



Ameren Illinois

**Demand Side Management Market Potential Study:
Volume 2 – Market Research Report**

Final Report

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Introduction and Market Research Highlights

Ameren Illinois (AIC) selected Applied Energy Group (AEG) to conduct a Demand Side Management (DSM) Market Potential Study to assess various categories of electric and natural gas energy efficiency potential in the residential, commercial, industrial and street lighting sectors of the Ameren Illinois service territory. The key objectives of the study were to:

- Satisfy the legislative requirement to provide an electric potential study with the IPA incremental savings filing that is no less than 3 years old (last one completed in 2014). Ameren Illinois chose to include natural gas as well.
- Estimate demand-side savings associated with traditional end-use energy efficiency measures, behavioral measures, and combined heat and power (CHP) measures.
- Provide support for the development of an integrated gas and electric Cycle 4 (2017-2020) Plan.
- Update market research to provide insights and enhance the planning representations of customers in the AIC service territory.

The study assessed various tiers of energy efficiency potential including technical, economic, maximum achievable and realistic achievable potential. The baseline estimates were updated with the latest information on federal, state, and local codes and standards for improving energy efficiency. The study consisted of three primary components: market research, a full energy efficiency potential analysis at the measure and program levels, and estimation of supply curves.

The AEG team conducted primary market research to collect data for the Ameren Illinois service territory. The objectives of this research were to

- Understand how customers make decisions related to their energy use and energy efficiency investment decision
- Update key saturation information that was likely to have changed since the previous study

Ameren Illinois will use the results of DSM Market Potential Study in its Demand Side Management (DSM) planning process to optimally implement energy efficiency related savings programs.

Report Organization

This report is presented in four volumes as outlined below. **This document is Volume 2: Market Research Report.**

- Volume 1, Executive Summary
- Volume 2, Market Research Report
- Volume 3, Energy Efficiency Potential Analysis
- Volume 4, Appendices

Abbreviations and Acronyms

Throughout the report we use several abbreviations and acronyms. The table below shows the abbreviation or acronym, along with an explanation.

Table 1-1 Explanation of Abbreviations and Acronyms

Acronym	Explanation
ACS	American Community Survey
AEO	Annual Energy Outlook forecast developed by EIA
BenCost	AEG's Program Design & Cost-Effectiveness tool for Program-Level Analysis
B/C Ratio	Benefit to Cost Ratio
BEST	AEG's Building Energy Simulation Tool
C&I	Commercial and Industrial
CAC	Central Air Conditioning
CFL	Compact Fluorescent Lamp
DEEM	AEG's Database of Energy Efficiency Measures
DSM	Demand Side Management
EE	Energy Efficiency
EIA	Energy Information Administration
EUL	Estimated Useful Life
EUI	Energy Usage Intensity
GW, GWh	Gigawatt, Gigawatt hour
HH	Household
HVAC	Heating Ventilation and Air Conditioning
kW, kWh	Kilowatt, Kilowatt hour
LED	Light emitting diode lamp
LoadMAP	AEG's Load Management Analysis & Planning™ tool for Measure-Level Analysis
MW, MWh	Megawatt, Megawatt hour
MMtherms	Million therm
NPV	Net Present Value
O&M	Operations and Maintenance
PCT	Participant Cost Test
RIM	Ratepayer Impact Measure
RTU	Rooftop Unit
SAG	Illinois' Stakeholder Advisory Group
SqFt	Square Feet
TRC	Total Resource Cost Test
TRM	Technical Reference Manual
UCT	Utility Cost Test
UEC	Unit Energy Consumption

Market Research Highlights

The market research described in this report was conducted as part of Ameren Illinois' DSM Market Potential Study. The focus of that research was to support the estimation of both Realistic and Maximum Achievable Potential accounting for likely customer adoption of a variety of DSM measures for each customer segment.

Surveys of Ameren Illinois customers were conducted that collected end-use saturation data, customer demographics and psychographic information. The following broad categories of questions were included in the surveys:

1. What energy using equipment is already present in customers' homes and businesses?
2. How likely are customers to participate in various electric- or natural gas-related energy efficiency programs Ameren Illinois is considering offering?
3. Which energy efficiency measures offer the highest likely participation rates?
4. How does likelihood to participate differ by payback period for customers?
5. What overall demographic and psychographic characteristics correspond to a higher likelihood to participate in energy efficiency programs?

Separate surveys were used for residential and business customers. The survey methodology and number of completed questionnaires for each population are summarized in the table below.

Table 1-2 Summary of Survey Fielding Strategy

Customer Class	Survey Strategy	Number of Surveys Completed
Residential	Mailed postcard with referral to web survey	1,004
Business	Mailed postcard with referral to web survey	798
Very Large Business	Onsite surveys and telephone interviews	50

Key, high-level findings are summarized below.

Residential Customer Profiles

A primary objective of the customer surveys was to develop energy market profiles that describe how customers use energy in the base year (2014). Detailed residential market profiles are presented in Volume 4, Appendix A. In this report, residential saturation results are presented at a high-level.

Besides the information provided in the detailed market profiles, it is worth noting that:

- The majority of customers utilize central air conditioning to cool their homes.
- Approximately 25% of survey respondents use electricity for each space heating and water heating purposes.
- 49% of residential customers use standard or manual thermostats, 48% have a programmable thermostat, and only 2% report having a "smart" advanced learning thermostat installed.

Overall attitudes have become more positive with regard to energy efficiency and toward Ameren Illinois since the time a similar survey was conducted in 2012.

- Over three-quarters of customers (77%) give Ameren Illinois a top-three box rating on overall satisfaction, a 14% absolute gain from 2012.

- Only 34% of all residential customers are aware of AIC rebates and incentives and only 22% have used them on one or more projects.

Residential Customer Take Rates

“Take rates” represent the proportion of customers who are estimated to be likely to adopt a new higher efficiency appliance or other measure given the presence of an Ameren Illinois rebate, adjusting for the fact that customers tend to overstate their likelihood to take this action. Customers were asked about the likelihood that they would acquire a higher-than-standard efficiency option for a total of five end use measures (CFLs, HVAC, refrigerators, PCs, and advanced thermostats) at multiple payback periods (1-, 3-, and 5-year payback levels for all five measures as well as 0-year paybacks¹ for CFLs, HVAC and advanced thermostats).

Summary findings on take rates indicate that:

- Across these five end-use measures, customers are estimated to have the highest take rates for CFLs, followed closely by HVAC, refrigerators and thermostats, with PCs slightly lower.
- As anticipated, take rates are higher at 0- or 1-year payback periods than they are for 5-year payback periods, though take rates are only marginally higher at 0-year payback periods than they are for 1-year payback periods for most measures.

For example, the estimated take rate for highly efficient HVAC systems is 40% at both a 0-year and a 1-year payback, while take rates for CFLs are 44% at 0-year payback and 43% for a 1-year payback. Thermostats show the largest difference, with a take rate of 41% at a 0-year payback versus a take rate of 37% for a 1-year payback.

- Customers with higher incomes tend to have somewhat higher take rates across several measures than do those with lower incomes.
- Customers who are categorized as “most likely takers” across a range of measures tend to be more satisfied customers than are less likely takers (67% compared to 53%). They are also more likely to believe that Ameren Illinois is a credible source of information about energy efficiency and is a company that helps customers to save money.
- Unsurprisingly, customers who have highly “green” and/or have highly cost-savings-focused attitudes consistently show much higher likelihood to adopt energy efficiency measures.

Other differences also exist in take rates across various demographic groups. Groups that exhibit higher take rates, and therefore greater program opportunity than their counterparts, include:

- Males
- Those older than 35
- Those with some college or technical schooling

Business Customer Profiles

Detailed findings describing key energy characteristics of AIC’s C&I customers are provided in the market profiles in Volume 4 Appendix A. Besides the information provided in the detailed market profiles, it is worth noting that:

- The majority of commercial electricity consumption is associated with lighting and HVAC usage, and the majority of commercial natural gas consumption is associated with heating and water heating.

¹ A zero year payback corresponds to an instantaneous payback, or an incentive that is 100% of the incremental measures cost.

- About half of customers (49%) say they have done “some things” to improve the energy efficiency of their operation.
- Over two-thirds (67%) give Ameren Illinois a top-three box rating on overall satisfaction.
- Only 38% of all C&I customers are aware of rebates / incentives from Ameren Illinois, and only 28% have used them on one or more projects.

Business Customer Take Rates

“Take rates” were also developed for business customers. Again, this is the proportion of customers who are estimated to be likely to adopt a new higher efficiency appliance or other measure given the presence of an Ameren Illinois rebate. Customers were asked about the likelihood that they would acquire a higher-than-standard efficiency option for a total of eight end-use measures (CFLs, HVAC, refrigerators, computer servers, motors, advanced thermostats, energy management systems, and occupancy sensors) at multiple payback periods (1-, 3- and 5-year payback levels for all eight measures as well as 0 year paybacks for CFLs, HVAC, and advanced thermostats).

Summary findings indicate that, across these eight end use measures, customers are estimated to have the highest take rates for CFLs, followed closely by AP thermostats and HVAC units. Servers and energy management systems show the lowest take rates.

There are, of course, differences in take rates across different subgroups, and the groups that exhibit higher take rates, and therefore represent easier program opportunity than their counterparts, include:

- Organizations with 20 or more employees
- Organizations with less than 15,000 square feet
- Organizations operating in healthcare and / or lodging

Residential Research Approach and Methodology

This section outlines the approach and methodology taken for the residential market research effort, including sample design, questionnaire development, and data analysis.

Survey Approach

The sample design process began by drawing an extract of the Ameren Illinois billing data for all residential customers served during calendar year 2014. The customer list generated included detailed information for each record selected, including name, address, annual kWh usage, annual therm usage, division, account number, etc. The AEG Team processed the file to yield the universe of program-eligible households directly billed by Ameren Illinois. The steps executed are documented in Table 2-1.

Table 2-1 Ameren Illinois Residential Survey Population

	Households	% of Original Accts	Annual GWh	% of Original GWh	Annual MMtherm	% of Original MMtherm
Original AIC database	1,151,503	100.0%	10,956	100.0%	602	100%
Removed accounts with less than 9 months of data	161,901	14.1%	426	3.8%	18	2.9%
Removed premises below energy use cutoff *	29,187	2.5%	22	0.2%	0.5	0.1%
Removed top 1% of customers**	16,854	1.4%	546	4.9%	27	4.5%
Sample Frame	943,578	81.9%	9,846	89.9%	561	93.2%

* Low energy cutoff was 2,000 kWh or 200 therms annually. For customers below only one threshold, the low usage was removed, but the customer was kept as an Electric- or Gas-Only customer, as appropriate.

** High energy cutoff for the top 1% was 40 MWh or 2,200 therms annually.

The AEG Team stratified the sample frame by electricity and natural gas usage, housing type and geographic region, resulting in a final sample design of 64 separate sample cells. The target sample size of 1,000 responses, was allocated to the sample strata proportional to the number of customers in each sample cell. Survey responses were targeted and monitored at the individual stratum level. The targets and responses are presented in [Appendix A](#).

The sample design required that the survey close each of the 64 sample cells once the desired number of completes was achieved to spread out the distribution of responses and avoid over-representing any given cell. Postcard invitations with instructions on how to complete the online survey were mailed to all households at the same time. Customers were offered a \$20 check for completing the survey.

In order to qualify to complete the survey, respondents had to meet the following criteria:

- Have primary or shared responsibility for making energy-related decisions
- Be at least 18 years old
- Be billed for electricity or natural gas directly by Ameren Illinois

A total of 1,004 respondents completed the survey, yielding a 95% confidence interval of + / - 3.1% for the overall population. An additional 42 respondents attempted to complete the survey but their sample cell was already closed at the point that they attempted to complete the survey.

- Approximately 88% of those who attempted to complete the survey qualified based on the criteria above.
- The overall net response rate for the survey was 5% (total completions divided by total invitations). This is a reasonable but better-than-average response rate for surveys of this type.
- Approximately 15% of those who started the survey abandoned it before completing all of the questions.
- Average online survey length was about 28 minutes.
- The data were weighted on the basis of the original sample matrix, in order to ensure that the weighted respondent sample mapped back to the underlying residential population on electric usage, gas usage, housing type, and region.

Questionnaire

Rather than conduct two separate surveys for saturation and program interest, as was done in 2012, this study utilized a single survey to improve efficiency and make the data collection more cost-effective. The saturation questions focused primarily on areas that were most likely to have changed since 2012. The full residential questionnaire covered the following content areas:

1. Screening questions
2. Description of household structure
3. Description of major end uses in the household
4. Description of heating and cooling equipment
5. Description of lighting (bulbs and fixtures / interior and exterior)
6. Attitudes toward Ameren Illinois
7. Attitudes toward using energy
8. Attitudes toward appliance purchasing
9. Awareness of EE-related energy programs
10. EE measures implemented to-date (with a focus on lighting)
11. Demographics

A copy of the questionnaire is provided in Volume 4, Appendix D.

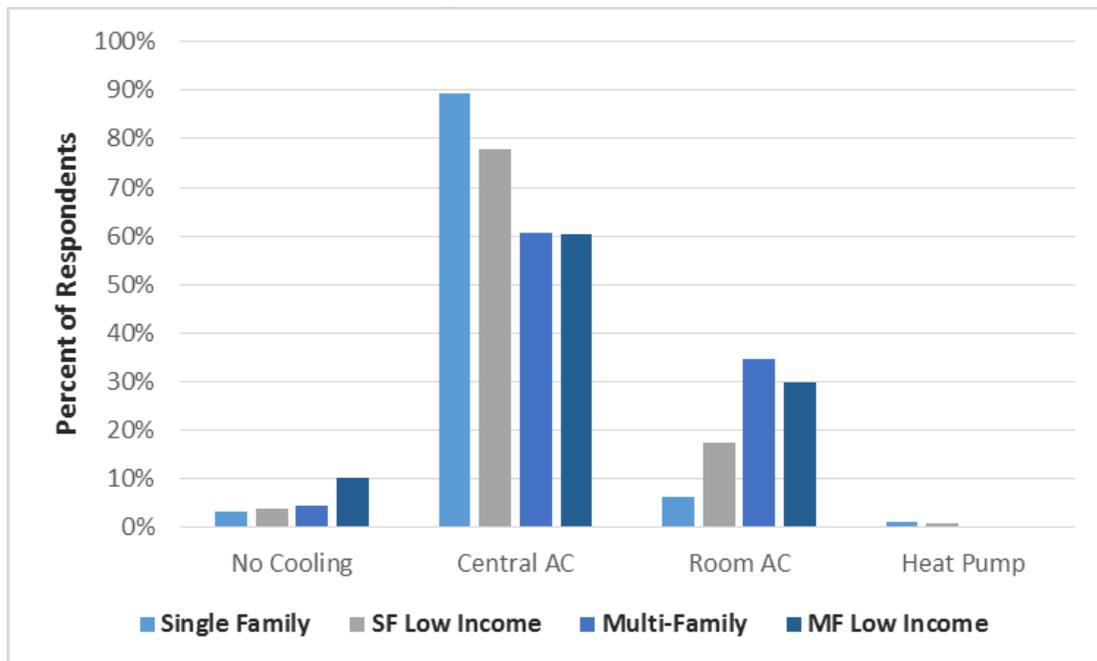
Residential Saturation Survey Results

This study used a different segmentation scheme for the residential sector than was used in the 2013 study. Specifically, in addition to segmenting by housing type, low-income customers were differentiated from non-low income customers. This section presents the residential saturation results at a high-level for the four segments. Detailed findings describing key energy characteristics of AIC's residential customer market are provided in the residential market profile in Volume 4 Appendix A.

Heating, Cooling and Water Heating

As is shown in Figure 3-1, most respondents report having central air conditioning, and this is more common in single-family homes than in multi-family homes. Approximately a third of multi-family customers rely on room air conditioners for cooling, while 10% of low-income multi-family customers do not have air conditioning equipment at all.

Figure 3-1 Residential Primary Cooling



In the aggregate, 26% of this population reports using electricity for space heating purposes, while 23% report using electricity for water heating. As is reported in Figure 3-2 and Figure 3-3 below, the majority of respondents, particularly those residing in single family homes, rely on natural gas or another fuel for their space and water heating needs. Multi-family low income respondents report the highest use of electric space and water heating.

Figure 3-2 Residential Primary Space Heating

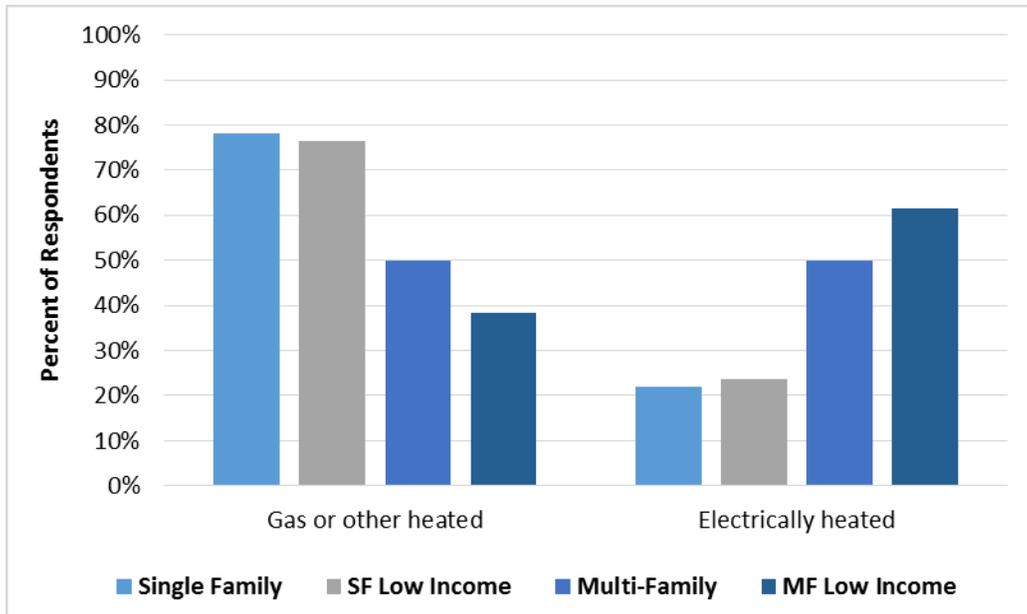
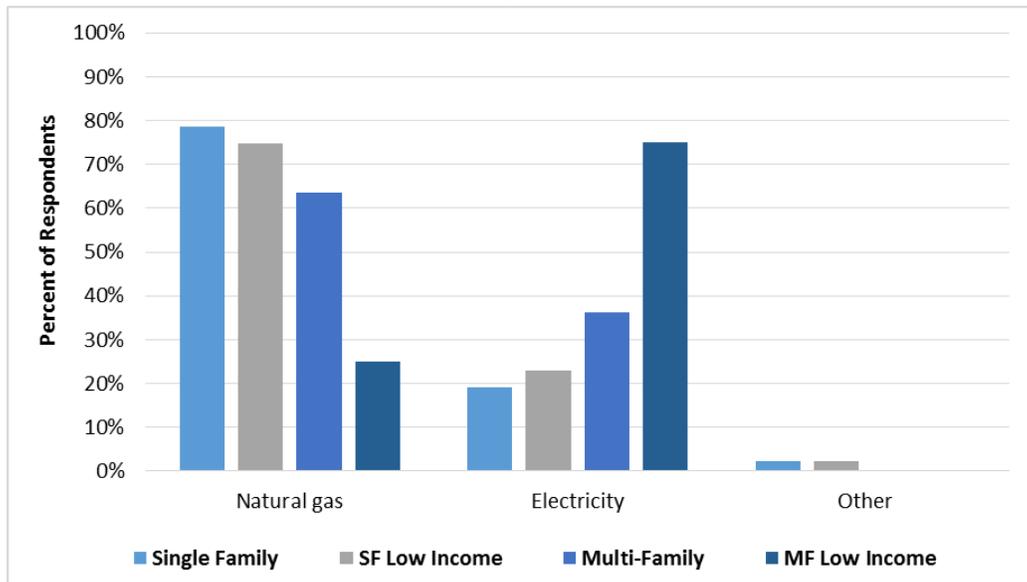


Figure 3-3 Residential Primary Water Heating



Lighting

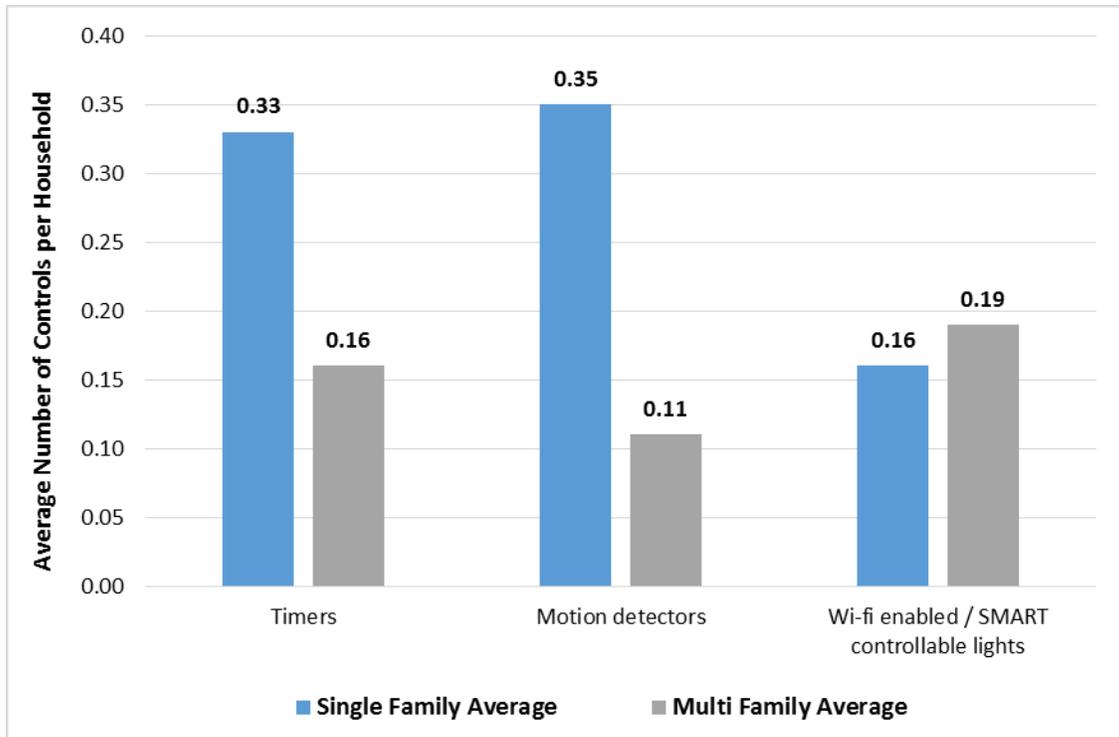
Lamps shares in 2014 are shown in Table 3-1. Lamp shares have changed significantly since the previous study. Overall, the share of incandescent lamps has fallen from 48% to 30%. CFLs increased from 31% to 40%, while LED lamps increased substantially from 1% to 12%.

Table 3-1 Shares of Total Lamps by Housing Type

Segment	Incandescent	CFL	LED	Tubular Fluorescent	Halogen	Linear LED	Other
Single Family	30%	40%	12%	9%	4%	1%	4%
Multi-family	32%	42%	11%	6%	5%	1%	3%
Total	30%	40%	12%	9%	4%	1%	4%

Devices used to control lighting are not common. The data reported in Figure 3-4 indicate that there are only an average of one timer or motion detector used for lighting control for every three homes. Single family homes are more likely to report using devices to control lighting than are their multi-family counterparts.

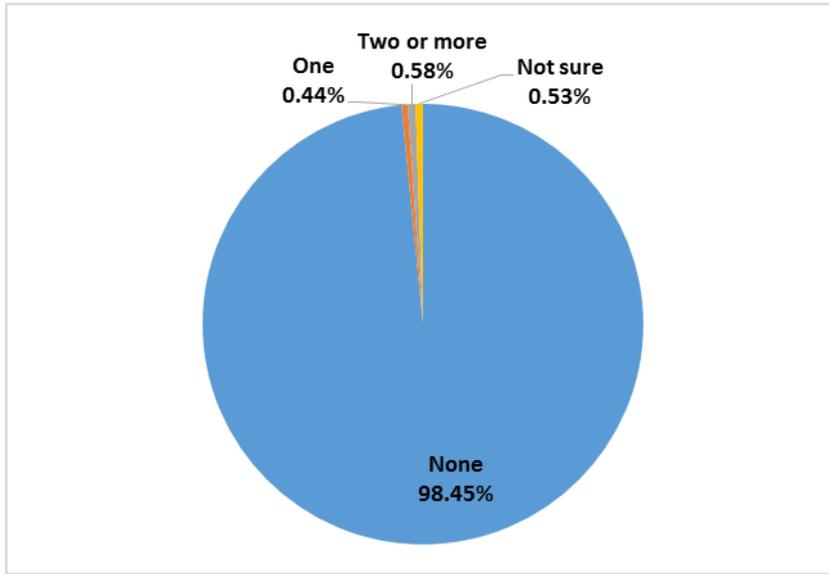
Figure 3-4 Mean Number of Lighting Controls per Household by Type of Control



Electric Vehicles and Solar PV

Solar panels and plug-in electric vehicles are also not yet very common among AIC’s residential population. Only 1% of households say they have at least one plug-in electric vehicle, though this may still be an over-estimate, since customers sometimes include hybrid electric vehicles in this category.

Figure 3-5 Residential Customer Use of Plug-In Electric Vehicles



Regarding solar, less than 1% of respondents (0.89%) say they have solar photovoltaic panels generating electricity on their home.

Thermostat Usage and Smart Technology

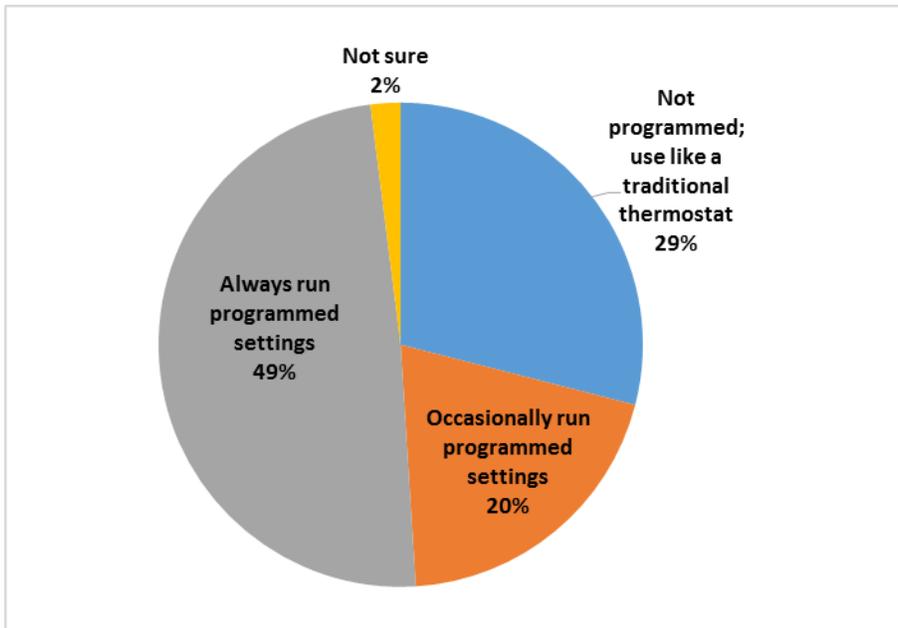
Table 3-2 indicates that households are roughly split between those reported to be equipped with a programmable thermostat that can be used to schedule different temperatures throughout the day (48%) and a standard / manual thermostat (49%). Just 2% of survey respondents report having a “smart” advanced learning thermostat.

Table 3-2 Residential Customers: Type of Thermostat Used

Type of Thermostat	Percentage
Yes, a programmable thermostat (one that lets you program a schedule and set the temperature up or down at different times of the day and/or different days of the week)	48%
Yes, a smart thermostat (one that learns your schedule and automatically adjusts the temperature at different times of the day and/or different days of the week)	2%
Yes, a standard/manual thermostat (one with a single setting for the internal temperature which you manually adjust)	49%
No thermostat (exclusive)	1%

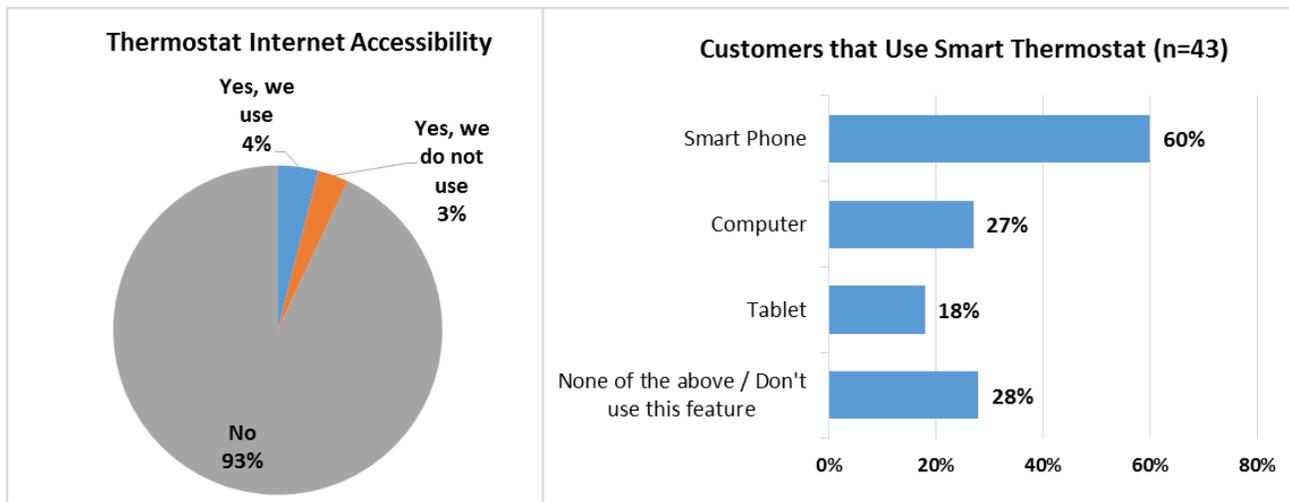
Figure 3-6 reports that, for respondents who say they have programmable thermostats, only about half say they always run that thermostat with programmed settings (49%), while 20% only occasionally run programmed settings, and the remaining 29% *never* use the programming functionality.

Figure 3-6 Residential Use of Programmed Mode



As is outlined in Figure 3-7 below, of the households with a programmable thermostat, only 7% say they have the ability to communicate with it over the internet, and only 4% say they actually use that capability. For those who say they utilize this feature, they are more likely to check it through their smart phone (60%) than on their computer (27%) or with a tablet (18%).

Figure 3-7 Residential Thermostat Internet Accessibility



Population Demographics

Turning to the question of the attributes of the energy decision makers surveyed, the results detailed in Table 3-3 below show that:

- A plurality (36%) have some college education, while equal proportions (23% to 25%) have either a Bachelor’s degree or no more than a high school degree.
- Only 52% are employed full time; a figure very close to the corresponding 2012 survey (54%).

- More than half (56%) have household incomes of less than \$75,000 per year; also similar to 2012.
- Most are white (85%); however there were 3% more black respondents than in 2012.

Table 3-3 Residential Customer Additional Demographics

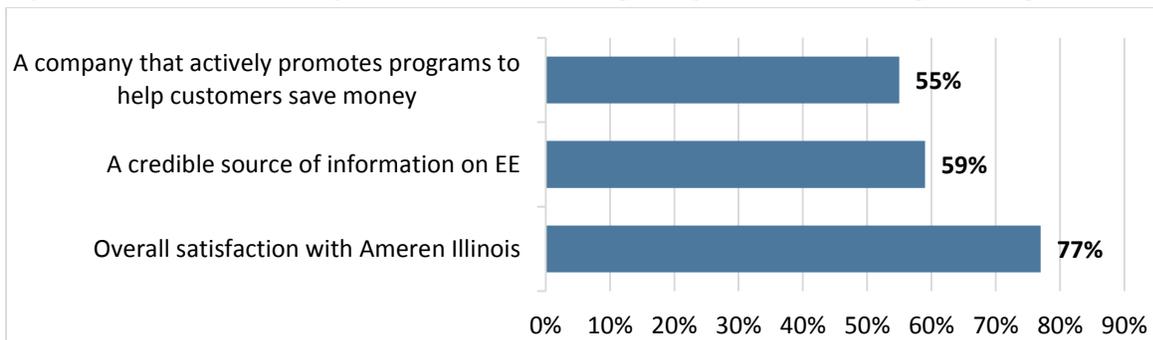
Gender (Q56)		Percent Change from 2012	Employment Status (Q58)		Percent Change from 2012	Ethnicity (Q63)		Percent Change from 2012
Male	42%	-3%	Employed full-time	52%	-2%	White, Caucasian	85%	-3%
Female	58%	+3%	Employed part-time	11%	+2%	Black, African American, Caribbean American	6%	+3%
Education (Q57)			Retired	24%	+2%	Asian	1%	-1%
High school or less	25%	+1%	Not currently employed/other	12%	-3%	Hispanic, Latino	1%	0%
Associates, trade school, or some college	36%	+3%	Household Income (Q59a)			Other	0%	0%
Bachelors Degree	23%	-2%	Less than \$30,000	23%	+3%	Prefer not to say	6%	0%
Graduate Degree (or professional certification)	16%	-2%	\$30,000-\$49,999	16%	-2%			
			\$50,000-\$74,999	17%	-1%			
			\$75,999-\$99,999	15%	+5%			
			\$100,000 or more	13%	0%			
			Prefer not to say	16 %	-6%			

Understanding Residential Customer Perspectives on Energy Issues

In order to understand what lies beneath customer reactions to new EE options that might be offered by Ameren Illinois, it is worth exploring overall customer perspectives, both toward the company and toward energy issues as a whole.

Customer opinions of Ameren Illinois are relatively high, with over three-quarters (77%)² of respondents giving the company a top-three box rating (8-10 on a 10-point scale) on overall satisfaction (see Figure 4-1 below). Ameren scored slightly lower, but still higher than 50%, on more specific attributes relating to the company's promotion of EE programs and credibility as a source of information about EE.

Figure 4-1 Overall Ratings of Ameren Illinois (ratings of 8-10 on 10 pt. scale)



When purchasing new appliances or renovating areas of their homes, respondents say they are more likely to purchase highly energy efficient products than they are to buy standard efficiency products (even without mentioning possible rebates). As the data in Table 4-1 indicates, this is especially prevalent when shopping for refrigerators (17% say they purchased a new high efficiency model, compared to 4% who say they purchased a standard efficiency model). Additionally, 21% say they added or upgraded insulation in the last three years, while 18% say they upgraded to higher efficiency windows.

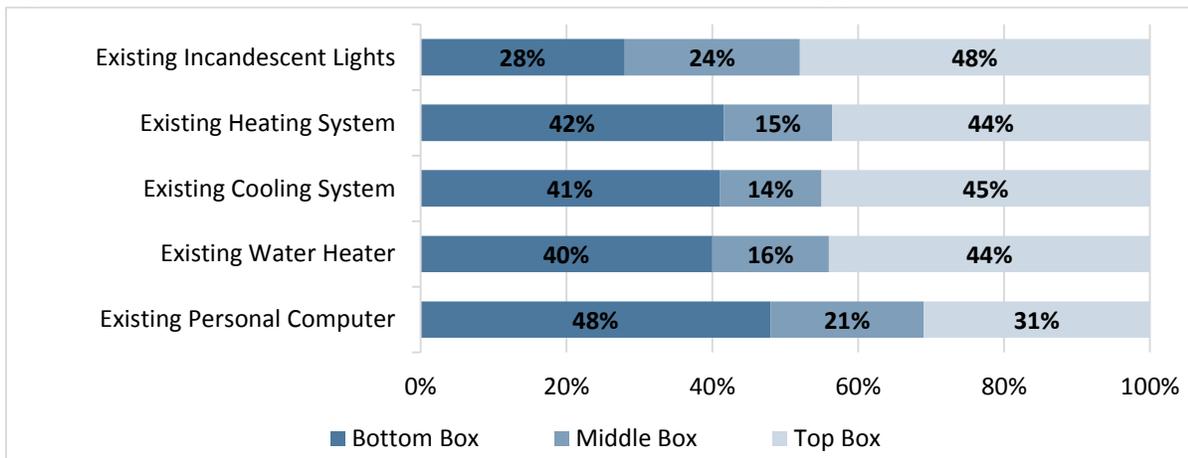
² Note that this compares to a 63% top-three-box rating for Ameren Illinois that was observed in similar research conducted in December 2012.

Table 4-1 Residential Customers Purchasing Behaviors within the Last 2 Years

Appliance	Purchased Highly Energy Efficient	Purchased “Standard Efficiency”	Did not Purchase
New heating system	10%	1%	89%
New air conditioning equipment	13%	3%	84%
New water heater	12%	6%	83%
New refrigerator	17%	4%	79%
Measure	Implemented in Last 3 Years	Plan to Implement in the Next 2 Years	Neither
Replacing windows with windows designated as “low-e” glass and / or have a gas core that increases energy efficiency	18%	11%	72%
Adding or upgrading insulation on exterior doors, walls, ceilings, or roofs	21%	13%	68%

Customers were also asked about their likelihood to replace an appliance or piece of equipment with a highly energy efficient (Energy Star) appliance the next time they need to do so (without reference to rebates or Ameren Illinois programs). The data in Figure 4-2 indicates that respondents reported they are most likely to replace incandescent lights with an energy efficient replacement (48%). Energy Star plays a lesser role in personal computer purchases (31%).

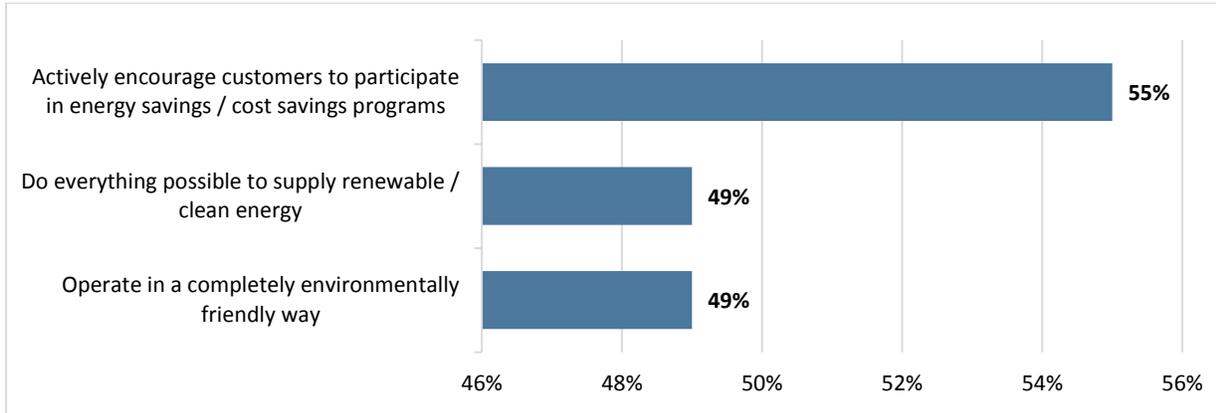
Figure 4-2 Residential Customer Likelihood to Purchase Energy Star³



³ Non applicable choices removed.

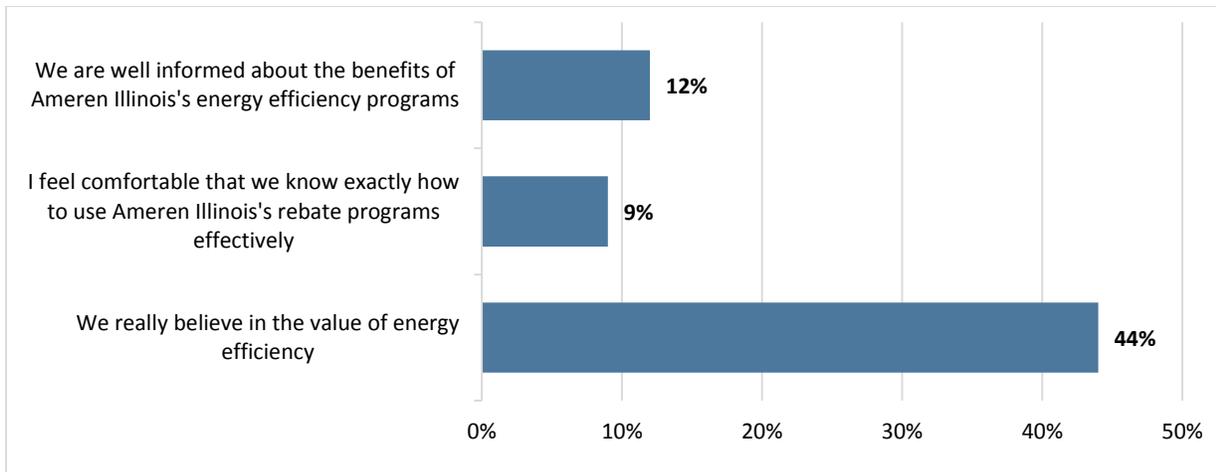
Turning to the question of whether or not Ameren Illinois **should** promote energy efficiency and/or greener energy options, the results in Figure 4-3 suggest that a majority of customers support this activity. A total of 55% or more believe AIC should “actively encourage” customers to participate in energy / cost savings programs, while just slightly fewer (49%) say the company should operate in a “completely environmentally friendly way.”

Figure 4-3 Ratings of Energy Efficiency



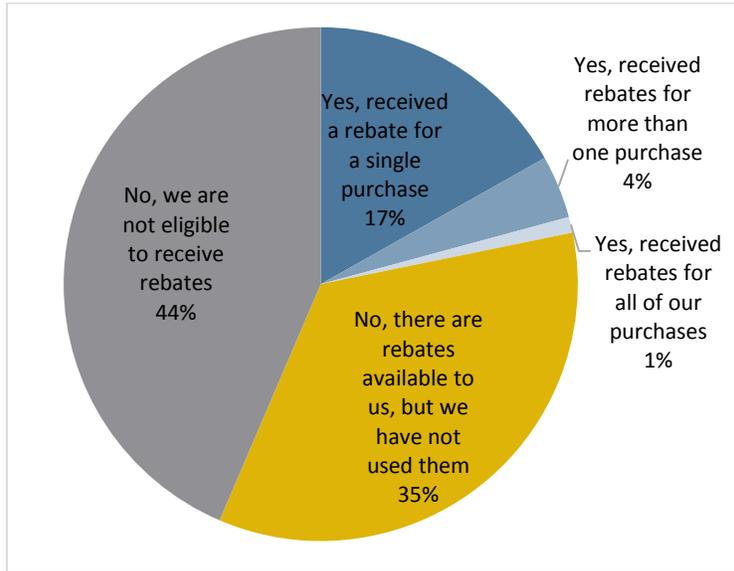
While the data reported in Figure 4-4 indicates that customers do believe in the value of EE (with nearly half rating it a “9” or “10”), only 12% believe they are **informed** about the particular benefits of EE programs, and only 9% **feel comfortable** that they know how to use the programs effectively.

Figure 4-4 Ratings of Ameren Illinois on EE-Specific Issues



Consistent with these perceptions, only one-third (34%) of residential customers say they are aware that Ameren Illinois provides EE-related rebates or incentives. The remaining 59% were not sure if Ameren offered rebates or incentives and 7% were unaware. As is shown in Figure 4-5 below, for those that are aware of Ameren rebates/incentives, 21% say they have utilized them for one or more projects, while nearly half said they were not eligible to receive the rebates (44%).

Figure 4-5 Utilization of Rebates / Incentives from Ameren Illinois



Residential Customer Take Rates

One of the important goals of the market research was the development of customer “take rates,” the proportion of customers estimated to be likely to adopt a new higher efficiency appliance or other measure given the presence of an incentive or rebate. The challenge in developing take rates is that survey respondents tend to over-estimate their true likelihood to participate in programs and services within the context of a market research study. Research and real world experience tell us that stated intent does not translate simply into likely downstream behavior, with customers tending to overstate the true likelihood that they will take a future action.

Methodology

Market researchers have developed mechanisms to account for these “say / do” differences. In 2012, AEG used a method for adjusting stated intentions to likely behavior that leveraged proprietary research conducted by YouGov Definitive Insights. In this study, the AEG Team chose to use a different methodology that leveraged local, current information to make these adjustments. The methodology consists of two steps:

1. Calculate an “unadjusted take rate” for each measure at each payback period by treating survey responses at face value. Therefore, if a respondent rated their likelihood to adopt a given measure as a “10” on the 10-point scale, then they were treated as 100% likely to adopt. Responses of “9” were treated as 90% likely to adopt, etc. The resulting average was interpreted as an “unadjusted” take rate because it takes respondents’ answers at face value.
2. Use a say / do calibration based on actual AIC program experience. Customers were asked about the likelihood that they would acquire a higher-than-standard efficiency option for a total of five end-use measures (CFLs, HVAC, refrigerators, PCs, and advanced thermostats) at multiple payback periods (1-, 3- and 5-year payback levels for all five measures as well as 0 year paybacks for CFLs, HVAC and advanced thermostats).⁴

The AEG team developed an “anchor question” for the AIC program which attempted to, as closely as possible, describe the current program. Since the team could calculate actual historical program participation, it was possible to compare the “say” responses (what people said they would do in the survey) to the actual “do” behavior (how customers have responded to the program in real life). By comparing these two numbers, the team was able to calculate a say / do adjustment based on the real experience of Ameren Illinois. This calibration factor was used to generate more accurate representations of how customers are likely to act in the real world. The reality-based say / do adjustment values were then applied to each of the unadjusted take rates values generated for each measure and payback period within each customer class.

In order to provide insight about the impact that varying payback periods might have on customer response to the programs tested, the survey explored responses to each program at 1-, 3- and 5-year payback levels as well as 0-year payback period for some measures. The survey used a method developed by the economist von Westendorp to capture customer responses. The technique begins by asking respondents to assess their likelihood of adopting a program at a 3-year payback, and then (a) if they respond positively to this option, asks them to respond to a 5-year payback, or (b) if they respond negatively to this option, asks them to respond to a 1-year payback period. In order to

⁴ A 0-year payback here corresponds to a DSM program incentive of 100% of the incremental measure cost, meaning the incremental cost to the consumer is instantly removed.

deal with issues of survey length, the tested program measures were sorted into different categories that were similar in terms of scale of investment and type of measure. The full 1-, 3-, and 5-year payback assessment was then conducted for a single program within each category. The remaining programs within each category were asked about in the survey at the 3 year payback level only. Regression analysis was then used to develop the 1- and 5-year payback values for each measure using the slopes observed for the example program in each category. Zero-year payback questions were asked separately for all respondents for a subset of measures.

It is important to note that take rates are calculated for all customers eligible to adopt each technology, and therefore, do not take program awareness or program availability into account. Since we know that program awareness is not likely to be at 100%, the actual program adoption rates that would be experienced by Ameren Illinois would also be affected by program awareness.

Estimated Take Rates

The AEG team determined that the unadjusted take rate was overestimating customer responses to the “real life” programs by a factor of two (an unadjusted take rate of 79% compared to an actual program adoption rate of 39%). As a result, a correction factor of 0.499 was applied to the unadjusted take rates to create adjusted take rates to estimate Realistic Achievable Potential customer program response for each measure at each payback period.

These adjusted take rates are highest for CFLs (by a small margin) and lowest for PCs (by a small margin). The range from highest take rate (at 44% for CFLs with a 0-year payback) to the lowest take rate (31% for a PC at a 5-year payback) is only 13 percentage points.

It is worth noting that while take rates do vary by payback period, the differences are not dramatic and, in particular, take rates do not differ dramatically between 0 and 1-year payback periods. The implication here is that, for the most part, if customers are not willing to buy an energy efficient option at a 1-year payback, moving to a 0-year payback does not change their mind.

The Realistic Achievable Potential customer program response adjusted take rates are presented in Table 5-1 below.

Table 5-1 Adjusted Take Rates by Measure and Payback Period

Measure	Payback Period	Adjusted Take Rate
HVAC	0	40%
HVAC	1	40%
HVAC	3	37%
HVAC	5	35%
Refrigerator	1	41%
Refrigerator	3	38%
Refrigerator	5	36%
PC	1	38%
PC	3	35%
PC	5	31%
Advanced Thermostat	0	41%
Advanced Thermostat	1	37%
Advanced Thermostat	3	36%
Advanced Thermostat	5	33%
CFL	0	44%
CFL	1	43%
CFL	3	39%
CFL	5	37%

To develop estimates of Maximum Achievable levels of program response, the AEG Team included questions in the survey which explored the potential impact that different conditional market elements might have on customer response to programs. Questions were developed to determine how much more likely customers were to say they would use a rebate program if:

- Their economic situation were much improved
- Ancillary product features were described positively
- Customers could be educated to be as informed about energy efficiency as are those who say they are currently well informed
- Programs were delivered using the method most preferred by customers

The independent impact of each of these factors on likely take rates, along with the impact of moving a base 3 year payback period to a 0 or 1 year payback period, is outlined in Table 5-2 below.

Table 5-2 Maximum Achievable Take Rate Lift

Factors Considered	Take Rate "Lift
Lift from Fastest Payback (0 or 1-year) vs. 3-year	10%
Lift from Best Delivery Mechanism vs Avg.	22%
Lift from Best Features vs Avg.	1%
Lift from Best Customer Financial Situation vs Avg.	14%
Lift from Most Informed vs Avg.	11%
Maximum Lift with All Factors Stacked	57%

Adding each of the independent impacts together yields a "stacked" adjustment value of 57%, meaning that if everything was as good as it could be (if paybacks were short, if the best delivery mechanism was used, if customer overall economic situations were better, etc.), then the Realistic Achievable Potential customer response to rebate programs could be increased by 57%. The Maximum Achievable Potential take rates are shown in Table 5-3 (generated by applying the 57% increase to the results in Table 5-1).

Table 5-3 Maximum Achievable Potential Take Rates

Measure	Payback Period	Maximum Achievable Take Rate
HVAC	0	63%
HVAC	1	63%
58%HVAC	3	58%
H55%VAC	5	55%
Refrigerator	1	64%
Refrigerator	3	60%
Refrigerator	5	57%
PC	1	60%
PC	3	55%
PC	5	49%
Advanced Thermostat	0	64%
Advanced Thermostat	1	58%
Advanced Thermostat	3	57%
Advanced Thermostat	5	52%
CFL	0	69%
CFL	1	68%
CFL	3	61%
CFL	5	58%

Profiling Likely Takers

Of course, not all customers are equally likely to use Ameren Illinois rebate programs. This section outlines differences in the way that customer subgroups indicate they would respond to the tested programs. Looking first at income differences, the results in Table 5-4 below, show that higher income customers say they are more likely to participate in almost every program compared to their low income counterparts (though the differences are often small and both groups report the same take rates for CFLs at a 3-year payback period).

Table 5-4 Adjusted Realistic Take Rates by Measure, Payback Period and Income Group

Measure	Payback Period	Lower Income Take Rate	Higher Income Take Rate
HVAC	3	30%	37%
HVAC	0	31%	40%
Refrigerator	3	30%	38%
PC	3	29%	34%
Advanced Thermostat	3	27%	33%
Advanced Thermostat	0	31%	38%
CFL	3	39%	39%
CFL	0	43%	44%

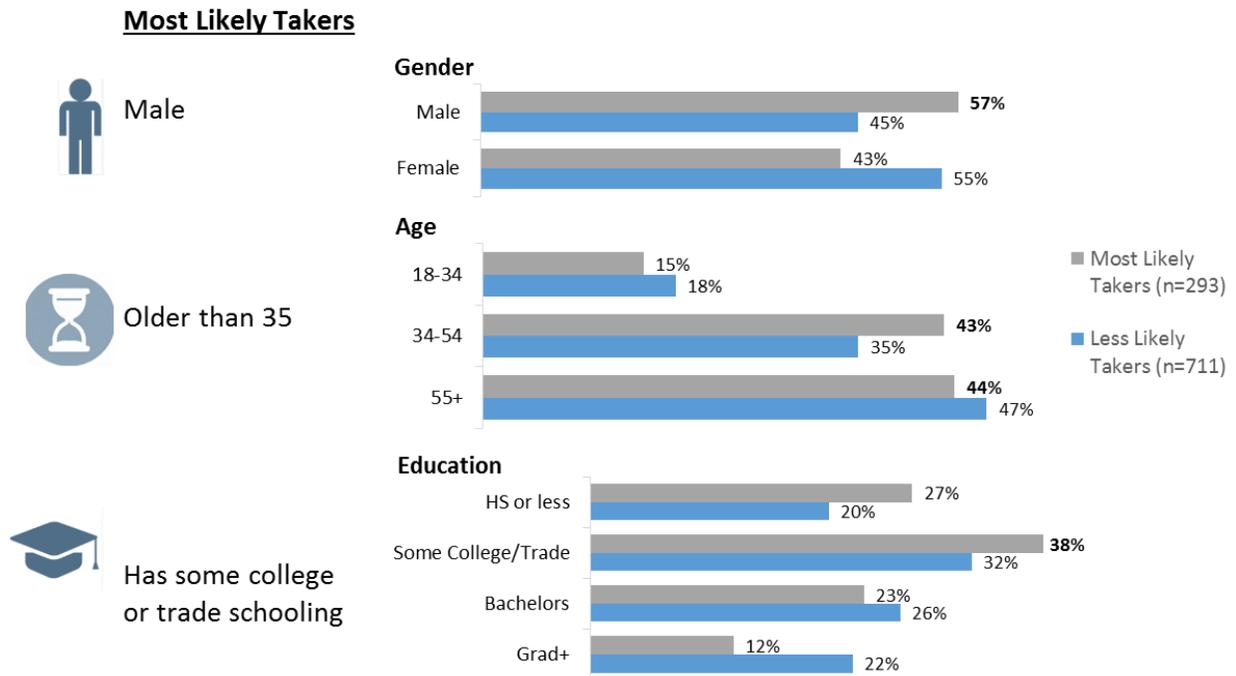
In order to look more broadly at differences between those more likely to use AIC EE programs and those less likely to do so, the AEG team assigned survey respondents to one of two groups ("most likely takers" and "less likely takers" based on their reaction to several of the programs tested). These two groups were then profiled on a variety of demographic and psychographic variables.

This analysis shows that the "most likely taker" group is more likely to include:

- Men
- Those age 35 or older

- Those with less than a college education

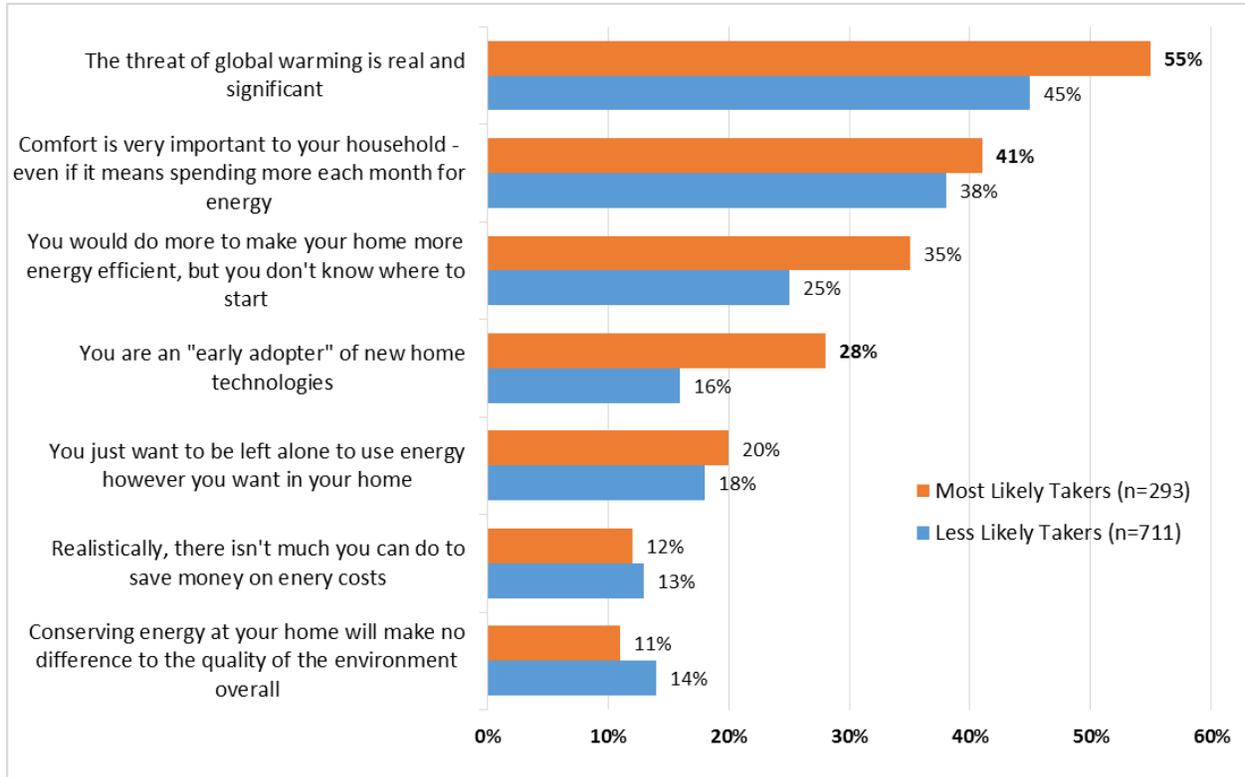
Figure 5-1 Likely Takers by Demographics



More striking differences between these groups, however, relate to attitudinal differences, and these are outlined in Figure 5-2.

- “Most likely takers” are more likely to say that the threat of global warming is real and significant, and to say that they would like to make their home more energy efficient, however they aren’t sure where to start. These respondents also tend to report being “early adopters” of new home technologies.
- Unsurprisingly, customers who have highly “green” and/or highly cost-savings-focused attitudes consistently show much higher likelihoods to adopt energy efficiency measures.

Figure 5-2 Likely Takers by General Attitudinal Differences (% Top Box, 8 -10)

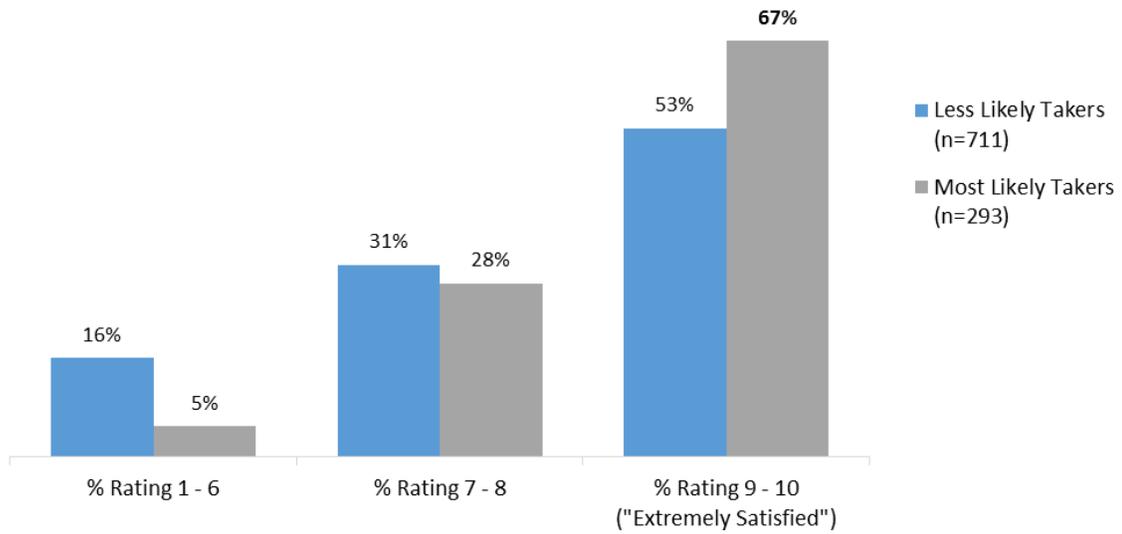


Another key factor in likelihood to adopt energy efficiency measures appears to be the degree to which customers have favorable opinions of Ameren Illinois.

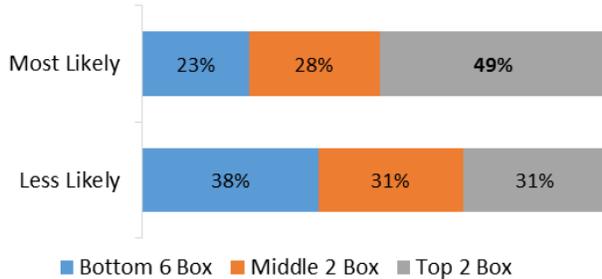
- “Most likely takers” are more satisfied than are less likely takers (67% compared to 53%).
- “Most likely takers” are also more likely to agree that Ameren Illinois is a credible source for energy efficiency information, and that the company helps customers save money.

Figure 5-3 Likely Takers by Attitudinal Differences about Ameren Illinois

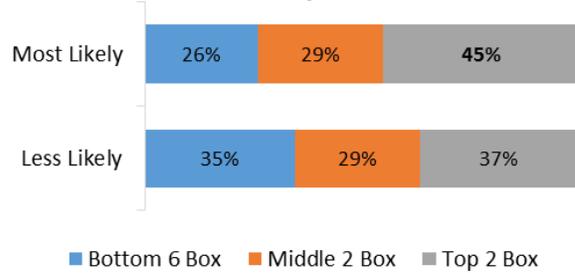
Overall Satisfaction with Ameren Illinois



Perception AIC is a Credible Source of EE Information



Perception AIC Helps Customers Save Money



C&I Analysis Approach and Methodology

This section outlines the approach and methodology implemented for the C&I market research effort, including sample design, questionnaire development and data analysis.

Survey Approach

The sample design process started by drawing an extract of all of the non-residential accounts from the Ameren Illinois billing data for calendar year 2014. The Ameren Illinois customer list included detailed information for each customer record, including name, address, annual kWh usage, annual therm usage, division, account number, etc. The AEG Team then processed and analyzed the data in order to represent program-eligible business premises directly billed by Ameren Illinois. The steps executed are documented in Table 6-1.

The AEG Team isolated the very largest businesses and targeted them for separate onsite surveys. The remaining customers in the sample frame were stratified by building segment and industry as well as usage (using the Dalenius-Hodges technique for determining size strata breakpoints), resulting in 124 separate sample cells. The target sample size of 900 responses for the online survey was allocated to the strata using Neymann Allocation. Survey responses were targeted and monitored at the individual stratum level. The full sample design at the segment level is presented in [Appendix A](#).

Table 6-1 Ameren Illinois C&I Survey Population

	Accounts	% of Original Accts	Premises	Annual GWh	% of Original GWh	Annual MMtherm	% of Original MMtherm
Original Ameren database	178,219	100.0%	n/a	24,896	100.0%	1,098	100%
Removed accounts with less than 9 months of data	8,210	4.6%	n/a	72	0.3%	5	0.4%
Removed gas usage of natural gas Opt-Out customers	0*	0.0%	n/a	0	0.0%	541	49.3%
Combined accounts during premise-level aggregation	31,834**	17.7%**	n/a	-	0.0%	-	0.0%
Premise-level sample frame (normalized)	169,919	95.3%	138,175	24,506	98.4%	540	49.2%
Removed premises below energy use cutoff ***			65,654	258	1.0%	-3	-0.3%
Removed non-building and other excluded premises			8,568	2,981	11.9%	39	3.5%
Sample Frame			63,953	21,267	85.4%	504	45.9%

* This step removed the gas usage but the accounts were not cleared until the energy cutoff step.

** 31,834 accounts were determined to be co-located. These accounts were combined, not eliminated.

*** Energy cutoff was to remove any customer with both <10 MWh and <800 therms per year.

For each stratum, the AEG Team pulled a random sample equal to 15 times the target sample size, up to the number of available sample points in each stratum. Postcard survey invitations with instructions on how to complete the online survey were mailed to each sampled business.

- Customers were originally offered a \$25 check for completing the survey, but that amount was increased to \$50 approximately halfway through fielding in order to increase response rates.
- Due to the limited size of the sample list, postcards were mailed to all respondents at one time, and the mailing was followed by several rounds of reminder emails and phone calls.

In order to qualify to complete the survey, responding companies had to meet the following criteria:

- The respondent had to report that they were knowledgeable about decision-making for energy issues for the business at the specified location.
- The company had to be responsible for the cost of their electricity or natural gas and Ameren Illinois had to provide the facility with either electricity and/or natural gas.
- The location had to include at least some enclosed space (i.e. could not be solely an outdoor structure or facility).

A total of 798 Ameren Illinois business customers completed the mail-to-web survey. In addition, 50 onsite surveys with the very largest businesses were completed. This total sample of 848 yields a 95% confidence interval of $+ / - 3.5\%$.

- Approximately 53% of those who attempted to complete the survey qualified to do so.
- The overall net response rate was approximately 3.71%. The response rate was reasonable, but slightly low at the beginning, which resulted in the need to increase incentive payments halfway through the fielding.
- Approximately 47% of those who started the survey abandoned it before completion.
- Average online survey length was about 36 minutes.

The data were weighted on the basis of the original sample design, in order to ensure that the weighted respondent sample mapped back to the underlying C&I population on electric usage, gas usage, and business type.

Questionnaires

As with the residential survey, a single questionnaire was used for the business survey in this study. The C&I questionnaire covered the following content areas:

1. Screening questions
2. Description of facility / structure
3. Description of major end uses in the facility
4. Description of heating and cooling equipment
5. Description of lighting (bulbs and fixtures / interior and exterior)
6. Attitudes toward Ameren Illinois
7. Attitudes toward using energy
8. Attitudes toward appliance purchasing
9. Awareness of EE-related energy programs
10. EE measures implemented to-date (with a focus on lighting)

A copy of the questionnaire is provided in Volume 4, Appendix.

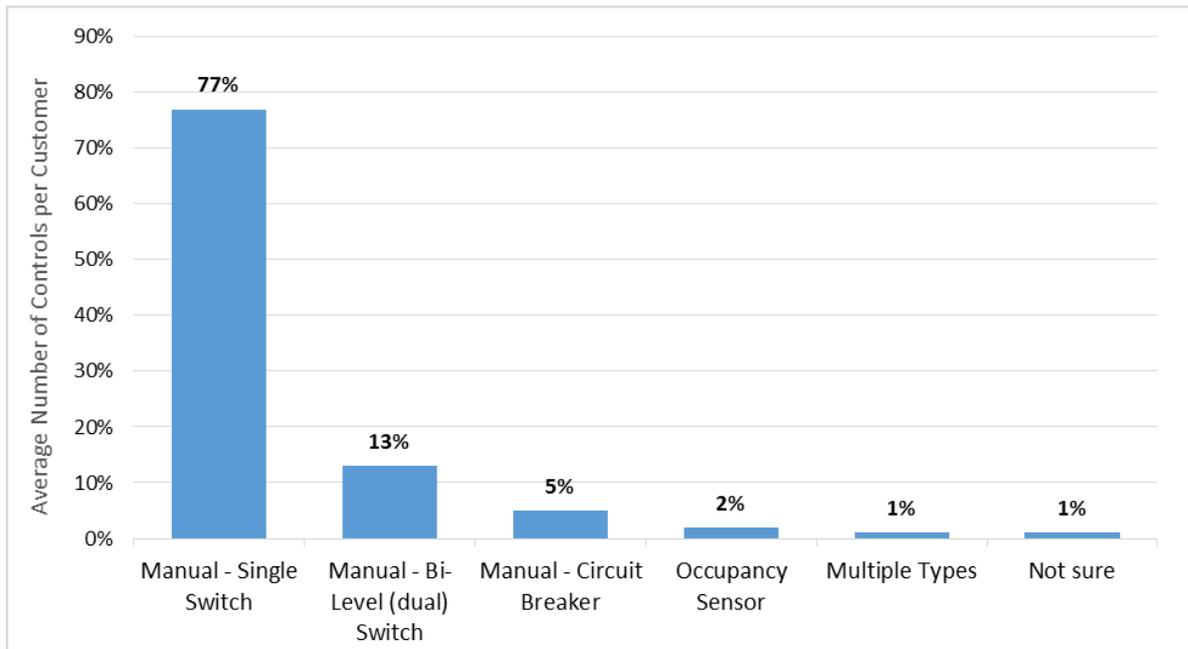
C&I Saturation Survey Results

The C&I survey provided insight into new / emerging technologies and those results are provided in this section. Detailed findings describing key energy characteristics of AIC's C&I customers are provided in the market profiles in Volume 4 Appendix A.

Lighting Controls

The most common device used to control lighting in C&I facilities is a manual single switch (77%). Only 13% of businesses say they have bi-level (or dual) switches installed and only 2% report using occupancy sensors. No businesses report using timers or an energy management system for lighting controls.

Figure 7-1 C&I Customer Controlled Lighting Device Usage

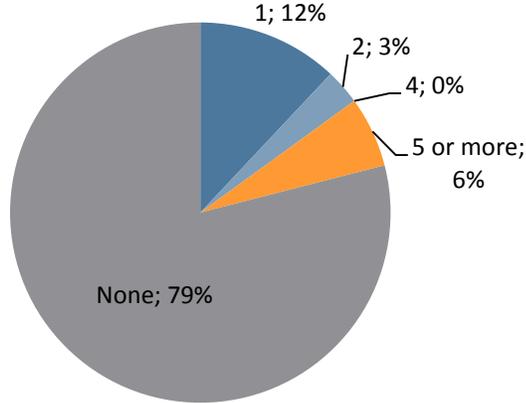


Electric Vehicles and Solar PV

Approximately 4% of businesses say that there is at least one EV charging station at their facility, although this seemed high to the research team. Only a half of one percent report more than one charging station. Those facilities with charging stations typically say that their company pays for the stations (82%).

While charging stations are relatively rare, 21% of businesses report using electric vehicles for business purposes.

Figure 7-2 C&I Number of Electric Vehicles for Business Purposes



Regarding solar power and alternative methods of energy generation, 2% of businesses say they have installed a solar photovoltaic system. Small wind turbines, on the other hand, are nonexistent within this population, with no reports of operating them onsite at their businesses.

Thermostat Usage and Smart Technology

Businesses are roughly split between the use of a programmable thermostat (50%) and the use of a standard / manual thermostat (41%). Only 3% of businesses say they have a Smart thermostat.

Table 7-1 C&I Type of Thermostats Usage

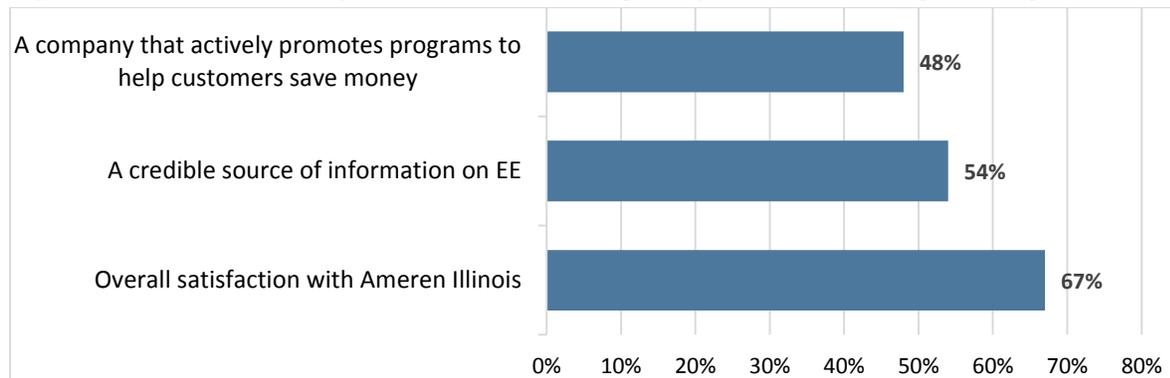
Type of Thermostat	Percentage
Programmable thermostat	50%
Manual thermostat	41%
Manual on/off	3%
Energy management system	3%
Smart thermostat (interactive and web-enabled)	3%
Always on	1%
None of these	1%

Understanding Business Customer Perspectives on Energy Issues

In order to better understand customer reactions to new EE options, the surveys also captured information about overall customer perspectives, both toward AIC and toward energy issues as a whole.

In terms of their overall opinion toward the company, and as shown in Figure 8-1, over two-thirds (67%) of businesses give the company a top-three box rating (8-10 on a 10-point scale) on overall satisfaction. Ameren scores slightly lower on more specific attributes relating to the company's promotion of EE programs and credibility as a source of information about EE. However, more than half of respondents give the company top-three box ratings on these attributes.

Figure 8-1 Overall Ratings of Ameren Illinois (ratings of 8-10 on 10 pt. scale)



In Table 8-1 below, businesses report a varied pattern regarding energy efficiency levels for new equipment they may have purchased recently. For HVAC and water heating equipment replacements, customers are slightly more likely to say they have installed a high efficiency model than a standard efficiency model in the last two years. For refrigeration equipment, and even more so, for office equipment, that trend is reversed, with more standard efficiency models reported as having been installed.

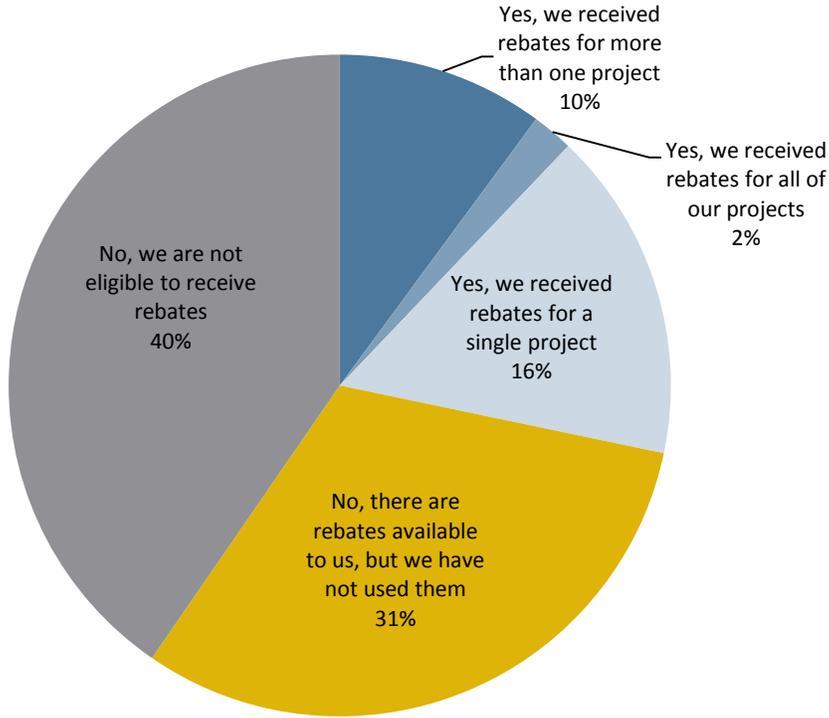
A significant proportion of customers (37%) say they have upgraded or renovated their fluorescent lighting system in the last three years and another quarter (24%) say they plan to do this in the near future. Fewer customers (18-28%) say they have recently, or expect to, eliminate some fluorescent fixtures, upgrade windows, or upgrade insulation within the next two years.

Table 8-1 C&I Customers Purchasing Behaviors of EE Products within 2 Years

Appliance	Purchased Highly Energy Efficient	Purchased "Standard Efficiency"	Did not Purchase
New heating system	14%	9%	76%
New air conditioning equipment	15%	11%	74%
New water heating equipment	14%	11%	75%
New refrigeration equipment	12%	15%	74%
New motors / drives	6%	8%	85%
New office equipment	21%	36%	43%
New ventilation equipment	4%	6%	90%
Measure	Implemented in Last 3 Years	Plan to Implement in the Next 2 Years	Neither
Upgrading or renovating fluorescent lighting system(s)	37%	24%	39%
Eliminating some fluorescent fixtures and adding reflectors to others to reduce the total number of lighting fixtures	15%	13%	73%
Replacing windows with windows designated as "low-e" glass	11%	6%	83%
Adding or upgrading insulation on exterior doors, walls, ceilings, or roofs	13%	14%	74%

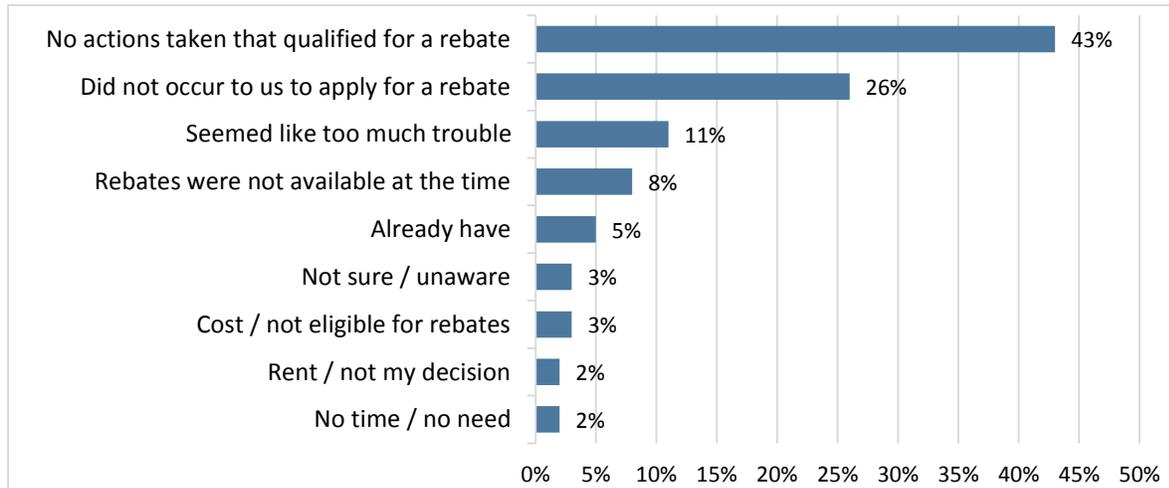
Just over one-third (38%) of C&I customers are aware that Ameren Illinois provides EE-related rebates or incentives. The remaining 52% were not sure if Ameren offered rebates / incentives and 10% were unaware. As is reported in Figure 8-2, for those that are aware of Ameren providing rebates and incentive offers, 28% say they have utilized them for one or more projects. Close to half said they were not eligible to receive the rebates (40%).

Figure 8-2 Utilization of Rebates / Incentives from Ameren Illinois



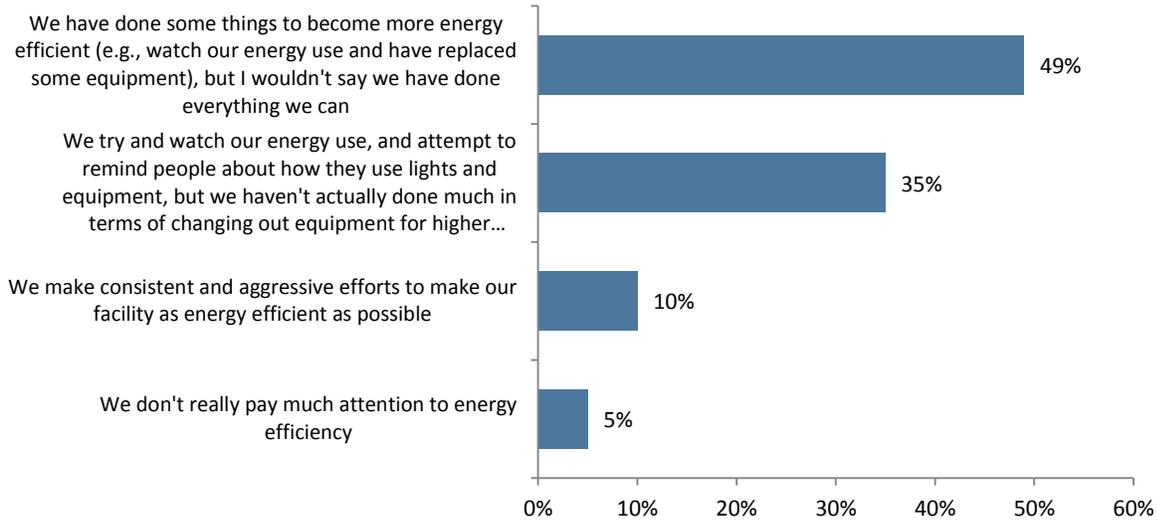
For those that have not used rebates, the biggest reported barrier to doing so is not taking actions that would have qualified for a rebate (43%). Second most commonly, businesses say that rebates simply do not come to mind (26%).

Figure 8-3 Barriers to Using Rebates / Incentives from Ameren Illinois



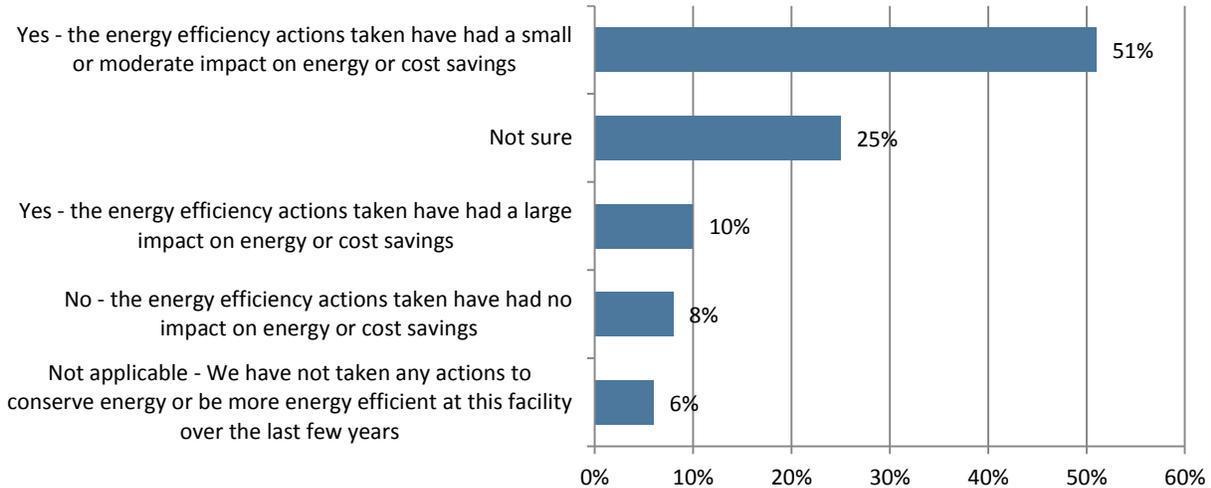
In terms of their overall efforts to implement energy efficiency actions at their facilities, Figure 8-4 shows that almost half (49%) of respondents say that some actions have been taken at their facility, but that more can be done. Another third (35%) report that they monitor their energy use but have not “actually done much” to change out equipment to more energy efficient options. Only 10% say that they make “consistent and aggressive” efforts to make their facilities as efficient as possible. Only 5% say that they make “consistent and aggressive” efforts to make their facilities as efficient as possible.

Figure 8-4 C&I Customer Approach to Implementing Energy Efficiency Actions



About half of those that reporting taking action in conserving energy also reported seeing a small to moderate impact on cost savings (51%) and another 10% report a “large impact” on cost savings. However, a quarter (25%) are unsure if their energy efficiency actions have actually translated into cost savings.

Figure 8-5 C&I Customer Costs Savings as a Result of Energy Efficient Actions



C&I Customer Take Rates

As with residential customers, one of the important outcomes of the market research among C&I customers was the development of customer “take rates” (the proportion of customers estimated to be likely to adopt a new higher efficiency appliance or other measure given the presence of an incentive or rebate). As was noted in the earlier chapter on residential customers, the challenge in developing take rates is that survey respondents tend to over-estimate their true likelihood to participate in programs and services within the context of a market research study. Research and real world experience tell us that stated intent does not translate simply into likely downstream behavior, with customers tending to overstate the true likelihood that they will take a future action.

Methodology

The methodology used to make the necessary “say/do” adjustments was the same as that used for residential customers and consisted of two steps:

1. Calculate an “unadjusted take rate” for each measure at each payback period by treating survey responses at face value. Therefore, if a respondent rated their likelihood to adopt a given measure as a “10” on the 10-point scale, then they were treated as 100% likely to adopt. The resulting average was interpreted as an “unadjusted” take rate because it takes respondents’ answers at face value.
2. Use a say / do calibration based on actual AIC program experience. Customers were asked about the likelihood that they would acquire a higher-than-standard efficiency option for a total of eight end use measures (CFLs, HVAC, refrigerators, server, motor, advanced thermostats, energy management system and occupancy sensors) at multiple payback periods (1, 3 and 5 year payback levels for all eight measures as well as 0 year paybacks for CFLs, HVAC and advanced thermostats).⁵

The AEG team developed an “anchor question” for the AIC lighting program which attempted to, as closely as possible, describe the current program. Since the team could calculate actual historical program participation, it was possible to compare the “say” responses (what people said they would do in the survey) to the actual “do” behavior (how customers have responded to the program in real life). By comparing these two numbers, the team was able to calculate a say / do adjustment based on the real experience of Ameren Illinois. This calibration factor was used to generate more accurate representations of how customers are likely to act in the real world. The reality-based say / do adjustment values were then applied to each of the unadjusted take rates values generated for each measure and payback period within each customer class.

In order to provide insight about the impact that varying payback periods might have on customer response to the programs tested, the survey explored responses to each program at 1, 3 and 5 year payback levels as well as 0 year payback period for some measures. The survey used a method developed by the economist von Westendorp to capture customer responses. The technique begins by asking respondents to assess their likelihood of adopting a program at a 3 year payback, and then (a) if they respond positively to this option, asks them to respond to a 5 year payback, or (b) if they respond negatively to this option, asks them to respond to a 1 year payback period. In order to deal with issues of survey length, the tested program measures were sorted into different categories that

⁵ A 0-year payback here corresponds to a DSM program incentive of 100% of the incremental measure cost, meaning the incremental cost to the consumer is instantly removed.

were similar in terms of scale of investment and type of measure. The full 1, 3, and 5 year payback assessment was then conducted for a single program within each category. The remaining programs within each category were asked about in the survey at the 3 year payback level only. Regression analysis was then used to develop the 1 and 5 year payback values for each measure using the slopes observed for the example program in each category. Zero year payback questions were asked separately for all respondents for a subset of measures.

It is important to note that take rates are calculated for all customers eligible to adopt each technology, and therefore, do not take program awareness or program availability into account. Since we know that program awareness is not likely to be at 100%, the actual program adoption rates that would be experienced by Ameren Illinois would also be affected by program awareness.

Estimated Take Rates

The unadjusted take rate of 59% for the lighting was compared to the calculated estimate of 32% for actual program participation. As a result, the AEG team determined that a correction factor of 0.542 should be applied to the unadjusted take rates to create adjusted take rates to estimate Realistic Achievable Potential customer program response for each measure at each payback period.

The range of take rates across the full range of programs / measures tested appear in Table 9-1 and range from a low of around one-third of all eligible customers to a high of just under one-half of all eligible customers. It is again worth noting in these results that the improvement from a 1 year payback to a 0 year payback creates little or no improvement in adjusted take rates.

Table 9-1 C&I Adjusted Take Rates by Payback Period and Measure

Nonresidential Measure	Payback Period	Adjusted Take Rate
HVAC	0	43%
HVAC	1	43%
HVAC	3	39%
HVAC	5	36%
Refrigerator	3	37%
Server	3	35%
Motor	3	39%
AP Thermostat	0	46%
AP Thermostat	1	45%
AP Thermostat	3	44%
AP Thermostat	5	40%
Energy Management System	3	32%
Occupancy Sensors	3	45%
CFL	0	48%
CFL	1	46%
CFL	3	43%
CFL	5	36%
CFL	5	37%

To develop estimates of Maximum Achievable levels of program response, the AEG team included questions in the survey which explored the potential impact that different conditional market elements might have on customer response to programs. The survey included questions to determine how much more likely customers were to say they would use a rebate program if:

- Their business's economic situation were much improved
- Several different ancillary product features were described positively

- Customers could be educated to be as informed about energy efficiency as are those who say they are currently well informed
- Programs were delivered using the method most preferred by customers

The independent impact of each of these factors on likely take rates, along with the impact of moving from a base 3 year payback period to a 0 or 1 year payback period, is outlined in Table 9-2 below.

Table 9-2 Maximum Achievable Take Rates Lift

Factors Affecting Take Rate	Take Rate "Lift"
Lift from Fastest Payback (0 or 1-year) vs. 3-year	8.2%
Lift from Best Delivery Mechanism vs Avg.	13.8%
Lift from Best Features vs Avg.	3.3%
Lift from Best Customer Financial Situation vs Avg.	20.2%
Lift from Best Informed vs Avg.	8.9%
Maximum Lift with All Factors Stacked	54.4%

Adding each of these independent impacts together yields a "stacked" adjustment value of 54.4%, meaning that if everything was as good as it could be (if paybacks were short, if the best delivery mechanism was used, if customer overall economic situations were better, etc.), then the Realistic Achievable Potential customer response to rebate programs could be increased by 54.4%, yielding the results in Table 9-3 below (which were generated by applying the 54.4% increase to the results in Table 9-1).

Table 9-3 Maximum Achievable Potential Take Rates

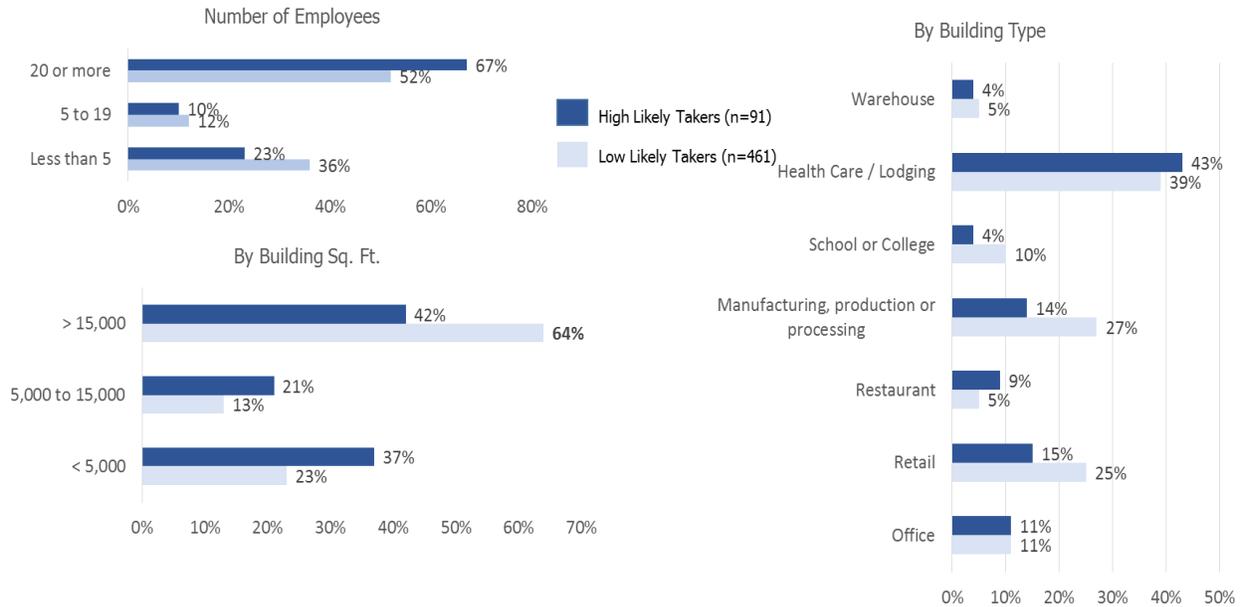
Nonresidential Measure	Payback Period	Maximum Achievable Take Rate
HVAC	0	66%
HVAC	1	66%
HVAC	3	60%
HVAC	5	56%
Refrigerator	3	57%
Server	3	54%
Motor	3	60%
AP Thermostat	0	71%
AP Thermostat	1	69%
AP Thermostat	3	68%
AP Thermostat	5	62%
Energy Management System	3	49%
Occupancy Sensors	3	69%
CFL	0	74%
CFL	1	71%
CFL	3	66%
CFL	5	56%

Profiling Likely Takers

As we saw with residential customers, it is also the case for business customers that some firmographic differences are associated with the likelihood to adopt new EE rebate options. Groups more likely than others to be defined as “high likely takers” include

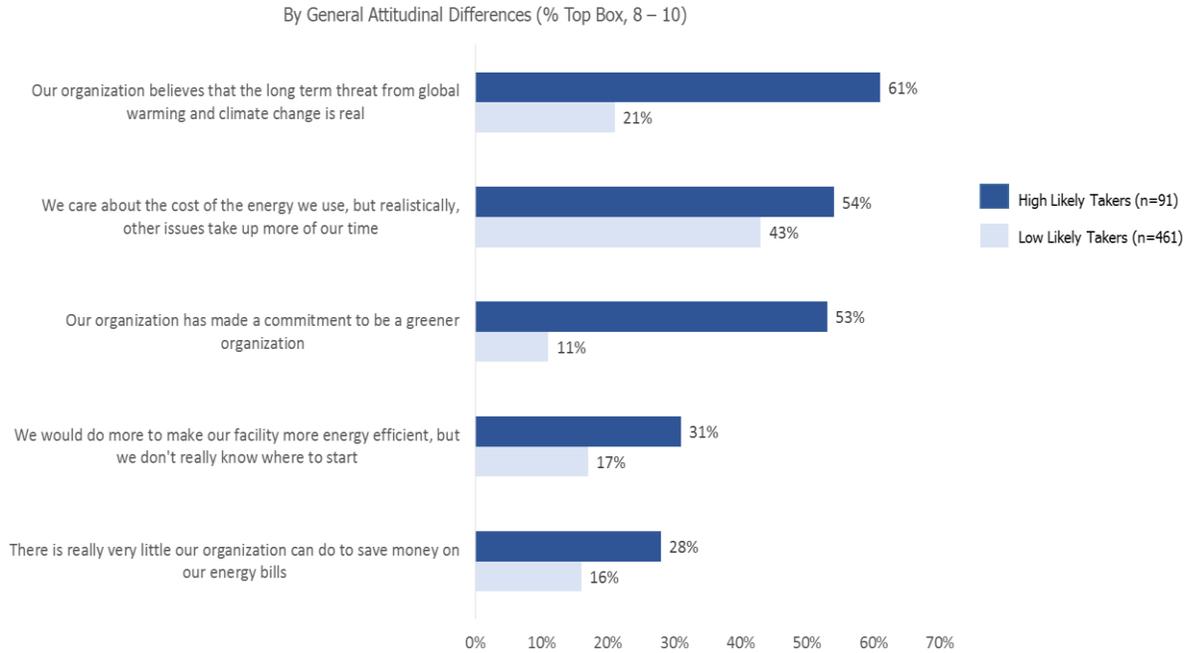
- Facilities with 20 or more employees
- Facilities with less than 15,000 sq. ft.
- Facilities described as healthcare / lodging

Figure 9-1 Likely Takers by Firmographics



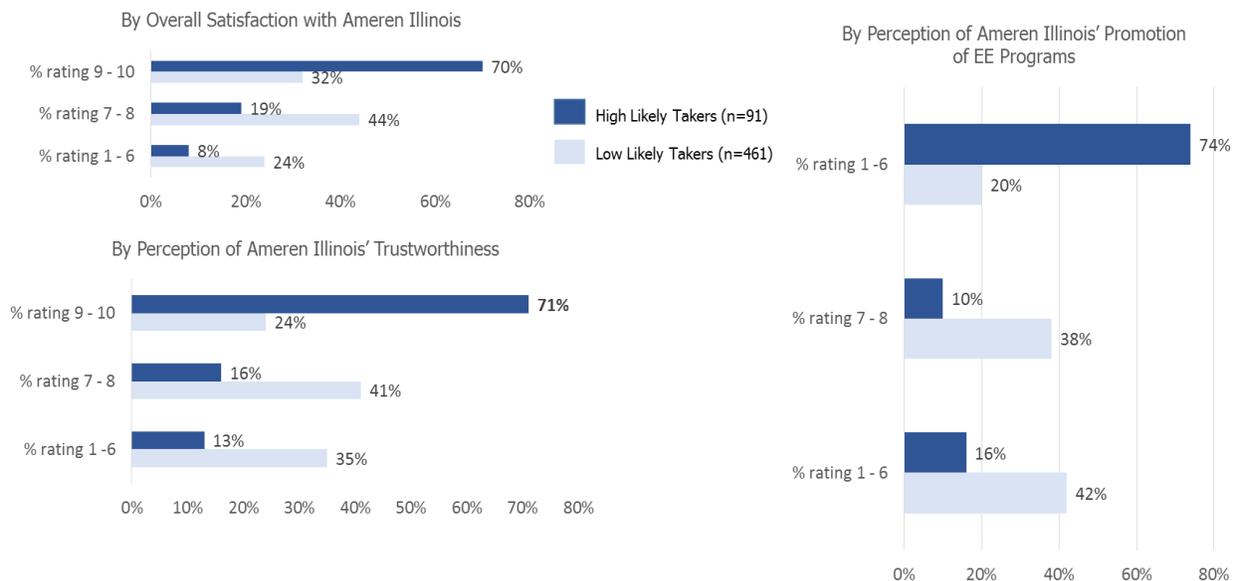
More striking differences in the take rates, however, again relate to attitudinal differences. Unsurprisingly, customers who exhibit highly “green” and/or highly cost-savings-focused attitudes consistently show much higher likelihood to adopt energy efficiency measures.

Figure 9-2 Likely Takers by General Attitudinal Differences



Another factor that affects likelihood to adopt energy efficiency measures appears to be the degree to which customers have favorable opinions of Ameren Illinois. Customers who have more favorable opinions about Ameren Illinois consistently show significantly higher likelihood to adopt energy efficiency measures.

Figure 9-3 Likely Takers by Attitudinal Differences about Ameren Illinois



Sample Design Matrices

The sample design as generated by AEG from the AIC residential customer database is detailed below, showing the various cells that were identified as targets for survey recruitment and eventual tracking of completions.

Residential Sample Design Matrix

Usage Stratum	Single Family or Multi Family	Region	Stratum ID	Completed Interviews by Stratum	Completed Interviews As a Percentage of Targeted Completes by Stratum
SF-Z2-E-1-G-0	SF	Zone 2	strat ID 001	21	90%
SF-Z2-E-2-G-0	SF	Zone 2	strat ID 002	25	116%
MF-Z2-E-1-G-0	MF	Zone 2	strat ID 003	4	67%
MF-Z2-E-2-G-0	MF	Zone 2	strat ID 004	5	100%
SF-Z2-E-1-G-1	SF	Zone 2	strat ID 005	32	129%
SF-Z2-E-1-G-2	SF	Zone 2	strat ID 006	51	139%
SF-Z2-E-2-G-1	SF	Zone 2	strat ID 007	22	147%
SF-Z2-E-2-G-2	SF	Zone 2	strat ID 008	37	146%
MF-Z2-E-1-G-1	MF	Zone 2	strat ID 009	3	150%
MF-Z2-E-1-G-2	MF	Zone 2	strat ID 010	1	50%
MF-Z2-E-2-G-1	MF	Zone 2	strat ID 011	2	100%
MF-Z2-E-2-G-2	MF	Zone 2	strat ID 012	4	100%
SF-Z2-E-0-G-1	SF	Zone 2	strat ID 013	8	140%
SF-Z2-E-0-G-2	SF	Zone 2	strat ID 014	7	88%
MF-Z2-E-0-G-1	MF	Zone 2	strat ID 015		0%
MF-Z2-E-0-G-2	MF	Zone 2	strat ID 016	4	150%
SF-Z3-E-1-G-0	SF	Zone 3	strat ID 017	44	105%
SF-Z3-E-2-G-0	SF	Zone 3	strat ID 018	42	114%
MF-Z3-E-1-G-0	MF	Zone 3	strat ID 019	6	36%
MF-Z3-E-2-G-0	MF	Zone 3	strat ID 020	6	50%
SF-Z3-E-1-G-1	SF	Zone 3	strat ID 021	52	147%
SF-Z3-E-1-G-2	SF	Zone 3	strat ID 022	64	120%
SF-Z3-E-2-G-1	SF	Zone 3	strat ID 023	40	138%
SF-Z3-E-2-G-2	SF	Zone 3	strat ID 024	53	141%
MF-Z3-E-1-G-1	MF	Zone 3	strat ID 025	7	233%
MF-Z3-E-1-G-2	MF	Zone 3	strat ID 026	4	200%
MF-Z3-E-2-G-1	MF	Zone 3	strat ID 027	2	100%
MF-Z3-E-2-G-2	MF	Zone 3	strat ID 028	3	150%
SF-Z3-E-0-G-1	SF	Zone 3	strat ID 029	24	110%
SF-Z3-E-0-G-2	SF	Zone 3	strat ID 030	45	141%
MF-Z3-E-0-G-1	MF	Zone 3	strat ID 031	5	200%
MF-Z3-E-0-G-2	MF	Zone 3	strat ID 032	3	150%
SF-Z4-E-1-G-0	SF	Zone 4	strat ID 033	45	118%
SF-Z4-E-2-G-0	SF	Zone 4	strat ID 034	51	74%
MF-Z4-E-1-G-0	MF	Zone 4	strat ID 035	2	29%
MF-Z4-E-2-G-0	MF	Zone 4	strat ID 036	5	50%
SF-Z4-E-1-G-1	SF	Zone 4	strat ID 037	61	119%

Sample Design Matrices

Usage Stratum	Single Family or Multi Family	Region	Stratum ID	Completed Interviews by Stratum	Completed Interviews As a Percentage of Targeted Completes by Stratum
SF-Z4-E-1-G-2	SF	Zone 4	strat ID 038	34	103%
SF-Z4-E-2-G-1	SF	Zone 4	strat ID 039	53	102%
SF-Z2-E-1-G-0	SF	Zone 2	strat ID 040	50	158%
SF-Z2-E-2-G-0	MF	Zone 2	strat ID 041	2	100%
MF-Z2-E-1-G-0	MF	Zone 2	strat ID 042	2	100%
MF-Z2-E-2-G-0	MF	Zone 2	strat ID 043	4	200%
SF-Z2-E-1-G-1	MF	Zone 2	strat ID 044	3	100%
SF-Z2-E-1-G-2	SF	Zone 2	strat ID 045	20	113%
SF-Z2-E-2-G-1	SF	Zone 2	strat ID 046	17	136%
SF-Z2-E-2-G-2	MF	Zone 2	strat ID 047	1	50%
MF-Z2-E-1-G-1	MF	Zone 2	strat ID 048	3	150%
MF-Z2-E-1-G-2	SF	Zone 2	strat ID 049	3	33%
MF-Z2-E-2-G-1	SF	Zone 2	strat ID 050	7	63%
MF-Z2-E-2-G-2	MF	Zone 2	strat ID 051	2	50%
SF-Z2-E-0-G-1	MF	Zone 2	strat ID 052	1	0%
SF-Z2-E-0-G-2	SF	Zone 2	strat ID 053	1	50%
MF-Z2-E-0-G-1	SF	Zone 2	strat ID 054	2	100%
MF-Z2-E-0-G-2	SF	Zone 2	strat ID 055	3	150%
SF-Z3-E-1-G-0	SF	Zone 3	strat ID 056	3	150%
SF-Z3-E-2-G-0	MF	Zone 3	strat ID 057	1	50%
MF-Z3-E-1-G-0	MF	Zone 3	strat ID 058	1	50%
MF-Z3-E-2-G-0	MF	Zone 3	strat ID 059		0%
SF-Z3-E-1-G-1	MF	Zone 3	strat ID 060		0%
SF-Z3-E-1-G-2	SF	Zone 3	strat ID 061	1	50%
SF-Z3-E-2-G-1	SF	Zone 3	strat ID 062		0%
SF-Z3-E-2-G-2	MF	Zone 3	strat ID 063		0%
MF-Z3-E-1-G-1	MF	Zone 3	strat ID 064		0%

C&I Sample Design Matrix

Sector	Segment	Electricity (GWh)	% Total GWh	Gas (MMtherm)	% Total MMtherm	Total Premises (N)	Target Sample Size (n)	Target % of Sample
Commercial	Office	1,009	4.7%	25	5.0%	919	51	5.7%
Commercial	Retail	1,261	5.9%	26	5.2%	12,068	53	5.9%
Commercial	Restaurant	519	2.4%	16	3.2%	3,972	22	2.4%
Commercial	Grocery	500	2.4%	4	0.7%	1,434	19	2.1%
Commercial	College	2,447	11.5%	31	6.1%	441	39	4.3%
Commercial	Schools	651	3.1%	24	4.8%	1,896	30	3.3%
Commercial	Health	1,624	7.6%	28	5.5%	2,840	51	5.7%
Commercial	Lodging	216	1.0%	6	1.2%	706	18	2.0%
Commercial	Warehouse	679	3.2%	22	4.3%	3,676	40	4.4%
Commercial	Miscellaneous	617	2.9%	27	5.4%	6,765	44	4.9%
Commercial Total		9,523	44.8%	208	41.3%	41,717	367	40.8%
Industrial	Industrial Machinery	628	3.0%	28	5.5%	470	27	3.0%
Industrial	Petroleum	705	3.3%	1	0.3%	224	23	2.6%
Industrial	Chemicals	1,420	6.7%	87	17.2%	135	33	3.7%
Industrial	Food Production	1,544	7.3%	28	5.6%	3,135	68	7.6%
Industrial	Primary Metal	1,224	5.8%	2	0.5%	100	28	3.1%
Industrial	Misc. Manufacturing	3,465	16.3%	45	8.8%	4,394	99	11.0%
Industrial Total		8,985	42.3%	191	37.9%	8,458	278	30.9%
Unknown		2,758	13.0%	105	20.8%	13,778	255	28.3%
Total		21,267	100.0%	504	100.0%	63,953	900	100.0%

Take Rate Development Detail

A key element of the say / do adjustment methodology was to compare the proportion of households in the survey who say they would take part in an AIC lighting rebate program described as closely as possible to the one that actually exists with the proportion of households who have actually participated in the “real life” program which maps to that description.

In order to generate the estimate of the actual proportion of households that have participated, the AEG team developed residential take rates (also known as adoption rates or participation rates) based on responses to the surveys completed by 1,004 Ameren residential customers in the summer of 2015. Take rates are defined here as the percentage of people who, given the opportunity to complete an action under circumstances similar to those described in the survey, would actually follow through with that action; which in this case is to accept an incentive and adopt the corresponding DSM measure.

We will first describe the raw survey results, then explain the adjustments made to translate the responses offered in the survey into likely real-life actions.

Raw Survey Results

The questionnaire posed a battery questions like that described in the figure below, in which respondents were asked to consider a specific DSM measure and rate their likelihood to adopt it on a scale of 1 to 10.

Example Survey Question on Take Rates



EXAMPLE QUESTION FORMAT:

Suppose you need to replace your HVAC system...

<Describe the specific DSM measure and the energy, financial, or contextual factors here>

What is your likelihood of taking the rebate and purchasing the high efficiency unit instead of the standard efficiency unit?

Not At All Likely					Extremely Likely				
To Do This					To Do This				
1	2	3	4	5	6	7	8	9	10

The values between “1” and “10” are aggregated for all survey respondents and initially mapped to a raw, weighted average score representing the unadjusted likelihood of adopting each measure. The table below shows this mapping as a straight, linear mapping to the probability of adoption, where an indicated likelihood of “10” corresponds to a 100% probability of adoption and “1” corresponds to a 10% probability of adoption.

Raw Mapping of Stated Intent to Probability of Adoption

Stated Intent of Adoption	Raw Mapping to Probability of Adoption
1	10%
2	20%
3	30%
4	40%
5	50%
6	60%
7	70%
8	80%
9	90%
10	100%

Adjusting Stated Likelihood to Likely Actions

Copious research and real world experience tells us that stated intent does not translate simply into likely downstream behavior, however, with customers tending to overstate their actual likelihood of taking a future action. As a result, we know that we need to apply an adjustment to the unadjusted results derived from the approach outlined above in order to generate more accurate estimates of future behavior. In the past, this adjustment was made using information generated from historical research with other customers. Responding to feedback from AIC stakeholders, however, the AEG team moved to a different approach in which the "say / do" adjustment uses actual participation rates observed by AIC customers as a benchmark.

The revised method for determining the say / do adjustment (which the AEG team believes is best practice for this analysis) was to link to actual program participation levels using an "anchor" question that could be associated with existing program outcomes. Specifically, survey respondents were presented with a description of a lighting program which was described as closely as possible to the existing Ameren Illinois lighting program (as it has been delivered in the market place) and asked how likely they would be to participate in that program. Since historical program participation levels are available for the actual program, customer statements about their likelihood to participate in the "hypothesized" program (which is effectively the real program) can be compared directly to those historical participation levels. Comparing customer claims about how likely they would be to participate in a "hypothetical" program with their likelihood to participate in an actual program of that type gives us a "say / do" adjustment grounded in real-life Ameren Illinois experience. The residential "anchor" question used in the survey is presented below.

Weighted Average Expected Useful Life of Screw-in Lamps

Lamp Type	Screw-in Socket Saturation		Expected Useful Life from DSMore Batch Tools PY4 and PY5
	ODC PY4 Evaluation	2012 Potential Study Surveys	
Incandescent	60%	55%	1
CFL	36%	36%	5
Halogen	1%	3%	3
LED	0%	1%	27
Other	2%	5%	3
Weighted Avg EUL = 2.69	2.49	2.89	

Considering the total number of screw-in sockets available in the two respective studies, and dividing it by the weighted average bulb life, yields the expected number of sockets turning over in that year and available for a purchase decision. This number is around 16 million, as shown in the table below.

Expected Screw-in Socket Turnover

	ODC PY4 Evaluation	2012 Potential Study Surveys	Average
Total # of Screw-in Sockets	45,747,879	41,993,716	43,870,798
Weighted Avg Bulb Life	2.49	2.89	2.69
Expected Socket Turnover (Total # Sockets / Wtd Avg Bulb Life)	18,372,642	14,555,591	16,323,843

Dividing the total number of incandescent, PY4 bulbs by the total socket turnover in that year results in an inferred take rate of sockets of 25%, as shown in the table below (though note that this is the percentage of sockets, and not the percentage of households).

Second Calculation of Actual Take Rate: Incandescent Lamps divided by Turnover Based on Weighted Average Bulb Life

	PY4
Total lamps incandescent	4,154,672
Total sockets turning over	16,323,843
Take Rate	25%

Averaging the two above methods of 53% and 25% yields an actual AIC Lighting Program Take Rate of **39%**, meaning that 39% of all households have participated in the program. This value of 39% was then compared with the 79% unadjusted take rate that was generated from the survey anchor question to yield a say / do adjustment factor of 0.499 (the value which adjusts 79% to 39%) which was then applied to other measures as well.

Note that a similar process was used to generate equivalent values for the C&I sector, though since the calculations are fairly involved, they are not included here, but are included in other project documentation.

Information Used to Adjust Residential Results for MAP

The questions (and survey results) used to drive the adjustments of take rates for residential customers from RAP to MAP are outlined below.

	Unadjusted Take Rates
Q50: Likelihood to use rebate for new EE lighting based on rebate method	
1: Mail	67%
2: Online / Check	73%
3: Online / Bill Credit	71%
4: At point-of-sale	81%
5: Direct Install	55%
Implied base (average of other responses)	79%
Ratio of high to base	102.5%
Q51: Likelihood to use rebate for new EE lighting based on economic situation	
1: You have more money than usual	67%
2: You have less money than usual	51%
Q52: Likelihood to use rebate for new EE lighting based on light quality	
1: Color rendering is unfamiliar	61%
2: Lighting is "sleek" and communicates "green"	62%

Information Used to Adjust C&I Results for MAP

The questions (and survey results) used to drive the adjustments of take rates for C&I customers from RAP to MAP are outlined below.

	Unadjusted Take Rates
Q50: Likelihood to use rebate for new EE lighting based on rebate method	
1: Mail	60%
2: Online / Check	63%
3: Online / Bill Credit	64%
4: At point-of-sale	75%
5: Direct Install	67%
Implied base (average of other responses)	66%
Ratio of high to base	113.8%
Q51: Likelihood to use rebate for new EE lighting based on economic situation	
1: Your business does better than expected for several months in a row	60%
2: Your business does worse than expected for several months in a row	40%
Q52: Likelihood to use rebate for new EE lighting based on light quality	
1: Color rendering is unfamiliar	53%
2: Lighting is "sleek" and communicates "green"	60%
Q53: Likelihood to use rebate for new programmable thermostat depending on thermostat features	
1: Programming can over-ride individual settings	56%
2: Comes with companion website that offers enhanced features	55%
Q54: Likelihood to use rebate for new PC depending on auto-sleep functions	
1: Auto-sleep can over-ride "push" upgrades	44%
2: Auto-sleep can actually enhance security	47%

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