

## DOCKETED

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|-------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>Docket Number:</b>   | 15-MISC-04                                                                                                |
| <b>Project Title:</b>   | Fuels and Transportation Merit Review                                                                     |
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| <b>Document Title:</b>  | Presentation California Energy Commission Investments and Strategies                                      |
| <b>Description:</b>     | Electric Vehicle Charging Infrastructure EV Merit Review, April 25, 2016 -<br>By CEC Staff Leslie Baroody |
| <b>Filer:</b>           | Tami Haas                                                                                                 |
| <b>Organization:</b>    | California Energy Commission                                                                              |
| <b>Submitter Role:</b>  | Commission Staff                                                                                          |
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CALIFORNIA ENERGY COMMISSION

# California Energy Commission Investments and Strategies: Electric Vehicle Charging Infrastructure EV Merit Review April 25, 2016



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# 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, and 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))



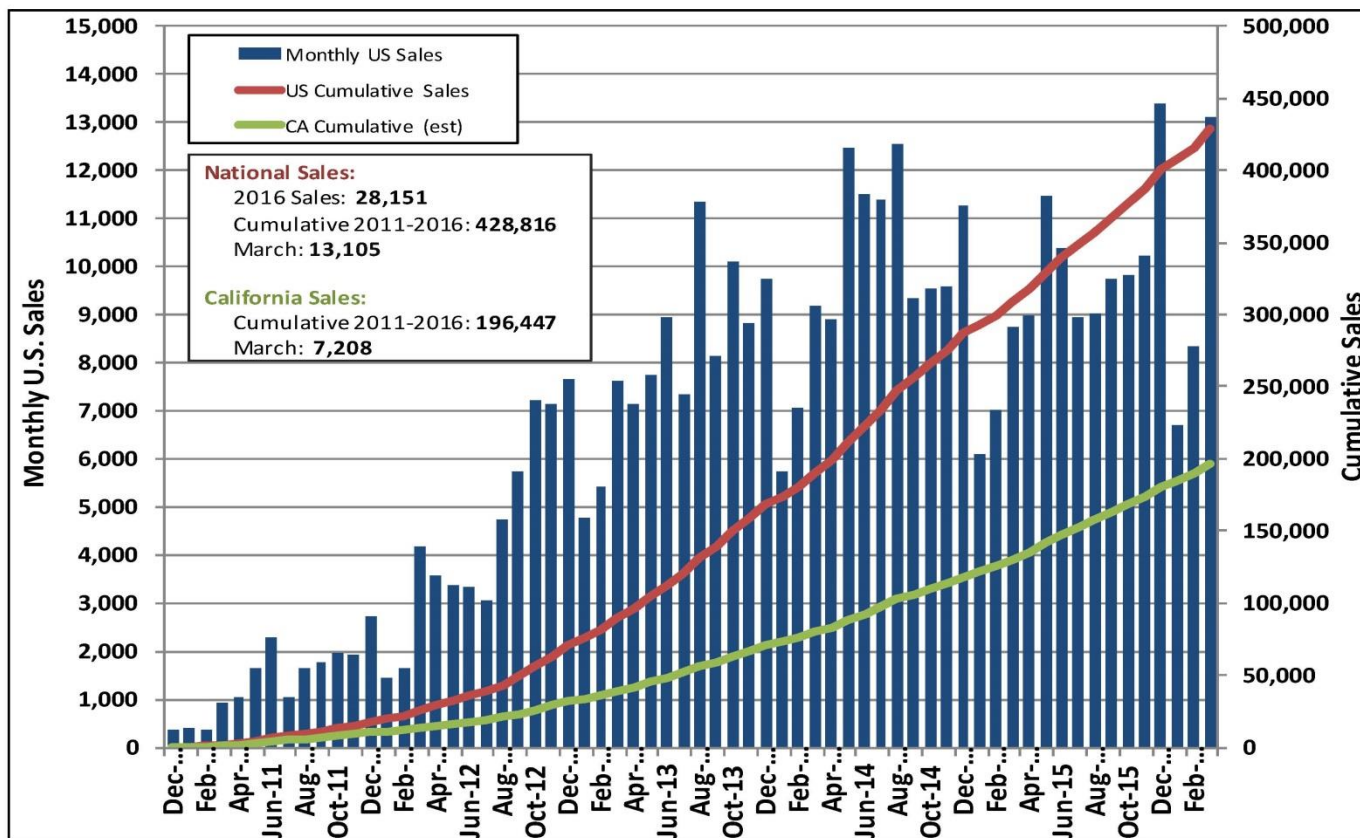
## California's Key ZEV-Related Policies and Regulations

| Policy Objectives               | Policy Origin                                             | Goals and Milestones                                                                                                                  |
|---------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Greenhouse Gas Reduction        | AB 32, Executive Order S-3-05 and Executive Order B-30-15 | Reduce greenhouse gas emissions to 1990 levels by 2020, 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050 in California |
| Petroleum Reduction             | Governor's Executive Order B-32-15                        | Governor's new target of 50% reduction for cars and trucks by 2030 and creation of Sustainable Freight Action Plan by July 2016       |
| Low Carbon Fuel Standard        | AB 32, California Global Warming Solutions Act            | 10% reduction in carbon intensity of transportation fuels in California by 2020                                                       |
| Air Quality                     | Clean Air Act                                             | 80% reduction in NOx from current levels by 2023                                                                                      |
| Renewables Portfolio Standard   | Executive Order S-21-09 and SB X1-2, and SB 350           | Goal of 33% renewable electricity generation by 2020 and 50% by 2030                                                                  |
| ZEV Mandate                     | California Executive Order B-16-2012                      | Accommodate 1 million ZEVs by 2020 and 1.5 million by 2025 in California                                                              |
| Integrated Energy Policy Report | SB 1389 (2002)                                            | 2014 IEPR: Chapter 3 recommendations for EV infrastructure deployment                                                                 |



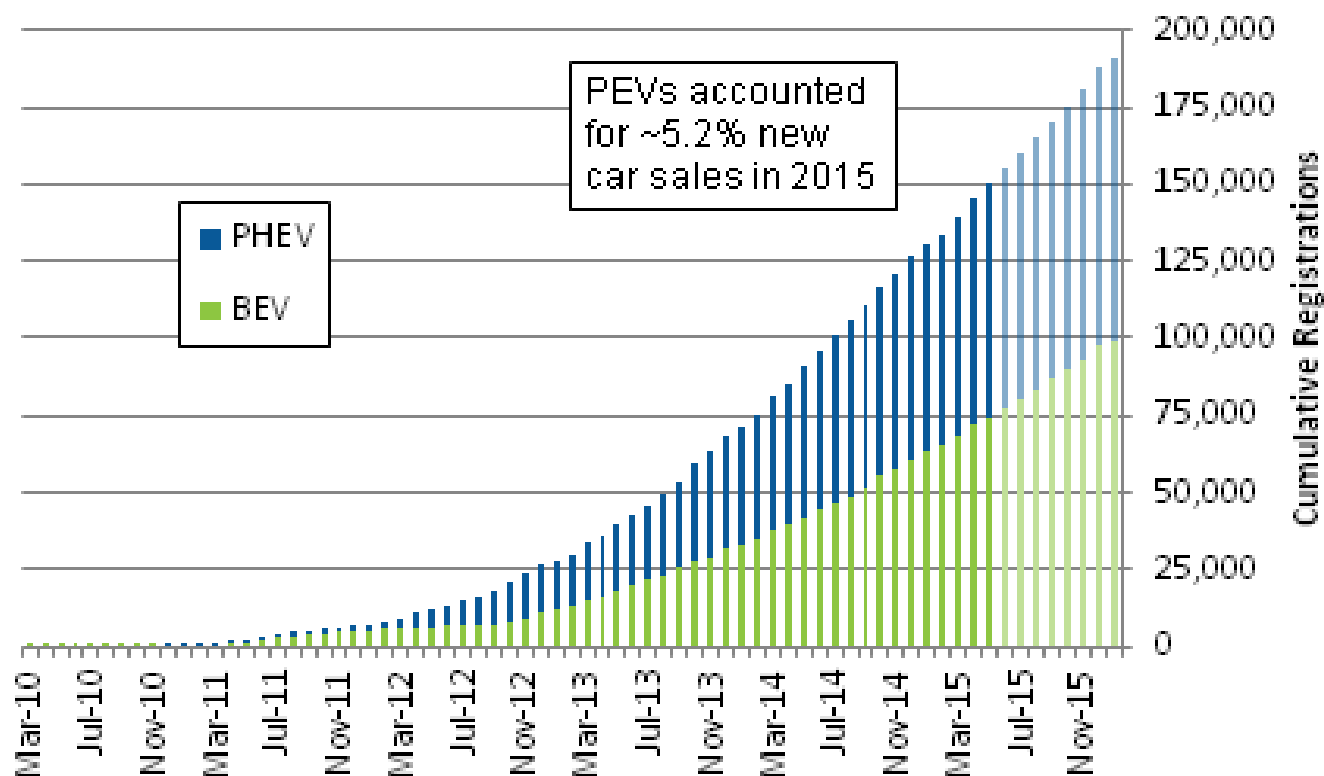
# March 2016

## Plug-in Electric Vehicle Sales





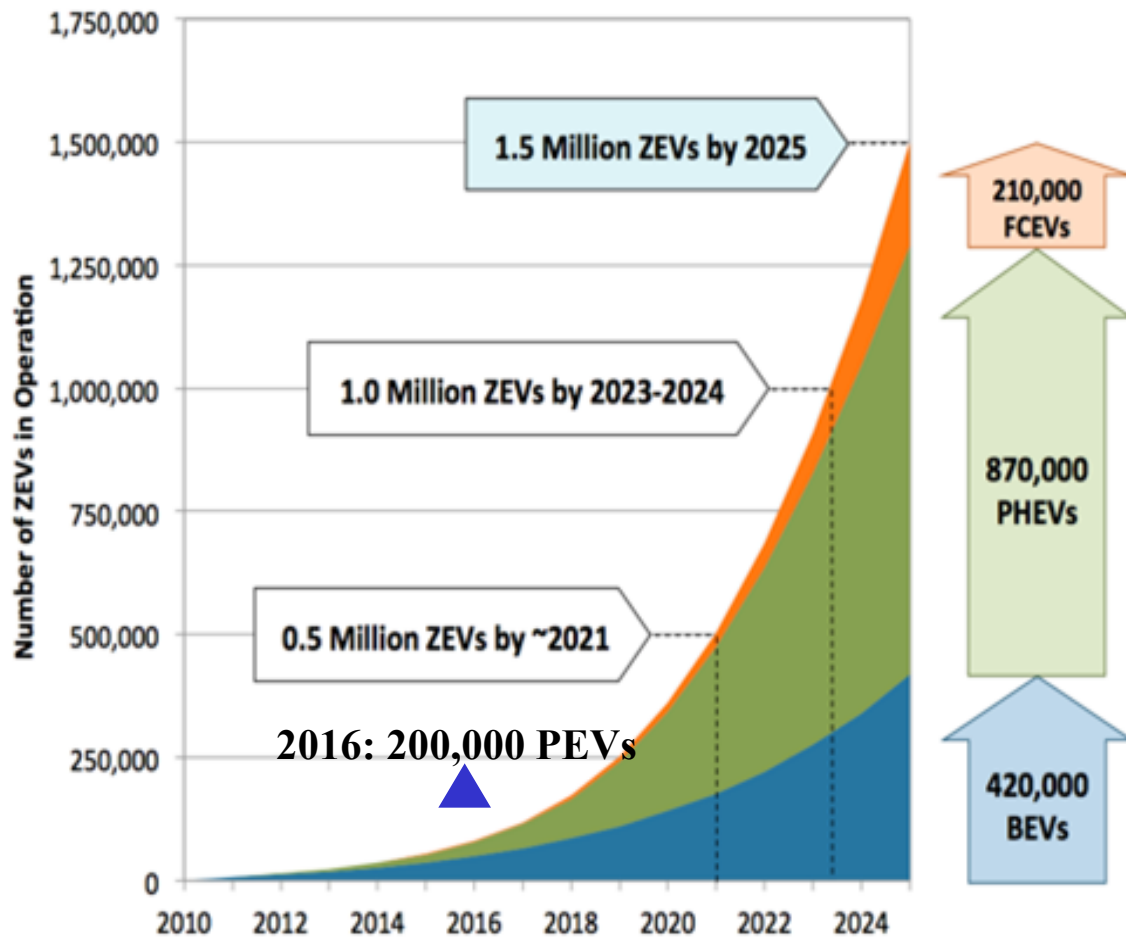
## Cumulative PEV Sales\* by Vehicle Category: CA





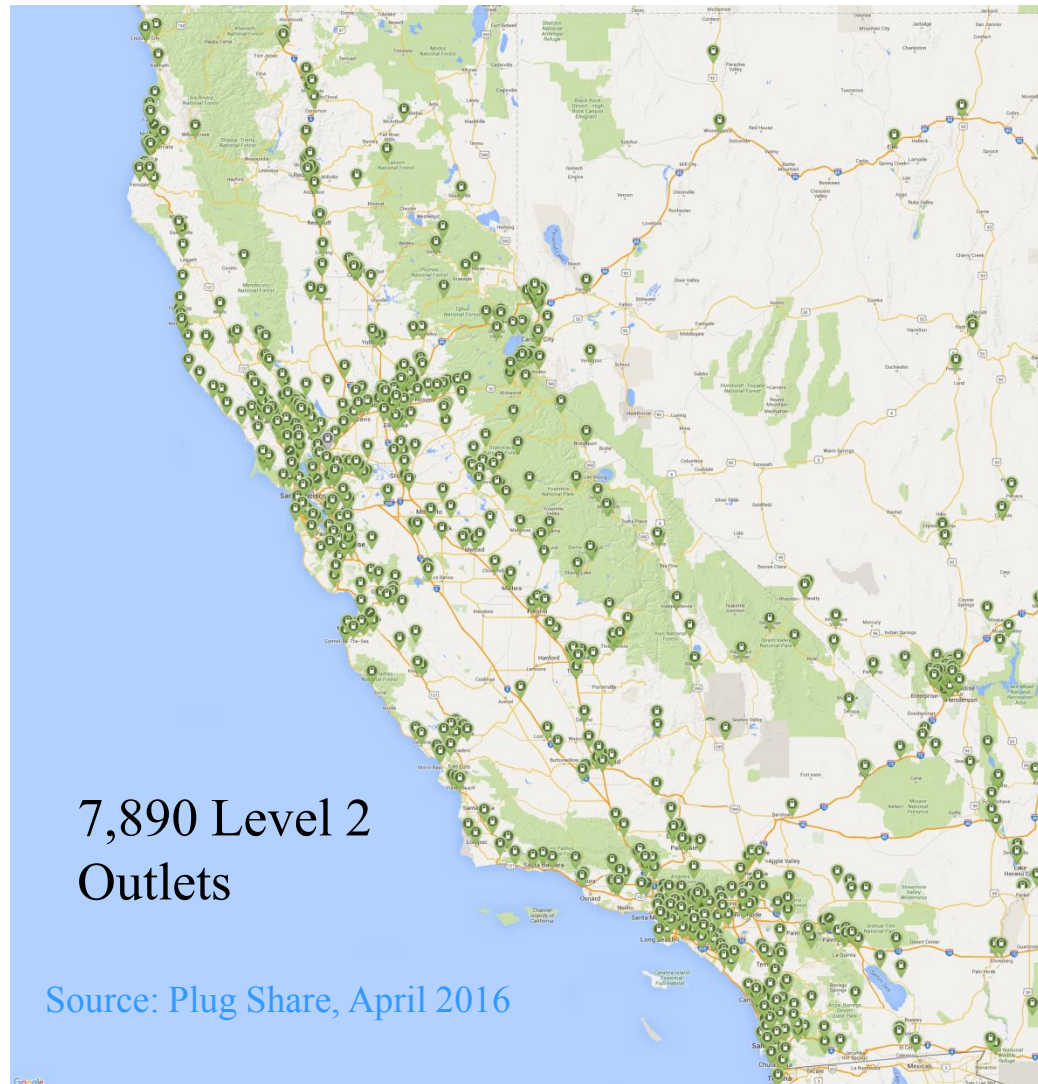
# Zero-Emission Vehicles by 2025

Air Resources Board Compliance Vision Model





# Existing Level 2 Charging Stations

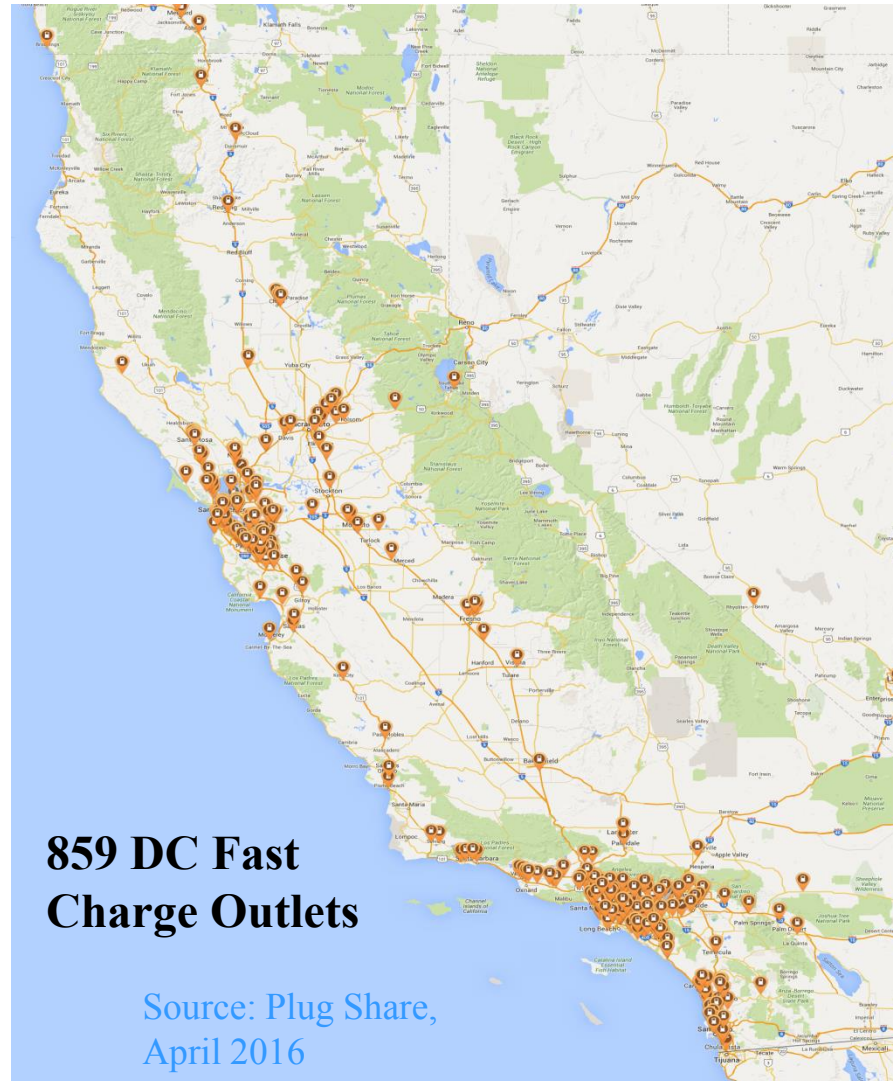


7,890 Level 2  
Outlets

Source: Plug Share, April 2016



# Existing DC Fast Chargers



**859 DC Fast  
Charge Outlets**

Source: Plug Share,  
April 2016



## Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) Electric Vehicle Support

| Charging Connectors | Residential  | Multi-unit Dwelling | Commercial   | Workplace  | Fleet      | DC Fast Chargers | Total        |
|---------------------|--------------|---------------------|--------------|------------|------------|------------------|--------------|
| Installed           | 3,937        | 178                 | 2,039        | 189        | 100        | 43               | 6,486        |
| Planned             | -            | 167                 | 1,415        | 236        | 36         | 199              | 2,053        |
| Other               |              |                     |              | 209        |            |                  | 209          |
| <b>Total</b>        | <b>3,937</b> | <b>345</b>          | <b>3,454</b> | <b>634</b> | <b>136</b> | <b>242</b>       | <b>8,748</b> |



### Charging Infrastructure

Grants: \$49.5 M

Plus 34 ZEV Regional Readiness

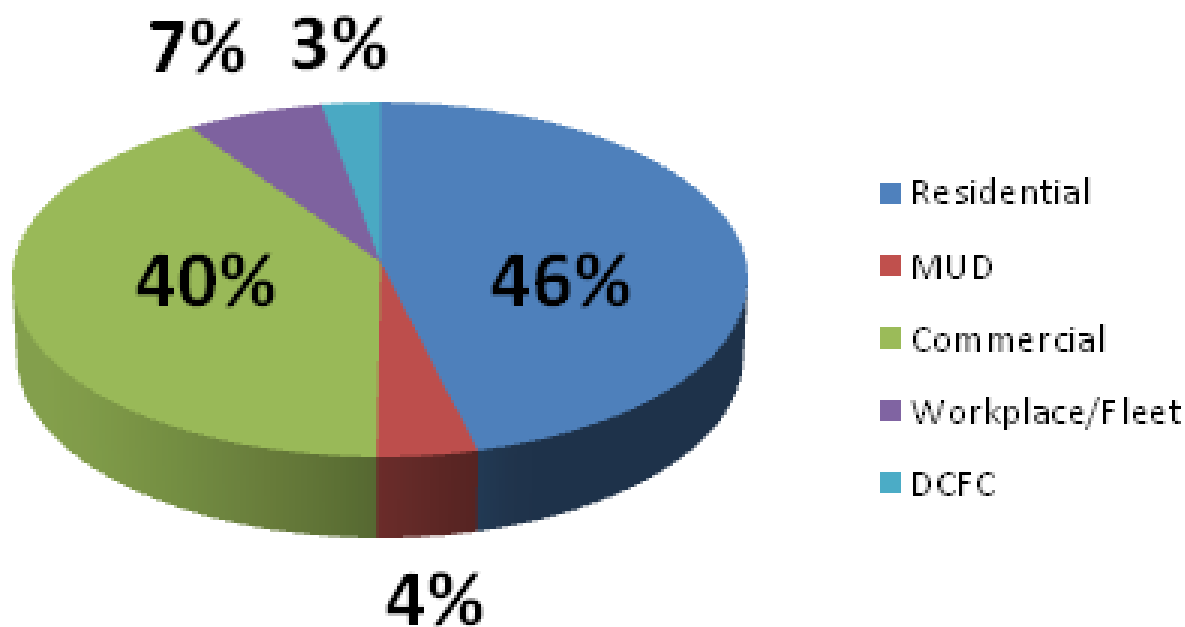
Planning Grants: \$7.6 M

CPCFA Loan-Loss

Reserve Program: \$2 M



## Energy Commission Funded EV Charger Connectors by Category





## Estimated Ratios of PEVs to ARFVTP-funded Charging Connectors – 2015 vs. 2020

Assuming steady continuation of \$17 million ARFVTP investments and charger types through 2020...

|                                       | 2015    | 2020    |
|---------------------------------------|---------|---------|
| Estimated # of PEVs                   | 185,000 | 950,000 |
| <b># of PEVs per ARFVTP-funded...</b> |         |         |
| ... DC Fast Charger Connection        | 1,542   | 1,944   |
| ... Workplace/Fleet Connection        | 292     | 603     |
| ... Commercial Connection             | 54      | 111     |
| ... MUD Connection                    | 536     | 1,109   |
| ... Residential Connection*           | 47      | 241     |

\* Assuming no added ARFVTP funding for single family residential chargers.



# History of Energy Commission EV Charging Infrastructure Deployment



## Phase 1: Partnering with Federal ARRA Grants (2010)

- EV Project and Charge America in Major Metro areas
- Focus on single family homes with a garage and public charging



## Phase 2: Funding for EV infrastructure providers (2013)

- Low cost sites in metro areas
- Upgrades to legacy chargers



## Phase 3: Funding for Public Agencies (2014)

- Coordination with Regional PEV Plans
- Broader geographic locations and corridors

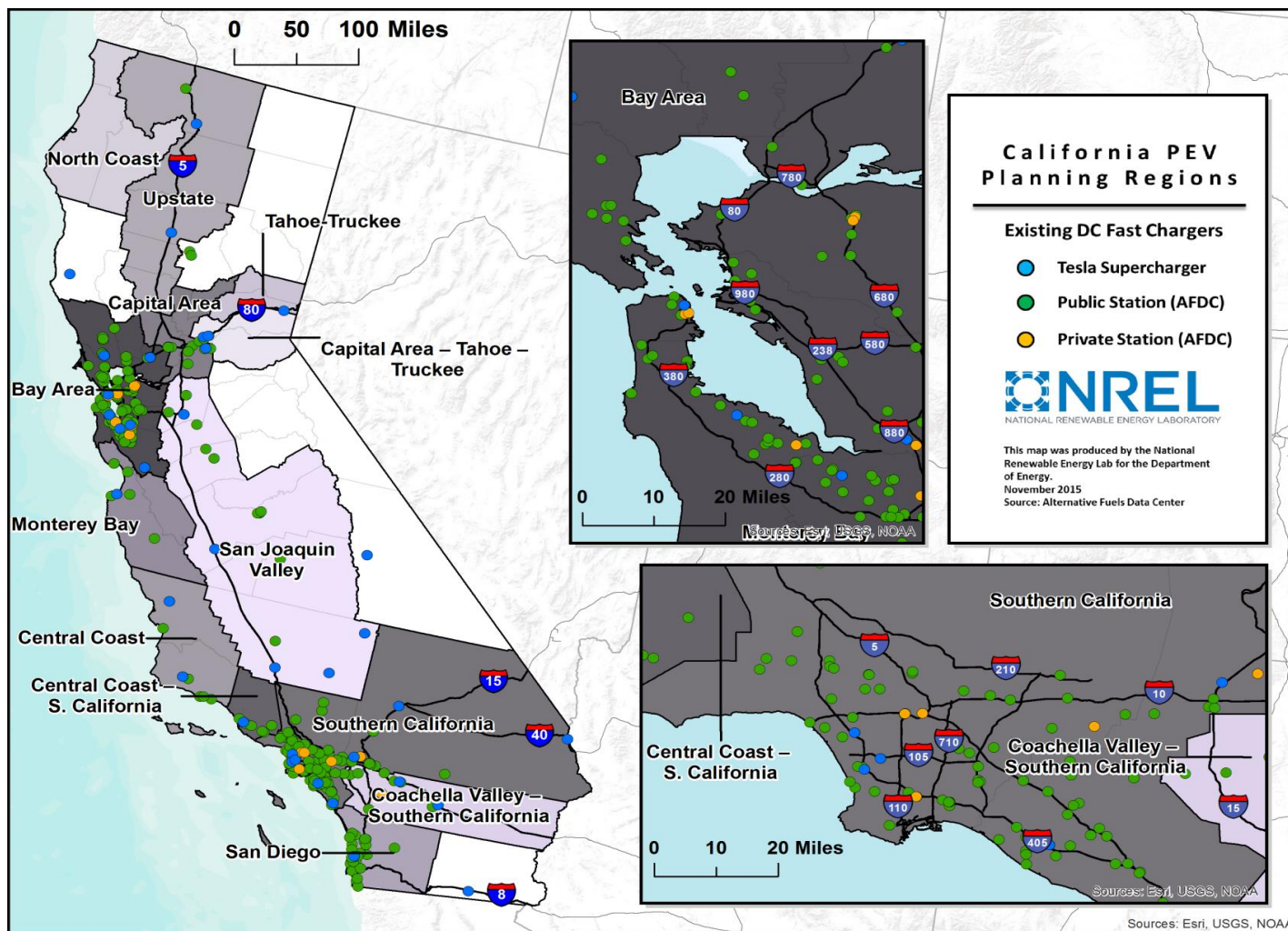


## Phase 4: Funding for Targeted Corridor Charging (2015)

- Specific corridor segments to complete West Coast Electric Hwy
- Coordination with regional PEV plans and “uptime” requirements



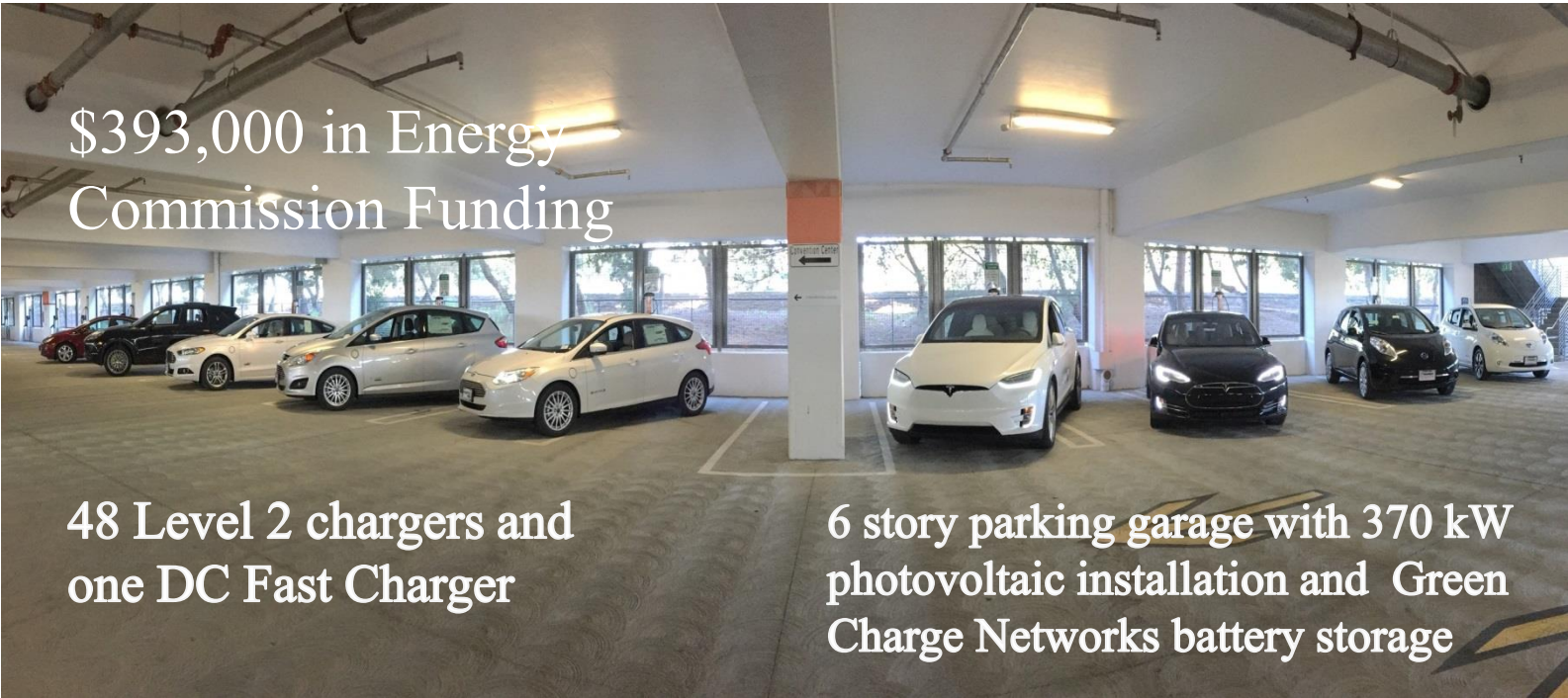
# Regional PEV Readiness Plans





# Santa Clara EV Charging Center

Tasman Garage Near Levi Stadium and Great America



\$393,000 in Energy  
Commission Funding

48 Level 2 chargers and  
one DC Fast Charger

6 story parking garage with 370 kW  
photovoltaic installation and Green  
Charge Networks battery storage



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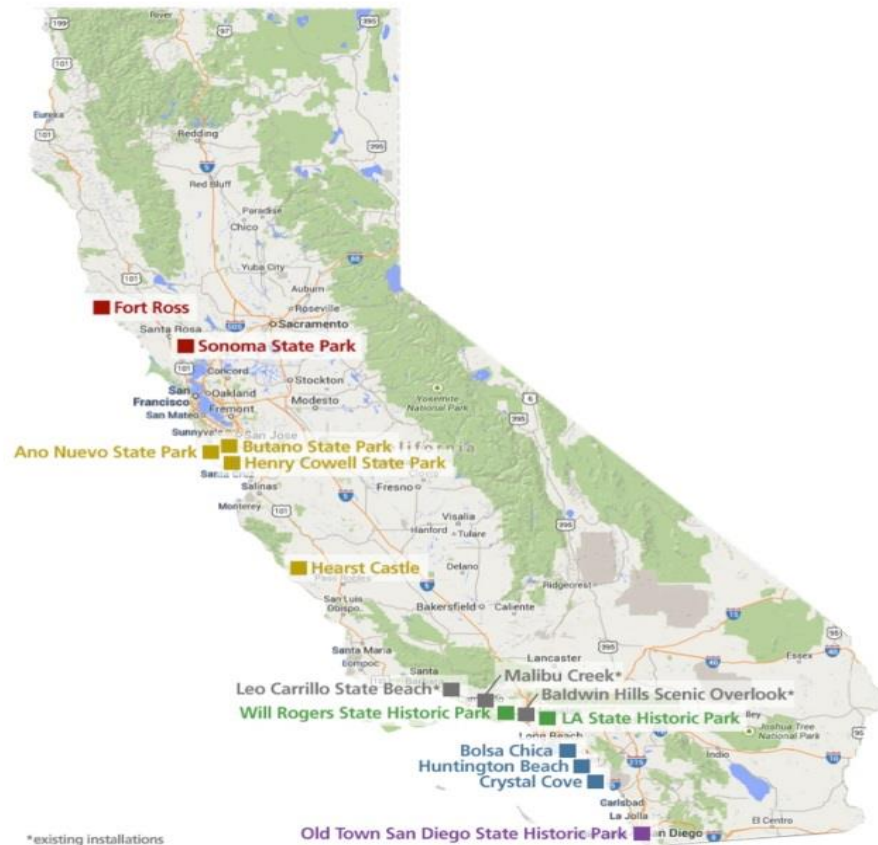


CSU  
Fresno  
DC Fast  
Charger &  
Level 2





# ARFVTP Funding for State Parks in Partnership with “Adopt-A-Charger”



\*existing installations



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## New Charging Model

### City of Burbank 8 Curbside Level 2 Chargers





## GFO-15-601 Sites

- 41 Sites
  - Interstate-5: 22 sites
  - Highway 99: 11 sites
  - US 101: 8 sites
- 61 DC Fast Chargers
- 42 Level 2 chargers

Source: Energy Commission Staff Analysis, PlugShare.com, US Department of Energy Alternative Fuels Data Center



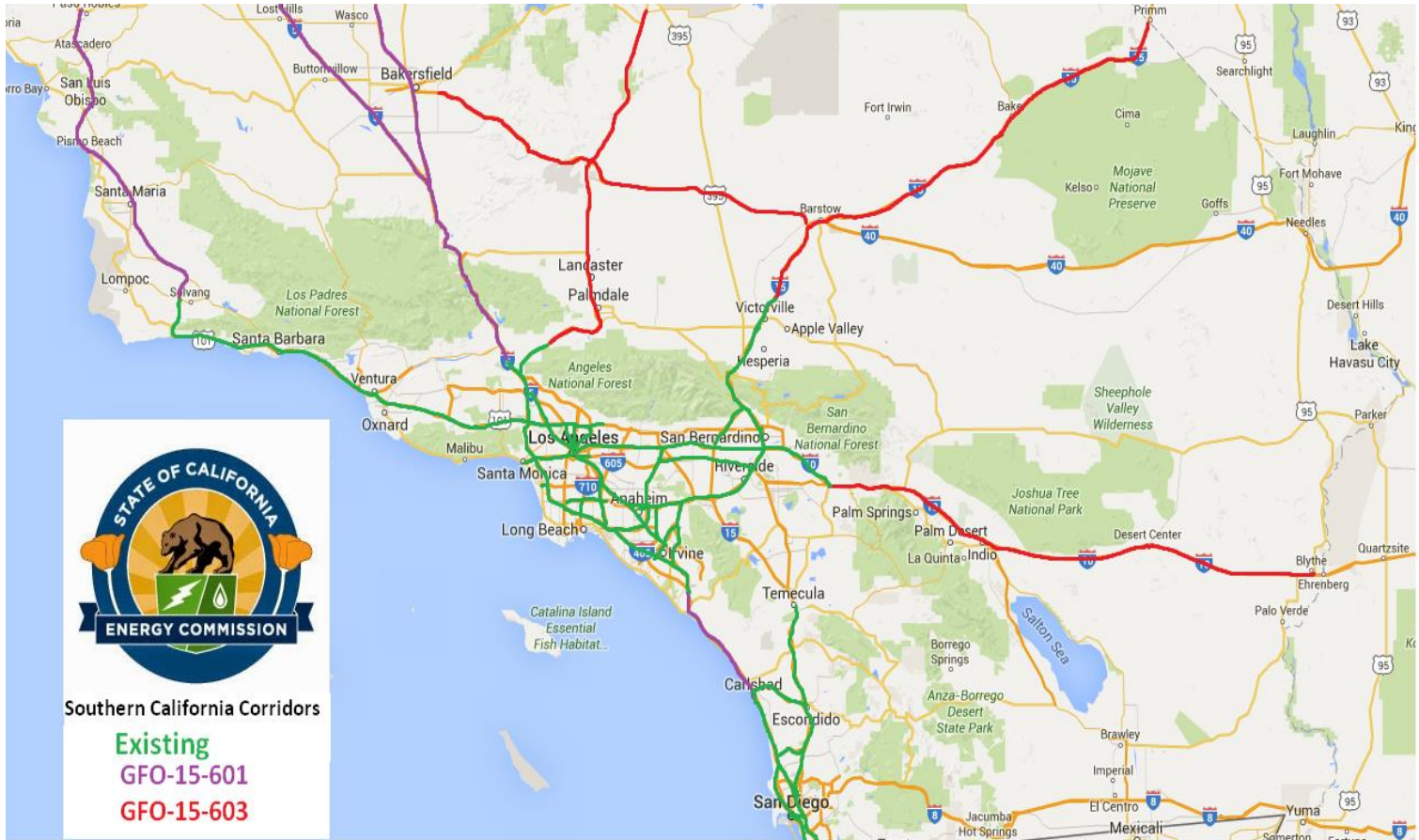


## Central and Northern California DC Fast Charge Corridors: Grant Funding Opportunity 15-601 and 15-603





## Southern California DC Fast Charger Corridors : Grant Funding Opportunity 15-601 and 15-603





## Some Lessons Learned from DOE EV Project



### Majority of charging done at home and work

- Half charged at home exclusively
- Half charged away from home less than 5% of the time
- Of those that charged away from home 3 or fewer spots favored



### Demand for DC fast chargers and Level 2 chargers were high in certain “hot spots”

- Factors influencing popularity of “hot spots” are community -specific
- DC fast chargers along corridors had higher use



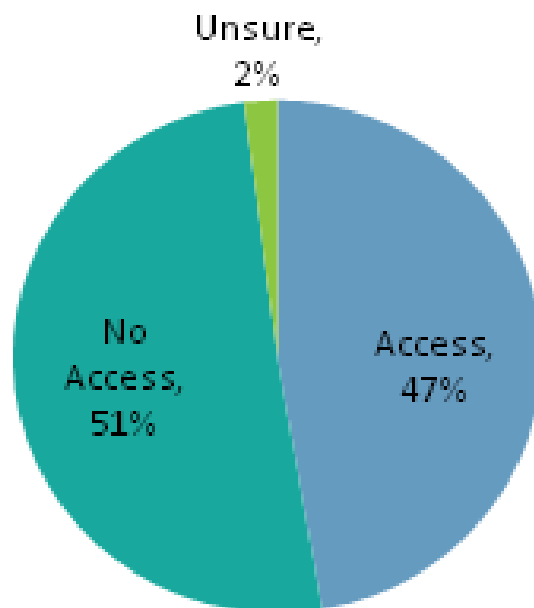
### Workplace charging was useful for those with access

- 98% of charging events were performed at home and work on work days
- Workplace charging extended range of EV drivers
- 30% of drivers only charged at work on most days



## Access to Workplace Charging

### Access to Workplace Charging



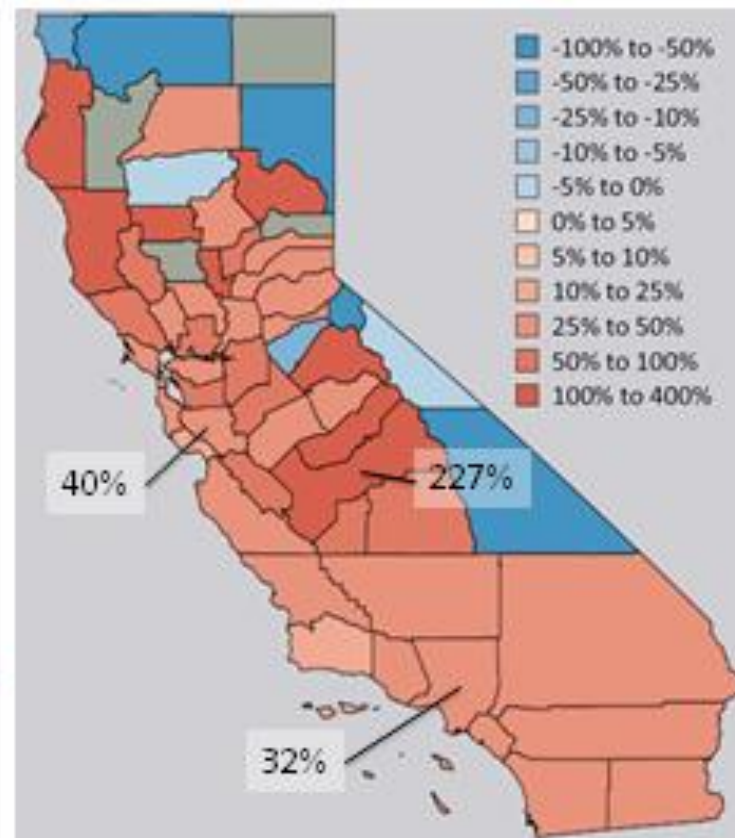
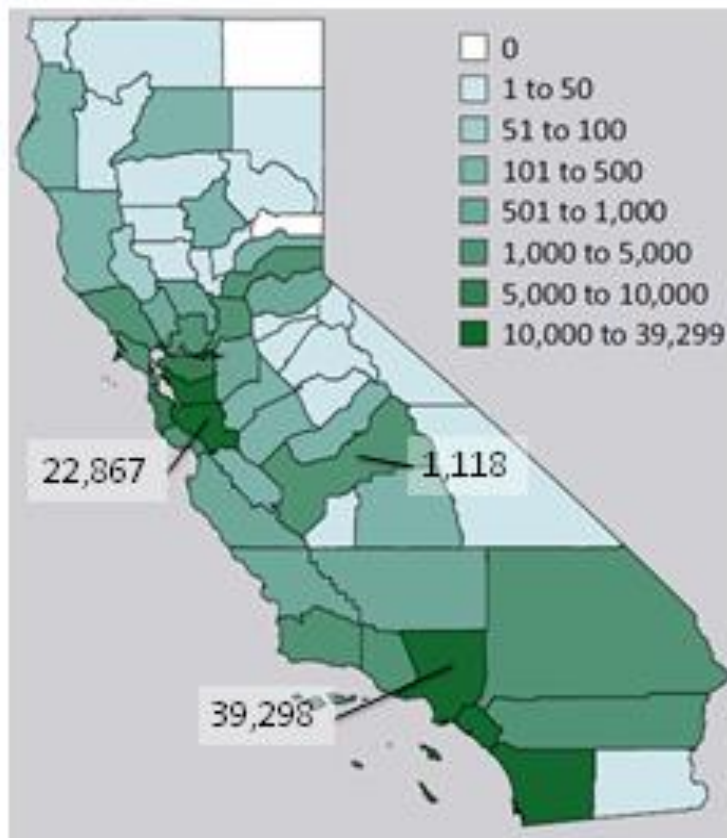
Total Responses: 15,654 (weighted)  
Collection Time Frame: 9/1/2012–5/31/2015

37% of respondents  
said access to  
workplace charging was  
very or extremely  
important in their  
decision to acquire a  
PEV

Total Responses: 17,369 (weighted)  
Collection Time Frame: 9/1/2012–5/31/2015



## ZEV Registrations by County (thru May 2015) & Growth (2013 to 2014)





## Energy Commission to partner with NREL on charging station data

- NREL tracks all networked public station data in California
- Energy Commission is working with NREL to gather data that will help inform EV charger deployment
- Energy Commission goal is to be able to collect data directly from CEC projects





## **NREL's Statewide PEV Infrastructure Assessment Revision (05/2016-12/2016)**

- Infrastructure Systems Analysis Group at NREL will revise their PEV Infrastructure Assessment Model by using updated PEV market data and real-world travel behavior characteristics of Light-Duty Vehicle drivers in California.
- The revised model will allow the state and local governments flexibility in evaluating outcomes of different PEV market scenarios between 2017 and 2025.



## Energy Commission's Focus

- Gather data to inform charging infrastructure deployment and update NREL EV Infrastructure Assessment
- Rapidly deploy charging infrastructure to target “fast followers” and meet California’s goals
- Choose strategic locations and sites that will spur EV adoption
- Include reliability and uptime of charging stations in funding opportunities in order to maintain California’s network of chargers



## Energy Commission ARFVTP Funding Opportunities

- 2016 Charging Infrastructure Funding: \$6.8 million
- DC Fast Charging for California's Interregional Corridors  
GFO-15-603: \$9.97 million (Applications due June 24, 2016)
- Zero-Emission Vehicle Regional Planning: \$1.9 million
- 2016-2017 ARFVTP Investment Plan:
  - \$17 million
  - \$2 million for regional readiness



# Energy Commission Resources

- The Alternative and Renewable Fuel and Vehicle Technology Program Investment Plan:  
<http://www.energy.ca.gov/2015publications/CEC-600-2015-014/CEC-600-2015-014-SD-REV.pdf>
- Energy Commission grant funding opportunities for transportation:  
<http://www.energy.ca.gov/contracts/transportation.html#GFO-15-603>
- Energy Commission ZEV Action Plan Implementation Activities:  
<http://www.energy.ca.gov/2013-ALT-01/index.html>
- DRIVE website for the Alternative and Renewable Fuel and Vehicle Technology Program: <http://www.energy.ca.gov/drive/index.html>