A utility worker wearing a bright yellow hard hat with the Ameren logo, safety glasses, and a high-visibility yellow safety vest over a grey long-sleeved shirt. He is holding a pair of pliers and looking off to the side. In the background, there are power line towers and another worker on a tower.

Ameren Illinois
Beneficial Electrification
January 10, 2020
Mike Abba

What Makes Electrification Beneficial?

Three Criteria: Achieve At Least One
Without Adversely Impacting The Others



1. Saves Customers Money
Long-Term



2. Reduces Environmental
Impacts



3. Enables Better Grid
Management

What is Beneficial Electrification?

Beneficial Electrification includes applications such as:

- On Road Transportation
 - Individual Electric Vehicles
 - Commercial / Fleet Vehicles
 - Transit Vehicles
 - School Busses
- Off-Road Transportation
 - Forklifts
 - Golf Carts
 - Airport / Dock / Terminal vehicles & equipment
- Heating, Ventilation, and Air Conditioning
- Water Heating
- Process equipment

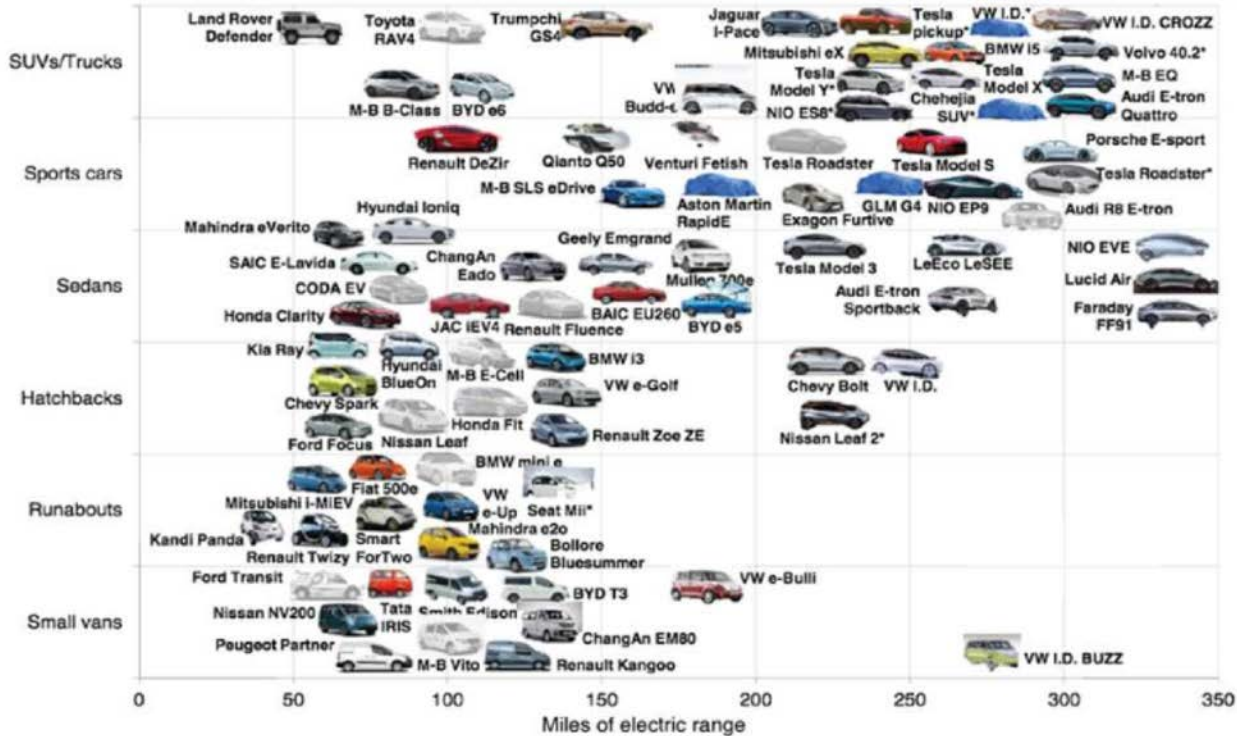


Why Beneficial Electrification?

- More electric energy usage increases the utilization of the electric grid fixed assets and puts downward pressure on delivery rates.
- Electrification of fossil fuel equipment (particularly gasoline, diesel, and propane) reduces emissions and is better for the environment with existing generation mix serving Illinois. Emissions will continue to be reduced as generation moves towards more renewables.
- Electrification reduces local emissions and improves local air quality.
- Electrification can be more economical for customers for total cost of ownership.
 - Operating fuel costs are much lower
 - Maintenance costs are much lower

Electric-Car Boom

Models by style and range available through 2020



Electric-Car Boom (Source: Bloomberg New Energy Finance)

Rivian



Specs	
Battery Size	Up to 180 kWh
Range	Up to 400 miles*
Power	750 hp
0-60 mph	3 seconds*
Payload	1760 lbs*
Towing	11000 lbs*
Drive Train	Quad Drive
Starting Price	\$61,500**
* Projected Specifications ** after Federal Tax rebate	

- Being manufactured in Bloomington IL.
- First vehicles expected in late 2020.
- Pre-orders being taken.

Specs	
Battery Size	Up to 180 kWh
Range	Up to 440 miles*
Power	750 hp
0-60 mph	3 seconds*
Payload	1760 lbs*
Towing	7700 lbs*
Drive Train	Quad Drive
Starting Price	\$65,000**
* Projected Specifications ** after Federal Tax rebate	

Fleet Vehicle Options – they are coming!



Types of Electric Vehicle Charging

LEVEL I

- 120V – typically 12 amp.
- About 3-5 miles of range added per hour of charge.
- Home Charging



LEVEL II

- 240V – up to 30 amp.
- About 25 miles of range added per hour of charge.
- Home & Workplace Charging



LEVEL III

- 480V – 100+ amp.
- About 190+ miles of range added per hour of charge.
- Home & Workplace Charging



Barriers to Electrification (Real & Perceived)

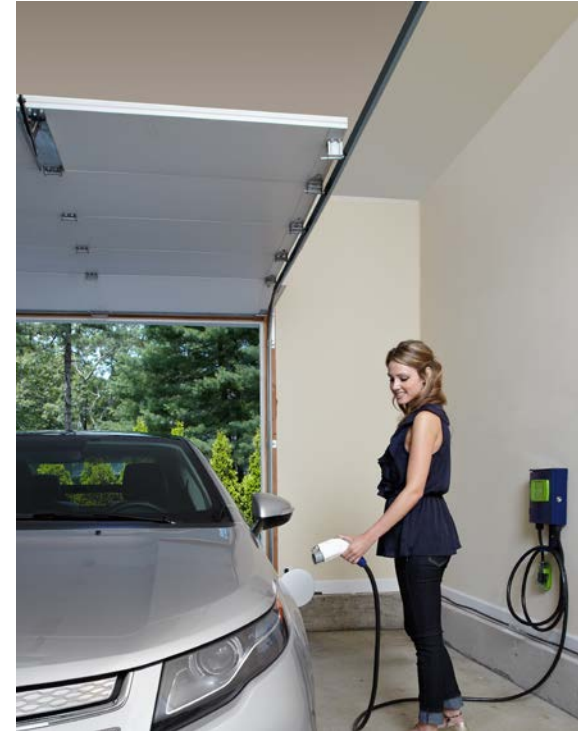
Barriers tend to be application specific, but there are some generalities:

- At this point, the up-front cost of electric technology is typically more than the fossil fueled option. However – the cost difference is narrowing and is expected to be negligible for many applications in next few years.
- For on-road transportation
 - Range Anxiety - Current Electric Vehicles typically have less range than fossil fueled counterparts.
 - Lack of sufficient public charging stations, particularly fast DC charging along travel corridors & in multi-unit housing complexes where home charging is not an option.
 - Dealership Business Model – a large portion of revenue comes from maintenance.
- Existing driving / operating habits.
- Lack of information / education – still many EV misconceptions.

What is Ameren Illinois Doing? – Customer Education



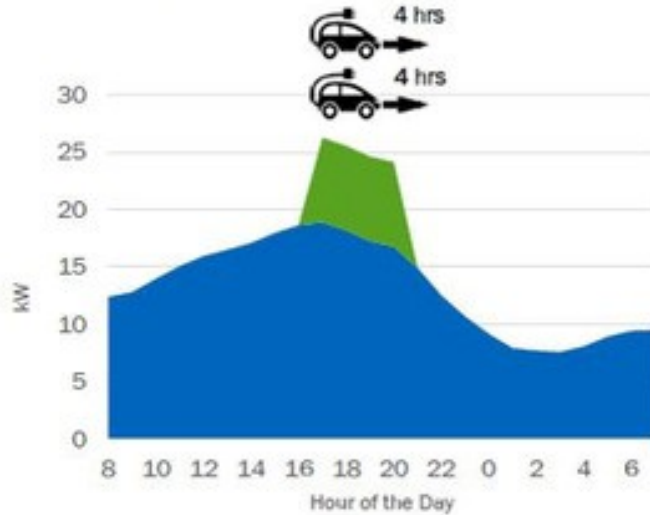
- Ameren Illinois is continuing to revise and update the electric vehicle information on our website.
- Considering an education campaign
 - To inform customers of the benefits of Ameren Illinois' real time pricing and power smart pricing supply options, especially if they are considering an EV.
 - To ask customers to let Ameren Illinois know if an EV is purchased and what level of charging is being used at the premise so we can effectively plan the system and mitigate any issues from the increased load.



What is Ameren Illinois Doing? – Rate & Grid Considerations

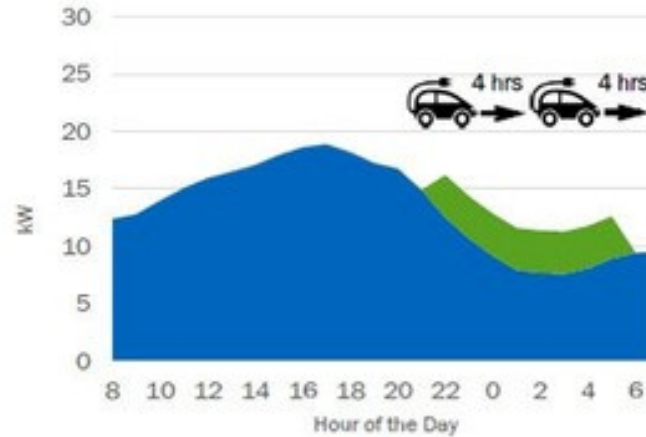
EVs as a grid burden

An unprepared grid will be burdened by increased load demand at peak times, such as when drivers return home in the evenings



EVs as a grid benefit

A grid prepared with smart charging and off-peak incentive rates can adjust EV loads to off-peak hours, optimizing the grid²



Rate Designs that take advantage of this flexibility will provide great benefits to participants & non-participants

What is Ameren Illinois Doing? – Workplace Charging

- Ameren Illinois has over 50 charging ports installed at 22 offices for operations and workplace charging.
- Approximately 150 Ameren employees own an EV.
- Expanding number and locations of workplace charging ports as other office location work is being done.
- Informing major employers in territory of workplace charging benefits as our Key Account representatives engage our customers on a normal basis.



What is AIC Doing? – School Busses

School Bus Electrification

- Electric school buses are much cheaper to operate (fuel & O&M).
- Electric school buses eliminate all tailpipe emissions.
- However, there is an up-front cost premium.

AIC Is

- Educating school districts on the benefits of school bus electrification and serving as a technical resource.
- Supporting school district applications for VW trust fund electric school bus grants.



Questions & Answers!