RATE DESIGN CONSIDERATIONS FOR EV CHARGING

Chris Nelder
Manager, Vehicle-Grid Integration
Rocky Mountain Institute

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RATE DESIGN GOALS

• Charging should be **profitable** so that it is sustainable. But **demand charges make this impossible** when utilization rates are low.

• Charging should always be **cheaper than gasoline** (typically $0.29/kWh, or ~$0.09/mile, or less).

• Level 2 charging should be considerably **cheaper than DC fast charging**.

• EV chargers should be on **dedicated tariffs** and on **separate meters**, preferably the meter built into the charging station.

• Tariffs should offer an opportunity to **earn credit for providing grid services** through managed charging.

• Ideally, utilities could leverage distributed energy resource management systems (DERMS) to **promote a more efficient use** of existing grid infrastructure by offering varying rates, or interconnection costs, or levels of cost sharing for make-ready by location.
RATE DESIGN PRINCIPLES FOR EV CHARGING

• Tariffs should be **time-varying**, and preferably dynamic, while recovering most utility costs.

• Tariffs should have **low fixed charges** which primarily reflect routine costs for things like maintenance and billing.

• Tariffs should reflect the actual cost of providing service, and should charge more for **coincident peak demand**.

• Tariffs for DCFC should de-emphasize demand charges and **shift more cost to volumetric charges until market matures** and utilization rates climb, then scale up demand charges and scale down volumetric charges.

• If needed at all, **demand charges should scale with utilization rates**, and only recover location-specific costs of connection to the grid, not upstream costs.
ADDRESSING THE DEMAND CHARGE PROBLEM

RMI’S PROPOSAL

- While the market is young, there are no demand charges. More cost is shifted to volumetric charges until the market matures.
- As the market matures and utilization rates climb, demand charges scale up and volumetric charges scale down.
- Can be done as a function of utilization rates. Example: (indicative pricing)

<table>
<thead>
<tr>
<th>Utilization rate</th>
<th>Volumetric rate (kWh)</th>
<th>Demand charge (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=10%</td>
<td>$0.20</td>
<td>$0</td>
</tr>
<tr>
<td>15%</td>
<td>$0.18</td>
<td>$1</td>
</tr>
<tr>
<td>20%</td>
<td>$0.16</td>
<td>$2</td>
</tr>
<tr>
<td>30%</td>
<td>$0.15</td>
<td>$3</td>
</tr>
<tr>
<td>40%</td>
<td>$0.14</td>
<td>$4</td>
</tr>
<tr>
<td>50%+</td>
<td>$0.11</td>
<td>$5</td>
</tr>
</tbody>
</table>
ADDRESSING THE DEMAND CHARGE PROBLEM

PG&E’S PROPOSAL

- No demand charges
- Time of Use rate is matched to system peaks for appropriate cost recovery
- Rates are stable year-round, sending charging networks and drivers reliable and appropriate price signals
- Allows profitable DCFC operation across a wide variety of load shapes and charging scenarios

Proposed “EV-Large S” (over 100 kW) rate

Subscription Charge $184 per 50 kW connected load

Energy Charge

Midnight 9am 2pm 4pm 10pm

11¢ kWh 9¢ kWh 30¢ kWh

PG&E’s Proposal

$184 per 50 kW connected load

11¢ kWh 9¢ kWh 30¢ kWh

Proposed “EV-Large S” (over 100 kW) rate
ADDRESSING THE DEMAND CHARGE PROBLEM
SCE’S DEMAND CHARGE HOLIDAY PROPOSAL

• SCE has proposed four new rates for EVs
• No demand charges for first 5 years, then demand charges phase in over next 5 years. By Year 11, back to regular rates.
• Time of Use rate is matched to system peaks for appropriate cost recovery
• Rates vary by winter/summer, reflecting system costs and sending charging networks and drivers reliable and appropriate price signals
• Should allow profitable DCFC operation
• Other utilities are proposing similar “demand charge holiday” approaches
ADDRESSING THE DEMAND CHARGE PROBLEM

XCEL’S “RULE OF 100” APPROACH

Demand calculation

\[ y \text{ kW demand} \times 0.9 \text{ power factor} \times 0.9 = \text{adjusted demand} \]

(\Rightarrow \text{current demand or 50\% of largest adjusted demand over previous 11 months})

*If demand charges are* \(< x \text{ kWh} / 100 \text{ hours/mo}*

- Xcel’s “A14” tariff in Minnesota
- Effectively calculates demand charges as a function of utilization.
- For example, a 50 kW DCFC used once per day would result in a bill that is 70\% lower.
- By the time the same charger is used five times per day, the provision no longer has any effect upon the bill