U.S. Department of Energy’s Vehicle Technologies Office

EV Project: Overview of Vehicle and Charging Profiles

Jim Francfort

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This presentation does not contain any proprietary or sensitive information
**EV Project Data Collection**

- EV Project: 8,113 Leafs, Volts and Smarts, 12,065 EVSE and DCFC, reporting 3.5 million charge events, 103 million test miles. 1 million miles every 6 days
  - Data continues to be provided by vehicle manufacturers and infrastructure providers
  - 11,000 NDAs and Data Use Agreements
- All projects, 122 million test miles accumulated on 11,600 electric drive vehicles and 16,300 EVSE and DCFC

**EV Project Vehicle Use Data**

<table>
<thead>
<tr>
<th></th>
<th>Leafs</th>
<th>Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average (Ave) trip distance</td>
<td>7.1 mi</td>
<td>8.3 mi</td>
</tr>
<tr>
<td>Ave distance per day</td>
<td>29.5 mi</td>
<td>41.0 mi</td>
</tr>
<tr>
<td>Ave # trips between charges</td>
<td>3.8</td>
<td>3.3</td>
</tr>
<tr>
<td>Ave miles between charges</td>
<td>26.7 mi</td>
<td>27.6 mi</td>
</tr>
<tr>
<td>Ave # charging events per day</td>
<td>1.1</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Leaf & Volt SOC Charging Profiles

**Leafs**

Battery State of Charge (SOC) at the Start of Charging Events

- Home location
- Away-from-home location

Battery State of Charge (SOC) at the End of Charging Events

- Home location
- Away-from-home location

**Volts**

Battery State of Charge (SOC) at the Start of Charging Events

- Home location
- Away-from-home location

Battery State of Charge (SOC) at the End of Charging Events

- Home location
- Away-from-home location
Infrastructure Use

• Per unit charging events for Residential and Public Level 2 and DCFC
DCFC Revenue Model Impacts

- 3rd Quarter revenue model introduction impacted DCFC use at least initially
- Public Level 2 EVSE had one time impacts

- 3.8 average charge events per day per DCFC
- 19.5 minutes average time connected
- 19.5 minutes average time drawing energy
- 8.3 kWh average energy consumed per charge
Residential Level 2 EVSE Connect Profiles

- Weekday EVSE 2\textsuperscript{nd} Quarter 2013
- San Diego and San Francisco, with residential L2 TOU rates, are similar to other regional EVSE connect profiles
Residential Level 2 EVSE Demand Profiles

- Residential Level 2 Weekday EVSE 2nd Quarter 2013
- TOU kWh rates in San Diego and San Francisco clearly impact when vehicle charging start times are set.

San Diego

Los Angeles

San Francisco

Washington State
Infrastructure Costs

- DCFC installation costs range from $8,500 to $48,000 (99 units), with a $21,000 average
- Commercially sited Level 2 EVSE average between $3,500 and $4,500 in installation costs
  - Tennessee and Arizona have average installation costs of $2,000 to $2,500
- Residential sited Level 2 EVSE have maximum installation cost of $8,429, average cost of $1,414, and minimum cost of $250

- Multiple units at one location drive down the per average installation cost
- Costs are significantly driven by poor sitting requests
  - Example: mayor may want EVSE by front door of city hall, but electric service is located at back of building
EVSE utilization at Worksites

- 47 additional EV Project work sites have been identified for analysis. Includes 197 EVSE and 1,571 vehicles.

**Overall Usage of EVSE**

<table>
<thead>
<tr>
<th>EVSE ID</th>
<th>Number of charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>11637</td>
<td>232</td>
</tr>
<tr>
<td>35296</td>
<td>202</td>
</tr>
<tr>
<td>51032</td>
<td>187</td>
</tr>
<tr>
<td>11331</td>
<td>179</td>
</tr>
<tr>
<td>31132</td>
<td>163</td>
</tr>
<tr>
<td>16908</td>
<td>141</td>
</tr>
<tr>
<td>50550</td>
<td>124</td>
</tr>
</tbody>
</table>

**Concurrent Usage of EVSE**

<table>
<thead>
<tr>
<th>Number of EVSE being used concurrently</th>
<th>Number of hours per weekday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13.7</td>
</tr>
<tr>
<td>2</td>
<td>11.2</td>
</tr>
<tr>
<td>3</td>
<td>10.1</td>
</tr>
<tr>
<td>4</td>
<td>9.0</td>
</tr>
<tr>
<td>5</td>
<td>7.1</td>
</tr>
<tr>
<td>6</td>
<td>4.5</td>
</tr>
<tr>
<td>7</td>
<td>2.0</td>
</tr>
</tbody>
</table>

- 47 additional EV Project work sites have been identified for analysis. Includes 197 EVSE and 1,571 vehicles.
Other Grid Infrastructure Activities

• During FY 2013, 527 reports, fact sheets, white papers and technical papers related to electric drive vehicles or charging infrastructure were published
  
  [Web Link]

• Lab & vehicle testing of Wireless Power Transfer systems
  – Supports SAE development of WPT test procedures
• Cyber security testing of 4 DOE OE funded Level 2 EVSE
• New York City electric taxi and infrastructure study
• Signing NDA for I-5 DCFC travel corridor study
• NYSERDA 580 EVSE L2 data collection
• Nissan Leaf DCFC Testing