Ameren Illinois
Demand Side Management Market Potential Study:
Volume 1 – Executive Summary

Final Report

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Executive Summary

Ameren Illinois Company (AIC) engaged the Applied Energy Group (AEG) Team to conduct this Demand Side Management (DSM) Market Potential Study. It evaluates various categories of electricity and natural gas energy DSM measures and programs 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 electricity potential study with the IPA incremental savings filing that is no less than three years old (last study completed in 2013). Ameren Illinois chose to include natural gas as well.
- Estimate demand-side savings associated with traditional end-use energy efficiency measures, behavioral measures and programs, 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 assesses various tiers of energy efficiency potential including technical, economic, maximum achievable, and realistic achievable potential. The study developed updated baseline estimates 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.

As part of the study, the AEG Team conducted primary market research to collect data for the Ameren Illinois service territory, including: electric and natural gas end-use saturation data, customer demographics, and firmographics and customer attitudes and behavior. This information enables Ameren Illinois to understand how their customers make decisions related to their energy use and energy-efficiency investment decisions.

Ameren Illinois will use the results of this study in its Demand Side Management (DSM) planning process to optimally implement programs.

Report Organization

This report is presented in four volumes:

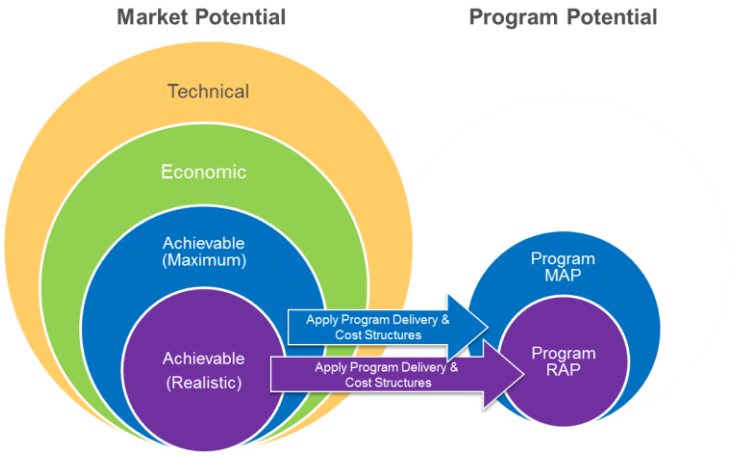
- Volume 1, Executive Summary
- Volume 2, Market Research Report
- Volume 3, Energy Efficiency Potential Analysis
- Volume 4, Appendices

This document is Volume 1: Executive Summary.

Definitions

This study estimated demand-side savings associated with three categories of DSM: traditional end-use energy efficiency measures, behavioral measures and programs, and combined heat and power (CHP) measures. Savings are estimated relative to a **baseline projection**, which is a reference end-use forecast developed specifically for this study that estimates what would happen in the absence of any future DSM programs. It includes naturally occurring energy efficiency and savings from equipment standards and building codes that were active and on the books for future enactment as of January 31, 2014. The savings estimated in this study represent net savings[1].

For each measure category, market potential and program potential were estimated.



Market potential (or measure-level potential) is evaluated before delivery mechanisms and program costs are considered. There are four levels:

- **Technical potential** is defined as the theoretical upper limit of energy efficiency potential. It assumes that customers adopt all feasible measures regardless of their cost.
- **Economic potential** represents the adoption of all ***cost-effective*** measures, defined as those that have a benefit-cost ratio of 1.0 or greater using the total resource cost (TRC) test
- **Achievable market potential** refines economic potential by applying customer participation rates that account for market barriers, customer awareness and attitudes, program maturity, and other factors that affect market penetration of DSM measures.
    - **Maximum achievable potential** assumes ideal market, implementation, and customer preference conditions, with well-established communication channels, trade allies and delivery partners, and high levels of incentives, administrative, and marketing costs.
    - **Realistic achievable potential** reflects expected program participation given reasonable barriers to customer acceptance, non-ideal implementation conditions, and limited program budgets.

Program potential creates utility programs by bundling the individual measures and initiatives from the achievable market potential results. This includes the subset of measures that can realistically be implemented considering alignment with near-term implementation accomplishments and budgetary constraints, as well as long-term strategic goals and planning constraints. It also considers delivery mechanisms and program costs. **Maximum achievable program (MAP)** potential makes these adjustments to the market maximum achievable potential, while **realistic achievable program (RAP)** begins with market realistic achievable potential.

Throughout the report we use several abbreviations and acronyms. The list is provided at the end of this document.

[1] Savings in "net" terms instead of "gross" terms mean that the baseline forecast includes naturally occurring efficiency. In other words, the baseline assumes that some customers are already purchasing the more efficient option.

Overall Conclusions

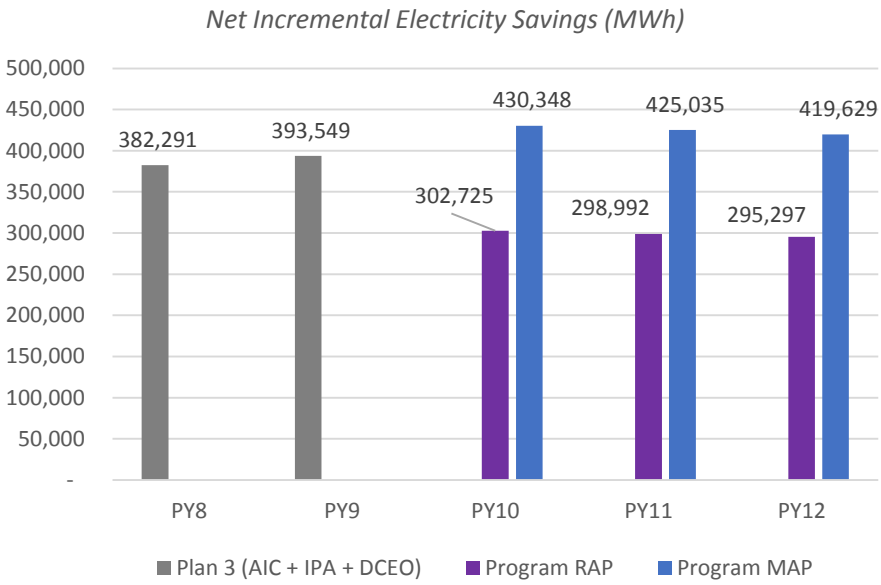
This study has enhanced Ameren Illinois' knowledge of its customer base and the potential for electric and natural gas energy savings that are possible through DSM programs. The key highlights are as follows:

- With a thorough review of demand-side resources, estimates of program potential support continued portfolio savings for the next three-year program cycle at roughly the same level as recent historic savings, with the possibility of slight increases. The potential comes largely from traditional energy-efficiency measures, augmented by behavioral initiatives, and to a lesser degree from combined heat and power installations.
- Several factors contribute to the continuation of projected savings potential relative to previous planning efforts
    - The continued transformation of the market through customer education and awareness,
    - Enhancements in the performance and costs of key technologies like LED lighting and heat pump water heaters
    - More robust administration and procurement practices among the now-seasoned program implementers, trade allies, and market partners
- On the other hand, there are headwinds that place constraints on the amount of achievable program potential:
    - Historically low global energy prices coupled with low regional avoided cost benefits create an environment where it is more challenging to justify measures as cost-effective.
    - Meanwhile, the enactment of federal building codes and appliance efficiency standards are resulting in more stringent baselines and lower per-unit savings for measures across the board.
- In general, attaining the maximum achievable program potential in the Cycle 4 plan will cost more than previous plan cycles for both electric and natural gas programs on the basis of absolute dollars and dollars per-unit-saved.
- The study identifies that a majority of savings are to be had in the commercial and industrial sectors as opposed to the residential sector. This reflects the effectiveness of Federal appliance standards in the residential space.

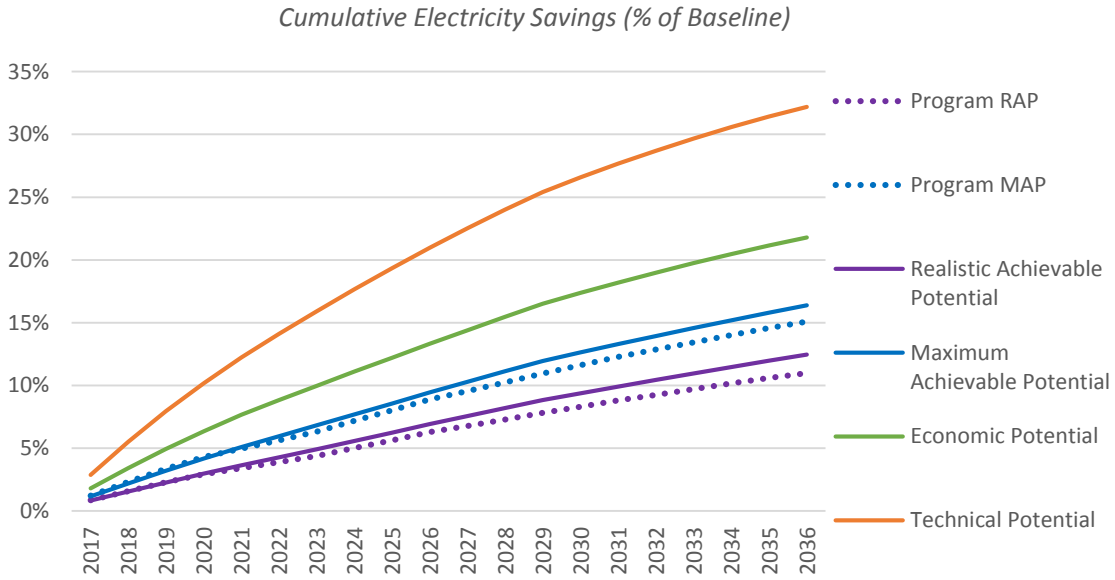
Key Findings for Electricity

The most recent program years (PY8 and PY9), based on plans from Ameren, IPA, and DCEO, project savings of 382 GWh to 394 GWh per year. The corresponding program potential from this study for the first three years of the analysis horizon (i.e., Plan 4) is shown as a range – Program RAP and Program MAP. This suggests that savings will continue along a similar trajectory as the past few years.

Program spending for PY8 and PY9 are expected to be $99 million in each year. The estimated budgets for Plan 4 program years are in the range of about $80 million to $145 million per year.

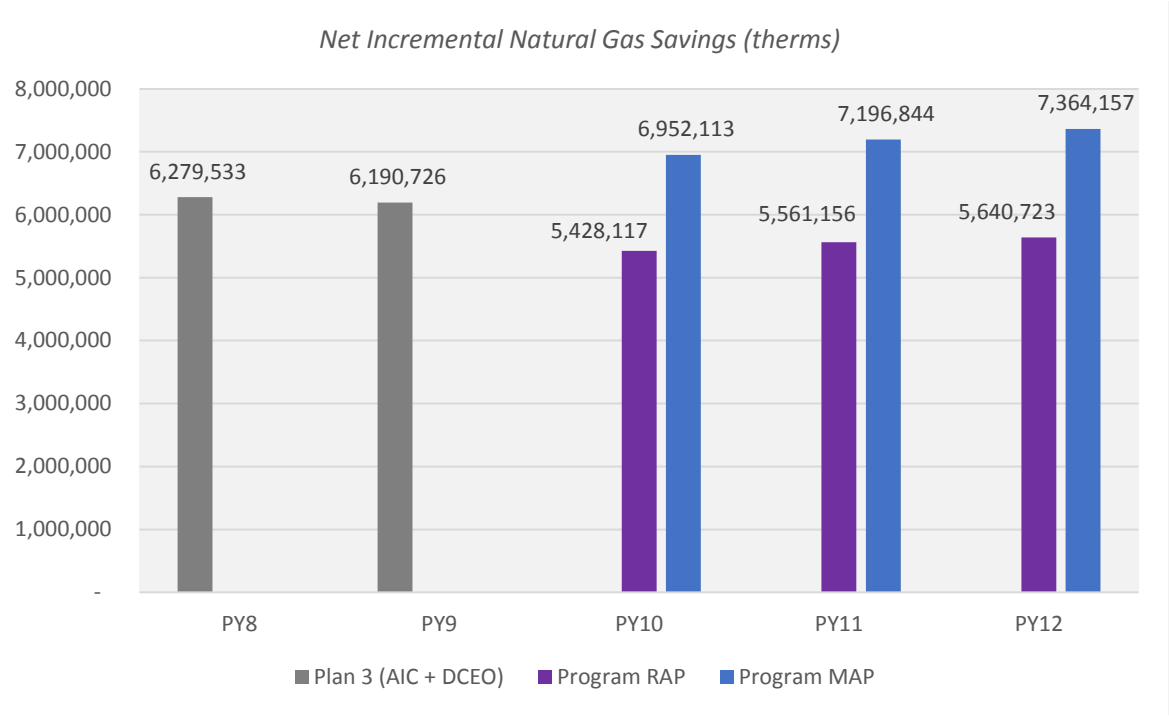


In addition to the analysis in support of Plan 4, the study also took a long view out to 2036 to support Ameren's integrated resource planning (IRP) process. The cumulative program potential savings are in the range of 11% to 15% of the baseline after 20 years, for average annual savings of 0.5% to 0.8% each year. Technical potential reaches 32% by 2036. The technical potential is tempered severely by the low regional avoided cost forecast, resulting in the green line of economic potential, which reaches 22% by 2036. This value is then decremented by the customer adoption factors or take rates to account for the various cases of achievable potential.

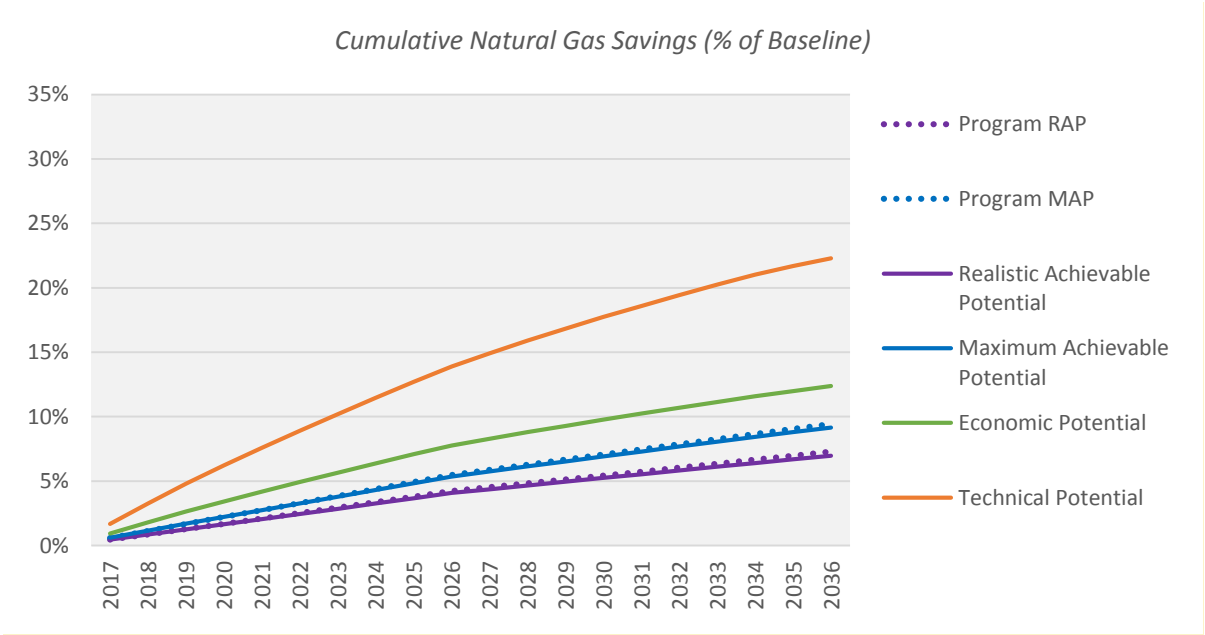


Key Findings for Natural Gas

Similar to the outcome for electricity, future natural gas savings are expected to be similar to the recent past. Program spending for PY8 and PY9 are just under $16 million. The estimated annual budgets for each Plan 4 year are expected to be between $11 million and $21 million.



The long-term projection for natural gas savings is not as robust as electricity. After 20 years, the cumulative achievable program savings as a percent of the baseline projection are in the range of 7% to 10%.

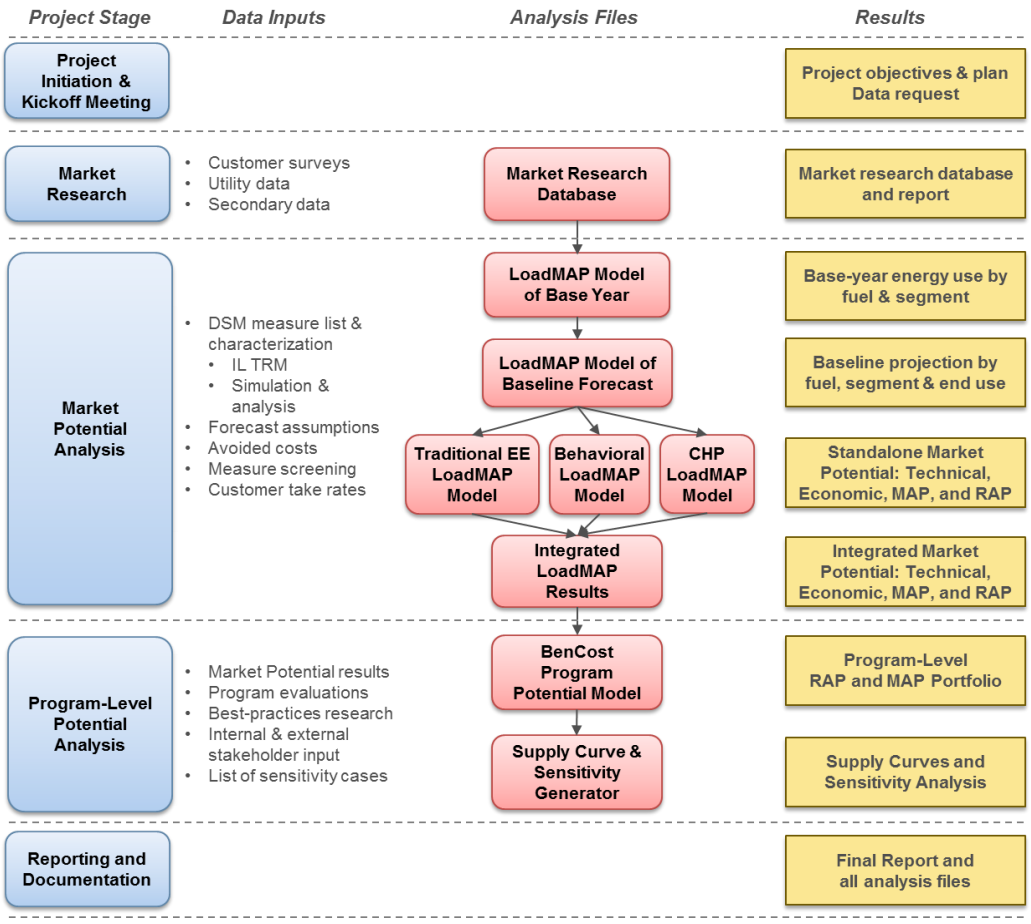


Overview of Analysis Approach

To perform the potential analysis, AEG followed industry best practices for potential studies and used a bottom-up approach following several major steps summarized and described below:

1. Conducted primary market research to identify equipment saturations, building characteristics, measure applicability and saturations, occupant behavior, and customer interest in programs.[2]
2. Using the market research, performed a market characterization to describe sector-level electricity and natural gas use for the residential, commercial, industrial, and street lighting sectors for the base year, 2014.
3. Developed a baseline end-use projection of electricity and natural gas for 2014 through 2036.
4. Defined and characterized several hundred measures to be applied to all sectors, segments, and end uses. The primary source of measure data was the Illinois TRM.
5. Estimated the market potential reductions to the baseline projection that could be expected from measures under four cases of energy-efficiency potential as described above.
6. Developed estimates of preliminary program-level potential based on the market potential by assigning specific delivery mechanisms and program cost structures. Ameren Illinois' current DSM portfolio, as well as cross-cutting industry research and benchmarking, were used as guidance.

Analysis Approach Used for Ameren Illinois



[2] Details on the market research methodology and results are available in Volume 2, Market Research.

Market Research

The market research contained in this report and conducted as part of Ameren Illinois' DSM Market Potential Study is concerned with supporting the estimation of Realistic and Maximum Achievable Potential in terms of customer adoption of a variety of DSM measures for each customer segment. Key, high-level findings are summarized below. Detailed information is provided in Volume 2.

The market research collected electricity and natural gas end-use data, end-use saturation data, customer demographics, and psychographic information in order to provide insight into how Ameren Illinois customers make decisions related to electric and natural gas usage and energy efficiency investment decisions.

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

The following broad questions were embedded in the market research:

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 non-energy, non-economic, demographic, and psychographic characteristics correspond to a higher likelihood to participate in energy efficiency programs?

We used a separate survey for the residential and business customers, with a fielding strategy and number of completions as summarized in the table below.

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 paybacks[3] 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

Adjusted Residential Take Rates

	Payback period (years)			
Measure	0	1	3	5
HVAC	40%	40%	37%	35%
Refrigerator	n/a	41%	38%	36%
PC	n/a	38%	35%	31%
Advanced thermostat	41%	37%	36%	33%
CFL	44%	43%	39%	37%

[3] A zero year payback corresponds to an instantaneous payback, or an incentive that is 100% of the incremental measure cost.

most measures. This indicates strongly that factors and barriers aside from pure economics are part of the decision making process

- 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%) and are more likely to believe that Ameren Illinois is a credible source of information about energy efficiency and is a company that helps customers save money.
- Unsurprisingly, customers who have highly "green" and/or highly cost-savings-focused attitudes consistently show much higher likelihoods to adopt energy efficiency measures.

Business Customer Take Rates

Take rates were also developed for business customers. 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 on take rates indicate that:

- Across these eight end use measures, customers are estimated to have the highest take rates for CFLs, followed closely by Advanced Thermostats and HVAC units. Servers and energy management systems show the lowest take rates at 35% and 32% respectively.
- More specifically, CFLs at a 0 year payback have a take rates of 48%, falling to 46% for a 1 year payback.

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

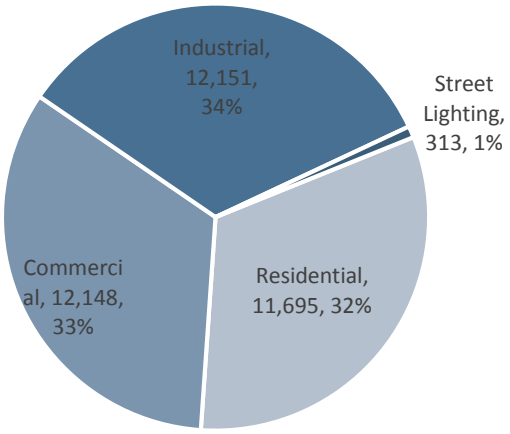
Adjusted Take Rates for Business Customers

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%
Advanced Thermostat	0	46%
Advanced Thermostat	1	45%
Advanced Thermostat	3	44%
Advanced 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%

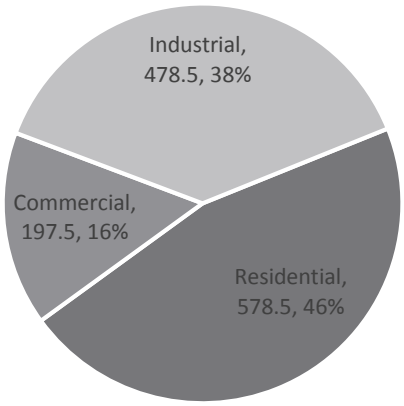
Market Characterization

In 2014, Ameren Illinois customers used 36,307 GWh and 787 million therms. The relevant industrial natural gas load for this study is smaller than Ameren Illinois' actual system load since there is a downward adjustment of approximately one half of this sector to account for large self-direct customers. These opt-out customers have been removed since they have elected not to participate in energy efficiency programs and are therefore not applicable to the analysis.

Electricity Use (GWh), 2014



Natural Gas Use (MMtherms), 2014



	Customers	GWh	%	Customers	MMtherms	%
Residential	1,062,644	11,695	32.2%	747,088	578.5	46.1%
Commercial	154,997	12,148	33.5%	62,549	197.5	15.7%
Industrial	1,004	12,151	33.5%	175	478.5	38.1%
Street Lighting	-	313	0.9%	-	-	-
Total	**1,218,645**	**36,307**	**100%**	**809,812**	**787.3**	**100%**

Residential Sector

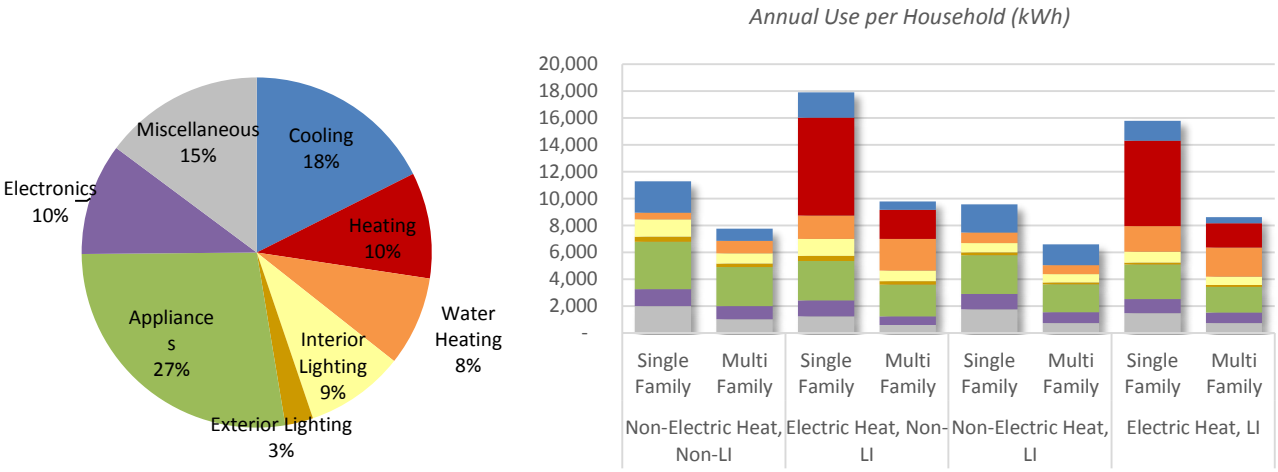
In 2014, there were over 1 million households in the Ameren Illinois territory that had total electricity usage of 11,695 GWh. Average electricity use per household was 11,006 kWh, including customers with and without electric heat. Individual household usage varies as a result of house size, age and use of natural gas or other fuels for space heating, water heating, and appliances.

The average distribution of annual electricity use by end use for all customers is shown below for the entire sector and by housing type.

- The largest four electricity end uses — appliances, cooling, electronics and heating — account for 65% of total use. Appliances include refrigerators, freezers, stoves, clothes washers, clothes dryers, dishwashers, and microwaves. The remainder of the energy falls into water heating, lighting, and the miscellaneous category – which is comprised of furnace fans, pool pumps, and other "plug" loads (all other usage, such as hair dryers, power tools, coffee makers, etc.). The breakdown of usage varies significantly among natural gas versus electrically heated homes. Based on the market research, an average of 26% of survey respondents use electricity for space heating (see Volume 2).

- Single family, non-low income homes with electric heat have the highest use per customer at 17,907 kWh/year, reflecting a higher saturation of electric space heating.

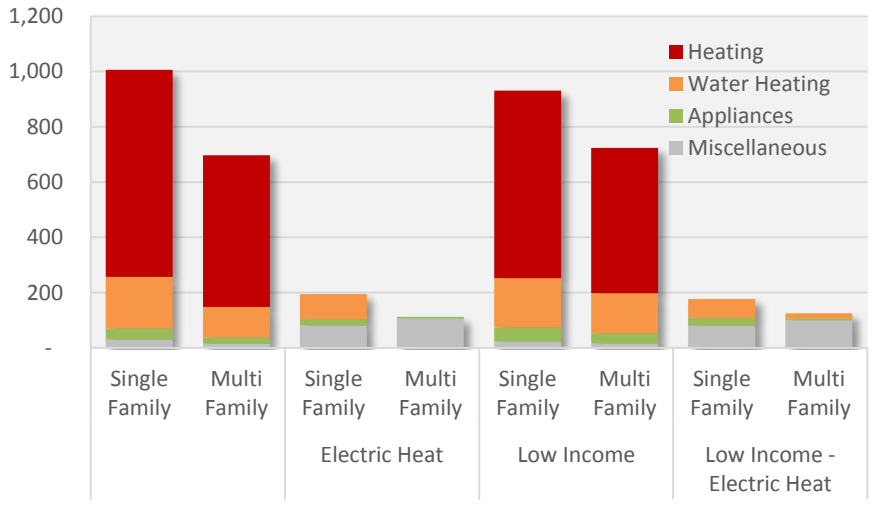
Residential Electricity Annual Use by End Use and Housing Type, 2014



Overall, lighting and electronics usage has decreased since the 2013 potential study. Efficient lamp purchases have increased and the overall inventory of lamps uses less energy than in the previous study. Also, households have replaced large PCs with tablets/laptops and set-top boxes with streaming devices.[4]

Natural gas use in the residential sector is dominated by space heating, which accounts for 71% of total use. Water heating accounts for 19% and appliance and miscellaneous uses, such as pool and spa heaters, account for the remainder. Natural gas intensities by end use vary by housing type. Single family, non-low income homes with gas space heating have the highest use per customer at 1,006 therms/year.

Residential Natural Gas Annual Use per Home (Therms), 2014

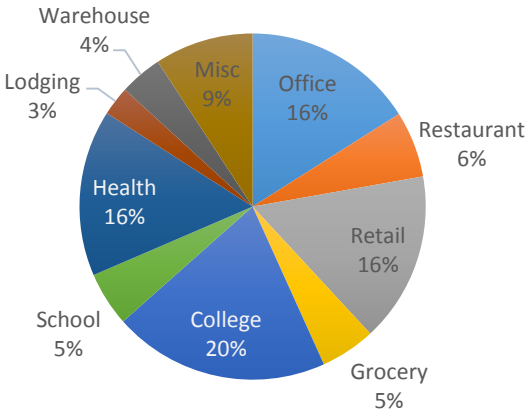


[4] "Ameren Illinois Energy Efficiency Market Potential Study Assessment." July 2013. http://www.ilsag.info/potential-studies.html

Commercial Sector

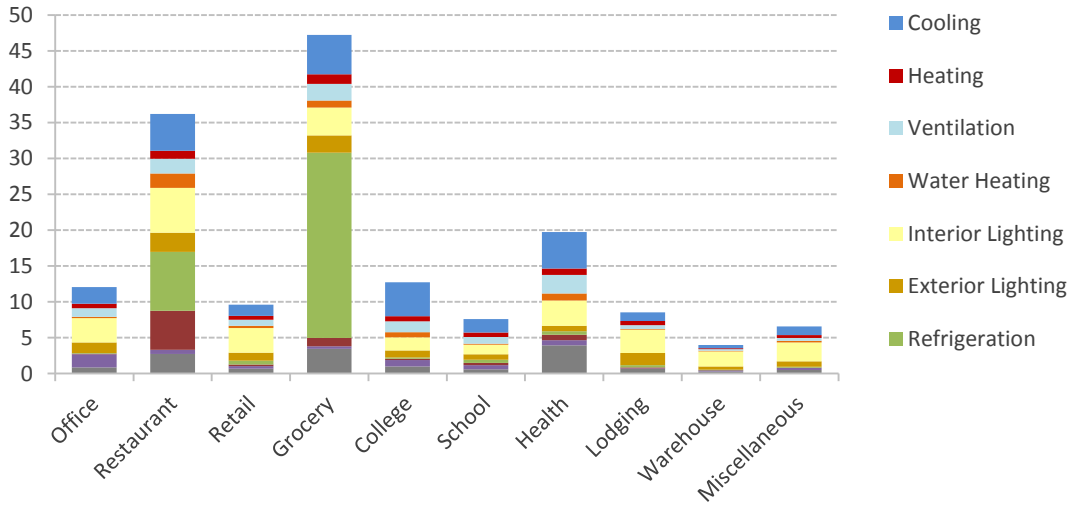
In 2014, Ameren Illinois's commercial customers used 12,148 GWh of electricity and 198 MMtherms of natural gas. The commercial and industrial survey performed as part of this study and Ameren Illinois billing data were used to develop estimates of annual energy use and intensity for 10 building types. The largest segments are offices, retail, health and colleges. The Miscellaneous segment includes unclassified or non-standard building types, such as greenhouses, fire stations, and auto shops.

Commercial Electricity Use By Building Type, 2014



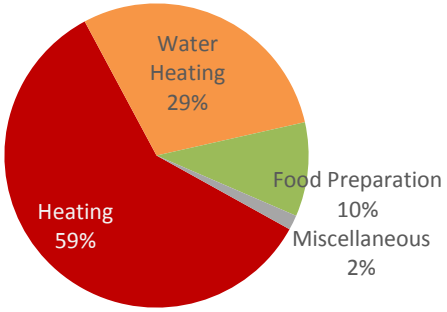
As expected, commercial sector electricity use is dominated by lighting (25% of the total), in spite of continued efficiency gains resulting from appliance standards and utility programs. Cooling is second at 22%. Energy intensity by end use varies among building types as shown below. Intensity is highest in grocery stores and restaurants, as a result of high refrigeration and food preparation uses. Most of the remaining building types have use in the 10 to 20 kWh per square foot per year range, which comports with national averages.

Commercial Electricity Intensity by End Use and Building Type (Annual kWh/sq. ft.), 2014



Natural gas use in the commercial sector, like the residential sector, is dominated by space heating, followed by water heating. Food preparation use, which is very high in restaurants, accounts for 10% of total use across the entire sector. The intensity of gas use in restaurants is 0.85 therms per square foot, compared with 0.46 therms per square foot in the health segment and 0.26 therms per square foot in all remaining building types.

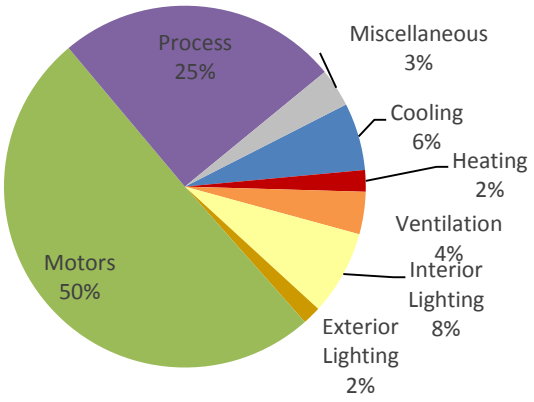
Commercial Natural Gas Use, 2014



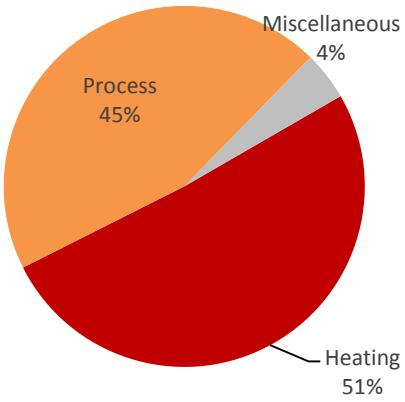
Industrial Sector

In 2014, Ameren Illinois's industrial customers consumed 12,151 GWh of electricity and 787 MMtherms of natural gas. The distribution of annual electricity and natural gas use by end use for all industrial customers is shown below. For electricity, motors are the largest overall end use for the industrial sector, accounting for 50% of energy use. Note this end use includes a wide range of industrial equipment, such as air and refrigeration compressors, pumps, conveyor motors, and fans. The process end use accounts for 25% of annual energy use, which includes heating, cooling, refrigeration, and electro-chemical processes. Natural gas use is roughly split in half between space and process heating, with a small amount of miscellaneous usage.

Industrial Electricity Use, 2014



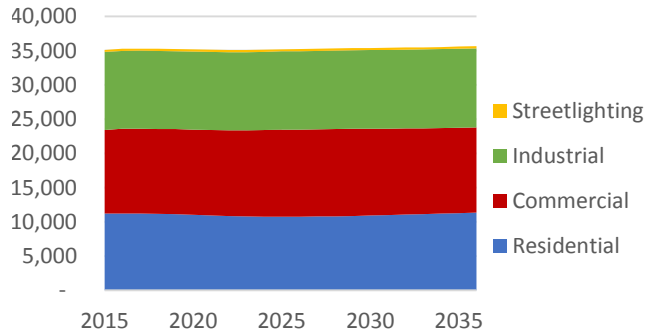
Industrial Natural Gas Use, 2014



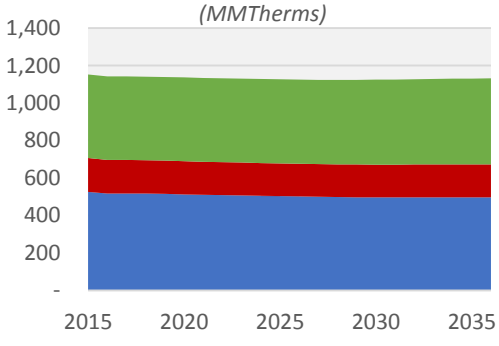
Baseline Projection

The baseline projection is an end-use load forecast that incorporates a forecast of customer growth, changes in electricity and natural gas prices, and trends in fuel shares. It also includes expected impact of appliance/equipment standards and building codes. The baseline projections represent what the consumption is likely to be in the future in absence of new efficiency programs and it serves as the metric against which energy efficiency potentials are measured. As shown below, the electricity and natural gas forecasts are essentially flat over the 20-year horizon for this study.

Electricity Baseline Projection (GWh)



Natural Gas Baseline Projection (MMTherms)



Market Potential

The energy efficiency potential identified in this study is distinguished at the measure level into three main categories:

- *Traditional Energy Efficiency* measures are equipment- or purchase-based and include familiar measures such as high-efficiency central air conditioners, high-efficiency windows, and smart thermostats
- *Behavioral* measures focus on habits, operations, and non-purchase behaviors; namely: Home Energy Reports in the residential sector and Strategic Energy Management, Commissioning, and Retrocommissioning in the commercial and industrial sectors
- *Combined Heat & Power* measures, where waste heat from onsite electricity generation is captured and used for space or process heating needs.

The analytical treatment of these three measure categories is the same, with the savings applied to the same market segments and baseline projections as described above; but the planning, policy, and philosophical implications of the underlying initiatives makes their distinction useful for downstream strategic considerations.

Traditional energy efficiency measures comprise a large majority of the savings in both the electricity and natural gas portfolios. Behavioral are the next largest, with combined heat and power representing the smallest amount of potential and only applicable in the non-residential sectors. For natural gas, there are no reported impacts associated with combined heat and power. This is a result of an adjustment made per section 4.4.32 of the Illinois Technical Reference Manual, where the electricity savings are multiplied by a factor of 0.70 for accounting purposes to offset the fact that CHP systems actually drive net increases in natural gas consumption as fuel.

Achievable Market Potential by Measure Category

Realistic Achievable Potential	Electricity (Cumulative GWh)					Natural Gas (Cumulative MMTherms)				
	2017	2018	2019	2026	2036	2017	2018	2019	2026	2036
EE Measures	230	454	674	2,079	3,704	4.1	8.2	12.4	41.1	69.1
Behavioral Initiatives	68	94	121	315	632	1.2	1.6	2.0	4.8	9.8
CHP	-	2	8	46	111	-	-	-	-	-
Total	**299**	**551**	**802**	**2,441**	**4,447**	**5.3**	**9.8**	**14.4**	**45.9**	**78.9**
Max Achievable Potential										
EE Measures	331	649	957	2,822	4,829	5.5	11.1	16.6	53.4	89.8
Behavioral Initiatives	80	123	166	449	879	1.4	2.0	2.7	6.8	13.7
CHP	-	3	10	60	139	-	-	-	-	-
Total	**411**	**776**	**1,134**	**3,330**	**5,846**	**6.9**	**13.1**	**19.3**	**60.3**	**103.6**

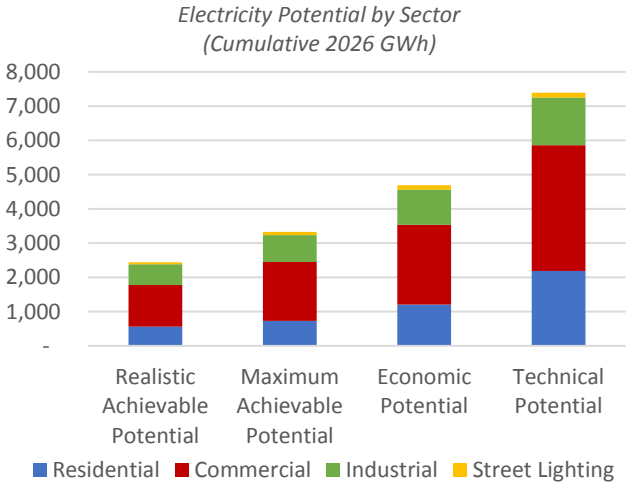
Electricity

Over the next three years, the cumulative net achievable market potential for electricity is projected to be between 802 and 1,134 GWh, which represents average savings between 0.8% and 1.1% of the baseline projection. These savings estimates are consistent with what Ameren Illinois has achieved in the past.

Summary of Electricity Potential

	2017	2018	2019	2026	2036
Baseline Projection (GWh)	**35,315**	**35,285**	**35,257**	**35,241**	**35,676**
Cumulative Savings (GWh)					
Realistic Achievable Potential	299	551	802	2,441	4,447
Maximum Achievable Potential	411	776	1,134	3,330	5,846
Economic Potential	634	1,204	1,743	4,697	7,779
Technical Potential	1,019	1,939	2,803	7,395	11,486
Energy Savings (% of Baseline)					
Realistic Achievable Potential	0.8%	1.6%	2.3%	6.9%	12.5%
Maximum Achievable Potential	1.2%	2.2%	3.2%	9.5%	16.4%
Economic Potential	1.8%	3.4%	4.9%	13.3%	21.8%
Technical Potential	2.9%	5.5%	7.9%	21.0%	32.2%

Electricity savings potential by customer sector in 2026, ten years into the forecast, is shown at right. The commercial sector is the highest, with nearly twice the potential savings of either the residential and industrial sectors. Street lighting has a relatively small share of total baseline use and also comprises a small component of the potential savings. Sector allocation is roughly consistent across the various cases/scenarios of potential, as well as across the study's time horizon in other years.



Over the 2017-2019 timeframe, the electricity measures that have the highest realistic achievable market potential savings include (cumulative GWh):

- Residential interior screw-in lamps (59), home energy reports (41) and smart thermostats (31)
- Commercial sector screw-in LED lamps (38), occupancy sensors (34), linear LED lighting (34)
- Commercial and industrial strategic energy management (33) and retro-commissioning (46)

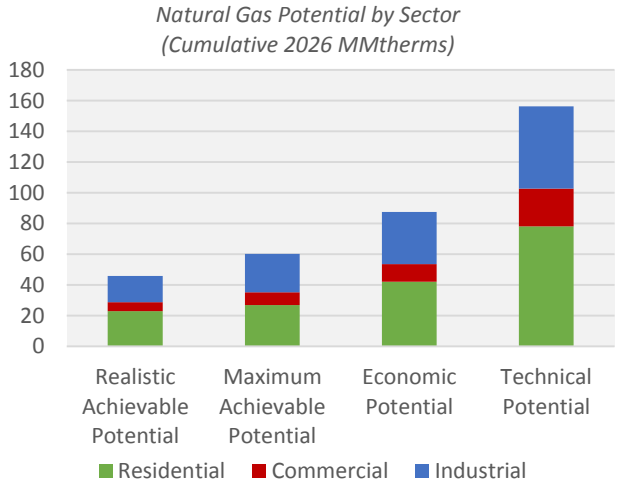
Natural Gas

By 2019, the cumulative achievable savings for natural gas are estimated to be between 14.4 and 19.3 MMtherms. This corresponds to average annual net savings of between 0.4% and 0.6% of the baseline projection.

Summary of Natural Gas Potential

	2017	2018	2019	2026	2036
Baseline Projection (MMtherms)	**1,142**	**1,140**	**1,139**	**1,125**	**1,132**
Cumulative Savings (MMtherms)					
Realistic Achievable Potential	5.3	9.8	14.4	45.9	78.9
Maximum Achievable Potential	6.9	13.1	19.3	60.3	103.6
Economic Potential	10.6	20.5	30.1	87.4	140.1
Technical Potential	19.3	37.3	54.8	156.3	252.2
Energy Savings (% of Baseline)					
Realistic Achievable Potential	0.5%	0.9%	1.3%	4.1%	7.0%
Maximum Achievable Potential	0.6%	1.1%	1.7%	5.4%	9.2%
Economic Potential	0.9%	1.8%	2.6%	7.8%	12.4%
Technical Potential	1.7%	3.3%	4.8%	13.9%	22.3%

The potential savings for natural gas by sector in 2026 are dominated by the industrial sector, due largely to its large share of baseline consumption. The commercial sector has the lowest share of baseline use and also the least opportunity for savings. The sector allocation is roughly consistent across the various cases/scenarios of potential, as well as across the study's time horizon.



Over the 2017-2019 timeframe, the natural gas measures that have the highest realistic achievable market potential savings include (cumulative MMtherms):

- Residential smart thermostats (4.1), duct repair and sealing (0.6)
- Industrial wall-cavity insulation (1.9), destratification fans (1.6) and process heat boiler upgrade (0.7)
- Commercial and industrial strategic energy management (0.5) and retro-commissioning (0.6)

Program Potential

Program potential is defined as the portion of the achievable potential that might be reasonably achieved given the realities of implementation and the constraints of program resources. It reflects recent implementation accomplishments, available future budget, and long-term strategic goals.

This study developed preliminary estimates of program potential that will be refined into program designs in a separate effort later in 2016. To translate market potential into program-level potential, the following adjustments were applied:

- Excluded any measure that did not pass the TRC screen
- Allocated each passing measure to one or more program; electricity and gas measures are often combined within a single program
- Added program administrative & delivery costs
- Ensured the most recent and relevant net-to-gross ratios were reflected
- Considered measure bundling, delivery mechanisms, and program-level cost-effectiveness. For example, at this stage we excluded efficient residential electronic equipment measures since there is no viable delivery method for a utility program in this market. We also excluded Appliance Recycling since the program bundle is no longer cost-effective due to progressively lower levels of unit energy savings and program net-to-gross ratios.

The programs included in these preliminary estimates of program potential are similar to those currently being offered in the Ameren Illinois service territory.

Residential Programs	Business Programs
Lighting	C&I Standard
Behavior Modification	C&I Custom
New Homes	Retro-commissioning
Whole Home	Small Business Direct Install
HVAC	Strategic Energy Management
Multifamily	Street Lighting
School Kits	Combined Heat and Power
Rural Kits	Institutional & Public Facilities
Moderate Income	
Smart Thermostats	
Low Income - Single Family	
Low Income - Multifamily	

New Initiatives in Preliminary Program Potential

There are several new initiatives and technologies that are critical additions to the DSM portfolio in the study's time horizon.

- **LED lighting** - Solid state lighting has now become a mainstream technology that will be taking the place of fluorescent lamps in all aspects of the portfolio over the planning horizon. Lamp efficacies for screw-in, linear, and panel LEDs are improving and costs are declining, and these technologies will be a large part of the portfolio, particularly in the business programs, in the coming years.
- **Combined Heat & Power** – This study models a new CHP incentive program as coming online in the second year of the coming implementation cycle. This will allow for time to establish the details of the program and related rates and tariffs.
- **Smart Thermostats** - In Illinois and indeed all around the country, capabilities and market adoption are growing in the realm of smart, programmable, learning, and wifi-enabled thermostats. Ameren Illinois is planning to incentivize and evaluate smart thermostats in a large number of customer households over the next implementation cycle, and is planning for a large portion of the incremental energy savings to come from these devices.
- **Street Lighting** - LED retrofits and smart-dimming technologies provide a largely untapped source of cost-effective savings in a program that is new to the portfolio.

- **Smart Power Strips** - We have modeled and included the second generation of smart, sensing power strips that combine occupancy, load, and other sensors to enable higher savings for electronics end uses, both in the office and at home.
- **Retrocommissioning** - The existing Ameren Illinois RCx program can be bolstered by the use of more powerful Building Analytics software that is rapidly permeating the industry.
- **Strategic Energy Management** - Ameren Illinois' Large C&I customer program will continue to focus on customized efficiency plans and cultural change, and can capitalize on national best practices in the SEM area, including lessons learned from implementations of ISO-500001.

A high-level summary of realistic achievable program potential is provided below. Additional information for electricity, natural gas and the maximum achievable potential case is provided in Volume 3, Section 5.

Realistic Achievable Program Potential Summary

Program	Total Budget (000s)			Electricity Savings Net Incremental (MWh)			Natural Gas Savings Net Incremental (therms)		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Lighting	$3,813	$3,541	$3,174	35,964	33,530	30,232	-	-	-
Behavior Modification	$2,320	$2,320	$2,320	42,383	41,932	41,449	897,815	895,152	891,628
New Homes	$735	$735	$735	999	999	999	13,794	13,794	13,794
Whole Home	$2,524	$3,179	$3,259	9,647	9,915	10,045	372,390	438,954	453,914
HVAC	$3,604	$3,932	$3,752	4,602	5,011	4,694	384,348	391,420	397,780
Multifamily	$375	$371	$360	1,653	1,596	1,504	60,369	61,801	63,453
School Kits	$219	$207	$190	853	798	725	29,038	27,360	25,016
Rural Kits	$219	$207	$190	853	798	725	29,038	27,360	25,016
Moderate Income	$6,093	$6,368	$6,358	4,951	4,830	4,582	247,335	253,654	260,317
Smart Thermostats	$5,368	$5,547	$5,727	7,280	7,416	7,556	1,213,459	1,240,537	1,266,905
Low Income SF	$3,580	$3,739	$3,742	2,327	2,274	2,165	118,445	121,480	124,707
Low Income MF	$3,961	$3,982	$3,986	3,686	3,552	3,378	171,470	175,735	180,790
C&I Standard	$21,683	$22,257	$23,048	81,673	79,321	78,275	978,684	987,463	996,334
C&I Custom	$15,296	$15,701	$16,258	33,376	32,415	31,987	406,992	410,642	414,331
Retro-commissioning	$2,600	$2,696	$2,794	15,152	15,371	15,590	201,321	207,497	213,757
Small Business Direct Install	$5,451	$5,439	$5,443	16,774	15,525	14,539	59,917	60,503	61,083
Strategic Energy Management	$2,511	$2,629	$2,750	10,698	10,980	11,261	148,054	152,051	156,047
Street Lighting	$582	$588	$588	7,749	7,503	7,244	-	-	-
Combined Heat and Power	$0	$458	$973	-	2,469	5,177	-	-	-
Institutional & Public Facilities	$7,883	$8,215	$8,324	22,105	21,700	20,953	95,647	95,754	95,850
Residential Total:	$32,811	$34,129	$33,793	115,198	112,650	108,052	3,537,502	3,647,245	3,703,321
Business Total:	$56,006	$57,982	$60,179	187,527	186,342	187,245	1,890,614	1,913,911	1,937,402
Portfolio Total:	$88,817	$92,111	$93,972	302,725	298,992	295,297	5,428,117	5,561,156	5,640,723
% of Baseline Forecast				0.86%	0.85%	0.84%	0.48%	0.49%	0.50%

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	Roof top 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

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