

DOCKETED

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

June 6, 2016

Leslie Barody

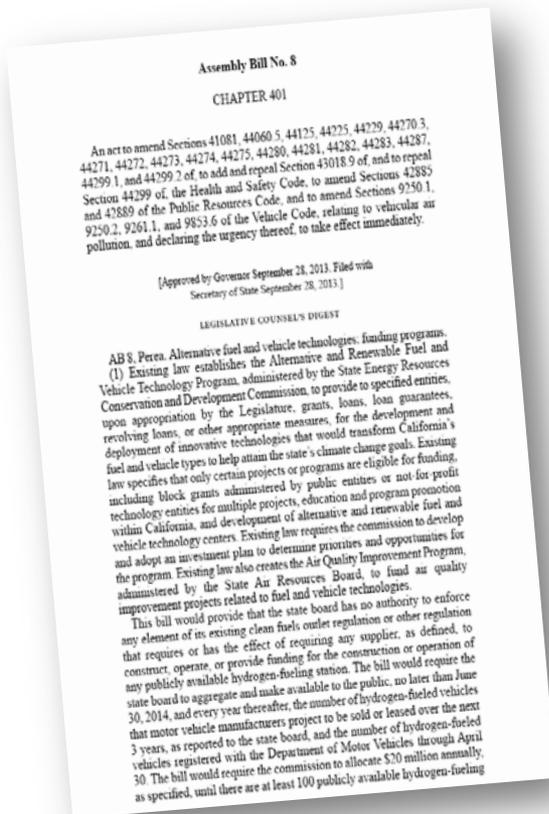
Zero-Emission Vehicle and Infrastructure Office

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))

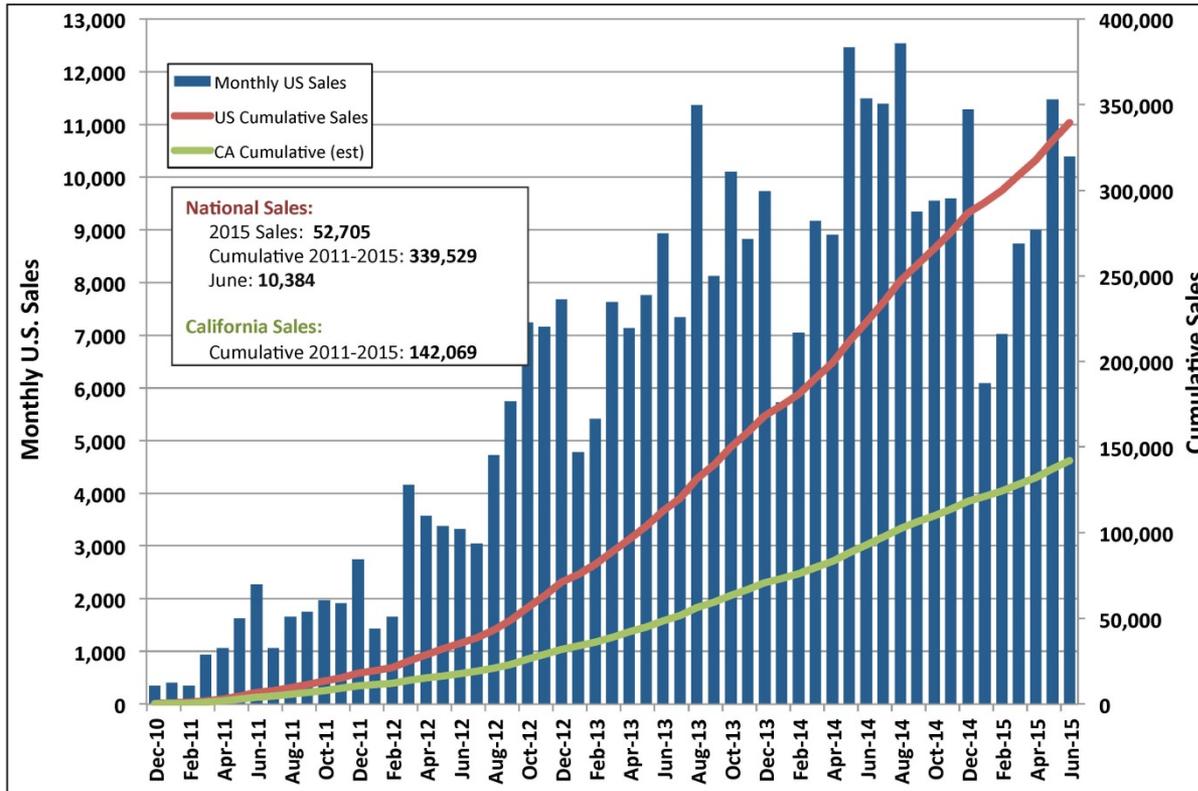


California's Key ZEV-Related Policies and Regulations

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

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



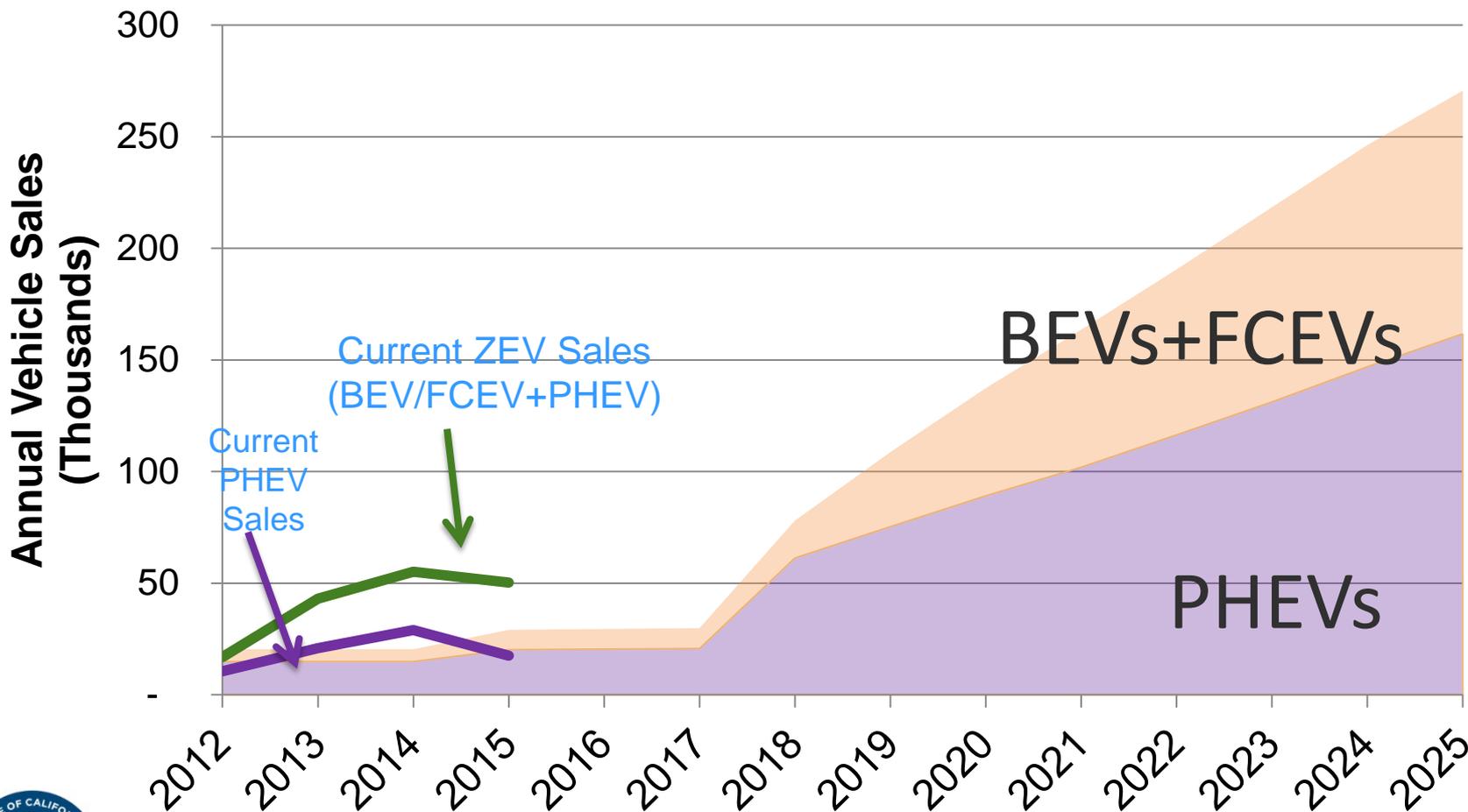
Ford 200 mile range EV

Details forthcoming

Source: HybridCars.com



ARB ZEV Regulation Likely Compliance Scenario and Current Sales in CA



Source: Air Resources Board



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
Total	3,937	345	3,192	248	425	136	243	8,526



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

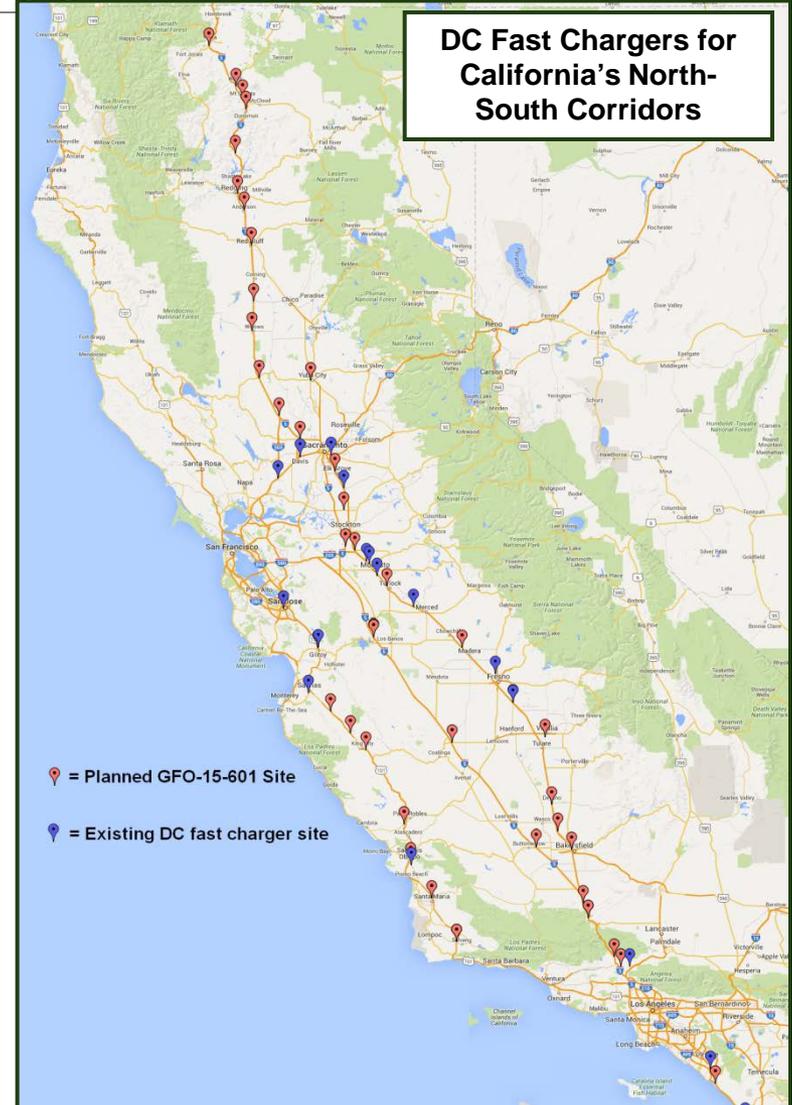
- Specific corridor segments to complete West Coast Electric Hwy
- Coordination with regional PEV plans and "uptime" requirements



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

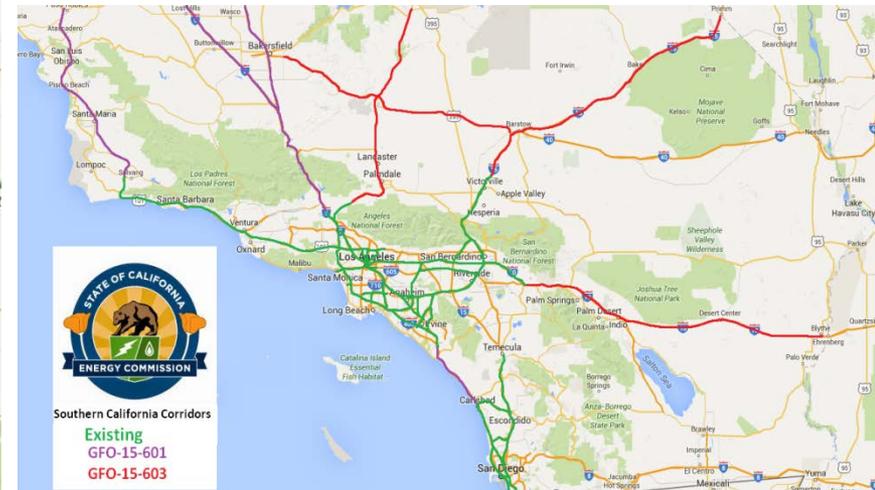
Source: Energy Commission Staff Analysis, PlugShare.com,
US Department of Energy Alternative Fuels Data Center



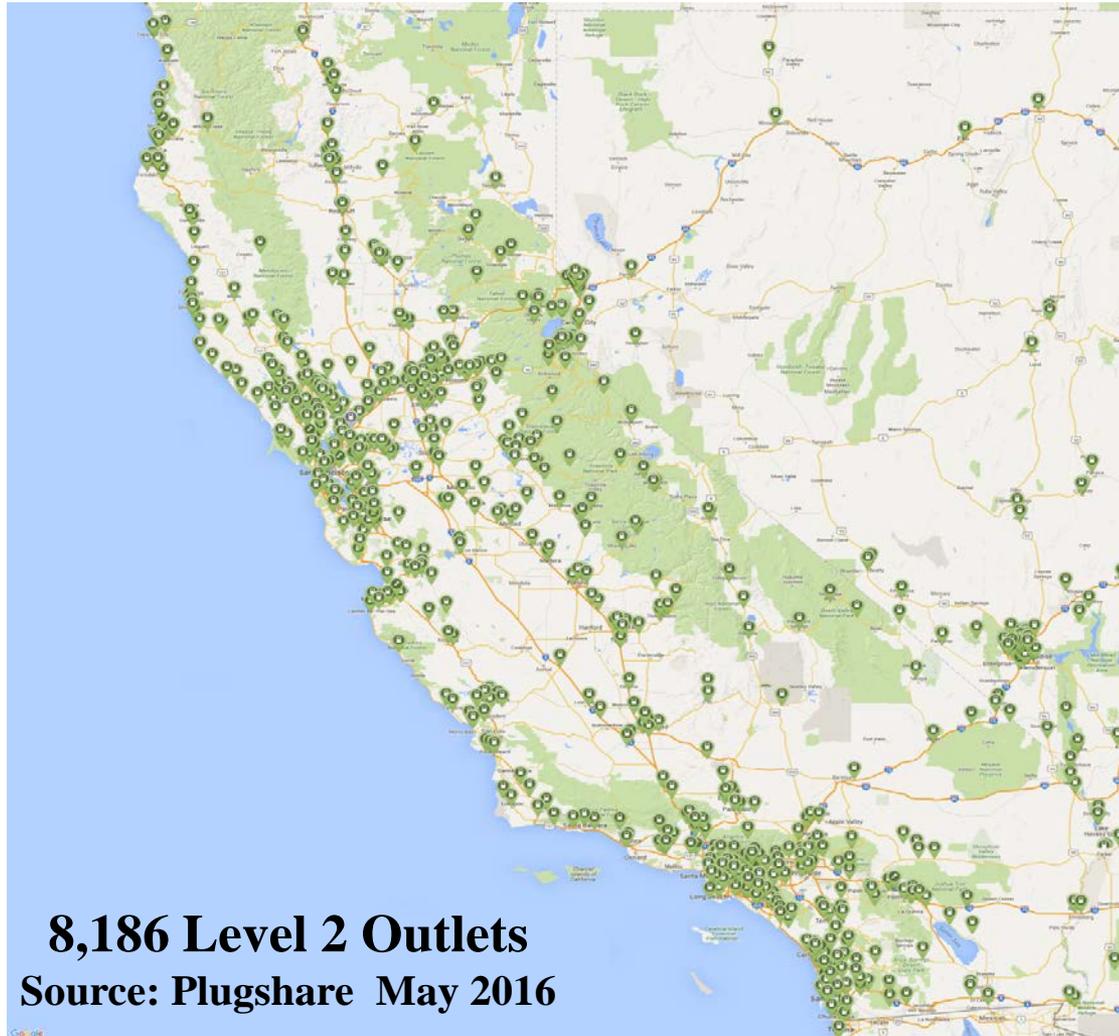
California DC Fast Charge Corridors: Grant Funding Opportunity 15-601 and 15-603



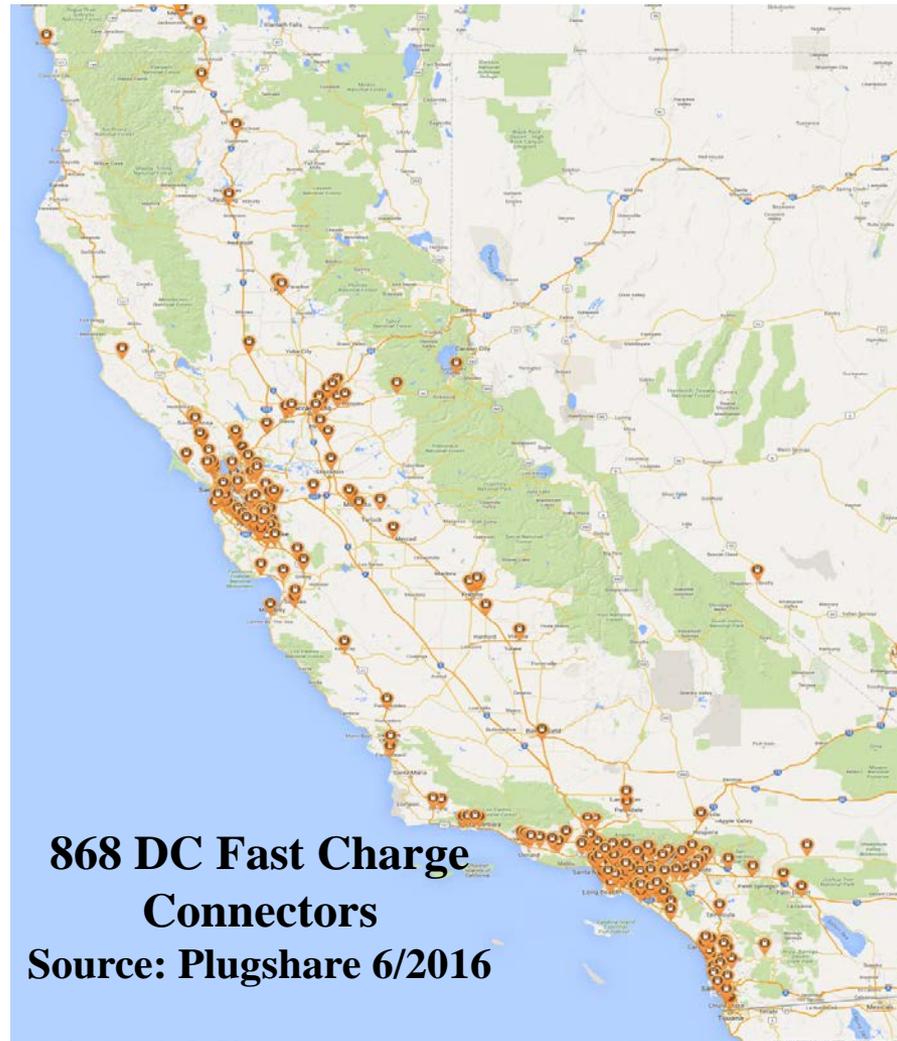
Southern California Corridors



Existing Level 2 Charging Stations

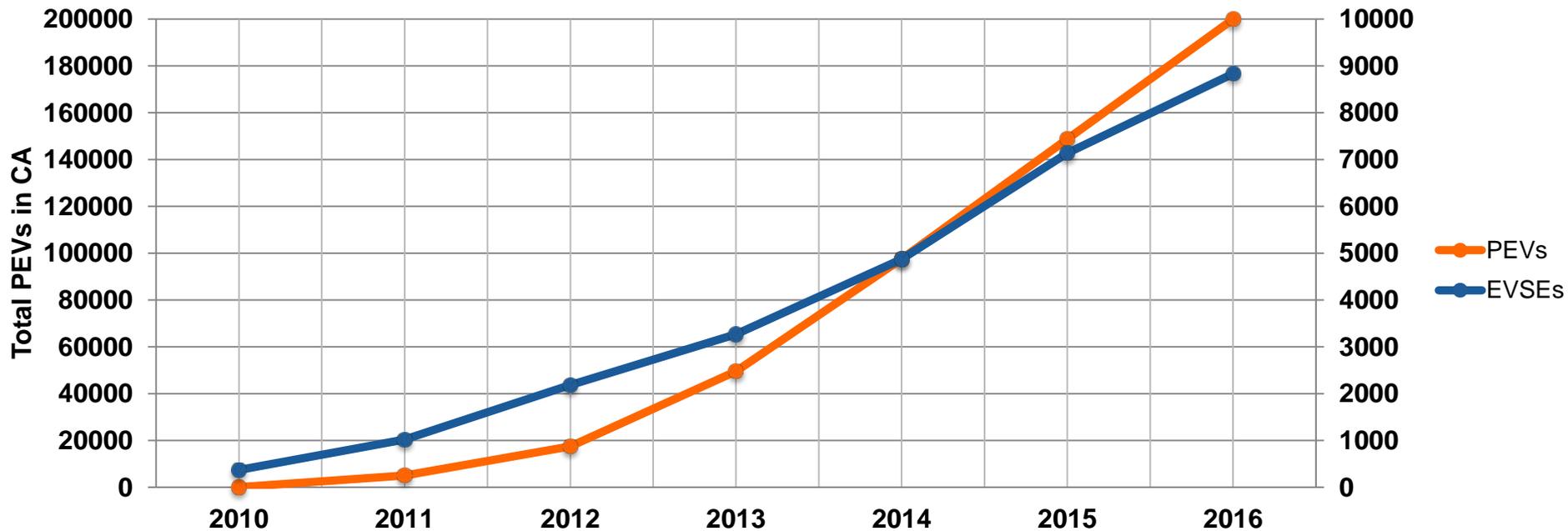


Existing DC Fast Chargers



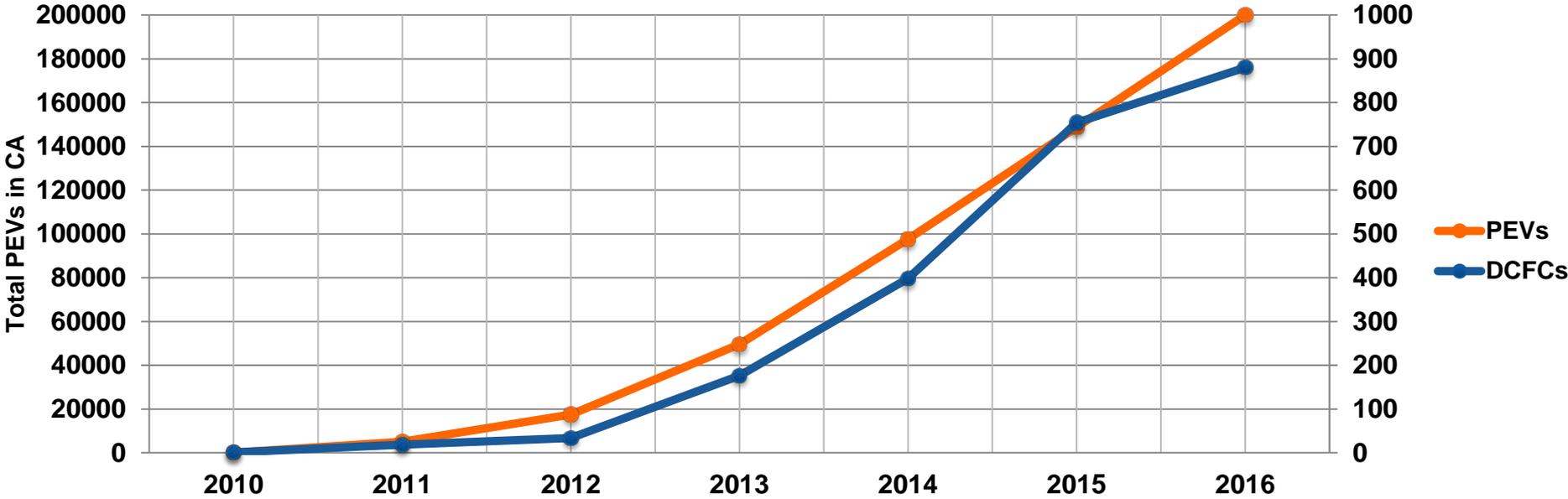
Progress on EV Charging Infrastructure (L1 & L2)

Progress on EV Infrastructure (L1 & L2 Chargers)



Progress on DC Fast Chargers

Progress on EV Infrastructure (DCFCs)



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
# of PEVs per ARFVTP-funded...		
... 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

- 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

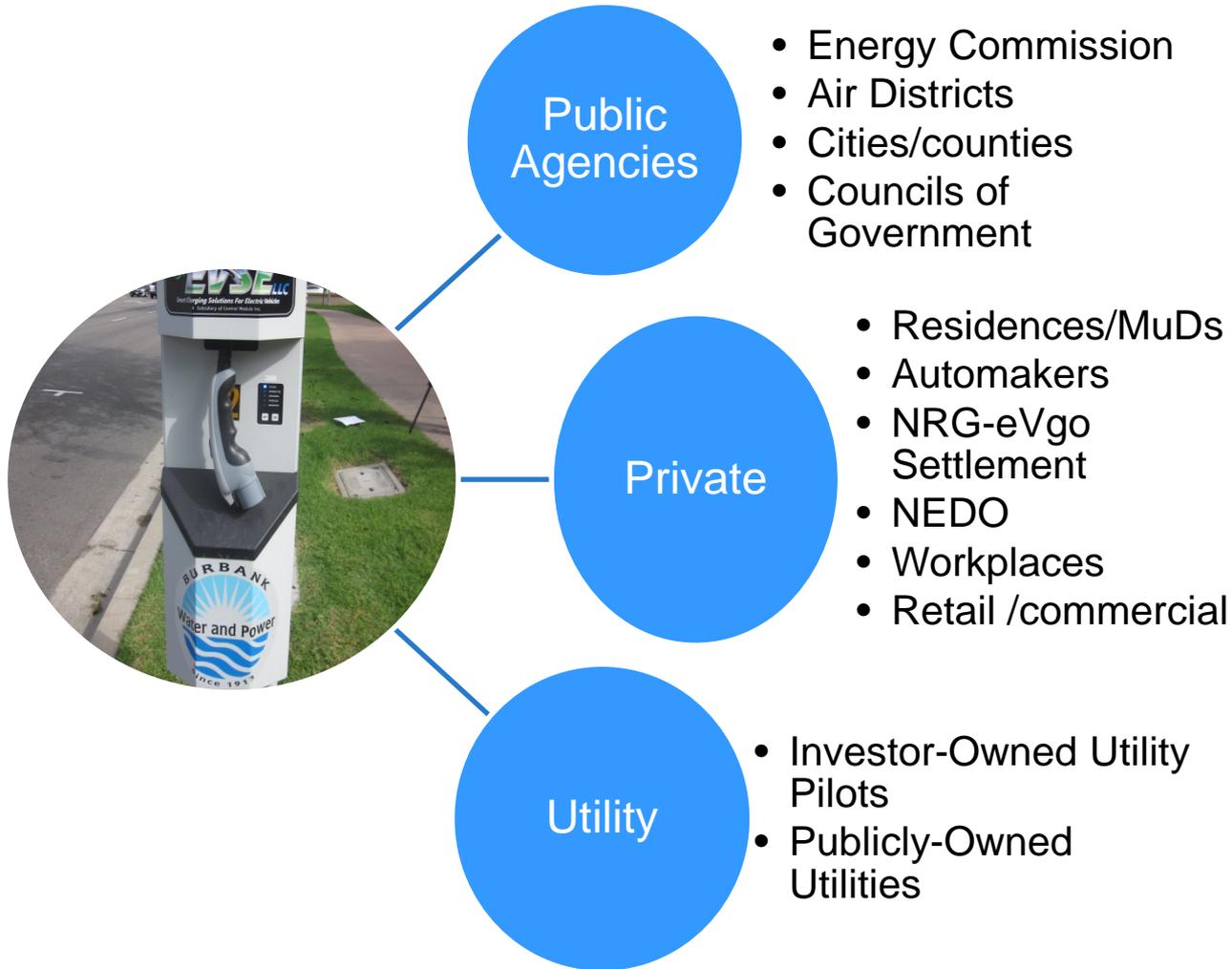


Destination

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



Funding California's Charging Infrastructure



- 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>

