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California Public Utilities Commission

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AeroVironment Inc. – Who We Are

- Established 1971
- Employees 650
- NASDAQ AVAV
- FY09 Sales \$248M



A Legacy of Innovation



Gossamer Albatross
1979

GM Impact
1990

GM Sunraycer
1987

Helios
2001



Unmanned Aircraft Systems



Puma
2001



Dragon Eye
2003



Raven
2005



Global Observer
In Dev.

Efficient Energy Systems



EV Test Systems
1991



On-Road Fast Charge
1995



Off-Road Fast Charge
1999



EV Fast Charge
In Dev.

AV EV Offering

- In the EV business since mid 90s
 - Leverage past experience and expertise to further EV technology
- Extensive Product Array
 - EV Chargers
 - J1772 - Level 2 EVSE for private, fleet and public use
 - DC fast chargers for fleet and public use
 - Neighborhood EV Chargers
 - Subsystems for EV OEMs
 - J-1772 Level 1 Cordset
 - On-Board Charging Systems
 - Li-Ion Battery Management Systems
 - EV Testing
 - EV Li-Ion Battery Testing Services
 - Battery Development & End of Line Testers
- EV Charging Support Services
 - Nationwide installation, service and support



Practical Charging Scenarios



At-home charging (garage, curbside, MDU):
inexpensive, convenient, off-peak energy

- J1772 Level 1 & Level 2 Charging
- 4 to 20 hours of charge time



Public and office charging: extends daily range

- J1772 Level 1, Level 2 & DC Fast Charging
- 4 to 8 hours of charge time (time limited)



Fast DC charging: long distance travel or immediate re-charge

- J1772 “DC Fast Charging”
- ½ hour to 1 hour of charge time



EV Charger Product Line

Level 2



RESIDENTIAL MODEL 1



RESIDENTIAL MODEL 2



DUAL PORT EVSE



QUAD PORT EVSE



COMMERCIAL EVSE

Fast DC



FAST CHARGER



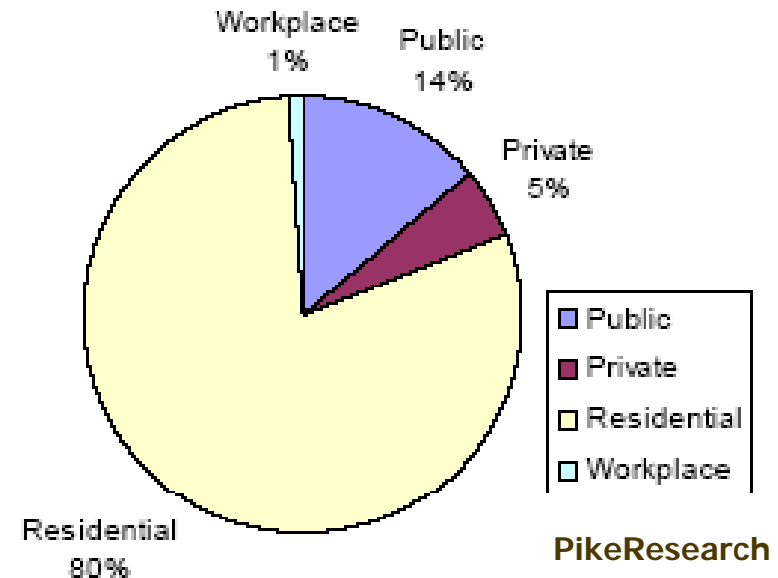
NEV CHARGER

- Application Appropriate Products
- Residential: Garage and MDU
 - Fleet & Workplace
 - Public: Level 2 and Level 3
 - Neighborhood Electric Vehicles

Models shown are concept prototypes; final production models may vary in appearance.

Infrastructure Issues

- Charging will be mostly at home, then public and fleets according to recent PikeResearch study
- Encourage development of charging infrastructure for both residential and public locations
 - Provisions for curbside residential
 - Consideration for Multi-Dwelling Unit needs
- Streamline residential installation process
 - Eliminate need for sub metering
 - Look at other methods to monitor EV power use
 - Simplify permitting and inspection
 - PUC involvement in building codes
- Distribution grid will likely be overloaded due to clustering and undersized neighborhood transformers.
 - Support studies, programs and technology that will improve the distribution grid
- Provide incentives for highway charging demonstrations



Incentives for demonstration programs

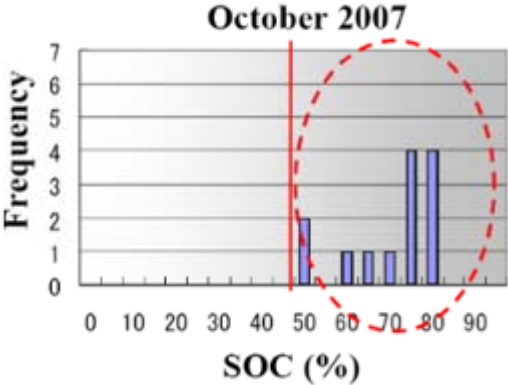
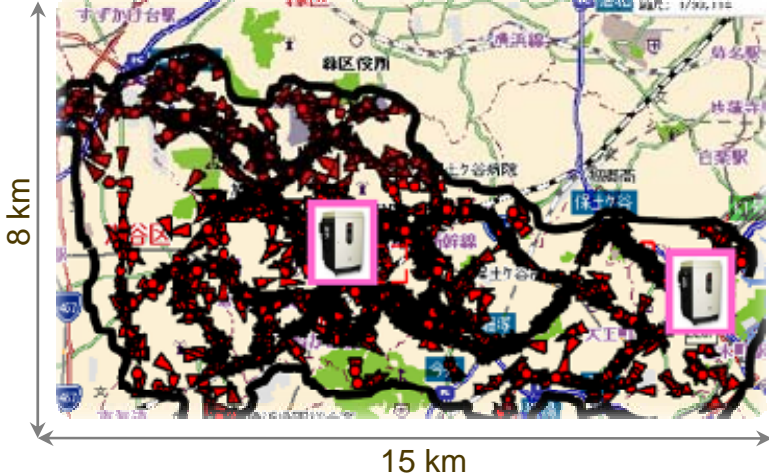
- Curbside and MDU location
- Fast Charging range extending demos

Fast Charging Infrastructure - Range & Convenience

- Tokyo Electric Power Company study 2007-2008: implemented fast charge in stages

Stage 1 - October 2007: One station at home base

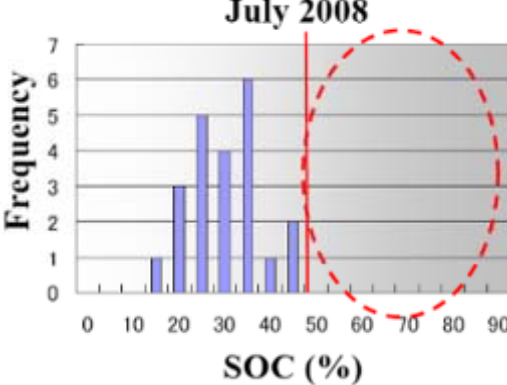
Stage 2 - July 2008: After EV fast-fuel station added



Greater battery use:

Before: Drivers returned with batteries > 50%

After: Drivers returned with batteries < 50%



Charging Infrastructure: A formula for success

Convenient

- Locate charging stations where drivers need and expect them: home, work, retail, highway
- Pay at the pump for public and fast charging
- Standard connectors and open networks that work with all EVs for all drivers

Fast Charging

- Convenience: Charging in minutes, not hours
- Range extender: Promotes use of EV between cities
- Its been done before

Stakeholders

- Need participation from automotive industry

Demonstration

- Proof installations, concepts and theories



Questions

