EVERGREEN ECONOMICS

Independent EM&V Audit of the Ameren Missouri PY2020 Program Evaluations

Final Report

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1 Executive Summary and Audit Conclusions

In 2020, Ameren Missouri continued implementing its Missouri Energy Efficiency Investment Act (MEEIA) Cycle 3 DSM Programs (Case No. EO-2018-00211). The MEEIA Cycle 3 Programs covered in this audit include:

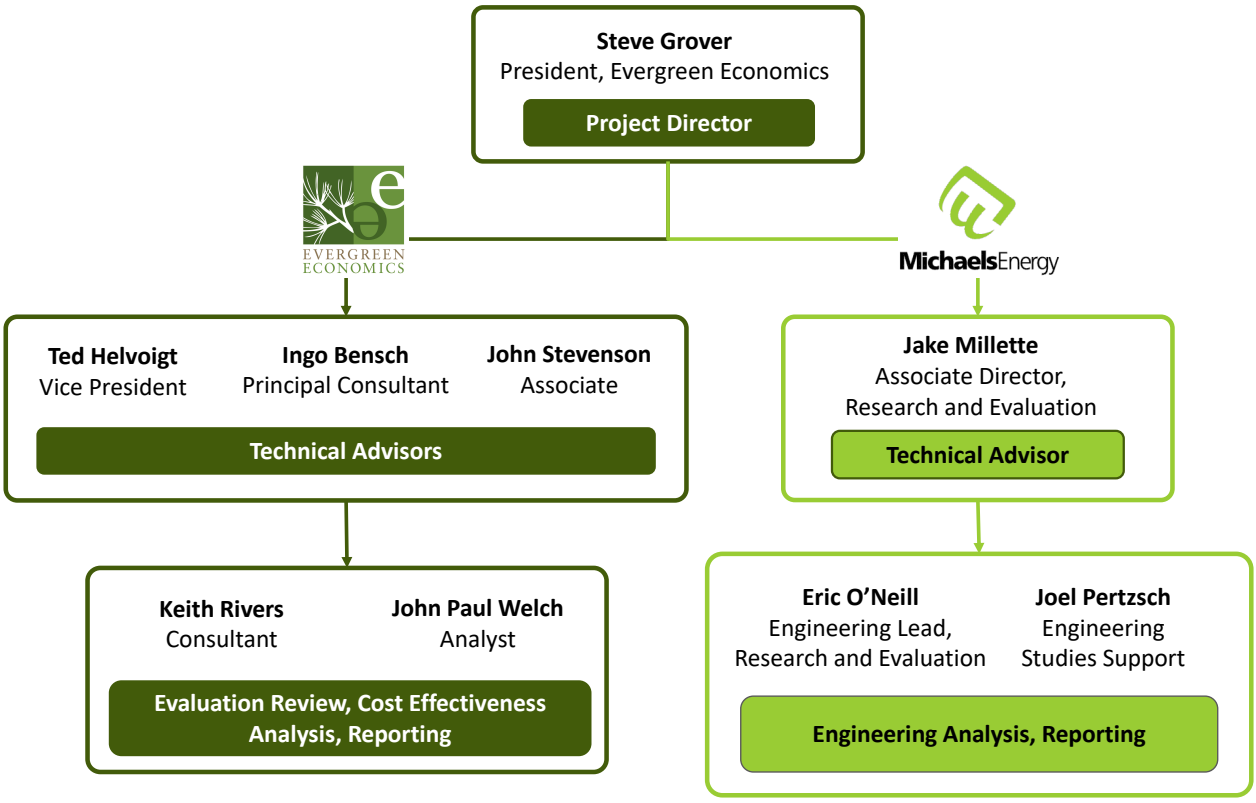
- **Residential Lighting –** The Residential Lighting Program is designed to increase sales and awareness of ENERGY STAR qualified LED lighting products. The target market consists of all residential customers within the Ameren Missouri service territory. The Lighting Program is delivered through two channels including upstream (via retail partners) and the Ameren Missouri Online Store.
- **Heating and Cooling (HVAC) –** The HVAC program obtains energy and demand savings through improvements in the operating performance of existing residential cooling units or replacement of central air conditioning (CAC) units and heat pumps. The program is delivered through two channels including a downstream channel and a new to PY2020 midstream channel that focuses on making super-efficient HVAC systems more broadly available to Ameren customers.
- **Home Energy Reports (HER) –** The HER Program was designed to promote changes in energy consumption behaviors that result in reduced electricity usage. The target market consists of residential customers in the Ameren Missouri service territory. This program is deployed as a randomized controlled trial, where customers are randomly assigned to a treatment or control group. The implementer also identifies and maintains a control group on non-participating customers.
- **Residential Efficient Products (REP) –** This program is designed to raise customer awareness of the benefits of high-efficiency products and to educate residential customers to save energy cost-effectively. Four measures were included in PY2020 including advanced thermostats, tier 1 and tier 2 power strips, variable speed and multi-speed pool pumps, and heat pump water heaters.
- **Energy Efficient Kits (EEK) –** The Energy Efficiency Kits program is designed to increase customer awareness of the benefits of high-efficiency products, educate residential customers about energy consumption in their homes, and offer information, products, and services to residential customers to encourage cost-effective energy savings. Due to the affects COVID-19 had on how schools operated in PY2020, the program team developed a set of processes and educational materials designed to be deployed virtually to supplement existing materials designed for use in the classroom.
- **Multifamily Market Rate (MFMR) –** The Multifamily Market Rate Program was designed to provide a one-stop-shop approach to assist owners and operators of multifamily Market Rate properties to overcome barriers to completing comprehensive retrofits. The program serves multifamily properties that have three or more tenant units and receive electric service from Ameren Missouri.

- **Residential Appliance Recycling (RAR) –** This program is designed to promote the retirement and recycling of inefficient refrigerators, freezers, dehumidifiers, and room air conditioners from households by offering turn-in incentives, free pickup of working equipment, and information on the operating costs of inefficient units.
- **Single-Family Income Eligible (SFIE) –** The Residential Single-Family Income Eligible Program, formerly known as the CommunitySavers Program, is designed to provide whole-home energy efficiency upgrades that result in long-term energy savings and bill reduction opportunities to low-income Ameren Missouri customers living in single family properties. The program leverages three channels (1) the Single-Family channel; (2) the Mobile Homes channel; and (3) the Grant channel.
- **Multifamily Income Eligible (MFIE) –** The Multifamily Income Eligible Program is designed to deliver long-term energy savings and bill reduction opportunities to income eligible Ameren Missouri customers living in multifamily properties. Property owner and managers of multifamily properties with three or more units, and high populations of low-income residents are targeted for the program.
- **Business Social Services (BSS)**: This program targets commercial, nonprofit, and tax-exempt business customers that provide social services to the low-income public in federally designated opportunity zones. The program provides lighting and other measures at low- or no-cost to social services business customers with qualifying facilities. In PY2020, the program offered new measures including occupancy sensors, VFDs, kitchen ventilation controls, and high-volume low-speed fans.
- **Business Portfolio–** Designed to help businesses identify and implement energy saving projects, the Business portfolio includes the Custom, Standard, New Construction, Retro-Commissioning, and Small Business Direct Install programs.
- **Demand Response –** The Residential and Business Demand Response programs are designed to control the cooling load with the help of smart thermostats to achieve peak demand savings and energy savings.

Ameren Missouri contracted with Opinion Dynamics and its subcontractors (Guidehouse, ADM Associates, Pammer Research, Sustainable Design & Behavior, Morgan Marketing Partners, and Washington University in St. Louis) to conduct comprehensive impact and process evaluations of Ameren Missouri's energy efficiency portfolio for Program Year 2020 (PY2020).

In 2020, the Missouri Public Service Commission (PSC) contracted with the Evergreen Economics team to serve in the capacity of Independent Auditor to review the evaluation, measurement, and verification (EM&V) work undertaken by the Opinion Dynamics evaluation team. Figure 1 shows the audit team members and organization, the individual team members by firm, and the associated audit responsibilities.

Figure 1: Evergreen Audit Team Organization



The audit team is required to review program evaluation activities and provide comments on compliance with 4 CSR 240-22.070(8) and the overall quality, scope, and accuracy of the program evaluation reports, as well as recommendations to improve the evaluation and reporting process.

A review of the PY2020 evaluation indicates that all evaluation reports are well written, complete, and meet the minimum requirements for impact and process evaluations stipulated in 4 CSR 240-22.070(8). These reports are also generally consistent with the best practices established for the industry, with the exception of the adjustment made for the Covid pandemic.

Audit Conclusions and Recommendations

Over the last year the audit team has had several meetings with ODC on analysis methods and were able to come to an agreement on several evaluation issues. ODC has also addressed many of the comments we made on a draft version of the PY2020 report. Below we identify some remaining issues and areas where we believe the evaluations can be improved.

Free Ridership Adjustment for Covid-19

A new addition to the evaluation this year was the application of a 20 percent reduction in the free ridership rate for the BizSavers Program to account for Covid-19. This adjustment was based on the results from contractor interviews, where 6 of the 13 contractors indicated that project cancellations or delays were smaller for BizSaver participants than with non-participating projects. The remaining contractors indicated that there was no effect from the program, or that the BizSavers projects actually had a greater incidence of delays.

The information included in the report does not come close to meeting the standard required to justify this very unusual type of adjustment. There is no rationale provided for translating very general responses into a very specific 20 percent reduction in free ridership. One could just as easily have concluded that a majority of contractors (7 of 13) reported no effect on project delays or cancellations. We have also commented in the past about the over-reliance on contractor opinions on the influence of the program, as they have a vested interest in promoting the program to evaluators and Ameren to keep the rebate dollars available.

This Covid adjustment assumes that the free ridership rate should be relatively constant across years, but this is a faulty assumption particularly in situations like 2020 where economic conditions have changed drastically. A similar change in equipment purchases would be expected to occur during a recession, where some customers decide to delay or cancel projects until economic conditions improve. In both these cases, the effect is on the **level** of participation observed for that year, **not** on the free ridership rate for the remaining participants. For those customers that are still able to participate in the program under Covid restrictions, we would expect the average free ridership to increase.

To see how this might work, consider the following example (summarized in Table 1) where the program population is divided into two groups[1]: those in most need of program rebates, and those in least need. For those with the most need of rebates, their free ridership rate would be lower as they are the most dependent on the program. Since their financial need is the greatest, they are also the most likely to delay or cancel the project due to Covid. Conversely, the second group has less need for rebates and therefore their free ridership rate is higher. Since their financial situation is stronger, they are more likely to be able to move forward with their project even during Covid. In this example, and shown in the table below, the free ridership rates are 0.40 and 0.20 for both groups.

In a normal year, both types of customers do projects and the resulting average free ridership rate is 0.32 (based on the number of participants use in this example). In the Covid year (or a recession year), the group that is in most need of the program decides not to participate, leaving the other group to determine the free ridership rate of 0.40. There is

[1] In reality there would be a distribution of need across participants and consequently a range of free ridership rates. For simplicity, we limit the example to two customer groups.

no need for an adjustment to the free ridership rate in this case; it is an accurate reflection of the rate for the smaller group of customers that were able to participate during the Covid year. Note that if this result were reduced by 20%, then the free ridership rate would equal 0.32, the same as when both groups participated.

Table 1: Covid Free Ridership Example

Customer Type	N	Free Ridership	
		No Covid Year	Covid Year
Most in need of the program	200	0.20	---
Least in need of the program	300	0.40	0.40
Average NTG		**0.32**	**0.40**

For these reasons, we strongly discourage allowing the 20% free ridership adjustment. It is a completely arbitrary adjustment based on a very small sample of contractors that provided only general responses to questions about the pandemic. There is no justification provided for why the adjustment should be 20 percent, other than that this number will provide the answer that ODC was originally hoping to get. It also relies on the faulty assumption that the free ridership should be the same as the prior year, even though economic conditions have changed dramatically and the free ridership would be expected to change as a result. We note that this adjustment is not made for the residential programs or new construction, both of which we would expect to be more sensitive to the Covid restrictions due to the lack of access to the Federal Paycheck Protection Program PPP assistance that the commercial customers are able to utilize.

We understand that the savings resulting from this adjustment is small for PY2020. However, allowing this will set a very bad precedent, as it permits an arbitrary adjustment due solely to the fact that the evaluation results (using a previously approved algorithm) did not match the pre-conceived notion of what the "correct" answer should be. As we have argued above, the economic conditions in 2020 should result in a higher free ridership rate and so the original unadjusted free ridership result is not surprising.

BizSavers Report – In Service Rate (ISR) and Hours of Use (HOU) parameters

In our comments on the draft report, we questioned the approach of adjusting the ISR and HOU parameters only if they were statistically different than 1.0. ODC pointed out that this method was documented in their PY2020 Evaluation Plan prior to the analysis being conducted. ODC also responded that these parameters had derived from desk reviews from the PY2019 evaluation, and that the HOU verification was just one component of the more comprehensive desk reviews/onsite visits that considered a range of project characteristics. For PY2020, it would have been an adjustment to program-tracked data for

that specific year. Since the results were statistically not different from 1.0, it was not clear to ODC that making this adjustment would actually improve the estimate.

This explanation is inconsistent with how other evaluation parameters are treated, however. The free ridership rates and spillover factors, for example, are often estimated in one program year and then applied to multiple years after the original estimation, even when the participation patterns change over time. We also note that this criterion of being statistically different from 1.0 is not commonly applied to other parameters such as realization rates, regression coefficients (i.e., for the Home Energy Reports program), or free ridership and spillover rates.

For future evaluations, we recommend that the actual point estimates for both the ISR and HOU parameters be used and the criterion of being statistically different from 1.0 be dropped.

Demand Response

Effective Full Load Hours (EFLH)

During our review of the draft report, we commented that the EFLH values assumed for the business demand response program were likely too low, and ODC responded that these values were based on deemed coincident peak demand adjustment factors that had been approved earlier for MEEIA 3. Given this prior agreement, we are not recommending that these values be changed for PY2020. However, we still maintain that these values are inaccurate and clearly overrepresent true demand savings in certain applications. Beginning in PY2021, we recommend that the evaluation team either 1) look into additional granularity on these values to allow for more specificity to the appropriate measures, or 2) use custom peak coincidence calculations to better estimate demand savings.

As we noted in our comments on the draft report, it appears that the effective full load hours are low for some programs. We have some concerns about the demand savings relative to energy savings ratio found in the evaluations of several programs. To illustrate this, we will define an EFLH value as the energy savings (kWh) divided by the demand savings (kW). The lower this number, the more prevalent demand savings are.

As an example, a load rolling demand measure that shuts off a specific piece of equipment and reduces demand by 10 kW on five separate occasions for a duration of two hours will save 100 kWh. The EFLH for this is 100 kWh / 10 kW = 10 hours. Conversely, a measure that saves 100 kWh, but has no demand savings (e.g., exterior light LEDs that only run at nighttime) has an effectively infinite EFLH, because no amount of the demand savings will ever achieve the electric savings. A project that saves the same amount of power every hour of the year (e.g., emergency lighting upgrades) will have an EFLH of 8,760.

Using those reference points, any project or program that saves below 8,760 EFLH is more effective at saving demand than energy, and vice versa. EFLH's below 8,760 are expected in programs with lighting measures where lights are on during the peak demand periods, but off for unoccupied periods.

There were no major red flags on the residential portfolio, however, looking at the EFLH values for the business programs, both the Custom and RCx programs seem potentially low.

Table 2: Average Effective Full Load Hours

Commercial Program	EFLH
Standard	4,602
Custom	2,266
SBDI	5,250
New Construction	3,465
RCx	2,687

Randomized Control Design

The evaluation report notes that ODC was unable to utilize a randomized controlled trial (RCT) approach with treatment and control groups due to a lack of data availability for the Nest devices (p. 34). The text indicates that this information was available for the PY2019 evaluation, however. We agree that the RCT would be the optimal evaluation approach and recommend that Ameren require that Nest make this information available in a usable and timely fashion for future evaluations.

Due to the lack of information from Nest, ODC utilized this next best approach that reflected an average treatment effect on the treated (ATT). To be consistent, they also used the alternative ATT approach to all the device manufacturers as well. Consequently, no RCT analysis was done in PY2020.

While we understand the desire for consistency, the RCT is still the preferred method when possible as it will capture the effects of external influences. We recommend that the RCT approach be used when the data are available, even at the expense of having an inconsistent approach across device manufacturers and/or programs.

Missing AMI data

The report describes several instances where the demand response participants were missing billing data (p. 62):

- For accounts with no interval data for one event but data present for the other event, the evaluation team imputed the other event's performance for the event with missing data.

- For accounts with no interval data for any of the events, the evaluation team imputed performance using a weighted average per-account performance across all participating accounts with valid interval data.

In these missing data cases, the evaluation should verify that these are indeed active accounts in order to claim savings – this is particularly true for those customers where there are no interval data for any of the demand response events. In the future, participating customers that do not have interval data and who are not verified by the evaluation team as being active accounts should be assigned a savings value of zero.

2 Introduction

The Missouri Energy Efficiency Investment Act (MEEIA) was passed in 2009, launching a new era for energy efficiency programs in Missouri. The Missouri Public Service Commission (the PSC) adopted four administrative rules (4 CSR 240-3.163, 4 CSR 240-3.164, 4 CSR 240-20.093 and 4 CSR 240-20.094) referred to as "MEEIA rules") to implement MEEIA.[2] MEEIA directs the PSC to permit electric corporations to implement PSC-approved demand side management (DSM) programs, with a goal of achieving cost-effective demand-side savings.

In 2009, the State of Missouri and Ameren Missouri reached an agreement to create Ameren Missouri's suite of residential and commercial energy efficiency programs, which began in 2013 as MEEIA Cycle 1. The MEEIA Cycle 1 programs ended on December 31, 2015 for Ameren Missouri (Case No. EO-2012-0142). In early 2016, the PSC approved MEEIA Cycle 2 DSM programs for Ameren Missouri (Case No. EO-2015-0055). All Cycle 2 programs were implemented no later than the second quarter of 2016, and ended by February 28, 2019.[3] In 2019, Ameren Missouri began implementing its Missouri Energy Efficiency Investment Act (MEEIA) Cycle 3 DSM Programs (Case No. EO-2018-00211).

The MEEIA Cycle 3 programs covered in this audit include:

- **Residential Lighting –** The Residential Lighting Program is designed to increase sales and awareness of ENERGY STAR qualified LED lighting products. The target market consists of all residential customers within the Ameren Missouri service territory. The Lighting Program is delivered through two channels including upstream (via retail partners) and the Ameren Missouri Online Store.
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[2] The PSC is currently in the process of revising the MEEIA rules.
[3] Some Cycle 2 long-lead projects are expected to continue after February 28, 2019, as a result of the PSC's July 20, 2017 *Order Approving Stipulation and Agreement*.

- **Residential Efficient Products (REP) –** This program is designed to raise customer awareness of the benefits of high-efficiency products and to educate residential customers to save energy cost-effectively. Four measures were included in PY2020 including advanced thermostats, tier 1 and tier 2 power strips, variable speed and multi-speed pool pumps, and heat pump water heaters.
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- **Demand Response –** The Residential and Business Demand Response programs are designed to control the cooling load with the help of smart thermostats to achieve peak demand savings and energy savings.

To ensure that programs comply with Missouri's rules regarding electric utility resource planning, the PSC has long-term resource planning rules that contain requirements for impact evaluations and process evaluations. The goal of the impact and process evaluations is "to develop the information necessary to evaluate the cost-effectiveness and improve the design of existing and future demand-side programs and demand-side rates, to improve the forecasts of customer energy consumption and responsiveness to demand-side programs and demand-side rates and to gather data on the implementation costs and load impacts of demand-side programs and demand-side rates for use in future cost-effectiveness screening and integrated resource analysis."[4]

Key requirements of the evaluations as outlined in 4 CSR 240-22.070(8) include the following:

- Utilities are expected to complete annual full process and impact evaluations for each DSM program.
- At a minimum, impact evaluations should
    1. "develop methods of estimating the actual load impacts of each demand-side program" using one or both of the following methods:
        a. "Comparisons of pre-adoption and post-adoption loads of program participants, corrected for the effects of weather and other intertemporal differences"; and
        b. "Comparisons between program participants' loads and those of an appropriate control group over the same time period".
    2. "develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination: monthly billing data, load research data, end-use load metered data, building and equipment simulation models, and survey responses or audit data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics".

[4] 4 CSR 240-22.070(8) Evaluation of Demand-Side Programs and Demand–Side Rates

3. Develop protocols to collect data regarding demand-side program market potential, participation rates, utility costs, participant costs and total costs.

- At a minimum, process evaluations should address the following five questions:
  1. What are the primary market imperfections that are common to the target market segment?
  2. Is the target market segment appropriately defined or should it be further subdivided or merged with other segments?
  3. Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target segment?
  4. Are the communication channels and delivery mechanisms appropriate for the target segment?
  5. What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

Ameren Missouri contracted with Opinion Dynamics and its subcontractors (Guidehouse, ADM Associates, Pammer Research, Sustainable Design & Behavior, Morgan Marketing Partners, and Washington University in St. Louis) to conduct comprehensive impact and process evaluations of Ameren Missouri's energy efficiency portfolio for Program Year 2020 (PY2020).

In 2020, the PSC contracted with Evergreen Economics and Michaels Energy (the Evergreen team) to serve in the capacity of EM&V Auditor to review program evaluation activities. The audit involved verifying compliance with 4 CSR 240-22.070(8) in addition to assessing the overall quality, scope, and accuracy of the program evaluation reports. The following report presents the Evergreen team's review of the Ameren Missouri program evaluations for program year 2020 (PY2020).

To conduct this review, the Evergreen team conducted the following activities:

- Reviewed each program's evaluation report in its entirety, including impact, process, and cost effectiveness methodologies and results;
- Reviewed the evaluation survey instruments and responses (where available) to confirm that the methodologies used were reasonable and consistent with best practices and that reported findings aligned with the data collected; and
- Reviewed specific evaluation tools and methodologies used for calculating program savings, including selected measure-level savings calculations, and survey methods for developing net program impacts.

3 Impact Evaluation Summary

This section summarizes the key findings and recommendations from the impact evaluations of Ameren Missouri's low-income, residential, and business energy efficiency program portfolio.

3.1 Summary of Impact Evaluation Methods and Results

The evaluation teams conducted an array of impact evaluation approaches summarized by program below.

Single Family Income-Eligible

The Residential Single-Family Income-Eligible program is designed to provide whole-home energy efficiency upgrades to low-income customers living in single family properties. The program includes three participation channels: (1) the single-family neighborhoods channel; (2) the mobile home park channel; and (3) the Low-Income Efficiency Housing Grant channel. Due to the health risks associated with COVID-19, the program team temporarily modified the program design for PY2020 and merged delivery of single family and mobile home projects into a single channel.

Evaluation activities included program material and database reviews, an engineering analysis to verify ex ante savings values and estimate ex post gross impacts using Missouri Statewide Technical Reference Manual (TRM) algorithms, a net impact analysis, and interviews with program manager and implementation staff.

Multifamily Income-Eligible

Ameren Missouri has been offering energy efficiency programs for multifamily income eligible properties since 2015. In PY2020, Ameren Missouri continued to deliver the Multifamily Income Eligible Program. The program is designed to offer a one-stop-shop approach to assist owners and operators of multifamily properties where residents meet certain income-related requirements. The ultimate goal of the program is to overcome barriers to completing comprehensive retrofits in multifamily buildings and deliver long-term energy savings and bill reductions opportunities to Ameren Missouri customers.

Notably, Ameren Missouri halted program activity in March 2020 due to the COVID-19 pandemic. Implementation resumed in June, but the program design was altered to limit health risks for program staff and participants. These changes included prohibiting work in occupied units, providing a relocation incentive to tenants, and offering virtual energy assessments and inspections.

Evaluation activities included program material and database reviews, an engineering analysis to verify ex ante savings values and estimate ex post gross impacts using Missouri

Statewide Technical Reference Manual (TRM) algorithms, a net impact analysis, and interviews with program manager and implementation staff.

Business Social Services Program

The Business Social Services (BSS) Program was a new program for Ameren Missouri in PY2019. The target market consists of commercial, nonprofit, and tax-exempt business customers that provide social services to the low-income public in federally designated opportunity zones. The BSS Program offers no-cost LED interior lighting equipment and low-cost equipment of other end uses.

PY2020 evaluation activities included reviewing program materials, an EUL review and analysis for lighting measures, an engineering analysis for lighting measures, and interviews with the program manager and implementation staff.

Residential Lighting Program

The Ameren Missouri Residential Lighting Program is designed to increase sales and awareness of ENERGY STAR® qualified LED lighting products. In PY2020, the Lighting Program provided incentives through two channels: (1) upstream, through retail partners, and (2) through the Ameren Missouri Online Store.

In PY2019, Opinion Dynamics conducted a detailed review of the program logic model, a program material review, Online Store participant surveys, in-store customer intercepts, lighting shelf stocking surveys, price elasticity modeling, and retailer/manufacturer interview, in addition to a large-scale non-participant survey. Because there is no expectation of substantive shifts in any of these parameters, for PY2020 the evaluation team focused their process evaluation efforts on program/implementer interviews and program material reviews. To derive PY2020 gross and net impact results, Opinion Dynamics applied the PY2019 evaluation-derived key parameters and the appropriate TRM inputs to PY2020 Lighting Program-tracking data.

Efficient Products Program

In PY2020, the Efficient Products Program provided downstream mail-in, email, and online rebates for the following measures:

- Advanced thermostats
- Tier 1 power strips
- Tier 2 power strips
- ENERGY STAR-certified variable-speed and multi-speed pool pumps
- ENERGY STAR-certified heat pump water heaters (HPWHs)

A total of 20,317 rebates were delivered to Ameren Missouri participants for the Efficient Products Program in PY2020.

For PY2020, the Opinion Dynamics team focused its efforts on an impact evaluation having completed detailed process and impact evaluations of the REP Program for PY2019. Evaluation activities included program material and database reviews, an engineering analysis to verify ex ante savings values and estimate ex post gross impacts using Missouri Statewide Technical Reference Manual (TRM) algorithms, and a net impact analysis.

Heating Ventilation and Air Conditioning (HVAC) Program

The Heating, Ventilation, and Air Conditioning (HVAC) Program obtains energy and demand savings through improvements in the operating performance of existing residential cooling units or replacement of central air conditioning (CAC) units and heat pumps. The program offers measures through two channels: a Downstream Channel that focuses on encouraging improving the efficiency of HVAC systems at the point of installation and a new Midstream Channel, introduced in PY2020, that focuses on making super-efficient HVAC systems more broadly available to Ameren Missouri customers.

For the impact evaluation, Opinion Dynamics began reviewing program-tracking data that had been recorded in the Vision database in order to identify variables necessary for impact calculations. To calculate verified gross energy and demand savings, Opinion Dynamics used engineering algorithms and the Missouri Statewide Technical Reference Manual (TRM).

Furthermore, the evaluation team conducted two waves of participant surveys for the PY2020 evaluation. These surveys sought to verify measure installation, measure participant satisfaction with program processes, the installed HVAC measure, trade ally interactions, and program informational materials. The surveys were then used to estimate participant FR and SO at the channel level. Additionally, contractors and distributors who had participated in the program in PY2020 were asked to complete in-depth interviews that gathered trade ally feedback on program requirements, processes, and design, including satisfaction with trade ally training and program materials and resources.

Appliance Recycling Program

The primary goal of the Appliance Recycling Program is to promote the retirement and recycling of inefficient refrigerators, freezers, dehumidifiers, and room air conditioners from households by offering turn-in incentives, free pickup of working equipment, and information on the operating costs of inefficient units. The program also provides participants with energy efficiency kits. The Appliance Recycling Program was re-introduced in PY2019.

Evaluation activities included program material and database reviews, an engineering analysis to verify ex ante savings values and estimate ex post gross impacts using Missouri Statewide Technical Reference Manual (TRM) algorithms, and a net impact analysis. 2019 estimates of Net-to-Gross Ratios, free ridership, and spillover were used to determine PY2020 net savings estimations.

Energy Efficiency Kits Program

Ameren implemented the PY2020 Energy Efficiency Kits program, which provides energy efficiency kits through an educational channel that primarily targets schools. The school kits provide participating teachers with classroom curriculum and energy savings kits to distribute to their students. The EEK Program includes a range of small energy-efficient products, such as LED light bulbs, hot water pipe wrap, low-flow showerheads, and faucet aerators. Due to changes in how schools operated in PY2020 as a result of the COVID-19 pandemic, the program team developed a set of processes and educational materials designed to be deployed virtually to supplement existing materials designed for use in the classroom.

In PY2020, the evaluation team conducted an engineering analysis to verify ex ante savings and develop ex post savings using TRM values and algorithms. Additionally, Opinion Dynamics completed a review of program materials (implementation plans, teacher materials, and student take-home worksheets), interviewed the program managers and implementers, and reviewed the implementer's data-tracking system to evaluate the effectiveness of program materials and provide results to improve program design and implementation.

Home Energy Reports Program

Ameren Missouri designed the HER Program to promote changes in energy consumption behaviors that result in reduced electricity usage. This program is deployed as a randomized controlled trial, where customers are randomly assigned to a treatment or control group. Home energy reports provide the treatment customers with a comparison of their energy usage to the usage of similar homes based on home size and location. At the same time, the implementer identifies and maintains a control group of non-participation customers. Energy savings were estimated using a lagged dependent variable regression model that utilized data from both the treatment and control groups.

Multifamily Market Rate Program

In PY2020, Ameren Missouri continued to deliver the Multifamily Market Rate Program, which was a new program in PY2019. The program is designed to provide a one-stop-shop approach to assist owners and operators of multifamily Market Rate properties to overcome barriers to completing comprehensive retrofits. Notably, Ameren Missouri halted program activity in March 2020 due to the COVID-19 pandemic. Implementation

resumed in June 2020, but the program design was altered to limit health risks for program staff and participants. These changes included prohibiting work in occupied units and offering virtual energy assessments and inspections.

PY2020 evaluation activities for the Multifamily Market Rate Program included reviewing program materials and the program tracking database, an impact evaluation, and interviews with program manager and implementation staff. To calculate verified gross energy and demand savings, Opinion Dynamics used engineering algorithms and the Missouri Statewide Technical Reference Manual (TRM).

Opinion Dynamics also conducted in depth interviews with participating property managers and owners to collect data informing estimates of free ridership and participant spillover, and to yield process-related insights.

Standard and Custom Incentive Programs

The Standard and Custom programs are designed to promote energy awareness and installation of energy-efficient technologies or services by providing incentives to offset the higher cost associated with completing these projects. The Standard Incentive Program provides incentives for a range of prescriptive measures, while the Custom Incentive Program applies to measures that are not deemed and do not fall under the Standard Program.

The PY2020 evaluation of the Standard Incentive Program included an engineering analysis of lighting measures and application of the PY2019 gross realization rates for non-lighting measures. The evaluation of the Custom Program included application of PY2019 gross realization rates for Custom Lighting and Custom Compressed Air measures, and desk reviews and onsite visits for a sample of measures within the HVAC, Motors, and "Other" end use categories. Both evaluations included an assessment of program attribution but did not assess program processes.

Opinion Dynamics conducted two waves of online surveys with business customers who participated in the Standard and Custom programs during PY2020. The business customer survey covered a range of topics, including sources of program information, participant satisfaction, free ridership and participant spillover. These surveys were used to calculate the net-to-gross ratios for PY2020.

Retro-Commissioning Program

The Retro-Commissioning Program (RCx program) is designed to help customers retro-commission existing facilities. Program activities include conducting a retro-commissioning study, benchmarking existing building system performance levels, identifying operating system performance optimization improvements, and, where applicable, providing financial incentives to support implementation of program

recommendations. The most common optimization measures involve compressed air, refrigeration, and building systems.

Opinion Dynamics conducted interviews with program managers and implementers before and after the program to inform evaluation planning and analysis. In addition, the evaluation team conducted engineering desk reviews and on-site verifications, reviewing supporting project documentation for all projects to ensure that original data were correctly entered from invoices and other documentation.

New Construction Program

The New Construction Program is designed to promote cost-effective, energy efficient design in nonresidential new construction and major renovation projects. In PY2020, participants could choose from three types of energy efficiency incentives: installed interior lighting, custom measures, and whole building performance modeling.

Opinion Dynamics completed in-depth interviews with program participants about their decision to include energy-efficient measures in their project and how their experience with the New Construction Program may or may not have influenced this decision. The evaluation team also conducted engineering desk reviews to review and verify savings assumptions.

Small Business Direct Install (SBDI) Program

The SBDI Program is designed to promote the installation of energy-efficient technologies in small businesses by removing barriers such as high upfront cost, lack of financing, lack of knowledge, and lack of time and resources to investigate energy efficiency opportunities. In PY2020, the measures included in the program were lighting and smart thermostats. In PY2020, the program introduced HVAC, occupancy sensors, and exterior lighting measures to the program.

Opinion Dynamics conducted an EUL review and analysis of lighting measures to develop EUL recommendations for PY2020 and future evaluations. An engineering analysis was also conducted for lighting measures to develop ex post savings using TRM algorithms, and a net impact analysis was conducted across all measures using PY2019 net-to-gross ratios.

3.1.1 Portfolio Level Findings

In this section, we provide a summary of the energy savings goals and accomplishments across Ameren Missouri's PY2020 energy efficiency program portfolio, as reported by the evaluation teams.

Table 3 and Table 4 show Ameren Missouri's energy efficiency targets, *ex ante* gross values, *ex post* gross values, the *ex post* net savings (evaluated) and net achievement

compared to the targets for energy savings (MWh) and demand reductions (MW), respectively. To ensure clarity, these terms are defined as follows:

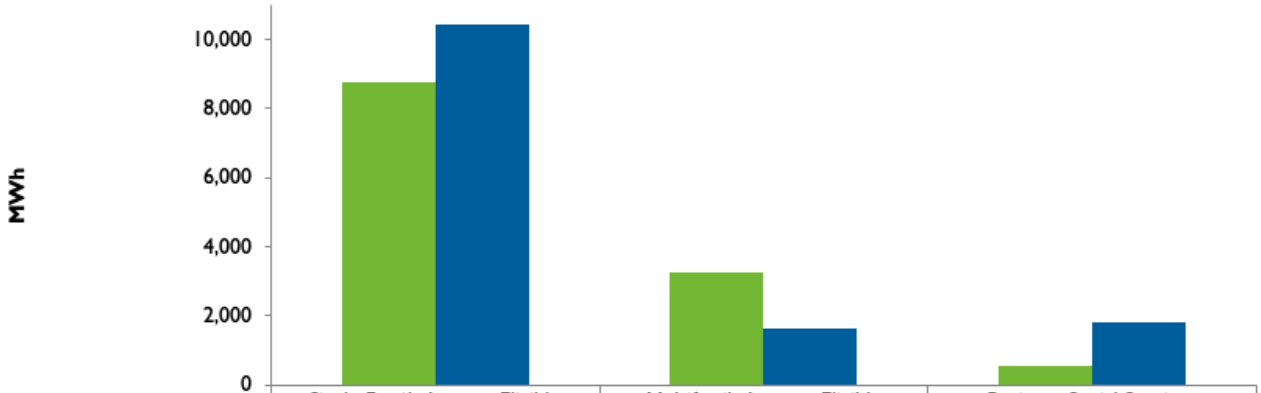
- **PSC-Approved Targets:** Annualized savings targets for the residential and commercial and industrial (C&I) sectors.
- ***Ex Ante* Gross Savings:** Annualized savings reported by Ameren Missouri or calculated using tracked program activity and the Ameren Missouri TRM savings values.
- ***Ex Post* Gross Savings:** Annualized savings calculated and provided by the evaluation team.
- ***Ex Post* Net Savings:** *Ex post* gross savings multiplied by the net-to-gross ratio, accounting for free ridership, participant spillover, and non-participant spillover.
- **Net-to-Gross (NTG) Ratio:** *Ex post* net savings divided by *ex post* gross savings.

Table 3: Ameren Missouri Portfolio Energy Savings in PY2020, MWh

Program	PSC – Approved Targets	*Ex Ante* Gross Savings	*Ex Post* Gross Savings	*Ex Post* Net Savings	NTG Ratio	% of Target Reached
Single Family Income-Eligible	10,415	9,475	8,748	8,748	100%	84%
Multifamily Income-Eligible	1,650	3,260	3,243	3,243	100%	197%
Business Social Services	1,793	585	569	569	100%	32%
Total Low-Income Portfolio	**13,858**	**13,320**	**12,560**	**12,560**	**100%**	**91%**
Lighting	13,203	105,291	115,409	74,812	65%	567%
Efficient Products	9,188	9,823	8,981	7,705	86%	84%
HVAC	47,594	38,830	36,908	28,245	77%	59%
Appliance Recycling	3,333	826	888	537	60%	16%
Energy Efficiency Kits	6,551	5,429	4,346	3,410	78%	52%
Home Energy Reports	35,250	24,693	36,002	36,002	100%	102%
Multifamily Market Rate	3,270	3,022	2,964	2,786	94%	85%
Total Residential Portfolio	**118,839**	**187,914**	**205,498**	**153,497**	**75%**	**130%**
Standard	56,470	85,129	82,832	70,390	85%	125%
Custom	69,882	35,049	34,010	28,031	82%	40%
Retro-Commissioning	7,217	6,099	6,913	6,346	92%	88%
New Construction	8,660	15,106	14,655	10,258	70%	118%
Small Business Direct Install	10,118	5,565	5,442	4,778	88%	47%
Total C&I Portfolio	**152,347**	**146,947**	**143,852**	**119,805**	**83%**	**79%**
Total	**284,595**	**348,181**	**361,911**	**285,862**		**100%**

The low-income portfolio did not meet the target savings goal, achieving 91 percent of the net savings target. While the Multifamily Income-Eligible program surpassed its savings target by 197 percent, the Single-Family Income-Eligible program (i.e., the program with the highest savings target) achieved 84 percent of its savings target, and the Business Social Services program only achieved 32 percent (Figure 2).

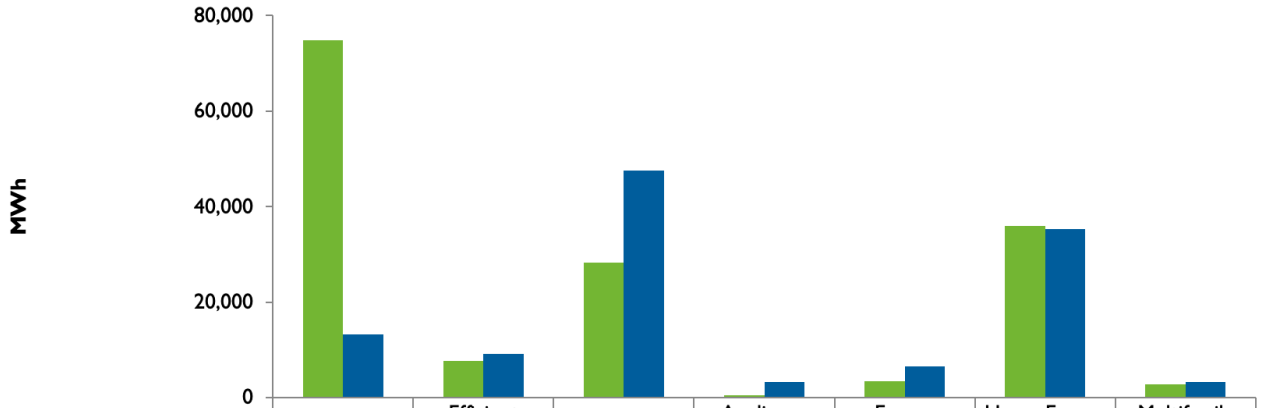
Figure 2: Low-Income Programs Planned and Evaluated Savings: PY2020 MWh



	Single Family Income-Eligible	Multifamily Income-Eligible	Business Social Services
MWh ExPost Net Savings	8,748	3,243	569
MWh 2020 Target Savings	10,415	1,650	1,793

In contrast, the residential portfolio surpassed the target savings goal, achieving 130 percent of the net savings target. The Lighting program had the highest savings relative to its target, meeting 567 percent of its target. The only other program to exceed its goal was the Home Energy Reports program, which achieved 102 percent of its target savings. However, all other residential programs missed their targets, with the lowest program achieving 16 percent of the target goal (the Appliance Recycling program; Figure 3).

Figure 3: Residential Programs Planned and Evaluated Savings: PY2020 MWh

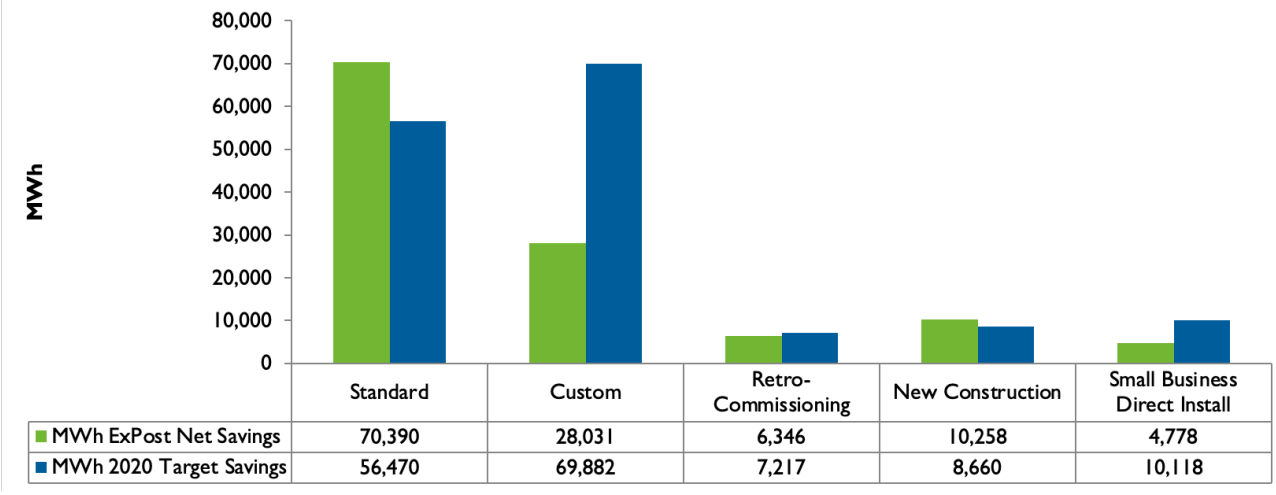


	Lighting	Efficient Products	HVAC	Appliance Recycling	Energy Efficient Kits	Home Energy Reports	Multifamily Market Rate
MWh ExPost Net Savings	74,812	7,705	28,245	537	3,410	36,002	2,786
MWh 2020 Target Savings	13,203	9,188	47,594	3,333	6,551	35,250	3,270

The 2020 C&I portfolio did not meet its approved targets, achieving 79 percent of the net savings target. Of the five PY2020 program areas, the Standard program and New Construction programs surpassed their energy savings target, achieving 125 percent and 118 percent of their respective goals. However, like the residential portfolio, all other C&I

programs did not meet their targets, with the lowest program achieving 40 percent of the target goal (the Custom program; Figure 4).

Figure 4: C&I Programs Planned and Evaluated Savings: PY2020 MWh



	Standard	Custom	Retro-Commissioning	New Construction	Small Business Direct Install
MWh ExPost Net Savings	70,390	28,031	6,346	10,258	4,778
MWh 2020 Target Savings	56,470	69,882	7,217	8,660	10,118

Table 4 displays approved targets for demand savings.

Table 4: Summary of PSC-Approved Targets for Demand Savings, MW

Program	PSC – Approved Targets	*Ex Ante* Gross Savings	*Ex Post* Gross Savings	*Ex Post* Net Savings	NTG Ratio	% of Target Reached
Single Family Income-Eligible	2.34	2.67	2.43	2.43	100%	104%
Multifamily Income-Eligible	0.73	0.5	0.49	0.49	100%	68%
Business Social Services	0.34	0.11	0.11	0.11	100%	33%
Total Low-Income Portfolio	**3.41**	**3.28**	**3.04**	**3.04**	**100%**	**89%**
Lighting	1.97	15.85	17.9	11.6	65%	588%
Efficient Products	2.43	3.42	2.88	2.31	80%	95%
HVAC	25.4	23.98	23.24	16.24	70%	64%
Appliance Recycling	0.47	0.13	0.13	0.07	55%	15%
Energy Efficiency Kits	1.16	0.98	0.81	0.65	79%	56%
Home Energy Reports	16.43	11.51	16.78	16.78	100%	102%
Multifamily Market Rate	1.04	0.67	0.67	0.63	94%	60%

Program	PSC – Approved Targets	*Ex Ante* Gross Savings	*Ex Post* Gross Savings	*Ex Post* Net Savings	NTG Ratio	% of Target Reached
Total Residential Portfolio	**48.8**	**56.54**	**62.4**	**48.26**	**77%**	**99%**
Standard	11.4	18.5	19.51	16.58	85%	145%
Custom	21.39	15.47	15.18	12.51	82%	58%
Retro-Commissioning	2.65	2.27	2.71	2.49	92%	94%
New Construction	2.30	4.36	3.78	2.64	70%	115%
Small Business Direct Install	1.75	1.06	1.09	0.96	88%	55%
Total C&I Portfolio	**39.49**	**41.67**	**42.27**	**35.18**	**83%**	**89%**
Total	**91.80**	**101.48**	**107.71**	**86.49**		**94%**

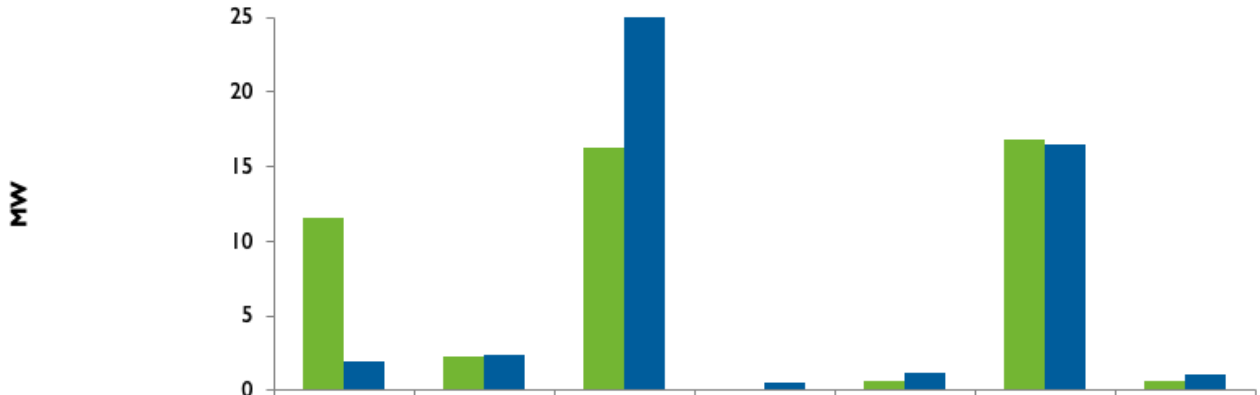
The low-income portfolio did not reach its demand savings targets, achieving 89 percent of target savings. While the Single-Family Income-Eligible program achieved 104 percent of its target goal, the Multifamily and Business Social Services programs met 68 percent and 33 percent of their target goals respectively (Figure 5).

Figure 5: Low-Income Programs Planned and Evaluated Savings: PY2020 MW

The residential portfolio almost met its demand target, achieving 99 percent of target savings. The Lighting program performed best, achieving 588 percent of its demand goals. The Home Energy Reports program also exceeded its demand target, achieving 102 percent of target demand savings. However, all other residential programs did not meet

their target savings, with the lowest program achieving 15 percent of demand goals (the Appliance Recycling program; Figure 6).

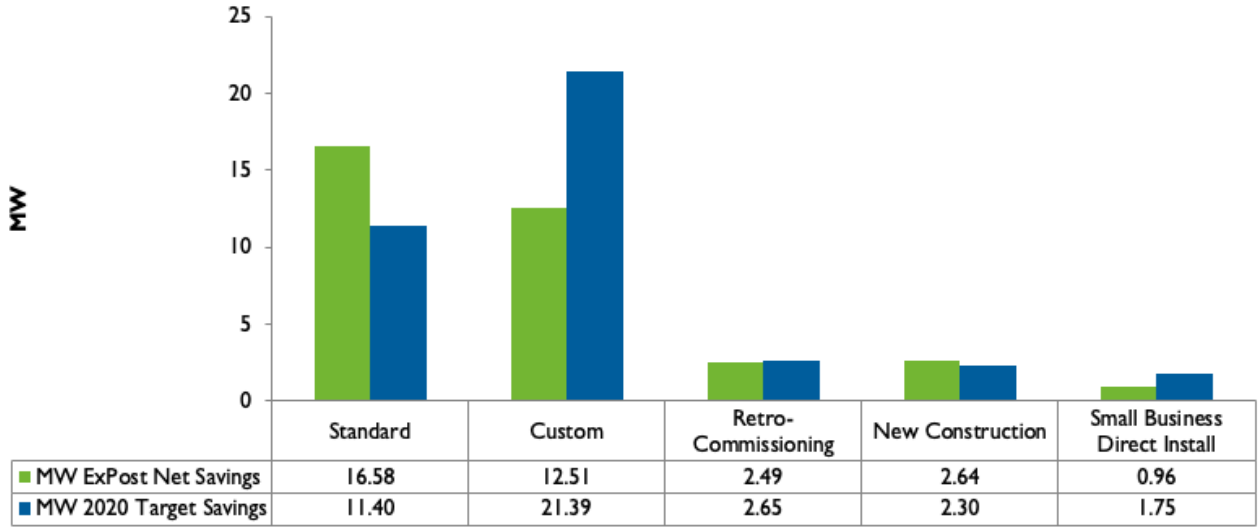
Figure 6: Residential Programs Planned and Evaluated Savings: PY2020 MW



	Lighting	Efficient Products	HVAC	Appliance Recycling	Energy Efficiency Kits	Home Energy Reports	Multifamily Market Rate
MW ExPost Net Savings	11.60	2.31	16.24	0.07	0.65	16.78	0.63
MW 2020 Target Savings	1.97	2.43	25.4	0.47	1.16	16.43	1.04

Similarly, the 2020 C&I portfolio did not achieve its demand target, achieving 89 percent of its target demand savings. Similar to energy savings (MWh), the Standard and New Construction Programs performed the best, achieving 145 percent and 115 percent of their respective target demand savings goals. The rest of the C&I programs did not meet their demand savings goals, with the lowest program achieving 55 percent of its demand target (the Small Business Direct Install program; Figure 7).

Figure 7: C&I Programs Planned and Evaluated Savings: PY2020 MW

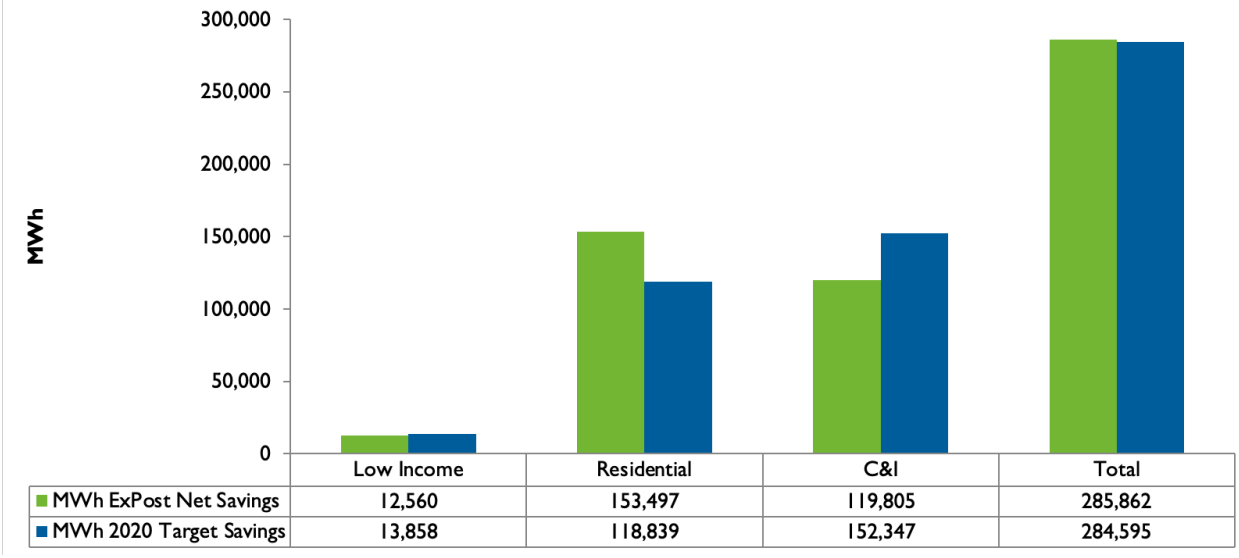


	Standard	Custom	Retro-Commissioning	New Construction	Small Business Direct Install
MW ExPost Net Savings	16.58	12.51	2.49	2.64	0.96
MW 2020 Target Savings	11.40	21.39	2.65	2.30	1.75

The following figures present summaries of program achievements in comparison with program goals**.** Figure 8 and Figure 9 display the PY2020 energy and demand savings targets and achievements by sector, as reported by evaluators.

The PY2020 portfolio had a target energy savings goal of 285,862 MWh and actual net savings of 284,595 MWh, equating to approximately 100 percent of the program year energy goal. Only the Residential programs met or exceeded its energy savings goal, achieving 130 percent of its target, while the Low-Income and C&I programs did not meet their goals, reaching 91 percent and 79 percent of their respective targets (Figure 8).

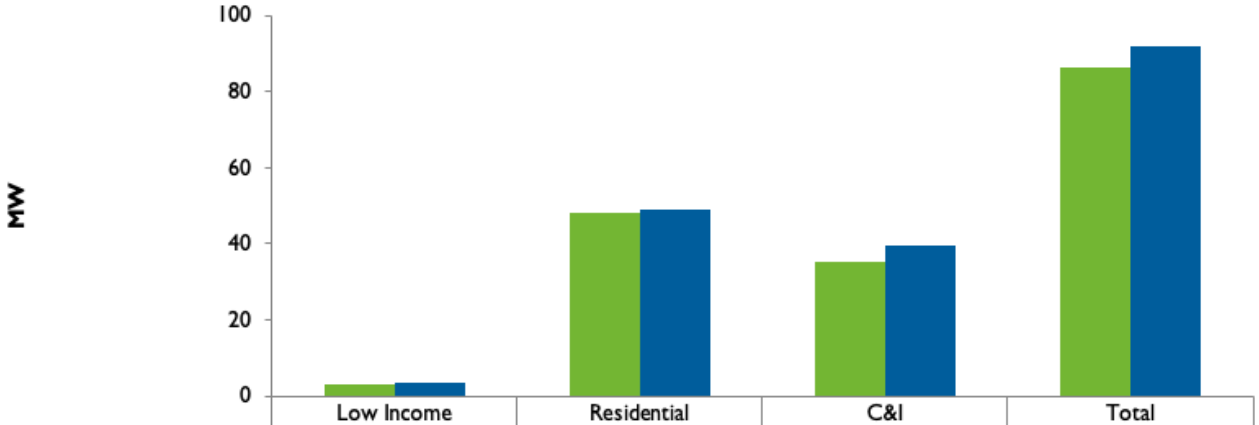
Figure 8: Energy Savings and Achievements by Sector: PY2020 MWh



	Low Income	Residential	C&I	Total
MWh ExPost Net Savings	12,560	153,497	119,805	285,862
MWh 2020 Target Savings	13,858	118,839	152,347	284,595

Finally, PY2020 had a target demand savings goal of 91.8 MW and actual net savings of 86.49 MW, equating to approximately 94 percent of the year's demand goal. None of the PY2020 programs met or exceeded their demand goals, though the Residential program was the closest, achieving 99 percent of its demand target. Both the Low Income and C&I programs achieved 89 percent of their target demand savings. (Figure 9).

Figure 9: Demand Savings Targets and Achievements by Sector: PY2020 MW



	Low Income	Residential	C&I	Total
MW ExPost Net Savings	3.04	48.26	35.18	86.49
MW 2020 Target Savings	3.41	48.80	39.49	91.80

4 Process Evaluation Summary

This section summarizes key methods and findings from the PY2020 process evaluations of Ameren Missouri's low-income, residential and business energy efficiency program portfolio.

In general, the audit team found that the process evaluations were thorough and followed best practices established for the industry. As noted below, the process evaluations were generally able to provide substantive answers to the required CSR questions.

4.1 Summary of Process Evaluation Methods and Alignment with Missouri CSR Minimum Requirements

The low-income, residential, and business program evaluations adopted a wide range of process evaluation methods. Table 5 below summarizes the process evaluation methods applied for each program.

Table 5: Process Evaluation Method Summary

Program	Methods	Description
Heating and Cooling	Program Manager & Implementer Interviews	Conducted interviews to assess changes in program design and implementation from PY2019, key program successes and challenges, program performance, and evaluation priorities.
	Program Material Review	Reviewed all program materials to inform evaluation activities.
	Tracking System Review	Reviewed implementer's tracking system to ensure that the data required for the evaluation is being collected.
	Participant Survey	Conducted online surveys with program participants to collect data to inform NTG (free ridership and participant spillover) and yield process-related insights.
	Contractor In-Depth Interviews	Gathered qualitative information to understand HVAC Program's impact on the larger market and early replacement market.
	Participating Distributor Interview	Conducted interviews with distributors to collect data to inform NTG (i.e., distributor free ridership and participant spillover) and yield Midstream channel process-related insights.
Home Energy Reports	Program Manager & Implementer Interviews	Conducted interviews to understand program changes and staff perspectives on program implementation.

Program	Methods	Description
Residential Efficient Products	Program Manager & Implementer Interviews	Conduct interviews to understand program staff's perspective on program performance.
	Program Material Review	Review all new program materials to inform evaluation activities.
Energy Efficiency Kits	Program Manager & Implementer Interviews	Conducted two interviews: one with Ameren staff and another with implementer staff both towards the end of PY2020 to understand program staff's perspective on program performance.
	Program Material Review	Review all available program materials to inform evaluation activities.
	Tracking System Review	Review the implementer's tracking system to ensure that data required for the evaluation is being collected.
Multifamily Market Rate	Program Manager & Implementer Interviews	Conducted interviews in the Fall of PY2020 to understand program staff's perspective on program performance.
	Program Material Review	Review program materials to inform evaluation activities.
	Property Manager/Owner Interviews	Conducted interviews with six participating property managers and owners to collect data to inform NTG (i.e., free ridership and participant spillover) and yield process-related insights.
	Tracking System Review	Review the implementer's tracking system to ensure that data required for the evaluation is being collected.
Appliance Recycling	Program Manager & Implementer Interviews	Conducted interviews with program administration and implementation staff during Q3 of PY2020.
	Program Material Review	Review all available program materials to inform evaluation activities.
	Tracking System Review	Review the implementer's tracking system to ensure that data required for the evaluation is being collected.
Single Family & Multifamily Income-Eligible	Program Manager & Implementer Interviews	Conducted interviews in the Fall of PY2020 to understand program staff's perspective on program performance.
	Program Material Review	Review all program materials to inform evaluation activities.

Program	Methods	Description
	Tracking System Review	Review the implementer's tracking system to ensure that data required for the evaluation is being collected.

The Public Service Commission set minimum requirements for the program process evaluations in 4 CSR 240-22.070(9).[5] At a minimum, process evaluations should answer the following five key questions:

- **Question 1:** What are the primary market imperfections common to the target market segment?
- **Question 2:** Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?
- **Question 3:** Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?
- **Question 4:** Are the communication channels and delivery mechanisms appropriate for the target market segment?
- **Question 5:** What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

In general, the evaluations provided substantive, updated responses to the five key questions that are clearly linked to the most recent evaluation findings. Each program evaluation provided a response to all five questions, and the full text response to these questions is provided as Appendix A to this report.

[5] *Rules of Department of Economic Development, Division 240 - Public Service Commission, Chapter 22 - Electric Utility Resource Planning*. 2011. https://www.sos.mo.gov/cmsimages/adrules/csr/current/4csr/4c240-22.pdf

5 Review of Cost-Effectiveness Calculations

The Evergreen team reviewed low-income, residential and business summary findings from the portfolio reports and the appropriate DSMore output files. This process involved reviewing the low-income, residential and business program DSMore aggregate files to confirm that calculations were performed correctly. This review was similar to those conducted in prior audits, with specific tasks including the following:

- Confirm that the reported program summary values matched those in the DSMore results file;
- Confirm that the reported costs matched the costs included in the DSMore input files (both incentive and overhead);
- Report current (PY2020) program results and compare against previous year results (PY2019).

Confirm summary values reported matched the values in the DSMore results files

The Evergreen team reviewed the reported summary cost-effectiveness values, as well as the net lifetime benefit and cost of conserved energy values to confirm the reported values matched the DSMore aggregate file results. The review consisted of checking all five cost-effectiveness tests for both the residential and business portfolio files.

The Evergreen team found discrepancies between the residential portfolio total PCT values in the DSMore files (11.72) and the value reported in the portfolio summary (11.57). However, all individual program cost effectiveness results values were consistent between the reported summary in the evaluation report and the DSMore files.

Confirm that the reported costs matched the costs input into the DSMore cost-effectiveness input files (both incentive and overhead);

The Evergreen team reviewed the costs reported in each DSMore aggregate file for each program and compared them against the reported costs in the evaluation reports. No discrepancies were found.

Table 6 presents the total net lifetime benefits from low-income, residential and business programs reported in the PY2020 EM&V reports and compares the current year net benefits to previously reported PY2019 net benefits totals. The low-income, residential, and business program portfolios all showed an increase in the total net benefits in PY2020 compared to PY2019.

Table 6: Net Lifetime Benefits per Program

Program	Net UCT Lifetime Benefit (Reported) 2019	Net UCT Lifetime Benefit (Reported) 2020
Single Family – Income Eligible	-$1,720,901	$1,246,902
Multifamily – Income Eligible	-$1,354,537	-$1,764,657
Business Social Services	$27,100	-$71,054
Lighting	$32,131,284	$36,357,744
Efficient Products	$572,584	$1,076,439
Heating and Cooling	$9,704,986	$9,056,463
Appliance Recycling	-$164,377	-$88,827
Energy Efficiency Kits	$1,394,794	$1,243,302
Home Energy Reports	-$1,034,217	$365,090
Multifamily Market Rate	-$120,858	$780,272
Residential DR	$947,483	$8,182,176
Business Standard	$26,039,009	$33,336,690
Business Custom	$9,668,141	$19,433,853
Retro-Commissioning	$1,230,398	$3,724,678
New Construction	$596,069	$5,317,834
Small Business Direct Install	$2,143,668	$1,713,794
Business DR	$27,871,840	$8,384,728

Table 7 compares the results of the four cost effectiveness tests between PY2019 and PY2020.[6]

[6] SCT results were calculated as part of the evaluation; however, they are excluded from the table below because they are equivalent to TRC results due to two factors: 1) Ameren Missouri does not included non-energy impacts in cost-effectiveness testing, and 2) Ameren Missouri uses the same planning assumptions for both tests, including the discount rate.

Table 7: Cost Effectiveness Test Results

Program	UCT		TRC		RIM		PCT	
	2019	2020	2019	2020	2019	2020	2019	2020
Single Family – Income Eligible	0.44	1.29	0.54	1.32	0.27	0.44	3.62	4.72
Multifamily – Income Eligible	0.32	0.51	0.42	0.72	0.21	0.29	5.34	4.49
Business Social Services	1.04	0.82	2.42	2.12	0.44	0.40	8.11	6.60
Lighting	5.52	4.64	15.57	6.45	0.55	0.55	N/A	N/A
Efficient Products	1.37	1.46	0.96	0.98	0.46	0.50	2.80	2.85
Heating and Cooling	1.78	1.81	1.76	1.49	0.57	0.59	4.63	3.72
Appliance Recycling	0.73	0.69	0.79	0.68	0.30	0.30	26.06	18.5
Energy Efficiency Kits	2.60	3.32	2.62	2.03	0.50	0.54	8.24	6.85
Home Energy Reports	0.44	1.22	0.44	1.22	0.26	0.42	N/A	N/A
Multifamily Market Rate	0.86	2.02	1.12	1.34	0.33	0.52	8.23	3.53
Residential DR*	1.11	2.13	1.11	2.13	0.98	1.93	N/A	N/A
Business Standard	3.92	4.01	2.92	2.20	0.64	0.71	5.90	3.79
Business Custom	3.49	4.16	1.92	2.10	1.05	1.09	2.02	2.28
Retro-Commissioning	6.78	5.19	5.74	4.94	1.45	1.08	5.63	6.03
New Construction	2.56	3.46	1.43	1.33	0.71	0.77	2.16	1.87
Small Business Direct Install	2.94	2.44	2.79	3.02	0.61	0.60	5.57	7.07
Business DR*	3.34	1.60	3.34	1.60	3.25	1.54	N/A	N/A

*Includes lifetime costs and benefits of Demand Response programs over a 10-year effective useful life.

6 Conclusions and Recommendations

Over the last year the audit team has had several meetings with ODC on analysis methods and were able to come to an agreement on several evaluation issues. ODC has also addressed many of the comments we made on a draft version of the PY2020 report. Below we identify some remaining issues and areas where we believe the evaluations can be improved.

Free Ridership Adjustment for Covid-19

A new addition to the evaluation this year was the application of a 20 percent reduction in the free ridership rate for the BizSavers Program to account for Covid-19. This adjustment was based on the results from contractor interviews, where 6 of the 13 contractors indicated that project cancellations or delays were smaller for BizSaver participants than with non-participating projects. The remaining contractors indicated that there was no effect from the program, or that the BizSavers projects actually had a greater incidence of delays.

The information included in the report does not come close to meeting the standard required to justify this very unusual type of adjustment. There is no rationale provided for translating very general responses into a very specific 20 percent reduction in free ridership. One could just as easily have concluded that a majority of contractors (7 of 13) reported no effect on project delays or cancellations. We have also commented in the past about the over-reliance on contractor opinions on the influence of the program, as they have a vested interest in promoting the program to evaluators and Ameren to keep the rebate dollars available.

This Covid adjustment assumes that the free ridership rate should be relatively constant across years, but this is a faulty assumption particularly in situations like 2020 where economic conditions have changed drastically. A similar change in equipment purchases would be expected to occur during a recession, where some customers decide to delay or cancel projects until economic conditions improve. In both these cases, the effect is on the **level** of participation observed for that year, **not** on the free ridership rate for the remaining participants. For those customers that are still able to participate in the program under Covid restrictions, we would expect the average free ridership to increase.

To see how this might work, consider the following example (summarized in Table 1) where the program population is divided into two groups[7]: those in most need of program rebates, and those in least need. For those with the most need of rebates, their free ridership rate would be lower as they are the most dependent on the program. Since their

[7] In reality there would be a distribution of need across participants and consequently a range of free ridership rates. For simplicity, we limit the example to two customer groups.

financial need is the greatest, they are also the most likely to delay or cancel the project due to Covid. Conversely, the second group has less need for rebates and therefore their free ridership rate is higher. Since their financial situation is stronger, they are more likely to be able to move forward with their project even during Covid. In this example, and shown in the table below, the free ridership rates are 0.40 and 0.20 for both groups.

In a normal year, both types of customers do projects and the resulting average free ridership rate is 0.32 (based on the number of participants use in this example). In the Covid year (or a recession year), the group that is in most need of the program decides not to participate, leaving the other group to determine the free ridership rate of 0.40. There is no need for an adjustment to the free ridership rate in this case; it is an accurate reflection of the rate for the smaller group of customers that were able to participate during the Covid year. Note that if this result were reduced by 20%, then the free ridership rate would equal 0.32, the same as when both groups participated.

Table 8: Covid Free Ridership Example

		Free Ridership	
Customer Type	**N**	**No Covid Year**	**Covid Year**
Most in need of the program	200	0.20	---
Least in need of the program	300	0.40	0.40
Average NTG		**0.32**	**0.40**

For these reasons, we strongly discourage allowing the 20% free ridership adjustment. It is a completely arbitrary adjustment based on a very small sample of contractors that provided only general responses to questions about the pandemic. There is no justification provided for why the adjustment should be 20 percent, other than that this number will provide the answer that ODC was originally hoping to get. It also relies on the faulty assumption that the free ridership should be the same as the prior year, even though economic conditions have changed dramatically and the free ridership would be expected to change as a result. We note that this adjustment is not made for the residential programs or new construction, both of which we would expect to be more sensitive to the Covid restrictions due to the lack of access to the Federal Paycheck Protection Program PPP assistance that the commercial customers are able to utilize.

We understand that the savings resulting from this adjustment is small for PY2020. However, allowing this will set a very bad precedent, as it permits an arbitrary adjustment due solely to the fact that the evaluation results (using a previously approved algorithm) did not match the pre-conceived notion of what the "correct" answer should be. As we have argued above, the economic conditions in 2020 should result in a higher free ridership rate and so the original unadjusted free ridership result is not surprising.

BizSavers Report – In Service Rate (ISR) and Hours of Use (HOU) parameters

In our comments on the draft report, we questioned the approach of adjusting the ISR and HOU parameters only if they were statistically different than 1.0. ODC pointed out that this method was documented in their PY2020 Evaluation Plan prior to the analysis being conducted. ODC also responded that these parameters had derived from desk reviews from the PY2019 evaluation, and that the HOU verification was just one component of the more comprehensive desk reviews/onsite visits that considered a range of project characteristics. For PY2020, it would have been an adjustment to program-tracked data for that specific year. Since the results were statistically not different from 1.0, it was not clear to ODC that making this adjustment would actually improve the estimate.

This explanation is inconsistent with how other evaluation parameters are treated, however. The free ridership rates and spillover factors, for example, are often estimated in one program year and then applied to multiple years after the original estimation, even when the participation patterns change over time. We also note that this criterion of being statistically different from 1.0 is not commonly applied to other parameters such as realization rates, regression coefficients (i.e., for the Home Energy Reports program), or free ridership and spillover rates.

For future evaluations, we recommend that the actual point estimates for both the ISR and HOU parameters be used and the criterion of being statistically different from 1.0 be dropped.

Demand Response

Effective Full Load Hours (EFLH)

During our review of the draft report, we commented that the EFLH values assumed for the business demand response program were likely too low, and ODC responded that these values were based on deemed coincident peak demand adjustment factors that had been approved earlier for MEEIA 3. Given this prior agreement, we are not recommending that these values be changed for PY2020. However, we still maintain that these values are inaccurate and clearly overrepresent true demand savings in certain applications. Beginning in PY2021, we recommend that the evaluation team either 1) look into additional granularity on these values to allow for more specificity to the appropriate measures, or 2) use custom peak coincidence calculations to better estimate demand savings.

As we noted in our comments on the draft report, it appears that the effective full load hours are low for some programs. We have some concerns about the demand savings relative to energy savings ratio found in the evaluations of several programs. To illustrate this, we will define an EFLH value as the energy savings (kWh) divided by the demand savings (kW). The lower this number, the more prevalent demand savings are.

As an example, a load rolling demand measure that shuts off a specific piece of equipment and reduces demand by 10 kW on five separate occasions for a duration of two hours will save 100 kWh. The EFLH for this is 100 kWh / 10 kW = 10 hours. Conversely, a measure that saves 100 kWh, but has no demand savings (e.g., exterior light LEDs that only run at nighttime) has an effectively infinite EFLH, because no amount of the demand savings will ever achieve the electric savings. A project that saves the same amount of power every hour of the year (e.g., emergency lighting upgrades) will have an EFLH of 8,760.

Using those reference points, any project or program that saves below 8,760 EFLH is more effective at saving demand than energy, and vice versa. EFLH's below 8,760 are expected in programs with lighting measures where lights are on during the peak demand periods, but off for unoccupied periods.

There were no major red flags on the residential portfolio, however, looking at the EFLH values for the business programs, both the Custom and RCx programs seem potentially low.

Table 9: Average Effective Full Load Hours

Commercial Program	EFLH
Standard	4,602
Custom	2,266
SBDI	5,250
New Construction	3,465
RCx	2,687

Randomized Control Design

The evaluation report notes that ODC was unable to utilize a randomized controlled trial (RCT) approach with treatment and control groups due to a lack of data availability for the Nest devices (p. 34). The text indicates that this information was available for the PY2019 evaluation, however. We agree that the RCT would be the optimal evaluation approach and recommend that Ameren require that Nest make this information available in a usable and timely fashion for future evaluations.

Due to the lack of information from Nest, ODC utilized this next best approach that reflected an average treatment effect on the treated (ATT). To be consistent, they also used the alternative ATT approach to all the device manufacturers as well. Consequently, no RCT analysis was done in PY2020.

While we understand the desire for consistency, the RCT is still the preferred method when possible as it will capture the effects of external influences. We recommend that the RCT approach be used when the data are available, even at the expense of having an inconsistent approach across device manufacturers and/or programs.

Missing AMI data

The report describes several instances where the demand response participants were missing billing data (p. 62):

- For accounts with no interval data for one event but data present for the other event, the evaluation team imputed the other event's performance for the event with missing data.
- For accounts with no interval data for any of the events, the evaluation team imputed performance using a weighted average per-account performance across all participating accounts with valid interval data.

In these missing data cases, the evaluation should verify that these are indeed active accounts in order to claim savings – this is particularly true for those customers where there are no interval data for any of the demand response events. In the future, participating customers that do not have interval data and who are not verified by the evaluation team as being active accounts should be assigned a savings value of zero.

Appendix A: Full Process Evaluation Responses to Minimum Question Requirements

The following appendix provides a summary of the detailed responses to minimum process evaluation requirement questions.

Table 10: Minimum Process Evaluation Questions

Issue Number	Question
Issue 1	What are the primary market imperfections common to the target market segment?
Issue 2	Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?
Issue 3	Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?
Issue 4	Are the communication channels and delivery mechanisms appropriate for the target market segment?
Issue 5	What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

Table 11: Issue 1 - What are the primary market imperfections common to the target market segment?

Program	2019 Summary Response	2020 Summary Response
Single Family Income Eligible	Low-income households face multiple barriers to investing in energy efficiency either through Ameren Missouri programs or outside of them. Market imperfections include: • The high upfront cost of energy-efficient products relative to household capital and • Available credit, even when taking into account traditional utility program incentives, • Lack of access to traditional forms of information about energy efficiency programs, • Housing stock that may need health and safety improvements, which can preclude • Efficiency upgrades unless these issues are addressed first, and • Split incentives between property owners and renters, for those who rent their home.	Income eligible households face multiple barriers to investing in energy efficiency either through Ameren Missouri programs or outside of them. Market imperfections include: • The high upfront cost of energy-efficient products relative to household capital and • Available credit, even when taking into account traditional utility program incentives, • Lack of access to traditional forms of information about energy efficiency programs, • Housing stock that may need health and safety improvements, which can preclude • Efficiency upgrades unless these issues are addressed first, and • Split incentives between property owners and renters, for those who rent their home.
Multifamily Income Eligible	Market imperfections specific to the multifamily sector include 1) the split incentive for in-unit measures between property owners, managers, and residents, 2) awareness of the potential for saving money and energy through energy efficiency upgrades, 3) costs associated with energy efficiency upgrades, 4) knowledgeable staff available to install energy-efficient upgrades, and 5) the time investment to plan, budget and implement energy efficiency upgrades.	Market imperfections specific to the multifamily sector include (1) the split incentive for in-unit measures between property owners, managers, and residents, (2) awareness of the potential for saving money and energy through energy efficiency upgrades, (3) costs associated with energy efficiency upgrades, (4) knowledgeable staff available to install energy-efficient upgrades, and (5) the time investment to plan, budget and implement energy efficiency upgrades.
Lighting	• Market imperfections have historically been product availability, customer awareness of energy-efficient lighting options and benefits, and the higher cost of these products. • Product availability is no longer a barrier. LEDs are the most frequently stocked bulb at lighting retailers across all bulb types (i.e., standard, reflector, and specialty). • Customer awareness is a decreasing barrier. The vast majority of customers	Market imperfections have historically been product availability, customer awareness of energy-efficient lighting options and benefits, and the higher cost of these products. For PY2019, we found the following: Product availability is no longer a barrier. LEDs are the most frequently stocked bulb at lighting retailers across all bulb types (i.e., standard, reflector, and specialty). Customer awareness is a decreasing barrier. The vast majority of customers have LEDs

Program	2019 Summary Response	2020 Summary Response
	have LEDs installed in their homes. Two-thirds of customer light sockets also contain either a CFL or an LED. • LEDs still cost more than incandescent, but the price difference has narrowed. Despite these positive signs of market progress, customer use of efficient bulbs varies by household income and use case (i.e., socket type). Lower-income customers have lower LED penetrations and efficient bulb saturation than other customers. Low- income customers are also more likely to purchase the lowest cost bulb rather than consider factors like energy efficiency. Sockets that take a standard bulb also have greater efficient bulb saturation than reflector or specialty sockets.	installed in their homes. Two-thirds of customer light sockets also contain either a CFL or an LED. LEDs still cost more than incandescent bulbs, but the price difference has narrowed. Despite these positive signs of market progress, customer use of efficient bulbs varies by household income and use case (i.e., socket type). Lower-income customers have lower LED penetration and efficient bulb saturation than other customers. Low-income customers are also more likely to purchase the lowest cost bulb rather than consider factors like energy efficiency. Sockets that take a standard bulb also have greater efficient bulb saturation than reflector or specialty sockets.
Efficient Products	The primary market imperfections for the REP Program are customer awareness of energy efficient product options and their benefits, and the higher price of efficient products. In terms of knowledge, many customers are not aware of energy efficiency and energy-efficient technologies. And even those that are aware are often not informed of actual energy savings opportunities available in their homes. For programs like the REP Program, customer awareness of the availability of the rebate is paramount. Customers need to either be proactive and search out the rebates, or they need to be informed of them via marketing or a contractor. Only 36% of residential customers were aware of the REP program, which limits participation. Other market imperfections are measure specific and generally apply to the market potential: • Only 4% of homes in the Ameren Missouri service territory have inground pools. This is a limited market, and the product selection is largely driven by contractor recommendations.	The primary market imperfections for the REP Program are customer awareness of energy efficient product options and their benefits, and the higher price of efficient products. In terms of knowledge, many customers are not aware of energy efficiency and energy-efficient technologies. And even those that are aware are often not informed of actual energy savings opportunities available in their homes. For programs like the REP Program, customer awareness of the availability of the rebate is paramount. Customers need to either be proactive and search out the rebates, or they need to be informed of them via marketing or a contractor. For PY2019, we found that only 36% of residential customers were aware of the REP Program, which limits participation. Other market imperfections are measure-specific and generally apply to the market potential: • Only 4% of homes in the Ameren Missouri service territory have inground pools. Thus, the market for pool pumps is very limited, and the product selection is largely driven by contractor recommendations.

Program	2019 Summary Response	2020 Summary Response
	While nearly every home has at least one thermostat, thermostats do not routinely fail, so customers will need another reason to replace existing thermostats. The desire for advanced technology is a factor driving advanced thermostat uptake. Thermostats have become a consumer product, and like other advanced technologies, many people appreciate and want the technology. Still, others do not and could view advanced thermostats as overly complicated or expensive. Greater customer awareness of new thermostat technology and its energy savings potential could help drive customers to advanced thermostats.	• While nearly every home has at least one thermostat, thermostats do not routinely fail, so customers will need another reason to replace existing thermostats. The desire for advanced technology is a factor driving advanced thermostat uptake. Thermostats have become a consumer product, and like other advanced technologies, many people appreciate and want the technology. Still, others do not and could view advanced thermostats as overly complicated or expensive. Greater customer awareness of new thermostat technology and its energy savings potential could help drive customers to advanced thermostats.
HVAC	The primary market imperfections include high upfront cost of high-efficiency HVAC equipment and a lack of customer awareness regarding the benefits of such systems (i.e., energy and utility bill savings). Trade allies play an important role in addressing these market imperfections by educating customers and promoting program incentives that reduce the cost of high-efficiency equipment so that is closer to the price of standard efficiency equipment.	At a high level, the primary market imperfections include the high upfront cost of high-efficiency HVAC equipment and a lack of customer awareness regarding the benefits of such systems (i.e., energy and utility bill savings). Contractors play an important role in addressing these market imperfections by educating customers and promoting program incentives to make the high-efficiency equipment affordable alternatives to standard efficiency equipment. Midstream research conducted for PY2020 also suggests, however, that there is an organic segmentation to the customer population that warrants consideration. Different segments of customers face different barriers—or at least the importance of the barriers can vary. The barriers faced by customers of higher sociodemographic attainment are not the same barriers of someone whose income is too high to qualify as a low-income customer but is still not high enough to be able to afford the initial costs of an energy-efficient system upgrade. While the former may easily be a candidate for super-efficient equipment, the latter is not really a candidate for any equipment, regardless of efficiency level. Of course, in between are customers who can bear the cost of higher-efficiency equipment but might not be able to bear the additional costs associated with super-efficient equipment. While each of these different segments of customer face the same

Program	2019 Summary Response	2020 Summary Response
		general barriers, the significance and importance of the different barriers certainly varies.
Appliance Recycling	The primary market imperfection that the program addresses is residential customers' low impetus to remove old, inefficient refrigerators and freezers from the grid. Often customers will keep a spare refrigerator or freezer for secondary use or dispose of it in a way that it continues to be used as opposed to disposing of the appliance permanently.	The primary market imperfection that the program addresses is residential customers' low impetus to remove old, inefficient refrigerators and freezers from the grid. Often customers will keep a spare refrigerator or freezer for secondary use or dispose of it in a way that it continues to be used as opposed to disposing of the appliance permanently.
Energy Efficiency Kits	The primary market imperfection that the program addresses is the lack of consumer awareness about (or the reluctance to purchase) the energy-saving kit items. The program addresses these two barriers to installation by providing the kit items free and educating the children (and, indirectly, household members) about the energy savings potential of installing the items. All potential housing stock characteristics may be included in kit product distribution due to the program being offered to all sixth-grade students. The 2019 residential baseline study results indicate shrinking opportunity for the standard LEDs included in the kit. Nearly 70% of light sockets that take a standard bulb contain an efficient bulb (either CFL or LED). LEDs also had a higher FR than other kit measures suggesting that many families were already using LEDs and would purchase them on their own. Faucet flow rate data from the baseline study indicate somewhat more opportunity for high-efficiency faucet aerators (39% of customers have aerators with flow rates greater than 2.2 GPM).	The primary market imperfection that the program addresses is the lack of consumer awareness about (or the reluctance to purchase) the energy-saving kit items. The program addresses these two barriers to installation by providing the kit items free of charge and educating the children (and, indirectly, household members) about the energy savings potential of installing the items. All potential housing stock characteristics may be included in kit product distribution due to the program being offered to all sixth-grade students. The 2019 residential baseline study results indicate shrinking opportunity for the standard LEDs included in the kit. Nearly 70% of light sockets in Ameren Missouri's service territory that take a standard bulb contain an efficient bulb (either CFL or LED). LEDs also had higher FR than other kit measures, suggesting that many families were already using LEDs and would purchase them on their own. Faucet flow rate data from the baseline study indicate somewhat more opportunity for high-efficiency faucet aerators (39% of customers have aerators with flow rates greater than 2.2 GPM).
Home Energy Reports	Survey responses from the treatment and control customers indicate that they have a general understanding of how behavioral changes lead to reductions in energy usage. A market imperfection common to both customer groups is a more nuanced awareness of how their actions to reduce energy consumption impact their utility bills. Reports sent through the HER Program are designed to address this market imperfection for treatment customers by providing them with information about energy efficiency	Though we did not complete a survey for the PY2020 evaluation, PY2019 survey responses from the treatment and control customers indicated that they have a general understanding of how behavioral changes lead to reductions in energy usage. A market imperfection common to both customer groups is the lack of a more nuanced awareness of how their actions to reduce energy consumption impact their utility bills. Reports sent through the HER Program are designed to address this market imperfection for treatment

Program	2019 Summary Response	2020 Summary Response
	program opportunities and recommendations to modify behaviors to reduce energy consumption in their homes.	customers by providing them with information about energy efficiency program opportunities and recommendations to modify behaviors to reduce energy consumption in their homes.
Multifamily Market Rate	Market imperfections specific to the multifamily sector include 1) the split incentive for in-unit measures between property owners, managers, and residents, 2) awareness of the potential for saving money and energy through energy efficiency upgrades, 3) costs associated with larger non-lighting measure upgrades, 4) knowledgeable staff available to install energy-efficient upgrades, and 5) the time investment to plan, budget and implement energy efficiency upgrades.	Market imperfections specific to the multifamily sector include (1) the split incentive57 for in-unit measures between property owners, managers, and residents, (2) awareness of the potential for saving money and energy through energy efficiency upgrades, (3) costs associated with larger non-lighting measure upgrades, (4) knowledgeable staff available to install energy-efficient upgrades, and (5) the time investment to plan, budget and implement energy efficiency upgrades.
BizSavers	The primary market barriers to adoption of energy-efficient equipment in the business sector are lack of awareness of energy saving opportunities and programs, the high cost of energy efficiency equipment, access to financing or capital, and uncertainty about expected bill savings. Evaluation results show that barriers differ by business size. Small business customers are less aware of energy saving opportunities beyond lighting whereas medium and large businesses are more likely to see lack of access to financing as a barrier. The upfront costs of upgrades are a barrier for all businesses regardless of size.	Based on PY2019 research, the primary market barriers to adoption of energy- efficient equipment in the business sector are lack of awareness of energy saving opportunities and programs, the high cost of energy efficiency equipment, access to financing or capital, and uncertainty about expected bill savings. In PY2020, business customers experienced additional barriers as a result of the COVID-19 pandemic, including competing priorities for available capital and uncertainty about the future. Based on our research, these barriers trumped the more traditional cost-related barriers in PY2020 and resulted in delays or cancellations of investment projects.

Table 12: Issue 2 - Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

Program	2019 Summary Response	2020 Summary Response
Single Family Income Eligible	Ameren Missouri has defined the target customer market as occupants of single-family housing who live in areas where most residents have an annual income at or below 80% if AMI. This criterion is aligned with low-income program eligibility criteria in other	Ameren Missouri has defined the target customer market as occupants of single-family housing who live in areas where most residents have an annual income at or below 80% of AMI. This criterion is aligned with income eligible program eligibility requirements in other states and should not be merged with any other income-based market segments.

Program	2019 Summary Response	2020 Summary Response
	states and should not be merged with any other income-based market segments. Additionally, the program's community-driven channels each target a specific housing stock subsegment (single family and mobile homes). This helps to target community and measure selection, as well as audits and measure installation assumptions, but the program and implementer should consider that: The program is set up to serve one type of housing at a time. Still, implementation experience shows many neighborhoods have mixed housing stock (including single family, small multifamily, and mobile homes). Notably, Ameren Missouri is formally pursuing a change in program eligibility requirements through the 11-step stakeholder process, asking to serve not only detached homes and duplexes but also attached dwellings of 4 or fewer units. Ultimately, this could help the program serve a larger share of homes per neighborhood, but also calls for a need to clarify when to serve small multifamily (i.e., 3- and 4-unit dwellings) through the Multifamily low-income vs Single Family low-income programs. Additionally, 23% of Ameren Missouri's single family low-income households rent their home compared to just 5% of non-low-income single family residents. In PY2019 implementers found it took more effort to enroll rental properties due to the extra step of gaining landlord approval after already spending time encouraging the tenant's interest. Single family rental properties should remain in the target segment due to the split-incentive market barrier, but it would be worth examining US Census data on the share of renters in proposed PY2020 neighborhoods to appropriately define budgets and timeframes by neighborhood. In some towns, mobile homes are clustered together in private parks or neighborhoods, while in others they are mixed in with other types of housing. Implementers found the private parks easier to serve given that park owners or managers are a built-in community	Additionally, the program's typical community-driven channels each target a specific housing stock subsegment (single family and mobile homes). This helps to target community and measure selection, as well as audits and measure installation assumptions. But the program team should consider that the program is set up to serve one type of housing at a time. Implementation experience shows many neighborhoods have mixed housing stock (including single family, small multifamily, and mobile homes). Notably, Ameren Missouri gained approval through the 11-step stakeholder process to change program eligibility to allow the program team to serve attached dwellings of four or fewer units in addition to detached homes and duplexes. In future years, when the program team can return to the original program design, this change will help the program serve a larger share of homes per neighborhood.

Program	2019 Summary Response	2020 Summary Response
	champion. Mobile home-specific outreach makes the most sense for private parks.	
Multifamily Income Eligible	Yes, the target market is appropriately defined as a building including three or more units with Ameren Missouri electric service. This program addresses multifamily property needs, both common area and in-unit upgrades.	Yes, the target market is appropriately defined as a building including three or more units with Ameren Missouri electric service and located in an area where most residents have an annual income at or below 80% of AMI. This program also addresses multifamily property needs for both common area and in-unit upgrades.
Lighting	• The target market for the Residential Lighting Program is all residential customers within Ameren Missouri service territory. • The program targets low-income customers by engaging discount stores that do not typically sell lighting such as St. Vincent De Paul, Salvation Army, Goodwill, and Habitat Restore. These stores tend to serve lower income customers. By bringing low-cost LEDs into these stores, the program attempted to reach customers it may not reach through other participating retailers. Still, nearly 90% of program-discounted bulbs were sold at large warehouse, big box, and DIY retailers though the upstream channel. Given the high level of efficient bulb socket saturation among non-low-income customers, the program could benefit from a more targeted design. Truly subdividing the market into low-income versus non-low-income and using tailored program designs for each customer segment would be appropriate.	The target market for the Residential Lighting Program is all residential customers within Ameren Missouri service territory. The program targets low-income customers by engaging discount stores that do not typically sell lighting such as St. Vincent De Paul, Salvation Army, Goodwill, and Habitat Restore. These stores tend to serve lower-income customers. By bringing low-cost LEDs into these stores, the program attempted to reach customers it may not reach through other participating retailers or programs. Given the high level of efficient bulb socket saturation among non-low-income customers, the program could benefit from a more targeted design. Truly subdividing the market into low-income versus non-low-income and using tailored program designs for each customer segment would be appropriate.
Efficient Products	Officially (per MEEIA III), the target market for the REP Program is all residential customers within the Ameren Missouri service territory. However, when the measure mix is considered (heat pump water heaters, pool pumps, and advanced thermostats), the actual market is predominantly homeowners. That said, virtually all residences (even rentals) could benefit from advanced Tier 2 power strips. Obviously, some measures like pool pumps should be targeted at residences with pools, but no further subdivision seems needed.	Officially (per MEEIA III), the target market for the REP Program is all residential customers within the Ameren Missouri service territory. When the measure mix is considered (heat pump water heaters, pool pumps, and advanced thermostats), however, the actual market is predominantly homeowners. That said, virtually all residences (even rentals) could benefit from advanced Tier 1 or Tier 2 power strips. Some measures like pool pumps should be targeted at residences with pools, but no further subdivision seems needed.

Program	2019 Summary Response	2020 Summary Response
HVAC	The HVAC Program's target market segment includes single family and multifamily residential homeowners with central cooling systems that are older or in need of replacement due to their operating conditions. The HVAC Program's overall target market segment is appropriately defined. The program also targets and claims incrementally higher savings for early replacement/early retirement projects. A project is considered ER if the trade ally 1) verifies that the outdoor compressor was in working condition and 2) the unit produces a measured temperature drop across the indoor coil (measuring entering and leaving temperature). While these requirements are important in establishing that a unit is operational, it is not sufficient for determining if the equipment provides adequate cooling, or if the program has induced the early retirement of the equipment. Rather, ER should be determined based on the customers' intentions before their involvement with a trade ally/program, in addition to the operating condition of the existing unit.	The HVAC Program's target market segment includes single family and multifamily residential homeowners with central cooling systems that are older or in need of replacement due to their operating condition. However, our research this year suggests the target market structure should be revised to incorporate the added complexity that the addition of the Midstream Channel revealed. There are at least three segments of customers that fall under the program- described target market but are not actually served by the program. First, there are low-income customers that qualify for the Single-Family Income Eligible Program. Though the program was changed in 2020 to address challenges posed by the COVID-19 pandemic (namely no in-home work was permitted), these customers would typically be the target of the Single-Family Income Eligible Program and not the HVAC Program. Second, are customers with incomes that exceed the criteria for low-income, but still are unable to afford the costs associated with upgrading to an energy-efficient system—of any efficiency level. The reality is that this is likely a sizable segment—maybe even the biggest—and energy-efficient HVAC equipment is not really accessible to them. No program is serving this latter segment. Though savings opportunities surely exist with this segment, accessing them will likely require alternative program designs. Third and final, is a unique segment of customers who are willing to make energy-efficient HVAC upgrades and can afford to, but only with the rebates. The program requirement that an existing operating system can be at most 12 SEER limits some of these customers from participating (i.e., there may be customers that would benefit from participating, but have systems that don't meet this threshold). Consequently, this is also a segment that does not really have access to energy-efficient equipment.
Appliance Recycling	Yes. Opinion Dynamics conducted a residential baseline study in 2019 that found that 37% of residents have a secondary refrigerator, an additional 8% have a third	Yes. The evaluation team conducted a residential baseline study in 2019 that found that 37% of residents have a secondary refrigerator, an additional 8% have a third

Program	2019 Summary Response	2020 Summary Response
	refrigerator, and 39% report the presence of a stand-alone freezer. This indicates ample opportunity to achieve savings by removing these additional appliances from the grid. Participant survey responses indicate 29% of recycled appliances were primary units, which, in the absence of the program, a customer might retain for secondary use. Regarding appliance age, baseline data indicates that there are very few existing appliances of vintages earlier than 1990 (1% of primary refrigerators, 10% of secondary refrigerators, and 12% of secondary freezers). Participant survey data indicate that 36% of recycled units are of vintages earlier than 1990. Thus, the program is successfully motivating the recycling of these units.	refrigerator, and 39% report the presence of a stand-alone freezer.62 This indicates ample opportunity to achieve savings by removing these additional appliances from the grid. Participant survey responses indicate 29% of recycled appliances were primary units, which, in the absence of the program, a customer might retain for secondary use. Regarding appliance age, baseline data indicates that there are very few existing appliances of vintages earlier than 1990 (1% of primary refrigerators, 10% of secondary refrigerators, and 12% of secondary freezers). Participant survey data indicate that 36% of recycled units are of vintages earlier than 1990. Thus, the program is successfully motivating the recycling of these units.
Energy Efficiency Kits	Yes. The program targets residential customers with children in the sixth grade. The intent is to increase awareness of energy efficiency and Ameren Missouri's energy efficiency programs and achieve energy savings through the installation of kit items. However, the program does distribute kits in schools that are near Ameren Missouri's territory border so that 28% of kits went to households that are not Ameren Missouri customers.	Yes. The program targets residential customers with children in the sixth grade. The intent is to increase awareness of energy efficiency and Ameren Missouri's energy efficiency programs and achieve energy savings through the installation of kit items.
Home Energy Reports	The PY2019 target market requires modification if Ameren Missouri wants to maximize program savings. Three waves of customers were included in the HER Program in PY2019, and the two legacy waves were appropriately defined. The program implementer included the top two quartiles in terms of energy consumption in the program from the legacy waves. These customers were virtually all single-family customers. The newest wave that joined the program in PY2019 was by far the largest. Unlike the legacy waves, the program implementer did not explicitly exclude multifamily customers, and therefore close to 25% of the treated customers fell into this category. Since multifamily customers generally have lower baseline consumption than their single-family counterparts, their potential to reduce their energy consumption	In PY2020 Ameren Missouri and the HER program implementation team made adjustments based on the PY2019 evaluation to target higher energy users and customers in single family homes to be included in Wave 4. The program implementer included the top two quartiles in terms of energy consumption in the program from the legacy waves (i.e., Waves 1 and 2). These customers were virtually all single-family customers. Unlike the legacy waves, 25% of the treated Wave 3 customers lived in multifamily housing with generally lower energy consumption, limiting energy savings potential from those participants. The implementation team addressed this in PY2020 as the newest wave (Wave 4) exclusively targeted single-family customers with higher energy usage.

Program	2019 Summary Response	2020 Summary Response
	is smaller and, therefore, may not result in similar energy savings. In the future, if Ameren Missouri includes multifamily customers for equity reasons, it should explicitly state this as a program goal. Otherwise, Ameren Missouri should target single family customers with the highest baseline consumption in the following year to generate greater savings from the program.	
Multifamily Market Rate	Yes, the target market is appropriately defined as a building including three or more units with Ameren Missouri electric service. This program addresses multifamily property needs, both common areas, and in-unit upgrades.	Yes, the target market is appropriately defined as a building including three or more units with Ameren Missouri electric service. This program addresses the need for both common area and in-unit upgrades.
BizSavers	Ameren Missouri's BizSavers portfolio serves businesses of varying sizes and sectors. The SBDI Program recognizes the unique challenges of small businesses though small businesses can still participate in the Standard or Custom Programs if the offerings are a better match to customer needs. The current target audience for the SBDI Program is commercial electric customers that are classified as Small General Service Rate 2(M). This covers a wide range of market segments. The SBDI Program is generally serving the majority of the market segments existing in the General Service Rate 2(M), although participation has been concentrated in a few segments (office, retail, warehouse). The new Business Social Services Program serves nonprofit organizations that provide services to the low-income public. The PY2019 program was small in scope, with 31 projects completed by 14 organizations that offer a mix of family, social, and healthcare services. Given the small participation and targeted outreach strategy to-date, insights into the reach of the program and appropriateness of market segmentation are limited but are expected to increase as the program matures. The SBDI program appears to have been successful in serving renters, a frequently underserved market segment by business	Ameren Missouri's BizSavers portfolio serves businesses of varying sizes and sectors. The SBDI Program recognizes the unique challenges of small businesses though small businesses can still participate in the Standard or Custom programs if the offerings are a better match to customer needs. The current target audience for the SBDI Program is commercial electric customers that are classified as Small General Service Rate 2(M). This covers a wide range of market segments. The SBDI Program is generally serving the majority of the market segments existing in the General Service Rate 2(M), although participation has been concentrated in a few segments (50% of PY2020 projects were completed in the office and retail segments). The new BSS Program serves nonprofit organizations that provide services to the low-income public. The PY2019 program was small in scope, with 31 projects completed by 14 organizations that offer a mix of family, social, and healthcare services; the PY2020 program was even smaller, with only 12 projects completed by eight organizations. Given the extremely small participation and targeted outreach strategy to-date, insights into the reach of the program and appropriateness of market segmentation are still limited. The SBDI program appears to have been successful in serving renters, a frequently

Program	2019 Summary Response	2020 Summary Response
	portfolios. According to program tracking data renters accounted for 38% of PY2019 SBDI Program participants, which tracks well with Ameren Missouri's business customers overall (36% are renters) according to market research in support of Ameren Missouri's 2019 potential study.	underserved market segment by business portfolios. According to program tracking data renters accounted for 54% of PY2020 SBDI Program participants, which tracks extremely well with Ameren Missouri's business customers overall (36% are renters) according to market research in support of Ameren Missouri's 2019 potential study.

Table 13: Issue 3 - Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

Program	2019 Summary Response	2020 Summary Response
Single Family Income Eligible	Opinion Dynamics' recent baseline study of residential Ameren Missouri customers shows that low-income households tend to have lower-efficiency products in their home than their non-low-income counterparts, including efficient lighting. These results are consistent with findings from around the United States. The program's mix of end use measures appropriately reflects these needs. The program offers measures that cover major single family and mobile home energy saving needs, including building envelope, HVAC and thermostats, refrigeration, lighting, domestic hot water, and plug load. Additionally, the program cross-promotes opportunities for additional savings through the Ameren Missouri HVAC program. That said, implementation experience has already identified and made changes to measure eligibility criteria that need refinement to best reflect the housing stock among the target market, including mobile home insulation, refrigerator efficiency, and air conditioning efficiency.	Opinion Dynamics' recent baseline study of residential Ameren Missouri customers shows that income eligible households tend to have lower-efficiency products in their home compared to their non-income eligible counterparts, including efficient lighting. These results are consistent with findings from around the United States. The program's mix of end use measures appropriately reflects these needs. The program offers measures that cover major single family and mobile home energy saving needs, including building envelope, HVAC and thermostats, refrigeration, lighting, domestic hot water, and plug load measures. Additionally, the program cross-promotes opportunities for additional savings through the Ameren Missouri HVAC Program. However, the program team had to adjust the measure offerings for PY2020 due to COVID-19. The program team made an effort to cover as many end uses as possible in the revised offering. Vacant properties received the full suite of measures, while occupied residences received lighting, domestic hot water, and HVAC measures.
Multifamily Income Eligible	Yes, the program offers measures that cover all major multifamily common area and in- unit end use needs: lighting, space cooling and heating, insulation, and water heating. The tracking data indicated that only 1% of participating customers installed both tenant and common area upgrades at their property. This indicates that there may be an opportunity for educating customer to take advantage of the "one-stop-shop" program offered.	Yes, the program offers measures that cover all major multifamily common area and in- unit end use needs, including lighting, appliances, space cooling, space heating, building shell (e.g., insulation and windows), and water heating. The tracking data indicates that 7 of the 15 properties treated through the program received both tenant and common area upgrades. While COVID-19 impacted the range of projects that could be completed in PY2020, in future years the program team could increase the comprehensiveness of solutions offered to the target market segment by encouraging greater participation in the one-stop-shop channel.
Lighting	Standard bulbs are the most commonly used bulb in customer homes and have long been the focus of the Residential Lighting Program.	Standard bulbs are the most commonly used bulb in customer homes and have long been the focus of the Residential Lighting Program. This

Program	2019 Summary Response	2020 Summary Response
	This focus made sense when socket saturation of efficient bulbs was low across all use cases. But now that nearly 70% of light sockets that take a standard bulb contain an efficient bulb, the time is right to shift the program's focus to LED reflector and specialty bulbs, which cost more and lag in use. An exception is the low-income customer segment, as noted previously. Low-income customers could still use support increasing their use of all efficient bulb types, including standard bulbs.	focus made sense when socket saturation of efficient bulbs was low across all use cases. In our PY2019 evaluation, we found that 70% of light sockets that take a standard bulb contain an efficient bulb. A shift in program focus to LED reflector and specialty bulbs, which cost more and lag in use, would be appropriate. An exception is the low-income customer segment, as noted previously. Low-income customers could still use support increasing their use of all efficient bulb types, including standard bulbs.
Efficient Products	The REP Program currently offers only four measures: (1) advanced thermostats, (2) Tier 2 power strips, (3) heat pump water heaters, and (4) pool pumps. When one considers the diversity of energy-consuming items in the typical residence (the target market), a very wide range of other end use measures appear potentially applicable to the REP Program. Of course, cost-effectiveness and overlap with other programs needs to be considered.	The REP Program currently offers only five measures: (1) advanced thermostats, (2) Tier 1 power strips, (3) Tier 2 power strips, (4) heat pump water heaters, and (5) pool pumps. When one considers the diversity of energy-consuming items in the typical residence (the target market), a very wide range of other end use measures appear potentially applicable to the REP Program. Of course, cost-effectiveness and overlap with other programs needs to be considered. ENERGY STAR room air conditioners, air purifiers, and dehumidifiers were included when developing targets/goals in 2018, so they may be good candidates for measure expansion.
HVAC	The HVAC Program offers incentives for heating and cooling equipment at various efficiency levels. The HVAC Program also correctly accounts for market and federal code changes, phasing out offerings (i.e., ECMs) when they are no longer effective under evolved market conditions. With the removal of ECMs as a program offering, Ameren Missouri should consider including other end use technologies such as high-efficiency water heaters. Based on the trade ally survey, about a fifth (22%) of respondents reported that in addition to HVAC, their companies are specialized in plumbing and hot water heating services. As such, Ameren Missouri could leverage its existing trade ally network to recruit contractors who already sell/install high-efficiency water heating equipment.	The HVAC Program offers incentives for heating and cooling equipment at various efficiency levels. The HVAC Program also correctly accounts for market and federal code changes, phasing out offerings (i.e., ECMs) when they are no longer effective under evolved market conditions. As noted above, however, the program requirement that the existing unit cannot exceed 12 SEER is a limitation. This limitation may be too stringent as the current federal minimum standard is 13 SEER (which is also the baseline for ROF measures), and the minimum SEER qualifying for the program is 15 SEER. Technically, the SEER ceiling could be increased to 13 (or even 14) SEER while still providing energy savings. Of course, baselines adjustments might be warranted for such higher SEER systems.
Appliance Recycling	Yes. The program allows refrigerators or freezers to be recycled, along with window air	Yes. The program allows refrigerators or freezers to be recycled, along with window air

Program	2019 Summary Response	2020 Summary Response
	conditioners and/or dehumidifiers at the same time. Two percent of recycled appliances were dehumidifiers and room air conditioners (4% total), demonstrating there is a market, albeit small, for these additional measures to be recycled. Customers did not mention requests for additional measures to be included in the program.	conditioners and/or dehumidifiers at the same time. In PY2020, 3% of recycled appliances were dehumidifiers and room air conditioners, demonstrating there is a market, albeit small, for these additional measures to be recycled. During the PY2019 RAR participant survey, customers did not mention requests for additional measures to be included in the program.
Energy Efficiency Kits	Yes. Since the residential customer end use technologies can vary so widely in age, make, model, and pre-existing efficiencies, kit programs like this, in particular, must carefully weigh the cost of included items and the potential for the items not to be installed by the customer. Survey results indicate the following installation rates: at least one LED bulb (88%), hot water pipe insulation (56%), showerhead (54%), bathroom faucet aerator (48%), furnace filter whistle (44%), and kitchen faucet aerator (40%). Customer responses indicate a desire to avoid wasting items. Faucet aerators appear to be the most likely to "not fit," and adaptors have been requested for inclusion in the kits by customers for this so that more may be utilized.	Yes. Since the residential customer end use technologies can vary so widely in age, make, model, and pre-existing efficiencies, kit programs like this must carefully weigh the cost of included items and the potential for the items not to be installed by the customer. Results from the PY2019 participant survey indicated the following measure in-service rates: at least one LED bulb (88%), hot water pipe insulation (56%), showerhead (54%), bathroom faucet aerator (48%), furnace filter whistle (44%), and kitchen faucet aerator (40%).
Home Energy Reports	The main form of treatment for customers is the HER. The HERs reflect the diversity of end use energy service needs of residential homes, which is the target market. They include information related to the last 13 months of electric consumption, load that is disaggregated by home area, as well as comparisons of monthly energy usage to similar homes. Reports also include customized tips aimed at modifying behavior related to the installation of LED lighting to replace less efficient lighting, installing programmable or advanced thermostats, and adjusting the way customers operate their washers/dryers, dishwashers, and HVAC equipment. In addition, HERs include information about applicable energy efficiency rebate programs that may lead customers to retrofit aging inefficient equipment.	The main form of treatment for customers is the paper or electronic HER. The HERs reflect the diversity of end use energy service needs of residential homes, which is the target market. They include information related to the last 13 months of electric consumption, including load that is disaggregated by home area, as well as comparisons of monthly energy usage to similar homes. Reports also include customized tips aimed at modifying behavior related to the installation of LED lighting to replace less efficient lighting, installing programmable or advanced thermostats, and adjusting the way customers operate their washers/dryers, dishwashers, and HVAC equipment. In addition, HERs include information about applicable energy efficiency rebate programs that may lead customers to retrofit aging inefficient equipment.
Multifamily Market Rate	Yes, the program offers measures that cover all major multifamily common area and in- unit end use needs: lighting, appliances, space cooling and heating, insulation, and water	Yes, the program offers measures that cover all major multifamily common area and in- unit end use needs, including lighting, appliances, space cooling, space heating, ventilation,

Program	2019 Summary Response	2020 Summary Response
	heating. The tracking data indicated that only 4.3% of participating customers installed both tenant and common area upgrades at their property. This indicates that there may be an opportunity for educating customer to take advantage of the "one-stop-shop" program offered.	building shell (e.g., insulation and windows), and water heating. The tracking data indicates that 5 of the 14 properties treated through the program in PY2020 received both in-unit and common area upgrades. While COVID-19 impacted the range of projects that could be completed in PY2020, in future years the program team could increase the comprehensiveness of solutions offered to the target market segment by encouraging greater participation in the one-stop-shop channel.
BizSavers	Evaluation results found participants were relatively dissatisfied with the breadth of measure offerings. In some cases, participants and market partners were dissatisfied with the list of eligible measures and in other cases they indicated low incentives rendered an officially eligible measure effectively ineligible. Standard and Custom Program participants reported relatively low levels of satisfaction with the range of equipment that is eligible for incentives from Ameren Missouri, with only 61% and 55% of participants reporting being "very satisfied". Market partners revealed similar levels of dissatisfaction with measure eligibility, and most frequently suggested adding outdoor lighting to the list of available measures. In PY2019, the SBDI Program only dealt with lighting. Because it is designed as a Fast-Track, direct install program, it may be that the ability to add other measures is limited. However, HVAC measures are being added in PY2020, which suggests there are likely other opportunities for additional measures that would meet the needs of small business customers. While the BSS Program offers a range of measures across different technologies, the program was almost exclusively focused on lighting measures in PY2019. Our evaluation found that incentive levels for non-lighting equipment appear to be insufficient to induce adoption in this market segment. One Service Provider noted that he was unable to complete any of the scoped non-lighting	PY2019 evaluation research found that participants were relatively dissatisfied with the breadth of measure offerings. In some cases, participants and market partners were dissatisfied with the list of eligible measures; in other cases, they indicated low incentives rendered an officially eligible measure effectively ineligible. The most common suggestion was to add outdoor lighting to the list of available measures, which the program did for the Standard and SBDI programs during PY2020. In PY2019, the SBDI Program only provided incentives for lighting measures. For PY2020, the program added HVAC measures, increased incentive caps, and developed a simplified, stand-alone HVAC application form. Despite these changes, uptake of non-lighting measures in PY2020 was limited to 15 smart thermostats, accounting for 0.2% of program savings. While the BSS Program offers a range of measures across different technologies, the program was almost exclusively focused on lighting measures in both PY2019 and PY2020. The PY2019 evaluation found that incentive levels for non-lighting equipment were insufficient to induce adoption in this market segment. While the program added a few new measures to the program in PY2020—including occupancy sensors, VFDs, and kitchen ventilation controls—incentive levels remained largely unchanged. The cost of delivering the program remains a concern to implementation staff and appears to affect the number and types of projects pursued.

Program	2019 Summary Response	2020 Summary Response
	projects due to incentive levels. If measure uptake for a broader mix of end use technologies is desired, the program may need to revisit incentive levels for non-lighting measures (balancing the potentially high-cost relative to achievable savings against other, non-financial objectives).	

Table 14: Issue 4 - Are the communication channels and delivery mechanisms appropriate for the target market segment?

Program	2019 Summary Response	2020 Summary Response
Single Family Income Eligible	The communication and delivery channels are appropriate to the target market segment. Staff used a variety of community-centric approaches to promote the program, including through community groups and mobile home park owners; conducting direct outreach to residents through neighborhood canvassing; holding meet-and-greet events with community leaders in popular community gathering places like restaurants; and working with Ameren Missouri to identify community non-profits serving low-income areas who could distribute efficient products to their constituents. These approaches are appropriate for the target market segment because they work around traditional time, geographic, and other barriers to learning about energy efficiency and the availability of utility-sponsored programs. That said, the level of personalized effort and outreach central to neighborhoods approaches necessarily slows the program's progress towards serving large numbers of homes per year. Because PY2019 was the inaugural launch year, we recommend reviewing how well these channels and mechanisms worked at-scale in PY2020. For the Housing Grant channel, the program is targeting the right kind of organizations who are prepared to distribute and install energy efficiency measures outside of a neighborhood "blitz" approach. However, according to the implementer, this channel tended to focus on urban areas in PY2019, as Ameren Missouri identified several of the partners through their existing connections, and the program did not have a specific budget spending goal—together suggesting that the program has the resources to serve additional untapped areas of potential need and savings. To fully serve the target market through this program, the program should focus on organization recruitment in 2020 with the goals of expanding the number of actively participating organizations, enrolling organizations specifically prepared to	The program team's typical communication and delivery channels are appropriate to the target market segment. Staff use a variety of community-centric approaches to promote the program, including through community groups and mobile home park owners; conducting direct outreach to residents through neighborhood canvassing; holding meet- and-greet events with community leaders in popular community gathering places like restaurants; and working with Ameren Missouri to identify community non-profits serving income eligible areas who could distribute efficient products to their constituents. These approaches are appropriate for the target market segment because they work around traditional time, geographic, and other barriers to learning about energy efficiency and the availability of utility-sponsored programs. In PY2020, the program team adapted their approach due to COVID-19. The program team targeted housing organizations with large portfolios of properties rather than contacting customers directly. This streamlined outreach strategy allowed the program team to treat many more properties in PY2020 compared to PY2019. However, the program did not reach any mobile home residents through this approach. Notably, program delivery was also limited in terms of the measures implemented at each property. For the Grant channel, the program is targeting CBOs that are prepared to distribute and install energy efficiency measures outside of the Single-Family channel. However, most of the measures distributed or installed through this channel in PY2020 went through CBOs in and around St. Louis. Notably, the share of measures delivered through St. Louis-based CBOs decreased from PY2019 to PY2020 (from 99% to 75%) and the number of participating CBOs in the channel increased from 6 to 19. This indicates the program team is expanding the reach of the channel and providing access to more customers outside of

Program	2019 Summary Response	2020 Summary Response
	complete eligible direct installation (such as more Community Action Agencies), and enrolling organizations serving rural communities.	the St. Louis metropolitan area. The program team should continue to focus on CBO recruitment in 2021 with the goals of expanding the number of actively participating CBOs, enrolling CBOs specifically prepared to complete eligible direct installation (such as more Community Action Agencies), and enrolling CBOs serving rural communities.
Multifamily Income Eligible	For this initial program year launch, the primary communication channel used was one- on-one contact between customers and implementation staff. The program does have a more varied marketing and communication plan they intend to employ in future program years, which includes conferences, promotional, and networking events.	The program uses a mix of communication channels including traditional channels such as e-mail blasts and distribution of collateral at industry events. The primary recruitment channel used is ICAST's existing relationships with larger property ownership and management companies. The program also leverages more tailored outreach to smaller scale property owners. This varied approach generates participation from varying customer types in the target market segment.
Lighting	For the upstream channel, the program used in-store and out of store marketing. Our evaluation found that in-store marketing was the primary driver of sales. Given the nature of the product, marketing at the point-of-purchase is appropriate. Program implementers added new discount retailers to the program increase the focus on low-income customers. This was an effective strategy that the program should continue and even expand, if possible. In turn, the program should reduce its emphasis on sales of standard bulbs at non-discount stores. The Online Store accounted for less than 1% of program sales and savings. With the growing customer reliance on online shopping more generally, the Online Store has unrealized potential. The channel is particularly useful for targeted marketing to underserved customers, which is more difficult to do through the mass market upstream channel.	For the Upstream Channel, the program used in-store and out of store marketing. Our PY2019 evaluation found that in-store marketing was the primary driver of sales. Given the nature of the product, marketing at the point-of-purchase is appropriate. Program implementers added new discount retailers to the program increase the focus on low-income customers. This was an effective strategy that the program should continue and even expand, if possible. In turn, the program should reduce its emphasis on sales of standard bulbs at non-discount stores. The Online Store accounted for just over 1% of program sales and savings. With the growing customer reliance on online shopping more generally, the Online Store has unrealized potential. The channel is particularly useful for targeted marketing to underserved customers, which is more difficult to do through the mass market Upstream Channel.
Efficient Products	In PY2019, program marketing activities included TV/radio ads, social media ads, paid search optimization, e-mail campaigns, including rebate information on energy statements or Home Energy Reports, and location-based ads and promotions. Most	In PY2020, program marketing activities included TV/radio ads, social media ads, paid search optimization, e-mail campaigns, including rebate information on energy statements or Home Energy Reports, and location-based ads and promotions. In PY2019, most participants

Program	2019 Summary Response	2020 Summary Response
	participants who purchased products through the Online Store learned about the program through direct communication from Ameren Missouri or the Ameren Missouri website. Mass marketing does not appear to have been that effective. Customers who purchased pool pumps pool pumps and heat pump water heaters were more likely to learn about the program through a contractor than other communication channels. Increasing outreach to contactors to increase their involvement with the program could increase participation for these measures.	who purchased products through the Online Store reported learning about the program through direct communication from Ameren Missouri or the Ameren Missouri website. Mass marketing does not appear to have been that effective. Customers who purchased pool pumps and heat pump water heaters were more likely to learn about the program through a contractor than other communication channels. Increasing outreach to contactors to increase their involvement with the program could increase participation for these measures.
HVAC	The HVAC Program is primarily driven by trade allies, and a majority of participants (68%) report having first heard about the program through trade allies. Ameren Missouri also promotes the HVAC Program through other forms of outreach, including e-mails, newsletters, bill inserts, Ameren Missouri website, home energy reports, and mass media advertising. Collectively, these channels are effectively reaching the target market segment and are, therefore, the appropriate communication and delivery mechanisms. Notably, the HVAC Program is the most well-known program of all Ameren Missouri residential programs, with 60% of general population survey respondents reporting awareness of the program. We found even higher awareness among the program's target market. Homeowners who have replaced their cooling system within the past three years are more likely to be aware of the HVAC Program than other homeowners (76% compared to 61%).	The HVAC Program is primarily driven by contractors. A majority of participants report having first heard about the program through contractors (this was 68% last year when only offering Downstream; it was 62% this when only considering the Midstream Channel). Notably, the HVAC Program is the most well-known program of all Ameren Missouri residential programs, with 60% of general population survey respondents reporting awareness of the program.30 Ameren Missouri also promotes the HVAC Program through other forms of outreach including e-mails, newsletters, bill inserts, the Ameren Missouri website, home energy reports, and mass media advertising. Collectively, these channels are effectively reaching a wide range of customers, but as noted above, some customers are still likely limited from accessing energy- efficient HVAC equipment for various reasons.
Appliance Recycling	Yes. Ameren Missouri primarily advertises this program through bill inserts and direct e- mail campaigns, and physical collateral is the primary mechanism responding participants report hearing about the program.	Yes. Ameren Missouri primarily advertises this program through bill inserts and direct e- mail campaigns. Based on PY2019 RAR participant survey responses, physical collateral is the primary mechanism responding participants report hearing about the program.
Energy Efficiency Kits	Yes, though adjustments could be made to better align the program with teachers' unique needs. The program provides teachers with teaching materials, student education worksheets, the kit materials, and installation	Yes, though adjustments could be made to better align the program with teachers' unique needs. The program provides teachers with teaching materials, student education worksheets, the kit materials, and installation

Program	2019 Summary Response	2020 Summary Response
	instructions. While program satisfaction is very high, the most frequent suggestion for program improvement from the teachers is a preference for being provided with an electronic version of all paper materials prior to receiving the kits so that they could print only the materials they would use and reduce the waste from un-used printed materials.	instructions. Further, in PY2020 program staff developed specific digital instructional and take-home materials to aid in delivering the program's educational content when schools offered remote or hybrid learning.
Home Energy Reports	The communication channels and delivery mechanisms are appropriate for the target market, given that a majority of survey respondents are satisfied with the way they receive HERs, and with the information they contain. Additionally, the HERs make customers aware of the energy efficiency programs Ameren Missouri offers. Late in PY2019, Ameren Missouri also launched an online portal that provides similar information as the HERs, but on a continual basis. These forms of communication are used to inform customers about how much energy they use as well as about equipment upgrade opportunities and behavioral changes they can make to reduce electricity usage.	The communication channels and delivery mechanisms are appropriate for the target market. Based on the PY2019 participant survey, the majority of respondents were satisfied with the way they receive HERs, and with the information they contained. Additionally, the HERs made customers aware of the energy efficiency programs Ameren Missouri offers. Late in PY2019, Ameren Missouri launched an additional communication channel for this program—an online portal that provides similar information as the HERs, but on a continual basis. These forms of communication are used to inform customers about how much energy they use as well as about equipment upgrade opportunities and behavioral changes they can make to reduce electricity usage.
Multifamily Market Rate	For this initial program year launch the primary communication channel used was one- on-one contact between customers and implementation staff. The program does have a more varied marketing and communication plan they intend to employ in future program years, which includes conferences, promotional, and networking events.	The program uses a mix of communication channels including traditional channels such as e-mail blasts and distribution of collateral at industry events. The primary recruitment channel used is ICAST's existing relationships with larger property ownership and management companies. The program also leverages more tailored outreach to smaller scale property owners. This varied approach generates participation from varying customer types in the target market segment.
BizSavers	According to market research in support of Ameren Missouri's 2019 potential study, awareness of Ameren Missouri BizSavers Programs is relatively low among the target market. Just over one-third of customers (36%) are aware of the programs offered. Medium and large businesses are much more likely to be aware of Ameren Missouri BizSavers Programs than small businesses (60% compared to 33%). These results suggest that additional communication or delivery of	According to market research in support of Ameren Missouri's 2019 potential study, awareness of Ameren Missouri BizSavers Programs is relatively low among the target market. Just over one-third of customers (36%) are aware of the programs offered. Medium and large businesses are much more likely to be aware of Ameren Missouri BizSavers Programs than small businesses (60% compared to 33%). These results suggest that additional communication or delivery of messages

Program	2019 Summary Response	2020 Summary Response
	messages through alternative channels is needed for small businesses. Ameren Missouri focuses most of its outreach on trade allies rather than direct communication with business customers, which can be seen in the large percentage of participants who learned of the program through a contractor (83% for Custom Program participants and 77% for Standard Program participants). While it is important that contractors are aware of Ameren Missouri programs and are enlisted as program advocates, direct customer outreach could support trade allies by increasing interest in programs among business customers.	through alternative channels is needed for small businesses. Trade allies remain a key communication channel for the BizSavers Program and much of the program's outreach efforts are focused on them. However, the program is expanding its direct customer outreach through social media, search engine marketing, segment-specific collateral, email blasts, and other efforts. While trade allies/contractors are still the primary source of information for program participants (reported by 62% of Standard and 69% of Custom survey respondents), these numbers are slightly lower than those reported by PY2019 participants (77% Standard and 83% Custom), with other information channels (including BizSavers representatives, Ameren Missouri's website, and e-mail blasts) becoming more important. Notably, more than one-third (38%) of Standard/Custom participants prefer e-mail outreach or electronic newsletters as an information channel for energy efficiency opportunities, which aligns well with recent program outreach efforts.

Table 15: Issue 5 - What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

Program	2019 Summary Response	2020 Summary Response
Single Family Income Eligible	PY2019 participants are satisfied with their program experience and received a variety of measures in their homes. As noted above, the program may want to consider additional methods to achieving more savings per community by overcoming split incentives in single family rental housing (to serve more homes) and should continue to validate the match between measure eligibility criteria by carefully observing on-the- ground housing stock (to provide more savings per home). With one year of implementation complete, it is early in this program's lifecycle and the program should focus on executing strategies to refine the existing delivery model. At this	The program team can increase the rate of customer acceptance by continuing to expand the network of participating CBOs in the Grant channel. This channel offers the opportunity to engage with many Ameren Missouri customers across the service territory. The distribution and installation arms of the channel offer opportunities for participants to install measures across a range of end uses. Per our recommendation in the PY2019 evaluation, once the program returns to its original design, the program team may consider methods to achieving more savings per community by overcoming split incentives in single family rental housing (to serve more

Program	2019 Summary Response	2020 Summary Response
	stage, some of the delivery challenges appear to reflect the process of launching a new program more so than problems with the program's design and ability to overcome barriers or promote customer acceptance. For example, implementers have discussed working with Ameren Missouri upfront to define all of the communities to be served each year, at the beginning of the year—reducing midyear transition time between communities and enabling greater delivery efficiency. Once the logistics are streamlined, the program may be able to step back to reassess what components are truly working well vs. which may need revision.	homes) and should continue to validate the match between measure eligibility criteria by carefully observing on-the-ground housing stock (to provide more savings per home).
Multifamily Income Eligible	Ameren Missouri can consider promoting Green Leases. Green Leases are contracts between landlords and tenant(s) that negotiate the mutual benefit of installing energy-efficient or green measures in shared buildings. For shared buildings, owners are burdened with green upgrade costs, while tenants benefit from lower operating costs. Without green leases, there is little incentive for owners to make green upgrades. Green leases are designed to allow both parties financial benefits and incentives, and multifamily building types are ideal buildings. The rate of customer acceptance and implementation is currently above expectations, as the program met goals despite implementation delays.	As noted in PY2019, one potential strategy to overcome split incentive issues is the promotion of Green Leases. Green Leases are contracts between landlords and tenant(s) that negotiate the mutual benefit of installing energy efficient or green measures in shared buildings. For shared buildings, owners are burdened with green upgrade costs, while tenants benefit from lower operating costs. Without green leases, there is little incentive for owners to make green upgrades to tenant units. Green leases are designed to allow both parties financial benefits and incentives, and multifamily building types are ideal buildings. The other market imperfections outlined above are largely targeted by the program's one-stop-shop model. As such, increasing participation and/or the share of projects in the program utilizing those services should help to more effectively overcome imperfections such as lack of awareness and information, project costs, limited staff knowledge, and the time needed to plan efficiency projects.
Lighting	Price is the remaining market imperfection, but much more so for low-income customers. The program should continue its partnerships with low-income retailers that do not traditionally sell lighting and other retailers in low-income neighborhoods. Customers have been slower to adopt reflector and specialty efficient lighting, in part because the previous product, CFLs, was	Price is the remaining market imperfection, but much more so for low-income customers. The program should continue its partnerships with low-income retailers that do not traditionally sell lighting and other retailers in low-income neighborhoods. Customers have been slower to adopt reflector and specialty efficient lighting, in part because the previous product, CFLs, was expensive and

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	expensive and did not meet customer expectations. LEDs are a superior product and price have fallen, but they still cost more than incandescent. The program could do more to increase adoption by focusing program budget on non-standard products.	did not meet customer expectations. LEDs are a superior product and price have fallen, but they still cost more than incandescent bulbs. The program could do more to increase adoption by focusing program budget on non-standard products.
Efficient Products	Customers seem largely satisfied with both the Online Store and mail-in channels. However, increased participation can likely be attained by expanding the breadth of measures rebated under the program, focusing additional marketing efforts on contractors, and increasing general customer awareness of the energy efficiency opportunities as well as available rebates.	In PY2019, customers seemed largely satisfied with both the Online Store and Mail-in Channels. Increased participation can likely be attained by expanding the breadth of measures rebated under the program, however, focusing additional marketing efforts on contractors, and increasing general customer awareness of the energy efficiency opportunities as well as available rebates.
HVAC	Even though the program offers various marketing support for trade allies (e.g., co-op marketing program, account manager, market collateral, and co-branded materials), almost half of trade allies (48%) said they do not use any of the program marketing support. Since trade allies play such an important role in promoting and delivering the HVAC Program, we recommend that Ameren Missouri and their implementation team work directly with trade allies to better understand the format, content, and features of marketing materials that trade allies would be more likely to use. A deeper understanding of what is needed by the HVAC technicians who are out in the field and interacting with customers face-to-face will enable the program to develop more effective promotional and educational materials to increase the sale of high-efficiency equipment.	Leverage the insights that arose with the introduction of the Midstream Channel. Acknowledge that the contractors operating in each channel are different, and much of this is likely based on the sociodemographic attainment of their targeted customer base. Segment the HVAC customer population to ensure that the program design and messaging are in alignment with the unique set of barriers and needs faced by the different segments.
Appliance Recycling	Ameren Missouri can annually revisit program assumptions regarding the percent of equipment in residential use that was manufactured prior to 1990, and percent of equipment recycled that is primary versus secondary. Based on the success of this program, the current incentive is satisfactory and results in participation. The time from scheduling to pick up is the primary reported participant concern, however, and Ameren Missouri could work with the program implementer to reduce the timeline between scheduling and pickup either via a more accurate and reliable interface where	Ameren Missouri can annually revisit program assumptions regarding the percent of equipment in residential use that was manufactured prior to 1990, the percent of equipment recycled that is primary versus secondary, and the size of freezers recycled through the program.

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	customers can schedule their own pickup, or providing greater quantity of available pickup times during the most popular pickup days.	
Energy Efficiency Kits	Some participants suggest an opt-in system could reduce waste and increase adoption rates. Also, adding adapters to the faucet aerators so they fit a greater range of faucets. Ameren Missouri is considering adding residential and business kit distribution channels to further address the market imperfections for households without school-aged children.	Based on responses to the PY2019 participant survey, some participating teachers/parents would appreciate an opt-in system, which could reduce waste and increase adoption rates—i.e., only providing kits to students whose parents opt-into the program.
Home Energy Reports	HERs increased awareness of energy saving opportunities. Treatment customers were more likely to be aware of energy savings opportunities compared to control customers (64% compared to 53%). However, a higher percentage of treatment customers reported feeling like they do not have control over the amount of household energy that is used relative to control customers. Since treatment customers receive HERs, Ameren Missouri should consider providing information about how much energy various end uses and behavioral changes are projected to save for the average home. One potential way to communicate this is to monetize the energy savings so that treatment customers gain some understanding of how much money they can save by replacing old equipment and/or making changes to how they use energy.	The PY2020 evaluation did not include process research designed to answer this question. The PY2019 evaluation provided the following recommendation: HERs increased awareness of energy saving opportunities. Treatment customers were more likely to be aware of energy savings opportunities compared to control customers (64% compared to 53%). However, a higher percentage of treatment customers reported feeling like they do not have control over the amount of household energy that is used relative to control customers. Since treatment customers receive HERs, Ameren Missouri should consider providing information about how much energy various end uses and behavioral changes are projected to save for the average home. One potential way to communicate this is to monetize the energy savings so that treatment customers gain some understanding of how much money they can save by replacing old equipment and/or making changes to how they use energy.
Multifamily Market Rate	Ameren Missouri can consider promoting Green Leases. Green Leases are contracts between landlords and tenant(s) that negotiate the mutual benefit of installing energy efficient or green measures in shared buildings. For shared buildings, owners are burdened with green upgrade costs, while tenants benefit from lower operating costs. Without green leases, there is little incentive for owners to make green upgrades. Green leases are designed to allow both parties financial benefits and incentives, and multifamily building types are ideal buildings. The rate of customer acceptance and implementation is	As noted in PY2019, one potential strategy to overcome split incentive issues is the promotion of Green Leases.58 Green Leases are contracts between landlords and tenant(s) that negotiate the mutual benefit of installing energy efficient or green measures in shared buildings. For shared buildings, owners are burdened with green upgrade costs, while tenants benefit from lower operating costs. Without green leases, there is little incentive for owners to make green upgrades to tenant units. Green leases are designed to allow both parties financial benefits and incentives, and multifamily building types are ideal buildings.

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	currently above expectations, as the program met goals despite implementation delays.	
BizSavers	• Continue to expand the slate of program-eligible measures. Outdoor lighting is the only one that arose as a specific recommendation, but others likely offer potential. • Revisit incentive levels to improve the uptake of non-lighting measures. • Continue to expand the network of trade allies and Service Providers, focusing on increasing the diversity of services offered and market segments targeted. Increase customer-focused, strategic, targeted marketing to customers.	The PY2020 evaluation did not include process research designed to answer this question. The PY2019 evaluation provided the following recommendations, some of which were adapted in PY2020: Continue to expand the slate of program-eligible measures. Outdoor lighting is the only one that arose as a specific recommendation, but others likely offer potential. • The program added exterior lighting (offered in combination with interior lighting projects) in the summer of 2020. • Other new measures include occupancy sensors, VFDs for certain applications, kitchen ventilation controls, compressed air measures, and high-volume low-speed fans. Revisit incentive levels to improve the uptake of non-lighting measures. • InresponsetoCOVID19 impacts, the program offered a 15% bonus incentive for HVAC measures (compared to 10% for lighting measures). In addition, it increased incentive levels for central air conditioning equipment and heat pumps. • Notably, the Standard Program saw a substantial increase in HVAC projects and savings during PY2020. Continue to expand the network of trade allies and Service Providers, focusing on increasing the diversity of services offered and market segments targeted. • In light of the COVID-19 pandemic, the program undertook considerable effort re-engaging and supporting its trade ally network. However, any

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		expansion of the network in PY2020 was limited. Increase customer-focused, strategic, targeted marketing to customers. • As noted above, the program has been expanding its direct customer outreach through social media, search engine marketing, segment-specific collateral, email blasts, and other efforts.