials. This includes all materials provided to retailers, as well as mass marketing and in-store materials. These activities will inform our process assessment.

We will request program tracking data, the program's goals tracker, program marketing materials, and marketing plans (including dates materials were used).

Deliverable: Data Requests

Deliverable Date: July 2013

2.4.4 IN-HOME LIGHTING STUDY

We will conduct additional and more in-depth analyses of the lighting audits we conducted in 226 AIC homes in 2012. For PY4, we calculated overall CFL penetration and saturation rates for 2012 and compared them with 2010. We also calculated 2012 CFL penetration and saturation by bulb type. We will conduct similar analyses by room type for PY5.

In the PY4 report, we documented a statistically significant increase in CFL penetration and saturation between 2010 and 2012. For PY5, we will examine changes in penetration and saturation by household characteristics, demographic characteristics, and socket type, as data allows. We will also use the study results to estimate a new CFL installation rate and potential program spillover.²

² The spillover estimated as a result of this study will be integrated into the PY5 NTGR.

Recent saturation studies have found that socket type—rather than household or demographic characteristics—may be equally if not more important in predicting the likelihood of having an efficient lighting product in one’s home. In other words, sockets with control capabilities (e.g., dimmers or three-way) or sockets with specialty bulbs (e.g., globes or reflectors) may represent the best program opportunities even in homes that are already highly saturated with efficient lighting. In the PY4 report, we used the results of the in-home study to estimate remaining program potential for standard and specialty sockets. This analysis was based on estimated total sockets by bulb type and CFL saturation rates by bulb type. For PY5, we will examine potential in greater depth by constructing lighting profiles that combine demographic, household, and lighting data. The profiles will also make use of data from the short paper survey that customers filled out during the in-home lighting audits.

Deliverable: Memo summarizing results

Deliverable Date: January 2013

2.4.5 IN-STORE CUSTOMER INTERVIEWS

We will conduct interviews with customers purchasing lighting in stores selling CFLs discounted through the Residential Lighting Program. The goal of this effort is to estimate program free ridership through a self-report survey and estimate the influence of price reduction and program marketing on CFL purchases. We will attempt to interview all customers purchasing lighting during our in-store visits. Our priority will be conducting interviews with customers purchasing program CFLs. We will also interview customers purchasing non-program CFLs or other alternatives to CFLs such as incandescent, halogen, or LED bulbs if a program purchaser is not available to interview at the same time. Interviewing customers purchasing non-program lighting will allow us to assess program awareness, the impact of program marketing, and barriers to CFL purchases.

While in the store, we will collect information on the availability of different lighting products, in-store materials, and other displays. We are particularly interested in tracking the availability and pricing of alternatives to EISA-regulated products such as EISA-compliant halogens and LEDs relative to CFLs. This information will help AIC with future program planning.

We will attempt to conduct interviews with at least 300 customers purchasing CFLs discounted through the AIC program. We will conduct additional interviews with non-program purchasers but we do not have a set quota on these customers. We will conduct the intercepts at retailers that sell the majority of program bulbs. Gaining permission to conduct the interviews can be a challenge and we will work with the program implementer to facilitate this process.

Deliverable: Draft and final interview instruments

Deliverable Date: December 2012

2.4.6 REVENUE NEUTRAL SALES ANALYSIS

We will conduct an analysis of PY5 program sales using the Revenue Neutral Sales Model to estimate program free ridership. The Revenue Neutral Sales Model is a method of estimating lighting program free ridership based on a theory of retailer behavior and decision making. Using program sales and tracking data, the method provides an estimate of product sales at regular retail pricing, which can, in turn, be used to estimate program free ridership.

The Revenue Neutral Sales Model assumes that retailers will only participate in a utility sponsored lighting program if their gross revenues do not drop as a result of their participation. A drop in revenue is possible because lighting products are sold at a lower price as a result of the program discount. If retailers do not sell more of the discounted product than they were selling prior to the program, their gross revenue will drop due to the discounts. Gross revenue is based on sales alone. While utilities reimburse retailers for the product discounts, this reimbursement cannot be counted

towards gross revenue. Retailers care about gross revenue because it influences investors, and corporate bonuses are often tied to it. Program reimbursements do count towards profits so retailers will not lose money due their participation, but without a sufficient lift in sales to cover the utility discounts, they are at risk of having their revenues drop.

To ensure that that their program participation is revenue neutral, retailers will avoid participating in utility lighting programs with incentive levels and sales goals that will not stimulate enough additional sales for them to make up lost gross sales revenue. For example, if a retailer wants to ensure that its gross revenue does not drop as a result of participating in a program that discounts the price of a CFL by 50%, the retailer must double its sales. Retailers have enough information about product pricing and sales to evaluate program contractual agreements so that they will only agree to contracts whose terms allow them to sell enough products so the program has no impact on their gross revenue. We have verified this model of retailer behavior through corporate-level retailer interviews.

With this theory of retailer behavior as background, we are able to estimate lighting sales at regular retail pricing using the following program data: (1) regular retail product price (2) program discounted price, (3) number of units actually sold at program pricing.

Deliverable: Analysis results in draft and final report *Deliverable Date: September-October 2013*

2.4.7 RETAILER INTERVIEWS

The evaluation team will interview corporate-level retailers to get their assessment of the current and future lighting market. In particular, we will explore the impact of EISA on stocking practices and consumer behavior.

Deliverable: Draft and Final Interview Guides *Deliverable Date: July 2013*

2.4.8 REPORTING

We will analyze and report the results of the above activities using descriptive statistics. If needed, we will use comparison of means or chi-squared tests to look at differences among groups of respondents.

Deliverable: Draft and final reports *Deliverable Date: September-October 2013*

2.5 BUDGET AND SCHEDULE

Table 2 provides a schedule of evaluation tasks for PY5.

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Table 2. Lighting Program Evaluation Tasks Schedule

Task	Evaluation Task	2013								
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sep
1	Interviews with Program Staff					■	■			
2	Program Database Verification and Savings Analysis							■	■	■
3	Request and Review Program Materials						■	■	■	
4	In-Home Lighting Study	■								
5	In-Store Customer Interviews	■	■	■						
6	Revenue Neutral Sales Analysis							■	■	■
7	Retailer Interviews						■	■	■	
8	Reporting									■



Table 3 provides the budget for each evaluation task for PY5.

Table 3. Lighting Program Evaluation Budget by Task

Task No.	Task	Deliverable Date	Dollars by Task
1	Interviews with Program Staff	May 2013	\$2,200
2	Program Database Verification and Savings Analysis	July 2013	\$11,000
3	Review Program Materials	July 2013	\$3,100
4	In-Home Lighting Study (PY4 budget only, additional effort in PY5)	January 2013	\$60,000
5	In-Store Customer Interviews	March 2013	\$70,000
6	Revenue Neutral Sales Analysis	August-September 2013	\$12,000
7	Retailer Interviews	July 2013	\$6,200
8	Reporting	September-October 2013	\$35,000
Total Dollars			\$193,500

3. RESIDENTIAL HVAC

3.1 PROGRAM DESCRIPTION

The AIC Heating and Air Conditioning Program (HVAC Program) offers incentives for the purchase of a high-efficiency furnace, boiler, air source heat pump (ASHP), ground source heat pump (GSHP) or central air conditioner (CAC) that is installed by an HVAC Registered Program Ally. Incentive levels vary according to equipment type and efficiency level of the existing equipment. AIC requires contractors to offer the incentive as a line item discount. Changes to the program in PY5 include higher incentives for most measures, the exclusion of 92% Annual Fuel Utilization Efficiency (AFUE) furnaces and 90% efficient boilers, and the addition of brushless furnace motors as a measure.

The program recruits contractors who are receptive to a higher quality approach when serving residential customers. Contractors are required to enter into a participation agreement that outlines the program responsibilities and contractor responsibilities. The program protocols specify sizing requirements, efficiency standards, and other elements, such as a matching indoor and outdoor coil requirement for new air conditioning equipment. The program provides sales and marketing training to educate the HVAC contractors on program requirements. The training includes topics such as developing a simple payback analysis for high-efficiency HVAC systems, marketing high-efficiency equipment, the basics of building science, and methods for communicating the need for high-efficiency equipment to customers.

- There are several modes of entry to the program that yield HVAC program savings:
 - The homeowner follows a routine maintenance plan. During a routine maintenance visit, the contractor explains the program and incentive options to encourage participation, and, as a result, the customer installs high-efficiency equipment.
 - The homeowner notices that equipment is not running as well as it used to and calls a contractor. The contractor explains the program and incentive options to encourage participation, and, as a result, the customer installs high-efficiency equipment.
 - The homeowner has heard about incentives and considers purchasing new high-efficiency equipment. The contractor further encourages the customer to select the high-efficiency equipment over standard equipment, and then installs equipment at the customer's request.
 - The homeowner decides to install new high-efficiency equipment because their old equipment is no longer functional or there was no pre-existing equipment. The contractor further encourages the customer to select high-efficiency equipment, and then installs equipment at the customer's request.

The expected savings from this program is 6% of the overall PY5 portfolio of electric savings and 26% of PY5 portfolio therm savings.

3.2 RESEARCH OBJECTIVES

We have structured the PY5 evaluation to achieve the following general research objectives for the HVAC Program:

1. Provide electric gross peak demand and cooling energy savings, by applying the TRM equations to verified measure installations for the population of measures installed as part of the program.
2. Assess customer satisfaction and the non-active registered (NAR) contractor experience with program processes and determine areas of possible improvement.
3. Assess possible barriers to participation through surveys with NAR contractors.
4. Identify possible market effects from the program and its progress towards market transformation.
5. Assess free ridership and spillover by estimates provided through surveys of participating customers and NAR contractors.
6. Report HVAC unit energy consumption and savings determined by metering program HVAC systems to update the TRM HVAC savings algorithm input assumptions.

During the first 3-year plan, The Cadmus Group evaluated the HVAC Program energy impacts through site visits, building simulation models (to determine per-unit savings), and metering (to verify the simulation models). The Cadmus Group also conducted surveys with NAR contractors and participating customers to develop Net-to-Gross Ratios (NTGRs) and evaluate program processes. In PY4, we verified installations, assessed program satisfaction, and estimated impacts using fixed savings estimates applied to verified participation. We also installed meters on samples of installed heating and cooling equipment.

In PY5, we will download the metered data and analyze savings. We will summarize these results and use them to inform future modifications to the TRM. PY5 will also include a complete analysis for estimating an updated NTGR, consisting of customer surveys and NAR contractor surveys. At the same time, we will gather information to inform a process evaluation, assessing customer and contractor satisfaction, as well as looking for barriers to participation and opportunities for improvement. At present, we plan to apply the NTG developed in PY5 retrospectively because the incentives offered and equipment efficiencies have changed significantly from when they were previously estimated.³

3.3 ***METHODOLOGY***

3.3.1 DATA SOURCES

Data sources for evaluating the HVAC Program include:

- Program tracking database
- Information gathered through stakeholder interviews
- Participant customer HVAC system and operational data collected on site
- Customer survey data
- NAR contractor survey data

³ The team will make a final determination regarding the value used for PY5 in consultation with AIC and ICC staff.

- Information gathered from program record reviews (tracking database, incentive applications, and invoices)

3.3.2 SAMPLING PLAN

Metering

As described in the PY4 plan, we installed meters on 48 cooling systems and 48 heating systems to meet 90/10 precision (one-tailed). We may utilize metering data from the PY2 evaluation to increase sample size.

Participating Customer Surveys

We will contact 30 customers of each of seven measures to verify that they had the type of measure specified in the tracking database installed by a qualified program contractor. We will also ask these customers survey questions to estimate program free ridership, as well as assess customer satisfaction and opportunities for improvement.

Non-Active Registered Contractor Surveys

We plan to contact up to 70 contractors who are registered as trade allies, but have not applied for any program rebates during the year. In PY3, we found these contractors to have increased their sales of high efficiency equipment, while not actually participating in the program. We will survey these contractors to determine why they have not participated in the program, and whether or not the program has influenced the equipment they stock and recommendations they make to their customers.

3.3.3 ANALYSIS PLAN

Gross Savings

In PY5, the evaluation team will determine gross impacts by multiplying the number of verified participants for each measure by savings determined through the appropriate savings algorithm as specified in the Statewide TRM.

Metering

In October and November 2012, the evaluation team removed central AC meters installed in May 2012. We downloaded data from heat pump meters at this time, but left the meters to record winter energy consumption (see Table 4). We also installed additional heating system meters on gas furnaces to bring the total number of heating meters to 48 (24 heat pumps and 24 gas furnaces). We will use the metering analysis to update the TRM.

We will build our metering efforts on the metering we performed for the PY3 evaluation, in which budget limitations resulted in sample sizes yielding less than 90/10 levels of confidence and precision. Metering is the most accurate approach for determining savings compared to other, less expensive methods such as secondary research, engineering analysis, and billing analysis.

- Secondary research is limited and often based on different climates or different customer characteristics.

- Engineering analysis may not account for the realities of how customers actually use their HVAC systems.
- Billing analysis uses a customer's entire energy bill, which is confounded by seasonal and variable use of other home equipment in addition to HVAC equipment seasonal energy use variation. Also, operational characteristics may change when a new system is installed: customers may use their new, higher-efficiency system more often or differently than they used their old system.

Invaluable information will come from the site visit verifications and meter installations of heating systems for the following reasons:

- The efficiency of high-efficiency furnaces and boilers may be variable and affected by the quality of installation, advanced controls, and ambient operating conditions (i.e., more condensing occurs as the outdoor temperature decreases).
- Site visits will provide us with insight regarding the use of secondary heat sources.
- Operational characteristics may change when a new system is installed.

The subsequent sections describe our methodology for calculating the gross impact savings to be used to update the TRM for future evaluations.

Baseline

AIC offers incentives for new construction, replacement on failure, or early replacement. Therefore, our analysis estimates savings using two different baselines:

- One that is based on the federal minimum standard (for new construction or replacement on failure), and
- One that is based on the existing functioning equipment that was replaced (for early replacement).

We will meter the amount of heating and cooling used by a sample of homes in AIC service territory. Savings will be based on the assumption that HVAC systems provide the same amount of heating and cooling capacity regardless of the equipment efficiency.

Electric Savings

We will use the metering data to estimate unit consumption, energy, and demand savings for CACs and heat pumps (HPs) and use the information to update the TRM for future years. We will also verify that the equipment installed at metering sites match equipment specifications recorded in the tracking system.

To meet International Performance Measurement and Verification Protocol (IPMVP) Option A requirements, we will collect the following metered data:

- Meter power (kW)
- Outside air temperature and humidity
- Evaporator blower power or amperage
- Supply air temperature and humidity
- Return air temperature and humidity

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- Space temperature (using U-10 or equivalent)
- Power drawn by resistive back-up heaters (air source and ground source HPs)

We will average the 5-minute interval data⁴ into hourly consumption bins. For each hour, we will use detailed manufacturers' engineering data to calculate the rated efficiency of the unit at the coinciding outdoor temperature, and the efficiency of a baseline code model (nominal SEER 13).⁵ For each hourly bin, we will calculate the energy impacts for hour 'i' and temperature 'T' as follows:

$$Eq. 1: Consumption Savings_i = Metered Energy Use_i \times \frac{EER_{High}(T)}{EER_{Replaced}(T)} - Metered Energy Use_i$$

For each metered system, EER (or COP)⁶ values are derived from the manufacturer's CAC and HP performance data. Figure 1 is an example of a Carrier performance data sheet for a heat pump in heating mode. This table provides heating capacity and system power estimates at various outdoor temperatures. According to Figure 1, as outdoor temperature (outdoor coil entering air temperature) declines from 37°F to 27°F, the heating capacity that the heat pump provides decreases by about 15%.⁷ Conversely, the heat load on a typical home in Illinois increases by about 15% when the outdoor temperature drops by 10°F. Ultimately, a heat pump is unable to provide sufficient capacity to heat the home meaning additional heating capacity from another source is needed. Typical backup heat sources are electric resistance (ER) heat or fuel-based heating sources. A properly controlled heat pump will use minimal ER thus maximizing energy savings.

Figure 1. Example Capacity and Power Values versus Temperature for Heat Pump

INDOOR AIR		OUTDOOR COIL ENTERING AIR TEMPERATURES °F (°C)														
		-3 (-19.4)			7 (-13.9)			17 (-8.3)			27 (-2.8)		37 (2.8)			
EDB °F (°C)	CFM	Capacity MBtuh		Total Sys. KW†	Capacity MBtuh		Total Sys. KW†	Capacity MBtuh		Total Sys. KW†	Capacity MBtuh		Total Sys. KW†	Capacity MBtuh		Total Sys. KW†
		Total	Integ*	Total	Integ*	Total	Integ*	Total	Integ*	Total	Integ*	Total	Integ*	Total	Integ*	
25HCC518A30 Outdoor Section With FX4DNF019 Indoor Section																
65 (18.3)	525	5.13	4.72	1.02	7.34	6.75	1.07	9.76	8.90	1.12	12.54	11.13	1.18	15.15	13.78	1.24
	600	5.22	4.80	1.02	7.46	6.85	1.07	9.91	9.03	1.11	12.68	11.27	1.17	15.35	13.97	1.22
	675	5.30	4.87	1.02	7.55	6.94	1.07	10.04	9.15	1.11	12.80	11.37	1.16	15.51	14.12	1.20
70 (21.1)	525	4.84	4.45	1.07	7.04	6.47	1.12	9.43	8.60	1.18	12.28	10.90	1.24	14.86	13.52	1.31
	600	4.92	4.53	1.07	7.15	6.57	1.12	9.58	8.74	1.17	12.44	11.04	1.23	15.05	13.70	1.28
	675	4.99	4.59	1.07	7.25	6.66	1.12	9.71	8.85	1.16	12.56	11.16	1.21	15.21	13.84	1.26
75 (23.9)	525	4.50	4.14	1.11	6.70	6.16	1.17	9.09	8.29	1.23	11.98	10.64	1.30	14.56	13.25	1.37
	600	4.59	4.22	1.12	6.82	6.27	1.17	9.24	8.42	1.22	12.15	10.79	1.29	14.75	13.43	1.34
	675	4.66	4.29	1.12	6.92	6.36	1.17	9.36	8.54	1.22	12.29	10.91	1.27	14.91	13.57	1.33

The typical energy savings algorithm is:

⁴ We will use 2-minute interval data for CAC metering. The HP meter duration (365 days) requires a 5-minute interval because of storage limitations with the data logger.

⁵ The baseline for these calculations is discussed in a previous section.

⁶ EER is the standard term for cooling capacity over system power while coefficient of performance (COP) is the standard term for heating capacity over system power.

⁷ Percentages are estimates provided for purposes of an example.

$$kWh\ saved = EFLH \times \frac{BTU}{hr} \times \frac{\frac{1}{SEER_{base}} - \frac{1}{SEER_{efficient}}}{1,000\ W/kW}$$

The limitation of the equation is that the equivalent full load hours (EFLH) is not well known and that many literature values over-predict consumption and savings. Simply inserting run time from metering does not fully account for variations in efficiency and is not recommended. Instead, we will calculate savings directly from metering as described above in Equation 1. We understand the usefulness of EFLH for use in the TRM algorithm. We will develop a value for EFLH based on metering savings that can then be used in the TRM algorithm to produce values that match metered savings.

$$kWh\ saved = \left(EFLH' \times \frac{BTU}{hr} \times \frac{\frac{1}{SEER_{base}} - \frac{1}{SEER_{efficient}}}{1,000\ W/kW} \right)$$

We will estimate EFLH values for each site and average all values to report a metered EFLH average value for use with the TRM algorithm. For example, if metering determines a 16 SEER, 3-ton system saves 400 kWh, EFLH is the only unknown in the equation above. In this example, EFLH = 770.

Gas Savings

We will use the metering data estimate unit consumption and energy savings for gas furnaces and boilers to update the TRM for future years. We will also verify that installed equipment is consistent with the equipment specifications recorded in the tracking system.

To meet IPMVP Option A requirements, we will collect the following data:

- Spot combustion metering noting excess oxygen, flue temperature, and efficiency.
- For furnaces, we will note the supply and return air temperatures, flue gas temperature, and gas valve position.
- Note the space temperature using U-10 or equivalent.

The purpose of this effort is to verify the AFUE of the installed high-efficiency gas furnace. AFUE is defined as:

$$AFUE = \frac{BTU\ Provided\ in\ the\ Season}{BTU\ Input\ in\ the\ Season}$$

A high AFUE rating greatly depends on the amount of condensing achieved by the furnace or boiler. We suspect that the rated AFUE may be less than the actual AFUE, and will determine savings by comparing a spot thermal efficiency measurement to expected thermal efficiency. We will note the flue gas temperature to estimate efficiency throughout the entire heating season. We will then develop an actual AFUE to compare to the baseline condition.

Weather Normalization

As part of our analysis for the TRM update, we will use the correlation between seasonal HVAC energy consumption and cooling degree days (CDD) or heating degree days (HDD) to weather-normalize the metered energy consumption. We will develop weather-normalization factors for heating and cooling savings based on a ratio of the seasonal degree days to 30-year normals.

Additional Considerations

The evaluation team engineers will record details of each metered system while on site. With the site-specific details and meter data, the evaluation team will provide insight regarding how systems are operating. Some examples of considerations are listed and described here.

Controls Issues

The evaluation team will provide insight from our site visits and the meter data that may allude to issues with installation or explain unexpected energy use. For example, we have seen very high HP electric resistance heat energy consumption when the controls are not properly configured.

Secondary Heat Sources

We will comment on the presence and possible effect of secondary heat sources on the amount of energy savings obtained through the HVAC Program. We will ask homeowners about the use of alternative heating sources, such as wood burning stoves, as well as other home characteristics that may impact energy consumption. We will also determine the savings effect of homeowners who have both an HP and a gas furnace installed.

Occupancy

We will note occupancy patterns, as some participants may vacate their home during some portion of the year. This information will help explain low or unexpected energy consumption (and low savings), which could lead to a variation in savings.

ECM Savings

Where possible, the evaluation team will attempt to verify additional savings from the installation of variable speed, electronically commutated motors (ECMs). Many high-efficiency HVAC systems require ECM blowers to achieve their high Seasonal Energy Efficiency Ratio (SEER) rating. If a homeowner normally leaves the fan in “on” mode, an ECM will provide significant additional savings if the old fan was also left in “on” mode. After installing an ECM motor, some HVAC contractors encourage homeowners to run their fans continuously to help maintain even temperatures throughout the home. If the old fan was not normally left on continuously, the savings from installation of an ECM fan are minimal or even negative. We ask metering participants how they ran their fan prior to installation of the new system.

Net Savings

Because the program changed significantly this year by adjusting the measure efficiency levels and increasing incentives, the evaluation team recommends developing a NTGR this year and applying it retrospectively to PY5. We will utilize participant surveys to estimate free ridership and participant spillover and NAR contractor surveys to estimate non-participant spillover.

The participant self-report approach to estimate free ridership uses a standard battery of questions that define: 1) whether the participant would have purchased the same product without the incentive, and if so, 2) whether the participant would have purchased the product at the same time without the incentive. For this program, participants may not have been aware of the incentive prior to purchasing, but if the contractor significantly influenced their purchase, we do not consider them a free rider since the program encourages contractors to promote high efficiency equipment. We then apply a free rider score, ranging from zero to 100 percent, to each participant based on their responses to a set of survey questions. We compute the total free ridership for this method from the average survey free ridership score.

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The evaluation team will estimate two different types of spillover:

- 1) NAR contractor spillover, which is based on the self-reported number of high-efficiency units sold and influenced by the program (without incentives).
- 2) Participating customer spillover, based on customers who purchase additional high-efficiency equipment or appliances due to their participation in the program.

NAR Contractor Spillover

We ask NAR contractors if the program influenced their sales of high-efficiency equipment, and also ask them to quantify the percentage of sales lift due to the program.

Participating Customer Spillover

We ask participating customers to list any additional energy-efficient items they have installed in their home since participating in the program; then we ask them to rate the program's influence in their purchase of that item as very influential, somewhat influential, not too influential, or not at all influential. For each type of measure that receives a rating of "very influential," we will estimate energy savings in comparison to federal standard efficiency.

Process Evaluation

In PY5, the team will utilize the participant surveys and the non-participant contractor survey discussed above to also gather information to inform a process evaluation. We will also review program materials and interview stakeholders to understand how the program is performing compared to expectations. We will perform the process evaluation to answer the following researchable process questions:

- Is the program meeting its goals?
- Are program design and implementation processes effective?
- Are marketing materials designed according to best practices?
- How did participating customers find out about the program?
- What motivated customer participation in the program?
- What barriers to customer and contractor participation exist?
- Does this program motivate customer participation in other AIC programs?
- How satisfied are participating customer with the program?
- How could the program be improved?

3.4 *TASKS*

3.4.1 REQUEST AND REVIEW PROGRAM MATERIALS AND DATABASE

The evaluation team will review the program tracking database and 70 random examples of incentive application forms and equipment invoices for us to compare to the program tracking database. We will review these materials immediately to determine if there are any data gaps or potential issues. The evaluation team requests the following information from AIC regarding each product sold through the HVAC program.

- Participating Customer Data
 - Name (first and last)
 - Address (number, street, apt#, city, state, and zip code)
 - Phone number (including alternative number if available)
 - Unique ID number
 - Type of dwelling (single family, multifamily, low income, manufactured home)
- Measure Data
 - Contractor name and address
 - Product purchased
 - Savings estimates as reported in tracking database
 - Date application was received
 - Date application was paid
 - Make and model of product purchased (including evaporator coil model number)
 - AHRI number
 - Size or capacity of product purchased
 - Make, model, size of existing condenser and evaporator
 - Alternative heat source and/or heat source replaced
 - Amount of rebate paid
 - Program materials
 - Monthly activity reports from implementer
- Program manuals or other documentation of implementation process

- Marketing materials used to promote the program (e.g. bill inserts, direct mail, materials provided to contractors, training materials used to train contractors in marketing skills)

Deliverable: Data Requests

Deliverable Date: April 2013

3.4.2 STAKEHOLDER INTERVIEWS

The evaluation team will perform stakeholder interviews with AIC program and implementation staff that will involve the following steps.

- Develop staff and implementer interview guides
- Complete interviews

Stakeholder interviews (including with AIC implementation team member CSG) will focus on assessing the following:

- Program goals
- Program process flow
- Program design versus program implementation
- Mid-year implementation changes
- Effectiveness of contractor training
- Registered contractor inactivity
- Program strengths and weaknesses
- Program marketing

Deliverable: Draft and final interview guide

Deliverable Date: April 2013

3.4.3 PARTICIPATING CUSTOMER SURVEY

We will develop a non-active participating contractor survey to assess spillover and address process questions such as why they have not participated in the program, and how the program is influencing the market.

Deliverable: Draft and final NAR contractor survey

Deliverable Date: November 2012

Participant Interviews/Recruiting Started

Deliverable Date: December 2012

3.4.4 NAR CONTRACTOR SURVEY

We will develop a non-participant survey to assess spillover and address process questions such as why they have not participated in the program, and how the program is influencing the market.

Deliverable: Draft and final participant survey guide

Deliverable Date: April 2013

Participant Interviews/Recruiting Started

Deliverable Date: May 2013

3.4.5 SITE VERIFICATION VISITS AND METERING

The evaluation team selected the metering participants from the PY4 tracking database; cooling participants were recruited in the spring of 2012 and heating participants in November 2012.

HVAC Metering

Completion Date: May 2013

3.4.6 IMPACT ANALYSIS

The evaluation team will conduct the following:

- Analyze tracking database
- Calculate Impacts

Complete analysis

Completion Date: August 2013

3.4.7 REPORTING

The evaluation team will write a draft report of findings. We will then deliver a final report that incorporates updates from the review.

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

3.5 BUDGET AND SCHEDULE

Table 4 outlines the schedule for the HVAC Program evaluation.

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Table 4. HVAC Program Evaluation Tasks Schedule

Task	Evaluation Activity	2013												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1	Install Remove Metering Equipment													
	Create Data Collection Instruments													
2	Create Participant Surveys													
	Create Nonparticipant Contractor Surveys													
	Create Staff and Implementer Interview Guides													
3	Collect Data													
	Conduct Participant Surveys													
	Conduct Nonparticipant Contractor Surveys													
4	Conduct Stakeholder Interviews													
	Analyze Data													
	Analyze metering data													
	Analyze participant survey data													
	Analyze non-participant contractor survey data													
	Analyze participant database													
	Review program materials													
Prepare Evaluation Binder														
5	Reporting													
	NTGR Memo													
	Prepare Draft													
	Review with Stakeholders													
	Final Draft													

	Data Request
	Create Data Collection Instruments
	Collect Data
	Analyze Data
	Milestone Deliverables

Table 5 outlines the evaluation budget for each task.

Table 5. HVAC Program Evaluation Budget

Task	Task Description	Deliverable Date	Dollars by Task
1	Install Remove Metering Equipment	Nov 12/May 13	\$83,000
2	Create Data Collection Instruments	Dec 12/Mar 13/Jun 13	\$15,500
3	Collect Data	Jan 13/Apr 13/Jun 13	\$30,000
4	Analyze Data	May 13/Jul 13	\$35,000
5	Reporting	May 13/Aug 13	\$24,500
Total Dollars			\$188,000

4. RESIDENTIAL BEHAVIORAL MODIFICATION

4.1 PROGRAM DESCRIPTION

As a part of its residential portfolio, AIC administers a Behavioral Modification Program. The program began as a pilot in August of 2010 and was developed to reduce the energy consumption of its customers by encouraging energy saving actions. Since then, it has expanded into a full program. In PY4, administration responsibilities shifted from AIC to Conservation Services Group (CSG), with Opower remaining as the implementer. The program's primary tool for encouraging energy efficient behaviors is the Home Energy Report (HER).

A HER includes the following: (1) a comparison of the customer's current energy usage to past usage, (2) a comparison of the customer's energy usage to similar households in the same geographical area, and (3) tips for reducing energy consumption, tailored to the customer's home energy profile (e.g., type of home, square footage, number of occupants).

AIC targets customers who live in high-population areas with higher-than-average energy use. Participants receive a paper copy of the HER through the mail and/or an electronic copy via email that includes the following information:

- Comparison of the customer's energy usage to past usage.
- A comparison of the customer's consumption to that of comparable customers in the same geographical area.
- Tips for reducing energy consumption, tailored to the customer's home energy profile (e.g., type of home, square footage, etc.).

The program treated dual fuel customers during the program pilot phase (Original Group), targeting households with higher than average energy consumption. At the beginning of PY4, the program added another group of dual fuel customers, focusing on the next level of high-use customers (Expansion Group 1). In November of 2011, two additional groups were added, including another group of dual fuel customers (Expansion Group 2), and a group of gas-only customers (Expansion Group 3). Table 6 provides further details about these groups, including treatment start and end dates, as applicable. As noted, 25,000 dual fuel customers and 21,189 gas-only customers ceased receiving treatment at the end of PY4.

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Table 6. Behavioral Modification Program Participation to Date

Group Name	Fuel Type	Number of Customers Treated	Start Date	End Date
Original Group*	Electric	50,001	August 2010	Continuing
	Gas	50,001	August 2010	Continuing
Expansion Group 1	Electric	76,355	April/May 2011	Continuing
	Gas	76,355	April/May 2011	Continuing
Expansion Group 2	Electric	119,917	November 2011	25,000 customers dropped in May 2012
	Gas	119,917	November 2011	25,000 customers dropped in May 2012
Expansion Group 3**	Gas	21,189	November 2011	May 2012
Total	Electric	246,273	-	-
	Gas	267,462	-	-

*This is the original pilot group.

** The customers in this group are gas-only customers. This group was added in the middle of PY4 to assist the program in meeting therm goals, with the intention of dropping them from treatment in PY5.

The expected savings from this program is approximately 9% of the overall PY5 portfolio of electric savings and 15% of PY5 portfolio therm savings (includes residential and commercial).

4.2 RESEARCH OBJECTIVES

The PY5 Impact Evaluation is structured to achieve the following general research objectives for the Behavioral Modification Program:

- What are the MWh and therm savings from this program in PY5?
- Do program savings need to be adjusted due to the treated population's participation in other AIC programs?

The PY5 Process Evaluation will explore the following research questions:

- For new treatment and control groups (if applicable), are these two populations comparable?
- Does program response vary by season or by baseline usage?
- Do participants show greater enrollment in AIC's other energy-efficiency offerings due to the Behavioral Modification Program?

4.3 METHODOLOGY

The following sections outline the proposed methodological approach for the Behavioral Modification evaluation.

4.3.1 DATA SOURCES

The primary method used to determine program impacts is the billing analysis. Data sources for the PY5 Impact Evaluation include:

- Program tracking databases
- Experian data and/or appended data, if needed
- For existing customer treatment and control groups, electric and gas consumption/billing data from June 2012 to May 2013
- For new customer treatment and control groups (if applicable), gas consumption/billing data (pre-period through May 2013)

Data sources for the PY5 process evaluation include:

- Example Home Energy Report(s) from PY5
- List of dates that Home Energy Reports were sent to program participants
- List of energy “tips” provided in Home Energy Reports in PY5
- Information on additional marketing and outreach activities performed by the program, including relevant dates

4.3.2 SAMPLING PLAN

Billing Analysis

If new treatment and control groups are added to the Behavioral Modification Program in PY5, we will take a close look at these two populations to be sure that the implementation of the choices between who goes into a treatment and control group lead to relatively comparable groups. If the populations are comparable, no sampling will occur for the billing analysis. We will include all available data in our analysis. However, if the treatment and control groups are found to be dissimilar, we will select two similar populations for this analysis.

4.3.3 ANALYSIS PLAN

Impact Evaluation

The evaluation team will determine net energy savings for the Behavioral Modification Program through the billing analysis combined with the channeling analysis. Through the Channeling Analysis, we will indicate which savings have already been accounted for through other residential AIC programs. In general, the net savings for each program year will be applied retrospectively to that year. As a result, PY5 savings are based on the PY5 analysis.

Process Evaluation

Similar to PY4, process evaluation efforts in PY5 will be limited, as the primary evaluation activity is the billing analysis. However, through our interviews with the program managers and review of program data and materials, we will explore program changes, successes, and challenges, and identify potential areas for program improvement. As products of the billing analysis and the channeling analysis, we will also compare customer responses by baseline usage and by season,

and determine whether more treated customers are participating in other AIC programs than control group customers.

4.4 TASKS

We plan to perform the following tasks in support of the PY5 evaluation.

4.4.1 REVIEW PROGRAM MATERIALS AND DATABASE

The evaluation team will review the program tracking database and any available program materials such as sample Home Energy Reports, web portal content, magnets or door hangers, etc. We will review these materials to determine if there are any data gaps or potential issues, and to inform our research efforts.

Deliverable: Data Request

Deliverable Date: May 2013

4.4.2 STAKEHOLDER INTERVIEWS

We will conduct one-on-one telephone interviews with key program staff from AIC, CSG, and Opower. The purpose of these interviews is to help uncover areas of success and challenges to success. The interviews will provide a rich source of key insights into the daily workings of the program.

Deliverable: Interview guide

Deliverable Date: May 2013

4.4.3 COMPARISON OF TREATMENT AND CONTROL GROUP

If new treatment and control groups are added to the program in PY5, Opinion Dynamics will evaluate the comparability of the treatment and control groups. This analysis will entail statistical comparison of baseline household energy consumption, and demographic, household, and psychographic characteristics. For this analysis, the evaluation team will purchase customer data, by demographic, household, and psychographic characteristics. Through the review of this information, we will be able to gain a better understanding of the differences between the treatment and control groups. Below we detail some sample data points of interest.

Demographic characteristics

Base Name/Address	Education
Birth Date	Homeowner/Renter Indicator
Dwelling Type	Number of Adults
Estimated Household Income	Number of Children
Occupation Group	Telephone Number Where Available

Household characteristics

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Building Square Footage

Year Built

Psychographic characteristics

Behavior bank (Social causes and concerns – Environment)

Behavior bank (Computers - Internet/Online subscriber or Use Internet Services)

Deliverable: Initial Data Requests

Deliverable Date: June 2013

Deliverable: Initial Analysis to help with Sampling for Billing Analysis

Deliverable Date: July 2013

4.4.4 BILLING ANALYSIS

The objective of the billing analysis will be to estimate the Home Energy Report program electricity and gas savings in PY5. The analysis for this program will focus on the period from June 2012 through May 2013, i.e., the PY5 period. However, because some of the treatment groups started prior to June 2011, our analysis will need to cover a multi-year period to look at 12 months pre-participation for all participants. Due to this extended analysis, there may also be a need to review economic indicators for the same time frame to help contextualize our findings.

The evaluation team will use an approach in PY5 that is consistent with the PY4 approach. The savings will be estimated using a Difference-in-Differences (D-in-D) approach, which is a fixed effects regression analysis of the monthly gas and electric bills of treatment and control group customers. The D-in-D refers to the model's implicit comparison of consumption before and after treatment of treatment and control group customers. The model includes customer-specific intercepts (i.e., fixed effects) to capture differences between customers in their non-weather sensitive consumption. The planned estimation period for the PY5 analysis will be June 2012 to May 2013.

The general model will have the following form:

$$ADC_{it} = \alpha_i + \beta_1 POST_{it} + \beta_2 PROGRAM_{it} \times POST_{it} + \mu_{my} + \varepsilon_{it} \quad (\text{Equation 1})$$

Where ADC is the average daily consumption (kWh or therms) for home *i* in month *t*. Other components of the model will include:

- α_i = home intercept corresponding to non-weather sensitive average daily consumption
- POST = indicator variable for whether the period is pre- or post-treatment. This variable is defined with a one month lag to allow for time for the home to implement energy savings measures. The first month in the post period was September 2010.
- PROGRAM = an indicator variable for program participation (=1, if in treatment group; and =0, otherwise)

- μ_{my} = month-by-year fixed effects intended to capture weather and other effects on consumption specific to the month⁸
- ε_{it} = error term for customer i in month t

The coefficient β_1 represents the impact of factors affecting the consumption of all customers (i.e., treatment and control) between the pre-treatment and treatment periods. The coefficient β_2 represents the average treatment effect of the program (the kWh or therm savings impact), controlling for changes in participant usage unrelated to the program.

Because the program design used random assignment to allocate customers to the treatment and control groups, the coefficient on $PROGRAM_{it} \times POST_{it}$ has a clear causal interpretation as the program effect. The large size of the treatment and control groups means that even small treatment effects (< 1%) can be detected.⁹

Deliverable: Data Request with Complete Billing Data

Deliverable Date: July 2013

4.4.5 CHANNELING ANALYSIS

The Behavioral Modification Program savings reflect both behavioral changes, such as turning off lights in unoccupied rooms and adjusting thermostat settings, and investments in energy savings equipment, such as high-efficiency furnaces and Compact Fluorescent Lamps (CFLs). Savings from measures that were rebated through AIC's energy-efficiency programs are counted in both the Behavioral Modification Program and the rebate programs, and thus are double-counted. In this task, we will determine the amount of Behavioral Modification Program gas and electric savings that were counted in other AIC rebate programs using tracking data provided by AIC.

Customers in the treatment and control groups are assumed to receive the same treatment from the utility for the program promoting Measure A (i.e., they face the same marketing and incentives). Because customers were randomly assigned to the treatment and control groups, any difference

⁸ This specification assumes that all control and treatment group customers are sampled from the same area and experience the same weather. If this assumption does not hold, the model would substitute location-specific monthly weather variables (e.g., HDDs, CDDs) for the month-by-year fixed effects. The program impacts were estimated using both specifications.

⁹ Also, in this framework, it is possible to measure heterogeneous treatment effects by including interaction terms between $POST \times PROGRAM$ and observable customer characteristics. For example, the following specification would be used to estimate how savings evolve in the post-treatment period and the persistence of savings in homes in the second year of the program:

$$ADC_{it} = \alpha_i + \beta_0 PROGRAM_{it} + \beta_1 POST_{it} + \sum_{p=2}^P \beta_{2p} POST_{it} \times POSTMONTH_{ipt} + \beta_2 PROGRAM_{it} \times POST_{it} + \sum_{p=2}^P \beta_{2p} PROGRAM_{it} \times POST_{it} \times POSTMONTH_{ipt} + \mu_{my} + \varepsilon_{ipt} \text{ (Equation 2)}$$

where p indexes the month number in the post-period for a building, $p=1, 2, \dots, P$ and all of the other variables are defined as before. In this framework, the average program savings in a home in month p in the post period equals: Average monthly savings in post-period month 1 = β_2 , Average monthly savings in post-period month p = $\beta_2 + \beta_{2p}$, for $p=2$ to P .

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between the groups in the installation of Measure A can be attributed to the behavioral program. We will work with AIC and CSG to ensure that measures are only counted once.

The period of analysis for this effort will be from June 2012 through May 2013.

Deliverable: Data Requests

Deliverable Date: August 2013

4.4.6 REPORTING

The evaluation team will write a draft report of findings for stakeholder review. We will then deliver a final report that incorporates any comments from the review.

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

4.5 BUDGET AND SCHEDULE

The table below outlines the schedule for the Behavioral Modification Program evaluation.

Table 7. Behavioral Modification Program Evaluation Tasks Schedule

Task	Evaluation Task	2013									
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sept	Oct
1	Review Program Materials and Database										
2	Stakeholder Interviews										
3	Comparison of Treatment and Control Group										
4	Billing Analysis										
5	Channeling Analysis										
6	Reporting										

	Data Request
	Create Data Collection Instruments
	Collect Data
	Analyze Data
	Milestone Deliverable

The table below outlines the evaluation budget for each task.

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Table 8. Behavioral Modification Program Evaluation Budget

Task #	Description	Deliverable Date	Dollars by Task
1	Program Materials and Database Review	May 2013	\$7,000
2	Stakeholder Interviews	May-June 2013	\$3,500
3	Treatment and Control Comparison Effort	June-July 2013	\$9,500
4	Billing Analyses (gas and electric) – note that this will include flags for the different participant groups	July-Sept 2013	\$27,500
5	Channeling Analysis	August-Sept 2013	\$8,500
6	Reporting	September-October 2013	\$24,000
	Total Dollars		\$80,000

5. RESIDENTIAL HOME ENERGY PERFORMANCE & ELECTRIC SPACE HEAT PILOT PROGRAM

5.1 PROGRAM DESCRIPTION

The Home Energy Performance (HEP) Program is now in its fifth year of implementation (PY5). The HEP Program is a home diagnostic and improvement program offered to AIC's residential customers. The program has two parts: 1) in-home audits with the direct install of measures, and 2) incentives for additional energy efficiency opportunities. Further, a customer can participate in the program in either way—receiving an audit from a HEP Energy Advisor, or by contacting a program ally to install shell measure improvements.

The HEP Program also focuses on developing a local home performance industry and is in the process of transforming into a more comprehensive Home Performance with ENERGY STAR® (HPwES) program. The HEP Program is working towards developing the local contractor network in Illinois through facilitating Building Performance Institute (BPI) certification and other whole building science training.

Within HEP, AIC includes all residential customers as well as a targeted effort for customers living in older homes who use electric space heating (called the Electric Space Heat Pilot (ESHP)). ESHP customers receive program services that are identical to non-electric space heating customers with two exceptions. These electric space heating home customers have a dedicated program implementer in CSG and, depending on homeowner eligibility and permission, are provided blower door-assisted air sealing of the home by a specially trained air-sealing technician. In past evaluations, we have treated HEP and these targeted customers differently. However, given the fact that the programs are implemented similarly, for PY5 and moving forward, the evaluation team will assess the two components with a single methodology and report findings for HEP overall (as ESHP operates as a sub-program to support achieving HEP's electric savings goals).

The expected savings from this program is 1% of the overall PY5 portfolio of electric savings and 2% of overall PY5 portfolio therm savings (including both residential and commercial).

5.2 RESEARCH OBJECTIVES

In this evaluation period, we will focus on conducting a billing analysis to assess gross savings attributable to the program for both electric and gas savings. This section outlines the planned tasks for our PY5 evaluation of the HEP Program. The tasks are designed to answer the following impact-related research question:

1. What are the gross and net energy savings impacts from the program?

The evaluation team will also explore a limited number of process-related questions as part of the PY5 evaluation. These questions and their prioritization are subject to change based on discussions with AIC and CSG program staff.

1. Are the programs implemented according to design?
2. What implementation challenges have occurred in PY5 and how have they been overcome?
3. Have there been any changes to program design and implementation from PY4? If so, how and why?

We will explore each of these questions through the evaluation activities described throughout this plan.

5.3 *METHODOLOGY*

Below we review the methods employed to evaluate the HEP Program in PY5.

5.3.1 DATA SOURCES

Impact Analysis

To estimate PY5 ex post gross savings, we will use participant billing data, the program tracking database, and the Statewide Technical Reference Manual (TRM). If we do not implement a pre-post billing analysis design (see the Gross Savings Section below), the evaluation team will apply the PY4 NTGR (0.83 for electric and 0.99 for gas) to calculate net savings for the HEP Program in PY5

Process Analysis

The process analysis is limited in PY5 and consists of a review of program materials and in-depth interviews with AIC program staff and CSG implementation contractors.

5.3.2 SAMPLING PLAN

Given the billing analysis impact approach planned for PY5, there is no sampling associated with the PY5 evaluation effort. The customer billing data will be used for all program participants if eligible for the analysis (i.e., sufficient pre- and post-billing data for analysis).

5.3.3 ANALYSIS PLAN

The evaluation team will conduct an impact and limited process evaluation for the HEP Program in PY5. We outline our analysis plan below.

Gross Savings

Gross savings will be determined in two ways: 1) application of the TRM values based on the measures installed in the home for PY5 gross impacts and 2) billing analyses for updating values within the TRM. The TRM values do not capture the possible interactive affects that can occur when more than one weather-dependent measure is installed. For example, if insulation and air sealing occur in a home, the engineering values in the TRM do not capture the reduction in total savings since both measures affect the HVAC system. As a result, the billing analysis will provide an indication of the overall savings in the home.

The evaluation team will use one of two different billing analysis designs: 1) a pre-post design or 2) a pre-post with comparison group design. If a pre-post design is used, the result will be the estimation of gross savings with the realization rate being the calculation between the ex ante gross savings and estimated gross savings results. With this design, the differences seen are weather normalized and are considered to have been caused by the program. If a pre-post with comparison group design is used, the estimated savings are net savings. A realization rate would need to be calculated from the ex ante net savings and the result of this analysis.

Because a billing analysis requires a complete year of billing data before and a complete year of billing data after installation of measures, the evaluation team will conduct the analysis in PY5 using PY4 participants. Regardless of which design is employed, we will perform a billing analysis to estimate savings observed in changes in energy usage as a result of installing HEP measures within the home. The model may build in dummy variables for each measure type installed (to provide estimated energy savings by measure), or depending upon the predictive power of the model, we will obtain a single whole-house savings value. If we are able to obtain measure level savings, the realization rates on each measure would be provided to the Technical Advisory Committee as possible updates to the per-unit savings for these measures. If this occurs, the realization rate will need to be based on a pre-post design so we have gross to gross comparison. If the data only supports a single value from our analysis, the results will be provided for prospective application as a realization rate to a per-home ex ante value. This value would be valid assuming comparable implementation of measures from year to year. In this case, a pre-post or pre-post with comparison group design could be used.

Net Savings

Net savings methodology will change depending on the gross impact billing analysis design employed. When using a comparison group, the results found are net impacts. As such, no NTGR is involved in determining net impacts (this could be considered a retrospective net analysis). However, if due to enrollment dates of PY5 participants, there is insufficient billing data to support using PY5 participants as a comparison group, the evaluation team will apply the PY4 NTGR to calculate net impacts for the HEP Program in PY5. The PY4 NTGRs were determined through participant self-report.

5.4 TASKS

Below we outline the various evaluation tasks for the PY5 evaluation.

5.4.1 PROGRAM MATERIAL REVIEW

The evaluation team will review program materials, including program design, implementation plans, marketing and outreach efforts, market actor training materials, and program databases to assess program implementation effectiveness and provide recommendations for improvement, where applicable.

Deliverable: Data Request

Deliverable Date: May 2013

5.4.2 PROGRAM MANAGER AND IMPLEMENTER INTERVIEWS

The evaluation team will conduct interviews with the HEP Program managers and implementation staff in PY5 to understand changes in each program's design, implementation, and evaluation priorities. We anticipate conducting approximately two to four interviews.

Deliverable: Draft and final interview guide

Deliverable Date: May 2013

5.4.3 STATISTICALLY ADJUSTED ENGINEERING ANALYSIS

The evaluation team will conduct an impact analysis for the HEP Program for participants in PY4 and apply findings to participants in PY5 (see above for more detail).

Deliverable: Draft and Final Report

Deliverable Date: September-October 2013

5.4.4 REPORTING

We will summarize and report on data from the PY5 evaluation activities in a report that we will deliver in Fall 2013. As stated earlier, we will not present separate findings for HEP and ESHP customers.

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

5.5 TASK SCHEDULE

Table 9 provides a schedule of evaluation tasks for PY5.

Table 9. Schedule of HEP and ESHP Evaluation Tasks

Task	Evaluation Task	2013					
		May	June	Jul	Aug	Sep	Oct
1	Program material review						
2	Program manager and implementer interviews						
3	Impact analysis						
4	Reporting						

	Data Request
	Collect Data
	Analyze Data
	Milestone Deliverable

5.6 BUDGET AND SCHEDULE

The PY5 budget for this effort is \$89,500.

Table 10. HEP and ESHP Program Evaluation Budget by Task

Task #	Task	Due Date	Budget
1	Program Material Review	May 2013	\$2,500
2	Program Manager and Implementer Interviews	May 2013	\$4,000
3	Impact Analysis	September-October 2013	\$65,000
4	Reporting	September-October 2013	\$18,000
Total Dollars			\$89,500

6. RESIDENTIAL APPLIANCE RECYCLING

6.1 PROGRAM DESCRIPTION

The Appliance Recycling Program (ARP) promotes the retirement and recycling of primary and secondary inefficient refrigerators and freezers from AIC's electric households by offering a turn-in incentive and free pickup of working equipment, as well as information and education on the cost of keeping an inefficient unit in operation. The target market for this program is residential electric customers with working refrigerators and freezers that are between 10 and 27 cubic feet in size.

The expected savings from this program is 8% of the overall PY5 portfolio of electric savings and 0% of PY5 portfolio therm savings.

6.2 RESEARCH OBJECTIVES

For PY5, the objectives of evaluation activities are to:

1. Obtain gross and net energy savings
2. Assess the difference between primary and secondary unit free ridership and test the survey for possible measurement error in the inducement section of the battery
3. Identify opportunities to improve the program performance

The PY5 evaluation will build on research we conducted in previous evaluations, and we will apply the TRM regression equation to calculate savings.

6.3 METHODOLOGY

6.3.1 DATA SOURCES

Evaluation data for the ARP in PY5 will consist of the following primary sources:

- Cognitive interviews with 15 participating customers
- Brief telephone surveys with 140 participating refrigerator recycling customers
- Reviews of program materials and marketing documents
- In-depth interviews with program management and program administrator staff

6.3.2 SAMPLING PLAN

To report results at the 90/10 level of confidence and precision or better, the evaluation team plans to conduct 140 participant surveys in PY5, as shown in Table 11.

Table 11. ARP PY5 Planned Participant Survey Sample Sizes

Measure	Number of Participant Surveys
Recycled Primary Refrigerators	70
Recycled Secondary Refrigerators	70

6.3.3 ANALYSIS PLAN

The evaluation team will conduct three major impact evaluation activities in PY5:

- Verify participation through telephone surveys
- Apply TRM per-unit gross savings estimates
- Update the NTGR for refrigerators for prospective application in PY7

In addition, the team will conduct two process evaluation activities:

- Document any changes to the program design and implementation
- Identify opportunities for improvement based on stakeholder interviews

Verification

The evaluation team will verify refrigerator recycling participation with 140 telephone surveys. Through these same surveys, we will collect additional data to inform future TRM estimates of the part-use factor (i.e., determination of the usage patterns for the measure removed), and NTGR analysis for prospective use in PY7. To provide verification for freezers, we will review the data in the tracking database to ensure all relevant information is collected for each unit.

Gross Savings

In PY5, the evaluation team will determine ARP gross impacts by multiplying the number of verified participants for each measure by the unit savings estimated through the TRM algorithm.

Net Savings

The evaluation team will apply the NTGR results from the PY4 analysis to the PY5 gross savings for refrigerators and freezers. However, as required by the TRM, we will include the induced replacement adjustment estimated and provided for informational purposes in the PY4 evaluation. We will estimate ARP refrigerator free ridership and spillover for PY7 application by analyzing participant data collected in PY5. Note that we may ask customers about room air conditioner removal, but do not plan to update this measure.

We outline the steps for the calculation of the refrigerator NTGR in the subsections below.

Estimate Free Ridership

In appliance recycling programs, we define free riders as program participants who would have permanently removed their appliances in the absence of the program. This applies to both secondary and primary units since the program does not cause primary units to be replaced, but rather affects the fate of the old unit by ensuring that it be permanently removed from the grid. Free riders are participants who receive an incentive when they would not have needed one to perform the same action.

For program participants, only four scenarios are possible for a refrigerator or freezer had it not been recycled through the program:

- The unit would have been kept by the household, but not used.
- The unit would have been kept by the household, and still used.
- The unit would have been discarded by the household through a method in which the unit was destroyed.
- The unit would have been discarded by the household through a method in which the unit was transferring to another person, who continued to use it.

Two of the four scenarios indicate free ridership:

- The unit would have been kept by the household, but not used.
- The unit would have been discarded by the household through a method in which the unit was destroyed.

Free ridership occurs in these latter scenarios, because units would have been removed from the grid and not used and/or destroyed, even in the absence of the program. As a result, the program cannot claim energy savings generated by the retirement of these appliances. Table 12 summarizes these scenarios.

Table 12. ARP Potential Attribution Scenarios

Scenarios Independent of Program	Scenario	Indicative of Free Ridership
Unit Kept but Not Used	1	Yes
Unit Kept and Used	2	No
Unit Discarded and Destroyed*	3	Yes
Unit Discarded, Transferred, and Used	4	No

*While Scenario 3 would lead to destruction of the appliance, previous market actor interviews have indicated that it is unlikely the unit would have been decommissioned in the environmentally responsible manner undertaken by the program. As a result, while the energy impact may be equivalent, the larger environmental and societal impacts may not be.

Spillover

Participant survey spillover questions quantify instances where participants' ARP experiences influenced them to participate in other AIC programs or take other actions to improve energy efficiency, outside of AIC programs. We ask survey respondents to identify additional energy efficiency actions or measures and rate the level of influence of the program. Specifically, when customers indicated the program was "very influential" and they did not receive an incentive for the action, the measure is counted as spillover.

Induced Replacement

In most cases, the per-unit gross energy savings attributable to the ARP are equal to the energy consumption of the recycled appliance (rather than being equal to the difference between the consumption of the recycled appliance and its replacement, when applicable). This is because the energy savings generated by the program are not limited to the change within the participant's home, but rather to the total change in energy consumption at the grid level.

In general, the purchase of new refrigerators is part of the naturally occurring appliance lifecycle, typically independent of the program and tantamount to refrigerator load growth. It is not the purpose of the program to prevent these inevitable purchases, but rather to minimize the grid-level refrigerator load growth by limiting the number of existing appliances that continue to operate after they are replaced. However, when a recycling program *induces* replacement (i.e., the participant would *not* have purchased the new refrigerator in the absence of the recycling program), that savings must account for replacement. The participant survey will ask participants if they replaced their appliances as a result of participating in the recycling program. In PY4, we asked participants these questions, but did not apply it in the PY4 net savings calculation.

This is due to the fact that we are concerned that customers may not understand the questions adequately to provide an accurate response. Therefore, we plan to ask 15 test survey respondents cognitive questions to ensure their understanding of the survey questions as intended. We will use these survey results to modify the participant survey, if necessary, prior to contacting the proposed sample of 140, to ensure inducement data is reliable.

Calculate Net-to-Gross

The final estimate of program-influenced savings is estimated by the following formula:

$$\text{Net Savings} = \text{Gross per unit savings} \\ * (100 - \text{Freeridership}\% + \text{spillover } \% - \text{induced replacement } \%)$$

Since the proportion of primary to secondary refrigerators may change over time, we propose to estimate a refrigerator NTGR in PY5 for PY7 application segmented by primary and secondary units.

Document Program Changes

The evaluation team will review program documentation, including marketing materials, implementation plans, and any additional documentation provided by AIC or Conservation Services Group (CSG), as well as analyze the results of our in-depth interviews with program and implementation staff. These data sources will inform a documentation of any changes to program processes that have occurred since the last process evaluation in PY4.

Process Evaluation

Since the PY4 evaluation assessed participant satisfaction through a variety of questions on the participant survey, we will not repeat these as the program has very high satisfaction rates. We will interview stakeholders to gather information on how well the program is performing and if there are opportunities for improvement from their point of view.

6.4 TASKS

6.4.1 REQUEST AND REVIEW DATA FROM UTILITY

The evaluation team requests the following information from AIC regarding each appliance recycled through the ARP:

- Participant Data
 - Name (first and last)
 - Address (number, street, apt#, city, state, and zip code)
 - Phone number (including alternative number if available)
 - Unique ID number
 - Type of dwelling (single family, multifamily, low income, manufactured home)
- Measure Data
 - Customer name and address
 - Appliance characteristics from the tracking database
 - Energy usage information as reported in tracking database
 - Date application was received
 - Date appliance was picked up for recycling
 - Amount of rebate paid
 - Date of the payment
- Program materials
 - Marketing materials
 - Marketing calendar
 - Program manuals or other documentation of implementation process

Deliverable: Data Requests

Deliverable Date: March 2013

6.4.2 PROGRAM MANAGER, IMPLEMENTER, AND MARKET ACTOR INTERVIEWS

The evaluation team will perform stakeholder interviews (including interviews with program managers, implementers, and ARCA) using the following steps.

- Develop staff and implementer interview guides
- Complete interviews

Deliverable: Draft and final interview guide

Deliverable Date: March 2013

6.4.3 PARTICIPANT SURVEYS

The evaluation team will conduct a participant survey using the following steps:

- Develop draft telephone survey and additional cognitive questions
- Obtain review and comment
- Finalize telephone survey and additional cognitive questions
- Conduct telephone surveys and cognitive questions with 15 participants
- Adjust telephone survey, if necessary
- Conduct telephone surveys

Deliverable: Draft and final participant survey guide

Deliverable Date: June 2013

6.4.4 ANALYZE DATA

The evaluation team will do the following:

- Analyze participant survey data
- Analyze participant database
- Review program materials

Deliverable: Complete analysis

Deliverable Date: August 2013

6.4.5 REPORTING

The evaluation team will write a draft report of findings to review with the stakeholders. We will then deliver a final report that incorporates updates from the review.

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

6.5 BUDGET AND SCHEDULE

Table 13. ARP PY5 Evaluation Timeline

Task	Evaluation Activity	2013									
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1	Request and review data from utility										
2	Create Data Collection Instruments										
	Create Participant Surveys										
	Create Staff and Implementer Interview Guides										
3	Collect Data										
4	Analyze Data										
	Analyze participant survey data										
	Analyze participant database										
	Review program materials										
	Prepare Evaluation Binder										
5	Reporting										
	Prepare Draft										
	Review with Stakeholders										
	Final Draft										
	Data Request										
	Create Data Collection Instruments										
	Collect Data										
	Analyze Data										
	Milestone Deliverables										

The table below shows the PY5 evaluation budget by task.

Table 14. ARP PY5 Evaluation Budget

Task	Task Description	Deliverable Date	Total Dollars
1	Request & Review Data	June 2013	\$8,500
2	Create Data Collection Instruments	June 2013	\$4,500
3	Collect Data	July 2013	\$17,000
4	Analyze Data	August 2013	\$12,000
5	Reporting	September-October 2013	\$9,000
		Total Dollars	\$51,500

7. RESIDENTIAL MULTIFAMILY

7.1 PROGRAM DESCRIPTION

The Multifamily Program encompasses three program components: Common Area Lighting, In Unit, and Major Measures. The Common Area Lighting Component primarily focuses on replacement of standard efficiency common area lighting with high efficiency fluorescent lighting, and incandescent and fluorescent exit signs with LED exit signs. The In Unit Component focuses on the installation of measures in tenant units related to a limited number of incandescent lighting replacements and water conservation measures. The Major Measures Component addresses more complex measures, such as adding insulation and performing air sealing to the building. The Major Measures Component was added to the program in PY4, and experienced much higher participation than was expected, resulting in the program exceeding its electric goal by 26% and its therm goal by 271%.

Program Year 5 (PY5) began in June 2012 and ends in May 2013. The expected savings from this program is 2% of the overall portfolio of electric savings and 7% of portfolio therm savings (including both residential and commercial).

7.2 RESEARCH OBJECTIVES

The PY5 Impact Evaluation will focus on answering the following research questions:

- What are realized gross energy and demand savings? What are the net program savings?
- What is the persistence of energy savings measures through the In Unit Component?
- What is the free ridership rate for the Major Measures Component?

We anticipate that the PY5 Process Evaluation of the Multifamily Program will focus on the research questions presented below.

- Are trade allies satisfied with the Multifamily Program? What improvements can the program make?
- Are property managers/owners satisfied with the Major Measure program offerings and their interactions with program staff and trade allies?
- Were there any changes in program implementation compared to the PY5 implementation plan?
- How does the AIC Multifamily Program compare to other multifamily programs in the country? Where are opportunities for growth in energy savings?
- Are any changes to program design or implementation planned for PY6?

7.3 METHODOLOGY

Below we provide a summary of the methods planned for the PY5 Multifamily evaluation.

7.3.1 DATA SOURCES

Data sources for the PY5 Impact Evaluation will come from:

- The program's tracking database
- Surveys of Multifamily property managers/owners
- On-site audits

Data sources for the PY5 Process Evaluation will come from:

- The program's materials (e.g., marketing information, program information for participants, applications)
- Interviews with program management and implementation staff
- Surveys of Multifamily property managers/owners
- In-depth interviews with trade allies
- On-site audits
- Secondary research on other Multifamily programs across the country

7.3.2 SAMPLING PLAN

For the Multifamily property manager/owner survey, we will conduct a census of PY5 Common Area Lighting and Major Measures participants to maximize the number of respondents, as in PY4 there were only 84 unique participants between the two program components.

We will also perform up to 75 on-site audits of tenant units that received measures through the In Unit Component. Where buildings also have Common Area Lighting measures, we will audit those measures as well. Prior to sampling, we will contact participating property managers/owners and seek approval to gain entry to their property for the purpose of the audit. After this step, we will randomly sample from the group of participating building units where we are able to gain access. The sample will be stratified by the size of the property so large and small properties are adequately represented in the results.

Final sampling design and size will be based on a review of the PY5 participation data and discussions with the program implementer and AIC.

7.3.3 ANALYSIS PLAN

The PY5 evaluation will focus on completing surveys with property managers participating in the Major Measures Component and Common Area Lighting Component, and on-site audits to verify the installation of direct install measures for the In Unit Component.

Gross Savings

Measure verification for the Major Measures and Common Area Lighting Components will be achieved through a survey of participating property managers/owners. For the In Unit Component, measure verification will occur through on-site audits.

Gross energy savings will be determined by conducting a review of the program database and applying fixed savings values for measures in the Statewide Technical Reference Manual (TRM), multiplied by installation verification rates from our on-site audits and surveys with property managers.

Net Savings

Net to Gross (NTG) ratios for the Major Measures Component estimated through property manager surveys in PY5 will be applied retrospectively as no primary research has been conducted to date. For the Common Area Lighting Component, we will apply the PY3 NTG ratio to determine PY5 net impacts while the value estimated through the PY5 property manager surveys will be applied prospectively. Finally, a NTG ratio of 1.0 will continue to be applied to In Unit Component measures, as determined in PY2.¹⁰

Process Evaluation

In the property manager survey, we will include a brief section that includes questions related to program process to gain customer feedback on the program. Other process-related tasks will be completed, including in-depth interviews with trade allies and potentially performing secondary research of similar multifamily programs across the country.

7.4 TASKS

7.4.1 REQUEST AND REVIEW DATA FROM UTILITY

We will request the following data from the program implementer:

- The program's final PY5 database, including property manager/owner contact information for each project (manager name, phone number)
- The program's materials (e.g., marketing information, program information for participants, applications)
- Contact information for participating trade allies
- Information gathered through the program manager interviews

Deliverable: Data Request

Deliverable Date: April 2013

7.4.2 PROGRAM MANAGER AND IMPLEMENTER INTERVIEWS

We will conduct telephone interviews with both the AIC program manager and CSG's program manager. Topics covered will include any program design changes that were made for PY5, challenges during the implementation, and how the recommendations from previous evaluations were addressed in PY5.

Deliverable: Draft and final interview guide

Deliverable Date: April 2013

7.4.3 PROPERTY MANAGER PHONE SURVEY

Property managers participating in the Major Measures and Common Area Lighting Components will be surveyed to verify measure installation and collect self-reported data to estimate NTG ratios.

¹⁰ The team will make a final determination regarding the value used for PY5 in consultation with AIC and ICC staff. As a result, this approach to NTGR application has the potential to change.

Currently, NTG values from the Home Energy Program are being applied to the Major Measures Component. As multifamily owners often face a different set of challenges and barriers to completing energy efficiency upgrades than single-family homeowners, NTG ratios may differ as well. As a result of these differences in participants and program design, we plan to apply these NTG ratios retrospectively to PY5 savings estimates.

Because we plan to speak directly with property managers, we will also include a brief section that includes program process questions to gain customer feedback on the program. We will inquire about satisfaction with different aspects of the program, including interactions with implementation team members and trade allies, the quality of the work completed, and other questions as appropriate. We expect to work with AIC to determine if there are other areas for inclusion.

Deliverable: Draft and final survey instrument

Deliverable Date: June 2013

7.4.4 ON-SITE AUDITS

The team will perform on-site audits for a sample of participating buildings in the In Unit Component to explore measure persistence. Our experience evaluating similar programs indicates that measures installed in tenant-occupied spaces are often removed, particularly when the installations occur in building “sweeps,” at times when tenants may not be in the unit.

We will work closely with CSG to schedule the on-site audits with participating customers and minimize the amount of disruption to property managers and tenants.

Deliverable: On-site audits performed

Deliverable Date: July 2013

7.4.5 IN-DEPTH INTERVIEWS WITH TRADE ALLIES

Interviews with trade allies will allow us to collect additional information on the program process and trade ally customer engagement, and explore additional ways for the program to potentially work with trade allies.

According to CSG, In Unit and Common Area Lighting measures are typically installed by property maintenance staff. CSG notes that if rewiring is not needed, Illinois law does not require the services of an electrician. As a result, trade ally interviews will focus on the Major Measures Component, where trade allies are used to install insulation and air sealing. In PY4, eight trade allies participated in the Major Measures Component. The evaluation team will attempt to speak with 3-4 of these trade allies in PY5.

Deliverable: Draft and final interview guide

Deliverable Date: June 2013

7.4.6 SECONDARY RESEARCH

We are aware that AIC recently had an energy efficiency potential study performed. If the multifamily market was not explored in this study and AIC so desires, the evaluation team could perform secondary research of similar multifamily programs across the U.S. The evaluation team may look at multifamily programs in California, Wisconsin, and Michigan, among others as information is available. This research could include a look at the current size of the multifamily market in AIC territory and opportunities for future growth, both for measures that are currently being incentivized by the program and those that are not. We would also compare and contrast program design and implementation strategies, focusing on developing recommendations for further program improvements that may increase the program’s savings potential in future years.

Deliverable: Secondary Research Completed

Deliverable Date: July-August 2013

7.4.7 OBTAIN GROSS AND NET IMPACTS

For the In Unit Component, we will determine gross impacts by reviewing the program database and verifying the measures installed through on-site visits to a sample of tenant units. We will calculate gross savings estimates by applying the gross per-unit savings from the Statewide TRM to these verified measure counts. To determine net impacts, we will apply an NTG ratio of 1.0 to verified gross savings. Since measures under the In Unit Component are direct installed, it is assumed that they would not otherwise be implemented.

For the Common Area Lighting and Major Measures Components, we will determine gross impacts by reviewing the program database and verify them through the property manager survey. We will multiply fixed values for measures in the Statewide TRM by installation verification values from the survey with property managers. We will estimate net impacts for both the Common Area Lighting and Major Measures Component by collecting self-reported data from the property manager survey. We will apply NTG ratios retrospectively to PY5 savings estimates. However, if the number of respondents for the Common Area Lighting Component is too small (there were only 11 participants in PY4), NTG ratios estimated in PY2 may be applied instead.

Deliverable: Analysis

Deliverable Date: July-August 2013

7.4.8 REPORTING

We will incorporate the outcome of the data collection and analysis tasks into one evaluation report.

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

7.5 BUDGET AND SCHEDULE

Below is the schedule for evaluation tasks.

Table 15. Multifamily Schedule by Task

Task	Evaluation Task	2013									
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sep	
1	Request and Review Data										
2	Program Manager and Implementer Interviews										
3	Property Manager Phone Survey										
4	On-site Audits										
5	In-depth Interviews with Trade Allies										
6	Secondary Research on Other MF Programs										
7	Obtain Gross and Net Impacts										
8	Reporting										

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	Create Data Collection Instruments
	Collect Data
	Analyze Data
	Milestone Deliverable

The budget for the PY5 Evaluation is \$80,000.

Table 16. PY5 Multifamily Budget by Task

Task	Task Description	Due Date	Dollars by Task
1	Request & Review Data from Utility	April 2013	\$2,048
2	Program Manager and Implementer Interview	April 2013	\$1,416
3	Property Manager Phone Survey	June-July 2013	\$10,446
4	On-site Audits	July 2013	\$36,378
5	In-depth Interviews with Trade Allies	June-August 2013	\$4,221
6	Secondary Research	July-August 2013	\$5,310
7	Obtain gross and net impacts	July-August 2013	\$6,482
8	Reporting	September- October 2013	\$14,539
Total Dollars			\$80,000

8. RESIDENTIAL MODERATE INCOME

8.1 PROGRAM DESCRIPTION

AIC's Moderate Income (MI) or WNCF Program began in PY3 as a pilot program. During PY4, the pilot became a formal program and staff began offering services beyond the Decatur area and into the Peoria tri-county area, St. Louis Metro East area, and the Quincy-Macomb area.

The WNCF program is a home diagnostic and whole-house retrofit program, but focuses on serving AIC customers who do not qualify for low-income weatherization assistance, but cannot afford to pay market prices for energy efficiency retrofit improvements to their homes. The target market is existing homes heated by a fuel source (electricity or natural gas) provided by AIC and owned by customers with a household income between 200% and 300% of the federal poverty level guidelines for household size.

Implemented by Conservation Services Group (CSG), the program performs no-cost energy audits for targeted customers, who are referred to CSG by the Energy Assistance Foundation (EAF), a nonprofit organization funded through donations by AIC employees and customers. The EAF is also a key contributor of program funds. In particular, the program requires customers to pay a small portion of the overall project cost (the greater of \$500 or 10% of the total project cost, in addition to any amount not covered by program incentives). EAF grants then fund up to \$3,000 to cover the remainder of the project cost after program incentives are applied.

The involvement of the EAF in participant intake and outreach is also of note in that it differentiates the MI Program from other home performance offerings. In particular, customers who are interested in participating in the program submit their application to the foundation, which screens the customers for income eligibility. If the customers are eligible, EAF then passes this information on to CSG to schedule an appointment.

Once a participant enters the program, they receive an in-home consultation during which several measures are installed. These measures include Compact Fluorescent Lamps (CFLs) and/or water conservation savings measures. Homeowners then receive a custom report with a work order of recommended energy efficiency improvements that they are encouraged to install by contracting with CSG in addition to actions they can perform themselves. CSG then subcontracts the work to be performed to select HEP and HVAC allies.

The expected savings from this program is less than 1% of the overall PY5 portfolio of electric savings and 2% of PY5 portfolio therm savings.

8.2 RESEARCH OBJECTIVES

In this evaluation period, we will focus on conducting a billing analysis to assess gross savings attributable to the program for both electric and gas savings. This section outlines the planned tasks for our PY5 evaluation of the MI Program.

The tasks are designed to answer the following impact-related research question:

1. What are the gross and net energy savings impacts from the programs?

The evaluation will also explore a limited number of process-related research questions. These questions and their prioritization are subject to change based on discussions with AIC and GDS program staff.

1. Are the programs implemented according to design?
2. What implementation challenges have occurred in PY5 and how have they been overcome?
3. Have there been any changes to program design and implementation from PY4? If so, how, and why?

We will explore each of the questions outlined above through the evaluation activities described throughout this plan.

8.3 *METHODOLOGY*

Below we provide a review of the methods employed to evaluate the MI Program in PY5.

8.3.1 DATA SOURCES

Impact Analysis

To estimate PY5 ex post gross savings, we will use participant billing data, the program tracking database, and the Statewide Technical Reference Manual (TRM). We plan to apply the Net-to-Gross Ratio (NTGR) from PY4 for this program to both gas and electric savings, which is a deemed value of 1.0.

Process Analysis

The process analysis is limited in PY5 and consists of a review of program materials and in-depth interviews with AIC program staff and CSG implementation contractors.

8.3.2 SAMPLING PLAN

Given the billing analysis impact approach planned for PY5, there is no sampling associated with this evaluation period. The customer billing data will be used for all program participants (if eligible for the analysis, i.e., sufficient pre- and post-billing data for analysis).

8.3.3 ANALYSIS PLAN

Gross Savings

Gross savings will be determined in two ways: 1) application of the TRM values based on the measures installed in the home for PY5 impacts and 2) billing analyses for updating the TRM. The TRM values do not capture the possible interactive affects that can occur when more than a single weather-dependent measure is installed. For example, if insulation and air sealing occurs in a home, the engineering values in the TRM do not capture the reduction in total savings since both measures affect the HVAC system. The billing analysis will provide an indication of the overall savings in the home. The evaluation team will conduct one of two different billing analysis designs: 1) a pre-post design or 2) a pre-post with comparison group design. If a pre-post design is used, the result will be the estimation of gross savings with the realization rate being the calculation between the ex ante

gross savings and estimated gross savings results. With this design, the differences seen are weather normalized and are considered to have been caused by the program. If a pre-post with comparison group design is used, the estimated savings are net savings. A realization rate would need to be calculated from the ex ante net savings and the result of this analysis.

Because a billing analysis requires a complete year of billing data before and a complete year of billing data after installation of measures, the evaluation team will conduct the analysis in PY5, but use PY4 participants. Regardless of which design is employed, we will perform a billing analysis to estimate savings observed in changes in energy usage as a result of installing HEP measures within the home. The model may build in dummy variables for each measure type installed (to provide estimated energy savings by measure), or depending upon the predictive power of the model, we will obtain a single whole-house savings value. If we are able to obtain measure level savings, the realization rates on each measure would be provided to the Technical Advisory Committee as possible updates to the per-unit savings for these measures. If this occurs, the realization rate will need to be based on a pre-post design so we have gross to gross comparison. If the data only supports a single value from our analysis, the results will be provided for prospective application as a realization rate to a per-home ex ante value. This value would be valid assuming comparable implementation of measures from year to year. In this case, a pre-post or pre-post with comparison group design could be used.

Net Savings

The evaluation team will not perform a net-to-gross analysis for this program in PY5; rather we will apply an agreed upon net-to-gross ratio of 1.0 given our understanding of program design and targeted customers from discussions with AIC, ICC staff, and the evaluation team.

8.4 TASKS

Below we outline the various evaluation tasks in the PY5 evaluation.

8.4.1 PROGRAM MATERIAL REVIEW

The evaluation team will review program materials, including program design, implementation plans, marketing and outreach efforts, market actor training materials, and program databases to assess program implementation effectiveness and provide recommendations for improvement, where applicable.

Deliverable: Data Request

Deliverable Date: May 2013

8.4.2 PROGRAM MANAGER AND IMPLEMENTER INTERVIEWS

The evaluation team will conduct interviews with MI program managers and implementation staff in PY5 to understand changes in each program's design, implementation, and evaluation priorities. We anticipate conducting approximately two interviews with AIC and CSG program staff.

Deliverable: Draft and final interview guide

Deliverable Date: May 2013

8.4.3 STATISTICALLY ADJUSTED ENGINEERING ANALYSIS

The evaluation team will conduct an impact analysis for the MI program for participants in PY4 to apply to participants in PY5 (see above for more detail). Per discussions among the evaluation team, AIC and ICC staff, we will apply an NTGR of 1 for this program.

Deliverable: Draft and Final Report

Deliverable Date: September-October 2013

8.4.4 REPORTING

We will summarize and report on data from the PY5 evaluation activities in a report that we will deliver in September 2013.

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

8.5 BUDGET AND SCHEDULE

Table 17 provides a schedule of evaluation tasks for PY5.

Table 17: Moderate Income PY5 Schedule of Evaluation Tasks

Task	Evaluation Task	2013					
		May	June	Jul	Aug	Sep	Oct
1	Program material review						
2	Program manager and implementer interviews						
3	Impact analysis						
4	Reporting						

	Data Request
	Collect Data
	Analyze Data
	Milestone Deliverable

The PY5 budget for this effort is \$57,000.

Table 18. Moderate Income Evaluation Budget

Task #	Task	Due Date	Budget
1	Program Material Review	May 2013	\$2,000
2	Program Manager and Implementer Interviews	May 2013	\$2,500
3	Impact Analysis	September – October 2013	37,500
4	Reporting	September – October 2013	\$15,000
Total Dollars			\$57,000

9. RESIDENTIAL ENERGY EFFICIENT PRODUCTS

9.1 PROGRAM DESCRIPTION

The Residential Efficient Products Program (REEP) provides rebates and in-store advertising for energy-efficient products sold at retail outlets in AIC's territory. AIC works with its implementers in coordination with industry retailers and manufacturers, while also educating customers on the benefits of efficient products. The goal of REEP is to reduce market barriers and create sustained demand and market for these products over time.

AIC's implementation team works with stores to train retail sales staff to be knowledgeable about and promote energy-efficient products, and to ensure they stock eligible products, place and maintain point-of-purchase (POP) signs on the shelves, and clearly identify price promotions for consumers. This program builds on the relationships and methods used in the Lighting Program, which is in its fifth year of operation. Marketing methods include the store POP signs, educational materials, and store education events. AIC supplements this approach with general awareness marketing, bill inserts, and customer newsletters that drive customers to participating retailers.

Because of the REEP, consumers shopping for a particular product have access to energy-efficient product models, education about the energy efficiency, and an incentive to purchase the products, resulting in higher rates of energy efficient purchases.

The expected savings from this program is 5% of the overall PY5 portfolio of electric savings and 11% of PY4 portfolio therm savings

Table 19 summarizes the products offered through the program with their incentives.

Table 19. REEP Measures, PY5 Goals, and Incentives

Measure	Incentive
Room Air Conditioners	\$35
Air Purifiers	\$20
Smart Strips	\$10
Heat Pump Water Heaters	\$300
Programmable Thermostats	\$25
Gas Water Heaters (0.67 Energy Factor)	\$50
Gas Water Heaters (0.70 Energy Factor)	\$75

9.2 RESEARCH OBJECTIVES

The research objectives for the REEP evaluation are to:

1. Calculate gross and net energy and demand savings
2. Assess program processes and opportunities for improvement

This plan builds upon the work performed in PY4 with installation rates and NTGR to be applied from the PY4 evaluation. We will use the TRM to calculate gross energy savings for verified participants.

9.3 *METHODOLOGY*

9.3.1 DATA SOURCES

Evaluation data for PY5 will consist of the following primary sources:

- Program tracking database
- Reviews of program materials and marketing documents
- In-depth interviews with program management and program administrator staff

9.3.2 ANALYSIS PLAN

Gross Savings

We will use program-tracking data from rebate applications to determine the ex ante number of units sold through the program. We will apply installation rates obtained from our PY4 telephone surveys. We will estimate total program savings using formulas provided in the TRM. We will verify participation by reviewing the data supplied in the tracking database.

Net Savings

At this time, the team expects to calculate PY5 net impacts using the results from the PY4 evaluation. However, this issue is currently under discussion by the SAG and ICC staff. As a result, we will finalize our approach based on those discussions.

Process Evaluation

We will report process findings as a result of our analysis of the program materials, the program database, and our interviews with program and implementation staff.

9.4 *TASKS*

9.4.1 REQUEST AND REVIEW DATA FROM UTILITY

We will include all program documents in our review, including records of marketing and outreach efforts, program applications, and all other paperwork.

The evaluation team requests the following information from AIC regarding each product sold through REEP:

- Participant Data
 - Name (first and last)
 - Address (number, street, apt#, city, state, and zip code)

Phone number (including alternative number if available)

Unique ID number

Type of dwelling (single family, multifamily, low income, manufactured home)

➤ Measure Data

Product purchased

Store name and address where purchased

Savings estimates as reported in tracking database

Date application was received

Date application was paid

Make and model of product purchased

Size or capacity of product purchased

Amount of rebate paid

➤ Program manuals or other documentation of implementation process

The evaluation team will review program materials and, along with information from stakeholder interviews, summarize any issues or concerns in a memo.

Deliverable: Data Requests

Deliverable Date: April 2013

9.4.2 STAKEHOLDER INTERVIEWS

The evaluation team will perform stakeholder interviews using the following steps:

- Develop staff and implementer interview guides
- Complete interviews

Stakeholder interviews (including with Applied Proactive Technologies and AIC implementation team members, i.e., CSG) will focus on assessing the following:

- Program goals
- Program process flow
- Program design versus program implementation
- Mid-year implementation changes
- Program strengths and weaknesses
- Program marketing

The evaluation team will use the interview results to develop recommendations for program design improvements.

Deliverable: Draft and final interview guide

Deliverable Date: May 2013

9.4.3 IMPACT ANALYSIS

The evaluation team will do the following:

- Analyze tracking database
- Apply TRM formulas to calculate savings.

Deliverable: Complete analysis

Date of Completion: August 2013

9.4.4 REPORTING

The evaluation team will do the following:

- Write draft report
- Review draft report with stakeholders
- Finalize report

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

9.5 BUDGET AND SCHEDULE

Table 20. REEP Program Evaluation Tasks Schedule

Task	Evaluation Activity	2013									
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1	Request and review data from utility										
2	Create Data Collection Instruments										
	Create Staff and Implementer Interview Guides										
3	Collect Data										
	Conduct Stakeholder Interviews										
4	Analyze Data										
	Analyze Stakeholder interviews										
	Analyze participant database										
	Review program materials										
	Prepare Evaluation Binder										
5	Reporting										
	Prepare Draft										
	Review with Stakeholders										
	Final Draft										
	Data Request										
	Create Data Collection Instruments										
	Collect Data										
	Analyze Data										
	Milestone Deliverables										

Table 21 outlines the evaluation budget for each task.

Table 21. REEP Program Evaluation Budget

Task	Task Description	Deliverable Date	Total Dollars
1	Request & Review Data	May 2013	\$8,000
2	Create Data Collection Instruments	May 2013	\$500
3	Collect Data	June 2013	\$1,200
4	Analyze Data	July 2013	\$5,000
5	Reporting	September-October 2013	\$6,500
Total Dollars			\$21,200

10. RESIDENTIAL ENERGY STAR NEW HOMES

10.1 PROGRAM DESCRIPTION

The ENERGY STAR New Homes program targets builders with a package of services, including training, technical information, and marketing assistance and incentives for construction of ENERGY STAR new homes (homes with a HERS Index of 85 or lower). The incentive is designed to defray the cost of the required home energy rating. In addition, the program provides cooperative marketing support for builders.

Implemented by CSG, the program targets builders of new single and multifamily homes heated with a fuel (natural gas or electricity) provided by AIC. A tiered incentive structure is applied, such that builders may qualify for additional financial incentives by achieving higher levels of efficiency in their new homes.

The expected savings from this program is 0.1% of the overall PY5 portfolio of electric savings and 0.3% of PY5 portfolio therm savings.

10.2 RESEARCH OBJECTIVES

The overarching research objectives for the PY5 evaluation are to:

- Determine the gross and net energy savings impacts from the program, and
- Assess program processes and opportunities for improvement.

The PY5 impact evaluation will apply a basic level of rigor.

10.3 METHODOLOGY

Below we provide a review of the methods employed to assess the residential ENERGY STAR New Homes program.

10.3.1 DATA SOURCES

Data sources for the PY5 evaluation will come from:

- The program's tracking database
- REM/Rate files
- The program management and implementation staff

10.3.2 ANALYSIS PLAN

The analysis for the PY5 program will be limited given that the program provides 0.1% of portfolio MWh savings and 0.2% of portfolio therms savings. The PY5 evaluation will consist of reviewing program records and confirming ex ante savings through a limited engineering review similar to evaluation activities performed in PY4. This will involve a review of the REMRate files for some, or all,

depending on how low participation is, of the program homes. The evaluation team will use a census of participant data to review program records for participating homes.

For net impacts, the team will apply the planning NTGR of 0.8 to both electric and gas savings.

10.4 TASKS

10.4.1 REQUEST AND REVIEW DATA FROM UTILITY

We will request the following data from the program implementers:

- The program's final PY5 database
- Information gathered through the program manager interview

Deliverable: Data Request

Deliverable Date: June 2013

10.4.2 PROGRAM MANAGER AND IMPLEMENTER INTERVIEWS

We will conduct telephone interviews with both AIC's and CSG's program managers. Topics covered include program outreach and implementation processes along with discussions regarding participant databases and ex ante savings estimates and algorithms.

Deliverable: Draft and final interview guide

Deliverable Date: June 2013

4.4.3 OBTAIN GROSS AND NET IMPACTS

The application of deemed savings task will be conducted for PY5 building from work already done in this area in previous evaluations. We will review the program tracking database to obtain a verified participant value and apply the gross per-unit savings to this value for the gross impact values. We will calculate net impacts by applying the deemed NTGR of 0.8.

Deliverable: Draft and final reports

Deliverable Date: September 2013

10.4.3 REPORTING

We will incorporate the outcome of the data collection and analysis tasks into one evaluation report.

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

10.5 BUDGET AND SCHEDULE

Below is the schedule for evaluation tasks.

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Table 22. ENERGY STAR New Homes Schedule by Task

Task	Evaluation Activity							
		Apr	May	Jun	Jul	Aug	Sep	Oct
1	Request and review data from utility							
2	Create Data Collection Instruments							
	Create Staff and Implementer Interview Guides							
3	Collect Data							
	Conduct Stakeholder Interviews							
4	Analyze Data							
	Analyze Stakeholder interviews							
	Analyze participant database							
	Review program materials							
	Prepare Evaluation Binder							
5	Reporting							
	Prepare Draft							
	Review with Stakeholders							
	Final Draft							
	Data Request							
	Create Data Collection Instruments							
	Collect Data							
	Analyze Data							
	Milestone Deliverables							

The budget for the PY5 Evaluation is \$12,000.

Table 23. ENERGY STAR New Homes Budget by Task

Task	Task Description	Deliverable Date	Dollars by Task
Task 1	Request and Review Data from Utility	June 2013	\$1,000
Task 2	Program Manager and Implementer Interviews	July 2013	\$2,000
Task 3	Obtain Gross and Net Impacts	September 2013	\$5,500
Task 4	Reporting	September-October 2013	\$3,500
Total Dollars			\$12,000

11. C&I STANDARD PROGRAM

11.1 PROGRAM DESCRIPTION

The C&I Standard Incentive Program offers AIC business customers fixed incentives for the installation of specific energy efficiency measures. The program covers lighting, variable frequency drives (VFDs), HVAC, refrigeration/grocery equipment, commercial kitchen, and steam traps among other measures. In addition, the program budget funds an online store available to all electric business customers that offers a variety of energy saving products, including compact fluorescent lamps (CFLs), LED exit signs, and vending misers in a convenient and easy-to-use delivery mechanism.

Lighting projects have traditionally generated the largest amount of savings within the Standard Program and the evaluation team expects to see similar participation and savings levels in PY5. The following table summarizes program activity through December 2012.

Table 24. C&I Standard Ex Ante Gross kWh and Therm Savings as of 12/18/12

Projects	Ex Ante kWh Savings	Ex Ante Therm Savings	Percent of Total kWh	Percent of Total Therms
Lighting	39,908,625	--	53%	--
Motor	31,340,858	--	41%	--
HVAC	1,741,485	48,953	2%	4%
Specialty Equipment	1,486,995	3,604	2%	<1%
Steam Trap	--	1,155,328	--	94%
Green Nozzle	202,314	20,793	<1%	2%
Leak Survey & Repair	901,376	--	1%	--
Total	75,581,653	1,228,678		

The program has made a number of changes to the application process in PY5. These changes involved removing sector-specific applications and combining those measures into a single Specialty Measures application form. Specialty measures include Standard Grocery/Convenience and Refrigeration, Standard Lodging, and Standard Commercial Kitchens.

The expected savings from this program is 17% of the overall portfolio of electric savings and 30% of portfolio therm savings (including both residential and commercial).

11.2 RESEARCH OBJECTIVES

The objective of the PY5 Standard Program evaluation is to provide estimates of gross and net electric and gas savings associated with the program. We will determine gross savings at the 90% confidence level with a precision of 10% or better. In addition, we will assess PY5 changes designed to improve the program participation process. In particular, the PY5 impact evaluation will answer the following questions:

1. What are the gross energy and demand impacts from this program?
2. What are the net energy and demand impacts from this program?

3. Did the program meet its energy goals? If not, why not?

The evaluation team will also explore a limited number of process-related research questions as part of the PY5 evaluation. These questions are aimed at exploring the impact of changes made between PY4 and PY5, which focused on application design and process improvements. These questions and their prioritization are subject to change based on discussions with AIC and SAIC program staff.

1. Program Participation
 - a. What does customer participation look like? How many projects were completed? By how many different customers? What type of projects?
 - b. Does customer participation meet expectations? If not, how is it different from expectations and why?
 - c. Does program ally participation meet expectations? How many market actors have joined the Program Ally Network?
2. Program Design and Implementation
 - a. Has the program as implemented changed compared to PY4? If so, how, why, and was this an advantageous change?
 - b. What implementation challenges have occurred in PY5 and how have they been overcome?
 - c. What program marketing and outreach efforts did the program employ in PY5? Are they appropriate for the target market?
 - d. Are participants taking advantage of new training and educational opportunities? Among those who have participated, are these program offers useful?
3. Participant Experience and Satisfaction
 - a. How satisfied are Online Store participants with their shopping experience? Are they likely to use the Online Store again in the future? Are they likely to participate in other AIC programs?
 - b. How satisfied are participants with the enhancements to the program applications in PY5?
4. Opportunities for Program Improvement
 - a. What changes could the program make to improve the customer experience and generate greater energy savings?

We will explore each of the questions outlined above through the evaluation activities described throughout this plan.

11.3 METHODOLOGY

Below we provide a summary of the methods planned for the PY5 Standard evaluation.

11.3.1 DATA SOURCES

Impact Analysis

To estimate PY5 ex post gross savings for the Core Program, we will utilize on-site visits and a telephone survey of program participants (see description below) to verify installed measure inventory for a sample of projects. We will use these data in conjunction with the Statewide TRM to estimate ex post gross savings by applying a realization rate. For the Online Store and Green Nozzle program offerings, the team will perform a database review and estimate savings based on the 2012 Statewide TRM per unit numbers and previous evaluation installation rates.

We plan to apply the Net-to-Gross Ratio (NTGR) from PY3 for this program. More specifically, we plan to apply the PY3 NTGR for gas measures (0.80) to PY5 gas measures and the PY3 NTGR for electric measures (varied by end-use groups) to PY5 electric measures.¹¹

Process Analysis

The process analysis will utilize data from four data collection methods: in-depth interviews, an Internet-based survey with Online Store participants, a review of program data, and a non-participant survey. In-depth interviews with AIC and SAIC implementation staff will provide the evaluation team with a comprehensive understanding of the program. In addition, we plan to field an Internet survey with Online Store participants to gather information about their experience with the program. The non-participant survey effort will provide insights into issues such as program awareness and barriers to participation.

11.3.2 SAMPLING PLAN

Impact Analysis

Based on the level of lighting projects completed through the Standard Program, we will divide the sample frame into lighting and non-lighting components and stratify the lighting sample frame to identify the largest projects based on savings. We will perform this stratification using the Dalenius-Hodges method to determine strata boundaries and the Neyman allocation to determine the optimal allocation of the available interviews to the strata.

The purpose of stratifying the sample of lighting projects in particular is to ensure that the projects under study represent a sufficiently large proportion of lighting savings, so that savings-related results are representative of the population at a confidence of 90% and a precision level of 10%. To achieve this level of precision for lighting projects, we attempt a census of the largest projects (via site visit) and a random sample of the smaller-size projects (via telephone). For non-lighting projects, we will also attempt a census via telephone.

We will conduct sampling for the participant telephone survey at the level of the project contact, rather than the project. This is necessary because as in previous program years, many customers complete more than one project in a given program year. In addition, given that there have

¹¹ The PY3 NTGR for gas measures is a planning value while the PY3 NTGR for electric measures is based on primary data collection efforts for the AIC program.

historically been significantly more projects in the Standard Program compared to Custom, the team will remove all customers in both frames from the Standard frame and place them in the Custom frame to be able to capture a sufficient number of custom projects.¹²

For the non-participant survey, the team will use a random sampling approach with quotas by rate code or rate code groups (large and small customers) to ensure completed surveys are representative of the AIC customer population. We plan to oversample the large strata to assure that we have sufficient sample size to find a company who has performed non-participant spillover (if present). We will generalize any savings found to the stratum level and then weight the findings from each stratum based on the percentage of customers in each strata.

Process Analysis

The evaluation team will conduct a quantitative Internet survey with participants in the Online Store during PY5. We will finalize our sample plan based on final PY5 participation. However, in the absence of special promotions such as the six free CFL kit, we anticipate conducting a census of program participants. If there is a large-scale promotion from which the majority of Online Store savings are derived, we will draw a random sample of participants with valid email addresses in proportion to the population of measures distributed through the store.

11.3.3 ANALYSIS PLAN

The evaluation team will conduct an impact and limited process evaluation for the Standard Program in PY5. Within our process evaluation activities, such as the Online Store participant survey, we will include questions to assess customer satisfaction with the processes in which they were involved. We will summarize and report on data from the PY5 Online Store Internet survey using descriptive statistics.

We will also conduct a telephone survey with business customers who have not participated in AIC's Act On Energy Business program. The team will use the results of the survey to support our impact and process evaluation. Engineering staff will estimate non-participant spillover based on responses to the telephone survey. We will also report process findings using descriptive statistics.

We outline our analysis plan below for the determination of gross savings, as well as NTG.

Gross Savings

Prescriptive measures incented through the Core Program during PY5 include lighting, HVAC, VFDs, steam traps, and other measures. In general, where available, we will use the Statewide Technical Reference Manual (TRM) to estimate ex post gross impacts. While not expected, if measures are installed during PY5 that are not included in the Statewide TRM, we will perform an engineering analysis for these measures.

We will also use a combination of the telephone survey of program participants and site visits (see description above) to verify installed measure inventory for a sample of Standard projects. We will use these data in conjunction with the TRM or engineering analysis to estimate ex post gross savings

¹² Given the two-wave approach to Custom survey work in PY5, some customers may already have been called about the Custom Program at the time of the Standard survey sample development.

by applying a realization rate. For those measures offered through the program, but installed in limited quantities (e.g., steam traps, and leak survey and repair) we perform a combination of engineering review and database review.

For the Green Nozzle and Online Store program offerings, the evaluation team will review the program database. We will check to ensure that the correct savings value has been applied for each measure or product type to verify that the database is providing correct information. We will also assess the database to ensure that project data has been recorded sufficiently and correctly. We will resolve any discrepancies found in the database and report on findings. To calculate gross savings, we will use the energy and demand savings formulas outlined in the 2012 Statewide TRM where applicable and engineering analysis as needed.

We will report savings by energy source using the following criteria. For single fuel customers receiving an incentive through the program, we will report the savings associated with the fuel type they receive from AIC. For example, the team will count gas savings associated with any gas incentive paid to a gas only customer by AIC. For dual fuel customers, we will report both the gas and electric savings associated with measures installed through the program regardless of whether the customer received a gas or electric incentive.

Net Savings

In terms of net savings, the team will apply the NTGR from PY3 for both gas and electric programs. However, given the implementation of Energy Independence and Security Act (EISA) standards, the team will gather data to support the development of a new Lighting NTGR for prospective application in PY7. The team will also estimate non-participant spillover based on the results from the non-participant survey. These results will be included in the NTGR developed for application in PY7.

11.4 TASKS

This section outlines the planned evaluation tasks for our PY5 assessment of the Standard Program. We expect some of the planned data collection activities to overlap with the Custom Program. As a result, we will ensure that we use our data collection instruments to address both programs, where needed, and that we coordinate our sampling strategies for the two programs.

11.4.1 REVIEW UTILITY DATA

The team will conduct a comprehensive review of all program materials and tracking data. This includes program marketing and implementation plans, customer and program ally communications, as well as extracts from the program tracking database. We requested program materials in December 2012 for planning and Custom survey sampling and will continue to communicate with AIC and SAIC about data needs. At a minimum, we will make subsequent requests at the close of PY5 (June 2013) and then again in August when the database is typically finalized for the year. The following table provides a general summary of when we expect to make these requests.

Table 25. C&I Standard Summary of Expected Data Requests

Items Requested	Timeline
Program Materials	November 2012 and Ongoing
Preliminary AIB Extract	December 2013
Year End AIB Extract	June 2013

Final AIB Extract	August 2013
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As described above, we will use the database as the sample frame for our on-site visit and telephone data collection efforts.

Deliverable: Data Requests

Deliverable Date: Ongoing

11.4.2 PROGRAM STAFF INTERVIEWS

We will conduct interviews with AIC and SAIC program staff to understand changes made to the program in PY5, and to discuss the evaluation priorities, if any, of program and implementation staff. We will explore the design and implementation of any special promotions or bonus incentive/coupon offers. In total, we expect to complete two to three interviews.

Deliverables: Draft and final interview guides

Deliverable Date: March 2013

11.4.3 NON-PARTICIPANT SURVEY

The evaluation team will conduct a non-participant survey with AIC's business customers. The survey will explore program awareness and barriers to participant, as well as non-participant spillover. We will conduct the survey with a sample of AIC business customers drawn from AIC program files.

Deliverables: Draft and final participant survey guide

Deliverable Date: March 2013

11.4.4 CORE PROGRAM PARTICIPANT SURVEY

The evaluation team will conduct quantitative telephone interviews with customers who have participated in the program in PY5. These interviews will focus on measure installation and NTG for lighting. As in previous years, the sample design is chosen to support the impact analysis. The number of interviews will depend on the level of participation in PY5, but will be sufficiently large to provide 90±10 precision for the impact values. For budgeting purposes, we assume that we will conduct approximately 180 interviews. As in PY4, we will employ a stratified random sampling approach, which will include an attempted census of the largest savers not selected for site visits (see below) and a random sample of the strata with the smaller projects.

Deliverables: Draft and final participant survey guide

Deliverable Date: May 2013

11.4.5 ONLINE STORE PARTICIPANT SURVEY

The evaluation team will conduct a quantitative Internet survey with customers who have purchased products through the online store in PY5. The survey will focus on measure installation, as well as customer satisfaction with their program experience. We will conduct the survey with a random sample of participating customers drawn from AIC's database.

Deliverables: Draft and final participant survey guide

Deliverable Date: June 2013

11.4.6 SITE VISITS

We will conduct on-site data collection to verify measure installation for selected lighting projects. More specifically, the engineer visiting each site will verify that the installed measure(s), for which

the program participants received an incentive payment, is still installed and functioning, and that the quantity is consistent with the number of measures the utility paid on.

The sample design will involve stratifying lighting projects by energy savings. As in prior years, we will use the Dalenius-Hodges method to determine strata boundaries and the Neyman allocation to determine the optimal allocation of the available interviews to the strata. Based on our past experience conducting these visits, we expect to conduct up to 40 site visits.

The team will share the site visit results with AIC and ICC staff in advance of submitting the draft annual report. The Excel file provided for review and discussion will feature the ex ante and ex post savings for each project, and the resulting realization rate. We will also hold a meeting with all stakeholders to discuss the findings and answer any questions.

Deliverable: Summary of Site Visit Results

Deliverable Date: September 2013

11.4.7 GROSS SAVINGS ANALYSIS

The team will use the Statewide TRM to calculate ex post gross savings associated with the measures installed through the program. In addition, we will draw on participant survey and on-site visit data to verify the installed measure inventory for a sample of projects.

Deliverable: Results provided in annual report

Deliverable Date: October 2013

11.4.8 REPORTING

The team will provide an integrated annual evaluation report containing process and impact results for the Standard Program.

Deliverable: Draft and final reports

Deliverable Date: October 2013

11.5 BUDGET AND SCHEDULE

The following tables summarize the timing of each evaluation activity, as well as the budget associated with each task. In total, the PY4 budget for the Standard Program is \$175,000.

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Table 26. C&I Standard Schedule by Task

Task #	Evaluation Task	2013											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	Review utility data												
2	Program staff interviews												
3	Non-participant survey												
4	Core participant survey												
5	Online store survey												
6	Verification site visits												
7	Gross Savings Analysis												
8	Reporting												

	Data Request
	Collect Data
	Analyze Data
	Milestone Deliverable

Table 27. C&I Standard Budget

Task	Task Description	Deliverable Date	Dollars by Task
1	Review Utility Data	Ongoing	\$4,000
2	Program Staff Interviews	March 2013	\$5,000
3	Non-Participant Survey	March 2013	\$32,000
4	Core Participant Survey	May 2013	\$19,500
5	Online Store Survey	June 2013	\$13,000
6	Verification Site Visits	September 2013	\$27,000
7	Gross Savings Analysis	October 2013	\$45,500
8	Reporting		\$29,000
Total Dollars			\$175,000

12. C&I CUSTOM PROGRAM

12.1 PROGRAM DESCRIPTION

The C&I Custom Program allows AIC business customers to complete energy efficiency projects that involve the installation of equipment not covered through the Standard Program. The availability of this program option allows customers to propose additional measures and tailor projects to their facility and equipment needs. Custom incentives are available for electric measures such as lighting, compressed air, energy management systems, and industrial process measures among others. The gas program also offers measures including heat recovery, process heat, and improvements to steam systems.

As in prior years, program staff is focused on using the Custom Program to overcome barriers to participation such as program awareness, the application process, and corporate project approval. In PY5 alone, AIC has already made a number of changes to the application form and process to make it shorter and easier for customers to understand, fill-out, and submit. They also continue to provide special program offerings such as the Competitive Large Incentive Project (CLIP) initiative, Staffing Grants, and a Feasibility Study. Efforts have also been made by program staff to make bonus offerings consistent in PY5 in terms of deadlines.

The expected savings from this program is 22% of the overall portfolio of electric savings and 5% of portfolio therm savings (including both residential and commercial).

12.2 RESEARCH OBJECTIVES

The objective of the PY5 Custom Program evaluation is to provide estimates of gross and net electric and gas savings associated with the program. We will determine gross savings at the 90% confidence level with a precision of 10% or better. In addition, we will assess the performance of newly implemented initiatives and promotional efforts designed to improve the participation process and the ability of customers facing resource constraints to participate in the program. This section outlines the planned evaluation tasks for our PY5 assessment of the program. In particular, the PY5 evaluation of the Custom Program will focus on the research questions presented below.

The impact evaluation will determine PY5 ex post net savings for the program and compare these to PY5 goals. The PY5 impact evaluation will answer the following questions:

1. What are the gross energy and demand impacts from this program?
2. What are the net energy and demand impacts from this program?
3. Did the program meet its energy goals? If not, why not?

The evaluation team will also explore a number of process-related research questions as part of the PY5 evaluation.

1. Program Participation
 - a. What does customer participation look like? How many projects were completed? By how many different customers? What type of projects?
 - b. Does customer participation meet expectations? If not, how is it different from expectations and why?

- c. Does program ally participation meet expectations? How many market actors have joined the Program Ally Network?
2. Program Design and Implementation
 - a. How and why has the program changed since PY4? Have these changes had their intended effect?
 - b. What barriers to participation exist and how is the program seeking to overcome them?
3. Participant Experience and Satisfaction
 - a. How do internal company approval processes affect participation in the Custom Program?
 - b. How satisfied are customers with changes to the application form and submission process? Have changes made the participation process easier for them?
 - c. Do participants see AIC as a key “energy advisor” and resource for energy saving information?
4. Opportunities for Program Improvement
 - a. What aspects of program design or implementation could AIC change to improve program effectiveness and participant satisfaction?

These questions are based on a review of PY5 program implementation and marketing plans, as well as a check-in interview with program staff at both AIC and SAIC, the program implementer. As the program year progresses, we will revisit these research questions and determine which to prioritize.

12.3 METHODOLOGY

Below we provide a summary of the methods planned for the PY5 Custom evaluation.

12.3.1 DATA SOURCES

Impact Analysis

The team will use engineering review, engineering modeling, database and hardcopy verification, and on-site measurement and verification (M&V) efforts to determine gross impacts. For the sample of sites we visit, the team will perform a desk review to compare the inputs provided on the application to the assumptions used in the project analysis, verify consistency in savings estimates throughout the project file, and provide insight into the validity of the ex ante energy savings. We plan to accomplish this through reviewing the submitted information and calculations for consistency, accuracy, and correct engineering principles. Additionally, the team will complete on-site visits and data logging at sampled sites to provide increased certainty in the gross impact results.

We plan to apply the NTGR from PY3 for this program given that the program’s implementation has remained relatively consistent, as has its NTGR over the past three program years. However, we will conduct a participant survey with PY5 Custom Program participants to develop an updated NTGR for application in PY7.

Process Analysis

The process analysis will utilize data from three data collection methods: in-depth interviews with AIC and SAIC program staff, a participant telephone survey, and a review of program implementation and marketing materials.

12.3.2 SAMPLING PLAN

Impact Analysis

On-Site Visits

We will conduct a total of 40 on-site visits with separate samples for gas and electric projects as we expect this sample size is sufficient to provide 90 ± 10 precision for our ex post gross impact estimates.¹³ We will tailor the scope of each audit to the specific measures installed at the site. We will develop our site visit sample in two waves using the program tracking database as a sample frame. The first wave will include projects completed in the first half of PY5 (June 1 – December 31, 2012). The second wave will include projects completed between January 1 and May 31, 2013. For each wave, we will stratify the custom projects included in the AIC project-specific tracking database (called AIB) in terms of ex ante savings, and select up to 20 projects.

As in prior years, if we determine that our site visit sample size is not sufficient to provide 90 ± 10 precision for our ex post gross impact estimates, we will conduct an engineering desk review of a small sample of applications. We will use the same stratified sample design described above for the site visit effort and select the largest remaining custom applications for desk review after developing the site visit sample. We will complete only as many desk reviews as is necessary to provide the required precision for our impact estimates when combined with our site visit results.

Net Impacts

We will conduct a quantitative telephone survey with PY5 Custom participants to update the program's NTGR for application in PY7. The final sample size associated with this effort will be determined based on program tracking data. However, based on participation numbers through October 2012, we anticipate conducting a census of PY5 participants.

Similar to the site visit approach outlined above, we will develop the survey sample in two waves using the program tracking database as the sample frame. The first wave of surveys will include projects completed in the first half of the program year (June 1 – December 31, 2012). The second wave will include projects completed between January 1 and May 31, 2013.

We will also conduct interviews with staffing grant participants in PY5. We expect to conduct a census of program participants, but will base the final sample design on the final PY5 program tracking data.

¹³ We expect to conduct approximately 45 electric site visits and 15 gas site visits.

Process Analysis

The sampling plan for process evaluation efforts is consistent with that outlined for the net impact analysis.

12.3.3 ANALYSIS PLAN

Given that the PY4 evaluation was mainly focused on program impacts, the PY5 Custom evaluation includes an assessment of both program impacts and process.

Gross Savings

Consistent with prior years, the gross impact analysis for the Custom Program in PY5 is based on site-specific M&V results, which is the mechanism used to verify measure installation and savings through the Custom Program. The team will develop site-specific M&V plans for each site evaluated with project complexity, savings magnitude, and access to critical parameter measurement in mind. Critical parameters include a combination of those that have a significant impact on the savings and/or have a high level of uncertainty. In addition, these plans will provide for internal quality assurance and quality control by senior staff, who are licensed professional engineers. In addition, the team will submit formal M&V plans and reports for 10 of the largest Custom projects.

Within each of the 10 M&V plans, we will describe the International Performance Measurement and Verification Protocol (IPMVP) approach that we will use to verify the savings estimates. The IPMVP approach is typically chosen based on the type of project that was completed (new construction or replacement), the technology implemented, the level of savings relative to the billed history, and the information provided in the project documentation. For example, Option A, retrofit isolation with parameter measurement, may be used for a specific measure but if the impacts are significant enough such that results should be apparent on billing data, analysis on billing data (Option C) will be conducted too as a cross-check. Similarly, if Option C, whole building energy billing analysis, is the primary means of M&V, Option A or B may be used to verify savings from specific measures with a significant impact on the total billed savings.

Once on site, each visit will include a physical inspection of measures and a customer interview to gather information about the project for verification purposes and to gather information about the program (process), if desired. We will use a standard inspection and interview format so that information gathered from various projects is consistent. The team will use the site-specific M&V plan to gather detailed information and data specific to the project and inspection, as well as monitoring and interview results in the final M&V plans for these ten sites. No other M&V sites will have a written site-specific plan or report.

For projects that operate mainly at a steady state, we will typically record spot measurements of critical parameters such as amps, kW, temperatures, and flow rates. For projects that operate with significant fluctuations, to the extent possible, we will use data logging over a period of one to two weeks. Data may be logged to determine run times or it may include "interval metering" where the loads are recorded at specific intervals as they vary throughout the day or week.

Based on the results from our on-site sample, we will calculate the gross impact for each site, compare the ex post site-specific impact to the ex ante site-specific impact to create a ratio, and

extrapolate these findings to the participant population using the ratio adjustment method.¹⁴ The team will use the following algorithm to extrapolate to the population.

Figure 2. Custom Program - Ratio Adjustment Algorithm

$$I_{EP} = \frac{I_{EPS}}{I_{EAS}} * I_{EA}$$

Where

I_{EP} = the ex post¹⁵ population impact

I_{EA} = the ex ante population impact

I_{EPS} = the ex post impact from the sample

I_{EAS} = the ex ante impact from the sample

We will report savings by energy source using the following criteria. For single fuel customers receiving an incentive through the program, we will report the savings associated with the fuel type they receive from AIC. For example, the team will count gas savings associated with any gas incentive paid to a gas-only customer by AIC. For dual fuel customers, we will report both the gas and electric savings associated with measures installed through the program regardless of whether the customer received a gas or electric incentive.

Net Savings

For PY5 net savings, the team will apply the PY3 NTGR (0.75) to all Custom projects except those performed by Staffing Grant participants. For these participants, the team will conduct NTG interviews to develop NTGRs that will be applied retrospectively.¹⁶ In addition, we will also update the NTGR for the overall program through the participant telephone survey. We will provide these results in the PY5 report and they will be applied in PY7.

Process Evaluation

Within our process evaluation activities, such as the participant and non-participant surveys, we will include questions to assess program awareness, barriers to participation, and customer satisfaction with the processes in which they were involved. We will summarize and report on data from the surveys using descriptive statistics.

12.4 TASKS

This section outlines the planned evaluation tasks for our PY5 assessment of the Custom Program.

¹⁴ Judith T. Lessler and William D. Kalsbeek. Nonsampling Error in Surveys. 1992. p. 269.

¹⁵ Ex post refers to the estimated impact found by the evaluation team.

¹⁶ Please note that the Staffing Grant initiative is included under the Custom Program for planning, budgeting, and reporting purposes. However, we recognize that recipients complete a variety of different C&I projects.

12.4.1 REVIEW UTILITY DATA

The team will conduct a comprehensive review of all program materials and tracking data. This includes program marketing and implementation plans, customer and program ally communications, as well as extracts from the AIB database and its replacement. We requested program materials in December 2012 for planning and Custom survey sampling and will continue to communicate with AIC and SAIC about data needs. At a minimum, we will make subsequent requests at the close of PY5 (June 2013) and then again in August when the database is typically finalized for the year. The following table provides a general summary of when we expect to make these requests.

Table 28. C&I Custom Program Summary of Expected Data Requests

Items Requested	Timeline
Program Materials	November 2012 and Ongoing
Preliminary AIB Extract	December 2013
Year End AIB Extract	June 2013
Final AIB Extract	August 2013

As previously noted, we will use the AIB data as the sample frame for our on-site visit data collection efforts, as well as the participant survey.

Deliverable: Data Requests

Deliverable Date: Ongoing

12.4.2 PROGRAM STAFF INTERVIEWS

We will conduct interviews with AIC and SAIC program staff to understand changes made to the program in PY5, and discuss the evaluation priorities, if any, of program and implementation staff. We will explore the design and implementation of any special promotions, as well as the performance of the CLIP, Feasibility Study, and Staffing Grant initiatives. In total, we expect to complete two to three interviews.

Deliverables: Draft and final interview guide

Deliverable Date: March 2013

12.4.3 PARTICIPANT SURVEY

The evaluation team will conduct quantitative telephone interviews with customers who have participated in the program in PY5. These interviews will focus on program processes and satisfaction and will also collect impact-related information. The number of interviews will depend on the level of participation in PY5, but will be sufficiently large to provide 90±10 precision in the impact values. For budgeting purposes, we assume that we will conduct up to 70 interviews.

Deliverables: Draft and final interview guide

Deliverable Date: December 2012

12.4.4 STAFFING GRANT PARTICIPANT INTERVIEWS

The team will conduct interviews with AIC customers who participated in the Staffing Grant initiative. Analyst staff will conduct the interviews, which will focus on gathering information about the net effect of this effort. The total number of interviews will depend on the final number of participants.

However, we generally expect to conduct around 20 interviews with participants in this group and will prioritize those participants with the largest grants.

Deliverable: Draft and final interview guide

Deliverable Date: January 2013

12.4.5 SITE VISITS

We will conduct on-site data collection to establish baseline conditions and to review and verify savings assumptions associated with selected projects. This may include an examination of existing equipment and/or program M&V measurements. At a minimum, the review engineer will perform the following actions during the site visits:

- Verify that the installed measure(s), for which the program participants received an incentive payment, is still installed and functioning, and that the quantity is consistent with the number of measures the utility paid on.
- Collect additional physical data to further analyze and determine the energy savings as a result of the incented measure. The pertinent data collected from each site will be determined based on an in-depth review of the site's project files and will be unique to each installed measure.

Some sites may require an additional level of effort, which could include monitoring of equipment to gather both real-time data at the time of inspection and trend data over a period of several weeks, if necessary.

As described in Section 12.3.2, we will conduct on-site data collection in two waves. The anticipated sample design includes separate samples for gas projects and electric projects in each wave. We expect to stratify projects by energy savings and to attempt to visit a census of the largest projects and a sample of all other projects. Based on data available through December 2012, we expect to conduct up to 40 site visits. We will provide formal M&V plans outlining the on-site approach for 10 sites, likely the largest in our sample.

The team will share the site visit results with AIC and ICC staff in advance of submitting the draft annual report. The Excel file and 10 Custom project site reports provided for review and discussion will feature the ex ante and ex post savings for each site visit project, the resulting realization rate, and the reasons for the realization rate. We will also hold a meeting with AIC and their implementation team as well as ICC staff to discuss the findings and answer any questions.

Deliverable: Summary of site visit results

Deliverable Date: September 2013

12.4.6 CUSTOM BASELINE M&V

Similar to PY4, the evaluation team will set aside a portion of the budget to perform M&V and/or conduct pre-participation meetings with AIC on up to five large Custom projects to support discussions of the baseline. This will occur as needed and AIC will choose sites where there is a high level of uncertainty around how the evaluation team will determine baseline savings.

We expect these sites to need review between January 2013 and the end of PY5. In addition, there is a high likelihood that these sites may be part of our sample for Custom M&V as detailed in the site visit section above. For these five sites, we will perform our analysis as if they were part of the Custom site visit sample and use them in our determination of gross impacts if they are ultimately selected as part of the sample. If they do not end up being included in our sample for Wave 1 or

Wave 2, we will not use their data as part of the determination of gross impacts based on the ratio adjustment method.

Our review will detail the gross impacts found at the site, paying close attention to the baseline used in the analysis. This is not different from our analyses for sites in previous years, except that it will occur closer to the time of implementation and involve a closer interaction with the AIC implementation team around available data for baseline documentation. The team will summarize the results of this review in a separate memo to AIC and ICC staff.

Deliverable: Custom Baseline Memo

Deliverable Date: May 2013

12.4.7 REPORTING

The team will provide an annual evaluation report containing process and impact results for the Custom Program.

Deliverable: Draft and final reports

Deliverable Date: October 2013

12.5 BUDGET AND SCHEDULE

The following tables summarize the timing of each evaluation activity, as well as the budget associated with each task. In total, the PY5 budget for the Custom Program is \$202,000.

Table 29. C&I Custom PY5 Schedule by Task

Task #	Evaluation Task	2013											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	Review utility data												
2	Program staff interviews												
3	Participant Survey												
4	Staffing Grant interviews												
5	Site Visits												
6	Custom baseline M&V												
7	Reporting												

	Data Request
	Collect Data
	Analyze Data
	Milestone Deliverable

Table 30. C&I Custom Budget

Task	Task Description	Deliverable Date	Dollars by Task
1	Review Utility Data	Ongoing	\$4,000
2	Program Staff Interviews	March 2013	\$4,700

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3	Participant Survey	March 2013	\$19,000
4	Staffing Grant Interviews	May 2013	\$22,000
5	Site Visits	June 2013	\$99,000
6	Custom Baseline M&V	June 2013	\$19,300
7	Reporting	September 2013	\$34,000
Total Dollars			\$202,000

13. C&I RETRO-COMMISSIONING PROGRAM

13.1 PROGRAM DESCRIPTION

The primary objective of the Retro-Commissioning Program is to implement low-cost and no-cost energy efficiency improvements among business customers using existing equipment. Over time, deferred maintenance and changing operating directives and practices lead to inefficient operation of building systems. Retro-commissioning is a process that examines current operation, relative to the needs of equipment owners and those served by the equipment, and determines opportunities for increasing equipment efficiency through maintenance, system tune-ups, scheduling, and optimization of operations. Most of the identified measures require little, if any, capital funds to implement. Secondary objectives of the program include:

1. Channeling participation into other AIC programs to implement cost-effective equipment replacements and retrofits.
2. Developing a network of retro-commissioning service providers that will continue to operate in the AIC service territory.

In PY5, the AIC Retro-Commissioning Program serves large energy consuming customers including large industrial compressed air systems, the healthcare market segment (hospitals, medical office buildings, and skilled nursing facilities), large commercial office buildings, and industrial refrigeration.

Major market barriers to these energy efficiency opportunities are lack of awareness and the cost of the detailed studies. Furthermore, even with a quality study in-hand, customer apathy can inhibit implementation of even no-cost retro-commissioning recommendations. To overcome these barriers, the program subsidizes Retro-Commissioning Service Provider (RSP) surveys and publicizes the benefits of retro-commissioning to foster a market for the services, with utility-certified service providers providing the marketing outreach. AIC incentives pay for 50-80% of the study cost, and early implementation bonuses—paid on a per-kWh saved basis—encourage implementation of recommendations prior to the end of the program year.

The expected savings from this program is 1% of the overall PY5 portfolio of electric savings and less than 1% of PY5 portfolio therm savings (including both residential and commercial).

13.2 RESEARCH OBJECTIVES

The objective of the PY5 Retro-Commissioning Program evaluation is to provide estimates of gross and net electric and gas savings associated with the program and with a brief review of the program processes. This section outlines the planned evaluation tasks for our PY5 assessment of the program.

The evaluation will answer the following research questions through the PY5 impact evaluation:

1. What is the level of gross and net annual energy (kWh), peak demand (kW), and gas (therm) savings induced by the program?
2. Did the program meet its energy goals? If not, why not?

We will attempt to determine gross savings at the 90% confidence level with a precision of 10% or better. To accomplish this level of review, the evaluation team plans detailed engineering reviews of project files and calculations for a sufficient sample of program participants. This review will include assessment of measure appropriateness, as well as a review of trend data and savings calculations and implementation records. The engineering review may require telephone verification of measure parameters with the customer and/or service providers and review of new trend data.

The PY5 impact evaluation will not address net savings, free ridership, and spillover. Since the program theory and structure has not changed substantially, PY4 net-to-gross (NTG) research will be applied prospectively in PY5 (i.e., we will apply the PY4 NTGR of 1.05 for kWh, 1.07 for kW, and 1.00 for therms).¹⁷ The PY5 process evaluation will only include interviews with key program staff to gain an understanding of program operation in PY5. Key areas of inquiry for the process evaluation are as follows:

1. Program Participation
 - a. What does customer participation look like? How many projects were completed? By how many different customers? What type of projects?
 - b. Does customer participation meet expectations? If not, how is it different from expectations and why? Are any changes in the mix of customers and projects desirable?
 - c. What does RSP participation look like? How many RSPs are actively participating in the Compressed Air, Commercial Building, and Healthcare sectors?
 - d. How effective has the Retro-Commissioning Program been in channeling customers into the Custom Program?
2. Effectiveness of Program Design and Implementation
 - a. Has the program as implemented changed compared to PY4? If so, how, why, and was this an advantageous change?
 - b. What implementation challenges have occurred in PY5 and how have they been overcome?
 - c. How effective have RSPs been in increasing participation in the program?
 - d. How well does the data tracking process work? Are all necessary data tracked and easily provided?
3. Opportunities for Program Improvement
 - a. What areas could the program improve to create a more effective program for customers and help increase the energy and demand impacts? What suggestions do RSPs have for program delivery and implementation?

13.3 ***METHODOLOGY***

13.3.1 **DATA SOURCES**

We will use the following data sources in the evaluation.

¹⁷ Initial plans for PY6 call for updated NTG research.

1. Program materials:
 - a. Business Program Implementation Plan
 - b. Business Program Marketing Plan and specific retro-commissioning materials
 - c. Retro-Commissioning Program Application materials
2. In-depth interviews with program managers
3. Program tracking spreadsheets
4. Project-specific files
 - a. Written reports
 - b. Savings calculations
 - c. Building simulation files, as required

13.3.2 SAMPLING PLAN

Impact Analysis

For the impact evaluation, we will sample the participants to attempt to achieve several goals: 90% confidence and 10% precision, representative market segments, and inclusion of a large proportion of program savings. Retro-commissioning projects can have large variability in savings among participants. Sources of variability include the physical size of the participant site, the systems installed, the condition of systems prior to retro-commissioning, the extent of control capabilities, the scope and quality of the retro-commissioning study itself, and the willingness of customers to implement recommendations.

To accommodate this variability, the evaluation team will use a stratified ratio estimation technique, based on anticipated realization rates, to draw the impact sample. We anticipate stratifying participants into small and large energy savers or small-medium-large savers depending on the program results. Stratification in this way tends to include a large proportion of large savers and comparable numbers from the other strata. From within each stratum, we will sample to ensure diversity of measures and market sector (compressed air, commercial office building, and healthcare). One project, which was selected in PY4, but later dropped from the evaluation due to timing questions, will be sampled with certainty.

Process Analysis

For the process interviews, we will speak with AIC and SAIC program managers to understand the differences in program delivery to different market segments.

13.3.3 ANALYSIS PLAN

The PY5 Retro-Commissioning Program evaluation focuses on program impacts. This focus reinforces the impact evaluation conducted in PY4 and utilizes available budget to the best effect. The PY6 evaluation will focus again on program processes and will revisit net-to-gross determination.

Gross Savings

Impact analysis for the PY5 Retro-Commissioning Program impacts will employ a bottom-up approach. We will determine realization rates from sampled sites for each impact metric—electric energy (kWh), demand (kW), and gas consumption (MMBtu)—individually at the project-level.

We will base gross impact analysis for the Retro-Commissioning Program in PY5 on site-specific engineering desk review. Based on the results from our desk reviews, we will calculate the gross impact for each site, compare the ex post site-specific impact to the ex ante site-specific impact to create a ratio, and extrapolate these findings to the participant population using the ratio adjustment method¹⁸ for each strata. For projects in the same sampling strata, we will roll up savings to strata-level realization rates for each metric. We will apply strata-level realization rates to non-sampled projects in the respective strata, and weight overall program realization rates by strata for each metric. ComEd and northern Illinois natural gas utilities use this same methodology for their retro-commissioning programs.

The team will use the following algorithm as described to extrapolate savings to the program population.

Figure 3. Retro-Commissioning Program - Ratio Adjustment Algorithm

$$I_{EP} = \frac{I_{EPS}}{I_{EAS}} * I_{EA}$$

Where

I_{EP} = the ex post¹⁹ population impact

I_{EA} = the ex ante population impact

I_{EPS} = the ex post impact from the sample

I_{EAS} = the ex ante impact from the sample

Since retro-commissioning measures are very site-specific (custom), there are no deemed values to investigate. Due to budget constraints, and the low overall portion of the portfolio, there will be no on-site impact research in PY5.

Net Savings

In terms of net savings, the team will apply the NTGR from PY4 (0.95) to calculate PY5 net impacts.²⁰

13.4 TASKS

This section outlines the planned evaluation tasks for our PY5 assessment of the Retro-Commissioning Program.

¹⁸ Judith T. Lessler and William D. Kalsbeek. Nonsampling Error in Surveys. 1992. p. 269.

¹⁹ Ex post refers to the estimated savings estimated by the evaluation team.

²⁰ The team will make a final determination regarding the value used for PY5 in consultation with AIC and ICC staff. As a result, this approach to NTGR application has the potential to change.

13.4.1 REQUEST AND REVIEW DATA FROM UTILITY

We will need the data required for the evaluation in two stages. First, the evaluation team will need program support data including goals for the retro-commissioning program and all Business Programs. Preliminary participation and savings data are also needed for sample development.

For the impact evaluation engineering reviews, we will need the full tracking database for the program, which includes savings and cost estimates by project and/or measure and milestone dates for the program. The program tracking data should be available to the evaluation team at the end of April 2013 and finalized by June 30, 2013 when program year participation is complete and verified by AIC.

We will also need project files for each of the retro-commissioning projects to be completed in PY5. These files should include preliminary reports, the retro-commissioning report that describes the project and details the recommended measures, and the final measurement and verification (M&V) report for each project, which details what measures were implemented, the conditions verified, electronic versions of savings calculations and monitored data, and costs incurred. The evaluation team requests notification as soon as each project is finalized, so that we can download the final project files from the AIB system.

Deliverable: Preliminary Data Request

Deliverable Date: April 2013

Deliverable: Impact Data Requests

Deliverable Date: ongoing – final June 2013

13.4.2 IN-DEPTH INTERVIEWS WITH PROGRAM STAFF

The evaluation team will modify the PY3 in-depth interview guide to focus on the changes in the program versus PY5. Following review of program materials, we will prepare and implement the interview instruments in March 2013.

Deliverable: Draft and final interview guide

Deliverable Date: March 2013

13.4.3 DETAILED ENGINEERING REVIEW

The evaluation team will establish the final impact sample in mid-June 2013 based on the latest program tracking data. For each sampled project, we will request project data as described in Task 1.4.1 above. Detailed review will follow upon receipt of the project files. The review will include verification of calculation methods and input data and review of implementation records and costs. We have budgeted for 24 detailed reviews anticipating sample optimization through stratification, but the analysis may not reach 90/10. Since this program is a small component of the overall portfolio, the fact that we may not reach the 90/10 precision here will not adversely affect the overall portfolio precision.

Deliverable: Review only ex post savings estimates

Deliverable Date: September 2013

13.4.4 REPORTING

The program evaluation will result in a report of findings for the limited process evaluation and impact results.

Deliverable: Draft and final reports

Deliverable Date: September-October 2013

13.5 BUDGET AND SCHEDULE

Below are our schedule and budgets by task for this program.

Table 31. C&I Retro-Commissioning PY5 Schedule by Task

Task #	Task	2013												
		Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct			
1	Data Request & Review													
2	In-depth Process Interviews													
3	Detailed Engineering Review													
4	Reporting													

	Data Request
	Collect Data
	Analyze Data
	Milestone Deliverable

Table 32. C&I Retro-Commissioning Budget and Deliverable Dates by Task

Task ID	Task	Deliverable Date	Total
1	Data Request & Review	Mar 2013	\$2,000
2	In-depth Process Interviews	Mar 2013	\$3,300
3	Detailed Engineering Review	Aug 2013	\$37,200
4	Reporting	Oct 2013	\$11,400
Total Dollars			\$54,900

14. OTHER EVALUATION ACTIVITIES

14.1 STATEWIDE TECHNICAL REFERENCE MANUAL

The team will continue its involvement in the Illinois Statewide Technical Reference Manual (TRM) process, including participation in Technical Advisory Committee (TAC) meetings, in order to support AIC. This will include attendance in weekly calls, and review and comment on TRM update items as they are presented to the TAC.

14.2 EVALUABILITY/PROGRAM TRACKING ASSESSMENT

The evaluation team will provide an evaluability assessment of the residential and commercial program tracking databases for PY5 and beyond, building on our knowledge of PY1-PY3 programs and a TRM review. The residential effort began in PY4 when we reviewed the Statewide TRM and indentified the key tracking variables. In PY5, we will begin this effort for the commercial programs and also expand our analysis to review the actual data being tracked to ensure it provides the information needed for the TRM calculations. We will also look beyond this current TRM to anticipate and recommend tracking data associated to possible TRM enhancements.

14.3 COST EFFECTIVENESS ANALYSIS

For PY4-PY6, the evaluation team will work with AIC as needed to audit the cost-effectiveness analysis based on that year's program results. To do this, we will first prepare the model inputs of evaluated program savings as determined through the evaluation effort. Next, we will review AIC's assumptions for avoided costs, discount rates, measure cost information, administrative costs, and other relevant data.

Total Resource Cost Test

Assessment of cost-effectiveness begins with a valuation of each program's net total resource benefits, as measured by (1) the electric avoided costs, (2) total incremental costs of measures installed, and (3) administrative costs associated with the program.

A program is cost-effective if its net "total resource" benefits are positive. That is,

$$\frac{\text{Total Resource Benefits}}{\text{Total Resource Costs}} \geq 1$$

where

$$\text{Total Resource Benefits} = PV \left(\sum_{\text{year} = 1}^{\text{measure life}} \left(\sum_i^{i = 8760} (\text{impact}_i \times \text{avoided cost}_i) \right) \right)$$

and

$$\text{Total Resource Cost} = \text{PV} \left(\text{Incremental Measure Costs} + \text{Utility Costs} \right).$$

Benefits used in the Total Resource Cost (TRC) test calculation include the full value of time and seasonally differentiated generation, transmission and distribution, and capacity costs, and also take into account avoided line losses as well as other quantifiable societal benefits including avoided natural gas costs. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases. For each energy efficiency measure included in a program, hourly (8,760) system-avoided costs are adjusted by the hourly load shape of the end use affected by the measure to capture the full value of time and seasonally-differentiated impacts of the measure.

The cost component of the analysis considered incremental measure costs and direct utility costs. Incremental measure costs are the incremental expenses associated with installation of energy-efficiency measures and ongoing operation and maintenance costs, where applicable. These costs include the incentive as well as the customer contribution. Utility costs include any customer payments and the expenses associated with program development; marketing; delivery; operation; and evaluation, monitoring and verification (EM&V).

Table 3 describes our understanding of the allocation of savings as incentive payments by fuel type. We understand that the AIC program savings by fuel type are driven by the type of account held by the customer. We will carry out the assignment of saving credits as follows:

- **Single fuel customers.** When AIC pays the incentive, it receives fuel-specific saving credit. For example, AIC electric only customers get electric incentives and electric savings are estimated and assigned to AIC.
- **Dual fuel customers.** As the table shows, for measures paid for by an electric incentive that also have gas savings (such as insulation), AIC can claim savings for both electricity and therms. Similarly, if gas measures also have electric savings, AIC can claim both fuel savings. However, for purposes of calculating the TRC, all gas savings will be counted.

Table 33. Savings by Fuel Type

Type of Account with AIC	Electric Measure		Gas Measure	
	Incentive Paid	Accrue Electric Savings	Incentive Paid	Accrue Therm Savings
Electric Only	Yes	Yes	No	For TRC only
Gas Only	No	No	Yes	Yes
Both Electric and Gas	Yes	Yes	No	Yes
	No	Yes	Yes	Yes

For purposes of the cost-effectiveness analysis, we will discuss with AIC the assignment of cost to the primary fuel targeted. The primary fuel incentive needs to be cost-effective against the primary fuel savings.

14.4 QA/QC COLLABORATION

Our contract requires a separate entity be hired by Opinion Dynamics and work collaboratively with us to assure the quality of our plans, analyses, and reporting. We have hired Dr. Richard Ridge to assume this role. He has a long and illustrative history in energy efficiency evaluation, being among the first set of individuals to critically assess efficiency programs back in the late 80's. More recently, he is using his expertise to help write evaluation protocols and oversee other firms in their efforts as well as continuing to perform evaluations across the country. For several years, Dr. Ridge was a consultant to the California Public Utility Commission (CPUC) evaluation staff, working with them to understand evaluation needs, reviewing contractor plans, and participating in many aspects of this multi-million dollar effort.

Dr. Richard Ridge will continue to play a role as the team's independent QA/QC consultant. As in PY4, he will:

- Discuss the portfolio evaluation plans with the Opinion Dynamics team, providing advice as needed.
- Participate in ongoing sampling and evaluation design efforts as requested. The Opinion Dynamics team will meet with Dr. Ridge at least once a quarter to discuss ongoing activities.
- Review the draft reports for the portfolio to assure a high quality report.
- Provide the ICC with a report of the efforts he was involved with each year. Dr. Ridge will provide this report by December 2013 for PY5 activities.

The table below provides a summary of the budget allocated to the evaluation activities described above.

Table 34. Summary of Other Evaluation Activity Budgets

Task	Total
TRM	\$117,040
Evaluability Assessment	\$41,200
TRC	\$70,000
QA/QC	\$20,000
Total	\$248,240

15. PORTFOLIO MANAGEMENT AND DELIVERABLES

Managing a portfolio of 13 programs and 1 pilot across four firms is complex and challenging. Our team has created processes based on our experience to assure that we are aware of all activities without being a bottleneck for getting the work done. We note that these portfolio management tasks include coordination with AIC, the ICC Staff, the SAG, the TRM Administrator, and coordination with evaluators for other Illinois utilities.

As part of the project management and reporting tasks, the Opinion Dynamics Team will conduct bi-weekly conference calls with AIC and Commission Staff. These calls are designed to keep the AIC project manager and the Commission Staff informed of the progress of our efforts, resolve issues, and coordinate upcoming activities. The calls will include key team members involved in activities on the critical path. This project management tool has been very effective in (1) ensuring the project is executed in a manner consistent with the evaluation plan, (2) maintaining ongoing mutual understanding of the project's progress, and (3) identifying future project issues and resolutions.

In addition to bi-weekly conference calls, we will develop written status reports each month. These status reports will coincide with the invoicing period and will include the following elements: (1) summary of accomplishments in period (previous month); (2) survey disposition (if appropriate); (3) outstanding data requests; (4) near-term activities/plans (following month); (5) commentary on tasks progress, issues, and solutions; and (6) variances in schedule and commentary on variances (including timeline). In accordance with the RFP, we will also provide quarterly expenditure reports in the format specified by AIC.

We have also set up an internal communication portal in the form of a SharePoint site, uploaded substantial content, and provided access to our team members. This site contains files that are important for all team members to know about, but not necessarily needed across all firms. For example, we have the proposal, past evaluation reports, and templates included here. We have also set in place a tracking spreadsheet with Navigant to track the Statewide TRM activities.

We provide the schedule of deliverables for the PY5 evaluation in Table 35.

Table 35. Schedule of PY5 Deliverables

Deliverable	2013												2014		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Monthly Progress Report	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
Draft PY5 Work Plan		◆													
Final PY5 Work Plan			◆												
Q1 Expenditure Report				◆											
Q2 Expenditure Report							◆								
Q3 Expenditure Report										◆					
Draft PY5 Report											◆				
Final PY5 Report													◆		
PY5 EM&V QA/QC Report														◆	
PY5 TRC Analysis														◆	

15.1 EVALUATION BINDERS

In addition to the deliverables described above, we will provide evaluation binders to AIC and ICC Staff each year for the analysis that occurred in that year. We will provide the following information for each program:

- Raw and final datasets with customer identifying information redacted. These files are expected to be in Excel, SPSS, or Stata format. These files will be for impact analyses and any process survey efforts as well.
- Clearly documented description of analysis that occurred along with any analytical files such as Stata DO files.
- DVD with electronic data and Word document of analyses.

In the table below, we describe the project management and planning budgets for PY5.

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Table 36. Summary of Program Management and Planning Budgets

Task	Total
Project Management	\$70,000
Collaborate with IL Utilities	\$7,500
Commission Staff Requests	\$10,000
SAG	\$10,000
AIC Coordination/Program Design	\$10,000
Legal/Docket (providing documentation through evaluation binder)	\$10,000
Total Project Management	\$117,500
Planning	\$17,500



MEMORANDUM

TO: Karen Kansfield and Jonathan Jackson, Ameren Illinois Utilities
Jennifer Hinman and Tom Kennedy, ICC

FROM: Opinion Dynamics Evaluation Team

DATE: March 2, 2012

RE: Response to ICC Recommendations for Ameren Evaluation Plan

This memo provides our response to the comments and recommended changes to Ameren's PY4-PY6 Evaluation Plan provided by Staff of the Illinois Commerce Commission (ICC). The evaluation team held an in-person meeting in Springfield on 2/16/12 where we covered the evaluation tasks planned across the three program years by program. Present were the evaluation team as well as Ameren and ICC staff. We received comments via an email from Staff on 2/21/12 that highlighted 11 points and detailed 42 comments / suggested changes within an attached document.

Overall, we have adopted many of the detailed comments/suggested changes and shifted budgets around to accommodate the Staff preference for customer intercepts in the spring of 2012. Because the evaluation team's independent opinion for the timing of the residential lighting research differs from the ICC request, we now spend time discussing our differences.

We understand that part of the current requests stem from a need for statewide consistency, and as such, our team is planning to add lighting intercepts in PY4, PY5, and PY6 based on ICC requests. However, as recommended by our QA/QC consultant, we are documenting our independent opinions prior to this change to ensure transparency in the planning process. We are happy to discuss this issue future if necessary.

Background

Per the evaluation contract, the evaluation team is required to perform an impact assessment (which we interpret to mean obtaining a new NTGR) for lighting at least once over the course of the three year period (ideally in time for Ameren to use in their Plan 3 filing, thus by March of 2013). Based on best practices, our evaluation team believes that NTG research should be conducted when the market is not in flux. Given the current 2007 Energy Independence and Security Act (EISA) regulations, our expectation is that the market will be in flux for the next three years. Specifically, EISA requires that most screw based light bulbs become approximately 28% more energy efficient over the period 2012 through 2014. EISA requirements will take effect in phases, beginning with 100-W equivalents in 2012 (with enforcement of the EISA standards eliminated through at least September 2012 per the federal spending bill approved in December 2011), 75-W equivalents in 2013, and 60- and 40-W equivalents in 2014.

Given: (1) the state of the market, (2) the need to conduct research at least once over the course of the three year period, and (3) the desire to have this early enough to inform the next cycle, our team recommends conducting research in the Fall of 2012 (closer to the enforcement date for 100-W equivalents) so that the market would have time to pass through most of the existing stock of bulbs.

We also recommend revisiting the requirement for intercepts in PY6, and instead base this decision on the state of the market at that time. If PY6 intercepts are necessary to update the PY5 estimates due to market change, we recommend conducting them in the fall of 2013.

Per ICC comments, our team has been requested to conduct in-store intercepts each year over the three year cycle. Limitations of any PY4 research, and our rationale for conducting research in the Fall rather than the Spring of 2012 are described below.

Limitations of PY4 NTG Research for Residential Lighting

Given the current planning cycle, conducting PY4 NTG research for residential lighting would require the evaluation team to field this effort in March/April/May 2012. Due to the timing, the use of any PY4 is more limited than we would like. Any data that the evaluation team collects in March/April/May is only relevant to half of the program year, if that, given the changing state of the market. NTG research conducted now should not be applied to bulbs sold prior to January 2012 since the EISA regulation was proposed for January 1, 2012 (enforced post-September 2012). Since the market is in such a state of flux, the research could only reasonably be applied any collected NTG value to bulbs sold post January 2012. The NTG estimate only applies to a very limited slice of time in PY4 when EISA regulated bulbs may or may not be available to consumers.

Our expert opinion is that due to the fact that we are proposing to conduct intercepts in the Fall of PY5 (less than 6 months after the proposed timing for PY4 intercepts), the PY4 intercepts are not a wise use of evaluation funds for Ameren. We understand that the decision for other utilities with larger evaluation budgets may be different, but the funds for Ameren are limited and additional costs for intercepts will mean fewer data collection efforts for other programs. The request for PY4 intercepts requires a larger investment in NTG research and the decision has research implications for other research efforts.

Why the Fall if 2012 Rather than Spring of 2012 for Customer Intercepts

With the implementation of EISA, the timing of intercepts could impact the results. As stated earlier, EISA regulations for different incandescent wattages go into effect at the beginning of each year from 2012 through 2014, with 100-watt bulbs affected in 2012. The timing of when the regulations go into effect is less important than when the regulated product becomes unavailable to consumers. The regulations do not ban sales of traditional 100-watt incandescent bulbs; just imports of them so that products that are already in the U.S. can be sold. It will take some time to sell through existing inventory so it is likely that the regulations will not affect consumers until later in the year.

The results of intercepts conducted at the beginning of a calendar year could be quickly outdated. We feel customer intercepts should be done in the fall of each calendar year during the EISA phase in, particularly, if those results will be applied to programs prospectively.

The Fall is also considered a time when more lighting purchases are made, thus allowing us to represent the market better with our research efforts. Seasonal differences in purchase volume also impact the cost of the research. Generally, more bulbs are sold during the fall as hours of daylight drop and people are indoors more and start turning on lamps for longer periods of time. It can be more efficient to conduct intercepts during the fall when more bulbs are being purchased.

We were also planning to use the intercept research effort to collect information in the stores. While we are in the stores, we will record the presence and type of program marketing materials and conduct a brief shelf survey of available lighting products. We are particularly interested in the presence of alternatives to the bulbs that have been phased out by EISA. These products are more likely to be present later in the year as old inventory of regulated products are sold through.

A Final Note

Our team understands the need to be consistent with other evaluators. As such, our plan is to field instruments that are consistent with other evaluation teams; however, as an independent evaluation firm, we feel strongly that the need for consistency is less important than the need for high quality data. We do not anticipate any difficulties in fielding consistent data collection efforts that are of high quality; however, we will continue to make sure that all research collected under our contract meets the needs of our contract while also considering statewide priorities. Where we are asked to have statewide coordination take precedence over looking specifically at the Ameren portfolio, we will document for transparency and may proceed as requested.

Next we provide a table with our responses to the 11 points, followed by our responses to each of the 42 comments / recommended changes.

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Staff Suggestion	Evaluation Team Response	Justification for Response
1. Remove Top Line Sales Approach for Residential Lighting	We will remove this approach	While we have removed this approach, we believe it has value and plan to use any contingency funds available at the end of PY4 to perform this small task.
2. Conduct In-Store Customer Intercepts for Residential Lighting to examine NTG, res/non-res split, and leakage	We will perform PY4 customer intercepts	See above discussion
3. Conduct NTG analyses for Residential Lighting, Custom, and Prescriptive programs each year	<p>We will adopt this suggestion for residential lighting across all years.</p> <p>We will not adopt this for the custom and prescriptive programs in PY4 and will consider a NTGR for lighting measures in the custom and prescriptive programs for PY6.</p>	We agree that the EISA changes will affect the linear fluorescent market when it comes into effect in PY5. We had planned a full net analysis in PY5 for the prescriptive and custom programs already. For PY6, we will consider performing additional net analysis on the lighting end uses only for the prescriptive and custom programs. We need to perform the PY5 research first to assess how this may be affecting choices made.
4. Write final site reports and NTG summaries for at least the largest custom projects	We will write site reports / NTG summaries for up to 10 sites	
5. Remove Treatment and Control Group Survey for Behavior Modification for PY4	We have removed this survey for PY4	
6. Remove Non-Participant survey for Appliance Recycling Program for PY4	We have removed this survey for PY4	
7. Reduce number of participants surveyed for REEP for PY4	We will not adopt this suggestion	
8. Remove site visits for Retro-commissioning Program for PY4	We have removed the four planned site visits.	
9. We suggest reducing the following program evaluation budgets for PY4: Behavior Modification, Appliance Recycling, REEP, and Retro-commissioning.	We have reduced the budgets for Behavior Modification, Appliance Recycling and Retro-Cx, but not REEP.	To enable performing PY4 customer intercepts for residential lighting and additional write ups for custom sites.

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Staff Suggestion	Evaluation Team Response	Justification for Response
10. We suggest increasing the following program evaluation budgets for PY4: Residential Lighting and Custom.	We have increased both budgets	
11. Coordinate with other utilities' evaluation teams. Page 23 of the Ameren Illinois ODC Plan 2 Evaluation Services Contract states: "• Review the energy efficiency program Plans submitted by all Illinois utilities. Meet and consult with all other Illinois evaluators (for ComEd, Nicor, Integrys and DCEO) in an ongoing manner to determine to what extent similar methodologies and timelines can be employed for Illinois efforts. It is expected that efforts will be made towards implementing a statewide Residential Lighting evaluation methodology. • In partnership with evaluators for other Illinois utilities (gas and electric), make every effort to employ consistent methodologies for identical programs throughout Illinois." http://www.icc.illinois.gov/downloads/public/edocket/307434.pdf	We will coordinate with other evaluation teams.	

We have attached the 42 detailed comments / suggested changes from staff in the next section, along with our responses.

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N	Program	Recommendation / Question	Response	Reason for Response
1	Custom	Increase Budget	Yes	We will increase the budget to allow for writing site reports / NTG summaries for up to 10 sites
2	Custom	Coordinate with other utilities (Kris Bradley and Josh Arnold called out)	We will coordinate	While we will discuss our approaches with other efforts in the state, we cannot guarantee that the approaches will be identical due to differences in evaluation budget and program design.
3	Custom	Add Participant Survey to PY4 and assess NTG	No	There is no reason to perform additional NTG. The program has had a relatively consistent NTGR over the last three years.
4	Custom	Ensure fully nested sample of NTGR with onsite sample	See 3.	We are not performing a NTG survey in PY4. For PY5, when we do plan to perform this research, we will make every effort to obtain the responses from our onsite sample in our telephone survey for NTGR, but cannot state with certainty that each customer will be willing to talk with us.
5	Custom	Will an effort be made to include some staffing grant participants in the onsite sample?	No	The onsite sample is based on energy savings. To the extent that a staffing grant participant is included in the stratified sample, they will be included. However, we do not plan to sample to assure that they are included.
6	Custom	Write final site reports for the largest projects (all tier 1) and for projects that receive the highest and lowest realization rates (to the extent that funds allow) from the tier 2 sampling strata onsite projects	Yes	
7	Lighting	Do not use retailer interviews for estimation of NTGR (“Corporate buyers self reports for NTG are notoriously unreliable”)	Yes	This is a PY5 process activity, not a NTG activity.
8	Lighting	Add customer intercepts for each program year and use them for the net impact approach	Yes	See above discussion.

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N	Program	Recommendation / Question	Response	Reason for Response
9	Lighting	Use customer intercepts to assess res/nonres split and leakage rates for gross impact approach	Yes	
10	Lighting	Expand the previous in-home survey to include market research components that can help us understand aspects at least related to the behavior modification program and the appliance recycling program. With respect to the appliance recycling program there is a need to better understand those customers with secondary fridges/freezers and what it would take (\$) to encourage them to get rid of the secondary fridge/freezer through the program.	We will discuss other possible information to collect with our team and include as feasible	
11	Lighting	Obtain suggestions from all residential program leads for useful information to gather during the in-home survey	We will discuss other possible information to collect with our team and include as feasible	
12	Lighting	Coordinate with ComEd lead	We will coordinate	While we will discuss our approaches with other efforts in the state, we cannot guarantee that the approaches will be identical due to differences in evaluation budget and program design.
13	Lighting	Increase budget	Yes	We increased the PY4 budget to perform the PY4 intercepts.
14	Lighting	There may be an in-service rate deemed as part of the TRM	Noted	
15	Lighting	Remove topline sales effort	Yes	While we have removed this approach, we believe it has value and plan to use any contingency funds available at the end of PY4 to perform this small task.
16	Standard	Coordinate with other utility evaluation efforts (Kevin Grabner and Josh Arnold called out)	We will coordinate	While we will discuss our approaches with other efforts in the state, we cannot guarantee that the approaches will be identical due to differences in evaluation

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N	Program	Recommendation / Question	Response	Reason for Response
				budget and program design.
17	Standard	Add NTG into PY5 and PY6 as “significant changes in the lighting market are occurring”	Yes for PY5, Considering for PY6	We will perform NTG for the Standard program in PY5. For PY6, we will consider performing additional net analysis on the lighting end uses only for the prescriptive and custom programs. We need to perform the PY5 research first to assess how this may be affecting choices made.
18	Standard	Comment - Prefer NTG by measure-type over a single NTGR	Noted	
19	Standard	Is 100 calls necessary for 90/10 precision for the Direct Install effort?	Yes	We agree that this number may not be required for 90/10 precision, depending on the specific results we are looking for. At a minimum, we would need 70 responses. We will closely watch our responses to determine if the additional 30 planned completes are needed.
20	Standard	Does PY5 NP survey include spillover estimates?	Yes	
21	HVAC	From later emails – drop GSHP and ASHP for metering	Possibly	Total metered will be the same, just what we meter will depend on final outcome of Ameren’s decision regarding GSHP and ASHP and expected participants.
22	Behavior Mod	Drop PY4 survey and use for lighting intercepts	Yes	Will drop PY4 survey (move budget to either intercepts or custom)
23	Behavior Mod	Coordinate with other utilities (Bill Provencher called out)	We will coordinate	While we will discuss our approaches with other efforts in the state, we cannot guarantee that the approaches will be identical due to differences in evaluation budget and program design.
24	Behavior Mod	Reduce budget	Yes	
25	ARP	Coordinate with other utilities (Jennifer Fagan called out)	Yes	We discussed the approach with ComEd’s evaluation contractor. The methods for

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N	Program	Recommendation / Question	Response	Reason for Response
				estimating NTG are similar. ComEd's contractor does not plan a non-participant survey, but does plan market actor interviews, which we do not due to budget limitation. Our evaluation will also include comparison of refrigerator type to ComEd (e.g. what types of measures are being recycled in terms of age of equipment and to review variation with metered data).
26	ARP	Drop NP telephone survey	Yes	
27	ARP	Add Sears (n=1) to market actor interviews	Yes	We will include SEARS in our sample to call
28	ARP	Reduce budget	Yes	
29	HEP	Coordinate with other utilities (Mark Thornsjo and Josh Arnold called out)	We will coordinate	While we will discuss our approaches with other efforts in the state, we cannot guarantee that the approaches will be identical due to differences in evaluation budget and program design.
30	Moderate Income	No comments / recommendations	-	
31	Multi-family	Does common area lighting come out of the MF budget or standard program budget?	MF Budget	
32	Multi-family	What % of savings for the MF program is a result of common area lighting?	-	The PY3 evaluation indicated that common area lighting was 9% of the overall savings from the program.
33	Multi-family	HOU should probably be investigated during these interviews with property managers and during the onsite audits for the common area lighting	Yes	This will occur with interviews with property managers.
34	Multi-family	Coordinate on net approach with other utilities (Josh Arnold called out)	We will coordinate	While we will discuss our approaches with other efforts in the state, we cannot guarantee that the approaches will be identical due to differences in evaluation budget and program design.
35	REEP	Coordinate with other utilities (Mohit Singh-Chhabra and Paul Wozniak called out)	We discussed this program with Mohit	ComEd's evaluation plan has not been written yet, however it appears that

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N	Program	Recommendation / Question	Response	Reason for Response
			and Jeff Erickson.	products being promoted through this program are different (ComEd – refrigerators and clothes washers), while Ameren IL (Room AC, dehumidifier, water heaters, smart strips). While we will discuss our approaches with other efforts in the state, we cannot guarantee that the approaches will be identical due to differences in evaluation budget and program design.
36	REEP	Reduce participant surveys from 210 to 90. Perform 30 on AC units, 30 on thermostats and a random sample of 30 for the rest of the projects	No	We will keep all 210 because the NTG values will be very different and cost savings are minimal from reducing number of completes due to the fixed costs associated with designing and analyzing the survey.
37	REEP	It would be useful to obtain some behavioral items - for example thermostat usage/set point for heating and cooling in comparison to previous use – is thermostat set higher or lower in comparison to purchase and why? Customer room C usage before (if any) and after	Yes	We will explore including behavioral items in the survey, but cannot guarantee their inclusion.
38	REEP	Reduce budget	No	See reasons above regarding reducing participant surveys.
39	RNC	No comments / recommendations	-	
40	NRNR	No comments / recommendations	-	
41	Retro-Cx	Remove site visits in PY4 and shift funds to Custom Program NTGR and site reports in PY4 – perform engineering desk review only for gross impacts in PY4	Yes	We will remove PY4 site visits will conduct an engineering desk review only.
42	Retro-Cx	Reduce budget	See 41.	



MEMORANDUM

TO: ICC Staff

FROM: Opinion Dynamics

DATE: July 14, 2013

RE: Revenue Neutral Model

In this memo, we respond to questions raised by the ICC and Navigant Consulting in their review of the Revenue Neutral Sales Model (RNSM). We also are attaching a 2013 IEPEC paper, which provides more information and results from an evaluation that utilized the model.

Any new method will face scrutiny and questions. As Navigant points out, “a new approach bears a burden of proof (p. 4 Navigant memo).” We agree and appreciate the time spent by ICC staff as well as Navigant to provide some critical review of this new method. Of course, the burden of proof also exists for approaches that are currently in use, and we believe that current methods have failed to meet this burden for upstream programs. We developed the Revenue Neutral method due to the methodological weaknesses of existing methods.

Because we are estimating an unknown that cannot be directly measured (i.e. the counterfactual), all methods will have strengths and weaknesses. To properly assess the value of the RNSM, we feel it is important to first review some of the existing methods for estimating lighting program free ridership.

Existing Methods

Estimating lighting program free ridership is challenging due to the upstream program delivery method which does not collect information on the customers who purchased program-discounted bulbs.¹ Existing evaluation methods are expensive, questionable in terms of their validity, and produce results that are unpredictable. In a review of net-to-gross ratios (NTGR) for lighting programs for 2008, results ranged from 0.19 to 9.17. Although we cannot expect the NTGRs to be the same for all programs, it is unlikely that this wide range is strictly due to program performance. Rather, the methods of determining the NTGR play a role. Below, we provide some details on the some existing methods:

1. Telephone Survey of General Population of Residential Customers

A commonly used approach involves conducting a survey with a sample of a utility’s residential customers and asking questions of those who reported recently purchasing light bulbs. CFL purchasers are usually asked what type of lighting they would have hypothetically purchased if the bulbs they actually purchased had cost more. To answer this hypothetical question, the respondent must first (1) accurately recall purchasing CFLs, and (2) accurately recall the price paid.

¹ This is true for any program that uses upstream delivery to intervene in the market.

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Survey researchers are well aware of the errors associated with consumer expenditure surveys that ask people about their past purchases.² Accurately recalling a purchase and the amount paid is a difficult task, particularly for less salient items such as light bulbs. The Bureau of Labor Statistics' (BLS) Consumer Expenditure Survey (CES) is one of the most methodologically sound studies of its kind yet it still has known errors with simple purchase recall.³ If consumers struggle to accurately recall an *actual* past purchase, we should not expect them to be able to accurately answer a question about a *hypothetical* purchase of the same product.

A related issue with these general population studies is that there is no way to ensure the bulbs purchased were discounted through the lighting program. The survey asks respondents where they purchased the bulbs. In addition to the recall error with this answer, evaluators must assume that any bulb purchased from a participating retailer was discounted through the program.

2. In-Store Customer Intercept Interviews

To address the weaknesses of this general population survey, evaluators have instead conducted in-store customer intercept interviews at participating retailers. This method is currently being used in Illinois. The interview location ensures that the respondents are purchasing program-discounted lighting and the timing of the interview ensures that recall of the purchase details is not an issue. However, the method is not without its weaknesses. In-store customer interviews must rely on convenience samples which are not random. Evaluators attempt to conduct interviews in locations that represent the greatest percentage of bulbs sold through the program, but ultimately, they conduct interviews where and when they are allowed. Many retailers do not allow the interviews to take place in their stores. They are also costly to conduct, so evaluators can only conduct them over a few days during the program year, which is not at all representative of the entire year.⁴ Finally, for programs targeting a large geographic area, it is logistically difficult and costly to conduct intercepts over the entire area. As a result, many parts of the territory are not visited, and results do not represent all sales. We know that the timing and place where we conduct interviews can affect the free ridership rate (i.e., see our earlier memo to ICC staff and Ameren that outlined differences in free ridership values by site). With convenience samples like this, traditional sampling theory, which allows the calculation of confidence intervals, does not apply. These values can always be calculated, though and some evaluators do place confidence and precision levels around the resulting free ridership estimates regardless of the fact that the values are meaningless since the estimate of free ridership is very likely biased in an unknown direction.

The focus of the purchase, a light bulb, is still not a salient event for most customers. Customers consider a number of factors when making purchases, and, for low-cost items like light bulbs, it is not clear whether they can accurately self-report what they would hypothetically purchase if the bulbs cost a couple of dollars more. The self-report method likely produces more accurate results when it is used for more expensive and considered purchases.⁵ There may also be greater social

² See, for example, Norman M. Bradburn, "Recall Period in Consumer Expenditure Surveys Program", (2010). http://www.bls.gov/cex/methwrkshp_pap_bradburn.pdf

³ Don Dillman, "Measuring What We Spend: Toward a New Consumer Expenditure Survey," (2012). http://www.census.gov/fesac/pdf/Dillman_FESAC_Dec142012.pdf

⁴ Evaluation data collection typically occurs on the weekends to attain the largest amount of foot traffic and reduce data costs to the extent possible.

⁵ The BLS CES provides some support for the greater accuracy of self-reported purchases of more expensive items. The survey is known to suffer from biases when compared to aggregate expenditure data. There is less error in the self-reported purchases of durable goods that cost more than less expensive non-durable goods. See, Thesia Garner, Robert McClelland, and William Passero, "Strengths and Weaknesses of the Consumer Expenditure Survey from a BLS Perspective," (2009), http://www.bls.gov/cex/pce_compare_199207.pdf.

desirability bias in this circumstance. In a person-to person interview, people may not want to admit that an amount as little as \$1 would cause them to buy a product that uses more energy.

3. Other methods

Because of the shortcomings of the methods listed above, evaluators have attempted to develop other methods to estimate lighting program free ridership.

One such method involves conducting interviews with retailers. Evaluators ask retailers to provide sales information with and without the program. Due to issues with confidentiality, retailers refuse to provide specific sales data, which forces evaluators to rely on retailer estimates of the percentage increase in sales due to program discounts. Some retailers will provide a response that has a wide range and applies to all utility programs but not a specific program (e.g. 50-60% increase in sales). Very often, the free ridership estimates from retailer interviews end up based on the responses of a small number of retailers who provide these broad responses—neither valid nor representative of the area of the evaluation.

Evaluators have used advanced modeling techniques, to estimate free ridership. Though these models are theoretically promising, they often make use of the same poor or incomplete data as other methods. A couple years ago, the “Multi-State method” was attempted. This econometric model compared states with different levels of program longevity. However, like the general population survey already discussed, the model included self-reported lighting purchase data and other variables. It is likely that these estimates suffered from a large amount of measurement error that resulted in NTGR estimates that were likely biased in an unknown direction with wide error bounds (NMR Group, Inc. 2011).⁶ As a result, this method has fallen out of favor.

Another currently used model estimates price elasticity using changes in program pricing over time. The model coefficients are used to estimate the quantity of bulbs that would be purchased at non-program pricing. The model is based on sales of bulbs at different levels of program discounts and does not have the luxury of including sales at regular pricing. The range of the dependent variable, bulb sales, is truncated, which is a form of selection bias. As a result, the slope of the demand curve and resulting sales estimates are likely biased.

Revenue Neutral Sales Model

The weaknesses associated with the methods used to date to evaluate upstream lighting programs led us to pursue another method that makes use of the large amount of very specific program data we do have. We also wanted to focus on the participants in upstream lighting programs who have made a considered choice to participate—retailers.⁷ In-store interviews with customers purchasing program-discounted bulbs often find that many customers do not know the bulbs are discounted. This does not mean the customers would pay full price, but they have not made a choice to participate in an energy efficiency program and therefore it may be difficult for them to answer detailed questions about their participation. Retailers, on the other hand, do choose to participate in the program, and will only do so under certain conditions. Those conditions provide the theory that underlies the RNSM.

The RNSM has a number of advantages. The model results are based on all retailers and all sales from the entire program year and not a sample of sales or customers. Though the overall results are based on full program data, the model allows the evaluator to estimate free ridership for different retailer types, bulbs types, and during promotional periods. An added benefit to this approach is that

⁶ For example, the multistate CFL model that included ten program administrators produced confidence intervals that ranged from 0.45 to 1.45 in one case. Other states had similar results.

⁷ This choice option indicates that the main program intervention occurs with retailers.

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the information can show where the program can be improved more clearly and quickly than the methods discussed above.

One of the major advantages of the RNSM is its ability to provide program implementers with an idea of what free ridership may be *before* the program year and make mid-year corrections if needed. This is crucial because it allows implementers to reduce the risk to their portfolios, and make design choices that reduce free ridership. It is in the best interest of ratepayers to reduce the amount of rate payer dollars being spent on energy efficiency options that would have occurred anyway. The RNSM's calculations allow for program designers to allocate budgets more wisely. Program implementers can select products and set discounts that will produce the greatest lift in sales. The implementer will not have any surprises in terms of savings when the evaluator calculates a final free ridership based on actual program sales.

Another major advantage of the Revenue Neutral method is that the analysis is inexpensive. The model requires that program implementers provide detailed information from the Memorandum of Understanding (MOU), provide updates when those MOUs change during the year, and track their program sales in a way that can be tied back to the MOUs. Program implementers must track all of the necessary information, otherwise there will be gaps in the data that will make it difficult to utilize and possibly produce invalid results. If the program implementer tracks all the necessary information, the RNSM is a cost-effective evaluation and planning tool.

With the previous information on the shortcomings of other methods as background, we address specific comments by the ICC staff on the RNSM.

Underlying Model of Retail Behavior

Comment 1: The model is inconsistent with the classical economic theory of a firm as a profit maximizer.

The Revenue Neutral Model is based on a theory that emphasizes revenue. Retailers will avoid participating in utility lighting programs if the incentive levels and sales goals are insufficient to stimulate enough additional sales to make up revenue lost due to program incentives. Their program participation must be *at minimum* revenue neutral.

From a profit perspective, retailers have little to worry about when participating in lighting programs. Because utilities reimburse retailers for the discounts, retailers' profits will not drop due to their participation in the program. In fact, their profits should increase because, in theory, the drop in price of the bulbs will cause customers to purchase more than they would have at full price. Since the program administrator is making up the cost difference, the retailer only needs to sell one additional bulb to increase its profits.

While we are not claiming that profits don't matter to retailers, our past research with retailers indicates that revenues matter more to retailers than might be expected based solely on the economic theory put forward by ICC staff. Research indicates that retailers' concern over the impact of these programs on their revenue influences whether and how they participate in these types of programs.

Opinion Dynamics has conducted interviews with the corporate staff of the largest participating retailers in the country. Our interviews confirm that retailers consider a program's impact on revenue before they agree to participate in such a program. Major retailers report that potential loss of revenue is one of the biggest challenges of participating in upstream lighting programs, and it is important to structure the MOUs so that revenues do not decline.

Revenue matters because, outside the company, investors pay attention to revenue, and within the company, bonuses are often based on revenue only. While profits are more important at the corporate level, revenue is more important to buyers and managers at lower levels. Corporate retailers

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(the people actually signing the MOUs) have told us they will get complaints from the store level retailers and buyers if the MOUs are not structured in a manner to allow them to make up lost revenue. These corporate retailers monitor the program performance on a regular basis and make changes as necessary to avoid a decline in revenue from their participation.

Retailers have learned from their participation in lighting programs and have told us about changes they have made to their MOUs to protect their revenues. Some have limited the number and types of products they will discount because the price elasticity of some products is too low to make up the revenue loss due to the discount. Likewise, retailers have also limited the size of the discount they are willing to accept because they know that their sales will not increase enough to cover their revenue loss from a discount that large.

Free Ridership Estimate is an Upper Bound

Comment 2: The free ridership estimate produced by the model is an upper bound.

We agree, the model, as currently configured, produces an estimate of the *maximum* program free ridership, which could be viewed as a weakness. The model only considers the impact of price discounts and does not include other program features, which means actual free ridership could be lower than the model estimate. For example, during the year, the program may negotiate the placement of discounted bulbs on an end cap, which is known to increase sales. This will not be captured by the model, which is strictly based on the price and quantity needed to cover the lost revenue of the discount. In these cases, the model will overestimate free ridership. If sales during end cap placement and other promotions are tracked separately, we could incorporate the effects of these events in future versions of the model.

However, when considering this upper bound, it is useful to distinguish between the planning free ridership that the program administrator can calculate in advance of the program year and the free ridership that is calculated based on actual bulb sales at the end of the program year.

One of the advantages of this method is that lighting program administrators can estimate a planning free ridership rate before the program year starts based just on information contained in the MOUs. The MOUs contain information on the regular price of each product, the size of the discount, and the number of bulbs for which the utility will reimburse the retailer, also known as the allocation. The allocation determines the number of discounted bulbs the retailer must sell to remain revenue neutral at program-discounted pricing. From this, we can determine the number of bulbs the retailer would sell without the discount to have the same revenues. This is the theoretical upper bound on free ridership.

At the end of the year, we estimate the final program year free ridership by dividing the estimated number sold at regular pricing that we calculated for the planning free ridership by the number actually sold under the program. This final free ridership number could be higher if the program does not meet its goals. Also, it is common to see more of one bulb sold than expected and less of another even when a program meets its sales goals. If these bulbs have different free ridership rates, the final overall program free ridership estimate will be different from the planning free ridership rate.

Other times, there are changes during the program year. Sales may be running behind schedule and the program needs to encourage more sales. It is common for programs to increase their lighting budget during the year to make up for other programs that may be underperforming. In both cases, the program will drop the price on some bulbs to increase sales. The drop in price causes people to buy who would not have purchased at the previous discounted price, thus free ridership on those sales is lower. Overall program free ridership may be lower as well if these promotional sales make up a significant portion of all sales. The retailer agreed to this drop in price as it will generate enough

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sales to cover the increased discount so it is consistent with the revenue neutral model (a price change like this requires a change to the MOU).

Strategic Interaction among Firms

Comment 3: The model does not consider the impact of competition on participation and pricing.

A criticism of the model is that it does not take into account that retailers exist in a competitive marketplace that impacts their program participation and product pricing decisions. The criticism maintains that retailers will be forced to participate in a program whose contract conditions will cause its revenues to drop because its competitors participate and consumers will purchase their lighting at the store with the lowest prices.

This criticism makes several assumptions about consumer and retailer behavior that are unrealistic and have been shown not to be true. Most importantly, large retailers have chosen not to participate in lighting programs even when their competitors participate. For example, for many years, Lowes did not participate in lighting programs while Home Depot did.

For retailers to be forced to participate based on the theory that consumers “vote” with their feet, consumers must comparison shop when they purchase light bulbs and must be aware that they can purchase CFLs from another retailer for less. This assumption requires consumers to know that discounted lighting can be purchased at some retailers and not others. We know from our in-store customer surveys that this assumption is not true. We have conducted in-store customer interviews for several lighting programs and have consistently found that approximately half of customers who are purchasing program-discounted lighting are unaware of the discount. Even fewer come specifically to the store to purchase program-discounted lighting (5% in the case of AIC). It is more likely that consumers compare product prices within a single store and choose the product that is least expensive, all else being equal about those products.

This criticism also assumes that retailers are powerless to negotiate a better contract and do not attempt to do so. Retailers have told us that they have made changes to their contracts to protect their revenue.

Revenues for Both Inefficient and Efficient Products are Affected by the Rebate

Comment 4: Program discounts revenues of discounted and non-discounted products

Critics of the model have wondered how it addresses lost revenue from consumers switching from non-discounted lighting to discounted lighting within a retailer. We agree that program discounts will take sales from non-discounted products. The purpose of the discount is to make the price of the efficient product closer to the inefficient one so that more customers will buy the efficient product instead. And, as we noted above, it is more likely that consumers compare the prices of products within a retailer than across retailers.

We have confirmed with retailers that they do consider the loss of revenue from other products when agreeing to participate based on the terms in the MOU. The terms of the MOU allow sufficient sales at the discounted price to cover the loss or revenue from product switching.

Conclusion

Estimating lighting program free ridership is challenging due to the upstream program delivery method. Evaluators have used methods that are not suitable for the program design such as general population surveys in which respondents must recall past purchases in great detail. Other methods such as in-store customer interviews are so expensive and difficult to conduct that evaluators are forced to use convenience samples, which may invalidate many of the results.

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The RNSM has a number of advantages that other methods do not, most notably its predictability as a planning tool, and its cost-effectiveness from an evaluation perspective. However, like all other methods, the model is not without weakness or question. In our judgment, the RNSM has more advantages and fewer weaknesses than other methods. The ICC staff comments have helped to further refine the method and our ability to describe the theory. We appreciate the comments.

If the program tracks all the necessary information, we believe that the RNSM is a cost-effective evaluation and planning tool that provides valid information that helps to measure the effectiveness of energy efficiency lighting programs.

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Memorandum

To: Ameren Evaluation Team, Opinion Dynamics Corporation
From: ICC Staff
Subject: Revenue Neutral Model Proposal for the AIC Res Lighting Program PY5 NTG
Date: June 5, 2013

In a memo dated April 23, 2013, Navigant Consulting provided feedback to the Commonwealth Edison Company regarding a proposed method to evaluate net-to-gross ratios (“NTGR”). The proposed method, known as a “revenue neutral model,” was submitted by Opinion Dynamics Corporation (“ODC”). Within Navigant’s memo were several recommendations for evaluating the efficacy of the revenue neutral model for estimating NTGR. The recommendations and summary are as follows:

Recommendations

The method presumes that revenue neutrality is a necessary condition for participation in a lighting program. This presumption is at odds with standard economic theory and therefore requires supporting material that could arise in several forms:

1. Development of a model of firm/management behavior that is consistent with revenue neutrality as a necessary condition for entry in a lighting program. As noted above, neither profit maximization nor revenue maximization is consistent with revenue neutrality as a condition for program participation.
2. Identification and testing the implications of the behavioral model developed in recommendation #1. Does the model produce implications that can be tested using available data, perhaps including survey data? Successfully testing the model provides support for revenue neutrality.
3. Evidence from published statistical studies indicating that under certain conditions firm/management behavior can be consistent with revenue neutrality.
4. Other evidence, such as self-reports by firm decision-makers, that revenue neutrality is a necessary condition for participation in a program like a lighting program.

Summary

As emphasized in the ODC slide presentation about the model, substantial issues afflict current standard methods for estimating free ridership, and attempts to identify cheaper, more accurate approaches should be encouraged.

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Nonetheless, a new approach bears a burden of proof. Navigant believes this burden has not yet been met by the approach outlined in the slide presentation, and believes additional research, as detailed above, should be conducted in support of the method before it is adopted by ComEd.

Staff generally concurs with the recommendations and reasoning provided by Navigant in its memo. However, Staff disagrees with the Navigant reasoning that a revenue neutral condition necessarily implies an upper bound for the rate of free riders. Additionally, Staff does not believe that one can conclude that any increase in sales at a firm that follows a top-line revenue model is necessarily incremental sales attributable to a utility rebate program. Staff identifies several potential problems with measuring free riders through the assumptions of a top-line revenue neutral model. Staff notes the identified items are not an exhaustive list of potential problems.

The first involves strategic interactions between firms. If firms consider not only their actions but also the actions of competitors, there is the potential to accept a rebate even if revenues are not offset by rebate. This is the result of revenues dropping more by not participating than by participating. If firms make such considerations, then there is the potential for underestimating free riders through a top-line revenue neutral method.

A second consideration is that the model cannot accurately account for free riders if the firms in the market are a mix of top-line revenue neutral firms and profit maximizing firms. Staff does not expand on this concern in this memo but notes that a profit maximizing firm would not need to double sales when a rebate cuts the price in half. As a result, the assumptions of the top-line revenue neutral evaluation approach could lead to an underestimation of free riders.

A third concern is that the introduction of a rebate for an efficient product affects the firm's sales of both the inefficient product and the efficient product. If the firm is truly concerned with top line revenue, it is concerned with the sales of both of these items. This leads to the possibility of implausible sales increases being required for top-line revenue neutral firms to participate in a rebate program.

A fourth concern is the overall efficacy of being a top-line revenue neutral firm. While revenues may be a concern, reputation and image are concerns as well. Lighting or most other low-cost items are likely to be a small percentage of a firm's total sales. A firm most likely considers the effect that offering a product without a rebate has when a competitor uses the rebate to offer the same product at a much lower price. It is entirely possible that consumers would view the firm as more expensive than its competitors overall. The result of such a consumer perception is that fewer large items could be purchased at this firm which would adversely affect sales. If firms take their price

reputation into consideration, the top-line revenue model could once again underestimate free rider percentages.

Based on these concerns, Staff objects to the proposed top-line revenue evaluation approach being used for the lighting program.

Case 1: Strategic Interaction among firms:

One of Staff's disagreement about the upper bound of free rider percentages is based on the assumption that a particular firm wishing to maintain or increase top-line revenue will consider the effect that non-participation will have in the event that other firms choose to participate. That is, a firm that is concerned about top-line revenue not only has to consider the impact of its decisions on its top-line revenues but also the decisions of its competitors in the market. Just as a profit maximizing firm would potentially choose the sales level that minimizes losses, a firm concerned with top-line revenues would have to consider whether those revenues drop less by participating in the rebate program than they would by not participating in the program.

Consider the following example:

Two firms both have an equal market share for an energy efficient product. The initial sales of the product are 100 units with 50 units sold by each firm. The price for the product is \$1. Customers are generally price responsive but there are some customers that for various reasons will remain loyal to one firm or the other. Assume half will remain loyal for this example.

The price elasticity of demand is -0.8, meaning that for every 1% decrease in price the quantity demanded increases by .8%. This would mean that for a \$0.50 rebate (or a 50% decrease in price), the quantity demanded would increase by 40% or 40 additional units would be sold. Under these assumptions, each firm would sell 20 more units (70 units each in total) but top-line revenues would drop to \$35.

Under the revenue neutral model as presented, it would appear that neither firm would participate in the program. However, the presented revenue neutral model fails to consider any strategic interactions amongst the firms. Namely, consider what happens if Firm 1 rejects participation in the rebate program but Firm 2 does participate (or vice versa). Under this scenario half of Firm 1's sales (25 units) would migrate to Firm 2. Firm 2 would also gain up to the 40 additional sales related to the rebate decreasing the price by 50%. If the sales to new customers (for the product not for Firm 2) are expected to be greater than or equal to 25 units, Firm 2 maintains revenue neutrality and would participate in the program. Assume exactly 25 more units are sold.

Under the situation described above, there are four potential outcomes:

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Firm 1 participates and Firm 2 participates: Both firms' top-line revenue decreases from \$50 to \$35.

Firm 1 participates and Firm 2 does not: Firm 1 maintains its \$50 revenue. Firm 2 revenue drops to \$25.

Firm 1 declines but Firm 2 participates: Firm 1 revenue declines to \$25, Firm 2 maintains \$50 in revenue.

Firm 1 and Firm 2 decline: Both firms maintain \$50 in revenue.

A very likely outcome is that both firms participate in the program. This outcome is likely because neither firm knows the decision the other firm will make. If Firm 1 participates but Firm 2 does not, Firm 1 maintains its revenue, increases its market share and increases its profits. Firm 1 knows that Firm 2 faces the same potential benefits for participating when Firm 1 does not.

Firm 1 also knows that if Firm 2 participates but the Firm 1 does not, that its revenue drops to \$25. The revenue for Firm 1 when both firms participate is \$35. A better top-line revenue than when Firm 2 participates but Firm 1 does not.

Any time that both firms participate under a scenario similar to this, total sales are 140 with 40 of those sales being new. The actual free rider percentage is 71% (100 sales of the 140 would have occurred prior to the rebate). The revenue neutral model assumes that a firm concerned with top-line revenues won't participate unless revenues are neutral. Thus the model would observe that 140 units sold at \$0.50 each generates \$70 in sales (\$35 for each firm) and would conclude that previous revenue could be no higher than \$35 at each store. The result is that the evaluator using this approach would assume that each firm sold at least 35 additional units as a result of the program rebates. That is the free rider percentage is no higher than 50% and could possibly be lower.

The case where one firm participates but the other firm does not is even more problematic for purposes of evaluation. The firm that does not participate is most likely not going to be part of the scope of the evaluation as the evaluators will not have any sales data on this firm. In the description above, the participating firm gains 50 units of sales but 25 of those would have occurred absent the program, it is just sales that migrated from the non-participating firm to the participating firm. Since the revenue is \$50 at this store, the evaluation using the revenue neutral assumptions will assume 50 additional units were sold as a result of the rebate and the free rider percentage is 50% (perhaps even less according to the revenue neutral model!). Since the non-participating firm is now selling 25 units while the participating firm is selling 100 units,

total sales increased from 100 to 125. That is the true free rider percentage is 80% (100/125), much higher than the supposed upper bound predicted by the model.

What makes the latter case more problematic is that it is likely to occur in practice. The rebates target the larger suppliers of lighting but do not target all suppliers and some targeted suppliers decline participation for various reasons. As a result, the evaluator only observes the number of rebated measures sold at participating suppliers. The evaluation cannot measure changes in the total market sales. As such even an assumption of increases in sales due to revenue neutrality does not imply that those sales would not have occurred absent the utility rebate program only that those sales would not have occurred at participating firms absent the utility rebate program.

Case 2: Revenues for both inefficient and efficient products are affected by the rebate.

One may argue that it is unlikely that significant migration would occur as the result of the rebates. The general premise around such arguments is that the cost of the item being rebated is low relative to the cost of comparing prices and traveling between stores.

If zero or low migration were to occur, the revenue neutral model could potentially be internally inconsistent or underestimate free-riders. If a firm behaves as top-line revenue neutral, then the firm would presumably be concerned with the revenues of both the efficient product and the inefficient product which is no longer being purchased. That is, if the revenue from efficient sales was \$100 and from inefficient product sales was \$100, then total top-line revenue is \$200. With zero migration from competitors, the rebate increases efficient sales by cannibalizing sales of the inefficient product.

Under the assumption that no migration occurs, the top-line revenue neutral firm will only participate if the sales increase of efficient product increases revenue sufficiently to offset the lost revenues from the inefficient product. This could lead to unreasonable results.

Consider the case where the top-line revenue firm sells 24 units of an efficient product for \$1 and 76 units of the inefficient alternative for \$0.25. Total revenue for these products is \$43 ($24 * \$1 + 76 * \0.25). With a rebate of \$0.50 on the efficient product, the firm must sell 48 more units of the efficient (losing sales of 48 units of the inefficient product). That means 72 units or more of the efficient product are sold and 28 or fewer of the inefficient product are sold. Or the share of the efficient product must triple just to remain revenue neutral. Under this scenario, no firm with more than 33.4% of sales belonging to the efficient product could offer the rebate.

Assuming no migration from competitors, the firm with 33.4% or more of sales who participates in the rebate program must be gaining sales from new customers who are not existing customers of some competitor. Under the unlikely event that this occurs, the evaluation process would only be attempting to account for free riders when there is a need to account for both free riders and the additional energy use by these new customers who did not migrate from a competitor.

Staff Conclusion:

Staff concurs with Navigant's recommendations regarding the need to provide a more intricate explanation and theory of the revenue neutral model. However, Staff disagrees that the underlying assumptions necessitate that the revenue neutral model presented imply an upper bound to free riders. With the evidence provided to date, Staff believes there is insufficient justification and support to use a revenue neutral framework to evaluate program savings at this time.

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JLH 6.01

Does AIC agree that the business gas furnace tune-up measure that AIC implemented during program year 4 was a measure that AIC added to its portfolio after Commission approval of Plan 2 (i.e., the cost-effectiveness of the measure was not included in AIC's Plan 2 docket)? Does AIC agree that these measures were not projected to be cost-effective when AIC made the decision to implement the measures during program year 4?

RESPONSE

Prepared By: Kenneth C. Woolcutt
Title: Managing Supervisor, Energy Efficiency
Phone Number: 309-677-5001

Yes.

No.

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JLH 6.02

Referring to pages 13-14 of Ameren Ex. 10.0, AIC indicates spillover may be small in many cases. Does AIC agree that for certain programs it is possible for the spillover to be zero? Does AIC agree that for new programs that it may not make sense for there to be spillover since they have not been in the market long enough for spillover savings to occur?

RESPONSE

Prepared By: Dr. Robert Obeiter
Title: Executive Vice President, Applied Energy Group, Inc.
Phone Number: (201) 444-1910

Dr. Obeiter agrees that it is possible that spillover may be zero for certain measures in a DSM program but that it is unlikely that spillover would be zero for the entire program (unless there was just one measure in the program). Further, it is Dr. Obeiter's opinion that it is just as possible for free ridership to be zero as it is for spillover to be zero.

Dr. Obeiter does not agree that it makes sense for there to be zero spillover in new programs, regardless of how long the program has been in the market. (However, ceteris paribus, it is just possible for a program promoting a brand new technology to have zero free ridership, as it is also possible for the same type of program to have zero spillover.) As Dr. Obeiter discusses on page 14 of his rebuttal testimony (lines 307-313) there are likely to be customers who, while aware of and eligible for rebates, simply do not take advantage of the rebate offered. Further, as Dr. Obeiter continues to discuss on page 14 of his rebuttal testimony (lines 313-314) if the program offered by the Company influences participants or non-participants to take additional energy actions that are not included in the program than spillover also occurs. Therefore, in Dr. Obeiter's opinion, having a program with zero spillover is a very unlikely event. Further, it is Dr. Obeiter's belief that the overall objective is to determine a balanced NTG value that a) includes both spillover and free-ridership and b) uses the best information available at the time decisions are made.

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JLH 6.03

Please specify the programs AIC proposed in Plan 3 for which no evaluated NTGR has been estimated.

RESPONSE

Prepared By: Andrew Cottrell
Title: Principal Consultant, Applied Energy Group Inc.
Phone Number: 732-447-1358

RES School Kits was the only proposed Plan 3 program which utilized a non-evaluated NTGR value.

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JLH 6.04

Referring to lines 192-193 of Ameren Ex. 6.0, please specify whether the “SAG participants’ proposed NTGR values for PY_{t+1}” will be those identified in the Party’s NTGR Objection Memos. Are the evaluator recommended NTGR values averaged as well or are just the Party’s NTGR Objection Memos?

RESPONSE

Prepared By: Keith E. Goerss
Title: Assistant Manager, Energy Efficiency
Phone Number: 309-677-5708

The evaluator recommended NTGR values are averaged as well.

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JLH 6.05

Referring to line 192-193 of Ameren Ex. 6.0, please specify whether there are any boundaries on the values that “SAG participants’ proposed NTGR values for PY_{t+1} ” can take. Can a proposed NTGR value for PY_{t+1} take on any of the following values:

- a) 0?
- b) 0.55?
- c) 1.0?
- d) 1.55?
- e) 5.0?

RESPONSE

Prepared By: Keith E. Goerss
Title: Assistant Manager, Energy Efficiency
Phone Number: 309-677-5708

Any boundaries on the values would be subject to Staff’s proposed NTG Framework (Exhibit 3.1) which provides the complicated process by which NTGR values are proposed including that “A *Party’s NTGR Objection Memo* shall be submitted to the Utility, SAG Facilitator, ICC Staff, and/or the SAG that documents any objections to the proposed NTGR values contained in the *Evaluator’s Revised Memo on Proposed NTGRs for PY_{t+1}* .” (Item 6).