Workplace Charging Workshop

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Powering forward. Together.

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The Alphabet Soup of EV's

- PEV: Plug-in electric vehicle includes EV's, BEV's, PHEV's and EREV's
  - EV's Electric Vehicles
  - BEV's are Battery Electric Vehicles
  - PHEV's are Plug-in Hybrid Electric Vehicles (generically includes EREV's)
  - EREV are Extended Range Electric Vehicles

- EVSE: Electric Vehicle Supply Equipment (informally called a charger)
  - Level 1 EVSE is a standard 120V electrical outlet (typically 1.5kW)
  - Level 2 EVSE is a 208 or 240V dedicated charging device (3.3 to 19.2kW)
  - DC Fast Charging is an off-board dedicated charger
    - 20 to 100kW charging Level
    - Approaches a gas station model with target 20 to 30 minute charge times
    - Technically different than "Level 3"

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PEV Model Introductions Continue

2009: Tesla Roadster

2010: Nissan Leaf
Chevrolet Volt

Now: Nissan Leaf
Chevrolet Volt
Mitsubishi iMiEV
Toyota Prius Plug-in
Toyota Rav-4EV
Ford Focus EV
Ford C-Max Energi
Ford Fusion Energi
BMW Active E, i3
Honda Fit EV
Honda Accord PHEV
Tesla Model S
Chevrolet Spark
Fiat 500e


Prius Plug-in Hybrid

2012 Honda Fit EV


2011 Chevrolet VOLT


2011 BMW ActiveE


2011 Mitsubishi i-MiEV


2011 Ford Focus Electric


2011 Nissan LEAF


2012 Tesla Model S

Graphic courtesy of the California PEV Collaborative

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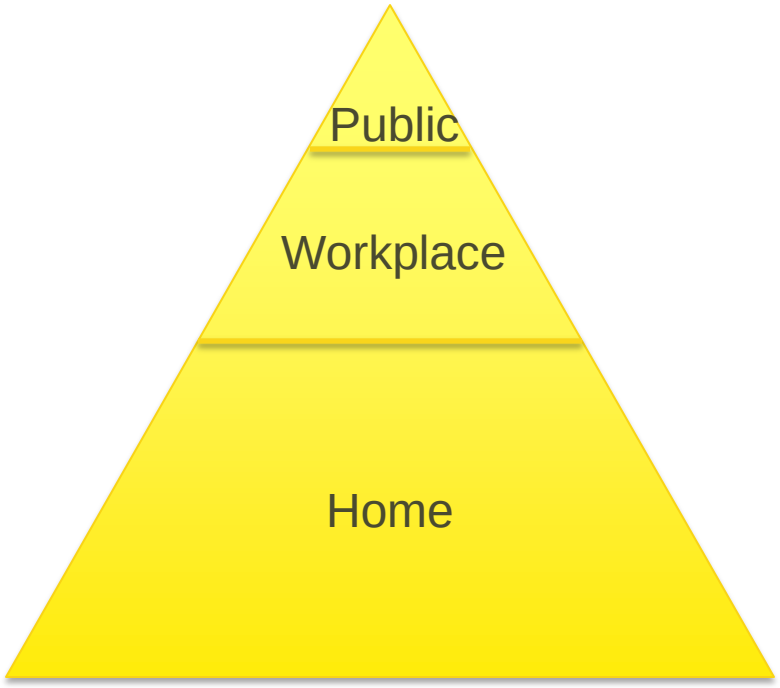
Why Workplace Charging



- **It's the second longest location cars get parked for potential charging**
- **Addresses range anxiety for drivers to support market adoption**
- **Enables more electric miles for environmental and economic benefits.**

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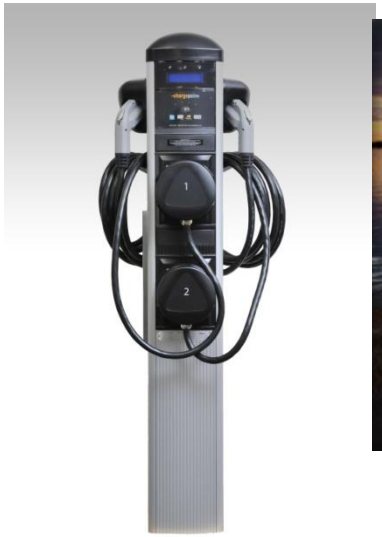

EVSE Examples

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Workplace Charging Initiatives

- U.S. DOE Workplace Charging Challenge
  - Launched last month
  - Congratulations to all the California entities who were inaugural members

- CalStart Employer EV initiative is supporting a statewide outreach and education campaign with the California PEV Collaborative

- Governor Executive order in place for State Facilities

- Progressive employer initiatives
  Examples: Google, SAP, Qualcomm, SDG&E, State DGS

- Resources
  - CalStart www.evworkplace.org
  - U.S DOE EV-Everywhere@ee.doe.gov

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Big Picture issues to consider

$’s

- Access to electrical power
  - Existing electrical capacity versus a new dedicated service
  - Distance from electrical access versus desired parking location
  - Level 1 versus Level 2 Decision making
- Offering Free Charging versus Fee based
  - Some employers offer free charging as an employee incentive ($200/year)
  - Other employers charge a fee for fairness or cost recovery
- Networked and Synchronized versus non-networked chargers
  - Networked or Synchronized chargers provide convenience for billing or other functions
  - Non-networked chargers have lower capital and O&M cost
- Funding sources to pay for it all
  - Periodic state or federal grant activity

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Free versus Fee and Payment Systems

- Free charging gets popular quickly
  - Amenity for employees or an entitlement?
  - Who gets priority for charging when all the stations are used up?
    - Early bird gets the worm?
    - Equal access for all?
    - Reserved for long distance commuters or multi-family dwellers?
    - Sharing amongst users?
  - Conflict amongst employees
  - Poaching/Squatting from non-employee users

- Fee based charging
  - Equity and fairness or cost recovery
  - Only people who need to charge will pay for charging
  - Impractical to try and recover the capital cost as part of a normal return on investment
  - Informal fee structures versus technology based credit card or subscription service

- Payment Systems
  - Subscription service type arrangements
  - Credit Card readers, Wi-fi, RFID or Phone-in synchronization systems
  - Individual units or joint kiosk type systems
  - Network or clearing house access fees

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State Government Building Survey Results

- SMUD surveyed several DGS Building/Properties last year

- Newer state buildings (post 1995?) seemed to have some PEV charging provisions
  - AG's Building: had 3 legacy charging units
  - East End : had multiple legacy charging units in each garage unit
  - Franchise Tax Board, an un-used electrical panel out in the parking lot

- Some older buildings had adequate capacity headroom from previous building uses
  - Department of Justice building: an available 400 amp panel in reasonable proximity to to one of the parking lots
  - Board of Equalization: had existing electrical capacity and the electrical room was on the 2nd floor of the parking structure

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Other Issues

- Minimum parking space requirements
- Signage
  - CalTrans Guidance document
- Plan for expansion if possible
  - Electrical backbone installation is the highest cost
  - Install larger electrical panel and bury conduit for future activation
- Charging with Solar Energy
  - Not a requirement
  - Typically done as an environmental showcase
  - Both charging and the solar array are grid tied
  - Usually supported by other funding sources

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Summary

- Workplace charging helps market adoption
- Vehicle availability and popularity is increasing
- Big Picture Issues include
  - Electrical service capacity, proximity, Level 1 vs. Level 2
  - Free versus Fee
  - Networked or Synchronized versus Simple EVSE
  - Plan for expansion
- Periodic funding source opportunities

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