June 16 & 17, 2020

Beneficial Electrification and EVs

“Virtual Alaska EV Workshop”

Hosted by Alaska Center for Energy and Power and

United States Arctic Research Commission

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Outline: *Beneficial Electrification in 10 minutes*

- Electrification vs. *Beneficial* Electrification
- Some Examples and Takeaways
Isn’t all electrification created equal?

- Brattle: “Utility sales could nearly double by 2050”!
- Isn’t it all about load growth?
Beneficial Electrification (BE) - Three Conditions

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

1 gallon of gasoline = 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.

A 78% reduction in end-use energy consumption.

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

AK utility-scale net generation

According to [Fay, Villalobos Meléndez, and West](#), in 2011:

- 58% -- natural gas
- 20% -- hydro
- 16% -- petroleum liquids
- 6% -- coal
- 0.3% -- wind

According to [US Department of Energy](#), in 2018:

- 47% -- natural gas
- 27% -- hydro
- 13% -- petroleum liquids
- 10% -- coal
- 3% -- wind power and biomass
3. Enables Better Grid Management

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

EVs have **Low Capacity Utilization**

In other words: “they sit around a lot, doing nothing”

Electric vehicles are a lot like water heaters
• Electric Vehicle
  • 3.3 – 6.6 kW
  • 2,000 – 4,000 kWh/year
  • Morning and early evening peaking if uncontrolled
• Batteries hold a full days supply (usually)

• Water Heater
  • 4.4 – 5.5 kW
  • 2,000 – 4,000 kWh/year
  • Morning and early evening peaking if uncontrolled.
• Tank holds a full day’s supply (usually)
Electrification Load is Flexible, i.e., Movable
Avoid High-Cost Hours

- Top 1% of hours = 9% of total spending
- Top 10% of hours = 26% of total spending

Source: Rhode Island Power Sector Transformation, Phase One Report to Governor Gina M. Raimondo (November 2017)
Value of Flexibility for Integrating Renewable Energy

Avoid EV charging during these hours

Move the EV load here

Source: California ISO
The Public Good -- Takeaways

Electrification or *Beneficial* Electrification?

- Does it save consumers money over the long run;
- Does it reduce environmental impacts; and
- Enable better grid management?

**Expect to balance different priorities**, e.g.:

- Increasing EV adoption;
- Managing load;
- Ensuring benefits for all;
- Environmental/public health improvements;
- Ratepayer fairness; and
- Promoting competition

**Continue stakeholder processes** (like this one) – very important

- Electrification is new so, involve the public;
- Produce better data and analyses, and
- Develop broadly acceptable goals and policy outcomes.
Thank you for your attention
RAP Resources

- Taking First Steps: Insights for States Preparing for Electric Transportation
- Beneficial Electrification: Ensuring Electrification in the Public Interest
- Beneficial Electrification of Space Heating
- Beneficial Electrification of Water Heating
- Beneficial Electrification of 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
About RAP

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.

Learn more about our work at raponline.org

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