EV Infrastructure Lessons Learned

David Packard

ClipperCreek, Inc.

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- California based company (Auburn).
- All California suppliers.
- Founders of ClipperCreek, Inc. were principals of EVI.
- Shipped 2,500 EVSEs this year.
- 12th generation of product.
- 3 UL listed products.
- 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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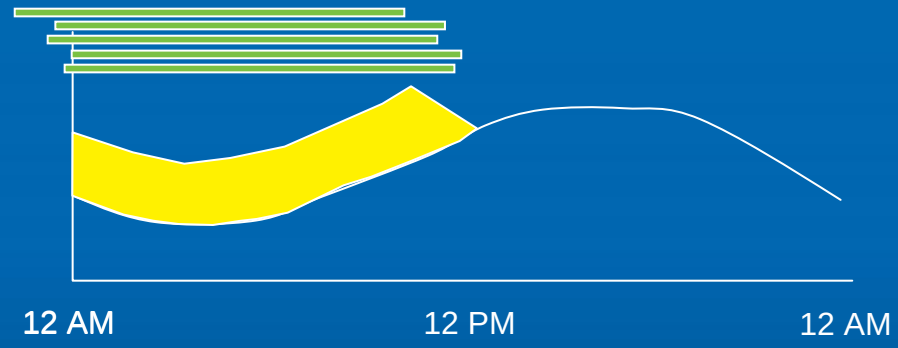
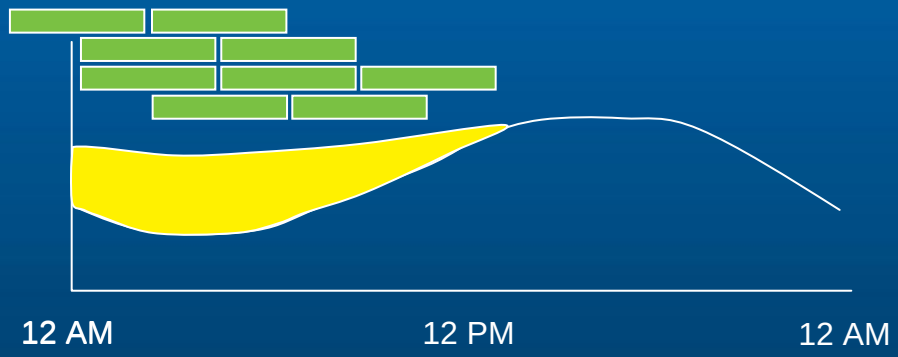
Charge Rate

- **Level 1 Charging minimizes load management options.**
  3 to 4 miles per hour
- **Level II gives utilities and drivers confident vehicle can be charged in allotted time.**
  12 to 75 miles per hour





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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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UL listing

- UL listing is required due to NEC Code (625)
  - Very high power (up to 20 kW).
  - To be used by *everyone*.
  - To be used in all types of weather.
  - Can not afford one incident.

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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.

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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.

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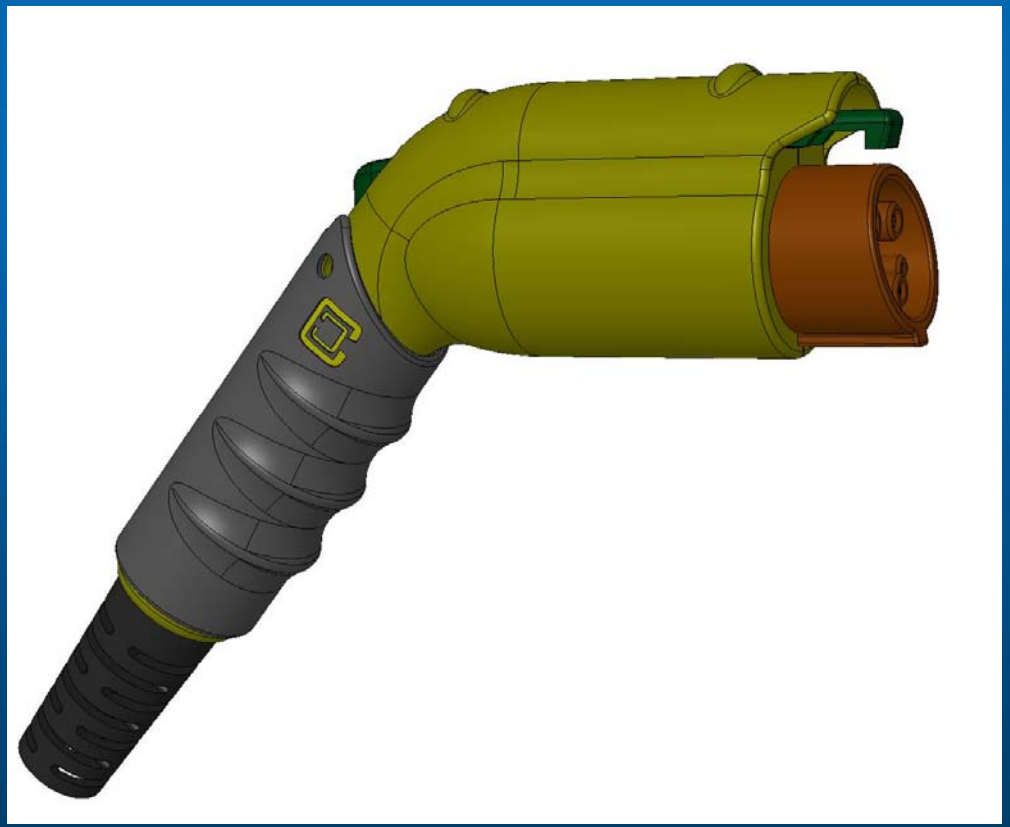
One Connector!

- SAE-J1772 Standard
- 6-80 Amps



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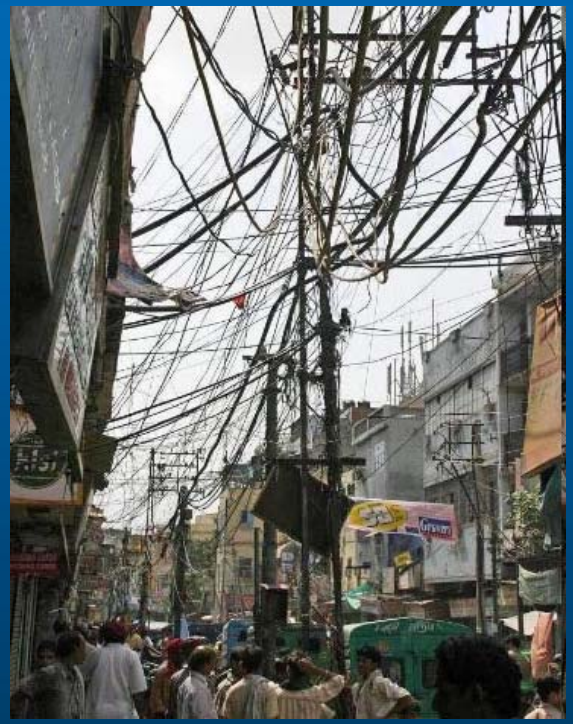
Electric Vehicles effect on the grid



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EVSE Networking

- From Prius example, products will be clustered.
- EVSE integration into Smart Grid crucial early on.
- Important for integration into utilities existing load management controls.

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Residential

- Customer serviceable EVSEs will be preferable.
- Creative solutions - splitting loads of large appliances.

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Fleet

- Load can be minimized by block charging.
- Dual EVSEs can minimize required service.

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Thank You

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