

3. Load Analysis and Forecasting

Ameren Missouri

customers. Ameren Missouri expects the customer-owned solar would increase at a compound annual growth rate of 12.5% between 2018 and 2037 (base case scenario). In this case, we expect that the cumulative installed customer-owned solar capacity would reach approximately 622 MW by 2037 in Ameren Missouri's territory. The high load growth scenario assumes low adoption of customer owned solar (approximately 114 MW of cumulative installed customer owned solar capacity by 2037), and the low load growth scenario assumes high adoption of customer owned solar (approximately 930 MW of cumulative installed customer owned solar capacity by 2037).

Other Forecasting Considerations – Electric Vehicles³⁹

Although the market share of EVs in the USA is around 0.7% (as of 2016), the EIA projects Battery EV (BEV) sales to increase to 6% of total light-duty vehicles sold in the United States between 2016 and 2040, while plug-in hybrid electric vehicle (PEV) sales are projected to increase to 4% over the same period⁴¹. EV sales in the USA have soared in the recent past, with a compound annual growth rate (CAGR) of 32% between 2012 and 2016. Supportive EV policies, such as the federal tax credit, state-level incentives, and supportive utility tariffs, have been strong drivers for EV adoption within the USA. In comparison, EV adoption in Ameren Missouri's footprint has been rather slow, with approximately 400 PEVs sold every year in the footprint. The primary reasons for such slow growth include range anxiety and the purchase price of PEVs. As of 2016, approx. 2,100 PEVs are in use in Ameren Missouri's footprint. As the battery technology improves and the cost of batteries decreases, Ameren Missouri believes that the PEV adoption in its territory has the potential to significantly increase over the next 20 years. Supportive tariff design and regulatory policies and favorable tax policies will foster such growth. Ameren Missouri has started taking proactive measures, such as proposing highway-charging corridor in the recently concluded rate review (ER-2016-0179), to promote PEVs in its footprint, and is continuing to explore options to stimulate investment in PEV charging infrastructure that will provide more access to charging for customers.

Ameren Missouri's analysis shows that future adoption can follow one of three scenarios. The base case scenario assumes approximately 75,000 PEVs will be in use by 2037 in the footprint. The minimum adoption scenario assumes that there will be approximately 20,000 PEVs on the road by 2037, whereas the maximum adoption scenario assumes approximately 300,000 PEVs on the road under the assumption that ~30% of new car sales are PEVs in the future. PEVs can be a growth vehicle for Ameren Missouri, representing approximately 335 GWh in annual energy usage by 2037 under the base case scenario. The maximum adoption scenario estimates approximately 1,400 GWh and the minimum adoption scenario estimates approximately 90 GWh in energy usage by

³⁹ EO-2017-0073 1.F; EO-2017-0073 1.K; 4 CSR 240-22.030(7)(A)5

2037. The base case CAGR assumption of 17.2% over the planning horizon is a conservative estimation compared to the US and global growth potential of PEVs.

The 2016 Ameren Missouri DSM Market Potential Study indicates that in the near-term and mid-term there is not significant penetration of PEVs. Ameren Missouri load forecasts include three scenarios of PEV adoption (See Other Forecasting Considerations in Chapter 3). While continuing to explore options to stimulate investment in PEV charging infrastructure and reduce the barrier to PEV adoption by customers, Ameren Missouri is very aware that there will be opportunities to educate customers and, potentially, to offer cost-effective programs to affect customer charging behavior in a way that increases system operational flexibility and utilization efficiency. However, the 2016 potential study does not identify any cost-effective program options at this time but Ameren Missouri will continue to seek viable program options as PEV penetration increases and technology changes increase available options to deploy cost-effective programs.

Ameren Missouri currently does not have any formal PEV programs but is providing basic PEV education to customers via website and key account outreach, occasional business presentations, utilizing PEVs in the Ameren Missouri fleet, and encouraging coworkers to drive PEVs through incentives, education and making workplace charging available.

Other Forecasting Considerations – Electrification of End-uses⁴⁰

With the goal of reducing greenhouse gas (GHG) emissions and addressing other environmental concerns, research publications⁴¹ show that electrification of end uses could help in achieving such goals. Electrification of end uses such as space heating, water heating, and transportation, which conventionally use natural gas, propane, gasoline, diesel, or fuel oil, will help achieve emission reduction goals for carbon dioxide and GHG. Advancements in solar and battery storage technologies make it increasingly easier for the end use customers to actively participate in their energy consumption and contribute to a greener and cleaner environment. Analysis published by The Brattle Group shows that coupling electrification of heating and transport with significant decarbonization of the power sector (e.g., through the adoption of clean power generation sources such as renewables, nuclear, or carbon capture) and modest reductions in other energy sectors could lead to more than a 70 percent reduction in U.S. energy-related GHG emissions relative to 2015 levels, and thus represent an important step towards overall economy-wide emissions reductions targets⁴². While the Brattle study identified what could be termed technical potential and did not evaluate the economics of such an

⁴⁰ 4 CSR 240-22.030(7)(A)5

⁴¹ Dennis, K. 2015. "Environmentally Beneficial Electrification: Electricity as the End Use Option." *Electricity Journal* 28(9): 100–112

⁴² Electrification: Emerging Opportunities for Utility Growth, Brattle Group Report, January 2017