Battery Power 2012

September 18-19, 2012 (3:15-4:00 pm)
Speaker: Colin Read
Location: Hyatt Denver Tech Center, Denver, CO

Battery Power 2012, an international conference highlighting the latest developments and technologies in the battery industry, being held September 18-19, 2012 in Denver, CO. This 10th annual event features more than 40 presentations on portable, stationary and automotive battery technology, as well as battery manufacturing, materials and research & development. Topics include new battery designs, emerging technologies, battery materials, power management, charging and testing systems, battery health, as well as the latest market trends affecting the industry.
The leader in clean electric vehicle transportation.
As provided by the “Safe Harbor Statement under the Private Securities Litigation Reform Act of 1995,” ECOtality, Inc. cautions the audience that this presentation includes forward-looking statements. Actual results might differ materially from those projected in the forward-looking statements. Additional information concerning factors that could cause actual results to materially differ from those in the forward-looking statements in ECOtality's financial statements filed with the Securities and Exchange Commission.
Agenda

• ECOtality Overview
  • Blink Chargers
• The EV Project Introduction
• LEAF vs. Volt
• Initial macro trends
• Residential Lessons Learned
  • Installation and Permitting
  • Impacts of TOU pricing
• Commercial Lessons Learned
  • Installation and ADA
  • DC Fast Charging
ECOtality Overview

- **Unmatched market experience and insights**
  - 20 year history as leading EV consultant and fast-charger supplier
  - 12+ million miles of vehicle testing on more than 200 advanced fuel vehicles
  - 38 million miles of data collection in The EV Project to date (August 2012)

- **Largest network of EV smart chargers**
  - The EV Project (valued at ~$230M) is funding initial development of Blink Network
  - 8,500+ chargers installed as of August 2012 (~5,500 residential)

- **Intelligent and Connected Charging Solutions**
  - Most advanced EVSE currently on the market
  - Iconic design capable of branding and real time media and messaging

- **Commercial relationships with leading national retailers and restaurants**
  - Walmart, Best Buy, Kroger, Macy’s, Sears, IKEA and others

- **Fast charging history for industrial and Airport GSE**
  - 6,000+ chargers installed over the 14+ years
  - 20 international airports
Blink Chargers

Level 2 Residential
Level 2 Commercial
DC Fast Charger
Blink Connected Chargers

Blink Level 2 & DC Fast Chargers

The Blink Network of residential and public chargers allows connectivity demanded in today’s market and data consolidation for the consumer

- Smartest EVSE with internet connectivity
- Unique and convenient (installation flexibility) binary design
- Level 2 uses J1772 standard EV connector
- DC Fast Charger utilizes CHAdeMo connector
- Smart meter capability
- Touch screen interface
- Multiple modes of communications
  - Wi-Fi, cellular (CDMA), 802.15 protocol, LAN
- Blink Mobile app for locating chargers/viewing status
- Access fees for all commercial level 2 EVSE
- DC Fast Charger features a LCD Display for media & advertising
Blink End User Features

Connect.
- Hello.
- Login.
Available on most phones and tablet devices.

Locate a charger.
- Find the closest charging station using your phone or tablet.

Be notified.
- Securely access your account and be notified by SMS or email.

View charging status.
- Check the status of your charge - from anywhere!
Current Charge State

CHARGING

Current energy consumed
2.75 kWh

Monthly Plug-in History
The EV Project

60+ EV Project Partners Include:

Objectives

• Collect & analyze data on EV use
• Establish a scalable & viable infrastructure
• Pilot various revenue models
EVP Data Overview

**EVP to date: February 2011 - August 2012**
- 38+ million miles of data collection in The EV Project to date
  - 113,000 miles per day
  - 1.3 miles per second
- More than 1 million charge events
- Over 1.7 million gallons of gas saved
- Over 2,900 metric tons of CO2 avoided
- Over 8,080 MWh charged residentially
- Over 570 MWh charged commercially

**Q2 snapshot (April 1- June 30)**
- 4,963 vehicles enrolled (4,322 LEAF & 676 Volts)
- 7,086 residential & publicly EVSE
The EV Project Lessons Learned

EV Project Documents

EV Project Quarterly Reports
- EV Project EVSE and Vehicle Usage Report: 2nd Quarter 2011
- EV Project EVSE and Vehicle Usage Report: 3rd Quarter 2011
- EV Project EVSE and Vehicle Usage Report: 4th Quarter 2011
- EV Project EVSE and Vehicle Usage Report: 1st Quarter 2012
- EV Project EVSE and Vehicle Usage Report: 2nd Quarter 2012

Lessons Learned Reports
- DC Fast Charge-Demand Charge Reduction (May 2012)
- The EV Micro-Climate Planning Process (May 2012)
- Signage (April 2012)
- Greenhouse Gas (GHG) Avoidance and Fuel Cost Reduction (June 2012)
- First Responder Training (March 2011)
- Accessibility at Public EV Charging Locations (October 2011)
- Battery Electric Vehicle Driving and Charging Behavior Observed Early in The EV Project (April 2012)

Presentations
- Clean Cities Webinar (June 2012)
Lessons Learned White Papers

- *DC Fast Charge-Demand Charge Reduction* (May 2012)
- *The EV Micro-Climate Planning Process* (May 2012)
- *Signage* (April 2012)
- *Greenhouse Gas (GHG) Avoidance and Fuel Cost Reduction* (June 2012)
- *First Responder Training* (March 2011)
- *Accessibility at Public EV Charging Locations* (October 2011)
- *Battery Electric Vehicle Driving and Charging Behavior Observed Early in The EV Project* (April 2012)
Lessons Learned

More to come...

• Need for Commercial Charging
• Pricing of Commercial Charging
• Residential Installation Process
• Commercial Installation Process
• EV Energy Metering
• Residential Permitting
• Commercial Permitting

www.TheEVproject.com/documents
LEAF vs. Volt
Nissan LEAF vs. Chevrolet Volt

- Avg distance traveled per day (mi): 39.6
- Avg trip distance (mi): 8.0
- Avg # of trips between charging: 3.2
- Avg distance between charging (mi): 26.0
- Avg # of charging events/day: 1.5

- Avg distance traveled per day (mi): 30.6
- Avg trip distance (mi): 7.2
- Avg # of trips between charging: 3.9
- Avg distance between charging (mi): 28.1
- Avg # of charging events/day: 1.1
Battery State of Charge (SOC) - LEAF

- Range Anxiety
  - LEAFs plug-in away from home at a higher SOC than at home
  - Average SOC at start of commercial plug-in is ~15% higher than at home
  - Majority of all commercial charge events end at a full state of charge
Battery State of Charge (SOC) - Volt

- "Gas Anxiety" – Volt/PHEV drivers are showing an aversion to using gasoline
- Largest portion of starting SOC is 0-10%
- End SOC is almost always a full (90-100%)
- Little difference from residential to commercial charging behavior
- Drivers are fully depleting their electric range and plugging in often

![Battery State of Charge (SOC) at the Start of Charging Events](chart1)

![Battery State of Charge (SOC) at the End of Charging Events](chart2)
Macro Trends
## Initial Trends

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Weekday</th>
<th>Weekend</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of time with EV</td>
<td>35%</td>
<td>38%</td>
<td>36%</td>
<td></td>
</tr>
<tr>
<td>connected to EVSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of time EV</td>
<td>8%</td>
<td>7%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>drawing power from</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg time with EV</td>
<td>11.6</td>
<td>11.6</td>
<td>11.6</td>
<td></td>
</tr>
<tr>
<td>connected per charge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>event (Hr)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg time with EV</td>
<td>2.5</td>
<td>2.1</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>drawing power per</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>charge event</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Avg electricity</td>
<td>8.7</td>
<td>7.5</td>
<td>8.4</td>
<td></td>
</tr>
<tr>
<td>consumed per charge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>event (AC kWh)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Avg # of charge</td>
<td>0.78</td>
<td>0.70</td>
<td>0.75</td>
<td></td>
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<tr>
<td>events per EVSE per</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>day</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Commercial</th>
<th>Weekday</th>
<th>Weekend</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of time with EV</td>
<td>6%</td>
<td>4%</td>
<td>6%</td>
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<td>connected to EVSE</td>
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<tr>
<td>% of time EV</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>drawing power from</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg time with EV</td>
<td>6.1</td>
<td>4.1</td>
<td>5.7</td>
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<tr>
<td>connected per charge</td>
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<tr>
<td>event (Hr)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg time with EV</td>
<td>2.3</td>
<td>2.2</td>
<td>2.3</td>
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<tr>
<td>drawing power per</td>
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<td></td>
</tr>
<tr>
<td>charge event</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg electricity</td>
<td>7.7</td>
<td>7.7</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>consumed per charge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>event (AC kWh)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg # of charge</td>
<td>0.28</td>
<td>0.16</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>events per EVSE per</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>day</td>
<td></td>
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</table>
Home Charging Decreasing

<table>
<thead>
<tr>
<th></th>
<th>% Charging @ Home</th>
<th>% Charging @ Away</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4</td>
<td>LEAF / Volt</td>
<td>Q4: 78% / 22%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q1: 74% / 27%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q2: 76% / 24%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q3: 76% / 25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q4: 78% / 22%</td>
</tr>
</tbody>
</table>

Percent Charge Events at Home Reporting Period

- Q4 2011
- Q1 2012
- Q2 2012
Driving distance is steadily increasing

**LEAF Driving Distance**
Q4: 30.0 (mi)
Q1: 30.2
Q2: 30.6

**Volt Driving Distance**
Q4: 38.0 (mi)
Q1: 36.4
Q2: 39.6
Lessons Learned: Residential
Residential Install Costs

- Average residential installation cost ~$1,375
- Individual installations vary widely
- Some user bias to lower costs

<table>
<thead>
<tr>
<th>Marlets In Ascending Order Of Residential Installation Cost</th>
<th>Number of Installations</th>
<th>Average Installation Cost</th>
<th>Variation From Project Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tennessee (entire State)</td>
<td>542</td>
<td>$1,113.07</td>
<td>-19.0%</td>
</tr>
<tr>
<td>Arizona (Phoenix &amp; Tucson)</td>
<td>357</td>
<td>$1,148.88</td>
<td>-16.4%</td>
</tr>
<tr>
<td>Washington DC</td>
<td>3</td>
<td>$1,197.44</td>
<td>-12.9%</td>
</tr>
<tr>
<td>Oregon (Portland, Eugene, Coralvls &amp; Salem)</td>
<td>465</td>
<td>$1,229.06</td>
<td>-10.6%</td>
</tr>
<tr>
<td>Washington (Seattle &amp; Olympia)</td>
<td>730</td>
<td>$1,289.56</td>
<td>-6.2%</td>
</tr>
<tr>
<td>Maryland</td>
<td>39</td>
<td>$1,311.75</td>
<td>-4.5%</td>
</tr>
<tr>
<td>Washington</td>
<td>80</td>
<td>$1,321.36</td>
<td>-3.8%</td>
</tr>
<tr>
<td>Virginia</td>
<td>38</td>
<td>$1,341.01</td>
<td>-2.4%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>1254</td>
<td>$1,386.13</td>
<td>0.9%</td>
</tr>
<tr>
<td>Texas (metro Houston &amp; Dallas)</td>
<td>128</td>
<td>$1,422.77</td>
<td>3.5%</td>
</tr>
<tr>
<td>San Diego</td>
<td>726</td>
<td>$1,593.91</td>
<td>16.0%</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>415</td>
<td>$1,794.64</td>
<td>30.6%</td>
</tr>
</tbody>
</table>
Residential Permits

- Permit timeliness has not been a problem
- Majority are over-the-counter
- Permit fees vary significantly

<table>
<thead>
<tr>
<th>Region</th>
<th>Count of Permits</th>
<th>Average Permit Fee</th>
<th>Minimum Permit Fee</th>
<th>Maximum Permit Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>66</td>
<td>$96.11</td>
<td>$26.25</td>
<td>$280.80</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>109</td>
<td>$83.99</td>
<td>$45.70</td>
<td>$218.76</td>
</tr>
<tr>
<td>San Diego</td>
<td>496</td>
<td>$213.30</td>
<td>$12.00</td>
<td>$409.23</td>
</tr>
<tr>
<td>San Francisco</td>
<td>401</td>
<td>$147.57</td>
<td>$29.00</td>
<td>$500.00</td>
</tr>
<tr>
<td>Tennessee</td>
<td>322</td>
<td>$47.15</td>
<td>$7.50</td>
<td>$108.00</td>
</tr>
<tr>
<td>Oregon</td>
<td>316</td>
<td>$40.98</td>
<td>$12.84</td>
<td>$355.04</td>
</tr>
<tr>
<td>Washington</td>
<td>497</td>
<td>$78.27</td>
<td>$27.70</td>
<td>$317.25</td>
</tr>
</tbody>
</table>
Residential: Availability / Demand

Range of % of EVSE with EV Connected vs. Time of Day

Range of Aggregate Electricity Demand vs. Time of Day
Lessons Learned: Commercial
Commercial: Availability / Demand

Range of % of EVSE with EV Connected vs. Time of Day

Weekday

Range of Aggregate Electricity Demand vs. Time of Day

Weekday

Weekend
Lessons Learned: Commercial

- ADA significantly drives cost
  - Accessible charger
  - Van accessible parking
  - Accessible route to facility
  - Inconsistent application of ADA
Lessons Learned: Commercial

- Permit fees and delays are significant
  - Load studies
  - Zoning reviews

<table>
<thead>
<tr>
<th>Region</th>
<th>Count of Permits</th>
<th>Average Permit Fee</th>
<th>Minimum Permit Fee</th>
<th>Maximum Permit Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>72</td>
<td>$228</td>
<td>$35</td>
<td>$542</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>17</td>
<td>$195</td>
<td>$67</td>
<td>$650</td>
</tr>
<tr>
<td>San Diego</td>
<td>17</td>
<td>$361</td>
<td>$44</td>
<td>$821</td>
</tr>
<tr>
<td>Texas</td>
<td>47</td>
<td>$150</td>
<td>$37</td>
<td>$775</td>
</tr>
<tr>
<td>Tennessee</td>
<td>159</td>
<td>$71</td>
<td>$19</td>
<td>$216</td>
</tr>
<tr>
<td>Oregon</td>
<td>102</td>
<td>$112</td>
<td>$14</td>
<td>$291</td>
</tr>
<tr>
<td>Washington</td>
<td>33</td>
<td>$189</td>
<td>$57</td>
<td>$590</td>
</tr>
</tbody>
</table>
Lessons Learned: DC Fast Charge
DC FC Barriers

- Demand and energy costs are significant for some utilities
  - 25¢/kWh
  - $25/kW

- Some utilities offer commercial rates without demand charges

- Others incorporate a 20 kW to 50 kW demand threshold

- Nissan Leaf is demand charge free in a few service territories

---

**No Demand Charges - Nissan Leaf**

<table>
<thead>
<tr>
<th>State</th>
<th>Utilities</th>
</tr>
</thead>
</table>
| CA    | Pacific Gas & Electric  
       | City of Palo Alto  
       | Alameda Municipal Power  
       | Silicon Valley Power |
| AZ    | Tucson Electric Power |
| OR    | Eugene Water & Electric Board  
       | Lane Electric Co-op |
| TN    | Middle Tennessee Electric  
       | Duck River Electric  
       | Harriman Utility Board  
       | Athens Utility Board  
       | Cookeville Electric Department  
       | Cleveland Utilities  
       | Nashville Electric Service  
       | EPB Chattanooga  
       | Lenoir City Utility Board  
       | Volunteer Electric Cooperative  
       | Murfreesboro Electric  
       | Sequachee Valley Electric Cooperative  
       | Knoxville Utility Board  
       | Maryville  
       | Fort Loudoun Electric  
       | Memphis Light Gas and Water Division |
## Demand Charges

Recurring Nissan Leaf demand charges (60 kW) are significant in many utility service territories.

<table>
<thead>
<tr>
<th>Utility Demand Charges - Nissan Leaf</th>
<th>Cost/mo.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA Glendale Water and Power</td>
<td>$16.00</td>
</tr>
<tr>
<td>Hercules Municipal Utility:</td>
<td>$377.00</td>
</tr>
<tr>
<td>Los Angeles Department of Water and Power</td>
<td>$700.00</td>
</tr>
<tr>
<td>Burbank Water and Power</td>
<td>$1,052.00</td>
</tr>
<tr>
<td>San Diego Gas and Electric</td>
<td>$1,061.00</td>
</tr>
<tr>
<td>Southern California Edison</td>
<td>$1,460.00</td>
</tr>
<tr>
<td>AZ TRICO Electric Cooperative</td>
<td>$180.00</td>
</tr>
<tr>
<td>The Salt River Project</td>
<td>$210.50</td>
</tr>
<tr>
<td>Arizona Public Service</td>
<td>$483.75</td>
</tr>
<tr>
<td>OR Pacificorp</td>
<td>$213.00</td>
</tr>
<tr>
<td>WA Seattle City Light</td>
<td>$61.00</td>
</tr>
</tbody>
</table>
Mitigation Technologies

• Limit demand of DC FCs
  – 20 kW maximum charge rate
  – 5 kWh in any 15 minute period
  – Other output rates (25, 30 kW?)
  – Incorporate w/ facility energy management systems
    • Variable TOU restrictions by site
    • Utilize up to the peak capacity

• Energy Storage assisted DC FC
  – Demand reduction
  – Grid ancillary services
  – Renewables absorption

• Revised Utility Tariffs
  – Demand responsive charging
  – Aggregated charger loads