

California Electric Vehicle Infrastructure Policies and Status

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Outline

1. Overview of California Infrastructure Status and Policies
2. California EV Readiness Building Codes
3. Additional State and Local Efforts



California Policy Background

Global Warming Solutions Act (AB32)	Outlines CA's major initiatives for climate change, 2020 GHG emission reduction goals.
Assembly Bill 118 and pending Senate Bill 1532	Incentive funding for alternative fuels and advanced vehicle technologies including EV infrastructure
Zero Emission Vehicle Regulation	10% electric drive vehicle market share by 2025
Governor's Executive Order	Infrastructure and other policies to support 1.5 million electric drive vehicles by 2025 and 80% transportation GHG reduction by 2050

California Public EV Charging Infrastructure Status

	Level 1	Level 2	DC Fast charging	Total
US	2253	7605	63	9921
California	494	1664	4	2162

Level 1 = 120 V

Level 2 = 240 V

Source: US National Renewable Energy Lab

Status of California Residential Charging Infrastructure

- EV Project Level 2 installations, mainly residential Nissan Leaf chargers
 - San Francisco - 1260
 - San Diego – 927
 - Los Angeles - 538
- Over 436,000 charging events at these stations

Source: Q2 2012 Status Report The EV Project

California EV Infrastructure Efforts

- California Public Utilities Commission settlement with NRG
 - 200 DC fast-charger
 - “make-readies” for 10,000 charging points at multi-dwelling units, offices, public buildings
 - Legal challenges pending
- California Plug-in Electric Vehicle Collaborative focus on workplace and multi-unit dwelling charging



CA EV Readiness Building Codes: Rationale

- Retrofitting a residence with a charging circuit can cost over \$2,000 (actual price varies)
- On the other hand, 'pre-wiring' new homes for EV charging during construction only ~ \$250.
- Similar benefits in other buildings

CA EV Readiness Building Codes

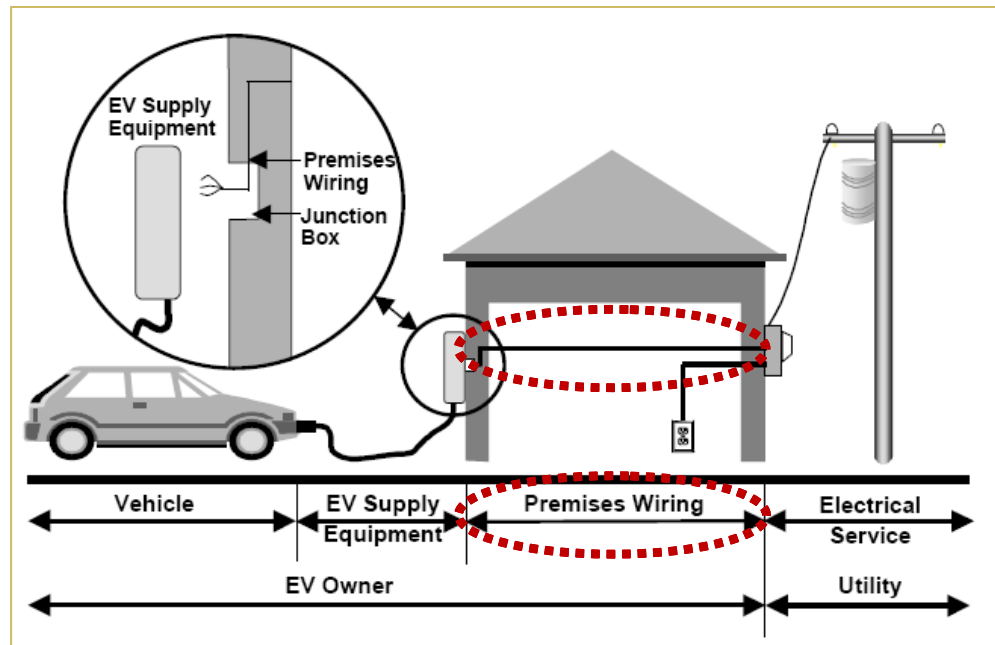
- PG&E and other California Investor-Owned Utilities (IOU) began to explore building codes options in 2009.
- California Green Building Standards Code (CALGreen, Part 11 of Title 24) contains mandatory standards and voluntary “Tier 1” and “Tier 2” standards

CA EV Readiness Building Codes

- Goals of IOU Proposed CalGreen 2011 revision
 - Minimize construction requirements and cost but maximize EV “readiness” with basic charging circuit infrastructure
 - Prioritize readiness for residential charging, which accounts for bulk of charging and encourages overnight, off-peak charging.
 - “Voluntary” section of standard allows local jurisdictions to choose whether to impose these standards for new construction

CA EV Readiness Building Codes: IOU CalGreen 2011 Proposal

- Install conduit and conductor for a dedicated 240 volt, 40 amp AC circuit from the electric service panel to parking space.
- Reserve panel capacity, install circuit breaker for the charging circuit.



CA EV Readiness Building Codes: Technical Issues

- Circuit termination method
 - Does National Electrical Code call for hardwiring circuit to electric vehicle service equipment (EVSE), or allow for a rated National Electrical Manufacturers Association “plug and play” outlet?
- Potential effect of sub-metering for EV electricity usage
- Grid impacts
 - Consider off-peak benefits, concerns for potential distribution infrastructure overloading, and future “smart charging” technology.

CA EV Readiness Building Codes: Technical Issues Considered

- Circuit sizing

- Is 40 amp, Level 2 AC circuit appropriate for the EVs of today and tomorrow?

AC Level 1

120V AC single phase
current (12 amp); power 1.44kW
current (16 amp); power 1.92kW

AC Level 2

240V AC single phase
rated current ≤ 80 amp
rated power ≤ 19.2 kW

- Service panel capacity and upsizing

- Will compliance require upgrading panel size, increasing cost?

- Multi-family, multi-unit dwellings

- Emphasized by urban stakeholders; we advocated provisioning 10% of parking spaces.

CA EV Readiness Building Codes: Current Standard

- CalGreen EV readiness revision (adopted 2011 with effective date June 2012) is a major first step
- Requires empty raceway (ie space for adding conductor later) for single family homes, and for 3% of spaces at multifamily homes, but not conductor, circuit breakers, and panel capacity
- Rationale for adopted standard: Empty raceway approach provides more flexibility on circuit sizing and avoids upfront expenses, service panel upgrade.

CA EV Readiness Building Codes: Future Revisions

- Next step: Strengthening the voluntary EV readiness requirements for CalGreen revisions later in 2012 to take effect in 2014
 - Provision fully equipped charging circuits and increase % of EV ready parking spaces in multi-family construction.
- Final goal: Transition to mandatory state-wide requirements for residential EV charging circuits.

Additional State and Local Efforts

- City of Los Angeles' new Green Building article; Municipal Code, Chapter IX
 - 208/240 volt, 40 amp grounded AC outlet for EV charging, or panel capacity and conduit
 - Similar provisions for 5% of spaces in townhouses, apartments, and non-residential parking facilities.
- City of San Francisco's Cleaner Fuels and Vehicles Program
 - Possible EV charging provisions in single- and multi-family residential, hotels, commercial and municipal.

Additional State and Local Efforts

- **California Public Utilities Commission Rulemaking**
 - Goal of consistent statewide policies for EV metering, home, commercial and public EV charging infrastructure, tariff schedules, and potentially incentive programs.
- Phase 1: EV charging providers will not be regulated as public utilities
- Phase 2: Rules against IOUs owning EVSE at customers' facilities
 - Initiates EV metering protocol development as potential alternative to separate meter (for lower-cost EV-specific electricity rates)
 - Until June 2013, costs of distribution upgrades are a shared cost
 - Requires utilities to perform load research

For More Information

- epike@energy-solution.com
(510) 482-4421 ex 239
- Reducing Barriers to Electric Vehicle Adoption through Building Codes; *Jordan Shackelford, Alex Chase, and Michael McGaraghan, Energy Solutions; Stuart Tartaglia, Pacific Gas and Electric Company*
<http://www.aceee.org/files/proceedings/2012/data/papers/0193-000012.pdf>

Thanks!

Questions and
Discussion

