

## DOCKETED

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# Overview of Energy Commission Strategies to Accelerate Electric Vehicle Charging Infrastructure Investments

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**June 6, 2016**

**Leslie Barood**

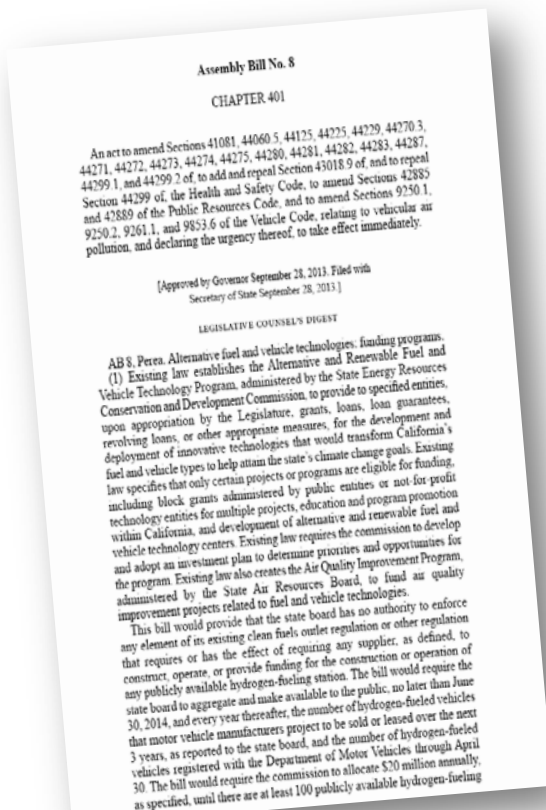
**Zero-Emission Vehicle and Infrastructure Office**

**Fuels and Transportation Division**

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# Assembly Bill 8

Perea, Chapter 401, Statutes of 2013



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))

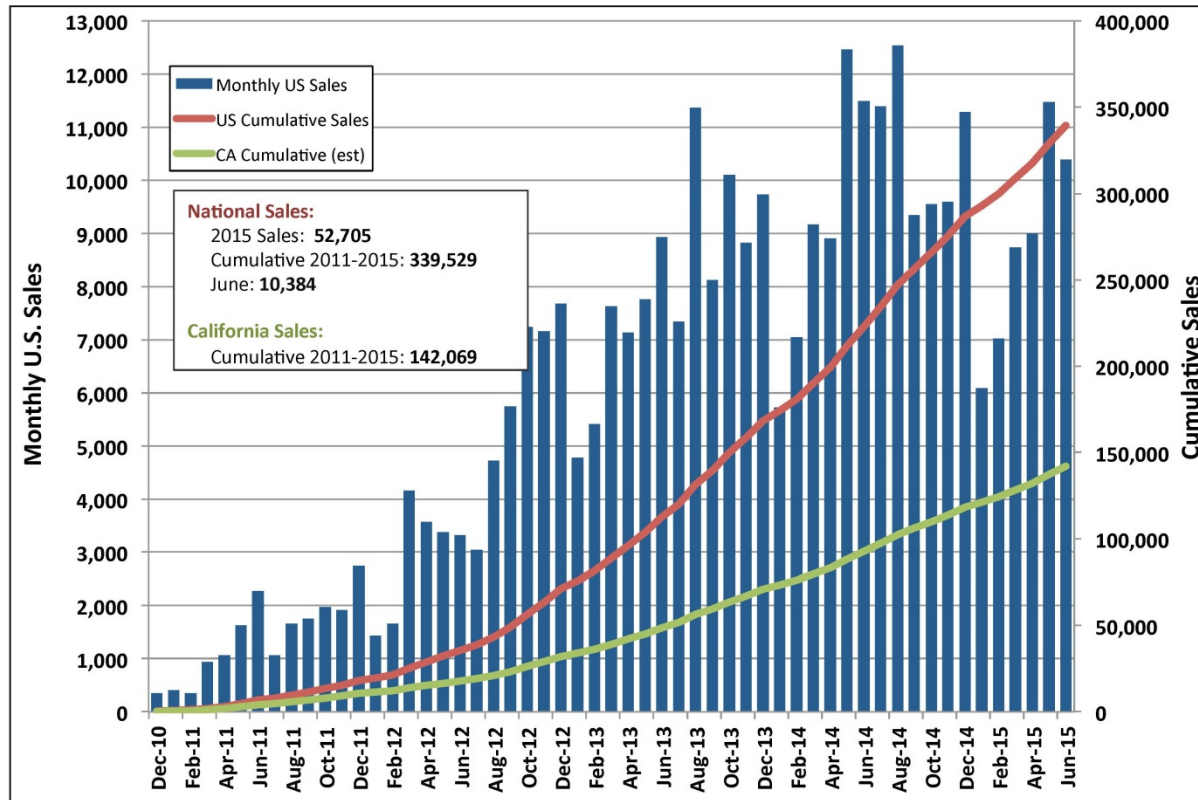


# California's Key ZEV-Related Policies and Regulations

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% petroleum 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



# April 2016 PEV Monthly Sales for California and U.S.



Note: Approximation assumes CA sales are 45% of national sales.  
Reference: [www.hybridcars.com](http://www.hybridcars.com)

7/6/2015



# Pending 200-Mile Range EVs



## Chevy Bolt

- 200 mile range starting at \$37,500 in 2017
- Liquid-cooled 60-kWh LG Chem battery



## Tesla Model 3

200 mile range available in 2017-2018  
\$35,000 starting price



## Nissan Leaf

250 mile-capable battery in testing



## Hyundai Crossover SUV

200-mile EV by 2018



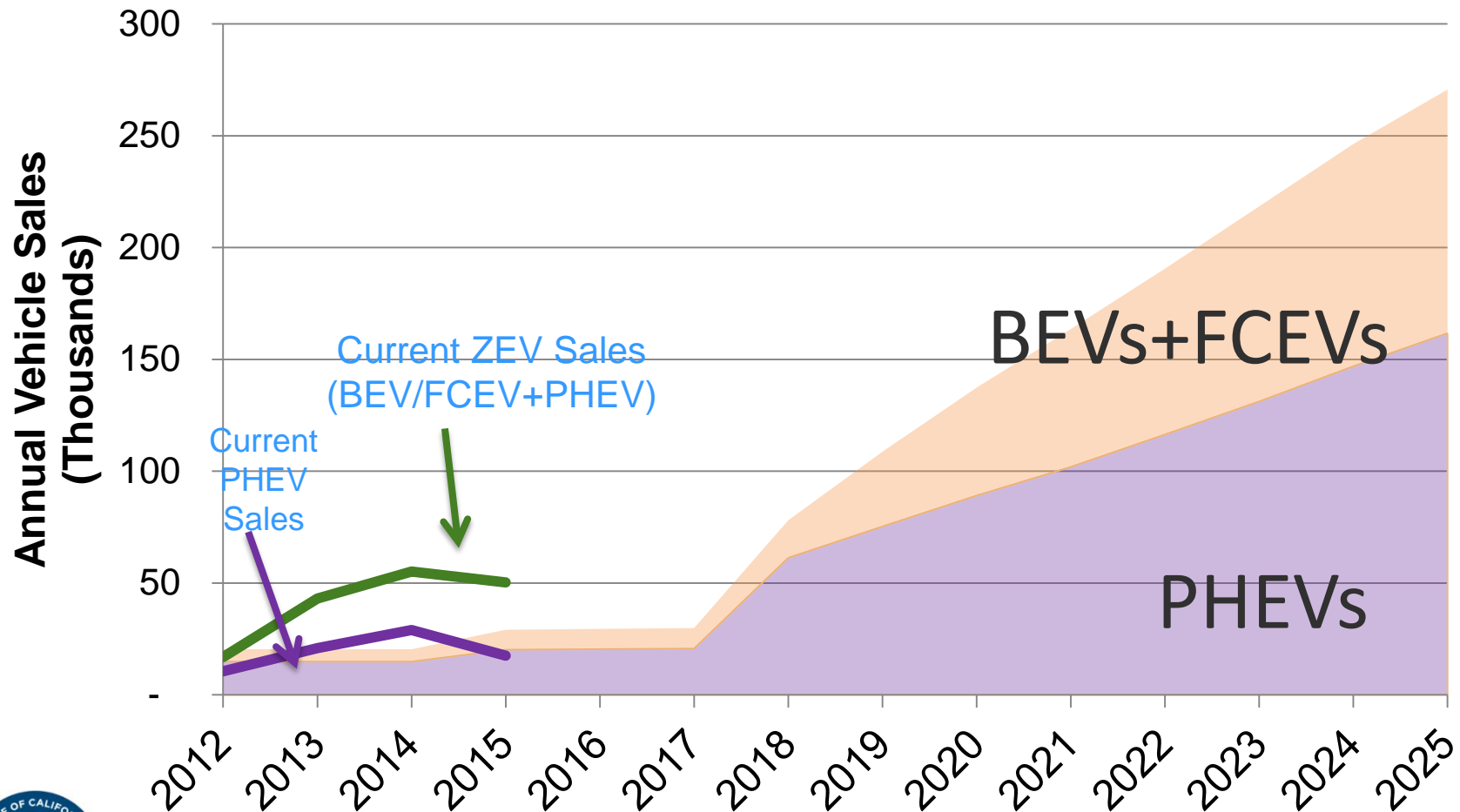
## Ford 200 mile range EV

Details forthcoming

Source: HybridCars.com



# ARB ZEV Regulation Likely Compliance Scenario and Current Sales in CA



Source: Air Resources Board



CALIFORNIA ENERGY COMMISSION

BEV = Battery Electric Vehicle, FCEV = Fuel Cell Electric Vehicle,  
PHEV = Plug-in Hybrid Electric Vehicle

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

Charging Connectors	Residential	MuD	Commercial	Other (Commercial & Workplace)	Work- place	Fleet	DC Fast Chargers	Total
Installed	3,937	220	2,018	106	221	100	54	6,656
Planned	-	125	1,174	142	204	36	189	1,870
<b>Total</b>	<b>3,937</b>	<b>345</b>	<b>3,192</b>	<b>248</b>	<b>425</b>	<b>136</b>	<b>243</b>	<b>8,526</b>



Charging Infrastructure

Grants: \$49.5 M

Plus 34 ZEV Regional Readiness

Planning Grants: \$7.6 M

CPCFA Loan-Loss

Reserve Program: \$2 M



# History of Energy Commission EV Charging Infrastructure Deployment



## 2010: Partnering with Federal ARRA Grants

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



## 2013: Funding for EV infrastructure providers

- Low cost sites in metro areas
- Upgrades to legacy chargers—"Up From the Ashes"



## 2014: Funding for Public Agencies

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



## 2015: Funding for Targeted Corridor Charging

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



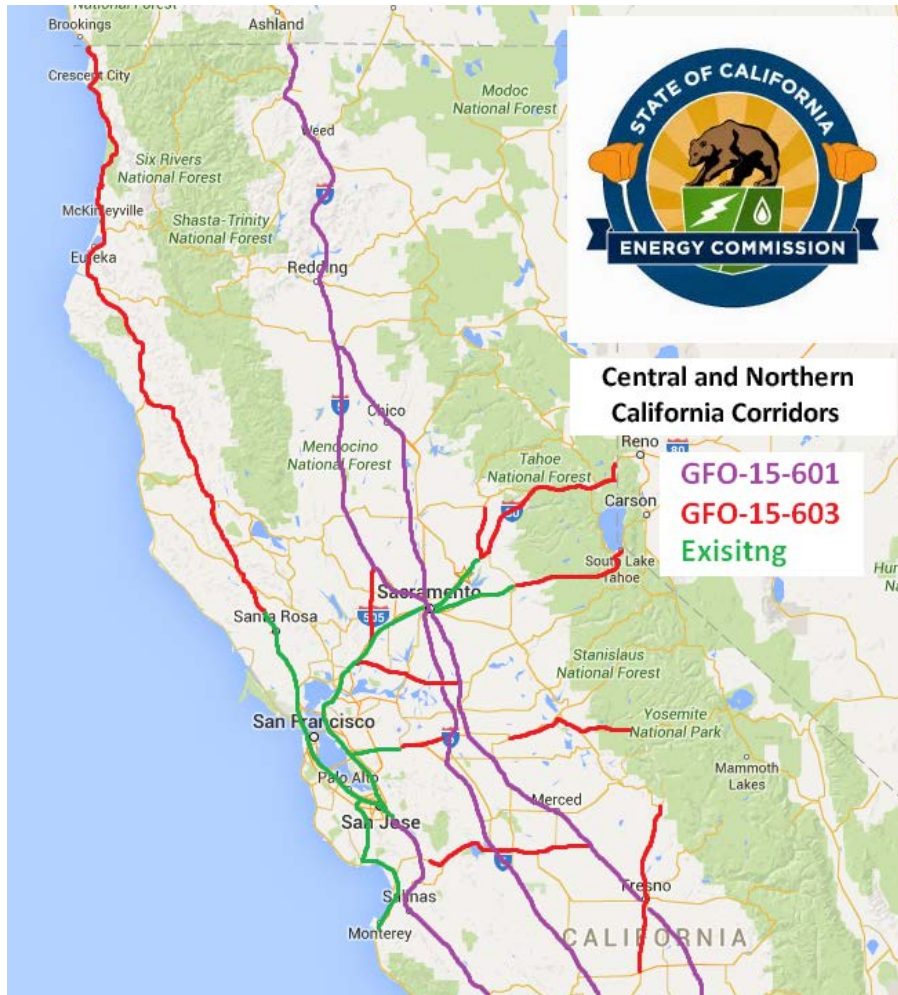
# North-South DC Fast Charger Corridors-- GFO-15-601 Sites

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

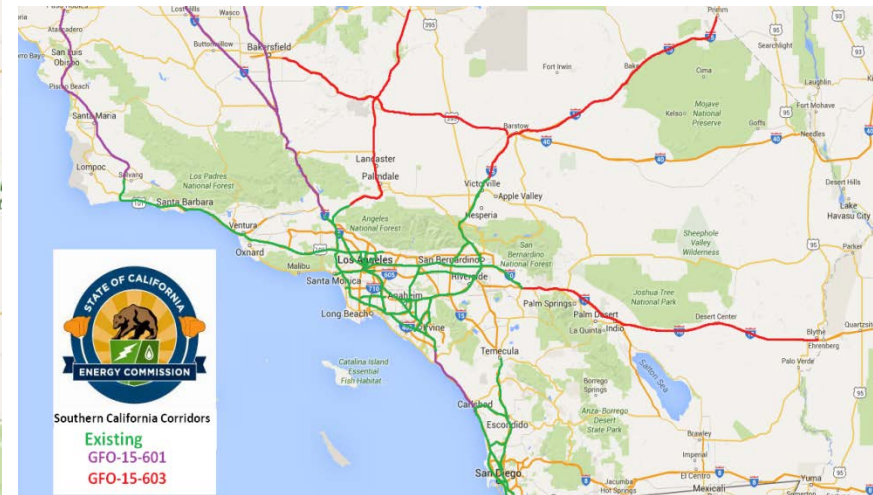
Source: Energy Commission Staff Analysis, PlugShare.com,  
US Department of Energy Alternative Fuels Data Center



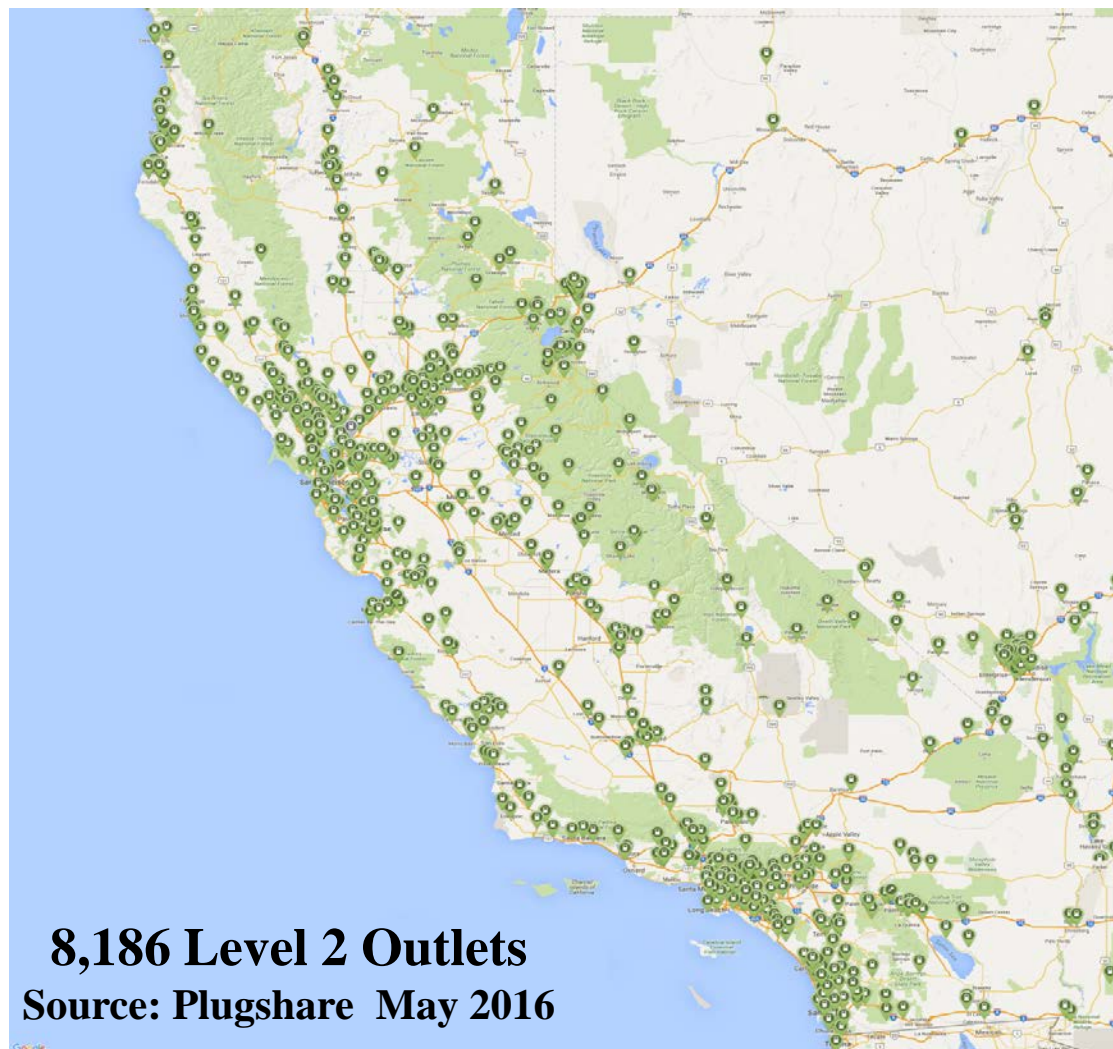
# California DC Fast Charge Corridors: Grant Funding Opportunity 15-601 and 15-603



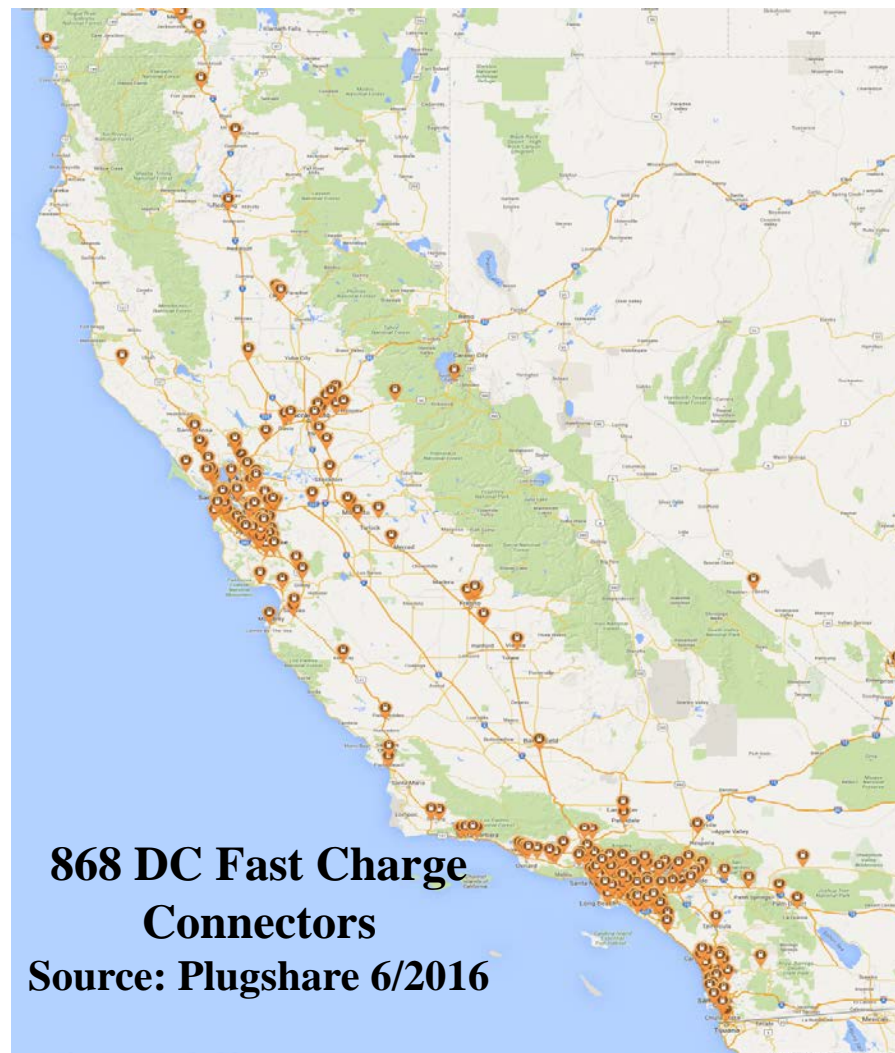
## Southern California Corridors



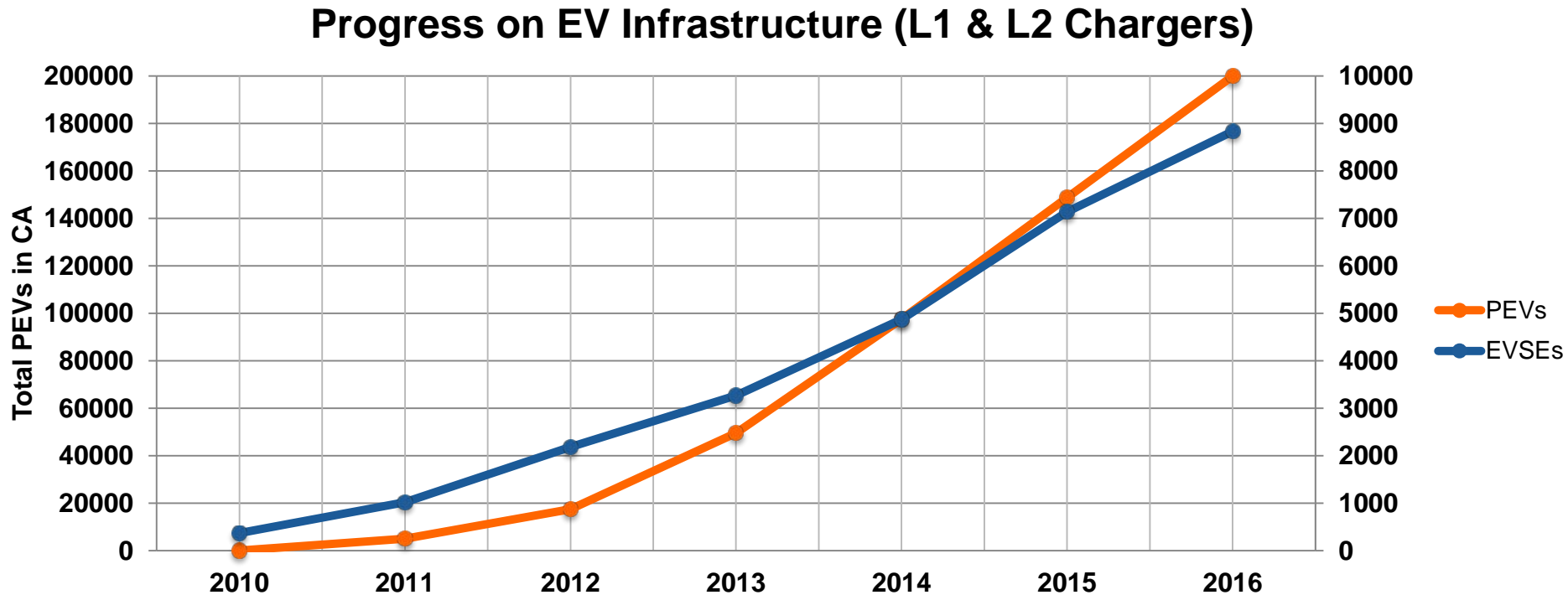
# Existing Level 2 Charging Stations



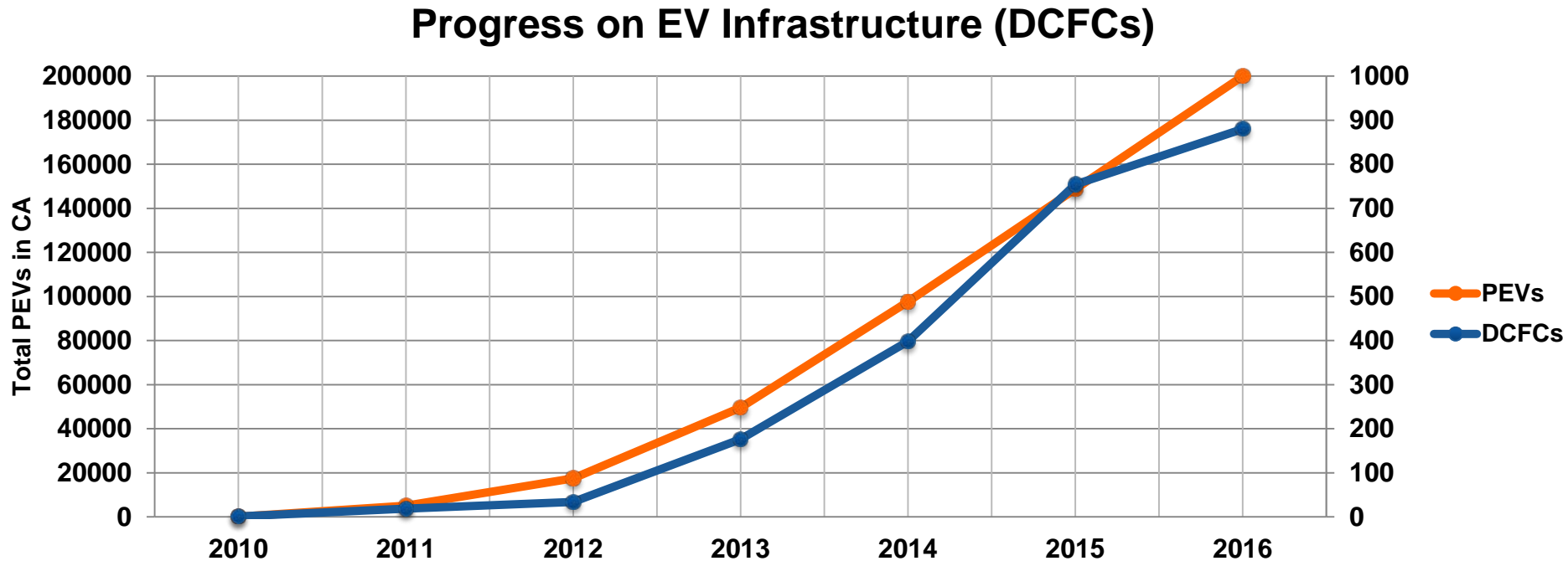
# Existing DC Fast Chargers



# Progress on EV Charging Infrastructure (L1 & L2)



# Progress on DC Fast Chargers



# 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



# Ratio of ZEVs to Charge Connectors Comparison

States/U.S.	Cumulative ZEVs 2011-2016	Ratio of ZEVs/Level 2	Ratio of ZEVs/DC Fast Charger
California	190,759	23	220
ZEV States	51,380	11	85
Other Select States*	99,672	14	111
U.S.	440,000	16	120
NREL Assessment for 2020	900,000 (PEVs)	4.7 to 8.8	580 to 1,633

Source: Association of Global Automakers  
and DOE Alternative Fuel Data Center

Other States: CO, TX, WA, FL, GA, WI, MI, IL, HI



# Ratio of Battery-Electric Vehicles to Public Level 2 and DC Fast Charger Connectors in Select CA Counties

CA County	BEVs/ Level 2 connector	BEVs/DC fast charger
Alameda	59	230
Fresno	112	112
Kern	48	191
Los Angeles	33	262
Monterey	7	43
Orange	38	301
Sacramento	16	122
San Diego	29	216
San Francisco	16	427
San Joaquin	23	230
Santa Clara	63	485

Source: CEC staff, Center for Sustainable Energy and  
DOE Alternative Fuel Data Center



# Energy Commission's Goals for Charging Infrastructure Deployment

- Encourage reliable, convenient and competitively priced charging infrastructure
- Rapidly deploy charging infrastructure (eg. vouchers) to target “fast followers” and locations with the potential for high utilization
- Choose strategic locations and sites that will spur EV adoption
- Encourage cost-effective installations while considering future needs, grid impacts and emerging technologies
- Invest in locations and sites that will spur private investments in additional charging infrastructure



# Statewide Strategic EV Charging Infrastructure Action Plan

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- Quantify need for EVSE for State/Regions to support 850,000 PEVs by 2020 and 1.5 million PEVs by 2025
- CEC/NREL model is in development and agreement for charger use data (2016)
- Model results will validate charging infrastructure deployment: how many, what type, what location types, and where to deploy
- Role of PEV Regional Infrastructure Plans (CEC/NREL web portal)
- Stakeholder coordination opportunities
- Leveraging funding sources and financing mechanisms



# Charging Infrastructure Deployment Involves Many Actors



## Workplace

- Commuter
- Campus manager
- Site owner
- Utility
- EVSE company
- Electrician



## Multi-Unit Dwelling

- Resident
- Site manager
- Property Owner
- Association
- Utility
- EVSE company
- Electrician

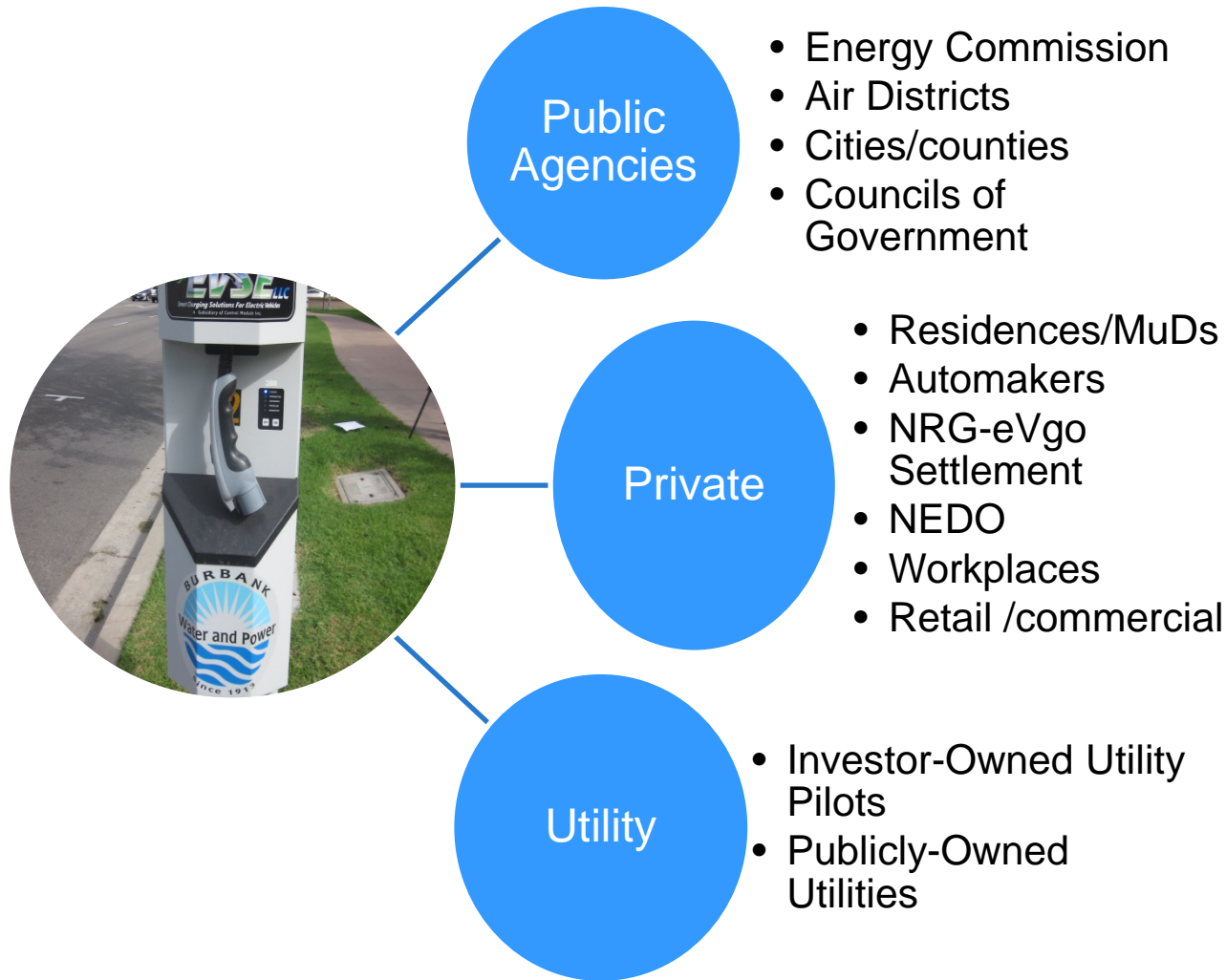


## Destination

- Driver
- Business owner or municipality
- Site manager
- Utility
- EVSE Company
- Electrician

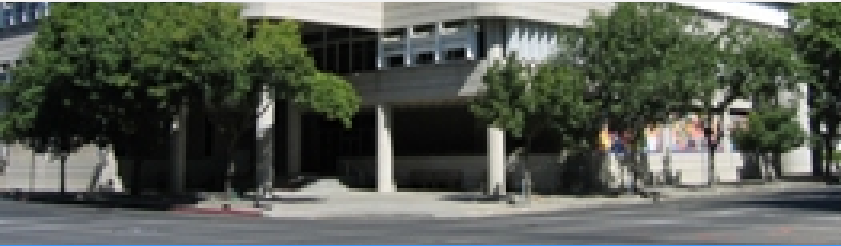


# Funding California's Charging Infrastructure



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- **ARFVTP Funding 2016-2017**

## Electric Vehicle Infrastructure and Readiness Planning



Join the Energy Commission  
list serve to receive notice of  
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**
-

# Questions for Stakeholders

- We are considering various strategies to deploy charging infrastructure in order to spur PEV adoption:
  - Vouchers or rebates
  - Block grant to administrator chosen via competitive process
  - Small targeted solicitations with simplified application form

What are your thoughts on these?

- What are the most effective financial incentives and funding mechanisms for various location types and actors?
  - Workplaces?
  - Multi-Unit Dwellings?
  - Fleets?
  - Destinations?
  - Disadvantaged Communities?



# 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>

