CLIPPERCREEK, INC.
INNOVATIVE INFRASTRUCTURE FOR ELECTRIC AND HYBRID VEHICLES

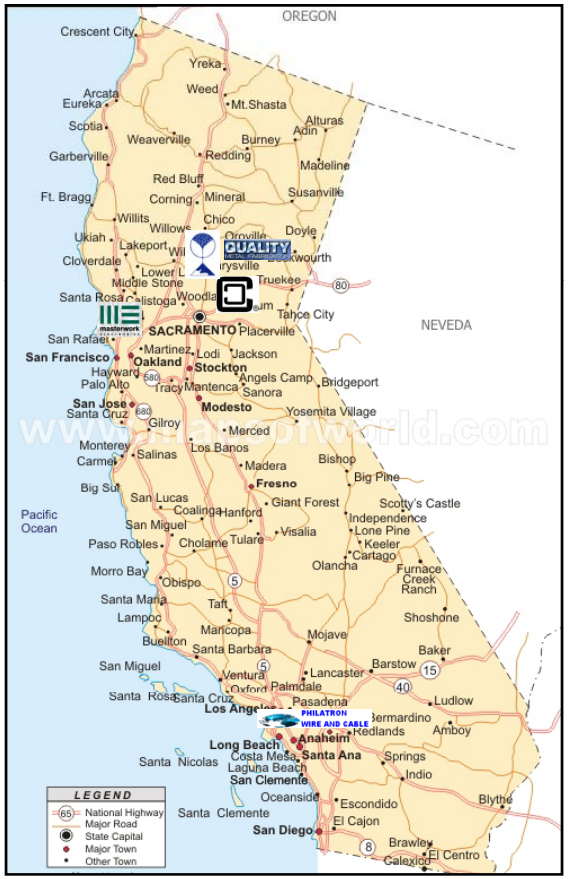
EV Infrastructure Lessons Learned

David Packard

ClipperCreek, Inc.

ClipperCreek, Inc.

- **California based company (Auburn) with all California suppliers.**
- **Founders of ClipperCreek, Inc. were principals of EVI.**
- **Shipped 2,000 EVSEs this year.**
- **12th generation of product.**
- **3 UL listed products compatible with the new SAE-J1772™ standards.**
- **Currently the only UL listed products on the market.**



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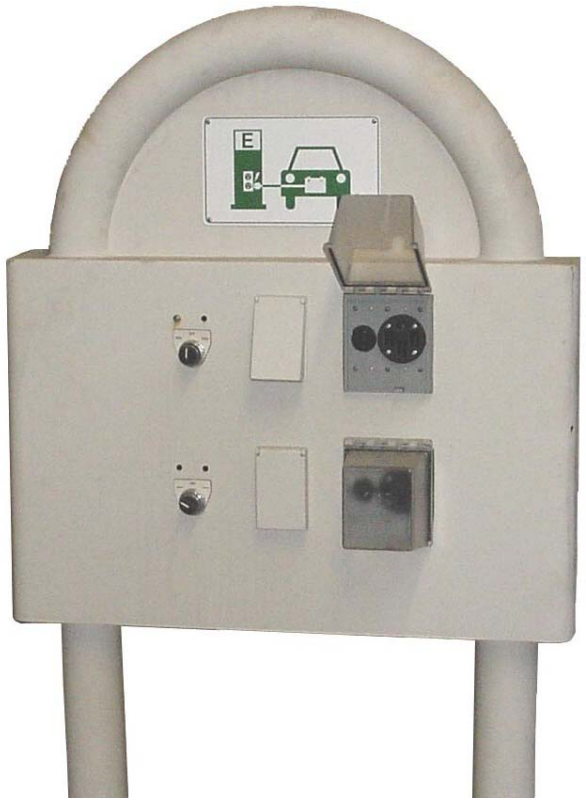
110 V Charging

- **5 mA GFCI is too sensitive.**
- **Too long to charge – 4 mi per hour max.**
- **Standard outlets not designed for this type of load or disconnection under load.**



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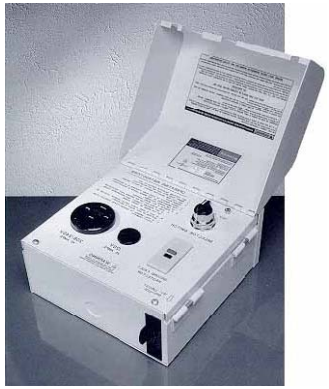
Plug and Cord Connected Level II

- **Standard 240 V traditional infrastructure is not safe.**
- **Power levels too high to be handled on a daily basis.**
- **Not safe to make/break under load.**
- **Difficult to ensure power disconnect prior to disconnecting plug from outlet.**

NEMA TT–30 plug and receptacle. (The center hole on the receptacle is not a contact.)



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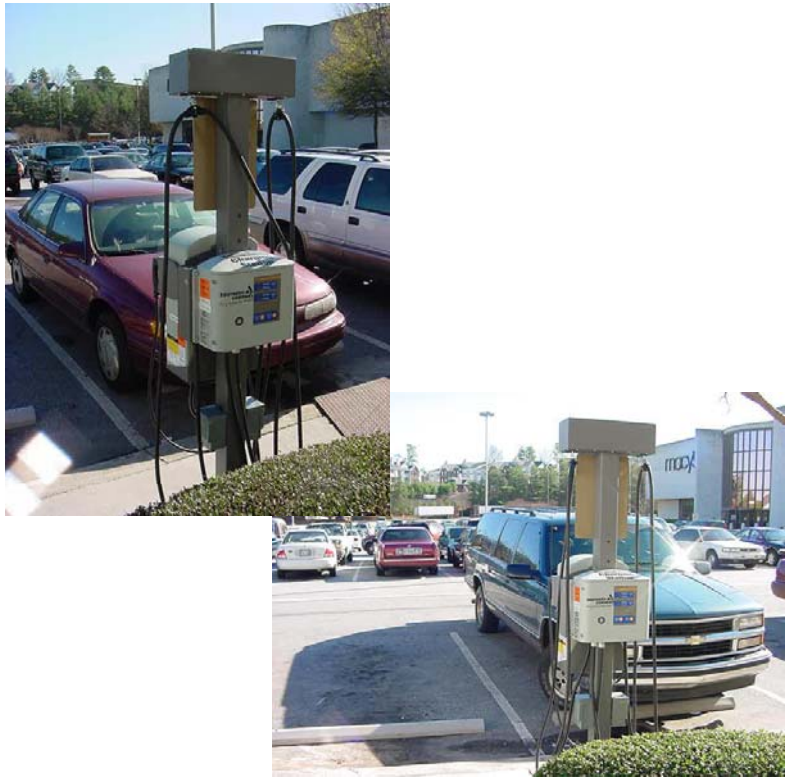
Location in Commercial Settings

- **Placing EVSEs in premier parking areas does not work.**
  - **Creates resentment from other drivers.**
  - **Increases likelihood of ICE'ing.**
  - **EVSEs should be placed in areas to minimize installation cost.**
  - **Proper signage is essential.**



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Public Infrastructure as a Sales Tool

- **Keep the vehicles in the mind of the car driving public.**
- **Helps overcomes range anxiety.**
- **Encourages use of EV over ICE vehicle.**

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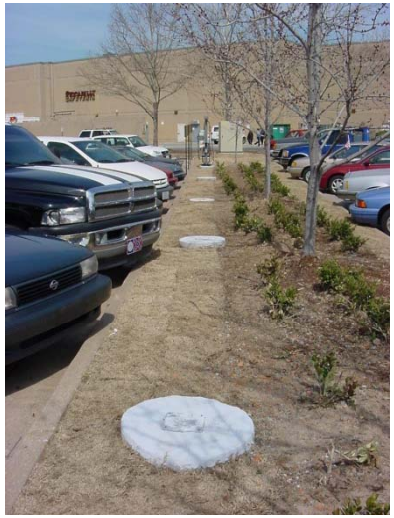
Real Costs

- **Installation costs can far outweigh EVSE cost.**
- **Design EVSEs and installation accessories to minimize cost.**
- **Keep the profit of driving an EV in the drivers wallet.**



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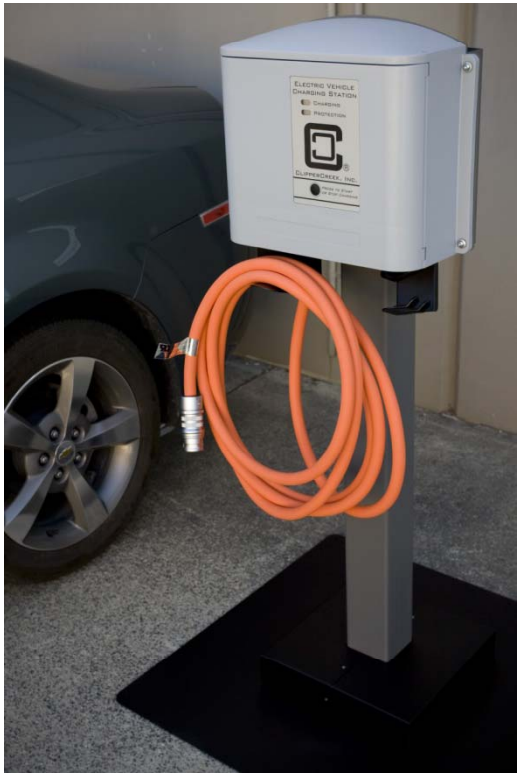
Good News

- **California currently has over 600 sites with 1,300+ EVSEs that can easily be updated to the new standard.**
- **There are numerous grants and federal tax credits to offset the cost of new installations.**
- **Public charging installed with CEC funds should be free to the public.**



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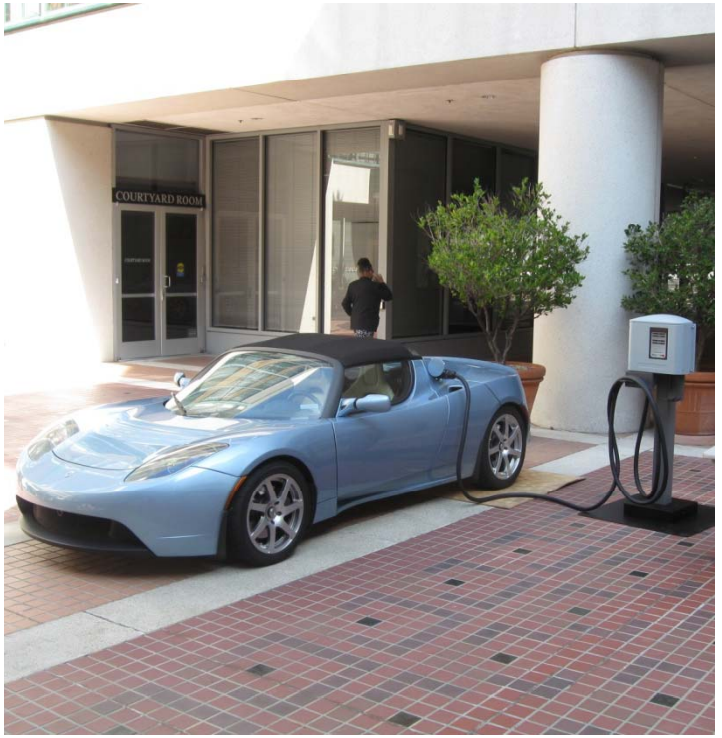
Residential Load

- **Vehicles should be charged in off peak hours.**
- **Customer serviceable EVSEs will be preferable.**
- **Creative solutions - splitting loads of large appliances.**



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Utility Load

- **Vehicles should be charged in selected times of the day or off peak.**
- **Fleets and other installations can minimize load by block charging.**
- **Dual EVSEs can minimize required service.**

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Conclusion

- **Level 2 charging is a necessity.**
- **Charge Stations are a cost effective way to attract customers.**
- **Public infrastructure will help prompt sales.**
- **Installation costs far exceed product costs.**
- **Utilities need the ability to control EVSEs early in the market.**
- **The industry may provide significant benefits for California.**

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THANK YOU

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CEC Panel Questions 1

Describe the status of your technology and your efforts to upgrade and install electric vehicle charging infrastructure, including level I, II, and III systems. Identify and quantify existing and planned installations by geographic areas and by home, municipal and commercial charging applications. In the April 2009 Investment Plan, the Energy Commission estimated a need for 6500 charging stations and co-funded 3100 charge points in California with ARRA. How much additional charging infrastructure is needed to support the rollout of electric vehicles through 2012 and later years?

- **ClipperCreek has developed a full line of UL listed, SAE compatible EVSE products including Level I and Level II. In addition, the level II products support the public infrastructure market with the industry standard pedestal. These products are for sale today.**
- **ClipperCreek has been installing residential and 2nd units for vehicles drivers.**
- **The majority of the public infrastructure we have installed has been for the Tesla Roadster out of necessity since this is the only connector we have available.**
- **Previously we found a ratio of 3 to 1 EVSEs to Vehicles.**

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CEC Panel Questions 2

Describe the estimated capital costs required for individual installations and the total number of installations to achieve full commercialization. Describe the remaining steps (including research and development) needed and timing to achieve full commercialization.

- **There is a wealth of information on public infrastructure installations. For the most part installations ran between $2,000 to $10,000 for public infrastructure.**
- **Southern Company in GA was able to get their average installation cost down to $2,000 per connector by standardizing the installations.**
- **R&D Needed Now!**
- **a. The new SAE industry standard connector is due next year, this has been a source for significant delays.**
- **b. Load sharing technology is needed for various applications to minimize the impact on individual service drops and beyond individual transformers.**
- **c. Existing load shedding technology needs to be spliced into existing AC load shedding technology.**
- **As utility smart grids are rolled out**
- **Networking technology is needed to EVSEs into the utilities varying Smart Grid technology.**

CEC Panel Questions 3

Substantiate how the customer demand for electric vehicles corresponds to the geographic location, electric vehicle charging patterns and timing of electric charging installations.

- **We do know that you will get less than 3 miles per hour of charge with Level 1 charging and 12 to 75 miles per hour of charge with SAE-J1772™ Level 2.**
- **Since we don't have any vehicles it is very difficult to "substantiate", however, the general consensus is that EVSEs need to be placed at locations driver's park for extended periods of time.**
- **Short stay locations have issues with limiting turn over when drivers are staying around to get a charge**
- **Vehicles will typically be charged at night, most public charging will be topping off for the daily driving up to that point. It goes a long way to relieve "range anxiety."**

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CEC Panel Questions 4

Describe the business model(s) that you employ to accelerate the development of electric charge infrastructure, combination vehicle and infrastructure projects and off-road applications. What sources of (non utility) matching funds are available for co-investment with the Energy Commission?

- To maximize volume ClipperCreek has tailored its public infrastructure products as “one model fits all”, where the same model can be used in public infrastructure, fleet, commercial and residential and can be wall or pedestal mounted.
- For the most part to date off-road applications or low voltage with off-board application and the charging application is not transferable from on-road to off-road.
- Other funds that are available:
- 1) Federal Tax Credit
- 2) Federal Stimulus Funds (or maybe not)
- 2) Commercial funding
- 3) ClipperCreek
- ClipperCreek’s business model is to supply EVSEs at a competitive cost whereby the owner takes ownership of the EVSE. ClipperCreek feels that public and secondary charge sites need to be free or nearly free of charge for the EV driving public to encourage EV miles.

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CEC Panel Questions 5

What is the rationale for incentives? What level and what type of incentives are needed, if any, and over what period of time are incentives needed? What is the potential to achieve cost reductions through economy of scale production, technology advances, manufacturing strategies, petroleum price increases or other market and regulatory influences? Describe conditions and circumstances required for your systems to be cost-competitive with gasoline and diesel options.

- **The great advantage of electric vehicles is that once the vehicle is in the drivers hands they are the low cost per mile solution.**
- **The key to taking advantage of this fact, and to encourage EV miles, is to make sure the cost advantage of driving an EV is not lost in recharging schemes.**
- **Incentives need to be focused on getting infrastructure in place to promote electric vehicles and help overcome range anxiety, where the cost of refueling is negligible.**
- **Volume is going to help to significantly reduce the cost of the hardware, however, the bulk of the cost is in the installation and we can't do much to change the price of cutting concrete.**
- **The market will push us to more cost effective installations: multiple connector stations, locating charging locations near service entrance, optimizing installations to "cookie cutter" approach.**

CEC Panel Questions 10

Describe how AB 118 funds could be allocated to resolve electric drive challenges and barriers not addressed in previous questions. Provide a rationale for incentives, studies or actions and the amount of the allocation.

- **Infrastructure serves many vital functions in the roll out of Electric Vehicles**
  - **1) Overcome range issues (real or not).**
  - **2) Advertise the existence of electric vehicles.**
  - **3) Encourage the use of the vehicles (extend miles).**
- **Require entities using AB 118 funds to install infrastructure to provide the electricity for free for the life of the installation.**
  - **1) Encourage public charging, more "EV" miles.**
  - **2) Actual kWhrs transferred are minimal.**

CEC Panel Questions 11

Comment on how the Energy Commission can allocate funding in electric charge infrastructure and facilitate utility roles in the electric transportation sector to help achieve California's quantified 2020, 2030 and 2050 goals to maximize greenhouse gas emission reductions and reduce petroleum dependency.

- **The focus must be on increasing "EV" miles and minimizing the cost per mile.**
  - **Encourage off peak charging with reduced rates.**
  - **Install free public charging and make it accessible – allow the energy used in public charging to be "rate based".**
  - **Work with the retail industry to increase charging spots.**
  - **Keep it simple.**

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