Beneficial Electrification and EV Rate Design

SC Electric Vehicle Stakeholder Initiative

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Regulatory Assistance Project

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1 Why is Flexibility Such a Big Deal?
Value of Flexibility for Integrating Renewable Energy

Avoid Home Charging during these hours

Source: California ISO
What Makes Electrification Beneficial?

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

1. Saves Customers Money Long-Term; New Services
2. Reduces Environmental Impacts
3. Enables Better Grid Management
Enables Better Grid Management
3. Understand the Emissions Effects of Changes in Load
Managing Load

EVs can be a **benefit** … or a **problem** for the electric grid.

Draw high amounts of power for short periods of time.
Managing Load

**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.

Managing Load

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.

Rate design foundations
Rate design should make the choices the customer makes to minimize their *own bill* consistent with the choices they would make to minimize system costs.
What does this rate design tell you?

$1.50  $2.25  $2.75
6. Design Rates to Encourage Beneficial Electrification

- **Typical Rate Design**
  - Noon
  - 6 PM
  - Midnight
  - System Peak: 6-9 PM

- **Time-of-Use Electric Rates**
  - Noon
  - 6 PM
  - Midnight
  - Peak Shifted
TOU Rates Can Focus on the System Peak Period

Price Can Influence When EVs Are Charged

Dallas/Ft Worth (standard rates)

San Diego (time-of-use rates)

Adapted from: M.J. Bradley, 2017
## Burbank Municipal Power
Optional TOU for EV Owners

<table>
<thead>
<tr>
<th>Customer Charge ($/mo.)</th>
<th>$8.99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Infrastructure ($/mo.)</td>
<td>Small: $1.37</td>
</tr>
<tr>
<td></td>
<td>Medium: $2.76</td>
</tr>
<tr>
<td></td>
<td>Large: $8.27</td>
</tr>
<tr>
<td>Summer</td>
<td></td>
</tr>
<tr>
<td>Off-peak (cents/kWh)</td>
<td>8.2 cents</td>
</tr>
<tr>
<td>Mid-peak (cents/kWh)</td>
<td>16.3 cents</td>
</tr>
<tr>
<td>On-peak (cents/kWh)</td>
<td>24.5 cents</td>
</tr>
</tbody>
</table>
New PG&E Commercial EV Rates

Distribution kW subscription of ~$1.20 to $2 per kW
At Least, Avoid High-Cost Hours

Source: Rhode Island Power Sector Transformation, Phase One Report to Governor Gina M. Raimondo (November 2017)
Recap: Why consider TOU?

- Managed load away from high-cost hours toward low-cost hours.
- Peak load (and cost) reduction
  - Improved reliability
  - Reduced emissions from power production
More rate design considerations
TOU Rates

CPP = critical peak price
PTR = Peak Time Rebate
Technology Can Help
Technology Can Help

Average Peak Reduction from Time-Varying Rate Pilots

- TOU
- TOU w/Tech
- PTR
- PTR w/Tech
- CPP
- CPP w/Tech
- RTP
- RTP w/Tech

Peak Reduction

10% - 20% - 30% - 40% - 50% - 60%
Expected Results

- Beneficial shift of flexible load
  - Depends on ability to avoid high-cost times
- Value proposition:
  - Load management technology
  - Smart charging for EVs
  - Consumer engagement
RAP Resources on Electrification

- Roadmap for Electric Transportation
- Taking First Steps: Insights for States Preparing for Electric Transportation
- Beneficial Electrification: Ensuring Electrification in the Public Interest
- 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
RAP Resources on Ratemaking

- Smart Rate Design for a Smart Future
- Demand Charges: What are They Good For?
- Principles of Modern Rate Design
- Smart Non-Residential Rate Design
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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