

Electric Vehicle Infrastructure



DOCKET

09-ALT-1

DATE OCT 12 2009

RECD OCT 15 2009

Market Readiness Support

10/12/09

Bill Boyce
Sacramento Municipal Utility District

SMUD's Leadership in EV Infrastructure

- **SMUD has been actively installing EV Chargers Since 1991**
 - **Began Working With Electrical Vehicle Infrastructure Inc. in 1992 on Conductive Chargers**
 - **1994: Market Studies on Public Acceptance**
 - **1995: Began installing inductive chargers**
 - **1999: Acquired Magne Charge / General Motors Charger Contract**
 - **Installation contractor network in California and Arizona**
 - **Responsible for approximately 1900 charger installations**
 - **Clean Fuel Connections Inc. primary contractor**
- **SMUD's continuing activities regarding public infrastructure**
 - **Coordinated activities with local EV Driver's Association**
 - **42 EV Charging sites still active (Total of 119 Chargers)**
 - **61 conductive chargers**
 - **33 small paddle inductive**
 - **25 large paddle inductive**

Historical Average Infrastructure Installation Cost

•Level 2 Residential installations averaged	\$4000 per charger
•Charger (Inductive with \$500 incentive)	\$1900
•Installation labor	\$1177
•Permits	\$ 150
•Other Mat'ls and freight	\$ 572
•Tax	\$ 193
•Level 2 Commercial installations averaged	\$6300 per charger
•Charger (Inductive w/o incentive)	\$2480
•Installation labor	\$2287
•Permits	\$ 77
•Other Mat'ls and freight	\$1497

Historical EV Charging Business Model

- **Most EV charging was home based (Automaker/Contractor)**
 - Automaker / Contractor initiated installation
 - Special TOU incentive rates for off-peak charging through utility
 - Typically required special dual meter adapter installation
 - Cost analysis to determine dual meter pay-off
- **Work Place and Public Charging were free to drivers**
 - Workplace charging more common than public charging
 - Costs borne by the facility owner
 - Other incentives: parking location, fee waivers
- **High Fixed Costs Hurt for Business Case**
 - Most profits from hardware sales
 - Installation activities broke even
 - Maintenance and repairs lost money
 - Typical business office staffed by only 3 employees
 - Office/Business manager
 - Electrical Design / Field Supervisor
 - Call Center / Records Keeper

Tough Issues Never Addressed

- **Multi-family Dwellings / Apartments**

- Typically require facility service upgrades

- **Residential Street / Parking**

- Service upgrades for new service
- Parking permits / regulations to prevent ICE-ing

- **Integration with Advanced Metering and Smart Grid**

- Communication protocols standards
- New EVSE Technology

EVSE Deployment is a Complex Issue

- **Home base / Fixed Parking charging is ideal**
 - **Level 1 or Level 2 (at lower levels)**
 - **Decision depends upon the customer and cost**

- **Workplace charging**
 - **Level 2 preferred to avoid afternoon charging**
 - **Employee provided benefit?**

- **Public / Non-fixed parking solution is a big question!**
 - **Level 1 and Level 2 for inclusion of bikes and scooters?**
 - **Level 2 vs. DC-Level 3 Fast Charging versus Battery Swaps?**
 - **When will the technology be ready?**
 - **Cost of distributed versus centralized approach**
 - **Revenue collection need**

Current SMUD EV Infrastructure Activities

- **DOE FOA28 – CEC AB118 Automaker Demonstration Teams support**
 - Upgrading existing public infrastructure in Sacramento to J1772
 - Supporting new EVSE installations for regional demonstration partner

- **Pursuing DC-Level III fast charging research**
 - Refitting SMUD Solar hydrogen station for PEV charging research

- **Initiating a multi-family charging cost estimation study**

- **Initiating regional permitting harmonization process**
 - **Objective: Get all municipal governments in SMUD service territory to adopt a similar application and permitting process**

- **Initiating Smart Grid / AMI integration approaches**

AB118 Funding Recommendations on EV Infrastructure

- **Update existing state infrastructure to new J1772 Standard**
 - **Statewide effort would go far for first wave of vehicles**
 - **Need to coordinate activity with legacy drivers for continuity**

- **Form a Task Force to address public infrastructure issues**
 - **Develop a comprehensive roadmap for electrification**
 - **Develop a structured approach for long-term coverage / need**
 - **Vehicle market penetration versus need**
 - **Distributed versus Centralized modeling**
 - **Develop statewide building codes for EV circuit integration**

- **Workforce development for EV installation contractors**

Final Thoughts

- **California's history with electric vehicle charging should be leveraged as a market readiness asset**
- **Task force needed to address tough issues**
- **Toughest issue: public charging approaches**
- **Advanced Technologies will take time to materialize**
- **Market likely to shift with time as technology matures**