Impact of EVs on Electric Utilities

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Overview of C’s

• Capacity - Electric System
  • Electric Utility Overview

• Customer Convenience - Time and Place of Charge
  • Existing System
  • New Infrastructure

• Cost of Electricity
  • Working Together – Utilities and Customers
Electric Utility Infrastructure
Electric Terms

- Demand (Power)
  - kW
- Energy Consumption
  - kWh

100 Watt \times 10 \text{ Hours} = 1,000 \text{ Watt-hours or 1 kWh}

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EV Chargers

Level 1
- 4 miles/hour
- 1.4kW; 120V, 20A

Level 2
- 32 miles/hour
- 7kW; 240V, 40A

DC
- 178 miles/hour
- 25-50kW; 480V, 100A
DC Charging
Electric Distribution
# Household Appliances

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Maximum Power (kW)</th>
<th>Voltage (V)</th>
<th>Amperage (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC</td>
<td>4.5</td>
<td>240</td>
<td>40</td>
</tr>
<tr>
<td>Electric Water Heater</td>
<td>4.5</td>
<td>240</td>
<td>40</td>
</tr>
<tr>
<td>Electric Dryer</td>
<td>3</td>
<td>240</td>
<td>30</td>
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<tr>
<td>Electric Range</td>
<td>5</td>
<td>240</td>
<td>50</td>
</tr>
</tbody>
</table>
Residential Load Throughout Day

SL 21762
Capacity & Convenience

- Time of EV Charging
  - Upgrade Infrastructure ($)
  - Charge When System Capacity Available
Cost of Electricity

• Electric Rates
  • Generation
  • Transmission & Distribution
  • Maintaining Infrastructure

• Electric System Batteries?
  • Utility and/or Residential
Summary of C’s

• Capacity - Electric System
  • Demand & Energy

• Customer Convenience - Time and Place of Charge
  • Flexible – Optimize Existing Infrastructure
  • 24/7 – Upgrade Electric Infrastructure

• Cost of Electricity
  • Working Together – Utilities and Customers
Thank you!