Research Teams

- Consumers
  - Lifestyle studies
  - Market demand
  - Usage patterns

- Fleet Development
  - Market Segments
  - Fleet Operation
  - Energy Savings

- Battery studies
  - Benchmark Testing
  - 2nd use
  - End of life

- Spatial & Temporal PEV Energy Use
  - GIS analysis
  - Charging network design

- Human Machine Interfaces
  - Response to HMI design
  - Benchmarking

A California Energy Commission Public Interest Energy Research Program
World EV Cities & Ecosystems project (WECE)  
www.WorldEVCities.org

1. Partnership:
   International Energy Agency, Clean Energy Ministerial Electric Vehicle Initiative,(16 Energy Ministries), Clinton 40, Rocky Mountain Institute, PH&EV Center

2. WECE Website
   20 + cities, data sharing, project showcasing

3. WECE Cities
   Amsterdam, Shanghai, Stockholm, Barcelona, Lisbon, Tokyo, Hamburg, Victoria, Portland, San Diego, Los Angeles, etc.
# 3 examples of Plugin Vehicles in the 2012 Market:

<table>
<thead>
<tr>
<th></th>
<th>Plug-in Prius</th>
<th>Chevy Volt</th>
<th>Nissan LEAF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Battery kWh:</strong></td>
<td>4 kWh</td>
<td>16 kWh</td>
<td>24 kWh</td>
</tr>
<tr>
<td><strong>Charge Time:</strong></td>
<td>3hrs/110v (15A) 1.5hrs/220v(30A)</td>
<td>10hrs/110v(15A) 4hrs/220V(30A)</td>
<td>20hrs/110v(20A), 8hrs/220v(40A) .5hrs/480v(80A) 80% SOC</td>
</tr>
<tr>
<td><strong>All Electric Range:</strong></td>
<td>14 Miles</td>
<td>40 Miles</td>
<td>100 Miles EPA 73</td>
</tr>
<tr>
<td><strong>Price:</strong></td>
<td>Base $32,000</td>
<td>Base $40,000</td>
<td>Base $33,720</td>
</tr>
</tbody>
</table>
California car market basics

- 28 million registered cars & light trucks
- About 1.5 million sales each year in Calif.
- New vehicles used up to 19,000 miles a year, median age of register vehicles is around 14 (lots of used vehicles)
- California is about 10% of US car sales
  But 20-25% of HEVs sales
  Around ½ of EVs and Plug in hybrids
New Car Buyers in California (last 5 years) (NHTS 2009)

2.4% of the households purchased 28% of the new vehicles.

14.6% purchased 1 new vehicle (about 72% of the new vehicles sold.)

83% of the households didn’t purchase a new car
CA Sample \( N=1201 \)

- EV project in San Diego (Ecotality)
- State rebate program (CCSE)
- Data collected on February-March 2012

<table>
<thead>
<tr>
<th>Survey</th>
<th>Leaf</th>
<th>Volt</th>
<th>Tesla</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Diego</td>
<td>312</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>State</td>
<td>836</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>1151</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

![Bar chart showing sample distribution by month](chart.png)
Plug-in vehicle distribution from our surveys
Households in our EV surveys

• 96% live in single family House

• 96% own their house
  – 1% rent in SD
  – 5% rent in other areas

• 38-42% have solar panels
  – 18% consider installation
  – 40% have no plan to install

• Average Household size 2.7
• 83% have yearly income income higher than $100K
  – 46% incomes is higher than $150K
  – 16% decline to state.
How much does the lack of garage limit market?

- Berlin 7%, San Francisco 20% have a garage
- About 50% of USA, California new car buyers have a stable parking spot 25 feet from electricity each night
A million PEVs charging at night is only about 1% of the grid.
Driver Characteristics

• Average age of a LEAF driver is 50 years old but only 10% are over 65 (N=1003).

• In 80% of the households the main LEAF driver is Male.

• On average, the main driver is using the car 76% of the time.

• 22% of the vehicles are used by single driver.
Monthly Miles per Vehicle

- Chevrolet Volt
- Nissan LEAF
- Tesla Roadster

[Bar chart showing monthly miles per vehicle for each model with three categories: Buy, Lease, and Both.]