



# Preparing for Future Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) Investment in California Plug-in Electric Vehicle Charging Infrastructure

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Electric Vehicle Charging Infrastructure Workshop  
California Energy Commission  
January 28, 2015



## Agenda

- |            |                                  |
|------------|----------------------------------|
| 10:00 a.m. | Introduction                     |
| 10:20 a.m. | Presentations                    |
| 11:00 a.m. | Corridor DC Fast Charging        |
| 12:00 p.m. | Lunch                            |
| 1:00 p.m.  | Multi-Unit Dwellings             |
| 1:45 p.m.  | Workplace Charging               |
| 2:30 p.m.  | Light-Duty EV Fleets             |
| 3:15 p.m.  | Public Charging and Other Venues |
| 3:30 p.m.  | Public Comment                   |
| 4:00 p.m.  | Adjourn                          |



## Workshop Objectives

**Inform development of \$10 million solicitation for EV charging infrastructure through stakeholder input and discussion**

- Identify optimal strategies for funding charging infrastructure projects in a complex and quickly evolving environment
- Gain better understanding of gaps and barriers that need to be addressed
- Obtain information to assist with prioritization of ARFVTP funding for EV infrastructure



# Assembly Bill 8

(Perea, Chapter 401, Statutes of 2013)

Assembly Bill No. 8

CHAPTER 401

An act to amend Sections 41081, 44060.5, 44125, 44225, 44229, 44270.3, 44271, 44272, 44273, 44274, 44275, 44280, 44281, 44282, 44283, 44287, 44299.1, and 44299.2 of, to add and repeal Section 43018.9 of, and to repeal Section 44299 of, the Health and Safety Code, to amend Sections 42885 and 42889 of the Public Resources Code, and to amend Sections 9250.1, 9250.2, 9261.1, and 9853.6 of the Vehicle Code, relating to vehicular air pollution, and declaring the urgency thereof, to take effect immediately.

[Approved by Governor September 28, 2013. Filed with Secretary of State September 28, 2013.]

LEGISLATIVE COUNSEL'S DIGEST

AB 8, Perea. Alternative fuel and vehicle technologies; funding programs.  
(1) Existing law establishes the Alternative and Renewable Fuel and Vehicle Technology Program, administered by the State Energy Resources Conservation and Development Commission, to provide to specified entities, upon appropriation by the Legislature, grants, loans, loan guarantees, revolving loans, or other appropriate measures, for the development and deployment of innovative technologies that would transform California's fuel and vehicle types to help attain the state's climate change goals. Existing law specifies that only certain projects or programs are eligible for funding, including block grants administered by public entities or not-for-profit technology entities for multiple projects, education and program promotion within California, and development of alternative and renewable fuel and vehicle technology centers. Existing law requires the commission to develop and adopt an investment plan to determine priorities and opportunities for the program. Existing law also creates the Air Quality Improvement Program, administered by the State Air Resources Board, to fund air quality improvement projects related to fuel and vehicle technologies.  
This bill would provide that the state board has no authority to enforce any element of its existing clean fuels outlet regulation or other regulation that requires or has the effect of requiring any supplier, as defined, to construct, operate, or provide funding for the construction or operation of any publicly available hydrogen-fueling station. The bill would require the state board to aggregate and make available to the public, no later than June 30, 2014, and every year thereafter, the number of hydrogen-fueled vehicles that motor vehicle manufacturers project to be sold or leased over the next 3 years, as reported to the state board, and the number of hydrogen-fueled vehicles registered with the Department of Motor Vehicles through April 30. The bill would require the commission to allocate \$20 million annually, as specified, until there are at least 100 publicly available hydrogen-fueling

- Extends ARFVTP funding through January 1, 2024
  - ✓ \$100 million per year
- To transform California's transportation market into a diverse collection of alternative fuels and technologies and reduce California's dependence on petroleum.

*“...develop and deploy innovative technologies that transform California’s fuel and vehicle types to help attain the state’s climate change policies.”* (Health and Safety Code Section 44272(a))



# Key Policies and Regulations

Policy Objectives	Policy Origin	Goals and Milestones
Greenhouse Gas Reduction	AB 32, Executive Order S-3-05, LCFS	Reduce greenhouse gas emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050 in California
Petroleum Reduction	<i>California State Alternative Fuels Plan</i>	Reduce petroleum fuel use to 15% below 2003 levels by 2020 in California
Low Carbon Fuel Standard	AB 32, California Global Warming Solutions Act	10% reduction in carbon intensity of transportation fuels in California by 2020
Federal Renewable Fuel Standard	Energy Policy Act of 2005, Energy Independence and Security Act of 2007	36 billion gallons of renewable fuel by 2022
Air Quality	Clean Air Act	80% reduction in NOx from current levels by 2023
ZEV Mandate	California Executive Order B-16-2012	Accommodate 1 million EVs by 2020 and 1.5 million by 2025 in California

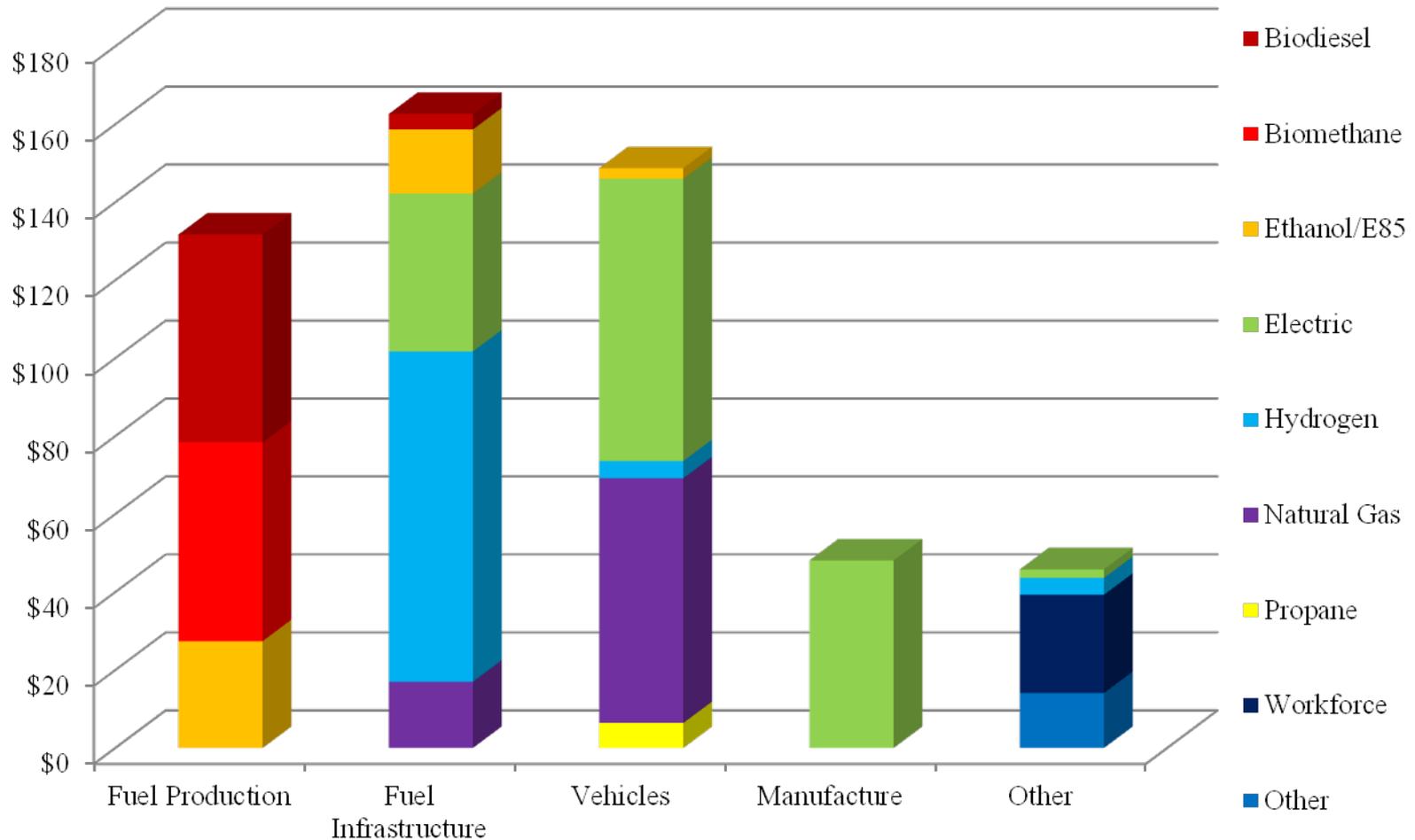


# ARFVTP Funding Summary: 2009-2014

Investment Areas	Funding Amount (\$ millions)	Percent of Total (%)	Number of Awards
Biofuels	152.8	29	55
<b>Electric Drive</b>	<b>159.6</b>	<b>30</b>	<b>128</b>
Natural Gas and Propane	86.0	16	184
Hydrogen	93.4	18	25
Workforce Development	25.2	5	55
Market & Program Develop.	14.1	3	15
<b>Total</b>	<b>531.1</b>	<b>100</b>	<b>462</b>



# Existing Agreements: 2009-2014





## 2013 ZEV Action Plan EV Infrastructure Related Goals

- **By 2015:** the State's major metropolitan areas will be able to accommodate ZEVs through infrastructure plans and streamlined permitting
- **By 2020:** the State's ZEV infrastructure will be able to support up to 1 million vehicles
- **By 2025:** Over 1.5 millions ZEVs will be on California roadways and their market share will be expanding. Californians will also have easy access to ZEV infrastructure.

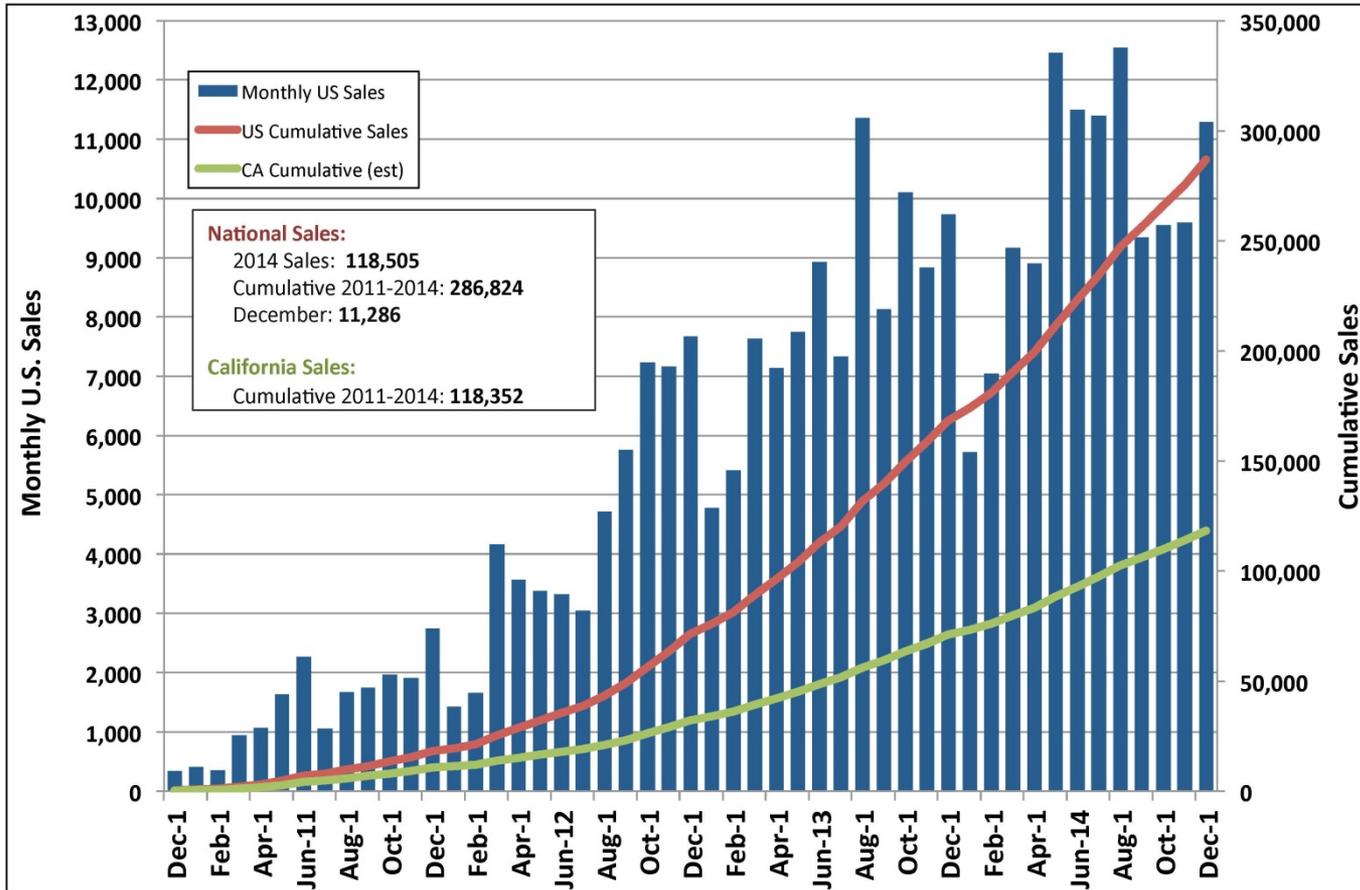


## 2013 ZEV Action Plan Actions Related to PEV Infrastructure

- Develop Statewide PEV Infrastructure Plan
- Support completion of regional PEV plans which include PEV infrastructure plans
- Identify a path to complete the West Coast Green Highway (BC to Mexico)
- Encourage hosting of PEV chargers in multi-unit buildings
- Build awareness among state's major employers about workplace charging benefits
- Expand incentives to encourage California companies to install workplace charging infrastructure
- Promote cost-effective charging infrastructure at appropriate longer-term public parking locations



# December 2014 PEV Sales



Note: Approximation assumes CA sales are 40% of national sales.  
 Reference: [www.hybridcars.com](http://www.hybridcars.com)



# CALIFORNIA ENERGY COMMISSION





# Plug-in Electric Vehicle Models



**BMW i3**



**Volkswagen e-Golf**



**BMW i8**



**Kia Soul EV**



## Plug-in Electric Vehicle Models



**Audi A3 Sportback e-tron**



**Mercedes B-Class  
Electric Drive**



**Tesla Model X**



**2016 Chevy Volt**



# Electric Vehicle Support

**Total EVSE Funding: \$38.3 million**

Total Funded = 9,369 chargers

Commercial = 3,373

Residential = 5,127

Workplace = 756

DC Fast = 113

Plus 21 Regional Readiness  
Planning Grants = \$5.1 M

Total CVRP Support:  
= \$49 million

- Over 21,000 vouchers

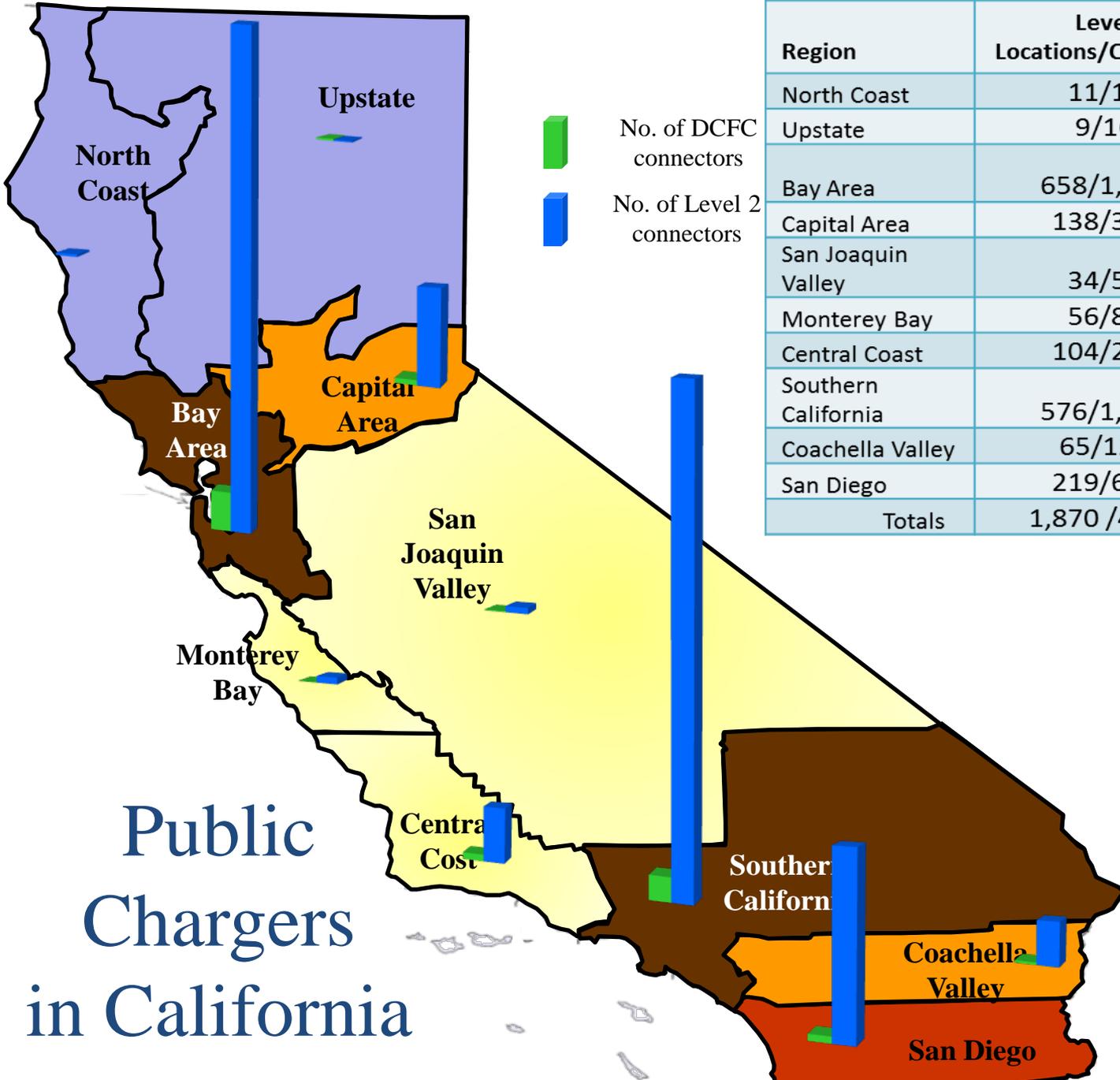


SAE Combo port  
(L2 + DC charging)

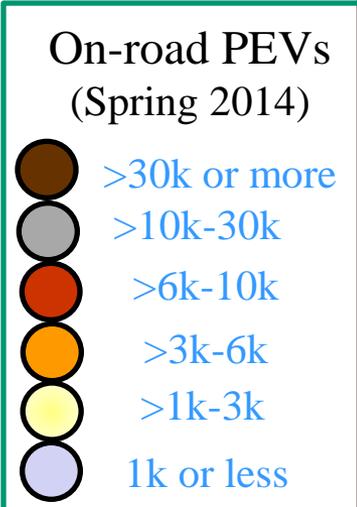
CHAdeMO port  
(DC charging)



# Public Chargers in California



Region	Level 2 Locations/Connectors	Fast Charge Locations/Connectors
North Coast	11/16	0/0
Upstate	9/16	4/17
Bay Area	658/1,557	72/124
Capital Area	138/346	9/19
San Joaquin Valley	34/52	2/8
Monterey Bay	56/80	1/1
Central Coast	104/201	10/25
Southern California	576/1,531	57/78
Coachella Valley	65/120	6/7
San Diego	219/607	16/23
Totals	1,870 /4526	177/302



Charger data from AFDC Database, September 1, 2014 (Source of slide is CARB)



## Regional Readiness and ZEV Implementation Solicitations

**PON-10-602:** Established 10 Regional PEV Readiness Plans for \$2 million

**PON-13-603:** Awarded 8 Alternative Fuels Readiness Plans for \$2.27 million

**PON-14-603:** Notice of proposed awards for 8 ZEV Implementation Projects for \$2.03 million



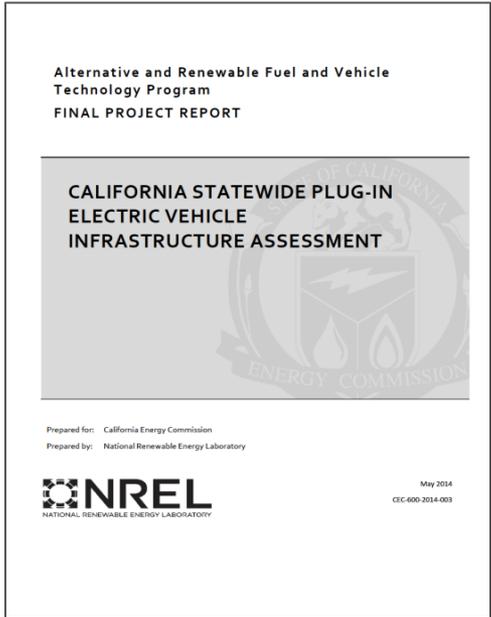
## Energy Commission and DOE Regional PEV Planning Grants

Awardee	CEC \$	DOE \$
Bay Area Air Quality Management District	\$200,000	\$300,000
Monterey Bay Area (BAAQMD)	\$200,000	NA
Coachella Valley Association of Governments	\$200,000	NA
Redwood Coast Energy Authority	~\$200,000	NA
Sacramento Area Council of Governments	\$200,000	\$75,000
San Diego Association of Governments	~\$200,000	\$100,000
San Joaquin Unified Air Pollution Control District	\$200,000	\$75,000
City of Mt. Shasta	\$200,000	NA
South Coast Association of Governments	\$200,000	\$300,000
Ventura County Air Pollution Control District	\$200,000	\$50,000



# NREL Assessment

- *First statewide analytical framework for EVSE infrastructure*
- *The Assessment establishes a framework for how to achieve the ZEV Action Plan Goal of EVSE Deployment Sufficient to support 1.0 Million ZEVs by 2020*



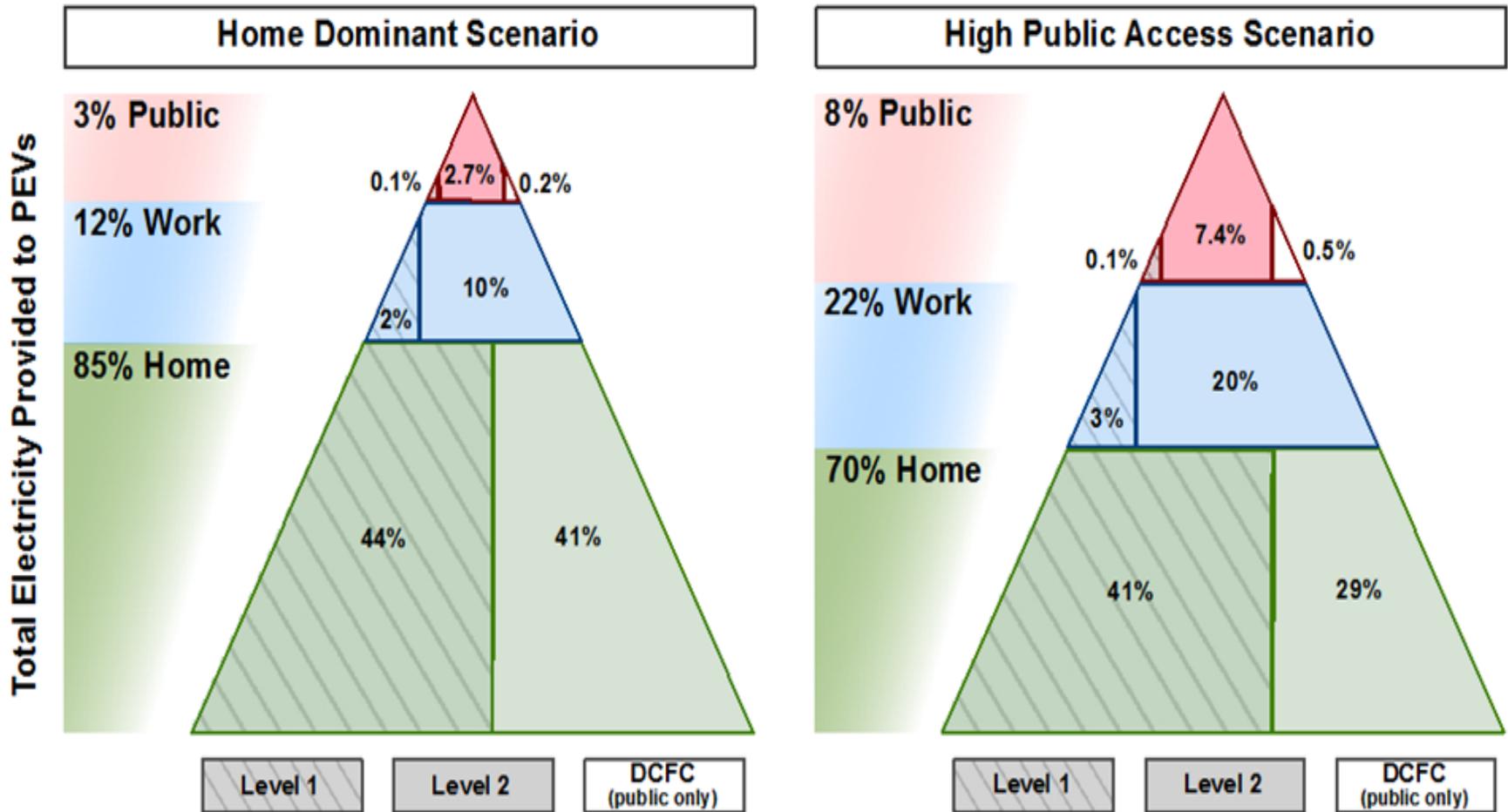
Estimates quantities, levels and geographic distribution of chargers needed in 2020 across 2 scenarios: HOME DOMINANT and HIGH PUBLIC ACCESS

	Total Statewide EVSE Charge Points by Location and Type (2020)						
Scenario	L1 Home	L2 Home	L1 Work	L2 Work	L1 Public	L2 Public	DCFC
Home Dominant	511,000	365,000	20,100	82,000	1,620	20,100	551
High Public Access	517,000	289,000	22,900	144,000	2,100	46,500	1,550



# Distribution of kWh by EVSE Type

*Most charging is still done at home in both scenarios*





## California's 2010-2012 PEV Infrastructure Funding in San Diego, Los Angeles, Sacramento and Bay Area

- Partnered with Federal ARRA Stimulus Grants: EV Project and “Charge America” (PON -08-010)
- Awarded over \$16 million in grants for over 4,200 charge points to ECOtality, Coulomb, Clipper Creek, Association of Bay Area Governments, Southern California Collaborative and others
- Additional awards for \$7.5 million for residential, workplace, fleets and DC fast charger demonstrations (PON-11-602)





## Continued Support of Emerging PEV Market

➤ **\$11.4 million solicitation** for charging infrastructure with awards for 871 chargers—including 75 DC fast chargers –PON-13-606 (April 2014)

- **A New Approach:**

Applicants were primarily public entities that were required to coordinate EVSE deployment with Regional PEV Infrastructure Plans.

- **Solicitation oversubscribed by 2.5 times**

➤ **Development of Statewide PEV Infrastructure Assessment with NREL**

➤ **Coordination with PEV Planning Regions, Clean Cities and other local agencies**

➤ **Allocation of \$15 million for charging infrastructure in the 2014-2015 ARFVTP Investment Plan and \$18 million proposed in the 2015-2016 Plan.**

➤ **Research on Battery Second Use and Recycling and Vehicle to Grid**



# PON-13-606 Maximum Award Amount and Funding Caps

Category Number	Categories	Minimum Requested Amount	Maximum Award	Total Funding Available
I	Any single or combination of: Destination Charging Corridor Charging Workplace Charging with Public Access	\$50,000 per <u>Application</u>	\$500,000 per <u>Applicant</u>	\$4 million
II	Workplace Charging without Public Access	\$50,000 per <u>Application</u>	\$200,000 per <u>Applicant</u>	\$1 million
III	Rental MUDs	\$10,000 per <u>Application</u>	\$50,000 per <u>Applicant</u>	\$100,000
IV	Occupant Owned MUDs	\$50,000 per <u>Application</u>	\$300,000 per <u>Applicant</u>	\$900,000

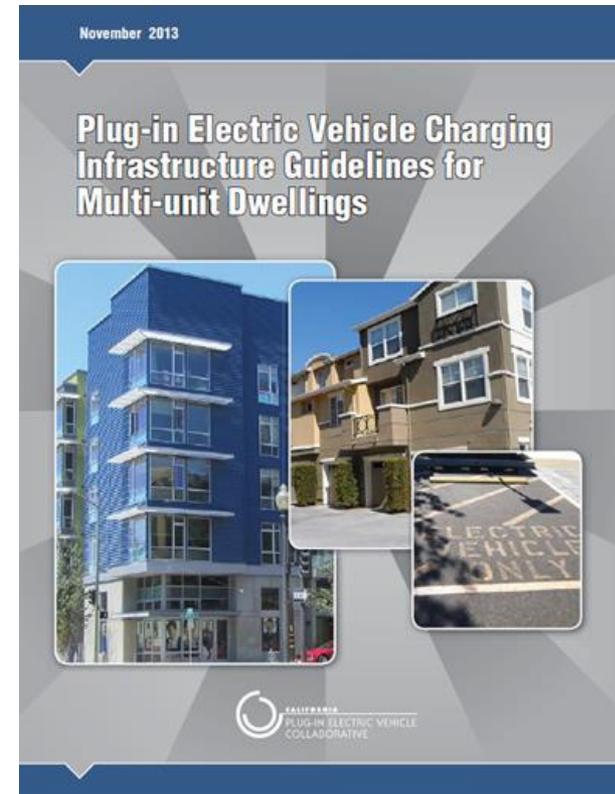
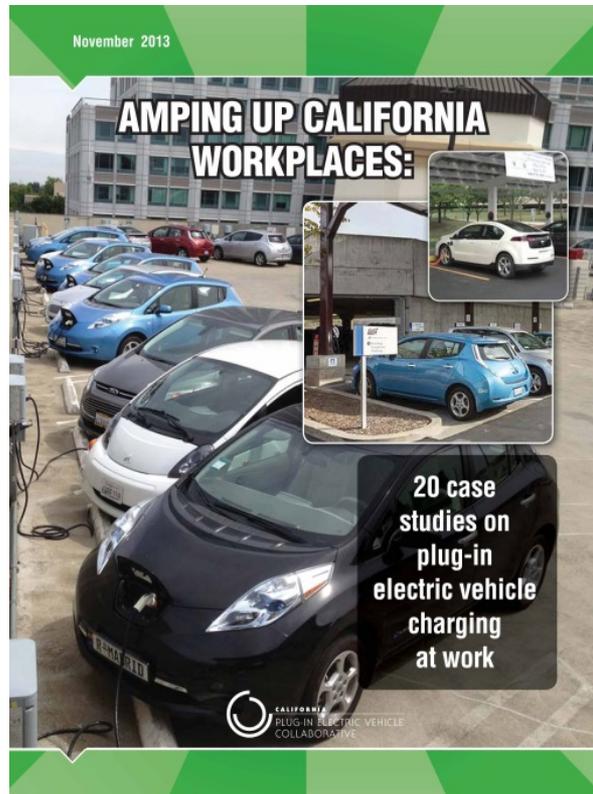


## PON-13-606 EV Charging Infrastructure at Destinations

- 30+ Level 2 EVCS at Airports
- 20+ Level 2 EVCS at Colleges/Universities
- 70+ Level 2 EVCS at Hospitals
  
- 50+ Level 2 EVCS, 20+ DC Fast Chargers at Regional and State Parks in California
  
- Over 75 DC Fast Chargers Statewide at Airports, Hotels along major corridors, Grocery Stores, Retail Locations, Parks and Libraries Statewide



# PEV Collaborative Working Groups





## Multi-Unit Dwelling Challenges

- Cost
- Availability of power supply
- Proximity to metering equipment
- Physical limitations
- Parking issues
- HOA requirements
- Allocation of charging costs
- Complexity of decision-making





## Workplace Charging Challenges

- Cost of installation
- Cost of equipment
- Congestion
- Charger expansion





## CALIFORNIA ELECTRIC VEHICLE FAST CHARGING STATIONS



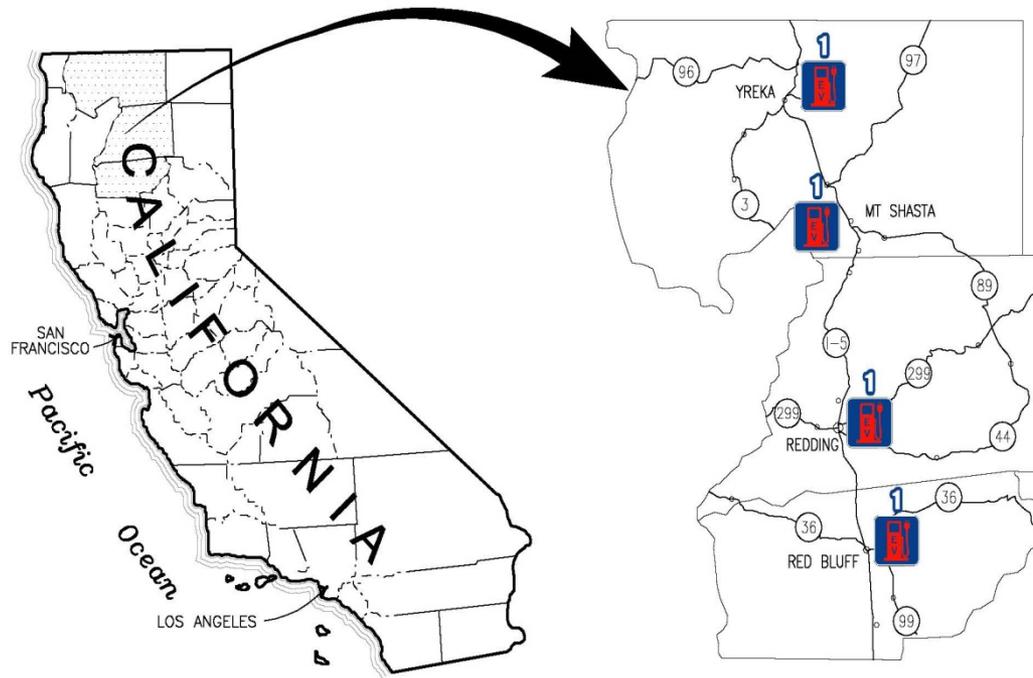


## DC Fast Chargers on Highway Corridors: Challenges

- Siting and site host availability
- Costs and business case
- Power upgrades and impact on local transformer
- Permits
- Demand charges



# Upstate Region DC Fast Charger Gap



Source: Upstate Planning Region



## Resources

- Governor's 2013 ZEV Action Plan  
[http://opr.ca.gov/docs/Governor's\\_Office\\_ZEV\\_Action\\_Plan\\_\(02-13\).pdf](http://opr.ca.gov/docs/Governor's_Office_ZEV_Action_Plan_(02-13).pdf)
- Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP)  
<http://www.energy.ca.gov/2014-ALT-01/>
- Draft 2014 Integrated Energy Policy Report Update  
[http://www.energy.ca.gov/2014\\_energypolicy/](http://www.energy.ca.gov/2014_energypolicy/)
- California Air Resources Board  
<http://www.DriveClean.ca.gov/PEV>



## Resources (continued)

- Energy Commission ZEV Action Plan Implementation: California Statewide Plug-in Electric Vehicle Infrastructure Assessment  
<http://www.energy.ca.gov/2013-ALT-01/documents/index.html>
- Previous Electric Vehicle Charging Infrastructure Solicitation  
<http://www.energy.ca.gov/contracts/transportation.html#PON-13-606>
- PEV Collaborative Statewide and Regional PEV Readiness Reports  
<http://www.evcollaborative.org/pev-readiness-reports>



## Public Comment

- Public Comment Open
- Written comments by **3:00 p.m. on February 16, 2015.**

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*Indicate “EV Infrastructure Workshop” in the subject line.*

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