Electric Vehicle Charging Infrastructure

A National and Local Look

Dan Bowermaster
Senior Program Manager, Electric Transportation
dbowermaster@epri.com

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About EPRI

- EPRI conducts **research and development** relating to the **generation, delivery** and **use of electricity** for the benefit of the public.

- EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity, including **reliability, efficiency, affordability, health, safety** and the **environment**.

- **EPRI members** represent 90% of the electricity generated and delivered in the United States with international participation extending to nearly **40 countries**.

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About EPRI’s Electric Transportation Program
50+ global utility members working collaboratively on ET since 1990

Source: https://mapchart.net/world.html
Electric Transportation is a global market

Europe (2019): 3.6%
- Norway (53.9%)
- Iceland (25%)
- Sweden (11%)
- Switzerland (5.5%)
- Denmark (4.3%)
- Germany (4%)
- France (3.4%)
- Belgium (3.2%)

The future has more uncertainty than ever
New EV Market Share by County: March 2019 – February 2020

189 counties in 33 states have new EV market shares > 1.9% (US average)

Source: EPRI analysis of vehicle registration data, May 2020
New EV Market Share by Illinois County
March 2019 – February 2020

Source: EPRI analysis of vehicle registration data, May 2020
How are EVs selling across the region?
2019 EV sales data for Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, Wisconsin

National average 1.9%
Regional average 0.85%

Source: EPRI analysis of vehicle registration data, April 2020
EPRI Consumer Guide to EVs – out now

Changes:
- Updated format
- MSRP included
- New icons for BEV, PHEV and vehicle type

Under evaluation:
- Online and mobile versions
- Translation into Spanish
More electric crossovers, SUVs, and trucks are coming in 2020-2021

Photos: Cedric Daniels, Alabama Power, a division of Southern Company (January 2020); Dan Bowermaster EPRI (November 2019)
North American utilities are proposing ~$3B in EV charging infrastructure

Key Challenges
- EV awareness
- Customer education
- Easy and reliable public charging infrastructure (to find, access, use, and pay)

The bulk of EV charging in US will be done at home and work (AC)
Public charging is largely DC fast charging

Public (DC) charging (~5-10%) – SRP, 2018 3%
- Necessary for adoption of BEVs (not PHEVs)
- Four challenges:
  1. Separate networks
  2. Different plugs
  3. Infrastructure costs, rates, utilization
  4. Increasing power levels

Workplace charging (~15%) – SRP, 2018 16%
- Extends electric range of PHEVs, short-range BEVs
- Supports the garage less
- Minimal distribution grid impacts
- One plug
- Challenges with parking and accessibility

Home charging (75-80%) – SRP, 2018 81%
- Many customers charge at 120V AC or use an existing 240V dryer outlet
- Minimal distribution grid impacts
- Existing infrastructure companies serve this market
- Opportunities for TOU rates, smart charging, and further customer study
- ~2,800 kWh/residential EV/year
A look at the status of public charging in May 2020

How much is needed? Wanted? Who pays?

State EV Charging Comparison, May 2020

Illinois County EV Charging Comparison, May 2020

Source: EPRI analysis of EV infrastructure data, May 2020
Looking ahead to 2040
Numerous key questions remain with EV charging infrastructure

- Customer experience
- Business model
- Ownership model
- Density and number
- Cybersecurity

Photo credit: Dan Bowermaster, February 2019, EPRI
Together...Shaping the Future of Electricity