



AeroVironment, Inc.

California Public Utilities Commission

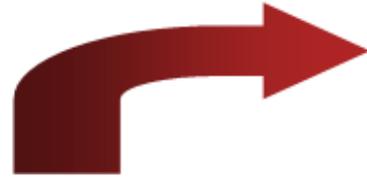
Larry Hayashigawa, Product Management

Ms. Kristen Helsel, Director EV Solutions

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AeroVironment Inc. – Who We Are

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

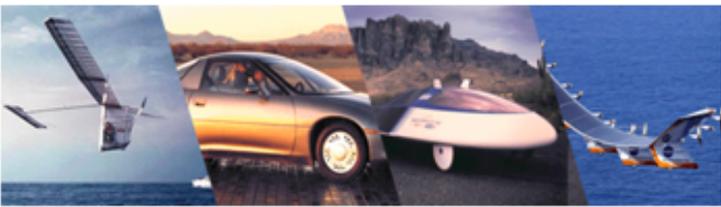


Unmanned Aircraft Systems



Puma 2001	Dragon Eye 2003	Raven 2005	Global Observer <i>In Dev.</i>
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A Legacy of Innovation



Gossamer Albatross 1979	GM Impact 1990	GM Sunraycer 1987	Helios 2001
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Efficient Energy Systems



EV Test Systems 1991	On-Road Fast Charge 1995	Off-Road Fast Charge 1999	EV Fast Charge <i>In Dev.</i>
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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



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

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



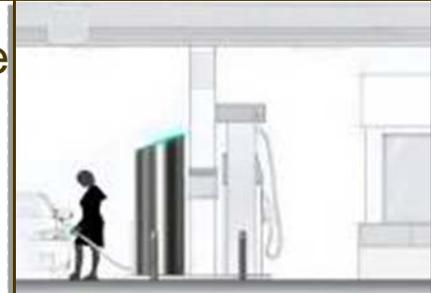
Public and office charging: extends daily range

- 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

Fast DC



RESIDENTIAL MODEL 1



RESIDENTIAL MODEL 2



DUAL PORT EVSE



QUAD PORT EVSE



COMMERCIAL EVSE



FAST CHARGER

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

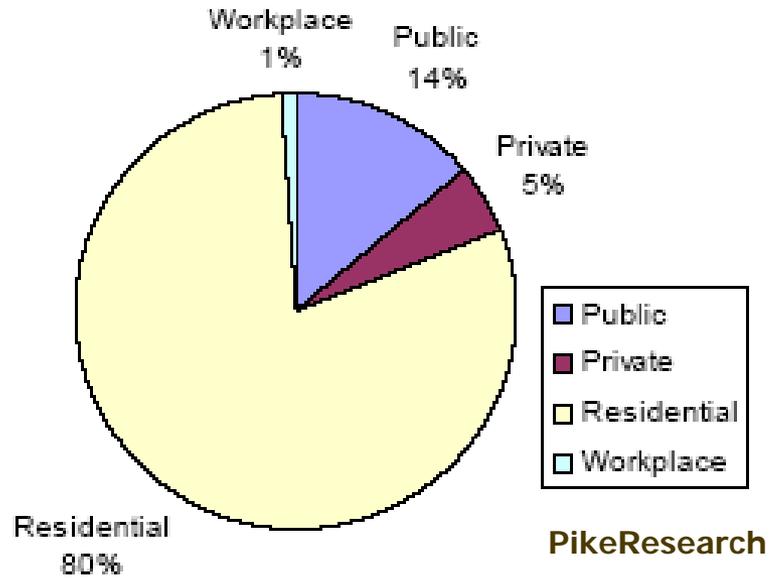


NEV CHARGER

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

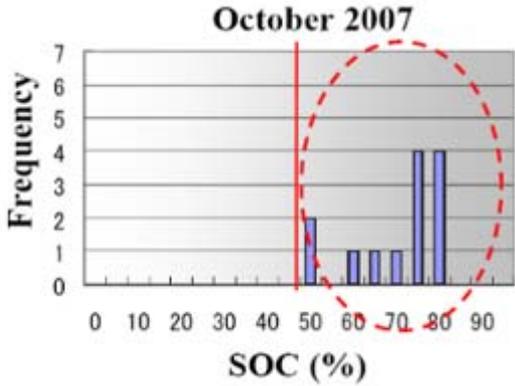
Fast Charging Infrastructure - Range & Convenience

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

Stage 1 - October 2007: One station at home base



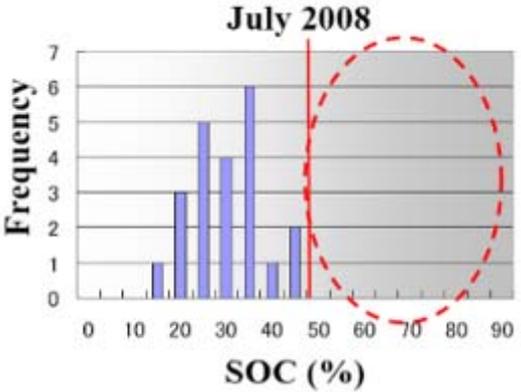
Stage 2 - July 2008: After EV fast-fuel station added



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

