Recognizing Electrification Benefits

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The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

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Beneficial Electrification
Ensuring Electrification in the Public Interest

By David Farisworth, Jessica Shipley, Jim Lazar, and Nancy Sedman

Beneficial Electrification of Transportation
Part of the Electrification in the Public Interest Series
Isn’t all electrification created equal?

• Brattle: “Utility sales could nearly double by 2050”!

• Isn’t it all about load growth?
Beneficial Electrification (BE)

1. Saves Customers Money Over Long-Term
2. Reduces Environmental Impacts
3. Enables Better Grid Management
1. Saves Customers Money Long-Term
Efficiency Across Fuel Types

120 megajoules (MJ) of energy = 33.33 kilowatt-hours (kWh) of electricity

- takes you 25 miles in an average gas car for an efficiency of 4.8 MJ/mile.
- takes you 114 miles in an average electric car for an efficiency of 1.1 MJ/mile.

2. Reduces Environmental Impacts
Power sector fuel mix is changing: MISO example

3. Enables Better Grid Management

GTM, How California Can Shape, Shift and Shimmy to Demand Response Nirvana, January 26, 2017

LBNL, California 2025 Demand Response Potential Study, 3/1/17
EVs can be a **benefit** … or a **problem** for the electric grid.

Draw high amounts of power for short periods of time.
Ev load must be managed effectively, otherwise all ratepayers will share in the expensive costs of upgrading and maintaining the distribution system to accommodate increased load on the system.

Pairing EV adoption and EV charging with intelligent rate design can **improve** electric distribution **system utilization** and create **downward pressure on rates** through load management and system peak reduction.

Rates

**Summer – Residential Time-of-Day (5 – 8 p.m.) Rate**

June 1 – September 30

- **Peak**
  - Mon. – Fri. only
  - 5 p.m. – 8 p.m.
  - $0.2835 kWh

- **Mid-Peak**
  - Mon. – Fri. only
  - noon – 5 p.m.
  - $0.1611 kWh

- **Mid-Peak**
  - Mon. – Fri. only
  - 8 p.m. – midnight
  - $0.1611 kWh

- **Off-Peak**
  - Mon. – Fri. midnight – noon
  - All hours on weekends and holidays
  - $0.1166 kWh

**Source:** Sacramento Municipal Utility District [https://www.smud.org/en/Rate-Information/Time-of-Day-Rates/Time-of-Day-5-8pm-Rate](https://www.smud.org/en/Rate-Information/Time-of-Day-Rates/Time-of-Day-5-8pm-Rate)
Level 2 EV charging is a lot like…

an electric water heater!
Electric Vehicle
• 3.3 – 6.6 kW
• 2,000 – 4,000 kWh/year
• Can avoid morning and early evening peak charging
• Batteries likely equal a full day’s supply

Water Heater
• 4.4 – 5.5 kW
• 2,000 – 4,000 kWh/year
• Can avoid morning and early evening peak charging
• Tank usually covers a full day’s supply
At Least, Avoid High-Cost Hours

Source: Rhode Island Power Sector Transformation, Phase One Report to Governor Gina M. Raimondo (November 2017)
Beneficial Electrification (BE)

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Electric Vehicles Are Driving Electric Rates Down
Jason Frost, Melissa Whited, Avi Allison February Synapse, 2019

- Revenue outnumbers costs 3:1 due to:
  - EVs charging off peak (requiring minimal distribution system and additional capacity costs)
  - Increased net revenues from more efficient use of grid can create conditions for lower rates for all ratepayers

NARUC Energy Infrastructure Modernization -- Electric Vehicles
EPRI’s Total Value Test

- A hybrid of the Total Resource Cost and Societal Tests, adapted and refined to improve application to electrification
- Cost-effectiveness should include uncertainty analysis
- Consider grid flexibility value of electrification must be considered
- Capture the impact of a decarbonizing power supply mix
- Continue research on treatment of non-energy benefits
• Recognize that energy efficiency and other distributed energy resources can provide energy or power system needs, and therefore should be compared with other energy resources and treated consistently for benefit-cost analysis

• Align primary test with applicable policy goals

• Ensure symmetry across costs and benefits
These Approaches…

- Recognize the limits of existing B/C tests
- Seek to recognize and incorporate benefits that result from electrification investment
Electrification: Some RAP Resources

- Beneficial Electrification (four-part series)
- Roadmap for Electric Transportation
- Taking First Steps: Insights for States Preparing for Electric Transportation
- Getting From Here to There: Regulatory Considerations for Transportation Electrification
- Blog post: We All Wish We Were More Flexible: Electrification Load as a Grid Flexibility Resource