



# PY4 EVALUATION PLAN FOR THE AMEREN ELECTRIC & GAS RESIDENTIAL AND COMMERCIAL PORTFOLIOS

**Draft**

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# 1. INTRODUCTION

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This document contains the PY4 evaluation plan for the Ameren portfolio of commercial and industrial (C&I), and residential energy efficiency resources. Opinion Dynamics Corporation, along with its subcontractors, The Cadmus Group, Navigant Consulting, and Michael's Engineering (the Opinion Dynamics team or the team), have been contracted by Ameren to provide an independent evaluation of the 2011-2014 electric and natural gas energy efficiency programs. In this document, we provide the detailed PY4 evaluation plan for each program. Note that this document supplements the Three-Year Evaluation Plan.

An overview of the data collection activities and planned analysis for PY4 is shown in the table below.

**Table 1. Planned PY4 Evaluation Activities**

Activity	Residential										Commercial			
	Lighting	HVAC	Behavioral Modification	Home Energy Performance	Electric Space Heat Pilot	Appliance Recycling	Multifamily	Moderate Income	Efficient Products	ENERGY STAR New Homes	Standard	Custom	Retro-Cx	New Construction
Program Material Review	● Every Year and Every Program (except Commercial NC)													
Program Manager and Implementer Interviews	● Every Year and Every Program (except Commercial NC)													
Energy Advisor or Key Account Executive Interviews											●	●		None
Market Actor / Program Ally / Retailer Interviews				●	●	●		●			●	●		None
Customer Intercepts	●													None
Participant Survey		●		●	●	●		●	●		●			None
Site Visits	●	●									●	●		None
Impacts (to be quantified)	●	●	●	●	●	●	●	●	●	●	●	●	●	None
Per Unit Values (Gross Impacts)	■	■	NA	■	■	■	■	■	■	■	■	⊙	⊙	None
NTGR (Net Impacts)	⊙	■	⊙	⊙	■	■	■	⊙	■	■	■	■	■	None
●	Activity planned to be performed													
■	Values in Excel sheets in Appendix C or NTGR in Appendix B													
□	Statewide TRM Values													
⊙	Value from that year's evaluation activities													

## 2. NOTES ON THE EVALUATION PLAN

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The Illinois Commerce Commission (ICC) has charged Ameren with obtaining cost effective energy savings (gas and electric) at the portfolio level. The evaluation of the portfolio must be broken down into the separate programs simply to assure correct attribution of net savings as the actual implementation of a program often determines what would have occurred absent the program (i.e., net savings). Through our evaluation, we will describe what is occurring at the portfolio level by rolling up our program level results to the sector level (residential and commercial). Our reporting will focus on highlighting what is taking place within each program and how this activity drives sector level savings, as well as bringing the sector level savings together to provide results for the entire energy efficiency portfolio.

In determining the optimum PY4 evaluation approach for the portfolio, we made certain trade-offs to align key activities with the available budget and continue to be responsive to Ameren and the ICC. As part of the PY4 evaluation planning process, the ICC made several requests that we accommodated, two of which required additional budget: 1) perform in-store intercepts for the residential lighting program in a timeframe to match ComEd and 2) add budget to the Custom Program to allow for the development of a set number of formal site specific EM&V plans. In order to perform these tasks, we dropped two survey efforts and one onsite M&V effort. In particular, we dropped the non-participant survey for the Appliance Recycling Program, which would have provided additional information on the net value for this program. We also dropped the planned survey for the control and treatment group in the Behavioral Modification Program, which would have asked participants what specific actions they are taking. The third item we dropped was the onsite M&V task for the Retro-commissioning Program.

During the planning process, Ameren also made one request – that our analysis provide them with useful information on the Staff Grant initiative implemented through the C&I portfolio. While we had planned to delve into this component, we had not planned to perform additional onsite audits specifically for Staff Grant recipients. However, given the Ameren request, we will closely look at our sampling frame to determine how best to obtain information for Staff Grant recipients.

Despite these modifications, there were a few requests from the ICC that we did not accommodate within our PY4 evaluation plan. Specifically, the ICC had requested we reduce our sample size for a telephone survey among REEP participants, and indicated that we should focus the survey on two end uses and pool the other three end uses together. We chose not to do this as the incremental cost of the survey completes is minimal, and each of the five end uses within this program are distinct and we expect them to have different Net-to-Gross Ratios (NTGRs). The ICC also requested that we provide updated NTGRs each year for the Custom and Standard programs – partially due to the upcoming EISA changes in June 2012 around fluorescent bulbs (described in greater detail within the analysis plans below). We had no Custom survey planned in PY4 and did not include one since this program had a relatively stable NTGR over the past three evaluation periods.

For the PY4 planning process, we were also guided by ICC Orders. We describe the guidance provided through the Orders below.

## 2.1 COMMISSION GUIDANCE ON EVALUATION EFFORTS

The ICC Order for Docket 10-0568 dated December 21, 2010, provides significant information about how the evaluation team should use NTGRs and per-unit values, which ones the team should use, and when per-unit values will be updated. This information is described in the Three-Year Plan, but we provide here for reference as well.

Key points directly taken from the ICC documents are:

- The Order has a set of fixed per-unit savings values that evaluators are to use in our PY4 evaluation for most measures. (Staff Cross Exhibits Part 1 and Part 2) For measures without a fixed value, we plan to perform an engineering analysis.
- Ameren must apply any updated per-unit values received by March 1 to the next program year (Lines 505-508 of Ameren Exhibit 10.0 in the December Order). As evaluation results are generally available in the fall, the earliest application of any results from the evaluation of standard measures will skip a program year. For example, PY4 results are available for application in PY6, and PY5 results are available for application in PY7.
- Ameren must work with other utilities and the Statewide Advisory Group “to develop a Statewide TRM for use in the upcoming energy efficiency three-year plan” (p.19 Order on Rehearing). Since this document is dated prior to the beginning of PY4, we assume this means PY4-PY6 (i.e., Plan 2).
  - The Statewide TRM consultant is currently working on high-impact measures and then will turn its attention to all the other measures in the portfolio. A draft of the some Statewide TRM with values may be available prior to March 1, 2012, but more likely, the final values will not be available until after March 1. Following the timeline from the Order, that would mean that per-unit values should be applied to PY6. We will default to this assumption unless otherwise agreed to in writing with Ameren or the ICC.<sup>1</sup>
- The *Order on Rehearing* also provided a framework on how and when to apply NTGRs as well as when any update to NTGRs should be applied. This framework has five points that are provided verbatim from the order next:
  1. Where a program design and delivery methods are relatively stable over time, and an Illinois evaluation of that program has an estimated NTG ratio, that ratio can be used prospectively until a new evaluation estimates a new NTG ratio.
  2. In cases that fall under point 1, once a new evaluation results exists, these would be used going forward, to be applied in subsequent program years following their determination until the next evaluation, and so on.
  3. For existing and new programs not yet evaluated, and previously evaluated programs undergoing significant changes - either in the program design or delivery, or changes

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<sup>1</sup> We have heard in the ongoing Statewide TRM meetings that ComEd expects to implement some or all of the Statewide TRM measures in PY5. This choice does not follow the timeline in the Ameren Exhibit 10.0, although Ameren has chosen to follow the same timeline and use Statewide TRM values in PY5.

the market itself - NTG ratios established through evaluations would be used retroactively, but could also then be use prospectively if the program does not undergo continued significant changes, similar to the first paragraph above.

4. For programs falling under point 3, deeming a NTG ratio prospectively may be appropriate if: the program design and market are understood well enough to estimate with reasonable accuracy and initial NTG (e.g., based on evaluated programs elsewhere); or it is determined that the savings and benefits of the program are not sufficient to devote the evaluation resources necessary to better estimate a NTG ratio.
5. Recommendations of the SAG to the Commission regarding application of this framework shall be submitted in adequate time for Commission review. If the SAG is not in unanimous agreement in its recommendation, the Commission requests that any recommendation that has the support of more than a majority of SAG members be submitted to the Commission along with a discussion and enumeration of the dissenting opinions.

Based on the language above, we have created a three-point set of rules to follow .

1. If the program design and delivery methods are stable over time and a previous Illinois evaluation has estimated a NTGR, that NTGR is used prospectively until a new value is calculated. When the new value is calculated, we will apply the value prospectively following a similar timeline as the per-unit values. For example, if a PY4 NTGR is calculated for a program that has had an evaluation and the program and market are stable, we will apply the new NTGR in PY6.
2. For existing programs that have been evaluated previously, but are undergoing significant changes in program design or in the market served by that program, or for existing and new programs that have not yet had an evaluation, a NTGR will be calculated and applied retroactively (i.e., for the year in which program participants are included in the research).
3. If a previous Illinois evaluation has not occurred, it is possible to deem a NTGR based on secondary research showing other NTGR values from similar programs. This approach is used in two cases:
  - a. If the program design and market is well understood
  - b. If the savings of the program are not sufficient to devote evaluation resources.

These rules have helped to shape the detailed program plans, provided below.

## **3. RESIDENTIAL PORTFOLIO - RESIDENTIAL LIGHTING**

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### **3.1 PROGRAM DESCRIPTION**

Ameren 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 and fixtures, HID lamps, and occupancy sensors. The program is available throughout the entire Ameren 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 Ameren 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 33% of the overall portfolio of electric savings and 0% of portfolio therm savings (including both residential and commercial).

### **3.2 RESEARCH OBJECTIVES**

The market for residential lighting products is changing. With implementation of the Energy Independence Security Act (EISA) and the entry of new technologies into the market, consumers will have more lighting options but will also be more confused about what to purchase. Implementers of residential lighting programs are also wondering what these changes mean for the cost effectiveness of their programs and what changes they should consider making.

In this environment, evaluators need to be forward looking. When designing an evaluation plan for a single program year, we must consider market changes and their implications for future evaluation needs. The research tasks presented below for PY4 are part of a larger three-year evaluation plan. They were selected because they provide the most accurate and cost-effective information for this program year considering the changes taking place in the market. Information could be outdated quickly. When selecting research tasks, we considered the value of the information it would provide this year, how we could build on that information in future years, and its costs.<sup>2</sup> 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 Ameren to adapt more quickly and provide the guidance its customers will need when selecting from a variety of lighting products.

The details and logic behind our PY4 evaluation tasks are described in detail below. The tasks are designed to answer the following impact-related research questions:

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<sup>2</sup> Note that there were also some tasks that were included at the request of the ICC. These efforts are called out in the Plan.

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 are the penetration and saturation rates of standard CFLs versus specialty CFLs? (Data will be collected across PY4 and PY5)

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

1. Did the program change its design in PY4? 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 Ameren 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 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?

## **3.3 METHODOLOGY**

### **3.3.1 DATA SOURCES**

The evaluation team will utilize the following data sources to evaluate the Ameren PY4 Residential Lighting program:

- Program tracking data
- Program goals tracker (i.e., sales data collected by implementer)
- Program marketing materials and marketing plans
- In-store intercept interviews with customers purchasing lighting at participating retailers
- In-home lighting inventories of Ameren customers (i.e., in-home visits/interviews)

### **3.3.2 SAMPLING PLAN**

We will conduct interviews with customers purchasing lighting at a sample of participating retailers. We will focus on retail chains that sold the greatest number of program bulbs and attempt to conduct interviews at the locations with the most sales. It is not cost effective to conduct intercepts at retailers that sell a small number of bulbs through the program. Our interviews will represent customers who made the majority of program purchases. We will work

with the program implementer to gain access to the stores, which can sometimes require slight adjustments to the store sampling plan.

We will draw a sample of Ameren customers to conduct the in-home lighting inventories. We will conduct a total of 225 in-home lighting inventory visits between the end of PY4 and the beginning of PY5. We will review the approach used for the PY2 in-home visits and if suitable, replicate the approach to facilitate comparisons between the two studies. Ideally, we will select the sample for the in-home visits via a stratified sampling approach based on the proportion of homes within different regions of Ameren territory. We will determine the actual number of strata and regions upon review of the PY2 study and discussion with program staff during the evaluation kick-off meeting.

### **3.3.3 ANALYSIS PLAN**

#### **Per Unit Values**

For PY4, the per-unit values for gross energy and demand savings are fixed. We provide the per-unit savings values for different bulb wattages in Appendix A. These values were presented in the Order and expanded upon slightly after the ICC Order. Ameren and the ICC have agreed to the values. Along with installation rates from the in-home audits, the Evaluation Team will use these values in the calculation of gross program savings.

#### **Net Savings**

The Opinion Dynamics team is proposing to conduct intercepts with customers to determine free-ridership, and in-home lighting inventories to gather information on spillover. The research from these two efforts will be combined to provide insights on the program, as well as to define a new NTG ratio for future program efforts. (Notably, this may be revisited in later years as necessary. Any future research would be discussed and approved by Ameren and the ICC.) Appendix B further discusses the timing of these efforts and how they will be used. Additional information on market trends and installation rates are described more below.

#### **Market Trends and Installation Rates**

We will use in-home lighting inventories to estimate the program's impact on the lighting market, program spillover, and CFL installation rates. This work will build on in-home visits conducted as part of the PY2 Ameren residential lighting evaluation. Comparison of penetration and saturation rates will help Ameren and the ICC understand the influence of the program on the market. To estimate spillover, we will compare number of CFLs found in Ameren 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. This number will be adjusted based on other market findings.

We will complete 225 total in-home lighting inventories, with one-half conducted towards the end of PY4 (April and May 2012) and one-half conducted at the beginning of PY5 (June and July 2012). The primary focus of the visits will be to gather information on the number, type and location of residential lighting products in each home. We will also use the visits to gather information on a few additional household products to inform other programs such as the appliance recycling program.

During the visit, we will also conduct a short interview about typical lighting purchase behavior, such as frequency and purchase location, that will aid us in attributing extra CFLs to Ameren as



warranted. We will also talk with Ameren customers about their knowledge of different lighting options currently available for the sockets in their homes. These will be in-depth interviews that would be difficult to conduct over the telephone or in-stores. We will explore what customers plan to purchase for different sockets when the current bulb burns out. This information will provide Ameren with information about customer awareness and likelihood to purchase different specialty CFL options, EISA-compliant halogens as well as LEDs.

We will also use the in-home visits to estimate a new CFL installation rate for Ameren, which was not estimated during the PY1 to PY3 evaluations. The installation rate will be the number of CFLs installed during the visit versus those found in storage. 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.

### **3.4 TASKS**

To answer the research questions outlined above, we will complete the following tasks as part of the PY4 evaluation:

#### **3.4.1 IN-DEPTH INTERVIEWS WITH PROGRAM STAFF**

The Evaluation Team will conduct up to five in-depth phone interviews with program and implementation staff involved in the design and administration of the efficient lighting program. These interviews will allow us to fully explore the details of the program design and implementation and explore the perspective of the people who are in direct contact with participating retailers. We will schedule these in-depth interviews early on in the evaluation process and will conduct them over the telephone utilizing experienced Opinion Dynamics analysts. All interviews will be recorded and transcribed to facilitate analysis.

*Deliverable: Draft and final interview guide*

*Deliverable Date: April 2012*

#### **3.4.2 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.

Using the number of bulbs sold by wattage, we will calculate gross energy savings using the program per-unit fixed values in Appendix A multiplied by the installation rate from our in-home audit. Our research will also develop a NTGR for PY4 and apply this number to obtain net impacts. (See also Appendix B for more information on how this might be applied.)

*Deliverable: Data request*

*Deliverable Date: July 2012*

### 3.4.3 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 2012*

### 3.4.4 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 Ameren with future program planning.

We will attempt to conduct interviews with at least 300 customers purchasing CFLs discounted through the Ameren program. Additional interviews will be conducted 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. After reviewing year-to-date sales data by retailer and store location, we will determine the retailers and stores where we will conduct customer interviews. 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: April 2012*

### 3.4.5 IN-HOME LIGHTING STUDY

We will visit 110 homes to conduct in-home lighting inventories toward the end of PY4 and another 115 at the beginning of PY5 for a total of 225 inventories. A detailed lighting study of this nature provides the most accurate "snapshot" of the number, type and location of residential lighting products. In addition, as possible, we will compare the results with the in-home visits conducted for the PY2 evaluation and describe the change in lighting products installed between PY2 and PY4. Most recent studies are finding that efficient lighting saturation is going up, indicating that programs such as the Ameren residential lighting program, combined with national education and retailer initiatives, are leading to an increase in CFL sales. Therefore, we will calculate the change in CFL saturation, identifying the most significant changes based on 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. Like in PY2, we will also

collect information on LEDs. We do not expect much change in LED saturation between PY2 and PY4, but it will be important to collect counts of LEDs to serve as a baseline if Ameren decides to add LEDs to its mix of incandescent products.

We expect the study to also provide insight into additional program opportunities. For example, our analysis will examine the correlation between efficient lighting and a number of household and demographic variables, including home ownership, housing type (e.g., single family vs. multifamily), income, and education. In addition, recent saturation studies have also 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.

As part of the visits, we will conduct short in-depth interviews with customers about their awareness of different lighting options and likely future purchase behavior based on their actual home lighting situation and needs.<sup>3</sup> We will measure their awareness of EISA and what they will likely install next in sockets with 100 watt and 75 watt incandescents.

*Deliverable: Draft and final inventory instruments*

*Deliverable Date: April 2012*

### 3.4.6 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 2012*

## 3.5 BUDGET AND SCHEDULE

Table 2 provides a schedule of evaluation tasks for PY4.

**Table 2. Lighting Program Evaluation Tasks Schedule**

Task	Evaluation Task	2012								
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>3.4.1</b>	Interviews with Program Staff				■	■				
<b>3.4.2</b>	Program Database Verification and Savings Analysis							■	■	■
<b>3.4.3</b>	Request and Review Program Materials							■	■	
<b>3.4.4</b>	In-Store Customer Interviews				■	■	■	■	■	
<b>3.4.5</b>	In-Home Lighting Study				■	■	■	■	■	
<b>3.4.6</b>	Reporting									■

<sup>3</sup> Note that we will also consider whether it is possible to ask about the effects of the Behavioral Modification program.

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

Table 3 provides the budget for each evaluation task for PY4.

**Table 3. Lighting Program Evaluation Budget and Deliverable Date by Task**

<b>Task</b>	<b>Task</b>	<b>Deliverable Date</b>	<b>Dollars by Task</b>
3.4.1	Interviews with Program Staff	April 2012	\$2,500
3.4.2	Program Database Verification and Savings Analysis	July 2012	\$6,500
3.4.3	Review Program Materials	July 2012	\$6,000
3.4.4	In-Store Customer Interviews	April 2012	\$69,000
3.4.5	In-Home Lighting Study (PY4 budget only, additional effort in PY5)	April 2012	\$86,000
3.4.6	Reporting	September-October 2012	\$30,000
<b>Total Dollars</b>			<b>\$200,000</b>

## 4. RESIDENTIAL PORTFOLIO – HVAC

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### 4.1 PROGRAM DESCRIPTION

The ActOnEnergy 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.

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 scenarios that facilitate savings due to HVAC Program offerings:

- 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 equipment.
  - The contractor encourages the customer to have high-efficiency equipment installed, 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 encourages the customer to have high-efficiency equipment installed, then installs equipment at the customer's request.

The expected savings from this program is 5% of the overall PY4 portfolio of electric savings and 23% of PY4 portfolio therm savings

### 4.2 RESEARCH OBJECTIVES

We have structured the PY4 evaluation to achieve the following general research objectives for the HVAC Program:

1. Provide electric gross peak demand and cooling energy savings, using fixed savings estimates applied to verified measure installations for the population of measures installed as part of the program.
2. Assess customer satisfaction with program processes and determine areas of possible improvement.
3. Identify possible market effects from the program and its progress towards market transformation.

Previously, Cadmus 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 evaluation team conducted surveys with participating contractors, drop-out contractors, and participants to develop NTGRs and evaluate program processes. In PY4, we will verify installations, assess program satisfaction, and estimate impacts using fixed savings estimates applied to verified participation. In addition, we will install meters on a sample of equipment, which we will obtain results for in PY5.

## **4.3 METHODOLOGY**

### **4.3.1 DATA SOURCES**

Data sources for evaluating the HVAC Program include:

- Program tracking database;
- Information gathered through stakeholder interviews;
- Participant HVAC system and operational data collected on site;
- Short survey data from metering recruiting; and
- Information gathered from program record reviews (tracking database, incentive applications, and invoices).

### **4.3.2 SAMPLING PLAN**

#### **Metering**

To ensure that we have complete data for the number of HVAC units required to meet 90/10 (one-tailed) precision threshold, we propose a sample that achieves slightly better than 10% precision to account for drop-outs and potential missing or lost data. Previous metering data from the PY2 evaluation may be selectively used to increase sample size.

#### **Document Review**

We will choose 70 participants at random and review their program documentation, including invoices, to check for consistency with the tracking database. We will also review program marketing materials and the Website to assess how the program is communicated to customers.

#### **Customer Verification and Satisfaction**

We will contact 70 customers at random to verify that they had the type of measure specified in the tracking database installed by a qualified program contractor. The evaluation team will also

use these calls to recruit metering participants and administer a short customer satisfaction survey.

## Metering

The PY4 and PY5 metering plan is described here to delineate the total sample which will deliver better than 90/10 one-tailed confidence for cooling systems and for fuel-based heating systems. Over the three-year program period, we will meter a total of 48 cooling systems and up to 72 heating systems. We plan to install meters on 48 cooling systems, the mix depending on the mix of CAC, air source heat pumps and ground source heat pumps incented through the program in PY4. We plan to install meters on 48 fuel heating systems in PY5 prior to the start of the heating season. CAC meters will be removed in the fall of PY5 and data from any ASHP and GSHP meters will be downloaded at that time but meters will continue recording winter energy consumption. We anticipate a coefficient of variance of 0.4<sup>4</sup> or better for size-normalized heating and cooling consumption (kWh/ton or BTU per 1,000 BTU capacity). We will randomly choose participants from the tracking database to achieve the desired sample.

### 4.3.3 ANALYSIS PLAN

#### Impact – Gross

In PY4, the evaluation team will determine gross impacts by multiplying the number of verified participants for each measure by the fixed energy savings values listed in Table 4.

**Table 4. Deemed Energy Savings Values by HVAC Program Measure**

Measure	Savings (kWh)
Air Source Heat Pump <16 Replaces SEER Greater than 10	2,422
Air Source Heat Pump 16+ Replaces SEER Greater than 10	2,543
Air Source Heat Pump <16 SEER Replaces SEER of 10 or less	5,782
Air Source Heat Pump 16+ SEER Replaces SEER of 10 or less	6,071
Central AC < 16 SEER Replaces SEER Greater than 10	373
Central AC 16+ Replaces SEER Greater than 10	515
Central AC <16 SEER Replaces SEER of 10 or less	1,773
Central AC 16+ SEER Replaces SEER of 10 or less	1,928
Geothermal Heat Pump	3,151
Geothermal Heat Pump Replaces Electric Resistance	25,154

<sup>4</sup> Previous studies show cooling CV is less than 0.4 and heating CV is closer to 0.3.

Fixed values have not been deemed values for gas boilers, so the evaluation team will utilize savings estimates from the PY3 evaluation.

## Metering

The evaluation team will begin our metering effort in May 2012, and will leave meters in place through the end of the cooling season (typically mid-October). Although we will not be able to report meter data results in PY4, this report still outlines the savings methodology and trade-offs with other approaches.

The evaluation team will build our metering efforts on the metering we performed for the PY3 evaluation, in which budget limitations resulted in samples 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 effected by the quality of installation, the 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 once the metering data is collected (note this work will be performed in PY5 and PY6).

## Baseline

Some incentives are specifically for new construction measures and replace on failure, while others are intended for early replacement. The evaluation team will develop two savings estimates for each program participant, each using a different baseline:

- One that is based on the federal minimum standard, and
- One that is based on the existing equipment that was replaced.

Heating and cooling capacity is estimated through metering. In other words, we will meter the amount of heating and cooling used by a typical home in the Ameren 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

The evaluation team will determine unit consumption, energy, and demand savings for CACs and HPs through metering. We will review the equipment installed at sites randomly selected for metering for data tracking accuracy to verify that the equipment specifications recorded in the tracking system are consistent with the equipment found at the customer site.

To meet International Performance Measurement and Verification Protocol (IPMVP) Option A requirements, we will determine the following for electric savings:

- Meter power (kW), outside air temperature and humidity, evaporator blower power or amperage, supply air temperature and humidity, return air temperature and humidity, and space temperature (using U-10 or equivalent).
- For air source and ground source HPs, the evaluation team will meter the above parameters in addition to the power drawn by resistive back-up heaters.

To estimate electric savings, the evaluation team will average the 5-minute interval data<sup>5</sup> 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).<sup>6</sup> For each hourly bin, we will calculate the energy impacts for hour 'i' and temperature 'T' as follows:

$$\begin{aligned} \text{Eq. 1: Consumption Savings}_i \\ = \text{Metered Energy Use}_i \times \frac{EER_{High}(T)}{EER_{Replaced}(T)} - \text{Metered Energy Use}_i \end{aligned}$$

For each metered system, EER (or COP)<sup>7</sup> values are derived from 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%<sup>8</sup>. 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.

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<sup>5</sup> 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.

<sup>6</sup> The baseline for these calculations is discussed in a previous section.

<sup>7</sup> 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.

<sup>8</sup> Percentages are estimates provided for purposes of an example.

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

INDOOR AIR		OUTDOOR COIL ENTERING AIR TEMPERATURES ° F (° C)														
EDB ° F (° C)	CFM	-3 (-19.4)			7 (-13.9)			17 (-8.3)			27 (-2.8)			37 (2.8)		
		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*	
<b>25HCC518A30 Outdoor Section With FX4DNF019 Indoor Section</b>																
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:

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

The limitation of the equation is that the 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 equivalent full load hours (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.

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

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

The evaluation team will determine unit consumption for gas furnaces and boilers through metering. We will also review the equipment that is randomly selected for metering for data tracking accuracy to verify that the equipment specifications recorded in the tracking system are consistent with the equipment found at the customer site.

To meet IPMVP Option A requirements, we will perform the following evaluation activities for gas savings:

- Spot combustion metering on the 24 boilers and 24 furnaces, 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.
- For boilers, we will note the supply and return water 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 annual fuel utilization efficiency (AFUE) of the installed high-efficiency gas furnace or boiler. AFUE is defined as:

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

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

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. Typically, a base of 65° F is used to estimate CDD. We have found that energy is better predicted by a higher base temperature. We will correlate the daily degree days with energy consumption from meter data, then vary the base temperature to determine the optimal average base temperature to use for the weather-normalization adjustment.

Table 5 shows the planned schedule of meter installations for all three-program year evaluations, including removal dates (signified by the end of the range of dates shown).

**Table 5. HVAC Planned Metering Schedule**

	PY4	PY5	PY6
CACs	24 units (May – October 1, 2012)	Remove 24 units October 2012	NA – Metering Complete
Air Source HPs*	12 units - May 2012	Download data October 2012 Remove April 30 <sup>th</sup> 2013	
Ground Source HPs*	12 units - May 2012	Download data October 2012 Remove April 30 <sup>th</sup> 2013	
Gas Furnaces		24 units (October 2012 – May 2013)	
Gas Boilers		24 units (October 2012 – May 2013)	
<b>Total</b>	<b>48 units</b>	<b>48 units</b>	

\* If there is not a significant number of ground source HP or ASHP participants or the program is choosing to move away from one of the technologies, we will meter additional CACs. Similarly if boiler participants are insignificant we will meter additional furnaces.

## **Additional Considerations**

### **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. Homeowners often use alternative heating sources, such as wood burning stoves. We will also determine the savings effect of homeowners who have both a 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 SEER rating. If a homeowner normally leaves the fan in “on” mode, an ECM will provide significant additional savings or reduce savings if the previous mode was not on continuously.

## **Net Impact**

The evaluation team will determine net energy savings from the HVAC Program by applying a fixed NTGR of 0.8 to the gross savings determined for PY4.<sup>9</sup>

## **Process**

In PY4, the team will conduct a high-level process evaluation that consists of collecting information through interviews with Ameren and CSG on how the program works, as well as through conducting short satisfaction surveys with customers who we recruit for metering and site visits. The residential HVAC Program process evaluation has two objectives:

- To understand how the program is performing compared to expectations and why in order to improve the existing program design and implementation.
- To assess customer satisfaction.

Our emphasis in PY4 will include:

- Documenting the program theory and logic.

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<sup>9</sup> Staff Cross Exhibit No. 1.

- Describing issues and providing recommendations to improve data tracking used to document program impacts.
- Examining areas of particular concern highlighted by Ameren or CSG through their own observations of program implementation activities and responses.
- Assessing participant satisfaction with the program.

For the process evaluation, the team will investigate: (1) program participation; (2) the effectiveness of the program design and implementation; (3) the effectiveness of program processes; and (4) opportunities for program improvement. The following subsections outline the types of questions we will investigate for each research area.

### ***Program Participation***

- What does customer participation look like? Which measures do customers prefer? How did customers become aware of the program?
- Does customer participation meet expectations? If not, how does it differ and why? What types of customers participate in the program? What are the key factors that prevent customers from participating?

### ***Program Design and Implementation Effectiveness***

- What are the program's key elements, including its ultimate goals, market barriers and associated market actors, and program activities, inputs, anticipated outputs/goals, and external influences?
- Is the program design effective in meeting its goals? Are the best available program delivery channels being used? Are any design elements creating barriers to customer or contractor participation? Has the utility assigned sufficient resources to implement the program? Are the data collection and management tools effective?
- What implementation challenges have occurred and have they been overcome? If so, how? If not, why not? What is being done to address these challenges?
- How effectively are the program data being tracked? Does the program implementer provide information in a timely fashion (if applicable)? Are all necessary data tracked and easily provided? Do program managers have adequate internal data tracking mechanisms to provide a comprehensive view of program status?
- Does the program have adequate staff to operate it effectively?

### ***Program Process Effectiveness***

- Are customers satisfied with the program and its offerings?
- Do customers clearly understand the program participation process and requirements? Is the application process onerous? Does the process present any barriers to program participation?

### ***Program Improvement Opportunities***

- How can the program operations and effectiveness be improved?

## **4.4 TASKS**

### **4.4.1 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 Ameren regarding each product sold through the HVAC program.

- 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
  - 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

**Deliverable: Data Requests**

**Deliverable Date: April 2012**

## 4.4.2 STAKEHOLDER INTERVIEWS

The evaluation team will perform stakeholder interviews including the following steps.

- Develop staff and implementer interview guides
- Complete interviews

*Deliverable: Draft and final interview guide*

*Deliverable Date: April 2012*

## 4.4.3 PARTICIPANT SURVEY

We will develop a short recruiting and satisfaction survey, which we will use to assess program satisfaction, verify the types of measures installed, and to recruit meter participants.

*Deliverable: Draft and final participant survey guide*

*Deliverable Date: April 2012*

*Participant Interviews/Recruiting Started*

*Deliverable Date: May 2012*

## 4.4.4 SITE VERIFICATION VISITS AND METERING

The evaluation team will select the CAC, air source HP, and ground source HP sample from the tracking database, and then recruit electrical metering study participants through the participant survey. We will recruit gas furnace and boiler participants in the same way, but at a later date.

*HVAC Metering*

*Completion Date: May 2012*

*Boiler/Furnace Metering (and AC Meter Retrieval)*

*Completion Date: October 2012*

## 4.4.5 IMPACT ANALYSIS

The evaluation team will conduct the following:

- Analyze tracking database
- Calculate Impacts

*Complete analysis*

*Completion Date: August 2012*

## 4.4.6 REPORTING

The evaluation team will write a draft report of findings for us 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 2012*

## 4.5 BUDGET AND SCHEDULE

Table 6 outlines the schedule for the HVAC Program evaluation.

**Table 6. HVAC Program Evaluation Tasks Schedule**

Task	Activity	2012									
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
4.4.1	Request and review data from utility										
	<b>Stakeholder Interviews</b>										
4.4.2	Stakeholder Interview Guides										
	Stakeholder Interviews Complete										
	<b>Participant Surveys</b>										
4.4.3	Develop Draft and Final Survey Instrument										
	Conduct Participant Survey/Recruiting										
	<b>Site Verification Visits and Metering</b>										
4.4.4	Install Cooling Season Metering										
	Remove AC Metering/Install Heating Season Metering										
	<b>Impact Analysis</b>										
4.4.5	Analyze Tracking Database										
	Prepare Evaluation Binder										
	<b>Reporting</b>										
4.4.6	Prepare Draft										
	Review with Stakeholders										




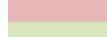
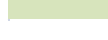
	Data Request
	Stakeholder Interviews
	Participant Surveys
	Analyze Data
	Milestone Deliverables

Table 7 outlines the evaluation budget for each task.

**Table 7. HVAC Program Evaluation Budget**

Task	Task Description	Deliverable Date	Dollars by Task
Task 4.4.1	Data Requests	April 2012	\$2,800
Task 4.4.2	Program Manager and Implementer Interviews	April 2012	\$1,700
Task 4.4.3	Participant Survey	April-May 2012	\$8,200
Task 4.4.4	Site Verification Visits and Metering	May-October 2012	\$85,000
Task 4.4.5	Impact Analysis	August 2012	\$14,300



Task 4.4.6	Reporting	September-October 2012	\$20,500
<b>Total Dollars</b>			<b>\$132,500</b>

## 5. RESIDENTIAL PORTFOLIO – BEHAVIORAL MODIFICATION

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### 5.1 PROGRAM DESCRIPTION<sup>10</sup>

As part of its residential portfolio, Ameren Illinois began a two-year Home Energy Report pilot program in August 2010.

The specific goals of the Home Energy Report pilot program were to:

- Reduce energy consumption by driving energy-efficient behaviors. This was to be accomplished by making customers more aware of how their behavior impacts their energy use through comparisons with others' energy use.
- Increase energy-efficiency program participation through a powerful, targeted marketing channel.
- Boost customer engagement and education by helping customers understand and save energy.
- Educate customers about no-cost and low-cost energy saving measures and behaviors.

Ameren Illinois and OPower target dual-fuel customers who live in high-population areas with higher-than-average energy use. Participants receive a Home Energy Report in the mail that included the following information:

- Comparison of the customer's energy usage to past usage.
- A "neighbor comparison" of a 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.).

According to discussions with Ameren Illinois, the number of customers in the program has changed over time:

- The initial ~50,000 customers started in August 2010 and remain in the program (through May 2012 and beyond). The reports for this group vary according to season, switching between **monthly and bi-monthly**.
  - A comparison group was established for this group.
- Additional dual-fuel customers were added in April/May 2011 and November 2011. These groups received **monthly and bi-monthly** mailings. Notably, mailings to about 90,000 of these customers will be discontinued in May 2012 (at the end of PY4).
  - Separate comparison groups were established for each additional group as shown in the table below.

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<sup>10</sup> This description comes from the Cadmus PY3 draft report.

- A group of approximately 17,000 gas only customers were also added in November 2011. Mailings to these customers will be discontinued in May 2012 (at the end of PY4).
  - Separate comparison groups were established for this group.

**Table 8. Summary of Participants**

Description	Number in HER Test Group	Number In Control Group	Frequency of Mailings	Start Date	End Date
Group 1 - Initial Pilot Selection – dual-fuel	43,945	44,503	Monthly and bi-monthly	August 2010	Continuing
Group 2 - PY4 additional dual fuel customers added	68,721	23,096	Monthly and bi-monthly	April/May 2011	Continuing
Group 3 - PY4 additional dual-fuel expansion	114,321	19,829	Monthly and bi-monthly	November 2011	May 2012 25,000 will remain in program
Group 4 - PY4 – additional gas savings – 6 months of reports	16,860	8,204	Monthly	November 2011	May 2012
<b>Total</b>	<b>243,847</b>	<b>95,632</b>			

\*Note that these numbers were provided by Ameren, March 13, 2012.

The expected savings from this program is 7% of the overall PY4 portfolio of electric savings and 17% of PY4 portfolio therm savings.

## 5.2 RESEARCH OBJECTIVES

The PY4 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 (PY4)?
- Does program response vary by customer demographic or season?
- Do participants show greater enrollment in Ameren Illinois’ other energy-efficiency offerings due to the Behavioral Modification program?

Note that in PY4, we will not conduct a customer survey due to budget restrictions; however, future efforts (PY6) will include surveys with both the treatment and control groups to understand:

- How does the program affect customer satisfaction and what improvements can be made to the program from the perspective of the stakeholders?

In addition, future efforts (PY6) will examine persistence, including questions such as:

- Does program response vary over time?

## **5.3 METHODOLOGY**

### **5.3.1 DATA SOURCES**

Data sources for evaluating the Behavioral Modification Program include:

- Program tracking databases;
- Information on the key program efforts and dates gathered through stakeholder interviews;
- Experian data and/or appended data
- Electric consumption/billing data for treatment and control groups (pre-period-May 2012)
- Gas consumption/billing data for treatment and control groups (pre-period-May 2012)

As mentioned above, the PY4 effort does not include surveys with the treatment or control groups.

### **5.3.2 SAMPLING PLAN**

#### **Billing Analysis**

We will take a close look at the treatment and control population 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.

### **5.3.3 ANALYSIS PLAN**

#### **Net Impacts**

The evaluation team will determine net energy savings for the Behavioral Modification program through the Billing Analysis combined with the Database Cross Check. Through the Database Cross Check, we will indicate which savings have already been counted for this program.

#### **Process**

No formal process evaluation will be conducted in PY4 due to budget limitations; however, any process related findings that arise through our analysis of the program materials, databases or comparisons between treatment and control groups will be shared in our write-up.

## **5.4 TASKS**

### **5.4.1 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:** April 2012

## 5.4.2 STAKEHOLDER INTERVIEWS

We will conduct one-on-one phone interviews with key program staff from Ameren Illinois as well as from OPower. The purpose of these interviews was 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:** April 2012

## 5.4.3 COMPARISON OF TREATMENT AND CONTROL GROUP

In some past studies, the comparison groups selected by the implementation team have not reflected a population that is comparable to the treatment group. As part of this effort, Opinion Dynamics will evaluate the comparability of the treatment and control groups. This analysis will entail statistical comparison of baseline household energy consumption, 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. Some sample data points of interest are detailed below.

### 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

Building Square Footage	Year Built
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### Psychographic characteristics

Behavior bank (Social causes and concerns – Environment)	Behavior bank (Computers - Internet/Online subscriber or Use Internet Services)
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**Deliverable:** Initial Data Requests

**Deliverable Date:** May 2012

**Deliverable:** Initial Analysis to help with Sampling for Billing Analysis **Deliverable Date:** June 2012

## 5.4.4 BILLING ANALYSIS

Similar to PY3, the objective of the billing analysis will be to estimate the Home Energy Report program electricity and gas savings in PY4. The analysis for this program will focus on the period

from June 2011 through May 2012, i.e., the PY4 period. Note, however, that 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 timeframe to help contextualize our findings.

The evaluation team will use an approach in PY4 that is consistent with the PY3 approach. The savings will be estimated using 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.<sup>11</sup> 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 PY4 analysis will be June 2011 to May 2012.

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:

- $\alpha_i$  = home intercept corresponding to non-weather sensitive average daily consumption
- POST = indicator variable for whether the period is pre- or post-treatment.<sup>12</sup> 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)
- $\mu_{my}$  = month-by-year fixed effects intended to capture weather and other effects on consumption specific to the month<sup>13</sup>
- $\varepsilon_{it}$  = error term for customer *i* in month *t*

The coefficient  $\beta_1$  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  $\beta_2$

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<sup>11</sup> We also performed an unconditional analysis for comparison purposes and included the results in Appendix A.

<sup>13</sup> 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.

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.<sup>14</sup>

**Deliverable:** Data Request with Complete Billing Data

**Deliverable Date:** July 2012

## 5.4.5 DATABASE CROSS CHECK

The Home Energy Report 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 CFLs. Savings from measures that were rebated through Ameren Illinois' energy-efficiency programs are counted in both the Home Energy Report program and the rebate programs, and thus are double-counted. In this task, we will estimate the amount of Home Energy Report program gas and electric savings that were counted in other Ameren Illinois rebate programs using tracking data provided by Ameren.

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 between the groups in the installation of Measure A can be attributed to the behavioral program.

For this analysis, the period of analysis will be from June 2011 through May 2012.

**Deliverable:** Data Requests

**Deliverable Date:** July 2012

## 5.4.6 REPORTING

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

**Deliverable:** Draft and final reports

**Deliverable Date:** September-October 2012

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<sup>14</sup> 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:

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

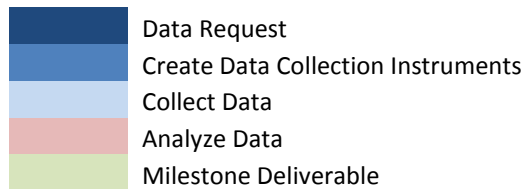
where  $p$  indexes the month number in the post-period for a building,  $p=1, 2, \dots, P$  and all of the other variables are defined as before. In this framework, the average program savings in a home in month  $p$  in the post period equals: Average monthly savings in post-period month 1 =  $\beta_2$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

## 5.5 BUDGET AND SCHEDULE

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

**Table 9. Behavioral Modification Program Evaluation Tasks Schedule**

Task	Evaluation Task	2012									
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
5.4.1	Review Program Materials				■	■					
5.4.2	Stakeholder Interviews				■	■					
5.4.3	Comparison of Treatment and Control					■	■				
5.4.4	Billing Analysis							■	■	■	
5.4.5	Database Cross Check								■	■	
5.4.6	Reporting										■



The table below outlines the evaluation budget for each task.

**Table 10. Behavioral Modification Program Internal Evaluation Budget**

Task	Description	Deliverable Date	Dollars by Task
Task 5.4.1	Program Materials Review	April 2012	\$3,000
Task 5.4.2	Stakeholder Interviews	April 2012	\$2,000
Task 5.4.3	Treatment and Control Comparison Effort	May-June 2012	\$12,500
Task 5.4.4	Billing Analyses (gas and electric) – not that this will include flags for the different participant groups	July 2012	\$35,000
Task 5.4.5	Database Cross Check	July 2012	\$12,500
Task 5.4.6	Reporting	September-October 2012	\$15,000
	<b>Total Dollars</b>		<b>\$80,000</b>



## **6. RESIDENTIAL PORTFOLIO – HOME ENERGY PERFORMANCE & ELECTRIC SPACE HEAT PILOT PROGRAM**

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### **6.1 PROGRAM DESCRIPTION**

#### **6.1.1 HOME ENERGY PERFORMANCE PROGRAM**

The Home Energy Performance (HEP) Program is a home diagnostic and improvement program offered to Ameren’s residential customers. The program offers audits, direct install measures, and incentives for additional energy efficiency opportunities identified through the audits. The program, implemented by Conservation Services Group (CSG), conducts an “HEP Audit” of participant homes, and installs instant savings measures (ISMs) such as Compact Fluorescent Lamps (CFLs) and Domestic Hot Water (DHW) measures (faucet aerators, low-flow showerheads, and water heater pipe insulation). Throughout the HEP audit, auditors educate the homeowner on savings possible through shell measures such as air sealing and wall, attic, and duct sealing. Auditors also recommend HEP program allies (Ameren-approved insulation contractors) that offer incentives and can install shell measures.

The expected savings from this program is 3% of the overall portfolio of electric savings and 12% of portfolio therm savings (including both residential and commercial).

#### **6.1.2 ELECTRIC SPACE HEAT PILOT PROGRAM**

The Electric Space Heat Pilot (ESHP) is a new program in PY4. ESHP is a home diagnostic program offered to existing homes heated by electricity provided by Ameren. The program focuses on serving Ameren customers living in older homes with electric space heat. Conservation Services Group (CSG) implements the program, which provides an energy audit at no cost to targeted customers with several measures installed at the time of the audit, in addition to blower door-assisted air sealing of the home. These measures include CFLs and/or water conservation measures, depending on homeowner eligibility and permission. The auditor produces a custom report with a set of recommended energy efficiency improvements for the homeowners to install. The report refers homeowners to the HEP program insulation contractors for improvements in the building shell and/or to HVAC contractors in the HVAC program to replace older heating and cooling equipment with highly efficient HVAC systems. Customers who use program allies are eligible to apply for HEP or HVAC program insulation and air sealing incentives.

### **6.2 RESEARCH OBJECTIVES**

This section outlines the planned evaluation tasks for our PY4 assessment of the HEP and ESHP Programs. We anticipate that the PY4 evaluation of the HEP and ESHP Programs will focus on the research questions presented below in two categories: 1) impact evaluation and 2) process evaluation.

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

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

2. What is the net-to-gross ratio for the programs?
3. How many ISMs were installed as a result of the audits, and how many were removed?

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

1. Program Participation
  - a. What does customer participation look like? How many homes received audits? How many homes received shell or HVAC measures? Has participation met expectations? If not, how is it different and why?
  - b. What is the program “conversion” rate, e.g., those participants who receive an audit and install additional energy shell or HVAC measures?
  - c. What does auditor and contractor participation look like? How many are active in the program? Has participation met expectations? If not, how is it different and why?
  - d. What are some of the barriers to participation for market actors and customers? What are barriers to installation of incentivized shell or HVAC measures after receiving an audit?
  - e. Does the program outreach to customers increase awareness of the measures, as well as the benefits of those measures and of the program opportunities more generally? What is the format of the outreach? How often does the outreach occur?
2. Participant Experience and Satisfaction
  - a. Are customers and market actors satisfied with aspects of the program processes in which they have been involved?
  - b. Are customers and market actors satisfied with the participation process and program measures?
  - c. Have the program processes been clearly explained to customers and market actors?
3. Program Design and Implementation Effectiveness
  - a. Are the programs implemented according to design?
  - b. What are the program marketing and outreach efforts? Are they appropriate for the target market?
  - c. What implementation challenges have occurred in PY4 and how have they been overcome?
  - d. For HEP, have there been any changes to program design and implementation from PY3? If so, how, and why?
4. Opportunities for Program Improvement
  - a. What areas could the programs improve to increase overall effectiveness and further assist customers in achieving higher energy savings?

## **6.3      *METHODOLOGY***

Below we review the methods employed to assess the HEP and ESHP programs in PY4.

### 6.3.1 SAMPLING PLAN

For participant verification efforts, we will pull a sample that meets the industry-standard 90/10 criteria in terms of sampling error. This means that we will be 90% confident that our results are within 10% of the true value in the population. When creating samples to support gross or net impacts, we will use the estimated energy savings from the program tracking database to determine the appropriate sample size.

We will base our final sample design and sample size on a review of PY4 participation data and discussions with the implementation contractor regarding expected PY4 participation for both programs.

### 6.3.2 ANALYSIS PLAN

The HEP and ESHP evaluation will build upon previous evaluation activities for this program in program years 1 through 3.<sup>15</sup> Evaluations in PY1-PY3 included an engineering analysis of gross measure savings and secondary research to estimate the net-to-gross (NTG) ratio. The process evaluation work consisted of a participant survey and review of the program documents and processes. The evaluation team will incorporate aspects of previous evaluations, including survey questions and analysis frameworks.

We outline our analysis plan below.

### Impact Evaluation

Below we outline the impact evaluation approaches for the HEP and ESHP programs. These include the application of per-unit savings and/or engineering analysis for PY4 participants.

**Application of Per-Unit Savings/Engineering Analysis:** The evaluation team will conduct a participant verification effort for the HEP and ESHP programs by assessing measure installation through survey self report and apply the per unit savings values from the Order to installed measures and obtain gross savings. For the ESHP program, we will determine savings associated with measures installed through other ActOnEnergy programs based on the approach specified for those programs. We will conduct an engineering review for any measures that do not have a fixed value from the Order.

**Net-to-Gross Approach:** The evaluation team will field a self-report net-to-gross battery within the participant survey to program participants to determine a program-level net-to-gross ratio. The self-report method asks the customer directly about the influence of the program activities on their actions. We will base the estimates on a series of questions that explore the influence of the program in getting participants to install the energy efficient equipment and what other actions participants may have taken had the incentive not been available. We will collect data via a telephone survey. We will apply the NTGR retrospectively to PY4 HEP given that this program has

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<sup>15</sup> The evaluation tasks are similar to those employed for similar Illinois programs. In PY2, ComEd conducted an assessment of default measure impact calculations and algorithms to inform program ex-ante gross impact calculations, as well as incorporated measure installation rate, first year measure persistence, home occupancy, and partial retrofit adjustments for water savings measures to estimate refined ex-ante impact values. The evaluation team also employed a customer self-report net-to-gross method to assess savings attributable to the program.

not had an Illinois specific NTGR calculated. The Electric Space Heat Pilot program is a very small portion of the overall program and may not be continued. We will apply a deemed value of 0.80. We will work with Ameren to understand if it will continue this pilot. If so, we will develop a prospective NTGR for PY6.

In PY2, the HEP evaluation unsuccessfully attempted to analyze NTG through a participant survey. However, PY2 was a unique year where Ameren rebates were supplemented with both American Recovery and Reinvestment Act (ARRA) rebates and large federal tax incentives affecting the reliability of survey results. Since ARRA rebates have ended and federal tax incentives are much smaller, we propose revisiting this assessment in PY4 (as mentioned above). We will conduct a survey of program participants as our primary research approach; however, we will revise the NTG batteries from prior surveys to attempt to separately estimate program effects from effects of other factors such as tax incentives. We will leverage interviews with the implementation contractor and participating subcontractors to gather their perceptions on program attribution and inform the development of a program-specific NTGR.

Notably, our program impact efforts will coordinate with the HVAC program evaluation to ensure that we have an understanding of the number of participants that were channeled into these programs. This understanding will provide a framework for determining savings attributable to each program.

Further, to appropriately allocate reductions for each energy source to the gas and electric portfolios, the evaluation team will report savings by energy source, both electricity and gas. We will review program records to determine the fuel type of each participant and the gas or electric incentives available per measure to allocate energy savings appropriately for each program by participant type.

## **Process Evaluation**

Below we outline the process evaluation approaches for the HEP and ESHP programs. These include review of program materials, in-depth interviews with program staff and implementation contractors, market actor interviews, and a quantitative participant survey.

The evaluation team will conduct a detailed process evaluation that will review all program documentation and interview several program stakeholders, including program managers, implementation contractors, and participating contractors, to ensure that all aspects of the programs are working as expected.

The evaluation team will assess the HEP and ESHP program processes in PY4, by fielding a participant survey. The survey will assess process-related issues, such as customer satisfaction with program processes to inform program planning processes, barriers to adopting follow-up measures, and other key process issues, in addition to verifying measure installations and collecting net-to-gross ratios for HEP.

## **6.4 TASKS**

Below we outline the various evaluation tasks in the PY4 evaluation.

### **6.4.1 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. As part of this review, the evaluation team will also verify that data in tracking systems will support impact evaluation efforts as well as examine algorithms that generate estimated energy savings.

*Deliverable: Data Request*

*Deliverable Date: May 2012*

## **6.4.2 PROGRAM MANAGER AND IMPLEMENTER INTERVIEWS**

The evaluation team will conduct interviews with the HEP and ESHP program managers and implementation staff in PY4 to understand each program’s design, implementation, and evaluation priorities. We anticipate conducting approximately two to four interviews. In addition, we will address questions of attribution regarding tax credits and other programs that are operating in this field to develop an appropriate NTG battery for our participant survey.

*Deliverable: Draft and final interview guide*

*Deliverable Date: May 2012*

## **6.4.3 MARKET ACTOR INTERVIEWS**

The evaluation team will conduct approximately 10 to 15 in-depth interviews with a variety of market actors in PY4 and PY6. For the HEP and ESHP programs, these market actor’s include CSG auditors in the field (n=2) as well as HEP program allies who are HVAC trade allies (n~13)<sup>16</sup>. These interviews will review program implementation successes and challenges, in addition to understanding barriers to participation for both contractors and participants. We will elicit insights into program design, implementation, strengths and weaknesses, and changes from year to year. We will explore satisfaction with the trainings, program information, application processes, and the program’s impact on their businesses.

The evaluation team may also include questions within the HVAC program evaluation in-depth interview guides with HVAC contractors to elicit feedback regarding the program. In addition, we will address questions of attribution regarding tax credits and other programs that are operating in this field to develop an appropriate NTG battery for our participant survey.

*Deliverable: Draft and final interview guide*

*Deliverable Date: June 2012*

## **6.4.4 PARTICIPANT SURVEY**

The evaluation team will field a participant survey to a random sample of HEP and ESHP program participants in PY4. We plan to complete enough interviews with program participants to provide statistically valid findings regarding each program. The survey will gather information regarding awareness of the program, audit satisfaction, preferred methods for receiving energy efficiency information, actions taken, key demographics, installation of ISMs, i.e., number of measures received and installed, and net-to-gross battery to assess program attribution. For this type of analysis, we adjust the program tracking estimated value of savings based on the results of the survey.

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<sup>16</sup> Note that this will be coordinated with the Moderate Income evaluation effort.

The survey will also assess barriers to “conversion” to installation of shell measures. Typically, for these programs, many customers conduct an audit and receive ISMs, but do not follow through to install shell measures. The participant survey will assess what the so-called barriers are to conversion and what the opportunities are to overcome those barriers.

*Deliverable: Draft and final participant survey*

*Deliverable Date: June 2012*

### 6.4.5 IMPACT ANALYSIS

The evaluation team will conduct an impact analysis for the HEP and ESHP Programs for participants in PY4. For both programs, we will conduct a participant verification effort and apply the per-unit savings from the Order for gross impacts. To estimate net savings, we will incorporate a self-report method to assess net-to-gross within the participant survey described above for HEP. For ESHP, we will apply a deemed NTGR value of 0.8.

*Deliverable: Draft and Final Report*

*Deliverable Date: September-October 2012*

### 6.4.6 REPORTING

We will summarize and report data from the PY4 evaluation activities in a report that we will deliver in September 2012.

*Deliverable: Draft and final reports*

*Deliverable Date: September-October 2012*

## 6.5 TASK SCHEDULE

Table 11 provides a schedule of evaluation tasks for PY4.

**Table 11. Schedule of Evaluation Tasks**

Task	Evaluation Task	2012								
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sep
6.4.1	Program Material Review									
6.4.2	Program Manager and Implementer Interviews									
6.4.3	Market Actor Interviews									
6.4.4	Participant Survey									
6.4.5	Impact Analysis									
6.4.6	Reporting									
	Data Request									
	Create Data Collection Instruments									
	Collect Data									
	Analyze Data									
	Milestone Deliverable									

### 6.6 BUDGET AND SCHEDULE

The evaluation team will combine HEP and ESHP as well as the Moderate Income Program evaluation budgets to field the participant surveys and assess energy and demand savings impacts.

We are combining these efforts given the similarity of program implementation and delivery and our understanding of program databases. The PY4 budget for this effort is \$46,500.

**Table 12. HEP and ESHP Program Proposed Evaluation Budget, Deliverable and Due Date by Task**

Task #	Task	Due Date	Budget
6.4.1	Program Material Review	May 2012	\$2,000
6.4.2	Program Manager and Implementer Interviews	May 2012	\$4,000
6.4.3	Market Actor Interviews	June 2012	\$8,000
6.4.4	Participant Survey	June 2012	\$20,000
6.4.5	Impact Analysis	September-October 2012	\$6,000
6.4.6	Reporting	September-October 2012	\$6,500
<b>Total Dollars</b>			<b>\$46,500*</b>
*Note that this will be coordinated with the Moderate Income evaluation effort.			

# 7. RESIDENTIAL PORTFOLIO – APPLIANCE RECYCLING

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## 7.1 PROGRAM DESCRIPTION

The Appliance Recycling Program (ARP) promotes the retirement and recycling of primary and secondary inefficient refrigerators and freezers from Ameren’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 4% of the overall PY4 portfolio of electric savings and 0% of PY4 portfolio therm savings.

## 7.2 RESEARCH OBJECTIVES

For PY4, the objectives of evaluation activities are to:

1. Obtain gross and net energy savings
2. Assess customer satisfaction
3. Identify opportunities to improve the program performance

The team evaluated PY1, PY2, and PY3 of the ARP. The PY4 evaluation will build on research we conducted in previous evaluations, and we will apply updated methodologies that are in line with current best practices.

The main difference between the evaluation methodology we applied in PY1 through PY3 and the planned methodology for PY4 is the inclusion of an existing database of in situ metering data in place of data derived via Department of Energy (DOE) testing protocols.

## 7.3 METHODOLOGY

### 7.3.1 DATA SOURCES

Evaluation data for the ARP in PY4 will consist of the following primary sources:

- Telephone surveys with 140 participating customers
- Reviews of program materials and marketing documents
- In-depth interviews with program management and program administrator staff

The evaluation team will also use the following secondary source:



- Appliance metering data from 452 refrigerators and 41 freezers<sup>17</sup>.

If feasible and appropriate, the evaluation team may also include data from Commonwealth Edison’s (Com Ed’s) ongoing appliance recycling metering study, which would add over 100 additional observations to the dataset. The Com Ed data may be applicable to Ameren’s service territory due to its geographic proximity. However, Ameren allows primary units to be recycled and Com Ed does not, meaning that the characteristics and usage patterns of Com Ed’s participating appliances may differ from those of Ameren.

### 7.3.2 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 PY4, as shown in Table 13.

**Table 13. ARP PY4 Planned Participant Survey Sample Sizes**

Measure	Number of Participant Surveys
Recycled Refrigerator	70
Recycled Freezer	70

### 7.3.3 ANALYSIS PLAN

The evaluation team will conduct three major impact evaluation activities in PY4:

- Verify participation through telephone surveys
- Update per-unit gross savings estimates for use in PY6 (through regression)
- Update the NTGR

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

- Document the program design and implementation changes
- Assess customer satisfaction and customers’ reasons for participating in the ARP

### Verification

The evaluation team will verify participation with 140 telephone surveys. Through these same surveys, we will collect additional data to inform the gross savings analysis (i.e., determination of the usage patterns for the measure removed), NTGR analysis, and process evaluation. The team will verify participation through a series of program participant questions. Since the recycled

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<sup>17</sup> The evaluation team will employ an existing aggregated *in situ* metering dataset, which we compiled from four evaluations in California, Michigan, and Ontario. The utilities sponsoring those studies have agreed to make the metering data available for other evaluations, including Ameren.

appliance is not present at the participant’s home, it will not be possible to verify participation in the ARP through site visits. Therefore, telephone surveys are the best-suited method of verification.

## Impacts-Gross Savings

In PY4, the evaluation team will determine ARP gross impacts by multiplying the number of verified participants for each measure by the fixed energy savings values listed in Table 14.

**Table 14. Fixed Per-Unit Energy Savings Values for ARP**

Measure	Gross Savings (kWh)
Refrigerator pickup	1,467
Freezer pickup	1,331
Air conditioner pickup	968

The evaluation team will also perform additional impact analysis in PY4. To leverage existing data sources on appliances, and to remain consistent with current best practices as will be outlined in the forthcoming DOE Uniform Methods Project, the team will develop an *in situ*-based multivariate regression model to estimate the average unit energy consumption of participating refrigerators and freezers.

The regression analysis will inform the following evaluation elements:

- Determination of estimated per-unit energy savings
- Estimate of program gross savings.

The evaluation team will develop model coefficients using an existing aggregated *in situ* metering dataset, which we compiled from four evaluations in California and Michigan.<sup>18</sup> Collectively, these evaluations yielded a database of metered appliances which contain a wide distribution of ages, sizes, configurations, usage scenarios (primary/secondary), and climate conditions. The diverse nature of the dataset makes it an ideal secondary data source for estimating appliance recycling energy savings when utility-specific *in situ* metering is not possible.

We prefer to use *in situ* metering data when estimating energy consumption, as opposed to data based on DOE testing protocols, for two reasons:

- First, *in situ* captures the impacts of critical external factors on appliance energy use (such as door openings, unit location, and weather), which are not accounted for when relying on DOE databases.
- Second, most existing DOE databases contain estimates of energy consumption at the time appliances were manufactured, not when they were retired. As a result, we have to make and apply additional assumptions regarding appliance degradation. Conversely, *in situ* data reflects the observed usage of appliances that are actually participating in appliance

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<sup>18</sup> We conducted the evaluations that yielded these data between May 2009 and April 2011 for Consumers Energy, DTE Energy, Pacific Gas & Electric, San Diego Gas & Electric, and Southern California Edison.

recycling programs at the time of their retirement, and that were used in the homes from which they were removed.

The evaluation team will undertake a multifaceted approach to model specification, weighing the impacts of each potential independent variable's inclusion on the overall model based on a variety of criteria. This variable selection will balance the desire for a concise model with the need to include variables that might have theoretical significance.

### **Part-Use**

To adjust the average per-unit gross energy savings for refrigerators and freezers, the evaluation team will calculate and apply a part-use factor, which accounts for participating appliances that were not plugged in year-round prior to participation. We will analyze data from the participant survey to calculate part-use factors, which is an estimate of the average proportion of the year that a recycled unit was operating within the home.

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

The evaluation team will apply the NTGR framework, which means applying the PY2 NTG results (shown in the Order) to the PY4 gross savings. In addition, we will perform an NTGR analysis on freezers and refrigerators to inform the results for prospective use (i.e., PY6). We will estimate ARP freezer and refrigerator free ridership for PY6 by analyzing participant and non-participant survey data. 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 NTGR to be used in PY6 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. Thus, the program paid these participants 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 15 summarizes these scenarios.

**Table 15. 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, 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.

### Calculate Net-to-Gross

The final estimate of program-influenced savings is a combination of the gross unit savings estimate, less the savings associated with free-riders. There is no expected spillover for this program and we will make no effort to determine if the program influenced participants to perform additional energy efficient actions outside of the Ameren program. The ratio of this final net savings to the gross savings is the NTGR.

As this program has had a previous Illinois evaluation and has no program design or market changes, we will apply the NTGR found in our analysis prospectively to PY6 participants.

### Document Program Changes

The evaluation team will review program documentation, including marketing materials, implementation plans, and any additional documentation provided by Ameren or 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 PY2.

### Assess Participant and Non-Participant Feedback

The evaluation team will analyze participant and non-participant survey data to address the following questions:

- Is program marketing effective?
- What are participation motivations and barriers?
- Are the program incentives set correctly?
- Is the program process effective from a participant perspective?
- Are customer satisfaction goals being met?
- What are the program’s strengths and what are areas that could be improved?

## **7.4 TASKS**

### **7.4.1 REQUEST AND REVIEW DATA FROM UTILITY**

The evaluation team requests the following information from Ameren 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 2012*

### **7.4.2 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 2012*

### **7.4.3 PARTICIPANT SURVEYS**

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

- Develop draft telephone survey
- Obtain review and comment
- Finalize telephone survey
- Conduct telephone surveys

*Deliverable: Draft and final participant survey guide*

*Deliverable Date: June 2012*

### **7.4.4 ANALYZE DATA**

The evaluation team will do the following:

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

*Deliverable: Analysis*

*August 2012*

### **7.4.5 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 2012*

## 7.5 BUDGET AND SCHEDULE

**Table 16. ARP PY4 Evaluation Timeline**

Task	Evaluation Activity	2012									
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
7.4.1	<b>Request and review data from utility</b>										
	<b>Stakeholder Interviews</b>										
7.4.2	Create Staff and Implementer Interview Guides										
	Conduct Interviews										
	<b>Participant Survey</b>										
7.4.3	Develop Survey Instrument										
	Conduct Participant Surveys										
	<b>Analyze Data</b>										
7.4.4	Analyze participant survey data										
	Analyze participant database										
	<b>Reporting</b>										
7.4.5	Prepare Draft										
	Review with Stakeholders										

	Data Request
	Stakeholder Interviews
	Participant and Nonparticipant Surveys
	Analyze Data
	Milestone Deliverables

The table below shows the PY4 evaluation budget by task.

**Table 17. ARP PY4 Evaluation Budget**

Task	Task Description	Deliverable Date	Dollars by Task
Task 7.4.1	Request and Review Data	March 2012	\$ 3,370
Task 7.4.2	Program Manager and Implementer Interviews	March 2012	\$ 1,100
Task 7.4.3	Participant Survey	June 2012	\$ 21,730
Task 7.4.4	Analyze Data	August 2012	\$ 20,300
Task 7.4.5	Reporting	September-October	\$ 11,500
<b>Total Dollars</b>			<b>\$ 58,000</b>

## **8. RESIDENTIAL PORTFOLIO – MULTIFAMILY**

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### **8.1 PROGRAM DESCRIPTION**

The Multifamily Program encompasses three program components: common area lighting, tenant unit installations, 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 tenant unit installation focuses on the installation of measures in tenant units related to a limited number of incandescent lighting replacements and water conservation measures. The major measure portion of the program will address more expensive complex measures, such as replacing central heating units, adding insulation, and performing air sealing.

The expected savings from this program is 3% of the overall portfolio of electric savings and 2% of portfolio therm savings (including both residential and commercial).

### **8.2 RESEARCH OBJECTIVES**

The overarching research objectives for the PY4 evaluation are to:

1. Document the program's performance in PY4
2. Document any changes in program implementation compared to the PY4 implementation plan
3. Document any program changes expected in PY5
4. Determine the realized gross energy and demand savings
5. Determine the net energy and demand savings (the PY4 evaluation will build upon previous evaluation efforts by applying the fixed NTG from the order)

The PY4 impact evaluation will apply a basic level of rigor. We are planning more advanced levels of rigor for the PY5 evaluation.

### **8.3 METHODOLOGY**

#### **8.3.1 DATA SOURCES**

Data sources for the PY4 evaluation will come from:

- The program's tracking database
- The program's materials (e.g., marketing information, program information for participants, applications)
- The program management and implementation staff

#### **8.3.2 ANALYSIS PLAN**

The PY4 evaluation will consist of reviewing and analyzing the program's tracking database and applying savings estimates based on past PY1-PY3 evaluation activities. The analysis will be similar to the evaluation of the PY3 program.



The evaluation team will review the program database and program materials. The team will check the database for errors and data quality. Energy savings for each measure will be recalculated using either the deemed savings value for in-unit measures or the annual kWh savings algorithm for common area measures.

The analysis for the PY4 program will be limited given that the program will likely not substantially change from PY3. The limited budget allocated to the PY4 evaluation allows us to increase the level of rigor in PY5 and dig deeper into the program's realization rates (potentially through site visits) and update the NTGR.

## **8.4 TASKS**

### **8.4.1 REQUEST AND REVIEW DATA FROM UTILITY**

We will request the following data from the program implementers:

- The program's final PY4 database;
- The program's materials (e.g. marketing information, program information for participants, applications);
- Information gathered through the program manager interview; and
- Other sources TBD depending on whether the program has new measures in PY4 compared to previous years.

*Deliverable: Data Request*

*Deliverable Date: June 2012*

### **8.4.2 PROGRAM MANAGER AND IMPLEMENTER INTERVIEWS**

We will conduct telephone interviews with both the Ameren program manager and CSG's program manager. Topics covered will include any program design changes that were made for PY4, challenges during the implementation, and how the recommendations from previous evaluations were addressed in PY4.

*Deliverable: Draft and final interview guide*

*Deliverable Date: June 2012*

### **8.4.3 OBTAIN GROSS AND NET IMPACTS**

The application of deemed savings tasks will be conducted for PY4 by building upon 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 from Appendix A to this value for the gross impact values. We will conduct an engineering analysis for any new measures added to the program in PY4 that were not explored in previous evaluation years (i.e., not included in Appendix A). We will calculate net impacts using the NTGR shown in Appendix A as well.

*Deliverable: Analysis*

*Deliverable Date: July-August 2012*

### **8.4.4 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 2012*

## 8.5 BUDGET AND SCHEDULE

Below is the schedule for evaluation tasks.

**Table 18. Multifamily Schedule by Task**

Task	Evaluation Task	2012								
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sep
8.4.1	Request and Review Data						■			
8.4.2	Program Manager and Implementer Interviews						■	■		
8.4.4	Obtain Gross and Net Impacts							■	■	
8.4.5	Reporting									■
	Data Request									
	Create Data Collection Instruments									
	Collect Data									
	Analyze Data									
	Milestone Deliverable									

The budget for the PY4 Evaluation is \$20,000.

**Table 19. Multifamily Budget by Task**

Task	Task Description	Due Date	Dollars by Task
Task 8.4.1	Request Data from Utility	June 2012	\$1,000
Task 8.4.2	Program Manager and Implementer Interview	June 2012	\$1,000
Task 8.4.3	Obtain gross and net impacts	July-August 2012	\$10,000
Task 8.4.4	Reporting	September-October 2012	\$8,000
<b>Total Dollars</b>			<b>\$20,000</b>

## 9. RESIDENTIAL PORTFOLIO – MODERATE INCOME

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### 9.1 PROGRAM DESCRIPTION

The Moderate Income Program is a home diagnostic and whole-house retrofit program that focuses on serving Ameren customers who do not qualify for low-income weatherization assistance and 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 Ameren and owned by customers with a household income between 200% and 300% of the federal poverty level guidelines for household size. During PY4, the program will serve three geographic areas: the Peoria tri-county area, the St. Louis Metro East area, and another area yet to be determined.

Implemented by CSG, the program performs no-cost energy audits for targeted customers, with several measures installed at the time of the audit. These measures include Compact Fluorescent Lamps (CFLs) and/or water conservation savings measures. Homeowners receive a custom report with a work order of recommended energy efficiency improvements that they are encouraged to install by contracting with CSG subcontractors selected from the Home Energy Performance (HEP) and HVAC programs. The program requires customers to pay a small portion of the overall project cost and the Energy Assistance Foundation (EAF) grants funds to cover the remainder of the project cost after program incentives are applied. The program also leverages the efforts of the EAF to conduct outreach to customers, educate them on the program offerings, and channel them into Ameren's existing suite of ActOnEnergy residential programs.

The expected savings from this program is 0.4% of the overall PY4 portfolio of electric savings and 3% of PY4 portfolio therm savings.

### 9.1 RESEARCH OBJECTIVES

This section outlines the planned evaluation tasks for our PY4 assessment of the Moderate Income Program. We anticipate that the PY4 evaluation of the Moderate Income Program will focus on the research questions presented below in two categories: 1) impact evaluation and 2) process evaluation.

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

Update gross and net energy savings parameters

1. What are the gross and net energy savings impacts from the program?
2. What is the net-to-gross ratio for the program?
3. How many measures were installed as a result of the audits, and how many have been removed?

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

1. Program Participation
  - a. What does customer participation look like? How many homes received audits? How many homes received shell or HVAC measures? How effective is the program

at channeling participants into Ameren residential programs? Has participation met expectations? If not, how is it different and why?

- b. What is the program “conversion” rate, e.g., those participants who receive an audit and install additional energy shell or HVAC measures?
  - c. What does auditor and contractor participation look like? How many are active in the program? Has participation met expectations? If not, how is it different and why?
  - d. What are some of the barriers to participation for market actors and customers? What are barriers to installation of incentivized shell or HVAC measures after receiving an audit?
  - e. Does the program outreach to customers increase awareness of the measures, as well as the benefits of those measures and of the program opportunities more generally? What is the format of the outreach? How often does the outreach occur?
2. Participant Experience and Satisfaction
    - a. Are customers and market actors satisfied with aspects of the program processes in which they have been involved?
    - b. Are customers and market actors satisfied with the participation process and program measures?
    - c. Have the program processes been clearly explained to customers and market actors?
3. Program Design and Implementation Effectiveness
    - a. Is the program implemented according to design?
    - b. What are the program marketing and outreach efforts? Are they appropriate for the target market?
    - c. What implementation challenges have occurred in PY4 and how have they been overcome?
    - d. Have there been any changes to program design and implementation from PY3? If so, how, and why?
  4. Opportunities for Program Improvement
    - a. What areas could the program improve to increase its overall effectiveness and further assist customers in achieving higher energy savings?

The Moderate Income Program was in a pilot stage in PY3 and has not been evaluated. The evaluation team will build upon previous evaluation activities for the HEP program to inform evaluation activities for the Moderate Income Program.

## **9.2 METHODOLOGY**

Below we provide a review of the methods employed to assess the Moderate Income Program in PY4.

### **9.2.1 SAMPLING PLAN**

For participant verification efforts, we will pull a sample that meets the industry-standard 90/10 criteria in terms of sampling error. This means that we will be 90% confident that our results are within 10% of the true value in the population. When creating samples to support gross or net

impacts, we will use the estimated energy savings from the program tracking database to determine the appropriate sample size.

We will base our final sample design and sample size on a review of PY4 participation data and discussions with the implementation contractor regarding expected PY4 participation for both programs.

## 9.2.2 ANALYSIS PLAN

The evaluation team will conduct both an impact and process evaluation for the Moderate Income Program in PY4. We outline our analysis plan below.

### Impact Evaluation

Below we outline the impact evaluation approaches for the Moderate Income Program. These include the application of per-unit savings and/or engineering analysis for PY4 participants.

**Application of Per-Unit Savings/Engineering Analysis:** The evaluation team will conduct a participant verification effort for the Moderate Income Program by obtaining self-reported installations from participants and applying the per-unit savings values from the Order to obtain gross impacts. We will determine savings associated with measures installed through other ActOnEnergy programs based on the approach specified for those programs. The evaluation team will conduct an engineering review for any measures that do not have a fixed value.

**Net-to-Gross Approach:** The evaluation team will field a self-report net-to-gross battery within the participant survey to determine a program-level net-to-gross ratio. We will apply the ratio retrospectively to PY4 given that this program is new.

We will coordinate our program impact efforts with the HVAC and HEP program evaluations to ensure that we have an understanding of the number of participants that were channeled into these programs. This understanding will provide a framework for determining savings attributable to each program.

To appropriately allocate load reductions and measure costs for each energy source to the gas and electric portfolios, we will report measure costs and savings by energy source, both electricity and gas. We will review program records to determine the fuel type of each participant and the gas or electric incentives available per measure to allocate energy savings appropriately for each program by participant type.

### Process Evaluation

Below we outline the process evaluation approaches for the Moderate Income Program. These include review of program materials, in-depth interviews with program staff and implementation contractors, market actor interviews, and a quantitative participant survey.

The evaluation team will conduct a quantitative telephone survey of program participants and interviews with the ActOnEnergy Residential Administrator, the EAF, and participating trade allies to gather information needed for the process evaluation. These efforts will focus on the efficacy of program processes, gather feedback regarding program incentive levels and the finance options for program participants, and assess participant satisfaction and other relevant process issues. We plan to complete enough interviews with program participants to provide statistically valid findings regarding the program. Further, the participant survey will verify installation of energy savings measures installed as part of the home energy audit and subsequent shell and HVAC measures.

## **9.3 TASKS**

Below we outline the various evaluation tasks in the PY4 evaluation.

### **9.3.1 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. As part of this review, the evaluation team will also verify that data in tracking systems will support impact evaluation efforts as well as examine algorithms that generate estimated energy savings.

*Deliverable: Data Request*

*Deliverable Date: May 2012*

### **9.3.2 PROGRAM MANAGER AND IMPLEMENTER INTERVIEWS**

The evaluation team will conduct interviews with the Moderate Income Program manager and implementation staff in PY4 to understand the program’s design, implementation, and evaluation priorities. We anticipate conducting approximately two interviews.

*Deliverable: Draft and final interview guide*

*Deliverable Date: May 2012*

### **9.3.3 MARKET ACTOR INTERVIEWS**

The evaluation team will conduct approximately five to seven in-depth interviews with a variety of market actors in PY4. For the Moderate Income Program, these market actor’s include EAF subcontractors who conduct marketing and outreach as well as provide grants for the program (n=3), CSG auditors in the field (n=2), as well as HEP and HVAC program trade allies (n=5-7). Notably, there will be significant overlap with the HEP and ESHP evaluation efforts, as we will be conducting these interviews across program evaluation efforts. These interviews will review program implementation successes and challenges, in addition to understanding barriers to participation for both contractors and participants. The guides will also explore satisfaction with market actor trainings (where applicable), application processes, and the program’s impact on their businesses. The evaluation team may also include questions within the HVAC program evaluation in-depth interview guides with HVAC contractors to elicit feedback regarding the program.

*Deliverable: Draft and final interview guide*

*Deliverable Date: June 2012*

### **9.3.4 PARTICIPANT SURVEY**

The evaluation team will field a participant survey to a random sample of Moderate Income Program participants in PY4. We plan to complete enough interviews with program participants to provide statistically valid findings regarding the program. The survey will gather information regarding awareness of the program; audit satisfaction; preferred methods for receiving energy efficiency information; actions taken; key demographics; installation of measures, i.e., number of measures received and installed; and a net-to-gross battery to assess program attribution.

The survey will also assess barriers to “conversion” to installation of shell measures. Typically, for these programs, many customers conduct an audit and receive measures, but do not follow through to install shell measures. The participant survey will assess what the so-called barriers are to conversion and what the opportunities are to overcome those barriers. Further, the survey will assess the degree to which the Moderate Income Program channeled customers into Ameren’s residential suite of energy efficiency programs.

We will also review program databases to ensure that the program does not double count participants who install shell and HVAC measures within the overall energy efficiency portfolio. We plan to complete enough interviews with program participants to provide statistically valid findings regarding each program.

*Deliverable: Draft and final participant survey guide*

*Deliverable Date: June 2012*

### **9.3.5 IMPACT ANALYSIS**

The evaluation team will conduct an impact analysis for the program for participants in PY4. We will conduct a participant verification effort for the Moderate Income Program by conducting an application of per-unit savings and/or engineering analysis for PY4 participants.

To estimate net savings, we will incorporate a self-report method to assess net-to-gross within the participant survey described above.

*Deliverable: Draft and final reports*

*Deliverable Date: September-October 2012*

### **9.3.6 REPORTING**

We will summarize and report data from the PY4 evaluation activities in a report that we will deliver in September - October 2012.

*Deliverable: Draft and final reports*

*Deliverable Date: September-October 2012*

## **9.4 BUDGET AND SCHEDULE**

The evaluation team will combine the Moderate Income and HEP and ESHP program evaluation budgets to field the participant surveys and assess energy and demand savings impacts. We are combining these efforts given the similarity of program implementation and delivery and our understanding of program databases. The PY4 budget for the Moderate Income effort is \$34,500.

Table 20 provides a schedule of evaluation tasks for PY4.

**Table 20: Moderate Income Schedule of Evaluation Tasks**

Task	Evaluation Task	2012								
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sep
9.4.1	Program Material Review									
9.4.2	Program Manager and Implementer Interviews									
9.4.3	Market Actor Interviews									
9.4.4	Participant Survey									
9.4.5	Impact Analysis									
9.4.6	Reporting									
	Data Request									
	Create Data Collection Instruments									
	Collect Data									
	Analyze Data									
	Milestone Deliverable									

The evaluation team will combine Moderate Income as well as the HEP and ESHP evaluation budgets to field the participant surveys and assess energy and demand savings impacts. We are combining these efforts given the similarity of program implementation and delivery and our understanding of program databases. The PY4 budget for this effort is \$34,500.

**Table 21. Moderate Income Proposed Evaluation Budget, Deliverable, and Due Date by Task**

Task #	Task	Due Date	Budget
9.4.1	Program Material Review	May 2012	\$2,000
9.4.2	Program Manager and Implementer Interviews	May 2012	\$2,500
9.4.3	Market Actor Interviews	June 2012	\$4,000
9.4.4	Participant Survey	June 2012	\$12,000
9.4.5	Impact Analysis	September - October 2012	\$7,000
9.4.6	Reporting	September - October 2012	\$7,000
<b>Total Dollars</b>			<b>\$34,500*</b>
*Note that this effort will be coordinated with the HEP and ESHP evaluation effort.			



# 10. RESIDENTIAL PORTFOLIO – EFFICIENT PRODUCTS

## 10.1 PROGRAM DESCRIPTION

The Residential Efficient Products Program (REEP) provides rebates and in-store advertising for energy-efficient products sold at retail outlets in Ameren’s territory. Ameren 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.

Ameren’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 the consumers. This program builds on the relationships and methods used in the PY3 Lighting and Appliances Program. Marketing methods include the store POP signs, educational materials, and store education events. Ameren 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 1% of the overall PY4 portfolio of electric savings and 2% of PY4 portfolio therm savings

Table 22 summarizes the products offered through the program with their incentives and projected sales goals.

**Table 22. REEP Measures, PY4 Goals, and Incentives**

Measure	Goal PY4 (Units Sold)	Incentive
Room Air Conditioners	4,350	\$35
Air Purifiers	400	\$20
Smart Strips	2,000	\$10
Heat Pump Water Heaters	300	\$300
Programmable Thermostats	1,400	\$10
Gas Water Heaters (0.67 Energy Factor)	1,750	\$50
Gas Water Heaters (0.70 Energy Factor)	500	\$75

## 10.2 RESEARCH OBJECTIVES

The research objectives for REEP are to:

1. Calculate gross energy and demand savings

2. Identify possible market effects from the program and its progress towards market transformation
3. Assess customer satisfaction and motivations for participating
4. Assess the program net-to-gross ratio (NTGR)

This plan builds upon the work performed from PY1 through PY3 under the Lighting and Appliances Program, where we performed an engineering analysis to estimate savings for air purifiers and room air conditioners. We considered these results in setting the fixed values for these appliances in Appendix A. The other products offered through REEP that are new in PY4 also have fixed value, as shown in Appendix A.

## **10.3 METHODOLOGY**

### **10.3.1 DATA SOURCES**

Evaluation data for PY4 will consist of the following primary sources:

- Telephone surveys with 210 participating customers (30 per product)
- Program tracking database
- Reviews of program materials and marketing documents
- In-depth interviews with program management and program administrator staff

### **10.3.2 SAMPLING PLAN**

To report results at 90/10 or better for the program level for participation verification, but still have information on results at a measure level, the evaluation team plans to conduct 210 total participant surveys in PY4, yielding 90/7 at the program level and 90/18 at the individual product level. Since the participation verification value is a ratio (i.e., number of units installed divided by number of units expected to be installed), we arrived at this precision using an estimate of precision given an unknown ratio of 0.50. Experience has shown that customers typically install measures with installation verification values around 0.9 to 1.0 when they are purchasing the measures. If we find a verification rate of 0.9 from our survey, then the per-measure precision will be within 10% for the measure and lower for the program.

Our sample frame will be the list of participating customers with information showing whether they have purchased more than a single measure within REEP (or any other Ameren program). We will set quotas for each measure, and, using a simple random sample by measure, ask them about verification for up to three measures in our call. Each respondent will count towards a single measure quota, so we may end up with slightly more than 30 verification responses, depending on the number of multiple measures per respondent.

### **10.3.3 ANALYSIS PLAN**

#### **Engineering Analysis**

We will use program-tracking data from rebate applications to determine the ex ante number of units sold through the program. Our telephone survey will gather self-reported installation verification of the measure to adjust the number of units sold found in the tracking database. We

will estimate total program savings using fixed estimates for all measures in Appendix A. We will separately perform engineering analyses to estimate savings on the exact mix of sizes of products sold to inform the PY6 program savings. ENERGY STAR® or other research on typical operating characteristics will inform engineering estimates, where needed.

## NTGR Calculations

We will calculate PY4 Net impacts using the fixed NTGR from the Order. This program is new as a separate program, as Ameren implemented it for three years combined with residential lighting. While the basic program design is similar, Ameren plans to add a number of measures not previously incented. The existing program has not previously been evaluated to obtain an NTGR, and is a low level of savings across the portfolio.

We will calculate the NTGR using the participant self-report approach as outlined in the *NAPEE Handbook on DSM Evaluation*, 2007 edition, page 5-1. We base this approach on 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 survey.

Participants may not have been aware of the REEP incentive prior to their purchase. However, if the retail promotion significantly influenced their purchase, we do not consider them a free rider, since the program encourages high-efficiency products at the point of sale. We then apply a free rider score to each participant, ranging from 0 to 100%, based on their responses to a set of the survey questions. We will apply the NTGR calculated in PY4 prospectively to the PY6 program.

## Additional Considerations

If additional budget were available and the program were larger, we could obtain a higher precision on unit savings estimates by metering the energy usage of each product. However, since metering is relatively expensive and this program is comparatively small, an engineering estimate appears to be the best use of evaluation funds.

## 10.4 TASKS

### 10.4.1 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 will provide feedback on the program in March 2012 and will highlight, in a short memo, any issues or concerns that Ameren needs to address. The evaluation team will recommend appropriate corrections to ensure a successful program.

The evaluation team requests the following information from Ameren 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
  - Customer name and address
  - 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 Materials
  - Program materials
  - Marketing materials
  - Marketing calendar
  - List of participating retailers and products offered
  - Monthly activity reports from implementers
- 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 2012*

## **10.4.2 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 Ameren implementation team members) will focus on assessing the following:

- 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: April 2012*

### **10.4.3 PARTICIPANT SURVEY**

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

- Develop draft telephone survey
- Obtain review and comment
- Finalize telephone survey
- Conduct telephone survey

The evaluation team will conduct 210 participant surveys with customers who purchased program products (30 of each product type). These surveys will aid in understanding participants' motivations for purchasing the products. They will also assist in understanding how program marketing and incentives influenced participants' decision making.

Specifically, the participant surveys will address the following:

- Program awareness
- Effectiveness of program marketing
- To what degree the current incentive structure is appropriate
- Likelihood of customers taking action independently of the program (free ridership)
- Other energy-efficiency changes resulting from the program (spillover)
- Satisfaction with the product
- Overall program satisfaction

*Deliverable: Draft telephone survey*

*Date of Completion: May 2012*

*Deliverable: Final telephone survey*

*Deliverable Date: June 2012*

### **10.4.4 IMPACT ANALYSIS**

The evaluation team will do the following:

- Analyze tracking database
- Perform engineering analysis

*Complete analysis*

*Date of Completion: August 2012*

### **10.4.5 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 2012

## 10.5 BUDGET AND SCHEDULE

**Table 23. REEP Program Evaluation Tasks Schedule**

Task	Evaluation Activity	2012									
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
10.4.1	Request and review data from utility										
	<b>Stakeholder Interviews</b>										
10.4.2	Create Stakeholder Interview Guides										
	Conduct Interviews										
	<b>Participant Surveys</b>										
10.4.3	Develop Survey Instruments										
	Conduct Participant Surveys										
	<b>Analyze Data</b>										
10.4.4	Analyze participant survey data										
	Analyze participant database										
	Evaluation Binder										
	<b>Reporting</b>										
10.4.5	Prepare Draft										
	Review with Stakeholders										

■	Data Request
■	Stakeholder Interviews
■	Participant and Nonparticipant Surveys
■	Analyze Data
■	Milestone Deliverables

Table 24 outlines the evaluation budget for each task.

**Table 24. REEP Program Evaluation Budget**

Task	Task Description	Deliverable Date	Dollars by Task
Task 10.4.1	Data Review	April 2012	\$6,000
Task 10.4.2	Program Manager and Implementer Interviews	April 2012	\$2,200
Task 10.4.3	Participant Survey	May-June 2012	\$32,000
Task 10.4.4	Impact Analysis	August 2012 analysis	\$10,000
Task 10.4.5	Reporting	September-October 2012	\$24,300
<b>Total Dollars</b>			<b>\$74,500</b>

# 11. RESIDENTIAL PORTFOLIO – RESIDENTIAL ENERGY STAR NEW HOMES

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## 11.1 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 multi-family homes heated with a fuel (natural gas or electricity) provided by Ameren. In PY4 a tiered incentive structure is being introduced, 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 PY4 portfolio of electric savings and 0.2% of PY4 portfolio therm savings.

## 11.2 RESEARCH OBJECTIVES

The overarching research objectives for the PY4 evaluation are to determine the gross and net energy savings impacts from the program. The PY4 impact evaluation will apply a basic level of rigor.

## 11.3 METHODOLOGY

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

### 11.3.1 DATA SOURCES

Data sources for the PY4 evaluation will come from:

- The program's tracking database, and
- The program management and implementation staff.

### 11.3.2 ANALYSIS PLAN

The analysis for the PY4 program will be limited given that the program provides 0.1% of portfolio MWh savings and 0.2% of portfolio therms savings. The PY4 evaluation will consist of reviewing program records and confirming ex-ante savings through a limited engineering review similar to evaluation activities performed in PY3. 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.

## **11.4 TASKS**

### **11.4.1 REQUEST AND REVIEW DATA FROM UTILITY**

We will request the following data from the program implementers:

- The program's final PY4 database;
- Information gathered through the program manager interview; and
- Other sources TBD depending on whether the program has new measures in PY4 compared to previous years.

*Deliverable: Data Request*

*Deliverable Date: June 2012*

### **11.4.2 PROGRAM MANAGER AND IMPLEMENTER INTERVIEWS**

We will conduct telephone interviews with both the Ameren program manager and CSG's program manager. Topics covered include discussions regarding participant databases and ex-ante savings estimates and algorithms.

*Deliverable: Draft and final interview guide*

*Deliverable Date: June 2012*

### **11.4.3 OBTAIN GROSS AND NET IMPACTS**

The application of deemed savings task will be conducted for PY4 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 fixed NTGR from order.

*Deliverable: Draft and final reports*

*Deliverable Date: September 2012*

### **11.4.4 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 2012*

## **11.5 BUDGET AND SCHEDULE**

Below is the schedule for evaluation tasks.



**Table 25. ENERGY STAR New Homes Schedule by Task**

Task	Evaluation Task	2012			
		June	Jul	Aug	Sep
<b>11.4.1</b>	Request and Review Data				
<b>11.4.2</b>	Program Manager and Implementer Interviews				
<b>11.4.3</b>	Obtain Gross and Net Impacts				
<b>11.4.4</b>	Reporting				
	Data Request				
	Create Data Collection Instruments				
	Collect Data				
	Analyze Data				
	Milestone Deliverable				

The budget for the PY4 Evaluation is \$10,000.

**Table 26. ENERGY STAR New Homes Budget by Task**

Task	Task Description	Deliverable Date	Dollars by Task
Task 11.4.1	Request and Review Data from Utility	June 2012	\$1,000
Task 11.4.2	Program Manager and Implementer Interviews	June 2012	\$2,000
Task 11.4.3	Obtain Gross and Net Impacts	September 2012	\$5,000
Task 11.4.4	Reporting	September-October 2012	\$2,000
<b>Total Dollars</b>			<b>\$10,000</b>

## 12. COMMERCIAL PORTFOLIO – STANDARD PROGRAM

### 12.1 PROGRAM DESCRIPTION

The C&I Standard Incentive Program offers Ameren business customers fixed incentives for the installation of specific energy efficiency measures. The program covers lighting, variable frequency drives (VFDs), HVAC, refrigeration/grocery equipment, and motors. In addition, the program includes an online store available to all business customers that offers a variety of energy saving products, including Compact Fluorescent Lamps (CFLs), exit signs, and vending misers in a convenient and easy-to-use delivery mechanism. The following table summarizes program activity through January, 30, 2012.

**Table 27.C&I Standard PY4 Ex Ante Gross kWh Savings by End-Use as of 1/30/12**

Program	Projects	N	Ex Ante kWh Savings*	Ex Ante Therm Savings*	Percent of Total kWh
Standard	Standard Lighting	614	30,401,110		57%
	Standard Motor	39	20,148,165		38%
	Standard Grocery	83	1,699,281		3%
	Standard HVAC <sup>a</sup>	138	810,571	72,223	2%
	Standard Other <sup>b</sup>	20	161,942	46,627	<1%
<b>Total as of 1/30/12</b>		<b>894</b>	<b>53,221,069</b>	<b>77,936</b>	

\* Includes the following project statuses: pre-approved, under review, check queued, and check cut.

<sup>a</sup> Includes savings associated with Small Business HVAC measures.

<sup>b</sup> Standard other includes lodging, agriculture, commercial kitchen, and steam trap projects.

Overall, Ameren designed and continues to modify the Standard Program to overcome barriers related to cost, awareness/information, transaction cost, and resistance to the adoption of new, more energy-efficient technologies. The incentives offered by the program address the cost of energy efficiency improvements; the recruitment of program allies, the establishment of a formal program ally network, and the development of program materials, including applications, that are easy to understand and complete overcome the awareness barrier. Those involved in program implementation use case studies, press releases, training sessions, and webinars as mechanisms to convince potential participants of the benefits associated with removing inefficient equipment even if it is still functional.

The expected savings from this program is 21% of the overall portfolio of electric savings and 22% of portfolio therm savings (including both residential and commercial).

## **12.2 RESEARCH OBJECTIVES**

The objective of the PY4 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 the performance of newly implemented initiatives and promotional efforts designed to improve the participation process. This section outlines the planned evaluation tasks for our PY4 assessment of the program. In particular, the PY4 evaluation of the Standard Program will focus on the research questions presented below.

The impact evaluation will determine PY4 ex-post net savings for the program and compare these to PY4 goals. The PY4 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 the following process-related research questions as part of the PY4 process evaluation. We based these questions on findings from PY3 and program changes over the past year. In addition, the Standard Program shares many of these questions with the Custom Program. Following PY4 “check-in” interviews with program managers and implementers, we will prioritize our process evaluation efforts and might add topics of particular interest to program staff or drop topics not deemed a priority for PY4.

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 PY3? If so, how, why, and was this an advantageous change?
  - b. What implementation challenges have occurred in PY4 and how have they been overcome?
  - c. What program marketing and outreach efforts did the program employ in PY4? Are they appropriate for the target market?
  - d. What impact have the Energy Advisors had on raising awareness of the program and increasing participation? How do these staff members reach out to customers?
3. Participant Experience and Satisfaction
  - a. How satisfied are program allies with the participation process (e.g., application submission and approval process)?
4. Opportunities for Program Improvement
  - a. What areas could the program improve to increase its overall effectiveness and further assist customers in achieving higher energy savings?

The PY4 Standard evaluation builds upon prior evaluation efforts and responds directly to changes in the program since PY3. For example, the evaluation features interviews with Energy Advisors, who are new to the program in PY4. It also includes a follow-up survey with online store participants and a first survey effort with participants in the Direct Install initiative. Further, we will expand on our prior research with program allies and move from qualitative in-depth interviews to a quantitative survey format that will provide more rigorous feedback to the program.

## **12.3 METHODOLOGY**

Below we provide a summary of the methods planned for the PY4 Standard evaluation.

### **12.3.1 DATA SOURCES**

#### **Impact Analysis**

To estimate PY4 ex-post gross savings, 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 deemed measure level savings values as shown in Appendix A to estimate ex-post gross savings.

We plan to apply the Net to Gross Ratio (NTGR) from the current Order for this program given that the program's implementation has remained relatively consistent, as has the NTGR for this program over the past three program years.

#### **Process Analysis**

The process analysis will utilize data from three data collection methods: in-depth interviews, an Internet-based survey, and review of secondary data. In-depth interviews with Ameren and SAIC implementation staff, as well as with Energy Advisors, will provide the evaluation team with a comprehensive understanding of the program. In addition, we plan to field an Internet survey with Program Allies to gather information about their experience with the program.

### **12.3.2 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 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 enable the team to capture a sufficient number of custom projects.

## Process Analysis

The evaluation team will conduct a quantitative Internet survey with Program Allies who were part of the program ally network in PY4. We will attempt to reach all Program Allies. As a result, we will not need to sample for this effort.

### 12.3.3 ANALYSIS PLAN

The evaluation team will conduct an impact and focused process evaluation for the Standard Program in PY4. Within our process evaluation activities, such as the Program Ally survey, we will include questions to assess program ally and customer satisfaction with the processes in which they were involved. We will also summarize and report data from the PY4 Program Ally Internet survey using descriptive statistics. We outline our analysis plan below for the application of deemed savings, as well as NTG.

## Application of Deemed Savings

Prescriptive measures incented during PY4 include lighting, grocery, HVAC, motors, and other measures. In general, where available, we will apply the per-unit fixed values provided in Appendix A to estimate ex-post gross impacts. While not expected, if measures are installed during PY4 that do not have fixed per-unit values, we will perform an engineering analysis for these measures.

We will also utilize a combination of the telephone survey of program participants and site visits (see description above) to verify installed measure inventory for a sample of projects. We will use these data in conjunction with per-unit fixed values or engineering analysis to estimate ex-post gross savings. For those measures offered through the program, but installed in limited quantities (e.g., steam traps, lodging, commercial kitchen, and agriculture measures) we will not survey participants. Instead, for these few measures, the ex-post gross savings value will equal the ex-ante gross value. We believe this is the most appropriate result given the small number of projects involving these measures (representing only 3% of savings within the Standard Program) and a diversity of measure types, which does not lend itself to the generalization of results

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 Ameren. For example, the team will count gas savings associated with any gas incentive paid to a gas only customer by Ameren. 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-To-Gross

In terms of net savings, the team will apply the NTGR in the current Order for PY4. However, we will update the NTGR in PY6 using data gathered through the PY4 participant telephone survey. We will provide the results of this analysis in the PY4 report and integrate them into the PY6 NTGR.

## 12.4 TASKS

This section outlines the planned evaluation tasks for our PY4 assessment of the Standard Program. We expect some of the planned data collection activities to overlap with the Custom Program. We will therefore 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.

### 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. We requested program materials in January 2012 and will work with Ameren staff to develop an ongoing file sharing system so that we are up to date on the program’s implementation. In addition, we have already requested an extract from AIB to inform our first wave of site visit sampling. We will make subsequent requests at the close of PY4 (June 2012) and then again in July 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 Standard Summary of Expected Data Requests**

Items Requested	Timeline
Program Materials	January 2012 and Ongoing
Preliminary AIB Extract	February 2012
Year End AIB Extract	June 2012
Final AIB Extract	July/August 2012

We will use the AIB data as the sample frame for our on-site visit data collection efforts, as well as a means to identify Staffing Grant participants for our in-depth interviews.

*Deliverable: Data Requests*

*Deliverable Date: Ongoing*

### 12.4.2 PROGRAM STAFF INTERVIEWS

We will conduct interviews with Ameren and SAIC program staff to understand changes made to the program in PY4, and to 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 Direct Install initiative. In total, we expect to complete 2-3 interviews.

*Deliverables: Draft and final interview guides*

*Deliverable Date: March 2012*

### 12.4.3 ENERGY ADVISOR INTERVIEWS

We will conduct interviews with Energy Advisor staff new to the program in PY4. The interviews will focus on Energy Advisors’ perceptions of customer interest in the program, program processes for coordination between the Energy Advisors and Key Account Executive (KAE) staff, and suggestions for program improvement.

*Deliverables: Draft and final interview guides*

*Deliverable Date: April 2012*

## **12.4.4 PROGRAM ALLY INTERNET SURVEY**

The Internet survey with Ameren ActOnEnergy program allies will focus on program participation, satisfaction, and barriers to participation among eligible Ameren business customers. We will send an invitation to participate in the survey to all registered program allies, as well as follow-up reminders. We will integrate results from the survey in the draft annual report.

*Deliverables: Draft and final program ally survey instrument*

*Deliverable Date: May 2012*

## **12.4.5 CORE PROGRAM PARTICIPANT SURVEY**

The evaluation team will conduct quantitative telephone interviews with customers who have participated in the program in PY4. These interviews will focus on measure installation and NTG. 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 PY4, 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 PY3, 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: Deliverable: Draft and final participant survey guide*

*Deliverable Date: June 2012*

## **12.4.6 DIRECT INSTALL PARTICIPANT SURVEY**

We will conduct a quantitative telephone survey with customers who have participated in the Direct Install effort in PY4. The survey will focus exclusively on measure installation. The number of interviews will depend on the level of participation in PY4, but will be sufficiently large to provide 90±10 precision. For budgeting purposes, we assume that we will conduct approximately 100 interviews.

*Deliverables: Deliverable: Draft and final participant survey guide*

*Deliverable Date: June 2012*

## **12.4.7 ONLINE STORE PARTICIPANT SURVEY**

The evaluation team will conduct a quantitative Internet survey with customers who have purchased products through the online store in PY4. The survey will focus on measure installation, as well as free ridership and spillover. We will conduct the survey with a census of participating customers drawn from Ameren's database.

*Deliverables: Deliverable: Draft and final participant survey guide*

*Deliverable Date: June 2012*

## **12.4.8 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 data available through December 2011, we expect to conduct up to 40 site visits.

The team will share the site visit results with Ameren 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: August 2012*

### 12.4.9 DEEMED SAVINGS ANALYSIS

The team will apply the per-unit fixed savings values to calculate ex-post gross savings associated with the measures installed through the program. In addition, we will draw on participant survey data to verify the installed measure inventory for a sample of projects.

*Deliverable: Results provided in annual report*

*Deliverable Date: August 2012*

### 12.4.10 REPORTING

The team will provide an integrated annual evaluation report containing process and impact results for the Standard Program. The report will also include results from other programs within the C&I Portfolio.

*Deliverable: Draft and final reports*

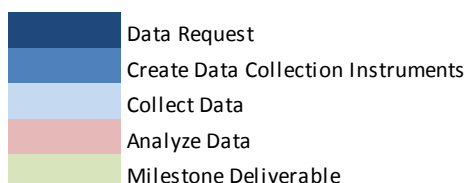
*Deliverable Date: September-October 2012*

## 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 PY4 budget for the Standard Program is \$220,000.

**Table 29. C&I Standard Evaluation Timeline**

Task	Evaluation Task	2012								
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sep
12.4.1	Review Utility Data									
12.4.2	Program Staff Interviews									
12.4.3	Energy Advisor Interviews									
12.4.4	Program Ally Internet Survey									
12.4.5	Core Program Participant Survey									
12.4.6	Direct Install Participant Survey									
12.4.7	Online Store Participant Survey									
12.4.8	Site Visits									
12.4.9	Deemed Savings Analysis									
12.4.10	Reporting									





**Table 30. Proposed C&I Standard Evaluation Budget by Task**

<b>Task</b>	<b>Task Description</b>	<b>Deliverable Date</b>	<b>Dollars by Task</b>
12.4.1	Review Utility Data	Ongoing	\$4,000
12.4.2	Program Staff Interviews	March 2012	\$7,500
12.4.3	Energy Advisor Interviews	April 2012	\$7,500
12.4.4	Program Ally Internet Survey	May 2012	\$3,000
12.4.5	Core Program Survey	June 2012	\$18,000
12.4.6	Direct Install Survey	June 2012	\$15,000
12.4.7	Online Store Survey	June 2012	\$15,000
12.4.8	Site Visits	August 2012	\$77,000
12.4.9	Deemed Savings Analysis	August 2012	\$18,000
12.4.10	Reporting	September 2012	\$55,000
<b>Total Dollars</b>			<b>\$220,000</b>

# 13. COMMERCIAL PORTFOLIO – CUSTOM PROGRAM

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## 13.1 PROGRAM DESCRIPTION

The C&I Custom Incentive Program allows Ameren 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. In general, Custom incentives are available for lighting, HVAC, refrigeration, and motors. Participants can also implement projects involving compressed air, drives, energy management systems, and industrial process measures.

Consistent with prior years, the PY4 Custom Program serves as a channel for the submission of New Construction projects, which have been limited in number over the past three program years. Beginning in PY4, Ameren business customers may also install gas measures through the program. Key gas measures include heat recovery, building shell, and process heat and steam system upgrades. Further, Ameren has introduced Energy Advisors to recruit potential participants to the program, as well as a Staffing Grant initiative to ensure that interested customers have the resources to implement projects.

Overall, Ameren designed and continues to modify the Custom Program to overcome barriers to participation such as program awareness, the application process, and corporate project approval. The company has taken specific steps to address these barriers in recent years including launching varied and innovative promotional offers such as the Early Completion Bonus and Competitive Large Project Incentive (CLPI) initiative, as well as simplifying the application form and providing access to program staff during the project development phase.

The expected savings from this program is 16% of the overall portfolio of electric savings and 16% of portfolio therm savings (including both residential and commercial).

## 13.2 RESEARCH OBJECTIVES

The objective of the PY4 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 PY4 assessment of the program. In particular, the PY4 evaluation of the Custom Program will focus on the research questions presented below.

The impact evaluation will determine PY4 ex post net savings for the program and compare these to PY4 goals. The PY4 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 the following process-related research questions as part of the PY4 process evaluation. These questions are based on findings from PY3 and program changes over the past year. In addition, many of these questions are shared with the Standard Program.

Following PY4 “check-in” interviews with program managers and implementers, we will prioritize our process evaluation efforts and might add topics of particular interest to program staff or drop topics not deemed a priority for PY4.

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? What business sectors do they work in and in what geographic areas are they based?
2. Program Design and Implementation
  - a. Has the program as implemented changed compared to PY3? If so, how, why, and was this an advantageous change?
  - b. What implementation challenges have occurred in PY4 and how have they been overcome?
  - c. What program marketing and outreach efforts did the program employ in PY4? Are they appropriate for the target market?
  - d. How effective has the Staffing Grant Initiative been in encouraging participating businesses to take additional energy saving actions outside of the Custom Program?
  - e. What impact have the Energy Advisors had on raising awareness of the program and increasing participation? How do these staff members reach out to customers?
  - f. How effective has the CLPI effort been in encouraging participation among large industrial customers?
3. Participant Experience and Satisfaction
  - a. How satisfied are program allies with the participation process (e.g., application submission and approval process)?
4. Opportunities for Program Improvement
  - a. What areas could the program improve to increase its overall effectiveness and further assist customers in achieving higher energy savings?

The PY4 Custom Program evaluation builds upon prior evaluation efforts and responds directly to changes in the program since PY3. For example, the evaluation features interviews with Energy Advisors, who are new to the program in PY4, as well as interviews with Staffing Grant participants to assess the performance of this new initiative. Further, we will expand on our prior research with program allies and move from qualitative in-depth interviews to a quantitative survey format that will provide more rigorous feedback to the program.

## **13.3 METHODOLOGY**

Below we provide a summary of the methods planned for the PY4 Custom evaluation.

## 13.3.1 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 Net-to-Gross Ratio (NTGR) from the current Order for this program given that the program's implementation has remained relatively consistent, as has its NTGR over the past three program years.

### Process Analysis

The process analysis will utilize data from three data collection methods: in-depth interviews, an Internet-based survey, and review of secondary data. In-depth interviews with Ameren and SAIC implementation staff, as well as with Energy Advisors, will provide us with a comprehensive understanding of the program. Further, interviews with Staffing Grant participants will provide insight into the performance of that initiative. In addition, we plan to field an Internet survey with Program Allies.

## 13.3.2 SAMPLING PLAN

### Impact Analysis

#### *On-Site Visits*

We will conduct a total of 60 on-site visits with separate samples for gas and electric projects as we expect this sample size is sufficient to provide  $90\pm 10$  precision for our ex post gross impact estimates. 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 PY4 (June 1 – December 31, 2011). The second wave will include projects completed between January 1 and May 31, 2012. For each wave, we will stratify the custom projects included in the Ameren project-specific tracking database (called AIB) in terms of ex ante savings, and select up to 30 projects.

As in prior years, if we determine that our site visit sample size is not sufficient to provide  $90\pm 10$  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.

## Process Analysis

The evaluation team will conduct a quantitative Internet survey with Program Allies who were part of the program ally network in PY4. We will attempt to reach all program allies. As a result, there is no sampling associated with this effort. Similarly, we will attempt to interview all of the Staffing Grant participants.

### 13.3.3 ANALYSIS PLAN

The PY4 Custom evaluation focuses on program impacts, but includes a targeted assessment of program processes. In general, we did not have to make trade-offs in allocating budget dollars to the Custom Program and have established a three-year plan to ensure that full impact and process studies take place at least once within this new program cycle.

Gross impact analysis for the Custom Program in PY4 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 which 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, licensed professional engineers.

For the 10 projects for which the team submits formal M&V plans, the each M&V plan will describe the IPMVP approach that will be used 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.

Each site visit will include 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.

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.<sup>19</sup> 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<sub>EP</sub> = the ex post<sup>20</sup> population impact

I<sub>EA</sub> = the ex ante population impact

I<sub>EPS</sub> = the ex post impact from the sample

I<sub>EAS</sub> = 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 Ameren. For example, the team will count gas savings associated with any gas incentive paid to a gas-only customer by Ameren. 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. In addition, given that Custom measures are site-specific, there are no deemed values to investigate as part of the evaluation effort.

In terms of net savings, the team will apply the NTGR in the current Order for PY4. However, we will update the NTGR in PY5 through a participant telephone survey. In addition, engineering staff will perform analysis of results from interviews with Staffing Grant participants to determine the savings associated with any spillover identified in conversations with these customers. We will provide the results of this analysis in the PY4 report and integrate them into the PY5 NTGR.

Within our process evaluation activities, such as the program ally survey and interviews with Staffing Grant participants, we will include questions to assess program ally and customer satisfaction with the processes in which they were involved. We will also summarize and report data from the PY4 Program Ally Internet survey using descriptive statistics.

## **13.4 TASKS**

This section outlines the planned evaluation tasks for our PY4 assessment of the Custom Program.

### **13.4.1 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. We requested program materials in January 2012 and will work with Ameren staff to develop an ongoing file sharing system so that we are up to date on the program's implementation. In addition, we have already requested an extract from AIB to inform our first wave of site visit sampling. We will make subsequent requests at the

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<sup>19</sup> Judith T. Lessler and William D. Kalsbeek. Nonsampling Error in Surveys. 1992. p. 269.

<sup>20</sup> Ex post refers to the estimated impact found by the evaluation team.

close of PY4 (June 2012) and then again in July 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 31. Custom Program Summary of Expected Data Requests**

Items Requested	Timeline
Program Materials	January 2012 and Ongoing
Preliminary AIB Extract	February 2012
Year End AIB Extract	June 2012
Final AIB Extract	July/August 2012

We will use the AIB data as the sample frame for our on-site visit data collection efforts, as well as a means to identify Staffing Grant participants for our in-depth interviews.

*Deliverable: Data Requests*

*Deliverable Date: Ongoing*

### **13.4.2 PROGRAM STAFF INTERVIEWS**

We will conduct interviews with Ameren and SAIC program staff to understand changes made to the program in PY4, 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 CLPI initiative. In total, we expect to complete 2-3 interviews.

*Deliverables: Draft and final interview guide  
2012*

*Deliverable Date: March*

### **13.4.3 ENERGY ADVISOR INTERVIEWS**

We will conduct interviews with Energy Advisor staff new to the program in PY4. The interviews will focus on Energy Advisors' perceptions of customer interest in the program, program processes for coordination between the Energy Advisors and Key Account Executive (KAE) staff, and suggestions for program improvement.

*Deliverables: Draft and final interview guide  
2012*

*Deliverable Date: April*

### **13.4.4 PROGRAM ALLY INTERNET SURVEY**

The Internet survey with Ameren ActOnEnergy Program Allies will focus on program participation, satisfaction, and barriers to participation among eligible Ameren business customers. We will send an invitation to participate in the survey to all registered program allies, as well as follow-up reminders. We will integrate results from the survey in the draft annual report.

*Deliverables: Draft and final program ally survey instrument*

*Deliverable Date: May 2012*

*Frequency results from Internet Survey*

*Deliverable Date: With draft report*

### **13.4.5 STAFFING GRANT PARTICIPANT INTERVIEWS**

The team will conduct interviews with Ameren customers who participated in the Staffing Grant initiative. Analyst staff will conduct the interviews, which will gather some process-related information such as satisfaction with the program offering and the ease of participation, but will focus on gathering information about spillover associated with this effort. Engineering staff will perform analysis of results from interviews with Staffing Grant participants to determine the savings associated with any spillover identified in conversations with these customers. The total number of interviews will depend on the final number of participants. However, we generally expect to conduct 10 interviews with participants in this group.

*Deliverable: Draft and final interview guide*

*Deliverable Date: April 2012*

### **13.4.6 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 13.3.2, 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 2011, we expect to conduct up to 60 site visits. We will provide formal M&V plans outlining the onsite approach for 10 sites, likely the largest in our sample.

The team will share the site visit results with Ameren 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, the resulting realization rate, and the reasons for the realization rate. We will also hold a meeting with Ameren and their implementation team as well as the ICC to discuss the findings and answer any questions.

*Deliverable: Summary of site visit results*

*Deliverable Date: September 2012*

### **13.4.7 CUSTOM BASELINE M&V**

Given the growing interest in assessing the baseline for savings associated with high impact Custom projects, the evaluation team will perform M&V and/or conduct pre-participation meetings with Ameren on up to five large Custom projects to support discussions of the baseline. Ameren 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 now and the end of PY4. 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 Ameren implementation team around available data for baseline documentation. The team will summarize the results of this review in a separate memo to Ameren and ICC staff.

*Deliverable: Custom Baseline Memo*

*Deliverable Date: May 2012*

### 13.4.8 REPORTING

The team will provide an integrated annual evaluation report containing process and impact results for the Custom Program. The report will also include results from other programs within the C&I Portfolio.

*Deliverable: Draft and final reports*

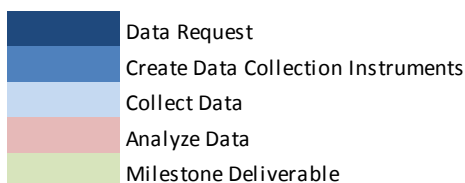
*Deliverable Date: September-October 2012*

## 13.5 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 Custom Program is \$200,000.

**Table 32. Custom Program Evaluation Timeline**

Task	Evaluation Task	2012								
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sep
13.4.1	Review Utility Data	■								
13.4.2	Program Staff Interviews			■	■					
13.4.3	Energy Advisor Interviews				■	■				
13.4.4	Program Ally Internet Survey					■	■	■		
13.4.5	Staffing Grant Participant Interviews				■		■			
13.4.6	Site Visits					■	■	■	■	■
13.4.7	Custom Baseline M&V			■	■	■				
13.4.8	Reporting									■



**Table 33. Custom Program Evaluation Budget by Task**

Task*	Task	Deliverable Date	Dollars by Task
13.4.1	Review Utility Data	Ongoing	\$4,000
13.4.2	Program Staff Interviews	March 2012	\$2,000
13.4.3	Energy Advisor Interviews	April 2012	\$2,000
13.4.4	Program Ally Internet Survey	May 2012	\$2,500
13.4.5	Staffing Grant Participant Interviews	April 2012	\$18,000
13.4.6	Site Visits	September 2012	\$110,000
13.4.7	Custom Baseline M&V	May 2012	\$18,000
13.4.8	Reporting	September-October 2012	\$43,500
<b>Total Dollars</b>			<b>\$200,000</b>

\*Note: Tasks 13.4.3 and 13.4.4 occur jointly with the Standard Program where most of the budget is captured.

# 14. COMMERCIAL PORTFOLIO – RETRO-COMMISSIONING PROGRAM

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## 14.1 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 Ameren 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 Ameren service territory.

The current Ameren Retro-Commissioning Program focuses on large industrial compressed air systems and the healthcare (hospitals, medical office buildings, and skilled nursing facilities) market segments. One large commercial office building also participated in the PY4 program.

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 will publicize the benefits of retro-commissioning to foster a market for the services, with utility-certified service providers providing the marketing outreach to customers and the services for successful retro-commissioning. Ameren incentives will pay for 50-80% of the study cost, and early implementation bonuses – paid on a per-kWh saved basis – will encourage implementation of recommendations prior to the end of the program year.

The expected savings from this program is 8% of the overall PY4 portfolio of electric savings and 2% of PY4 portfolio therm savings.

## 14.2 RESEARCH OBJECTIVES

The objective of the PY4 Retro-Commissioning 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. This section outlines the planned evaluation tasks for our PY4 assessment of the program.

The evaluation will answer the following research questions through the PY4 impact evaluation:

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

We will 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 customer and/or service providers and review of new trend data. The evaluation team will also conduct on-site measurement and verification for selected sites in the impact sample where measures are complex or savings is exceptionally high.

The PY4 impact evaluation will not address net savings, free-ridership or spillover. We will apply the net-to-gross ratio fixed value per the order to estimate net program savings. Net-to-gross will be addressed in the PY5 evaluation.

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 Retro-Commissioning Service Provider (RSP) participation look like? How many RSPs are actively participating in both the Compressed Air 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 PY3? If so, how, why, and was this an advantageous change?
  - b. What implementation challenges have occurred in PY4 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?

## **14.3 METHODOLOGY**

### **14.3.1 DATA SOURCES**

We will use the following data sources in the evaluation.

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

## 14.3.2 SAMPLING PLAN

### Impact Analysis

For the impact evaluation, we will sample the participants to achieve several goals: the required 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 stratification 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 (often a census) 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).

### Process Analysis

For the process interviews, we will attempt a census of program managers and implementers to understand the differences in program delivery to different market segments.

## 14.3.3 ANALYSIS PLAN

The PY4 Retro-Commissioning Program evaluation focuses on program impacts. This focus complements the process evaluation conducted in PY3 and utilizes available budget to the best effect. The three-year evaluation plan for this program projects alternating focus between program processes (with NTG) and program impacts with the most significant impact effort occurring in PY6. In this manner, the evaluation budget will ensure a complete look at the program every two-year cycle. In PY5, a planned process-focus year, we will conduct file reviews for measure verification, but limit impact research.

Analysis for the PY4 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) and demand (kW) and gas consumption (MMBtu) – individually at the project-level.

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, the DCEO, and natural gas utilities use this same methodology for their retro-commissioning programs.

We will base gross impact analysis for the Retro-Commissioning Program in PY4 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 method.<sup>21</sup> The team will use the following algorithm to extrapolate to the population.

**Figure 3. Retro-Commissioning Program - Ratio Adjustment Algorithm**

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

Where

$I_{EP}$  = the ex post<sup>22</sup> 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

Assuming that costs are adequately reported at the measure level, measure costs and savings will be reported by energy source: both electricity and gas. Where the same measure saves both gas and electricity, we will allocate costs based on site MMBtu saved.

Since retro-commissioning measures are very site-specific (custom), there are no deemed values to investigate. Due to budget constraints there will be no NTG research in PY4. The PY5 evaluation will update NTG questions and will devote fewer resources to the gross impact evaluation. Since we will not be conducting customer surveys for the process evaluation, PY4 results will not contain customer satisfaction metrics.

## 14.4 TASKS

This section outlines the planned evaluation tasks for our PY4 assessment of the Retro-Commissioning Program.

### 14.4.1 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 marketing materials, training materials, and schedules for service

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<sup>21</sup> Judith T. Lessler and William D. Kalsbeek. Nonsampling Error in Surveys. 1992. p. 269.

<sup>22</sup> Ex post refers to the estimated impact found by the evaluation team.

providers, as well as goals for the retro-commissioning program and all Business Programs. These data will support the limited process review in PY4.

For the impact evaluation, 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 sent at the end of March 2012 and mid-June 2012 when program year participation is complete and verified by Ameren.

We will also need project files for each of the retro-commissioning projects to be completed in PY4. These files should include preliminary reports, the retro-commissioning report that describes the project and details the recommended measures, and the final 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: Process Data Request*

*Deliverable Date: March 2012*

*Deliverable: Process Data Review*

*Deliverable Date: March 2012*

*Deliverable: Impact Data Requests*

*Deliverable Date: ongoing – final June 2012*

## **14.4.2 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 PY4. Following review of program materials, we will prepare and implement the interview instruments in March 2012.

*Deliverable: Draft and final interview guide*

*Deliverable Date: March 2012*

## **14.4.3 DETAILED ENGINEERING REVIEW**

The evaluation team will establish the final impact sample in mid-May 2012 based on the latest program tracking data. For each sampled project, we will request project data as described in Task 14.4.2 above. Detailed review will follow upon receipt of the project files. Review will include verification of calculation methods and input data and review of implementation records and costs. Up to 16 sites will receive detailed engineering review.

*Deliverable: Review only ex post savings estimates*

*Deliverable Date: September 2012*

## **14.4.4 REPORTING**

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

*Deliverable: Draft and final reports*

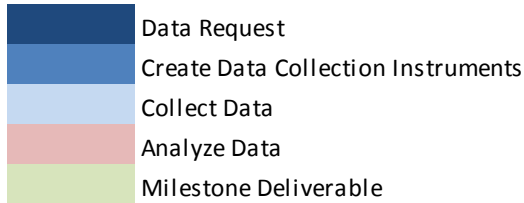
*Deliverable Date: September-October 2012*

## **14.5 BUDGET AND SCHEDULE**

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

**Table 34. Retro-Commissioning Schedule by Task**

Task	Evaluation Task	2012								
		Jan	Feb	Mar	April	May	June	Jul	Aug	Sep
14.4.1	Data Request and Review									
14.4.2	In-Depth Interviews									
14.4.3	Detailed Engineering Review									
14.4.4	Reporting									



**Table 35. Retro-Commissioning Budget and Deliverable Dates by Task**

Task ID	Task	Deliverable Date	Total
14.4.1	Data Request & Review	March 2012	\$3,000
14.4.2	In-depth Process Interviews	March 2012	\$12,000
14.4.3	Detailed Engineering Review	September 2012	\$37,000
14.4.4	Reporting	September/October 2012	\$16,000
<b>Total Dollars</b>			<b>\$68,000</b>



## **15. COMMERCIAL PORTFOLIO – NEW CONSTRUCTION PROGRAM**

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We do not plan to evaluate the New Construction Program in PY4. Please see the Three-Year Evaluation Plan for information regarding our approach for this program in PY5 and PY6.

# 16. OTHER EVALUATION ACTIVITIES

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## 16.1 STATEWIDE TECHNICAL REFERENCE MANUAL

One of the critical activities occurring during the PY4 evaluation cycle is the development of an Illinois Statewide Technical Reference Manual (TRM). The Vermont Energy Investment Corporation (VEIC) leads this work on behalf of the Illinois Energy Association as ordered by the ICC.<sup>23</sup> Ameren is required to participate in the process as ordered by the ICC. In support of Ameren's efforts to participate, the evaluation team will review all documents and measure protocols submitted to the Stakeholder Advisory Group (SAG) by VEIC, and, as necessary, comments will be provided on behalf of Ameren. The goal of the review and comment process will be to ensure the savings and measures included in the statewide TRM adequately reflect Ameren's programs and measures. In order to provide timely review, our evaluation team began this effort in late December 2011.

There are three levels of rigor that we will apply to the review process. The specific level will depend on the potential impact of the measure, with higher impact measures reviewed with more rigor.

The basic level of rigor entails doing a minimal review with the goal of verifying the reliability of the algorithms and measure descriptions only. This must be the fundamental part of any TRM review to ensure algorithms actually represent the measures they are intended to represent. This review does not look at the reasonableness of savings and default values for variables however. The goal of the basic review is to ensure measure descriptions place the proper boundary conditions on the measure and that algorithms are technically correct.

The medium rigor review takes this one-step further and attempts to confirm the reasonableness of savings estimates for Ameren's programs. Here we review the variable defaults and deemed savings estimated through the measure characterizations and ask if they adequately represent what is actually occurring in Ameren's territory and programs. An example of this would be to compare the default C&I lighting HOU to the evaluation findings from Ameren's C&I Lighting program. If we find significant differences, we would provide comments to VEIC. The medium level of rigor will compare Ameren specific information as much as possible, and otherwise will look to secondary data sources. Where secondary sources are used, we will review whether the estimates are likely to apply without adjustment. If adjustments are required, we will determine if the TRM provides an adequate adjustment.

The high level of rigor includes all the activities described in the basic and medium rigor reviews and adds a review of all sources referenced in the TRM. For example, if the TRM references a Department of Energy (DOE) paper for measure efficiency, we would review that paper to ensure that it was interpreted correctly and that the efficiencies were correctly applied in the TRM.

For a majority of the high impact measure reviews we plan to follow the medium level of rigor and provide comments as appropriate. Because of the importance of these measures, it is worth the extra effort and cost to ensure these measures adequately reflect Ameren specific savings. The added cost of the high level of rigor is generally not necessary. We will only review original references if we expect an inappropriate application or use of the reference. This is not common, but may be warranted from time to time.

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<sup>23</sup> We will confirm that this is the correct sponsor.

For the low-impact measures, we plan to follow the basic level of rigor for the most part, but we will review reasonableness of default variables and savings estimates based on our experience. We will typically not spend additional time reviewing Ameren evaluation reports for these measures because their small impact does not justify the added cost to do so. Because of low participation rates in the low impact measures the average true savings within an individual program and program year are not typically represented well using the TRM values. When compared over multiple program years and across utilities, however, default TRM values can reliably represent the average savings for the measures. It is because of this that evaluation findings from one program year for low impact measures should be considered as one piece of information when updating the TRM, but not as the only driving force for updating a measure.

The deliverables for this effort will be comments uploaded to the VEIC Illinois TRM SharePoint site for each document submitted by VEIC for review. We will also keep a tracking log of when comments have been submitted and a summary of the key comments.<sup>24</sup>

## **16.2 EVALUABILITY/PROGRAM TRACKING ASSESSMENT**

The evaluation team will provide an evaluability assessment of the residential program tracking database, building on our knowledge of PY1-PY3 programs and our evaluation recommendations for improved data tracking. This effort will occur in the Spring of 2012. In PY3, Cadmus made several recommendations for improved data tracking in the following programs:

- **Lighting & Appliances**
  - Add the expected ex ante values into gross and net kW fields,
  - Round ex ante savings values consistently,
  - Include per unit energy and incentives estimates and the formulas used to calculate savings in the database,
  - Incorporate most recent evaluated savings into the ex ante estimates for the following program year, and
  - Include appliance-specific size information in tracking database.
- **HVAC**
  - Update ex ante savings estimates in the database.
  - Make changes to integrate gas and electric rebate applications and link gas and electric customer account information.
  - Collect more information on existing and new equipment including make and model information, and any backup heating and cooling sources.

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<sup>24</sup> As of March 2012, we have reviewed close to 50 measures and several overarching documents.

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- Integrate and standardize the new database platform to ensure inconsistent measure details are tracked.

We will request and review PY4 database excerpts for each of the programs and consider our planned evaluation approaches for program years 4 through 6 to ensure adequate information is collected to inform the evaluations in each year. We will review Ameren’s responses to the above recommendations from the PY3 evaluation. We will summarize our findings in a memo that details any areas where data is not tracked sufficiently, where there are missing entries, and where there are variables that are not needed.

### 16.3 COST EFFECTIVENESS ANALYSIS

For PY4-PY6, the evaluation team will work with Ameren as needed to either perform or 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 either review or incorporate Ameren’s assumptions for avoided costs, discount rates, measure cost information, administrative costs, and other relevant data. We will then calculate and compare and/or report the cost-effectiveness of all programs individually as well as for the portfolio as a whole using the ex-post gross savings and actual incurred plan implementation costs.

We will summarize results of the cost-effectiveness analysis into an annual report.

#### 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

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

and

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

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. 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 Ameren 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 Ameren pays the incentive, it receives fuel-specific saving credit. For example, Ameren electric only customers get electric incentives and electric savings are estimated and assigned to Ameren.
- **Dual fuel customers.** As the table shows, for measures paid for by an electric incentive that also have gas savings (such as insulation), Ameren can claim savings for both electricity and therms. Similarly, if gas measures also have electric savings, Ameren can claim both fuel savings.

**Table 36. Savings by Fuel Type**

Type of Account with Ameren	Electric Measure		Gas Measure	
	Incentive Paid	Accrue Electric Savings	Incentive Paid	Accrue Therm Savings
Electric Only	Yes	Yes	No	No
Gas Only	No	No	Yes	Yes
Both Electric and Gas	Yes	Yes	No	Yes
	No	Yes	Yes	Yes

For purposes of conducting cost-effectiveness analysis, we propose to assign the cost to the primary fuel targeted. The primary fuel incentive needs to be cost-effective against the primary fuel savings.

## 16.4 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. Ridge will be filling a unique and defined role within this evaluation. Each year 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 October 2012 for PY4 activities.

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

**Table 37. Summary of Other Evaluation Activity Budgets**

Task	Total
TRM	\$125,000
Evaluability Assessment	\$20,000
TRC	\$62,000
QA/QC	\$24,000
<b>Total</b>	<b>\$231,000</b>

## 17. 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 Ameren, the ICC, the SAG, 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 Ameren and Commission Staff. These calls are designed to keep the Ameren project manager and the Commission 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 Ameren.

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 PY4 evaluation in Table 38.

**Table 38. Schedule of PY4 Deliverables**

Deliverable	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Progress Report		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Draft 3 Year Work Plan			◆									
Draft PY4 Work Plan			◆									
Final 3 Year Work Plan				◆								
Final PY4 Work Plan				◆								
Q1 Expenditure Report				◆								
Q2 Expenditure Report							◆					
Q3 Expenditure Report										◆		
Draft PY4 Report									◆			
Final PY4 Report										◆		
PY4 EM&V QA/QC Report											◆	

Deliverable	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PY4 TRC Analysis												◆

## 17.1 EVALUATION BINDERS

In addition to the deliverables described above, we will provide evaluation binders each year for the analysis that occurred in that year. While our contract requires this only once at the end of the three year period, we know from experience that unless we create the evaluation flow and pull all the data together shortly after analysis, it becomes increasingly difficult to do well. We will provide the following information for each program:

- Raw and final datasets with identifying information redacted. These files are expected to be in Excel, SPSS, or Stata format.
- 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.

We expect that the data required through this task is specific to impacts only. As such, we will provide data supporting gross and net impacts, but not datasets associated with any process efforts.

In the table below, we describe the project management and planning budgets for PY4.

**Table 39. Summary of Program Management and Planning Budgets**

Task	Total
Project Management	\$82,942
Collaborate with IL Utilities	\$10,000
Commission Staff Requests	\$10,000
SAG	\$10,000
Ameren Coordination/Program Design	\$10,000
Legal/Docket (providing documentation through evaluation binder)	\$10,000
<b>Total Project Management</b>	<b>\$132,942</b>
<b>Planning</b>	<b>\$60,000</b>



## **A. APPENDIX - PER-UNIT FIXED VALUES**

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The embedded files contain the agreed fixed values for the residential and commercial portfolios.



AIC PY4 RES Measure  
Values.xlsx



AIC PY4 BUS  
Measure Values.xlsx

## B. APPENDIX - EVALUATION NOTES ON ICC LIGHTING REQUESTS

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Upstream programs like lighting can be challenging to evaluate because we do not have records of the actual customers who purchased products through the program. We cannot as easily conduct participant surveys to evaluate program net-to-gross and the effectiveness of program processes. The planned analyses make use of sound and defensible research practices to address both this challenge and the requirements of our research efforts.

Despite the lack of participant data, telephone surveys of customers are still often used to estimate CFL usage and identify program participants for the calculation of free ridership and spillover. These surveys are often the most cost-effective way to collect data when other options are unavailable. However, they have been shown to suffer from measurement error when self-reports are compared to what customers actually have installed in their homes. Given the number of bulbs in a home and the small size of most lighting purchases, it is not surprising that people have difficulty accurately answering these survey questions.

An alternative to telephone surveys with respondents who *might* be program participants are in-store interviews with *actual* customers purchasing program lighting. The Opinion Dynamics team is proposing to conduct intercepts with customers to determine free-ridership, and in-home lighting inventories to gather information on spillover. The research from these two efforts will be combined to provide insights on the program, as well as to define a new NTG ratio for future program efforts. (Notably, this may be revisited in later years as necessary. Any future research would be discussed and approved by Ameren and the ICC.) Below we discuss the timing of these efforts and how they would be used.

### Timing of Our Net-to-Gross Analysis

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. We understand that part of the 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. Because the EISA changes took place mid-program year for PY4, we will review the results and make a recommendation as to whether to develop a two-part NTGR for lighting (i.e., NTGR from the order for program sales from June through December 2011 and the NTGR resulting from our customer intercepts for sales from January through May 2012). Our recommendation will be data driven based on our review of the market.

As recommended by our QA/QC consultant, we are documenting our independent opinions to ensure transparency in the planning process. 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 of 2012 Rather than Spring of 2012 for Customer Intercept***

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 only ban sales of imported traditional 100-watt incandescent bulbs, so products that are already in the U.S. can still 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 on stores' lighting inventory. 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.